



University of Sassari
Department of Economics and Business
Ph.D. in Economics, Management and Quantitative methods

Effectiveness of Healthcare Networks: An Empirical Study of Determinants and Their Effects on Outcomes

Tutor:

Prof. Lucia GIOVANELLI
Prof. Federico ROTONDO

Candidate:

Silvia Cassandra POLO

Academic year 2022/2023

SUMMARY

Introduction

CHAPTER I

Performance evaluation in focus: definitions, complexities, and a joint evaluation perspective

1.1 Understanding the concept of performance: definitions, characteristics, and dimensions.....	2
1.2 Healthcare performance: the complexities of defining and assessing health.....	9
1.3 Healthcare evaluation from a joint perspective.....	18

CHAPTER II

Effectiveness: definitions, measures, and implications for the healthcare sector

2.1 Understanding the concept of effectiveness.....	22
2.2 Effectiveness in healthcare: meaning and related concepts.....	29
2.3 Measures of effectiveness for public services.....	37
2.4 Measures of effectiveness in healthcare.....	42

CHAPTER III

Exploring the dynamics of network evolution, configurations, and functioning

3.1 Theoretical evolution toward collaboration.....	52
3.2 Understanding the concept of network: exploring diverse collaborative forms of working.....	58
3.3 Shaping network structures: influential factors and configurations.....	66
3.4 Navigating healthcare networks: evolution, principles, and configurations.....	71
3.4.1 Theoretical progressions toward healthcare collaboration.....	71
3.4.2 Defining networks within the healthcare context.....	74
3.4.3 Shaping networks in healthcare: principles and configurations.....	81

CHAPTER IV

Defining network effectiveness: concepts and dimensions

4.1 Effectiveness in networked collaborations: concepts and frameworks.....	87
4.2 Determinants of network effectiveness and their impact on outcomes.....	93
4.2.1 Structural determinants.....	97
4.2.2 Context determinants.....	108
4.2.3 Process determinants.....	114

CHAPTER V

Connecting the dots: Italy's healthcare network evolution and the stroke network case study

5.1 Transforming the Italian healthcare sector: normative shifts and impact.....	123
5.2 Performance evaluation in Italy.....	128
5.3 Reshaping Italian healthcare: The network approach.....	134
5.3.1 Collaborative healthcare: A Network-Based Model for Territorial Care.....	140
5.4 Italian Stroke Network: Insights from Data and Care Configuration.....	145
5.4.1 Assessing the Impact of Stroke on Public Health.....	145
5.4.2 Pre-hospital phase: Prevention.....	149
5.4.3 Hospital phase: Acute emergency.....	150
5.4.4 Rehabilitation.....	157
5.4.5 Performance evaluation	160
5.4.6 The impact of the Covid-19 pandemic on stroke.....	165

CHAPTER VI

Results and discussion

6.1 Introduction.....	168
6.2 Selection Dynamics: Exploring the Reasons and Criteria Guiding Determinant Choices in Stroke.....	171
6.3 Methodology.....	182
6.4 Results.....	187
6.4.1 Lazio.....	187
6.4.2 Liguria.....	197
6.4.3 Lombardy.....	206
6.4.4 Sardinia.....	215
6.4.5 Tuscany.....	225
6.4.6 Structural determinants.....	234
6.4.7 Context determinants.....	243
6.4.8 Process determinants.....	249
6.5 Key insights into outcome indicators.....	254
6.6 Discussion.....	257
6.7 Final remarks.....	267
References.....	273
Appendix.....	286

Introduction

Nowadays, public healthcare operates in a context of resource constraints, both in terms of human and financial resources, in the face of a complex and diverse demand for healthcare services. The factors driving this change in demand can be attributed to the aging of the population, the prevalence of chronic diseases, and comorbidities, which refer to the coexistence of multiple health conditions simultaneously. Healthcare organisations are thus tasked with providing effective and satisfactory responses in a complex environment that is increasingly challenging to address individually. Consequently, the healthcare context has undergone a notable transformation in recent years. This shift has moved away from a fragmented, hyper-specialised environment where organisations competed for resources and toward a collaborative mindset.

Collaboration has been expressed through the integration of multiple organisations working together to deliver a comprehensive patient-centred service. As a result, the clinical approach has shifted from a traditional model focused solely on individual providers to a patient-centric approach that prioritises the unique needs, preferences, and active involvement of each patient. The collaborative paradigm has broader implications, pushing the debate towards a reconsideration of the role of the hospital in the care process. The traditional hospital-centred perspective of healthcare has demonstrated its shortcomings in providing high-quality care, underscoring the need for a redefined role of local care. Consequently, there is a progressive rethinking of healthcare delivery, with the redistribution of roles between providers and care settings aimed at assigning acute care management to hospitals, while enhancing territorial responses both before and after the acute phase. Hence, the organisation of clinical care pathways has been redirected towards network-based management to optimise patient care experience across different settings and varying degrees of severity of the condition.

This research examines the topic from a managerial perspective, investigating the challenges that have arisen in evaluating the new collaborative intent of healthcare organisations, since the reorganisation of healthcare providers has made traditional evaluation systems centred on individual organisations inadequate. Existing evaluation frameworks primarily focus on the performance of single

organisations, neglecting a comprehensive assessment of the network's role. Thus, there is a need to establish a monitoring and evaluation system capable of assessing the performance of the entire network.

The analysis is further complicated by the public context, which relies on different principles compared to the private sector (such as funding through taxation and the absence of a clear pricing mechanism). This has expanded the concept of performance from one based solely on economic and financial equilibriums to a more comprehensive approach that investigates additional dimensions, including equity, efficiency, and appropriateness. Among these dimensions, effectiveness, which can be broadly defined as an organisation's ability to achieve its stated goals, remains underexplored due to its uncountable feature and the multifaceted nature of the concept.

This research aims to investigate whether a connection exists between specific network determinants and the effectiveness of care provision by advancing the understanding of what conditions may enhance a network's effectiveness. The context analysed is the Italian healthcare system, characterised by a high degree of heterogeneity due to the devolution principle, in which regions are responsible for organising healthcare services within their respective territories. The analysis focuses on stroke as a time-dependent disease, the organisation of which is regulated by national norms. Stroke is the third leading cause of death after cardiovascular diseases and neoplasms, the main cause of permanent disability, and the second cause of dementia. Furthermore, with the increasing aging of the population, it is expected that the burden of this disease will grow in the coming years.

To explore this context from a managerial perspective, the adopted methodology is the multiple-case study, which examines the determinants of the effectiveness of stroke networks and their impact on outcomes. The case studies involve five regions selected as top performers nationally in terms of outcomes and compliance with regulatory requirements related to networks.

The identified determinants of effectiveness have been grouped into three categories based on the literature: structure, context, and process. Each element has been assigned a unique code used for the analysis of regional documentation. For each region, strategic documents, network operational plans, and regulatory documentation supporting the regional stroke network have been analysed and

coded. To gain a deeper understanding, interviews have been conducted with coordinators of the regional stroke network, medical managers with coordination responsibilities, directors, and responsible individuals of the Stroke Units at both hub and spoke facilities. The analysis has allowed for the identification of relationships between determinants and outcomes, ultimately leading to the development of five research propositions for healthcare networks.

This research makes a theoretical contribution by providing a new interpretation of the concept and measurement of effectiveness in the context of healthcare networks, offering insights into stage-specific determinants and outcomes related to different types of effectiveness. It identifies a path for implementing different types of effectiveness based on the level of network development and formalisation. It puts forth a set of propositions to elucidate the evolution of the effectiveness concept during the network's formation, the path of network formalisation and potential deviations from it, as well as the role and intensity of trust. These findings could be supportive for policymakers and healthcare professionals seeking to structure a more effective provision of care by outlining clear steps for the development of time-dependent networks.

CHAPTER I

PERFORMANCE EVALUATION IN FOCUS: DEFINITIONS, COMPLEXITIES, AND A JOINT EVALUATION PERSPECTIVE

- 1.1 Understanding the concept of performance: definitions, characteristics, and dimensions
- 1.2 Healthcare performance: the complexities of defining and assessing health
- 1.3 Healthcare evaluation from a joint perspective

This first chapter introduces the research by presenting the concept of performance, elucidating its attributes within the public sector, and highlighting the various dimensions of analysis. The attention then shifts to the examination of public organisations and their inherent characteristics, which exert a significant influence on the performance evaluation process.

Subsequently, the chapter thoroughly explores the domain of healthcare performance, specifically addressing the core challenges associated with evaluating the concept of the *health good* and establishing the crucial dimensions for conducting evaluations.

It concludes by delving into the theoretical perspective that suggests current frameworks, which are primarily designed for individual organisations, might fall short when assessing the collaborative dynamics inherent in networked healthcare models.

1.1 Understanding the concept of performance: definitions, characteristics, and dimensions

Every initiative taken to measure and evaluate public services has its starting point in the understanding of what is meant by performance. Defined as a *social construct*, performance derives from an interactive process among individuals and institutions¹. A common pitfall when referring to performance is to focus solely on the results obtained by the organisation in terms of achieved objectives, while performance refers to a broader concept involving individuals' contribution to the realisation of the organisation's goals. Thereby the true interpretation of performance can be appreciated only when widening its meaning beyond the idea of performance evaluation as measurement and embracing its nature of adoption of a cluster of well-reasoned objectives set to guide people's behaviours toward the institutional mission of the organisation.

From the beginning of this work, it is worth highlighting the distinction between the concepts of performance measurement and evaluation. Measuring and evaluating are two interconnected yet distinct processes in assessing the performance of an individual, organisation or groups of organisations working together. Measurement involves quantifying specific metrics or indicators to gauge the extent of achievement or progress in a particular area. It provides a numerical representation of performance but may lack the depth needed for a comprehensive understanding. However, measuring performance proves essential for economically conscious governance of a company, enabling informed decision-making by the management.

On the other hand, evaluation as a subsequent step, goes beyond mere measurement. It involves a more holistic analysis, considering various factors such as context, goals, and expectations. Namely it seeks to interpret the significance of the measured data by assessing the overall impact and making judgments about the performance. On the relationship between measurement and evaluation it is worth noting the sequential nature of actions, starting from defining objectives, moving to planning activities, their actual implementation, measuring outcomes, and only thereafter proceeding to evaluation. Similarly, evaluation is frequently described as

¹ THOMAS, P.G, 2006. *Performance measurement, reporting and accountability*. Recent Trends and Future Directions, ANU Press.

a primary purpose for measuring performance, specifically the common rationale for measuring performance is to evaluate performance.

While measurement provides a numeric glimpse, evaluation adds a layer of interpretation and judgment to offer a more comprehensive and nuanced perspective on performance. Both processes are integral in performance management, providing a balanced view for informed decision-making and continuous improvement. Hence performance evaluation exceeds the mere monitoring activities and involves the development of an unbiased reasoning on the objectives and on the activities implemented to achieve them².

The significance of measurement and evaluation becomes apparent as they play a role in making well-informed decisions that encompass both economic and social responsibility. In the public context, these activities ensure that the behaviours of all those operating within the company are geared towards the ultimate result, namely, satisfying needs³.

Aligning individuals' behaviour with strategic goals necessitates the development of a performance assessment system, which involves the selection of relevant performance dimensions to monitor and appropriate indicators for results analysis. Performance assessment moves from the prior and fundamental step of understanding the organisation's mission. In the public context, a hierarchically prevailing power ensures that the goals setting occurs accordingly to public interests and safeguards the adoption of measures to adequately satisfy them. Nevertheless, goal setting is a political process through which the institutional mission is inevitably melded with political interests. Frequently, goals are set by politicians to maintain consensus rather than to truly impacting on communities' wellbeing.

Given the complexity of the interests at stake, the purpose for performance evaluation shifts accordingly with the stakeholders' point of view⁴.

In the academic literature, the rationale for measuring performance is considered twofold. Although great emphasis is given to performance assessment as a strategic tool for managers, when the service provided is public, the external dimension gains considerable importance. From an internal perspective, performance measurement responds to a broad number of purposes: to improve

² GIOVANELLI L. (a cura di), 2013. *La valutazione delle performance in ambito sanitario profili teorici ed evidenze empiriche*, Torino, Giappichelli.

³ MUSSARI, R., 2022. Performance e valore pubblico. Cedam.

⁴ BEHN, R.D., 2003. *Why Measure performance? Different purposes require different measures*, Public Administration Review 63(5), pp.586-606.63, <https://doi.org/10.1111/1540-6210.00322>.

policy decision making, to set performance targets and allocate resources, to formulate budgets and to intervene in individuals' behaviours with the goal of enhancing the overall performance. By contrast, external accountability concerns stakeholders' expectations and information needs. Providing reliable information to stakeholders helps understand the impact of the policies on the community, monitor the satisfaction regarding public services, and enhance public accountability in order that managers and politicians can take their own responsibility in the goals achievement process. However, the multi-facet view of stakeholders on organisation's goals entails the use of different criteria to judge public services. Due to the absence of a standard set of criteria universally recognised by diverse stakeholders, performance evaluation is considered *contestable*⁵. Nevertheless, some elements of public performance concern tangible elements likely valued by stakeholders. Despite this common ground, the lack of shared goals leads toward different approaches in performance assessment aimed at dealing with multiple stakeholders' requirements.

Until now, we have discussed the primary attributes of performance within the public context. Nevertheless, it is appropriate to shift our focus towards the entity responsible for this performance and contemplate the subject of evaluation. The current analysis adopts a managerial perspective. In the field of management literature, the central subject of examination is typically organisations, which are described as social entities arising from human activities and shaped by the dynamic environments in which they function. Therefore, an initial step is to comprehensively determine whether a construct can be classified as a *firm*. Firms are defined by several characteristics, among which their capability of enduring over time represents the cornerstone. To be considered a firm, a construct must benefit from some characteristics observed from two main perspectives: objective and subjective⁶. Objective requirements deal mainly with time concerns. Firms are meant to endure over time and, in order to develop their production functions, they necessitate time to work toward value generation. At the same time, the systemic approach is fundamental when defining firms. To be implemented, the diverse operations require true understanding of the interrelationships among firm's

⁵ BOYNE, G. A., 2004. *Explaining Public Service Performance: Does Management Matter?* Public Policy and Administration, 19(4), 100-117. <https://doi.org/10.1177/095207670401900406>

⁶ FERRARIS FRANCESCHI, R., CALAVIERI E. (a cura di), 2005. *Economia aziendale, vol. I*, Turin, Giappichelli; GIOVANELLI, L., 2011. *Elementi di economia aziendale*. Torino, Giappichelli Editore.

components as well as a comprehensive overview. Operations must then be studied according with space-time considerations as some may be characterised by a sequential order and activities undertaken in different offices can be mutually interconnected. Lastly, firms operate in a dynamic environment, thus management should benefit from external opportunities while monitoring the internal activities. From a subjective perspective, management has to ground decisions on the systemic nature of the firm, namely being aware of the different component at various levels and their relationships. Management is also required to have decision-making autonomy in leading the organisation toward its ongoing economic equilibrium. Eventually, firms are meant to endure over time, creating value and guaranteeing the renewal of resources.

The longevity of the organisation's ability in maintaining its economic equilibrium is then final goal and key decision criteria for managers. Analysis of organisations' ability to endure over time while generating value provides the basis for assessing how well the organisation is doing in achieving predetermined objectives. For value generation and, consequently, organisation's outliving, it is necessary to produce value higher than the value invested in the production itself. The first condition for longevity relies on the organisation's ability to compensate factors involved in the production process through income. Second equilibrium to be monitored concerns the right balance between revenues and expenses. Monetary equilibrium relies on an organisation's ability to cope with payment commitments. In other words, management is held to pursue the right synchrony between in-going and out-going flows of monetary resources. Lastly, it is beneficial to balance sources of financing and corresponding intended use, that is managers are expected to regularly tackle financial needs resulting from resources employment.

However, challenges emerge when dealing with the public sector⁷, where services are primarily funded through taxation. The primary issue is the absence of a definitive price mechanism capable of indicating the value generated. The lack of

⁷ Public firms are identified by the public nature of the *soggetto economico*, namely the one entity holding the freedom to decide the strategic and operative goals as well as the means to achieve them. Bertini offered a classification of public firms based on ownership. Public firms *stricto sensu* are those where the risk capital is only present in the form of endowment fund, conferring a managerial trait to the governance and consequently making it susceptible to political intrusiveness. A clear example of public firms in healthcare is the Italian Local Health Authorities. On the contrary, public holding firms benefit from legal autonomy and the risk capital infusion by means of the *soggetto economico*. Governance encompasses both public and private entities. BERTINI, U., 1995. *Scritti di politica aziendale*. Torino, Giappichelli.

real market transactions effectively renders revenues an external variable, which leads to the implementation of quasi-market mechanisms. The funds allocated by the central government represent revenues determined by the amount and complexity of services provided to patients. Consequently, management is missing true financial autonomy, meaning the ability to self-finance through revenues stemming from the divestiture of services against the payment of an adequate price. Hence, when analysing public organisations, the meaning of performance must enlarge embedding other dimensions different from the previous mentioned equilibriums. These dimensions vary in the literature according to different scholars, but efficiency, effectiveness and equity are the most recurring ones.

The first dimension is *efficiency* which concerns the output obtained in relation to consumption of input. An organisation is more efficient when is able to reduce the inputs (costs or resource consumption) while producing the same level of output (and leaving quality levels unchanged), it implies maximising the outputs achieved per unit of input invested. Efficiency deals with organisation's ability in managing outputs to produce given outputs (or outcomes). Based on the interpretation given to the dimensions involved in the ratio, efficiency may be technical or economic. The former employs tangible inputs (e.g., unit production cost as working hours over the number of medical treatments provided), the latter refers to composite inputs concerning economic dimensions giving the possibility to form composite input measures able to mix together different type of resources otherwise incomparable (e.g., working hours*hourly cost over the number of medical treatments provided)⁸. Efficiency is a comparative construct. An organisation cannot be efficient per se, it needs a benchmark built on previous performances, other organisations' performance or preestablished efficiency objectives. Concerning the public context, efficiency is seen as the ability to rationally combine resources to achieve institutional goals. In broad terms, efficiency here highlights an organisation's effort to satisfy the same level of demand while guaranteeing the

⁸ In order to better clarify the complexity of the relationship between the two terms, Marinò provides a helpful example. The patient-time ratio is commonly used as a measure of efficiency. It represents the amount of time a physician spends with each patient during check-ups where the care time represents the productive resource (input) and the number of medical appointments provided represents a productivity parameter (output). As the indicator decreases, productivity enhances, in different terms, the less the time spent by a physician with a patient, the more patients he/she can assist. Nonetheless, if consequently to this reduction in time, the quality of service deteriorates, the effectiveness would be negatively affected even though efficiency may increase. MARINÒ, L., 2008. *La ricerca dell'economicità nelle aziende sanitarie locali: concetti, modelli, decisioni*. Torino, Giappichelli.

rational use of resources. Nevertheless, public agencies have to face some peculiarities. What changes is that inputs are public funding in the form of fixed resource allocation. Being inputs prearranged, management can only act over outputs. Consequently, in the public sector, the core concept of efficiency is no more linked with the minimisation of inputs keeping outputs equal, but with the maximisation of the outputs being inputs fixed.

The second dimension of performance is *equity*. Interpreted as fairness of service provision, it represents one of the cornerstones of public services. Equity is grounded on the notions of genre, citizenship, and socio-economic conditions. The concept of equity arises in two different understanding. Horizontal equity intended as equal treatment reserved to citizens having similar needs, considering individual's peculiarities owed to genre, age, and socio-economic conditions. By contrast, vertical equity refers to the provision of diverse services in accordance with individual's characteristics reflected in different needs.

Eventually, *effectiveness* is one of the most discussed dimensions of performance. It is defined accordingly with the organisation's outcomes, stating the impact - positive or negative - of the actions implemented by the organisation. It includes measures of adherence to planned objectives, perceived quality of the service and customer satisfaction. The ambiguity concerning this concept arises due to the varying meanings it can encompass. It is possible to analyse effectiveness from two different perspectives. In general terms, effectiveness indicates the extent to which the organisation achieves planned objectives. In this inward definition, effectiveness seeks to capture the contribution of implemented actions in pursuing the planned goals. At the same time, effectiveness may refer to the outcomes of the service, highlighting the external validity of the measure. External effectiveness represents the organisation's ability to satisfy people's needs and expectations. Satisfaction can be assessed based on qualitative standards conforming to the concept of appropriateness or it can be assessed in quantitative terms through measurable units.

We can already observe the complexity surrounding the concept of effectiveness. When applied to public contexts, the convergence of interests and objectives adds another layer of ambiguity. Given its relevance across various domains of activity, effectiveness encompasses a range of interpretations, necessitating a deeper exploration to establish a comprehensive definition of the

concept. The study will primarily centre on the concept of effectiveness, which, despite its complex definition, carries significant weight in the public sphere. The decision has been made to narrow the analysis down to the public sector, with a particular focus on the healthcare industry where effectiveness holds paramount importance. Subsequent sections will shed light on the challenging environment within which healthcare organisations must strive for effectiveness, with the ultimate objective of providing efficient pathways for patients to address their health needs or enhance their initial health status.

1.2 Healthcare performance: the complexities of defining and assessing health

Around the world, the challenges faced by health systems are receiving growing attention as costs of care continue to rise in response to the persistent growth in health expenditure, coupled with increasing environmental complexity and challenging societal trends. For public policymakers, one of the most difficult issues to detangle is addressing the multiple goals concerning healthcare while working toward an equilibrium between resource shortage and increasing healthcare needs.

The lack of resources, both financial and human, is felt as a major concern across Europe despite the demand for care leading the number of resources channelled to health to an almost continual rise. In 2020, the European Union devoted 10.9% of the GDP to healthcare⁹, while Italy's health expenditure as a share of GDP accounted for 9.6% of all spending, lower than other countries¹⁰. By looking at these data, the weight of public spending on health compared to expenditure on other goods signals the considerable relevance that healthcare services are acquiring compared to the overall economic system. At the same time, in the Italian context, human resources have long been downsized due to financial impediments and resource shortage, declining from 2001 to 2020 (-3.4%). Despite a first prevailing trend, in which healthcare workers remained relatively constant between 2001 (688,378) and 2010 (688,847), the notorious human resource shortage affecting the Italian healthcare system arose in this last year. Starting in 2010 there has been a sharp decline in healthcare workforce until 2019 (-5.7%) due to the global financial crisis resulting in maximum caps of employees set by the central government and turnovers ban. Despite this brittle growth, the number of national physicians and nurses per 1.000 population (respectively, 4:1.000 and 6.3:1.000) places Italy slightly above the OECD (Organisation for Economic

⁹ OECD/EUROPEAN UNION, 2022. *Health at a Glance: Europe 2022: State of Health in the EU Cycle*, OECD Publishing, Paris, <https://doi.org/10.1787/507433b0-en>.

¹⁰ This positive trend appears to be affected by the COVID-19 pandemic which forced healthcare as a government priority, leading toward higher expenditure and lower GDPs triggered by the exceptional economy slowdown. On the impact of Covid-19 on healthcare expenditure see ARMENI, P., BORSOI, L., NOTARNICOLA, E., ROTA, S., 2022. *La spesa sanitaria: composizione ed evoluzione nella prospettiva nazionale, regionale ed aziendale*, in Rapporto OASI 2022, Milano, Egea, p. 95 ff.

Cooperation and Development) average¹¹. Human resources faced a slight upward trend in 2020 (+2.3%, approximately 15.000 new occupations compared to 2019) mostly attributable to the hiring policies implemented to face Covid-19 exceptional workload. The Covid-19 pandemic made clear the crucial role of adaptability in guaranteeing both the accessibility and quality of services.

Facing these challenges urgently requires a comprehensive policy approach able to deploy new resources and to reorient the overall healthcare delivery chain. In this scenario, healthcare systems are required to be flexible enough to adapt effectively to changing environments while enhancing the coordination of patients across multiple care settings. The ability of healthcare systems to provide tangible answers to emerging healthcare needs is mainly affected by two transitions: demographical and social.

Rapid population ageing challenges the healthcare systems in almost every country. In 2021, Italy's *old age index* (the ratio of population over the age of 65 to population under the age of 15) was 182.6%. However, the population composition highlights how in a 10-year span, the elderly population (defined as people aged 65 and over) in OECD countries will outnumber the younger population (defined as those people aged less than 15). The youth population declined from 14.0% on January 1st, 2011, to 12.9% in January 2021 and, during the same period, the elderly population increased from 20.3% to 23.5%¹². Population ageing is critical important as it relates with more complex health needs mostly concerning mobility problems, sensory disorders, and cognitive impairment. In fact, increased longevity does not imply an extended good health years rather it has been showed that the additional years of life come with a deterioration of health conditions, implying the rise of the demand for primary healthcare and long-term care. Elderly people often endure age-related diseases and, despite being some more manageable (e.g., hearing loss, decreased visual acuity such as cataracts and presbyopia), others may result in

¹¹ GUGIATTI, A., MANFREDI, S., MEDA F., 2022. *La struttura e le attività del SSN*, in Rapporto OASI 2022, Milano, Egea.

¹² Data on the health status of the Italian population are regularly provided by the *Direzione generale della digitalizzazione, del sistema informativo sanitario e della statistica* in the Report on the Health Status Report (*Relazione sullo Stato Sanitario del Paese*), in the order to inform the Italian Parliament and the citizens about overall health status and health policies implementation. Data here discussed refer to the latest edition of the report. MINISTERO DELLA SALUTE, 2022. *Relazione sullo Stato Sanitario del Paese 2017 – 2021*. Available at https://www.salute.gov.it/imgs/C_17_pubblicazioni_3270_allegato.pdf (accessed October 2023).

chronic conditions¹³ requiring both long term care and attention from multiple providers. In addition to the extended period of time required to heal, frequently multiple health problems can coexist, requiring diverse collaborative approaches across clinical disciplines. In Italy, about half of the elderly people reported at least one severe chronic disease¹⁴ and despite being the trend slightly dropping since 2013 (accounting for the 54%) in 2021, 47.8% of people aged 75 years and over present comorbidity conditions (more than three chronic diseases)¹⁵. Managing chronic, long-term conditions calls for longer monitoring which, from a hospital perspective, often results in higher acute hospital bed utilisation, unnecessarily long stays due to delayed discharges and frequent hospital readmission. At the same time, informal carers are given the responsibility of navigating and coordinating the information within a fragmented healthcare system, increasing societal costs for elderly people' health. Reasons behind these inefficiencies are mostly linked to the lack of appropriate follow-up care or professional support at home. Consequently, the demand for long-term caregiving (LTC) is on the rise. Despite being population ageing a largely predictable trend, over the coming decades significant LTC workforce shortage is expected in most OECD countries as to the increasing demand for LTC corresponds a stagnation or decline in LTC workforce supply¹⁶.

From a social point of view, upward pressure on health systems arises from the burden of unmet care needs due to costs. The *Rapporto sul benessere equo e sostenibile* (BES, Equitable and Sustainable Well-Being Report) on the quality of the Italian healthcare delivery envisages a deterioration in the accessibility of the service¹⁷. In 2021, 11% of people in need of health treatments or diagnostic procedures reported foregoing consultations due to costs or difficulties linked with accessibility procedures. The percentage of people delaying medical tests and treatments due to economic distress increased in 2021 (+1.5%, accounting for

¹³ According to the Equitable and Sustainable Well-Being Report 2021, half of the elderly people aged 75 and over are affected by hypertension, and osteoarticular diseases (arthrosis and arthritis). Other major chronic diseases are osteoporosis (30.5%), diabetes (20.8%) and nervous system disorders (15.9%), the latter encompassing Alzheimer and dementia (8.3%) as well as parkinsonism (2.9%). ISTAT, 2022. *BES 2021: Il benessere equo e sostenibile in Italia*, 2022. Available at https://www.istat.it/it/files//2022/04/BES_2021.pdf (accessed October 2023).

¹⁴ ISTAT, 2017. *Elderly: health conditions in Italy and in the European Union*, 2017.

¹⁵ ISTAT, 2022. *BES 2021: Il benessere equo e sostenibile in Italia*, op.cit.

¹⁶ OECD, 2020. *Who Cares? Attracting and Retaining Care Workers for the Elderly*, OECD Health Policy Studies, OECD Publishing, Paris. Available at <https://doi.org/10.1787/92c0ef68-en> (accessed October 2023).

¹⁷ ISTAT, 2022. *BES 2021: Il benessere equo e sostenibile in Italia*, op.cit.

765.000 people) corroborating the upward trend already detected in 2020 (+3.3% compared to 2019).

To manage these compelling problems, many countries have sought to manage healthcare performance through the implementation of performance assessment systems. Performance assessment frameworks are being implemented to promote quality improvement and accountability, both internal and external. The relationship between improvements in population health and well-performing health systems has long been acknowledged by the World Health Organisation (WHO)¹⁸, conveying the importance attributed to performance monitoring. Consequently, the growing push to improve quality of the service and the containment of costs has driven the need for new frameworks for analysing organisations' outputs and outcomes.

In the healthcare sector, performance has been defined as the extent to which the healthcare system achieves a set of objectives¹⁹. However, evaluating the performance of public health services presents significant challenges for managers. These assessment difficulties primarily stem from the unique characteristics of healthcare demand. In particular, scholars concur on the distinct features that set healthcare demand apart from other public services.

When it comes to healthcare evaluation, the initial aspect complicating management's decisions is the central role governments play in delivering care services. Academic contributions often associate the definition of health with the economic concept of *merit good*²⁰. Healthcare is deemed to be so meritorious to require government's intervention in guaranteeing effective provision and accessibility to the service. The provision of such services falls within the government sphere and their satisfaction is provided through the public budget. In the same way, health is considered a fundamental human right requiring government's protection²¹. Government interventions in guaranteeing healthcare

¹⁸ WHO, 2016. *Strengthening people-centred health systems in the WHO European Region: framework for on integrated health services delivery*.

¹⁹ HURST, J., JEE-HUGHES, M., 2001. *Performance measurement and performance management in OECD Health Systems*. Labour Market and Social Policy Occasional Papers, No. 47, OECD Publishing, Paris, <https://doi.org/10.1787/788224073713>.

²⁰ A unifying definition of merit good is provided by Musgrave who defines them as: "(wants) considered so meritorious that their satisfaction is provided through the public budget, over and above what is provided for through the market and paid for by private buyers". MUSGRAVE R.A., 1959. *The theory of public finance: a study in public economy*, New York, McGraw-Hill.

²¹ In Italy, health is recognised a fundamental right guaranteed by the Constitution. As stated in Article 32 "The Republic safeguards health as a fundamental right of the individual and as a collective interest and guarantees free medical care to the indigent".

provision have a major influence on managerial strategic and operational leverages, hindering their activities toward goals pursuit.

The assessment of healthcare performances is further inextricably linked with the intangibility of the output. Even though medical treatments may have tangible outputs, health status is hard to concretise. Usually, we refer to health as a well-being status influenced by the physical and non-physical characteristics of the patient²². Consequently, from a managerial point of view, two main concerns stem from the intangibility of the health status.

First consequence worth noting concerns the *appropriateness* domain. Considered as a narrow variation of the concept of quality, appropriateness deals with the difficulty in assessing whether the received medical treatment is opportune, convenient, and clinically benefitting for the patient. The adherence of the provided service to the health need expressed by the patient raises concerns about asymmetric information. Defined by the literature as the *principal-agent problem*, this matter regards the agent-based nature of the healthcare service. Asymmetry arises when the physician takes actions on behalf of the patient, assuming the former having more knowledge of the service being provided and the latter being ill-equipped for self-managing the health provision. Moreover, if in private markets the price is used to measure the value produced by the organisation, in healthcare, being it free at the point of demand, service users are held unaccountable for their consumption, strengthening the risk for demand distortion and inappropriate use of healthcare facilities²³.

A further consequence of the intangibility of care is the inherent difficulty in assessing outputs and outcomes deriving from the cycle of care. One reason involves personalised medicine, meant as the customisation of the service according to individuals' needs²⁴. Managers have to contrive practices to standardise the

²² Of the multiple definitions of health proposed in the literature, the long-established meaning proposed by WHO is "health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition [...]". WHO, 1946. *Constitution of the World Health Organisation*, New York, July 22, 1946.

²³ MARINÒ, L., 2008. *La ricerca dell'economicità nelle aziende sanitarie locali: concetti, modelli, decisioni*. Op. cit.

²⁴ Customisation involves different aspects of the healthcare service. From a technical and operative point of view, physicians have to adapt the provided medical treatment to patient's characteristics and to the case-specific clinical manifestations of the disease. Concerning the quality of the service, medical actions must be evaluated not only with respect to the medical outcome (the mere overcoming of the disease) but also taking into consideration the psychological aspects of the treatment. Eventually, customization of the health service concerns ethical matters since providing

assessment of similar outputs deriving from custom-made clinical paths. At the same time, intangibility leads to technical difficulties in measuring the performance. Thus, managers need to resort to proxies, indirect measures of the output²⁵.

These peculiarities constitute a major concern of public health performance, often leading to dysfunctions in the health service evaluation. The aim of the evaluation is twofold: inward, meant to support to the decision-making process by providing managers with reliable data, and outwards to enhance accountability toward external stakeholders. Although the introduction of performance assessment is linked with enhanced awareness of organisational processes, accountability and better quality, the use of performance measures can lead to some dysfunctions²⁶. A first controversial issue concerning healthcare assessment is to select the appropriate performance measures. Healthcare systems are complex entities. Being built on diverse net relationships among constituencies, they deal with the integration of diverse activities and responsibilities across the delivery cycle. Deriving from this complexity, a large volume of data from hospitals and health authorities is at management' and researchers' disposal. The availability of data represents a compelling risk as having too much information may result confusing. Based on its inherent characteristics, the healthcare sector suffers from the lack of shared selection criteria for performance measures. Despite the existence of well-established frameworks for measuring and comparing the performance of health services, the lack of a standard methodological approach commonly accepted by the literature leads to a plethora of different measures for assessing organisations' performance. Involving different stakeholders, each stating personal requests and expectations, performance assessment suffers the burden of selecting the appropriate performance measurement to satisfy the diverse requirements.

treatments cannot ignore patients' opinions and worries. BORGONOV E.,1990. *Il controllo economico delle aziende sanitarie*, Milano, Egea.

²⁵ Health studies normally employ proxy measures such as unplanned readmissions for measuring effectiveness or appropriate prescribing for antibiotics as allocative efficiency measure since it indicates an inappropriate use of resources.

²⁶ For further detail refer to: SMITH, P.C., 1993. *Outcome-related Performance Indicators and Organisational Control in the Public Sector*. British journal of Management, 4(3), pp.135-151; ARYANKHESAL A., SHELDON T.A., MANNION R., MAHDIPOUR S., 2015. *The dysfunctional consequences of a performance measurement system: the case of the Iranian national hospital grading programme*. Journal of Health Services Research & Policy. 20(3):138-145; MANNION, R., GODDARD, M., SMITH, P., 2019. *On the Limitations and Pitfalls of Performance Measurement Systems*, in Quality in Health Care, pp. 158-169. Routledge.

Furthermore, the complexity resulting from the diverse array of stakeholders adds complexity to the process of establishing corporate goals. In the first instance, the effectiveness of performance management systems in driving organisations to better results is impacted by goal ambiguity²⁷. Health goals are set through a political process, resulting in a multitude of interests, often contradictory. Healthcare organisations pursue institutional goals, which can lead toward the prevalence of social criteria in decision making. In choosing the most appropriate performance measures, it is useful to consider stakeholders' purpose, only by knowing what they expect to do with the measures provided, it is possible to determine which information is the most helpful. It follows that, the right performance measure depends on the purpose that the management is aiming to achieve.

Moreover, despite the rigorous and accurate selection of indicators, deterioration may affect performance measures. This phenomenon appears when the relation between performance and its indicator weakens, and such indicator provides no accurate report of the performance. In other words, measures lose their sensitivity in discerning between good or bad organisations' performances and reports or underestimate actual performance. Consequently, performance evaluation is constantly evolving to offer a truthful representation of the changing environment in which healthcare organisations operate.

Ultimately, assessing performance must give adequate consideration to the context-specific attributes within which the service is delivered. This includes factors such as whether the providers are public or private, the level of autonomy granted to local governments in healthcare organisation, and compliance with central government requirements. Given the multidimensional nature of performance, it is only natural to contemplate which elements should be factored in when evaluating public organisations. The complexity of healthcare systems also results in the need to combine the measures for diverse performance dimensions. The multidimensionality of healthcare performance leads to the coexistence of measures covering a wide range of areas. A comprehensive framework for

²⁷ On the elusiveness of goals see: CALCIOLARI, S., CANTÙ, E., FATTORE, G., 2011. *Performance management and goal ambiguity: Managerial implications in a single payer system*. *Health Care Management Review* 36(2): p 164-174; VAN THIEL, S., LEEUW, F.L., 2002. *The performance paradox in the public sector*. *Public performance & management review*, 25(3), pp.267-281.

assessing healthcare performance should encompass diverse measures able to catch the multifaceted nature of performance.

Concerning the healthcare sector, OECD has deployed a framework, named Health Care Quality Indicator (HCQI) (now Health Care Quality and Outcomes programme) that considers a set of six dimensions assessing the quality of the healthcare system²⁸. Quality dimensions are here interpreted as characteristics of the healthcare system relevant to its ability in maintaining, restoring, and enhancing health²⁹. OECD expanded the traditional 3E framework by encompassing three further dimensions: safety, responsiveness, and accessibility. Table I provides an overview of OECD's dimensions and corresponding definitions.

Table I. Concepts related to quality according with OECD's dimensions of healthcare performance.

<i>OECD's dimensions of quality</i>	<i>Definitions</i>
<i>Efficiency</i>	Delivering healthcare in a manner which maximises resource use and avoids waste
<i>Equity</i>	Delivering healthcare which does not vary in quality because of personal characteristics such as gender, race, ethnicity, geographical location, or socioeconomic status
<i>Effectiveness</i>	An effective healthcare system provides healthcare that is adherent to an evidence base and results in improved health outcomes for individuals and communities, based on need
<i>Accessibility</i>	Delivering healthcare that is timely, geographically reasonable, and provided in a setting where skills and resources are appropriate to medical need
<i>Patient-Centred</i>	Delivering healthcare which takes into account the preferences and aspirations of individual service users and the cultures of their communities
<i>Safety</i>	Delivering healthcare which minimises risks and harm to service users

Source: Adapted from Kelley and Hurst (2006)

²⁸ WHO, 2006. *Quality of care: A process for making strategic choices in health systems*, WHO Press, Geneva.

²⁹ KELLEY, E., HURST J., 2006. *Health care quality indicators project: Conceptual framework paper*, OECD Health Working Papers, No. 23, OECD Publishing, Paris

The relevance of the framework echoed at national level and has been embedded into national frameworks for evaluating quality of care³⁰. Among the six dimensions of performance, effectiveness is currently a highly debated aspect of healthcare performance that is driving methodological shifts in accountability measures and reporting. Effectiveness holds significant importance, especially in the restructuring of the healthcare delivery process to ensure improved outcomes. As a result, the increasing consensus on the pivotal role of effectiveness has underscored the demand for new measurement and evaluation frameworks that are adaptable to a dynamic environment. Indeed, despite the long-standing use of performance assessment in the healthcare sector, novel clinical approaches to patient management within an interconnected network of providers necessitate innovative solutions.

³⁰ HURST, J., JEE-HUGHES, M., 2001. *Performance measurement and performance management in OECD Health Systems*. Op. cit.

1.3 Healthcare evaluation from a joint perspective

The strategic trajectory envisioned by WHO commits to designing a healthcare delivery *according to population's multidimensional needs, delivered by a coordinated team of providers working across settings and levels of care, effectively managed to ensure optimal outcomes and the appropriate use of resources based on best available evidence*³¹. As a result, healthcare systems need to undergo two significant transformations: a shift in perspective towards patient-centred healthcare and a shift in the framework for evaluating performance to align with the collective efforts of providers throughout the entire care delivery process, rather than evaluating performance based on individual settings. Enhancing the quality of care entails a reimagining of healthcare services centred on meeting the needs and expectations of individuals. Without diminishing the widespread importance of existing measurements, the person-centred care approach necessitates a fresh contemplation of the significance attributed to value. Value stands as the central element that should shape the frameworks for enhancing performance³². Defined as the health outcomes achieved per dollar spent, the concept of value in healthcare deals with outcomes achieving. *Value-based healthcare* depicts the intention to generate value for the patient across the entire duration of the cycle of care. Committing to the *continuum of care* approach, value derives from the combined efforts of the numerous units involved in the delivery process. From this perspective, the proper unit for measuring value is not the action of single units or providers, rather the health benefits produced by the entire production of health.

The intentions set out in the European Health Policy framework *Health 2020* rely on the concept of people-centred health systems defined as *the design of core health system functions that prioritise the needs of individuals, their families, and communities, both as participants and beneficiaries for high quality comprehensive and coordinated services delivered in an equitable manner and involving people as partners in decision-making*³³. Strengthening people-centred health systems requires to give priority to live up to people's expectations concerning health well-

³¹ WHO, 2016. *Strengthening people-centred health systems in the WHO European Region: framework for on integrated health services delivery*. Op. cit.

³² PORTER, M.E., 2010. *What is value in health care?* The New England Journal of Medicine, 363(26), pp.2477-2481.

³³ WHO, 2015. *Priorities for health systems strengthening in the European Region 2015-2020: walking the talk on people centredness*. Copenhagen: WHO Regional Office for Europe.

being. It involves optimal response to the diverse needs of people and a renewed commitment to performance assessment. Accountability for value demands integrating the patient perspective into performance evaluation through additional measures reported by patients (both patient-related experience measures PREMs and patient-related outcomes measures PROMs) as well as the introduction of new approach to care to monitor the value created across the care pathway.

Given the abundance of information at management's disposal, the need is to broaden performance evaluation to diagnostic and therapeutic care pathways namely focusing on patient cycle of care rather than the single healthcare service³⁴.

Nowadays, one of the major concerns related with performance management systems (PMS) is their inherent focus on the organisational perspective while the delivering services unfolds through the inter-organisational relationships. The majority of PMS collects and provides data from an individual provider's perspective namely, data are acquired and examined to assess a single-organisation performance. However, the strong complexity that affects the healthcare sector, requires to overcome the shortcomings of the traditional approach, and needs considering the relationships between multiple healthcare organisations involved in the delivery process. Present-day frameworks seem ill-equipped to address the elevated levels of complexity and heightened dynamism. From a performance measurement perspective, the main difficulty is the assessment of the value created by the interaction of the providers involved in the delivery in fact, being healthcare delivered through joint actions of different providers, the monitoring of performance calls for integrated measures.

In the literature, networking has been identified as an emerging trend able to decrease the importance of measurement as we know it today and replacing it with performance evaluation within the network³⁵. However, scholars appear reluctant in shifting perspective thus, even when studying inter-organisational performance,

³⁴ AGENAS, 2006. *Gli Indicatori per la qualità: strumenti, metodi, risultati*. Supplemento al n. 15 di Monitor.

³⁵ BITITCI, U., GARENGO, P., DÖRFLER, V., NUDURUPATI, S. 2012. *Performance measurement: challenges for tomorrow*. International Journal of Management Reviews, 14(3), pp. 305-327.

researchers keep focusing on the single institution³⁶. What is missing is the understanding of single-organisation's performances as mere component of the overall outcome experienced by the patient.

The research endeavours to examine a framework designed to assess the performance of multiple healthcare organisations working collaboratively across the entire cycle of care. The primary focus lies in the realm of effectiveness, denoting the extent to which an intervention results in enhanced health outcomes. Moving forward with the research, we will delve deep into the concepts of effectiveness and networks, exploring their structures, essential components, and possible assessment frameworks in detail. The aim is to create a unified framework that can effectively gauge the performance of collaborative efforts involving multiple healthcare organisations.

³⁶ DEKKER, H.C. 2016. *On the boundaries between intrafirm and interfirm management accounting research*. Management Accounting Research, 31, pp. 86-99; CUGANESAN, S., JACOBS, K., LACEY, D. 2014. *Beyond new public management: does performance measurement drive public value in networks?*, in Guthrie, J., Marcon, G., Russo, S., Farneti, F. (Eds), Public value management, measurement and reporting (Studies in Public and Non-Profit Governance), 3, pp. 21-42.

CHAPTER II

EFFECTIVENESS: DEFINITIONS, MEASURES, AND IMPLICATIONS FOR THE HEALTHCARE SECTOR

- 2.1 Understanding the concept of effectiveness
- 2.2 Effectiveness in healthcare: meaning and related concepts
- 2.3. Measures of effectiveness for public services
- 2.4. Measures of effectiveness in healthcare

The chapter's objectives include defining the specific interpretation of effectiveness selected for this study and detailing the primary metrics employed to assess individual organisations.

Following a review of the existing literature, this section presents an overview of the rival meanings of effectiveness in several disciplinary fields since, although the term effectiveness has come to be used to represent the ability of a service to satisfy users' needs and expectations, there remain a lack of general agreement among researchers. Several basic principles of taxonomy are identified and the differences between the diverse scientific field are analysed with the final purpose to converge toward a clear idea of what I mean by effectiveness throughout the study.

The rest of the chapter is devoted to analysing the measures of effectiveness. Building on the concept of effectiveness, a first distinction is made between measures of effectiveness commonly used to evaluate public and healthcare services, with respect to the single organisations. The section analyses the prerequisites and distinctive traits of an appropriate measurement system providing an initial classification of such measures which serves as starting point for building a plausible initial theory for the assessment of network-based effectiveness.

2.1 Understanding the concept of effectiveness

Being considered a dynamic and evolutive concept, effectiveness is notoriously difficult to define and, consequently, to measure. Defining it a *construct*, seeks to capture the extent to which effectiveness is an abstract concept opposite to concrete phenomenon commonly addressed by the measurement systems. In spite of the growing importance of the topic, the literature has mainly focused on efficiency, easier to measure and considered a cornerstone of the 90s reforms, while much less attention has been devoted to effectiveness in managerial practices. Although managers agree on the importance of effectiveness, its difficulty in being defined hinders its measurement and thus endorse a common trend of neglecting effectiveness³⁷. More notably, abstraction constitutes a major problem whenever effectiveness concerns the health status. On the one hand, medical interventions have a tangible component that is easy to measure and evaluate (e.g., bone fractures, mild flu). Still, more frequently symptoms are expression of a general feeling of discomfort not fitting an early diagnosis and, if so, determine whether the treatment given is effective or not requires careful reasoning. On the other hand, effectiveness may also represent the expression of a patient's expectations regarding specific interventions, hopes for health improvements not achievable with actual standards of care.

From the onset, defining effectiveness emerges as a daunting task to tackle. It should be no surprise, therefore, that the multitude of initiatives taken to comprehend what is meant by effectiveness led to the understanding that an *agreement about effectiveness is mainly an agreement to disagree*³⁸. The lack of general consensus as to what constitutes a valid definition of effectiveness led to none of the authors and administrative bodies to produce a straightforward definition of the concept neither in the literature nor in strategic-operative documents addressed to managers. Receiving multiple meanings, the effectiveness concept will hardly lead toward a unified understanding not only in research studies

³⁷ ALMQVIST R. 2001. *Management by contract – a study of programmatic and technological aspects*. Public Administration, 79(3):689–706.; BEVAN, G., HOOD, C. 2006. *What's measured is what matters: Targets and gaming in the English public health care system*. Public Administration, 84 (3), 517-538; BROADBENT, J., 2007. *If you can't measure it, how can you manage it? Management and governance in higher educational institutions*. Public Money and Management, 27(3),193-198.

³⁸ CAMERON, K.S. 1986. *Effectiveness As Paradox: Consensus and Conflict in Conceptions of Organisational Effectiveness*. Management Science 32, no. 5, p:539–53.

but also within an organisation itself. Discussions of what effectiveness actually means are usually missing, key actors working in different organisations – or, more alarming, actors working within the same organisation - provide different meanings of effectiveness.

The lack of a common interpretation it is not a problem per se, the main pitfall is represented by the obstacles to an organisation's activities and its resulting undermined development. It has been pointed out in the literature that if actors involved in the delivery of healthcare services don't share the same view, there is a high risk of confusion and conflicts in the cooperation between them³⁹. The complexity here is that incoherence in perceived effectiveness hinders coordination between healthcare professionals and organisations, which has been proven to be a hugely important feature for a successful delivery of care. Consequently, sharing a common understanding would enable the joint actions of all professionals involved, improving their cooperation and outcomes in return.

In order to shed light on what is meant with effectiveness, it is useful to step back and rely on organisational studies which assess that prior to the definition of the effectiveness, several critical questions should be asked since, depending on the answers provided, different criteria of effectiveness are applicable⁴⁰.

1. *From whose perspective is effectiveness being assessed?*
2. *On what domain of activity is the assessment focused?*
3. *What level of analysis is being used?*
4. *What is the purpose for assessing effectiveness?*
5. *What time frame is being employed?*
6. *What type of data are being used for assessments?*
7. *What is the referent against which effectiveness is judged?*

What emerges is the shifting nature of effectiveness. Yet, before the provision of a straightforward meaning, it is easier to agree on effectiveness features to keep in mind while trying to converge toward a unifying definition of the concept.

The perspective of observation is the key for understanding effectiveness since it varies according to the assumed point of view. Deciding who is benefitting from

³⁹ On the perception and understanding of the concept of effectiveness among healthcare organisations see: AXELSSON L, ENGSTRÖM AK. 2001. *The concept of effectiveness--a blind alley? A study of different interpretations in a Swedish county council*. The International Journal of Health Planning and Management. 16(1):61-71.; ROSEN, R. 2000. *Applying research to healthcare policy and practice: medical and managerial views on effectiveness and the role of research*. Journal of Health Service Research and Policy, Vol. 5 No. 2, pp. 103-8.

⁴⁰ CAMERON, K.S., 1986. *Effectiveness as paradox: Consensus and conflict in conceptions of organisational effectiveness*. Op. cit.

the evaluation (e.g., internal actors such as managers, healthcare professionals, or external recipient of the service as patients or stakeholders) helps to ascribe the correct meaning to the assessment itself fitting the purposes of each perspective and simultaneously paving the way to the selection of the adequate measures and indexes. At the same time, the unit of analysis may vary, shifting from the single professional's performance, to the results achieved by the organisation or even being analysed with respect to the general system. In the continuation of the present study, the definition of the correct level for analysing effectiveness will play a fundamental role. To date, the majority of research studies emphasises the importance of organisational effectiveness. Nevertheless, the rapid rise of collaborative forms of working is leading the way toward a change in the assessment paradigm, favouring an upper aggregation level as the main unit of analysis, hence characterising the definition of effectiveness with a more collaborative trait. The time span also represents a moot point in defining effectiveness. Being a dynamic concept, effectiveness calls for a consistent monitoring over time, thus its definition should be shaped by a shifting distinctive feature. The last element to be analysed is the domain of activity and represents a pivotal stage in shaping the concept since depending on the object under consideration, different nuances of meaning may arise.

So far, the multi-perspective trait, as well as the diverse focus and time span, have been used as necessary items helping us to converge toward a definition of effectiveness. Aware of the main traits to include while describing effectiveness, it is high time to venture an attempt to properly define the concept. A useful starting point is the *goal model* of effectiveness presented in organisational studies. Here, a prominent element that bands together the conceivable definitions is goal achievement. Interesting enough, the multitude of meanings attributed to effectiveness share a common ground on goals. Consequently, an organisation is considered effective whenever accomplishing its stated goals⁴¹. Table II represents

⁴¹ In his investigation Cameron analysed eight models of organisational effectiveness: Goal model, System resource model, Internal process model, Strategic constituencies model, Competing values model, Legitimacy model, Fault-driven model, High performing system model. For each model, the author presented a definition of effectiveness and the corresponding intended use. Building on Cameron's work, Boyne analysed five out of eight models. In his view, three models were unsuitable for defining improvement. The critique relied on the assumption that variables used in the models only work as a proxy for improvement rather than signalling real improvements. The remaining two models – goal model and multiple constituency model – provided true evidence of quality improvement. The strength of the goal model relied on the tangibility of services' elements used to measure standards. Despite the stakeholders having different views on goals achievement, they

the diverse meanings acquired by the concept inter and intra several disciplines. The diverse definitions of effectiveness emerging from the literature are gathered under the prevailing scientific field to which the source belongs. Of the different meanings of effectiveness presented in Table II, the most relevant for the purpose of the present analysis are discussed below.

According to the goal approach, effectiveness can also be assessed from an internal point of view. Also known as *administrative or operational effectiveness*, it is defined as the extent to which the whole system achieves defined goals for set outcomes. Differently from external effectiveness, here the gaze is turned inwards the organisation, and the primary focus is on the organisation's internal processes, systems, and operations. Starting points are the objectives resulting from the strategic planning and included in specific indicators, they represent both the origin and ending of the monitoring and evaluation process since, being effectiveness an iterative process, retrospective reasoning on past actions works as feedback for future goal planning. Through the internal evaluation, the organisation is called to reflect ex post on the actions undertaken and their compliance to the initial goals. Effectiveness will be considered positive if actions implemented by the organisation resulted in achievement in line with what has been previously planned.

Although effectiveness deals with implementing activities to pursue organisation's goals, when referring to the *external* dimension of effectiveness, these goals are related with the institutional mission of the organisation. Hence, external effectiveness refers to organisation's ability to achieve its broader mission and objectives within its external environment. Simultaneously, external effectiveness concentrates on the organisation's ability to meet the demands and expectations of its external stakeholders. Also named *institutional or social effectiveness*⁴², it concerns the activities of public organisations aimed at satisfying clients' (or patients' as in healthcare) needs. As a result, metrics for external effectiveness frequently encompass customer satisfaction, among others. Eventually, another possible interpretation of the concept of effectiveness, relates

ascribed the same relevance to tangible elements. At the same time, the multiple constituency model recognised the political nature of improvement, rather than technical, so doing enhancing the public value of the process. CAMERON, K.S., 1986. *Effectiveness as paradox: Consensus and conflict in conceptions of organisational effectiveness*. Op. cit.

⁴² IMPELLIZZERI, A. 2000. *Gli indicatori di efficacia e di efficienza nelle amministrazioni locali*, *Rivista trimestrale di scienza della amministrazione*. Milano, Franco Angeli, 2000., BORGONOV I E., 2005. *Principi e sistemi per le amministrazioni pubbliche*, Egea.

with the economic field of science. Cost-effectiveness analysis is a vital tool in making resource allocation decisions, especially within the public sector. It involves comparing the costs associated with achieving specific outcomes to assess the efficiency of an intervention, program, or service. This approach proves invaluable when evaluating the effectiveness of a particular initiative in relation to the resources expended. As a result, it assists policymakers, healthcare providers, and organisations in making well-informed decisions about how to allocate their limited resources effectively to attain optimal outcomes.

Table II. Definitions of effectiveness emerging form the literature

Scientific field	Type of effectiveness	Source	Definition
Management	Overall effectiveness	Giovanelli, L. (2011)	Overall effectiveness is achieved in relation to the predisposition of enduring over time.
		Mussari, R. (2017)	It is related with strategic objectives, whose responsibility belongs to the political authority.
	Internal or managerial effectiveness	Heffron, F. (1989)	Effectiveness can be broadly defined as producing the intended or expected result. Nevertheless, the author specifies that there is no agreement on what the intended result of organisations is or should be.
		Impellizzeri, A. (2000)	Effectiveness means the achievement of a pre-arranged goal. From a managerial point of view, effectiveness is the ratio between the achieved objective and the planned objective. Specifically managerial effectiveness may concern: - production increase in relation to specific resources (e.g., human, technological or financial) - decrease the cost of production - decrease the time required by the production - enhance the production
		Lega, F. (2003)	Effectiveness is the relationship between achieved results and planned objectives
		Borgonovi, E. (2005)	Indicators of effectiveness refers to the ratio between delivered services and programmed services
		Basys et al. (2005)	Effectiveness can be defined as the extent to which a healthcare system achieves goals. The effectiveness of a health system may be measured by assessing the extent to which health system interventions achieve defined goals for health outcomes, for outputs and the quality of the process of care, and for health system responsiveness to the legitimate expectations of the population (where the goals may be defined by entities with statutory or non-statutory responsibility for monitoring health system performance).
		Axelsson L. and Engström, A.K., (2001)	Internal effectiveness represents the relationship between resources applied and what is done, i.e. productivity
		Giovanelli, L. (2013)	Internal effectiveness is the capability to achieve programmed objectives, concerning both the short and long term
		Io Storto, C., Goncharuk, A (2017)	Effectiveness is related to the capability of the healthcare system to achieve the maximum healthcare expected outputs without increasing any unwanted outputs
		Ansari et al. (2023)	Effectiveness is an achievement of activities in accordance with what has been planned
	External or social effectiveness	Impellizzeri, A. (2000)	Institutional effectiveness of a public organisation is expressed by the ratio between the pre-arranged institutional goal of the organisation and the achieved objective. Effectiveness can be considered institutional whenever the pre-arranged goal concerns: what to produce and the creation of new activities, competencies or new products or their modification
		Borgonovi, E. (2005)	Indicators of social effectiveness concern the ratio between achieved changes in patients' need and expected changes defined during the programming phase
		Marinò, L. (2008)	An organisation, an activity, a service delivery, a public policy, or a business unit is the more effective, the more its ability to satisfy patients' needs in terms of quali-quantitative satisfaction. External effectiveness is monitored in public organisations through ratios between satisfied demand and expressed demand or between satisfied demand and potential demand or through customer satisfaction analysis

Scientific field	Type of effectiveness	Source	Definition
		Axelsson L. and Engström, A.K., (2001)	External effectiveness represents the relationship between the resources applied and the extent to which a target has been reached.
		Giovanelli, L (2011)	From a production point of view, an organisation is considered effective if satisfies users' needs
		Giovanelli, L (2013)	Effectiveness is the organisation's capability to satisfy citizen's and user's expectations
		Afsaneh K.H. (2014)	It is the health systems' ability to produce positive health outcomes, i.e., to improve the health of the population.
		Burches, E. and Burches, M. (2020)	Effectiveness is doing “the right” things, for example setting right targets to achieve an overall goal (the effect). It is the extent to which planned outcomes, goals, or objectives are achieved as a result of an activity, intervention or initiative intended to achieve the desired effect, under ordinary circumstances (not controlled circumstances such as in a laboratory).
	Political-institutional effectiveness	Giovanelli, L. (2000)	Ability of the <i>soggetto economico</i> (i.e., who owns the strategical power) to interpret key values expressed by those who delegated him/her the power and orienting the whole system toward those values.
	Operative effectiveness	Mussari, R. (2017)	Related with operative objectives, whose responsibility belongs to executives.
		Nuti, S. (2008)	It concerns the modality of resource utilization
	Strategical effectiveness	Nuti, S. (2008)	It is the capability to plan and program organisation's activities according with local community's needs
	Structural effectiveness	Nuti, S. (2008)	It represents the adequacy of the structure (buildings, equipment, furniture) with respect to the institutional mission and the typology of services provided
Economics	Cost-effectiveness	Detsky A.S., Naglie I.G. (1990)	Cost-effectiveness considers both the effectiveness of the healthcare intervention and the resources required to deliver the intervention with the aim of helping managers to set priorities for funding healthcare programs.
		Russell et al. (1996)	Cost-effectiveness analysis is a method for evaluating the health outcomes and resource costs of health interventions. Its central function is to show the relative value of alternative interventions for improving health.
		Steijger, et al. (2023)	The cost–effectiveness analysis primarily focuses on the efficiency of healthcare interventions and analyses health outcomes relative to costs
	Comparative effectiveness	Sox et al (2009)	Comparative effectiveness research is the generation and synthesis of evidence that compares the benefits and harms of alternative methods to prevent, diagnose, treat, and monitor a clinical condition or to improve the delivery of care.
		Concato et al. (2010)	Comparative effectiveness can be considered a subset of patient-oriented research that examines available therapeutic options in particular patients to determine relevant health outcomes; in other words, comparative effectiveness evaluates “what works best” in healthcare.

2.2 Effectiveness in healthcare: meaning and related concepts

Effectiveness is a cornerstone of high-quality healthcare. It ensures that healthcare interventions and practices are evidence-based, deliver positive outcomes, prioritise patient safety, and make efficient use of resources. Ultimately, the focus on effectiveness contributes to better patient care and a healthier population.

The primary goal of healthcare is to improve patient outcomes. Effectiveness ensures that treatments, interventions, and medical practices lead to positive health outcomes for patients. It directly impacts their quality of life, survival rates, and overall well-being. Simultaneously, patient safety is a crucial component of healthcare quality. When the effectiveness of treatments and interventions is established, it minimises the likelihood of unfavourable events and medical mistakes. Furthermore, healthcare interventions that are effective not only yield optimal outcomes but also prove to be cost-efficient, making the most of the resources invested. Given that healthcare resources, such as time, personnel, equipment, and finances, are frequently limited, effectiveness ensures their efficient utilisation, directing them toward interventions and treatments that offer the greatest advantages to patients. Lastly, effectiveness measurements establish a foundation for accountability within the healthcare sector. They enable healthcare organisations and providers to monitor their performance, pinpoint areas requiring enhancement, and introduce modifications to elevate the quality of care provided.

What clearly emerges in the realm of healthcare is that the term effectiveness is often referred to as *clinical effectiveness* and encompasses both medical and managerial dimensions. There are a number of definitions of clinical effectiveness but for the present, the following will serve to mark out the general meaning: Clinical effectiveness is defined as the ability of an intervention to positively impact health, meant as the ultimate goal of every healthcare system.

Although the healthcare literature proposes multiple interpretations of effectiveness (shortly resumed in Table III), a widely accepted definition is provided by Donabedian, who identified effectiveness as *the degree to which improvements in health now attainable are, in fact, attained*⁴³. Similarly, the

⁴³ DONABEDIAN, A., 2003. *An Introduction to Quality Assurance in Health Care*. New York, Oxford University Press.

concept of effectiveness has been described by WHO as the *health systems' ability to produce positive health outcomes* and it is considered one of the six dimensions of quality⁴⁴. Thus, a health system necessitates to be effective, that is *to deliver health care adherent to an evidence base and results in improved health outcomes for individuals and communities, based on need*⁴⁵. What these definitions have in common is the focus on the outcomes of the healthcare process and their ability to improve the initial health status of the patient. The clinical point of view represents one of the many possible interpretations of the concept, measuring effectiveness in terms of health gains expressed through a patient's health and well-being⁴⁶. Hence, clinical effectiveness is coherent with the goal model previously analysed. In fact, improvements in health outcome are seen as the main goal to achieve for a healthcare system (macro perspective) and for a healthcare organisation or professional (micro level). At the same time, clinical effectiveness commonly spurs organisations to adopt healthcare practices supported by scientific evidence and observational studies of real practice. Hence, effectiveness deals with the delivery of services adherent to an evidence base, which is proven to enhance individuals' health. The strength of these considerations is valued thanks to the help offered both to the management - at handling practices - and to the healthcare authorities at different levels (local, regional, and national) - in monitoring the results. The reasoning developed around the three main declinations of the concept of effectiveness, can be transposed to the healthcare field. The meaning described so far adheres to the external perspective of effectiveness. Coherently, clinical effectiveness assumes an outside point of view by addressing two different forces: patient satisfaction (patient-reported experience) and the whole system ability in achieve healthcare improvements (outcomes measures).

⁴⁴ AFSANEH K.H. 2014. *Communication from the Commission on Effective, Accessible and Resilient Health Systems*. European Institute for Gender Equality.

⁴⁵ WHO, 2006. *Quality of Care: A process for making strategic choices in health systems*. Op. cit.

⁴⁶ ROSEN, R. 2000. *Applying research to health care policy and practice: medical and managerial views on effectiveness and the role of research*. Op. cit.

Table III. Definitions of effectiveness in healthcare

Medicine	Donabedian, A. (2003)	Effectiveness is the degree to which improvements in health now attainable are, in fact, attained. This implies a comparison between actual performance and the performance that the science and technology of healthcare, ideally or under specified conditions, could be expected to achieve.
	Burches and Burches (2020)	Effectiveness is the ability of an intervention to have a meaningful effect on patients in normal clinical conditions. effectiveness can be defined as the extent to which a drug achieves its intended effect in the usual clinical setting. It can be evaluated through observational studies of real practice. A treatment is effective if it works in real life in non-ideal circumstances. Effectiveness cannot be measured in controlled trials, because the act of inclusion into a study is a distortion of usual practice. On the contrary, observational studies do not require randomisation
	Agenas (2022)	At a population level, effectiveness aims to monitor for the benefits deriving from randomised clinical trials. It is measured in terms of net change in the outcomes of health status or quality of life within normal conditions
	WHO (2006)	A health system should seek to make improvements in six dimensions, among which there is effectiveness. Hence, in order to be effective an healthcare system is required to delivering health care that is adherent to an evidence base and results in improved health outcomes for individuals and communities, based on need.

External effectiveness in healthcare is closely tied to patient satisfaction, serving as a fundamental component of healthcare quality evaluation, and it is often used as an indicator to assess the overall performance of healthcare providers and systems. The rapid promotion of patient-centred care has set patient experience as a high priority across EU countries. Patients are now invested with a central role in decision-making regarding their healthcare, and their preferences and feedback are considered integral to the care delivery process. In order to correctly assess the perceived experience, Europe promoted the Patient-Reported Experience Measures (PREMs). These measures have been developed to assess the impact that the process of the care has on the patient's experience⁴⁷. Hence they do not rely on outcomes but rather on the perception of patients benefitting for specific healthcare services⁴⁸. In fact, PREMs are designed to prioritise the patients' viewpoint, their subjective perceptions, feelings, and experiences related to the care they receive. PREMs can cover various aspects of healthcare such as the overall satisfaction on hospital stays, outpatient visits, primary care; the communication with the professionals; waiting times and ease of access but also patients might be asked about the coordination of their care. These measures are essential for assessing the quality of care from the patient's point of view and ultimately to help healthcare organisations to achieve higher quality of care. Moreover, external effectiveness is

⁴⁷ KINGSLEY C, PATEL S. *Patient-reported outcome measures and patient reported experience measures*. BJA Education 2017; 17:137–44.

⁴⁸ BENSON, T., 2020. *Measure what we want: a taxonomy of short generic person-reported outcome and experience measures (PROMs and PREMs)*. BMJ open quality, 9(1), p.e000789.

closely associated with the concept of Patient-Reported Outcome Measures (PROMs). When assessing effectiveness at a population level, the focus is on monitoring the benefits resulting from randomised clinical trials, with effectiveness measured by the net change in health status or quality of life outcomes under normal conditions⁴⁹. PROMs represent self-reported evaluations of a patient's health, gathering information directly from patients regarding their health status. They play a vital role in evaluating how medical treatments and interventions impact patients' overall well-being. Essentially, PROMs serve as a bridge between clinical outcomes and the patient's personal experience. In clinical practice, they are utilised to track patients' progress, evaluate the success of treatments, and pinpoint areas where additional support or interventions may be required. These indicators are typically collected through standardised questionnaires or surveys that inquire about a patient's ability to perform daily physical activities, pain levels, quality of life, emotional well-being, and other relevant symptoms.

Healthcare effectiveness can also be characterised from an internal perspective, as previously mentioned in more general terms. It refers to a healthcare organisation's ability to successfully accomplish its intended goals and objectives. This includes the organisation's capability to efficiently allocate resources and personnel to achieve desired outcomes. Like many public agencies, healthcare organisations also engage in planning and programming processes to ensure that patients receive timely and appropriate healthcare services that align with evidence-based care and meet the required quality standards. This strategic undertaking defines the overall objectives, priorities, and guidelines for healthcare services, which are outlined in national documents known as National Health Plans. Healthcare organisations integrate these overarching goals into their programming efforts and work diligently on a daily basis to attain them.

However, when evaluating healthcare performance, it is essential to recognise and consider its multifaceted nature. Effectiveness analysis should not be limited to making judgments solely based on the adequacy of services in meeting patients' needs. Instead, it should be conducted in conjunction with the assessment of other dimensions to accurately reflect the systemic nature of healthcare organisations. Since the various components are interconnected, any actions taken to improve one

⁴⁹ AGENAS. *Programma Nazionale Esiti 2022*. Available at https://pne.agenas.it/main/doc/Report_PNE_2022.pdf (accessed October 2023)

element will inevitably have an impact on other elements. Therefore, all components of the system need to be monitored simultaneously across various dimensions without allowing one component to dominate. This systemic approach also implies that effectiveness can be associated with different performance dimensions. The following section explores the interrelationships that occur across the main performance dimensions in healthcare.

Defined by Donabedian (1990) as *the possibility of improving organisations in order to achieve optimum conditions for health care*, efficacy presents the most subtle difference from effectiveness. The difference between the two terms can only be appreciated from a medical point of view. Efficacy is the theoretical effectiveness obtained in controlled settings through the application of medical best practices. In healthcare, efficacy differs from clinical effectiveness due to the setting in which benefits are achieved: clinical effectiveness relates to external validity as it refers to the extent to which a particular healthcare intervention or treatment achieves its intended outcomes when applied in actual clinical practice settings. In contrast, efficacy relates to the extent to which a healthcare intervention or treatment generates favourable results under ideal or controlled conditions, often observed in clinical trials or controlled laboratory environments⁵⁰. Effectiveness, on the one hand, employs patient-oriented outcome measures such as quality of life, mortality rates, and patient satisfaction to assess how interventions impact individuals. On the other hand, efficacy studies frequently utilise clinical endpoints like the reduction in tumour size or changes in biomarker levels, which may not directly capture patient well-being but can indicate the intervention's potential effectiveness.

Of the many performance dimensions, efficiency is one of the most commonly debated. Although the performance evaluation literature has emphasised the difference between efficiency and effectiveness, problems of definition keep plaguing many authors' works. Usually, efficiency focuses on how well resources (such as time, money, and manpower) are utilised to achieve a specific outcome or result. While effectiveness relates to achieving desired outcomes, efficiency concerns the achievement of those results while minimising resource wastage.

⁵⁰ On the difference between effectiveness and efficacy see: COCHRANE A., 1972. *Effectiveness and efficiency: Random reflections on health services*. Nuffield Trust; BURCHES, E., BURCHES, M., 2020. *Efficacy, effectiveness and efficiency in the health care: The need for an agreement to clarify its meaning*. International Archives of Public Health and Community Medicine, 4(1).

From a patient point of view, efficiency in its traditional view is the ratio of a given healthcare output to the minimum amount of healthcare input⁵¹ but it can also represent the relationship between the health improvements and the cost of the provided care.

Although effectiveness and efficiency are generally considered separate, in some cases the two concepts can lead to a trade-off, or they can coexist. The problems associated with a possible trade-off between increases in efficiency within organisations and effectiveness have gained the attention of scholars. According to several studies, this trade-off exists and influences an organisation's life⁵². An organisation is deemed effective when it successfully accomplishes its intended goals and generates the desired outcomes. This signifies that it is taking the appropriate actions to realise its objectives. However, effectiveness does not inherently consider the efficient utilisation of resources like time, money, and manpower to attain these outcomes. Conversely, an organisation can achieve efficiency by optimising resource usage but still fall short of realising its intended goals. In such a scenario, it might execute tasks swiftly and cost-effectively, yet those efforts do not translate into the desired results. However, a study on the performance evaluation of national healthcare systems using a two-dimensional approach (efficiency-effectiveness) demonstrated that improving efficiency is not likely to compromise effectiveness and expenditure reduction is not required to achieve higher effectiveness⁵³. Ideally, organisations should strive to be both effective and efficient, that is why other scholars affirm the coexistence of effectiveness and efficiency⁵⁴. These studies proved the compatibility of the two concepts, where the broad concept of effectiveness includes the narrower efficiency. In this scenario, organisations not only are achieving their goals, but they are doing it in a way that optimises resource utilisation.

⁵¹ PALMER, S., TORGERSON, D. J. 1999. *Definitions of efficiency*. BMJ, 318, 1136.

⁵² LAINE, J., LINNA, M., HÄKKINEN, U., NORO, A. 2005. *Measuring the productive efficiency and clinical quality of institutional long-term care for the elderly*. Health Economics, 14(3), 245-256; MARTINI, G. M., BERTA, P., MULLAHY, J., VITTADINI, G. 2014. *The effectiveness – efficiency trade-off in health care: The case of hospitals in Lombardy, Italy*. Regional Science and Urban Economics, 49, 217-231.

⁵³ IO STORTO, C., GONCHARUK, A. G., 2017. *Efficiency vs Effectiveness: A benchmarking study on European healthcare systems*. Economics and Sociology, 10(3), 102-115. doi:10.14254/2071-789X.2017/10-3/8.

⁵⁴ IMPELLIZZERI, A. 2000. *Gli indicatori di efficacia e di efficienza nelle amministrazioni locali*, Rivista trimestrale di scienza della amministrazione. Op. cit.

Assuming the improvement of individuals' and communities' health as the main goal of healthcare systems, effectiveness in delivering care is strictly linked with the concept of equity. Problems of equity represent one of the most compelling plagues of universal healthcare systems since it refers to fairness and justice in the distribution of resources, opportunities, and benefits among individuals. Equity in the public context can be loosely described as the equal access to healthcare services. In universal healthcare systems, this principle is translated into patient's entitlement in benefitting of health treatments regardless of the diverse genre, age, and socio-economic conditions. It follows that an equitable service is provided if individuals experiencing different conditions but expressing the same need can access the same service benefitting from homogeneous treatments in terms of effectiveness. Hence, equity and effectiveness are often seen as complementary goals in healthcare, this means providing access to care for all while ensuring that the care provided leads to positive health outcomes. In order for a provider to be effective in offering the same service - no matter its peculiar characteristics - it is crucial to have standards of provision, consequently, the central government is required to plan and program national guidelines dictating the standards. An effective service is then provided when individuals experience equity in benefitting the service and when providers are given equitable possibilities to uniformly provide health services⁵⁵.

As evident from the examination of the term effectiveness in both its general and healthcare contexts, the term is multifaceted and closely intertwined with other analytical elements such as efficiency, efficacy, and equity. In this analysis, a tripartite definition of effectiveness has been adopted: clinical, signifying the capacity of an intervention to positively impact health; internal, indicating the extent to which the entire healthcare system attains defined goals for specific, evidence-based clinical outcomes; and external, pertaining to the ability to not only properly treat patients but also satisfy their needs.

A tripartite definition offers the primary advantage of enabling a more comprehensive and nuanced understanding of the concept. Having addressed the

⁵⁵On policies implementation for lessen inequalities in healthcare from a micro and macro perspective see MARINÒ L., *Dinamiche di finanziamento, economicità ed uguaglianza nei servizi sanitari. Condizioni, limiti ed implicazioni*. In GIOVANELLI L. (a cura di), 2013. *La valutazione delle performance in ambito sanitario profili teorici ed evidenze empiriche*, op. cit.

challenges in defining the concept of effectiveness, it is evident that seeking a unanimous definition is not a straightforward task, as it is bound to encounter disagreements among diverse scholars and professionals. Moreover, the pursuit of a singular definition is deemed overly restrictive, potentially diminishing the richness and multifaceted nature of effectiveness by reducing it to a singular aspect. Recognising the diversity of perspectives and contextual nuances is crucial for a more encompassing understanding of effectiveness, which is inherently multifaceted and dynamic in its application across various fields and disciplines. Hence, by dividing effectiveness into three dimensions the analysis can delve into distinct aspects of performance.

The final conclusions derived from the analysis will heavily depend on the pivotal role played by these three meanings of effectiveness. The clinical, internal, and external effectiveness collectively provide a comprehensive framework for assessing the overall impact and success of healthcare provision. By evaluating the positive health outcomes, system-wide goal attainment, and patient satisfaction, these dimensions contribute to a holistic understanding of the effectiveness of healthcare practices, guiding informed decision-making for improved patient care and healthcare system optimisation.

2.3 Measures of effectiveness for public services

The terminological confusion surrounding the meaning of effectiveness is mirrored on the difficulty perceived by managers and researchers whenever called to measure and evaluate effectiveness. Academic contributions to the definition of a complete set of indicators for effectiveness measurement provide considerable evidence of the ambiguity that still characterise the research of the topic. Effectiveness studies suffered a problem of selecting the proper measurements among vast indicator sets. Even if interested in effectiveness, managers lack studies of effectiveness specifically. Consequently, when interviewed, managers acknowledged the lack of systematic use of measures of effectiveness: different professionals produced a number of different measures of effectiveness to use in the same context⁵⁶. The majority of them cited measures of quality and output of the organisation, demonstrating at the same time both the uncertainty concerning what effectiveness means, and inaccurate perception of the benefits associated with different measures.

A necessary prerequisite to define effectiveness measures is the clear understanding of an organisation's functioning and its environmental uniqueness. Thereby the main concern regarding effectiveness is matching its unique circumstances with the appropriate framework and with a congruent indicators set to measure it. Focus of the management is looking for the best fit between method and situation in which effectiveness is to be implemented⁵⁷. Fundamental is then highlighting the public nature of the organisations here analysed. The generalisability of the criteria used in measuring effectiveness relates to the concept of external validity, that is the extent to which those criteria are considered relevant and appropriate in other settings. A primary level of analysis is that criteria appropriate for evaluating private firms may be inappropriate for public agencies.

⁵⁶ In their study on how managers in secondary healthcare perceived effectiveness, Simonen et al. interviewed hospital districts' medical and nursing directors working on the middle and highest levels of management. When asked about the measures of effectiveness in use, 16 different measures of effectiveness emerged: The measures of quality of life, 15D,16D,17D, FIM measure, GAF measure, despondency measure, depression measure, honos measure, rai measure, yield capacity measure, pain measure, patient satisfaction survey, mortality measure, electronic feedback of outcomes of treatment, satisfaction with life index. SIMONEN, O., BLOM, M., VIITANEN, E., 2011. *Knowledge of effectiveness and its application in secondary healthcare management*. International Journal of Productivity and Performance Management, 60(8), pp.797-812.

⁵⁷ DONABEDIAN, A., 1996. *The effectiveness of quality assurance*. International Journal for Quality in Health Care, 4(8).

As discussed above, public goods supply envisages several attributes which differentiate public organisations from other organisations. Secondly, public organisations' effectiveness can be analysed with respect to the general system or to the individual organisation. At general system level, the perspective is macro hence the performance evaluation concerns the system design and relates to the overall results, being particularly useful in planning and programming activities. When evaluating the single organisation, the perspective is micro. It examines organisational results framed into the general system, focusing on the sub-business units functioning (proper managerial control). When evaluating healthcare performance, it will be necessary to take into consideration both the system and the organisational level. This consideration leads to two main reasonings. In analysing the public sector on the whole, it has to be considered the core role of the diverse hierarchy levels in defining public policies. By contrast, when considering the micro perspective, it is fundamental to take proper consideration of the strong heterogeneity that affects healthcare services around the world. Diversity makes it difficult to identify a shared set of measurements to commonly address effectiveness across different organisations.

Before penetrating the maze of effectiveness measures, it is worth dwell on the distinctive traits of effectiveness measurement and their pitfalls. Although the frameworks proposed for analysing effectiveness are affected by a lack of shared criteria, scholars have identified several major characteristics of effectiveness evaluation⁵⁸. In the first instance, the models for analysing effectiveness frequently focus on the results achieved by single organisations, whereas public services are often provided by a set of organisations. Thus, the focus should lay on joint achievements rather than individuals. Some effectiveness models focused their attention exclusively on a single overall rating of effectiveness, while it is advised to rely on a set of multiple relevant criteria. Common is to see single criteria used in private firms to measure for effectiveness (e.g., net profit, overall performance measured by employee, organisational growth), nevertheless, in public contexts, single outcomes cannot reflect the joint-nature of the service provided. Being effectiveness a multidimensional construct, the use of a one-dimensional indicator seems inadequate as different variables jointly influence effectiveness, requiring

⁵⁸ BOYNE, G.A., 2003. *What is public service improvement?* Public administration, 81(2), pp.211-227.

several sets of the criteria to be defined and measured. Relatedly, the evaluation is based on effectiveness results assessed at the service level, rather than organisational. This difference corroborates the idea of public services being provided by multiple organisations involved in the delivery process. The assessment of effectiveness should then rely on new approaches to service delivery able to consider a single organisation's outcome as a mere component of the broader efforts to satisfying users' needs.

Moreover, organisational accomplishments are compared over a single time period, but improvement is a highly dynamic phenomenon that requires longitudinal studies to appreciate its true variation. Generalising is possible to state that effectiveness cannot be measured in terms of a static set of variables. It varies according to both the time the measurement takes place and the assumed point of view. As previously stated with regard to performance evaluation in the public context, the selection of appropriate effectiveness criteria may be a function of the interests of different stakeholders, that is, measurement (and evaluation) criteria are based on the values and preferences of individuals charged with evaluation. Not only evaluators of effectiveness may use different criteria, but those same criteria may be contradictory among different evaluators and may change over time. Consensus regarding the right set of indicators can change over the life of the organisation and the selected measures may be designed to reflect the reality at one point in time. Nevertheless, being dynamic and transitory in nature, effectiveness changes rapidly and so should its measurement. To achieve a proper evaluation of effectiveness, the consistency of measures over time must be consistently monitored by managers.

Having defined the main characteristic of the effectiveness measures, it is now necessary to provide a first classification of the measurement according with the so-called *increasing widening of the setting criteria*⁵⁹. This classification provides three levels of analysis easily comparable with the classification provided in the former section. The first level of analysis considers *internal* effectiveness, previously described as the extent to which the whole system achieves defined goals for set outcomes. Being related to the compliance of the activities carried out - and the results achieved - in relation to the institutional mission embodied by the

⁵⁹ MUSSARI R., 2017. *Economia delle amministrazioni pubbliche*, Milano, McGraw-Hill Education.

organisation, internal effectiveness is the ratio between achieved objectives (interpreted both as input or output) and planned objectives. This first type of measurement is quite straightforward due to the countable nature of inputs and outputs. Namely, the organisation is considered effective when it achieves the planned objectives using the resources allocated to that specific objective, while providing the prearranged quality standards. Second class of indicators include those related to the demand. Since the institutional mission of public entities is to produce positive outcomes and, at the same time, users' expectations refer to the enhancing of their status, indicators of external effectiveness are built according with the demand expressed both in quantitative and qualitative terms. Consequently, the second level of analysis comprises all those measures conveying the ability of the organisation to satisfy patients' demand in quantitative terms namely, they allow to match the organisation's ability to satisfy users' needs (offer) and the demand. The interpretation of the demand is two-fold. First interpretation deals with potential demand. Demand here represents the percentage of potential demand satisfied by the organisation's activities. The ratio considers the potential demand effectively expressed by users (the number of people truly asking for a specific service) and the number of users that could possibly have asked for a specific service. Second interpretation deals with expressed demand, the ratio considers the accepted demand (the services provided) and the received demand (services requested by the patients but not provided). Hence, from a quantitative point of view, ratios of external effectiveness include satisfied demand over expressed demand or satisfied demand over potential demand. These ratios highlight an organisation's attitude in accomplishing its institutional goal of delivering the healthcare service to those in need. Third and last class of indicators monitors users' satisfaction in qualitative terms. From a qualitative point of view, assessment of external effectiveness deals with outcome evaluation, that is, organisations' ability to satisfy users' needs, making customer satisfaction an appropriate measure. Through questionnaires, the management can assess users' perceived quality of the service by calling the receivers to state their (dis)satisfaction with the service received.

It is worth noting that, by conforming to the *goal model*, the definition of effectiveness as the ability of an organisation to achieve stated goals fits the ratio at the basis of the cycle of performance. The assessment of performance is not an end

to itself, but rather embedded in a wider process starting with the definitions of an organisation's goals and the measures to assess progress in achieving them, ending with concomitant and ex-post analysis of data and their interpretation. Evaluation data serve as feedback for the strategic planning process leading to the definition of new targets. On the same line, effectiveness can also be represented as a process based on a sequence of steps: introduction, implantation, implementation, modification in behaviour and finally progress toward health and health-related objectives⁶⁰. Hence, effectiveness presents a retrospective trait. Based on the outcomes of the production process, it requires pre-established goals and objectives to be monitored ex-post. The true benefit deriving from effectiveness measurement and evaluation can be appreciated through its signalling role. It provides useful data to estimate the future effects of new programmes implemented on extant data.

⁶⁰ DONABEDIAN, A., 1996. *The effectiveness of quality assurance*. Op. cit.

2.4 Measures of effectiveness in healthcare

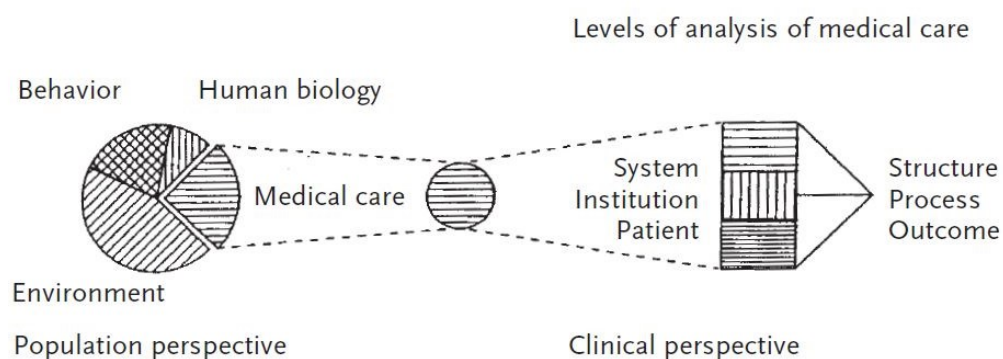
The concept of effectiveness measures plays a critical role in both the broader public sector and the specialised domain of healthcare, where distinct evaluation criteria and priorities come into play. Hence, to the distinctive traits of effectiveness measures it is necessary to further add secondary characteristics concerning indicators specifically designed for the healthcare sector. First, measures of effectiveness are strictly linked with the institutional goal of health protection and rely on the clinical assessment of health, it follows that the choice should fall on indicators that can be attributed to health system interventions⁶¹. Equally important is the focus of such measures. Proper indicators of effectiveness should monitor changes in the health status of the population intended as a consequence of policy and managerial decisions. Concerning their nature, effectiveness indicators in healthcare are heterogeneous. They may rely on an objective perspective (quali-quantitative appraisal of the health status) but also subjective aspects of the service (patient satisfaction indicators, discrepancies between patients' expectations and the service provided).

Despite the lack of a common ground on effectiveness measurement concerning most authors' work, academic literature on effectiveness has emphasised the importance of conceptual models of organisational effectiveness⁶². Prior research in this area detected the lack of universal criteria of effectiveness and, consequently, agreement on a shared framework for measuring effectiveness does not exist either.

In their book *Evaluating the Healthcare System: Effectiveness, Efficiency, and Equity*, Aday et al. (2004) presented a framework for assessing effectiveness in healthcare organisations. Building upon prior research, the authors have constructed a conceptual framework (Figure I) that examined the factors influencing population health. This analytical framework encompassed two distinct viewpoints (population and clinical) and spans four hierarchical levels (community, system, institution, and patient).

⁶¹ BORGONOV E., 2000. *Gli indicatori di efficacia e di efficienza nella sanità*, Rivista Trimestrale Di Scienza Dell'Amministrazione. Milano, Franco Angeli; BASYS, D., INSTEAD, C., IRDES, F., IGSS, L., 2005. *Development of a methodology for collection and analysis of data on efficiency and effectiveness in health care provision*. Final Report EU Commission, Eurostat, pp.2000-2010.

⁶² BEHN, R.D., 2003. *Why Measure performance? Different purposes require different measures*. Op. cit.

Figure I. Factors Contributing to Population Health

Source: Aday et al. (2004)

Population perspective represents the macro level of analysis which considers health outcomes generated by medical treatments and addressed to the population as a whole. It relied on healthcare indicators as overall population mortality, morbidity rates, or health status. Population health, described as the health outcomes of a group of individuals, is determined by four main factors: the physical and social environment, human biology, individual behaviour, and medical care services. The second perspective focused on the last determinant of health, the medical care services, and assessed effectiveness from a clinical point of view. Representing the micro level, it dealt with medical benefits specifically, on how patients and providers interact and how this interaction affects patients' clinical outcomes or overall health. Clinical effectiveness can thereby be assessed based on endpoints including symptoms and warning indicators of a problem, laboratory results, disability, and death, as well as health-related quality of life metrics like physical, mental, and social aspects. This perspective was then further broken down according to the ecology of medical care which included four levels of analysis: community, system, institution, and patient. Table IV integrates the proposed framework with effectiveness research questions by level of analysis and outcome measures. With respect to the general system, an international assessment of the effectiveness of health care systems is fostered by OECD, whose report *Health at a glance: Europe 2022. State of Health in the EU Cycle (2022)* provides a cross-country assessment of national health systems' performance in the EU, designed to assist the Member States in improving public health and strengthening the resilience of health systems, especially following the Covid-19 pandemic.

Table IV. Framework for effectiveness research

<i>PERSPECTIVE</i>		<i>POPULATION</i>	<i>CLINICAL</i>		
<i>Typical effectiveness research questions by level of analysis</i>		Community <i>What is the contribution of medical care to the health of the population?</i>	System <i>What is the impact of system-level variables (e.g., provider specialty mix, organisational form, payment mechanism) on the processes and outcomes of medical care?</i>	Institution <i>What is the impact of the quality of care on the outcomes of medical care?</i>	Patient
<i>Outcomes measures</i>	1. Mortality	Population death rates	Case fatality rates	Case fatality rates	Individual deaths
	2. Morbidity	Population morbidity rates	Complication rates	Complication rates	Adverse events
		Disability rates	Disability rates	Disability rates	Disability limitation
	3. Health status	Disease incidence and prevalence rates	Diagnosis rates	Diagnosis rates	Clinical endpoints
		Perceived health status	Averaged HRQOL (HRQOL = health related quality of life)	Averaged HRQOL	Health-related QOL (QOL = quality of life)

Source: Adapted from Aday et. al (2004)

Using the indicators selected from the European Core Health Indicators (ECHI)⁶³ shortlist, OECD provides 12 measures of effectiveness strictly related with the quality of care and the patient experience.

Remaining in the general sphere of significance, effectiveness is also defined as a health systems' ability to improve the health of the population⁶⁴. Thus, common measures selected for assessing effectiveness at a system level are representative of mortality (perinatal and amenable mortality), communicable diseases which can be affected by the appropriateness of the healthcare services and cancer screening meant as a proxy for signalling how effective is the healthcare system in addressing sectors at risk. Cinaroglu et al. (2016) in their study on the relationship between effectiveness indicators and health outcomes defined effectiveness as a measure meant to help an organisation achieve its policy and objectives. The authors measured effectiveness according with two main dimensions: accessibility and utilisation. The former addressed volume indicators as the number of beds and the number of physicians, chosen as indicators of availability. Utilisation was measured through the Average Length of Stay (ALOS) meant as a critical performance metric related to costs, efficiency, quality of care; and the number of surgical operations since particular surgical procedures are associated with shorter patient lengths of stay. Io Storto and Gončiaruk (2017) conducted a benchmarking study based on a two-dimensional approach considering both efficiency and effectiveness. The authors have defined effectiveness as the capacity to attain the highest anticipated healthcare outcomes without generating any undesired results. They identified three indicators for measuring the effectiveness of the health output: the ratio of infant mortality to population, healthy life years in absolute value at birth and life expectancy in absolute value at birth.

Another approach in examining effectiveness was proposed by Kurk and Freedman (2008). It relied on the difference between outputs and outcomes. Generally, output is defined as a rough indicator of the quantity of products and services produced and consumed, while outcome signals the positive impact of the treatment on a patient's health status. These diverse perspectives are gathered in Table V which resumes the effectiveness indicators analysed so far, while providing

⁶³ The European Core Health Indicators (ECHI) are available at: https://ec.europa.eu/health/indicators/echi/list_en

⁶⁴ AFSANEH K.H. 2014. *Communication from the Commission on Effective, Accessible and Resilient Health Systems*. Op. cit.

the ratio for the application of each of them as well as other literature sources using the same indicator.

In conclusion, from a theoretical standpoint, the incorporation of a diverse array of measures significantly increases the complexity involved in formulating effectiveness frameworks. This complexity, while challenging, underscores the necessity for comprehensive and adaptable approaches in our ongoing pursuit of effective solutions in various domains.

Table V. Effectiveness indicators

<i>Effectiveness measure</i>	<i>Rationale</i>	<i>Most used indexes</i>	<i>Source</i>
<i>Avoidable mortality</i>	OECD defines preventable mortality as causes of death that can be mainly avoided through effective public health and primary prevention interventions. It also provides the definition of treatable causes of mortality as causes of death that can be mainly avoided through timely and effective health care interventions, including secondary prevention and treatment. Thus, indicators of avoidable mortality can provide a starting point to assess the effectiveness of healthcare systems in reducing premature deaths from various diseases and injuries.	Main causes of avoidable mortality in EU Mortality rates from avoidable causes	OECD (2022), AIOP (2016)
<i>Mortality</i>	Indicators which measure mortality avoided by health interventions, such as: potential years of life lost for selected causes known to be sensitive to prevention, but also mortality following acute myocardial infarction (AMI) and mortality following stroke are long-established indicator of the clinical effectiveness of secondary care.	Thirty-day mortality after hospital admission for ischaemic stroke or AMI Perinatal, infant, or maternal mortality	Afsaneh (2014), Kurk and Freedman (2008), European Commission (2005), AIOP (2016), Aday et. al (2004), Io Storto and Gončiaruk (2017)
<i>Avoidable hospital admissions</i>	Health systems remain fragmented when delivering care, poor integration undermines health outcomes especially when transitioning between care settings with complex health conditions. OECD identifies integrated care as crucial in improving patient outcomes since it increases co-ordination, while reducing duplicative and unnecessary care. A solid evidence suggests that effective treatment at the primary care level reduces the deterioration in chronic health conditions and hospital utilisation in return. Primary care serves as first contact for people requiring continuous and integrated care consequently high rates of avoidable admission may signal quality issues in primary care.	Patient outcomes one year after surgery Diabetes hospital admission in adults	OECD (2022), Kurk and Freedman (2008)

<i>Effectiveness measure</i>	<i>Rationale</i>	<i>Most used indexes</i>	<i>Source</i>
<i>Readmission rates</i>	Readmissions after hospitalisation signals how well care is co-ordinated across settings, representing a key element for the quality of the provided service.	One-year hospital readmission after discharge following hospitalisation for ischaemic stroke or chronic heart failure Rate of emergency room visits within 30 days of discharge	Kurk and Freedman (2008), Barrenho et al. (2022)
<i>Vaccination rates</i>	There is broad agreement within the scientific community that vaccines are effective tool for protecting against infectious diseases. People receiving the respective vaccination in the recommended timeframe reduce their probability of contracting the disease. Childhood vaccinations routines have been established to reduce the spread of preventable infectious diseases. Likewise, seasonal influenza represents a great risk for elders and immune-compromised people, from whom it can develop into severe illness or result in death. Consequently, vaccines requiring more doses are an indicator of care continuity and access to primary care as well as signalling the quality of preventive services.	MMR vaccination coverage of children aged 24 months Vaccination against DTP Flu vaccination coverage	OECD (2022), European Commission (2005), Rotondo et al. (2018)
<i>Cancer screening</i>	Screening programmes are designed to early detect cancer since the stage of the disease at diagnosis severely impacts the survival rates. Hence, the stage at diagnosis signals timeliness in accessing the screening services and routine care. Moreover, public interventions and awareness campaigns may have a tangible effect on changes in personal behaviour and, ultimately, on the health status of the population. Consequently, impacts of policies may be evaluated based on their effects on life expectancy.	Level of coverage of colorectal cancer screening Percentage of people participating in a 1st level screening programme Cancer stage distribution at diagnosis healthy life years in absolute value at birth No. of years, life expectancy in absolute value at birth	Afsaneh (2014), OECD (2022), European Commission (2005), Rotondo et al. (2018), Io Storto and Gončiaruk (2017)

<i>Effectiveness measure</i>	<i>Rationale</i>	<i>Most used indexes</i>	<i>Source</i>
<i>Patient-reported experience</i>	Patient-reported experiences are implemented to assess how well health systems are serving people's needs. Data on the perception of the health system by the population represent an indicator of responsiveness of the system and can be used to improve the quality of the service based on patient's own assessment.	BREAST-Q tool (internationally validated tool for measure breast surgery outcomes reported by patients) Self-reported satisfaction outcome Doctor spending enough time with patient during consultation Being treated with respect Quality of physician-patient communication Doctor involving patient in decisions about care and treatment	OECD (2022), Kurk and Freedman (2008), European Commission (2005), Impellizzeri (2000)
<i>Safe prescribing</i>	Varying clinical practices, guidelines and government incentives play a fundamental role in safe prescribing which is considered a marker of quality of the healthcare system. Antimicrobial resistance is rising public concerns due to the misuse of antibiotics leading to higher risk of resistant strains of bacteria. At the same time, opioids serve as treatment for chronic acute pain, usually associated with cancer. Nevertheless, misuse of opioids in primary care may enhance the risk of dependence, dose increase and death.	Use of evidence-based diagnostics and therapies (HbA1C for diabetes, aspirin for myocardial infarction, correct antibiotic for community acquired pneumonia) Correct prescribing (dosage, duration) Overall volume of antibiotics/opioids prescribed Trends in antibiotics use in adults	OECD (2022), Kurk and Freedman (2008)
<i>Safe acute care</i>	Patient safety indicators offer the opportunity to evaluate patient-reported experiences of safety and ultimately work for the strengthening of healthcare systems built on people's voices. Medication errors including wrong dosage or wrong medication are more frequently reported by patients. Additionally, health workers perception of patient safety is also measured in relation to the correct handoffs and transitioning of patients across settings, contributing to the development of a more integrated care.	Patients reporting medical mistakes during treatment or care Health workers perception of patient safety Infection and complication rates of surgery Rate of hip fractures in facilities	OECD (2022), Kurk and Freedman (2008)

<i>Effectiveness measure</i>	<i>Rationale</i>	<i>Most used indexes</i>	<i>Source</i>
<i>Access to care</i>	It refers to the extent to which individuals can easily obtain and utilise healthcare services. It is a critical dimension of healthcare quality because it directly impacts a person's ability to receive timely and appropriate care. It includes measures of personnel, geographic accessibility and referrals.	Physicians, nurses, hospitals per 1000 population, number of surgical operations Basic and comprehensive emergency obstetric care facilities per 500,000 population Percentage of population within 10km of a clinic Referral rates for women with obstetric complications Accepted demand (the services provided) over the received demand (services requested by the patients but not provided)	Kurk and Freedman (2008), Impellizzeri (2000), Cinaroglu (2016)
<i>Timeliness</i>	For emergency procedures like hip and knee fractures, AMI or stroke, time to surgery represents the key factor for ensuring improved outcomes and minimise the risk of complications. An early surgical intervention is influenced by structural factors (staff capacity, operating rooms) as well as managerial factors (length of stay, patient transfer services). Thus, indicators of waiting times strongly impact on the quality of care.	Length of wait for care ALOS (average length of stay) Effective treatment for malaria within 24 h Rapid treatment for delivery complications	Kurk and Freedman (2008), Impellizzeri (2000), Cinaroglu (2016)
<i>Continuity</i>	Indicators of care continuity help to evaluate the extent to which healthcare systems are ensuring that patients receive consistent and uninterrupted care.	Frequency and rate of follow-up visits Treatment completion rates (TB) Amputation of lower limbs in patients with diabetes	Kurk and Freedman (2008), AIOP (2016)

CHAPTER III

EXPLORING THE DYNAMICS OF NETWORK EVOLUTION, CONFIGURATIONS, AND FUNCTIONING

- 3.1 Theoretical evolution toward collaboration
- 3.2 Understanding the concept of network: exploring diverse collaborative forms of working
- 3.3 Shaping network structures: influential factors and configurations
- 3.4 Navigating healthcare networks: evolution, principles, and configurations
 - 3.4.1 Theoretical progressions toward healthcare collaboration
 - 3.4.2 Defining networks within the healthcare context
 - 3.4.3 Shaping networks in healthcare: principles and configurations

The underlying assumption of the study is that networking forms of collaboration may play a crucial role in effectiveness assessment. Therefore, this chapter is dedicated to a comprehensive analysis of the second pivotal concept upon which this study is founded: network.

To underscore the significance of the collaborative framework, the chapter initially delves into the theoretical evolution of inter-organisational collaborations.

Subsequently, the second part of the chapter endeavours to elucidate the diverse interpretations associated with the concept of network since, to date, no conclusive evidence has been generated. The remainder of the chapter seeks to foster an understanding of the factors that shape the configurations of networks.

The chapter is brought to a close with an in-depth exploration of the themes previously discussed, with a specific focus on their application within the healthcare sector.

3.1 Theoretical evolution toward collaboration

The evolution of public management theories, from the traditional paradigm of Old Public Administration to the contemporary framework of Public Governance, has been a dynamic journey marked by transformative shifts in the way governments approach accountability and evaluation. Over the decades, the concept of performance evaluation in public management has evolved significantly, reflecting changing societal expectations, governance challenges, and administrative complexities. This evolution represents a profound shift from rigid bureaucratic structures to more flexible, networked, and participatory models of governance. In this exploration of the evolution of public management theories, we will trace the trajectory of accountability from its roots in Old Public Administration through the stages of New Public Management (NPM) and ultimately into the era of Public Governance, shedding light on the changing landscape of performance evaluation mechanisms and the broader implications for contemporary public administration practices.

The inception of Old Public Administration can be traced back to the late 19th century, a period marked by significant industrialisation and urbanisation, resulting in profound economic transformations. Old Public Administration, a foundational era in the evolution of public management theories, underscored the significance of a structured and hierarchical bureaucracy. Democratic control primarily revolved around conformity with established norms, with personal accountability limited to successfully adhering to these norms. This lack of clear lines of responsibility and the relative unaccountability of decision-makers contributed to an escalation in public expenditure and a decline in service quality. Accountability mechanisms, such as budgetary controls and performance evaluations, were instituted to ensure the efficient operation of government agencies. However, accountability predominantly centred on financial oversight and rule adherence, often failing to hold public administrators accountable for tangible results and outcomes. Citizen involvement in the decision-making process was restricted, as policy decisions were typically the purview of elected officials. On the cost front, despite its emphasis on efficiency, Old Public Administration did not consistently deliver cost-effective and efficient services. Criticized for these deficiencies, this theoretical approach laid the

groundwork for contemporary paradigms aimed at fostering more responsive public administration capable of better addressing citizen needs.

The New Public Management paradigm (NPM) represented a radical departure from the traditional bureaucracy which sought to reinvigorate government by borrowing principles from the private sector and emphasising efficiency, accountability, and citizens' role. NPM theories are considered to foster the *managerialism* of the public sector by improving the role of public managers, implementing new managerial tools imported by the private sector (i.e., results-oriented management, performance-based budgeting, and the use of business-like practices) and changing the governance approach (i.e., decentralisation, the transfer of decision-making authority and responsibilities from central government agencies to lower-level entities). Contrary to the bureaucratic logic, NPM overcome the division between public and private companies ignoring the peculiarities of public organisations. Of the multiple innovations introduced by the new paradigm, management empowerment was at the heart of the change. Letting management *free to decide* meant improving the dichotomy between autonomy and responsibility while redirecting the accountability toward results rather than just adherence to rules and procedures. Deprive the decision making of the burden of normative controls would enhance the ability to manage strategic leverages efficaciously, directing the attention to the economic dimensions of efficiency, effectiveness, and outcome. At the same time, new emphasis on managers' responsibility would improve public accountability on results achievement and resources employment, as a mean to control the constantly growing public expenditure and enhancing the efficiency of public provision. One of the pivotal trajectories of innovation introduced by NPM is competition among public providers. For the modernisation of public administration to be effective, a necessary condition was the introduction of quasi-market schemes where competition among providers was simulated in order to reduce costs and enhance

quality standards⁶⁵. Competition constituted the opportunity to overcome the monolithic structure envisaged by old administration theories through the contraction of the functions ascribed to the central State and the separation between provision and production. A fundamental principle of NPM revolved around elevating the quality of public services. To achieve this objective, NPM heavily promoted the widespread adoption of performance measurement and management methods. Governments were tasked with creating well-defined performance standards and benchmarks to assess the effectiveness and efficiency of public services. However, it should be noted that a key focal point also shifted towards reducing costs and enhancing efficiency in this paradigm.

Despite the optimistic expectations, the NPM movement produced unforeseen effects⁶⁶. One of the initial criticisms directed at NPM is its tendency to place excessive emphasis on efficiency. This strong focus on efficiency and cost reduction has, at times, resulted in the prioritisation of short-term objectives while neglecting more complex, long-term challenges that demand a more strategic approach to public administration. Likewise, due to its preoccupation with efficiency, NPM did not sufficiently account for outcomes that are challenging to measure, such as social or health impacts. NPM advocated for the outsourcing of government services to the private sector; however, an overabundance of outsourced services has led to governments renouncing direct control over the delivery of these essential services.

Moreover, NPM stimulated a reform process aimed at disassembling the rigid structure proposed by the Old Public Administration and rooted on norms, by using a similar normative approach. The formal application of NPM innovations clashed

⁶⁵ The main goal of quasi-markets is *customer empowerment*. Tracing an evolution of customers' freedom in choosing between providers, is possible to collocate on the ends of a simulated continuum line both the state provision (monopoly), where users are left with no choice and markets where users are free to decide which of the multiple providers would offer higher benefits. Competition originates from - and is endorsed by - the true choice given to users in deciding among providers. The relevance of customers' freedom echoes both externally, orienting the healthcare offer toward users' real needs and internally to healthcare providers, fostering the achievement of higher allocative efficiency. To further elaborate and develop these topics refer to: LE GRAND J., 1991. *Quasi-market and social policy*, in *The Economic Journal*, 101; MARINÒ L., 2014. *L'azienda pubblica nel quasi-mercato: Il management sanitario tra autonomia formale ed opzioni di scelta reali*. Turin. Giappichelli

⁶⁶ CEPIKU, D. and MENEGUZZO, M., 2011. *Public administration reform in Italy: a shopping-basket approach to the new public management or the new Weberianism?* *International Journal of Public Administration*, 34(1-2), pp.19-25.; ONGARO, E. AND VALOTTI, G., 2008. *Public management reform in Italy: explaining the implementation gap*. *International Journal of Public Sector Management*, 21(2), pp.174-204.

with the relatively unfavourable culture permeating the Italian public administration. The exogenous top-down imposition hindered a real cultural change, favouring a compliance approach. Paradoxically, by fostering the adoption of a *business-like* view of public administration, the reform led to the opposite result of producing more bureaucracy and politicisation⁶⁷. Vulnerability of the reform also arose from the growing understanding of the difference between public and private organisations. The presence of free market in the private sector made it impossible to simply transpose private tools into public governance, where the competition was only pretended. At the same time, enhanced competition among providers, fostered major shift toward the disaggregation of units in the public sector according with a specialisation logic - complex tasks concerning professional knowledge limited to a small group of experts - in the belief that smaller units would be better manageable. Nonetheless, fragmentation poses challenges for citizens attempting to navigate intricate systems and seek comprehensive solutions, concurrently exacerbating coordination difficulties.

The emergence of the Public Governance approach can be attributed to the challenges confronting public administrations. Public Governance theories acknowledged the complexity of public issues and the limitations of an inward-looking perspective. Addressing multifaceted problems necessitated a more holistic approach that engaged various stakeholders, each articulating their unique needs and expectations across diverse domains. Consequently, this theory placed a significant emphasis on the external context relaying on the assumption complex public issues require collective efforts for effective solutions. Hence, the Public Governance theory emphasised collaboration and networking among a wide range of actors built upon the principles of participation and consensus. Key innovations introduced by Public Governance encompassed participatory decision-making

⁶⁷ A closer look at the implementation of NPM theories highlights the development of political procedures for controlling the administrative apparatus. The separation between politics and administration and the consequent depoliticised management alarmed the political leadership threatened by the impossibility to further exert control over managements actions. According to the separation of powers, the political leadership was assigned the strategical planning of activities whereas management was in charge of the implementation of policies in operative terms. Paradoxically, the reform produced the opposite result of enhancing political intrusiveness in deciding procedures for hiring, resignation and promotion of public managers, inevitably influencing their behaviour indirectly and producing more rules and constraints. MAOR, M., 1999. *The paradox of managerialism*. Public Administration Review, 59, 5–18; HOOD, C., 2000. *Paradoxes of public-sector managerialism, old public management and public service bargains*. International public management journal, 3(1), pp.1-22; GIOVANELLI, L., 2012. *L'area del potere aziendale nelle amministrazioni pubbliche*. In FORTUNA F. (a cura di), *Liber amicorum per Umberto Bertini*. L'uomo, lo studioso, il professore, Milano, Franco Angeli.

processes, the acknowledgment of issue interconnectivity, and the active solicitation of continuous feedback from stakeholders. The fulfilment of complex requirements was thus rooted in a fresh methodology involving the development of network management systems. These systems possessed the capacity to converge resources and guide the behaviours of diverse actors towards shared objectives. The emphasis placed by Public Governance theory on collaborative and networked approaches aligns with the concept of the collaborative advantage frequently asserted in inter-organisational collaboration. Public Governance acknowledges the necessity of involving diverse actors to address complex public issues. Similarly, the notion of the collaborative advantage in inter-organisational collaboration underscores that organisations can achieve greater collective impact compared to individual efforts. One of the benefits of interorganisational collaboration includes heightened efficiency through the elimination of redundancies, improved information transfer, and the reduction of fragmentation, ultimately fostering greater continuity of care to provide person-centred services⁶⁸. At the same time, benefits of partnerships include strengthened trust between providers and a consequent amplification of the synergy effect. Nevertheless, a reasonable body of evidence suggests that such collaboration outcomes may also result in potential disadvantages concerning conflicts (over goals, leadership, integration of procedures) and cultural barriers, especially when due support during the transition is missing. Integrated provision also implies enhanced complexity resulting in delays (multiple meetings involving stakeholders who belong to different organisations) and loss of identity⁶⁹.

⁶⁸ “It has long been recognised that artificially dividing care and services between different institutions causes many problems for users. Those in need of help may encounter numerous obstacles in their search for the appropriate professional or department; services may indulge in boundary management as they attempt to conserve resources at the expense of another arm of the public sector; professionals may operate from within competing cultures with diverse goals. All of these factors severely limit both quality and accessibility of care. Collaboration can thus be seen as attempting to increase the effectiveness of services” BURCH, S. AND BORLAND, C., 2001. *Collaboration, facilities, and communities in day care services for older people*. Health & Social Care in the Community, 9(1), pp.19-30.

⁶⁹ AUNGER, J.A., MILLAR, R., GREENHALGH, J., MANNION, R., RAFFERTY, A.M. AND MCLEOD, H., 2021. *Why do some inter-organisational collaborations in healthcare work when others do not? A realist review*. Systematic reviews, 10, pp.1-22.; AUSCHRA, C., 2018. *Barriers to the integration of care in inter-organisational settings: a literature review*. International journal of integrated care, 18(1).; GLASBY, J., DICKINSON, H. AND MILLER, R., 2011. *Partnership working in England—where we are now and where we’ve come from*. International journal of integrated care, 11(Special 10th Anniversary Edition); DOWLING, B., POWELL, M. AND GLENDINNING, C., 2004. *Conceptualising successful partnerships*. Health & social care in the community, 12(4), p. 309.

In tracing the evolution of public management theories from the traditional framework of Old Public Administration through the market-driven principles of New Public Management and the holistic approach of Public Governance, a clear trajectory emerges, one that underscores the growing recognition of the pivotal role of collaboration. As we transition into the next chapter, the focus will be placed on exploring the growing significance of networks within the domain of public contexts.

3.2 Understanding the concept of network: exploring diverse collaborative forms of working

Due to the increased adoption of collaborative approaches, the studies on governance models of partnering have received significant attention from scholars. Management literature on collaboration is dominated by questions concerning the widespread adoption of network as a new form of organising the provision of public services. To this extent, the concept of network seeks to capture the structural stability of multiple organisations mutually linked together, where one unit is more than the formal subordinate of others⁷⁰, and their work is aimed at achieving both personal and collective goals⁷¹. The integration among organisations is often achieved through the network logic, nevertheless this term has generally been used as a concise definition encompassing the wide range of relationships aimed at achieving collaboration⁷². The ambiguity surrounding the concept of collaborative arrangements frequently provides contradictory definitions such as partnership, network, integrated provision, cooperation, and inter-organisational collaboration.

Taking a broader perspective, collaboration has been loosely defined as a cooperative, inter-organisational relationship negotiated through ongoing communication which does not rely on market or hierarchical control mechanisms⁷³. At the same time, collaborative arrangements are seen as assets of interventions supported by a commitment to move toward collaborating rather than

⁷⁰ O' TOOLE, L. J., 1997. *Treating Networks Seriously: Practical and Research-Based Agendas in Public Administration*. Public Administration Review 57 (1): 45–52.

⁷¹ PROVAN, K.G. AND KENIS, P., 2008. *Modes of network governance: Structure, management, and effectiveness*. Journal of public administration research and theory, 18(2), pp.229-252.

⁷² Academic contributions to the definition of networks mainly adhere to two different generations of scholars supporting different approaches. A first generation of writers focused on the definition of network and its structural characteristics in terms of components and the reasons behind the adoption of networks as an organisation form. Their approach was analytical, mostly centred on the micro-level of analysis. Focusing on networks' components (nodes, actors, relationships) and characteristics (density, centrality), the study of networks as a whole was neglected. Avoiding treating the entire network as the main unit of analysis, the functioning of networks has received insufficient attention. The second generation of scholars focused on the governance approach considering networks as a whole. The discussion unfolded the unfavourable consequences of networks' adoption as well as its failure in comparison to the alternative forms of governance (hierarchy and market).

⁷³ HARDY, C, PHILLIPS, N AND LAWRENCE, TB., 2003. *Resources, knowledge and influence: The organisational effects of interorganisational collaboration*. Journal of Management Studies, 40(2): 321–47.

competing⁷⁴. They represent a mutually beneficial process that brings people and organisations together to work toward a common goal, while entailing the joint development of structures and procedures, sharing relevant resources and accountability.

Drawing from organisational theories, collaborative arrangements between organisation have been described as an intermediate relationship situated in a continuum delimited by hierarchy and market⁷⁵. Williamson (1975) used the metaphor of a hand to describe both ends of the spectrum. Hierarchy, *the visible hand*, refers to the managerial process which defines top-down relationships among organisations ruled by fiat and norms. On the contrary, market, *the invisible hand*, uses the price mechanism to coordinate the competition among multiple independent organisations. Collaborative working across organisational boundaries is then seen as a hybrid governance form, claimed to enhance competitiveness and effectiveness⁷⁶. Collaborative arrangements are neither market-dominated, nor characterised by strict hierarchy relationship, they instead rely on the two main concepts of power and trust⁷⁷. However, a different strand of research rejects the idea of networks as forms of organisation sharply distinct from hierarchy and market, supporting the existence of hierarchical networks and market-like (individualistic) networks (e.g., monopolistic markets, markets structured by state regulation)⁷⁸.

⁷⁴ AUNGER, J.A., MILLAR, R., GREENHALGH, J., MANNION, R., RAFFERTY, A.M. AND MCLEOD, H., 2021. *Why do some inter-organisational collaborations in healthcare work when others do not? A realist review*. Op. cit.

⁷⁵ THOMPSON, G., 2003. *Between Hierarchies and Markets – The Logic and Limit of Network Forms of Organisation*, Oxford: Oxford University Press.

⁷⁶ It is worth noting that Powell raised concerns on networks' nature. The author wondered whether networks were a simple combination of elements belonging to both market and hierarchy or rather a new and unique form of governance. POWELL, W. W. 1990 *Neither market nor hierarchy: Network forms of organisation*. In Barry M. Staw and L. L. Cummings (eds.), *Research in Organisational Behavior*, 12: 295-336. Greenwich, CT: JAI Press.

⁷⁷ According with Child et al. (2005), alliances, by creating a mutual dependence between members, require having sufficient reliance in other partners as "it is true that you need to trust your colleagues in a hierarchy, and you need to trust the trader who sells you a product in a market, at least to the extent of believing that the good is of the declared quality. But in these circumstances tacit behavioural caution and legal remedies can to some degree compensate for doubtful trust in hierarchies and markets respectively. However, without trust, and a member's reputation on admission to a network, such a mode of cooperation would soon wither, probably into a market form". CHILD, J., FAULKNER, D. AND TALLMAN, S.B., 2005. *Cooperative strategy*. Oxford University Press, USA, p.150.

⁷⁸ A detailed examination of the reasons for rejecting the distinction between networks and hierarchy/market is presented in GOODWIN, N., PECK, E., FREEMAN, T. AND POSANER, R., 2004. *Managing across diverse networks of care: lessons from other sectors*. Report to the NHS SDO R&D Programme. Birmingham: Health Services Management Centre, University of Birmingham.

A growing body of literature attempted to classifying inter-organisational models of collaboration by using different criteria. Given the vast academic contributions on the classification of collaborative working, the present work will outline a variety of taxonomies.

A valid classification was proposed by Lega (2003), and it is rooted on the legal and institutional framework. It relies on the concept of governance forms pictured on the continuum of collaborative options ranging from stronger bonds among organisations (hierarchy) to weaker integration (market). The *aggregati aziendali* (aggregated organisations) are depicted as a group of companies connected by stable relationships that act collaboratively, limiting the decision-making autonomy of individual units in favour of creating a group logic. In this view, hybrid governance refers to judicially autonomous entities, more or less formally arranged, joint working on mutually beneficial processes. Despite the terminological differences, consolidated organisations develop along the following common dimensions:

1. Juridical autonomy of the entities involved in the consolidation
2. Unity of the management (*soggetto economico*)
3. Degree of formalisation of the agreement.

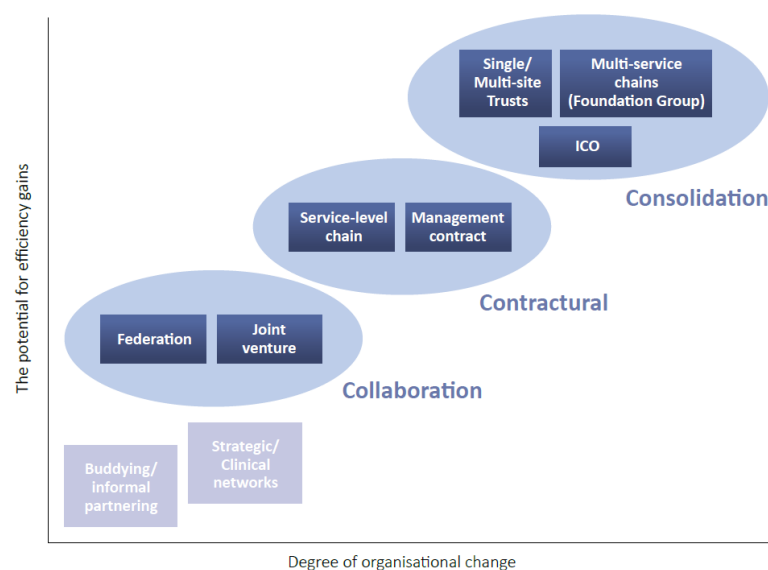
This classification relies on two main concepts grounded in the Italian business administration field. On the one hand the *soggetto giuridico* (the legal entity) is the person entitled to represent the business in front of the law, namely it owns legal responsibility for the business operations. It can be represented by a single legal entity (i.e., resulting from mergers and acquisitions, drawing from the Italian context notable examples are the Local Health Authorities consolidation into single organisations and AOs detachment) or by a partnership whenever the business is run by multiple bodies. In the case for inter-agency collaboration, the legal responsibility becomes particularly compelling. Collaborative arrangements imply the co-existence of two or more entities, each preserving its own legal entity. The decision to be made is whether to unify the legal entities of the businesses involved in the collaboration or stick with different legal representatives developing specific bodies to enhance a shared decision process.

On the other hand, the group of people having the decision-making power (*soggetto economico*) represents the ones who have freedom to decide the strategic and operative goals as well as the means to achieve them. The author built on others

(Zanotti, 2000) a framework for network configuration based on the above characteristics, represented in Table VI.

Another example comes from the Dalton Review (2014). Commissioned by the English government, it explores a range of organisational forms among providers that can help achieve quality improvements. It offers a systematisation of different inter-organisational forms developed by the NHS and divide them into three macro categories (Figure II, Table VII)⁷⁹: *collaboration*, which encompasses the voluntary collaboration among two or more organisations which combine their resources while keeping their legal entities separated; *contractual forms*, which refer to formalised agreement to pursue performance and quality standard; *consolidation*, which involves a change in ownership due to the development of a new organisation.

Figure II. Different organisational forms and their potential ability to release efficiency gains



Source: The Dalton Review (2014)

⁷⁹ Among the organisational forms proposed by the Dalton Review there are also mergers and acquisitions, nevertheless in developing their theory of partnering, based on the Dalton review, Aunger et al. affirm “some readers may consider mergers and acquisitions to not be classified as forms of inter-organisational collaborations due to their mandated nature (from the perspective of the acquired) and intention to unify as a singular entity. We agree that, after the merging is complete, the resulting organisation would count as a singular entity from a structural standpoint; however, we contend that the processes of collaboration are nonetheless key during the implementation of the merger or acquisition itself and persist for some time thereafter”. AUNGER, J.A., MILLAR, R., GREENHALGH, J., MANNION, R., RAFFERTY, A.M., MCLEOD, H., 2021. *Why do some inter-organisational collaborations in healthcare work when others do not? A realist review*. Op. cit.

According to the review, the main benefit deriving from the organisational forms proposed is standardisation. It can be declined into standardisation of back-office functions (i.e., IT, transactional HR, finance, payroll); standardisation of procurement strategies to influence costs by reducing product lines while guaranteeing higher volumes and consequently leading toward economies of scale and scope; standardisation of clinical protocols and pathways enabling the development of best practices and the alignment of patient pathways; standardisation of innovation which provides the access to - and the sharing of - new technologies. At the same time, different organisational forms contribute to the development and reinforcement of group culture and to the consolidation of clinical support among members. The conceptualisation of service integration is further analysed from a horizontal point of view as a full range of inter-organisation integration options ranging from autonomous organisations to a fully connected system. According to Keast et al. (2007), along the horizontal integration continuum, a number of options can be located at different points. The terms cooperation, coordination, and collaboration, described as the 3Cs, have been used interchangeably in the literature, nevertheless each of these options relates to different purpose, operating mechanisms and leads to different outcomes.

Cooperation is the lowest term on the spectrum, close to the end concerning autonomous, fully fragmented firms. It represents the best option if the main purpose of service integration is information sharing, hence it includes a short-term, voluntary, and informal relationship. Organisations which cooperate remain separate while taking each other's goals into consideration, their relationship is expected to involve reduced efforts, resources, and intensity. Moving further along the integration continuum, *coordination* helps structure participants' individual work. The emerging need is to keep organisations separate while aligning their activities by devoting joint efforts to achieve already established goals. Lastly, *collaboration* is suggested to address complex problems requiring high contribution, shared goals and resources, and interdependency among participants. The prime purpose of collaboration is to change the way organisations work together but, due to the development of joint goals and the trust-building process requiring a considerable amount of time, collaboration is considered high risk.

Table VI. Inter-organisation configurations

Table VI. Inter-organisation configurations			Juridical autonomous organisations	Unity of the management	Formalised relationships	
Lessen bond ↑ ↓ Stronger bond	Network between companies <i>The network structure includes hybrid business aggregates that are characterized by an intermediate position between the corporate group and the free market. They are made up of a plurality of legally distinct companies without unity of the economic subject</i>		Y	N	Y	
	Formal associations	Consortium	The consortium is an aggregation of multiple companies brought together by the goal of achieving partial economic coordination in areas such as sales, research and development in order to ensure a higher bargaining power			
		Cartel	Organisations agree to work together at developing shared strategies to reduce the competitive pressure			
		Franchising	The franchising deploys a franchisor - a central organisation - owing the right of use of a trademark or patent, which transfers it to the franchisees - connected organisations			
		Framework agreement	Organisations operate under formal contracts including exclusivity clauses and continuity agreements			
		Trade association	Formalizations of agreements through contracts that include specific continuity, exclusivity, and reciprocity conditions of relationships. A typical example is represented by supply contracts			
	Informal associations	Subcontracting network	Where a central organisation outsources several activities to supplier organisations which, for their survival, rely solely on the central organisation			
		Constellations of companies	They represent an aggregate composed of a small number of relatively autonomous small and medium-sized companies with closely complementary economic combinations			
		District	Where a vast number of organisations in geographic proximity come together due to market relationships			
		Alliances	Informal agreements aimed at achieving specific goals, both strategic and operative. Alliances are commonly considered the antecedent of formalised networks			
	Company groups <i>A corporate group is defined as a set of economic combinations of production, relevant to different legal entities and governed by a unitary economic subject. Each unit has its own discretionary space, albeit finds a limit to its conduct in belonging to a stable aggregate of companies. The mere legal bond is not sufficient to qualify a corporate group; it also requires the existence of control over the companies that make up the group and the management of critical variables (information flows, planning and scheduling, conflict management)</i>		Y	Y	Y	
	Economic groups Production company groups are composed of companies connected by links between the stages of the production process (in healthcare, multi-hospital groups)					
	Financial groups Financial groups are made up of companies connected by financial links (such as joint venture combinations or venture capital groups as well as family wealth management groups)					
	Intra-organisation aggregations <i>Intra-company aggregates refer to a plurality of economic combinations aggregated in the same company, characterized by the uniqueness of the economic and legal subject and governed by the principle of hierarchy</i>		N	Y	Y	
	Multi-unit companies Multi-unit companies are companies that incorporate several relatively autonomous technical transformation units (production plants and facilities) or commercialization units (branches). (in healthcare, multi-presidium healthcare companies)					
	Vertical integrated company Where the service is provided through sequential processes implemented by the diverse integrated companies (in healthcare, this is the case of LHAs with respect to care processes related to different levels such as prevention, early and primary diagnosis, and specialized diagnosis).					
	Diversified company Diversified companies have production processes aimed at distinct markets as they satisfy different classes of needs (in healthcare, this is the case of private groups and LHAs that manage outpatient and residential activities not connected to each other and intended for different sectors of the population).					

Source: Adapted from Lega (2003)

Table VII. Seven different organisational forms

Organisational form	Definition
Collaborative	<i>Collaborative forms bring together two or more organisations voluntarily to pool their resources to achieve better outcomes for patients or for financial benefit, while retaining their original legal entity. Federation and joint venture are examples</i>
Federation	Several organisations come together to collaborate to deliver one or more type of service or back-office provision. Each organisation retains its sovereignty and there does not need to be a legal agreement. However, it is best practice for one trust or other body to be the nominated lead for governance, quality and finance, set out in a Memorandum of Understanding (MoU) or equivalent
Joint venture	Two or more organisations pool their sovereignty in either a corporate arrangement to create a new legal entity to manage a particular service line; or in a contractual arrangement to create a shared services agreement with another organisation. In contractual arrangements one trust takes the lead responsibility for governance, quality, performance and finance reporting
Contractual	<i>Contractual forms have more formalised agreements and there are often performance and quality standards agreed as part of the arrangement. Service level chains and management contracts are examples</i>
Service level chain	One provider provides services for other providers. There are several ways that this could be contracted, such as the host provider outsourcing services to the service level provider, a service level agreement where the host organisation holds the service level provider accountable for delivery, or paying a fee to use the policies and protocols of the first provider
Management contract	Some or all management control of the operations of an organisation is awarded to another organisation to manage for an agreed duration
Consolidation	<i>Consolidation forms are when a change of ownership occurs and organisations come together to form a new organisation potentially delivering different services than previously. Mergers and acquisitions, integrated care organisations (which can also be contractual) and Foundation Group are examples</i>
Integrated care organisation	Brings together some or all of the acute, community, primary care, social care and mental health services in a variety of forms. The organisation manages patients from a particular population across defined care pathways supported by shared data, IT and information systems
Multi-site trust (M&A)	Two or more organisations are brought together to become one organisation through merger; all the relevant organisations would dissolve and a new organisation would be formed. Alternatively, one organisation may acquire the other one, which dissolves and becomes part of the acquiring organisation
Multi-service chain or Foundation-group	This model is distinct to a large, merged organisation as it has a separate ‘group’ Headquarters that sets the governance, standards, protocols and procedures, often with centralised procurement and back office functions. Each site is managed on behalf of the group by a management team that have delegated decision-making within the parameters set by the HQ board

Source: The Dalton Review (2014)

In this chapter, we have explored the multifaceted nature of the term network, the evidence analysed so far has generated a clear delineation of the multiple forms of collaboration intended in the literature. Among the several definitions available, this study opts to adopt the term network to characterise the phenomenon. This choice is motivated by the hybrid nature of networks, which encompass aggregates of individual organisations positioned between the realms of a free market and voluntary cooperation based on loose connections. In this study, the term network will be employed in alignment with O'Toole's (1997) definition, which characterises networks as structures of interdependence involving multiple organisations or their components, where no single unit simply serves as a formal subordinate within a larger hierarchical arrangement. As we move forward to the next chapter, we delve deeper into the fundamental components and configurations that underpin these networks. Gaining a grasp of the complexities surrounding the components and configurations within networks will offer us insights as we further explore the theme of healthcare effectiveness.

3.3 Shaping network structures: influential factors and configurations

Despite the relevance of focusing on an exhaustive definition of network, in the context of management what appears more useful is the development of a categorisation of network forms.

The multiple ways in which network types may be classified share common ground on the elements from which the classification derives. In their systematic review on the management of diverse networks of care, Goodwin et al (2004) identified the main elements according to which network types will be categorised, represented in Table VIII.

Table VIII. Key elements for network analysis

<i>Key element for the classification</i>	<i>Measures used in network analysis literature</i>
<i>Internal structure</i>	by degree of centralisation, by degree of density, the strength of ties, the extent of structural equivalence between different segments of the network, the extent to which the network is organised into distinct clusters or cliques of high density.
<i>Content</i>	by the nature of what is passed along the ties that make up the network (information, capabilities, money, authorisation, emotional support). A tie between two organisations or individuals is deemed <i>multiplex</i> if more than one kind of thing is passed along the same tie.
<i>Functions</i>	by the degree to which common tasks can be and actually are undertaken by members of the network across particular dyadic, triadic, or multiple ties
<i>Institutional form</i>	by the degree to which structure, content and functions are prescribed by either formal or informal rules, norms, established and entrenched or sanctioned expectations.
<i>Symmetricality</i>	by the degree to which there is equality or inequality in the net value of the content passed from A to B and back from B to A.
<i>Styles of learning</i>	by the nature of the learning and management of knowledge that organisations either seek to pursue through their external ties or in any case practice through those ties
<i>Types of activity</i>	by the stages in the production process jointly engaged in or acquired or accessed through ties.

Source: Goodwin et al (2004)

Among these levels of description, the authors have pinpointed institutional form, structure, content, and functions as the most significant variables capable of elucidating the diverse forms of networks. These aspects are further elaborated in the context of networks.

After defining networks as a collection of nodes (individual entities or elements within the network), interconnected by functional relationships, the initial aspect to investigate when discussing networks is the configuration these relationships take. An essential metric to consider is network density, which gauges the level of interconnection within a network relative to the total potential connections, offering insight into the extent of node connectivity. High network density suggests that a substantial portion of possible node connections is established, resulting in a tightly interconnected network. Conversely, a network is deemed low in density when only a small fraction of potential connections realises, resulting in a sparse and fragmented structure. What is often observed, especially in large networks, is the formation of small, densely interconnected groups that are part of the larger network. These groups, called cliques, emerge spontaneously and bottom-up among the network's nodes. Considering the complex nature of networks, involving numerous nodes, connections, and being accountable to external stakeholders, the significance of governance cannot be overstated. Network governance, in the context of interorganisational coordination, deviates from conventional hierarchical governance structures precisely because it engages multiple entities in collaborative efforts to attain shared objectives. Therefore, critical elements for effective governance include the establishment of a collaborative goal-setting process capable of aligning the diverse actors contributing to the formulation of common goals. Furthermore, it involves setting up a resilient communication and information system that connects all participants, ensuring accountability and cultivating trust among them. In other words, establishing a communication framework along with information exchange protocols is essential for the functionality and efficacy of the entire network.

Subsequently, these concepts are put into practice in determining the possible configurations of the network. When examining its structure, we address the degree of centralisation and consider the following variations. At one extreme, the equal-partner network is governed by the single organisations composing the network (Figure III). Also defined *rete paritetica* (peer to peer network, Lega 2003) and

shared participant-governed network (Provan and Kenis, 2008), it relies on self-governance by network members. Decisions are taken collectively by members' interactions as no single entity represents the entire network. Shared governance does not comprise a formal administrative entity distinct from network members, rather a sub-set of network participants may perform administrative and coordination activities. Given their extreme flexibility, shared networks can rapidly adjust to environmental changes but, lacking a central leadership, trust issues may arise among members and the ability to direct organisational efforts toward common goals is critically affected.

Coordination evolves based on two criteria: organisational, which promotes horizontal integration for economic purposes (such as specialisation, economies of scope, and competitive advantages), and institutional, which rationalises the formation of networks based on geographical factors (such as population density, traffic patterns, and seasonality⁸⁰). Lacking a hierarchy among members, these integrated systems are often described as horizontal and decentralised.

At the other extreme, the dominated network embraces a highly centralised (brokered) structure. Lega (2003) talked of networks having a single centre of gravity, whereas Child et al (2005) used the term dominated network. The model, depicted in Figure III, is characterised by a strong asymmetry in power since it envisages a single member organisation acting as a broker or, as for the public healthcare sector, hub. By assuming the role of network leader, the dominant organisation is charged with the development of the strategic trajectory for the whole network by taking key decisions, determining adequate resource provision and distribution among members, and coordinating satellite organisations⁸¹. Provan and Kenis (2008) identified two different models for the brokered structure. On one side the lead organisation-governed network refers to the coordination of network

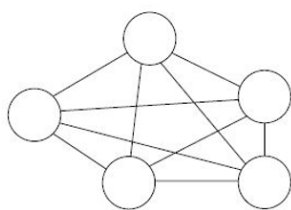
⁸⁰ Among geographical reasons it is possible to highlight the pivotal role played by tourism. Tourist destinations, foremost coastal destinations, are affected by seasonality, namely additional healthcare demand due to the increased population. Healthcare has been proved unable to deal with additional demand during peak season, as the number of serviced offered did not increase accordingly to the demand. Reduced bed availability and decreased hospital admissions imply prioritisation of urgent patients and a consequent delay of elective and non-urgent surgeries and procedures. Investigation of alternative paths and service organisations might help addressing performance drops following seasonality. EZZA, A., MARINÒ, L. AND GIOVANELLI, L., 2019. *Assessing the impact of tourism on hospitals' performance in a coastal destination*. *Tourismos: An International Multidisciplinary Journal of Tourism*, Vol. 1, No. 14: pp. 55-76.

⁸¹ Provan and Kenis note that the dominated network structure often occurs in the healthcare sector where the lead organisation role is played by a core provider agency (i.e., a hospital in community health), due to its central position in the customer or resource allocation chain. PROVAN, K.G. and KENIS, P., 2008. *Modes of network governance: Structure, management, and effectiveness*. Op. cit.

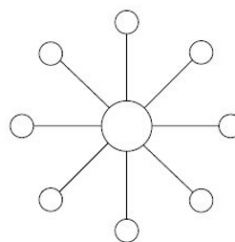
activities and its direction by a single participant member acting as a leader. On the other side, the Network Administrative Organisation (NAO), also envisages a centralised structure, but the network is externally governed by an outside entity either mandated or defined by network members. Typically, the NAO is composed by a single person (network facilitator or broker) or by an organisation.

Figure III. Different network configurations

Shared participant-governed network



Dominated network



Another noteworthy aspect within network analysis pertains to the level of formalisation that collaboration can adopt. Formal networks are characterised by structured connections among the individuals or organisations involved, and they emerge to support essential services and ensure access to them, particularly in cases where normative requirements might otherwise result in the closure of local services⁸². Network formalisation involves implementing structure, guidelines, and procedures to improve the efficiency, effectiveness, and long-term viability within a network and to guarantee the seamless operation of network members while jointly working toward common goals.

When considering the external context, networks exhibit a significant emphasis on addressing the expectations of stakeholders. In the realm of public services, stakeholders' expectations play a pivotal role in ensuring that government agencies and service providers address community needs. These expectations serve as mechanisms for holding providers accountable and enable them to customise their offer to meet desired quality standards. The comprehension and proactive response to these expectations have the potential to enhance service delivery and foster greater trust in government institutions. In essence, when the stakeholders feel that their needs are being met, they are more inclined to place trust and offer support to

⁸² EDWARDS, N., 2002. *Clinical networks: Advantages include flexibility, strength, speed, and focus on clinical issues*. BMJ, 324(7329), p.63.

government entities. Therefore, significant attention must be directed towards stakeholders, both in understanding their needs and in assessing whether the network has been able to meet their expectations. This translates into mechanisms of stakeholder participation in the network's decision-making process, their involvement during evaluation, and also serves as a stimulus to innovate the services offered. At the same time, the involvement of external competition is a crucial aspect of network management, representing the competitive challenges networks encounter from other entities operating within similar or related fields. This external competition presents a dynamic challenge, necessitating networks to adopt a proactive, adaptable, and customer-centric approach. It is worth noting that competition is not always detrimental; networks can explore collaborative and partnership strategies as responses to competition. Establishing alliances with organisations or networks that complement their offerings can yield mutual advantages and bolster their competitive edge.

Ultimately, networks are distinctly characterised by the manner in which daily tasks are executed. The close interplay among network components necessitates the development of a foundation of trust to ensure the success of relationships. Trust serves as the cornerstone for collaborative efforts within the network, effectively lowering transaction costs by encouraging member participation in exchanges, facilitating robust communication by promoting idea and feedback sharing, and enhancing network resilience, allowing trustworthy members to adapt to environmental shifts during crises. Moreover, the management of potential conflicts within networks necessitates precise managerial competencies that are notably more advanced than those required for overseeing individual organisations. Effective conflict management within networks is a vital skill necessary for preserving healthy relationships. Managers should foster transparent communication, engage in negotiation and compromise to discover mutually agreeable resolutions, offer training initiatives to enhance conflict resolution abilities among network members, and adopt a proactive approach in consistently assessing the dynamics within the network.

3.4 Navigating healthcare networks: evolution, principles, and configurations

3.4.1 Theoretical progressions toward healthcare collaboration

During the phase of *managerialism*, one of the drawbacks of New Public Management was its heightened focus on efficiency measures within public organisations. While the primary goal was to strike a better balance between cost reduction and service quality, driven by the significance of public healthcare expenditure, the outcomes have been less than satisfactory. This was primarily due to an excessive emphasis on operational efficiency, which resulted in control systems that centred more on how organisations functioned rather than on individual behaviours. The focus was placed on the control of inputs and outputs rather than assessing outcomes, as it aligned with the government's aim to reduce expenditures using easily measurable metrics. From an organisational perspective, cost reduction was accomplished by systematically reducing the breadth of services offered to citizens, leading to a decline in healthcare quality. During these stringent periods, the overarching objective of public policies was to curtail public spending, and consequently, less emphasis was placed on evaluating the effectiveness of service delivery⁸³.

Whilst focused on the mere internal side of the organisation, from a theoretical point of view, the *component-based approach* in healthcare implied that medical staff only handled its own duties without coordinating with upstream or downstream co-workers. Healthcare providers neglected the external dimension, losing sight of the coordination mechanism required to deliver valuable care. The rise of healthcare networks is defined as a system-response to an emerging paradigm of care characterised by the ever-increasing importance ascribed to chronic diseases, necessitating close integration among primary and secondary care and enhanced coordination among settings⁸⁴. Under these circumstances, the idea of one hospital serving as the primary provider of all amenities for a local community has become no longer tenable⁸⁵, being replaced by an alternative

⁸³ MUSSARI R., 2017. *Economia delle amministrazioni pubbliche*. Op. cit.

⁸⁴ PERRI, P., GOODWIN, N., PECK, E. AND FREEMAN, T., 2016. *Managing networks of twenty-first century organisations*. Springer.

⁸⁵ BAKER, C.D., and LORIMER, A.R., 2000. *Cardiology: the development of a managed clinical network*. Bmj, 321(7269), p.1152.

network-based approach to care delivery. Initially, the focus was placed on hospital networks, namely horizontal organisations dedicated to the acute care. The main need was to restructure the often-redundant hospital services, where service duplications were driving up public spending in the face of declining demand, due to a greater awareness of the role of territorial care⁸⁶. Moreover, networking has been developed as a strategy for survival in an increasingly competitive environment where resources are limited and the service delivery extremely fragmented. In fact, among the theoretical advantages associated with healthcare collaboration, a major cornerstone is constituted by a more standardised, evidence-based form of treatments as well as enhanced accessibility to care services.

There are several advantages associated with healthcare networks. Firstly, by delegating the management of non-clinical support services, healthcare networks can concentrate on meeting the actual needs of patients. Second, networks are expected to facilitate the dissemination of knowledge and clinical expertise across organisational and professional boundaries, countering competitive pressures in the healthcare quasi-market. Knowledge sharing promotes the circulation of standardised, evidence-based treatments and best practices⁸⁷, contributing to equitable and rational acute care as well as improving protocol development⁸⁸. At the same time, theoretical benefits include flexibility in tailoring care to patients' needs, local requirements, and the effective delivery of specialised services⁸⁹. Furthermore, networks demonstrate resilience and agility in promptly addressing rapid environmental changes. This dynamic collaboration enables networks to swiftly adapt to medical advancements, facilitating the rapid dissemination of innovation, and optimising both quality and volume of care⁹⁰. The dynamism of networks is also evident in how it stimulates creativity through providing enhanced opportunities for interaction among individuals with diverse backgrounds. However, it is important to note that researchers have pointed out that networks may not serve as a one-size-fits-all solution for all healthcare services. Networking

⁸⁶ LEGA, F., 2016. *Leadership e management dell'azienda sanitaria: conoscere il settore e il sistema, organizzare i servizi, dirigere i professionisti*. Egea.

⁸⁷ ADDICOTT, R., MCGIVERN, G. and FERLIE, E., 2006. *Networks, organisational learning and knowledge management: NHS cancer networks*. Public Money and Management, 26(2), pp.87-94

⁸⁸ LEGA, F. and SARTIRANA, M., 2011. *Managed clinical networks: scope, evidence, and feasibility*. International journal of clinical practice, 65(7), p.725.

⁸⁹ THE SCOTTISH OFFICE, *Department of Health*. 1999. *Introduction of Managed Clinical Networks within the NHS in Scotland*. Leeds: NHS Executive

⁹⁰ EDWARDS, N., 2002. Clinical networks: Advantages include flexibility, strength, speed, and focus on clinical issues. Op. cit.

can present specific difficulties, including the potential for deskilling of peripheral units as clinical expertise centralises at hub facilities, hampering communication, and fostering competition among priorities, which may result in confusion and a decrease in quality.

One of the key elements of change has been the concept of *value-based care*, a healthcare delivery mode that prioritises the quality of care over the volume of services provided. It was introduced as a response to the shortcomings of the traditional fee-for-service model, which often incentivised overutilisation of services without ensuring improved patient outcomes. At the heart of value-based healthcare lies *patient-centred care*, a fundamental concept that revolves around placing patients at the core of care delivery. This approach emphasises the importance of comprehending patients' preferences, values, and objectives to customise care plans according to their unique requirements and desires. Transitioning from a system where healthcare providers were compensated primarily for the quantity of services provided to one that incentivises the delivery of high-quality, effective care necessitated a reemphasis on measuring outcomes. These outcomes encompass various aspects, including clinical results (such as decreased mortality rates and enhanced quality of life), patient-reported experiences (like patient satisfaction), and economic effectiveness (including cost-efficiency). Public administrations reacted to the new scenario by rationalising the idea of outcomes of public policies as depending on a considerable variety of actors. The decision-making process has been widened, involving not only institutions and main stakeholders but empowering the role ascribed to patients. Consequently, patients are now involved both in designing care processes (upstream) and in evaluating the service provision (downstream), namely, the change in the core logic of the provision has occurred in line with the *patient-centred care*.

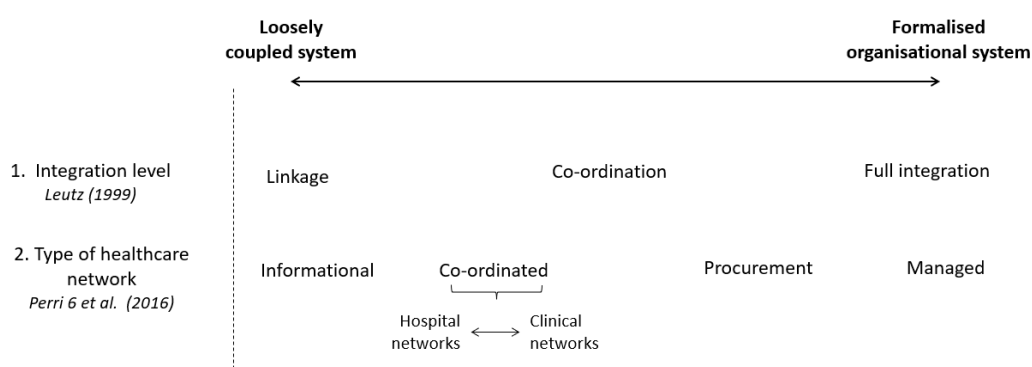
Collaborative efforts have promoted a more comprehensive perspective on the various stakeholders involved in a fresh approach to healthcare. This approach acknowledges the increasing complexity of patients' needs, necessitating the involvement of multiple healthcare professionals and highly coordinated service providers. It aligns with the principle of the *continuum of care*, where the goal is to ensure that patients experience a seamless and uninterrupted transition of care throughout their entire healthcare journey. This concept was introduced as a response to fragmented healthcare systems, aiming to guarantee that patients

receive continuous care, spanning from preventive measures and early interventions to treatment, recovery, and ongoing management.

3.4.2 Defining networks within the healthcare context

Problematic is that the confusion surrounding the term network is also reflected in the literature on healthcare networks, which fails to converge toward a unified definition. Although the concept of networks in healthcare may be challenging to grasp, researchers concur on the need to categorise various types of healthcare collaborations along a continuum based on the degree of formality in their relationships. Just as the use of the term network varies in general discourse, the healthcare literature also acknowledges different interpretations and shades of meaning. Indeed, networks can be considered a hybrid organisational structure, situated between hierarchy and the market. However, it is important to recognise that within the realm of healthcare networks, there exists a spectrum of forms that range from those with loose connections to more structured ones built upon hierarchical relationships. The conceptual continuum of network forms in healthcare is articulated around the level of management integration, that is organised integration expressed in terms of management centrality, resource control and organisational complexity⁹¹. A first classification concerns the integrated care literature and is depicted in Figure IV.

Figure IV. The continuum of network forms in healthcare



Leutz (1999) proposed a classification rooted on the concept of level of integration, namely on the level of formality of the ties connecting network

⁹¹ GOODWIN, N., PECK, E., FREEMAN, T. AND POSANER, R., 2004. *Managing across diverse networks of care: lessons from other sectors*. Op. cit.

members. According to this classification, there exists three levels of integration. *Linkage* represents a loose approach to integration where organisations develop ad hoc protocols to facilitate the collaboration within the existing system. Following, in the *co-ordination* level, defined structures are developed to ease communication while promoting information sharing and to overcome problems related with a fragmented and discontinue provision of the service. Nevertheless, the coordination resembles an enclave structure modelled by high developed social ties but low regulation (i.e., provide a broad range of treatments for a specific disease group). Lastly, a *fully integrated* network is representative of hierarchical ties established among network members. Integration involves a complete reorganisation of the whole system, the features of which include consolidated responsibilities, resources, and funds, which is to say developing a structured mechanisms to regulate the relationships withing the network.

The emphasis on fully integrated network has led to the implicit assumption that the more hierarchical are the relationships, the most effective is the network. The reasons of such argument are rooted in the belief that full integration allows for development of a unified, comprehensive service able to tackle the needs of complex patient groups. At the same time, fully integrated networks benefit of greater legitimation in using coordination techniques (i.e., disease management, Integrated Care Pathways). Hierarchical networks are deemed to achieve better levels of integration and to achieve more easily the integration goals.

In contrast to this belief, hierarchical networks may be considered overly structured and overly managed whenever members of the network do not fully realise their potential gains or whenever innovation is hindered⁹². Ultimately, fully integrated networks turn out to work best for small subsets of chronically ill patients facing unstable conditions and frequent interactions with the healthcare system, that is structural integration is appropriate only in cases when all agencies within the network are required to engage in ongoing professional collaboration to provide the service⁹³.

Leutz classification serves as a starting point to clarify integration as a dynamic concept involving loose linkages rather than more structured and hierarchical ones.

⁹² GOODWIN, N., PECK, E., FREEMAN, T. AND POSANER, R., 2004. *Managing across diverse networks of care: lessons from other sectors*. Op. cit.

⁹³ PERRI, P., GOODWIN, N., PECK, E. AND FREEMAN, T., 2016. *Managing networks of twenty-first century organisations*. Op. cit.

A second classification is proposed by Goodwin et al (2004) and reiterated by the same authors in 2016⁹⁴. What the authors propose is a conceptual continuum of network forms in health and social care using the dimensions of social organisations proposed by Durkheimian (Figure V).

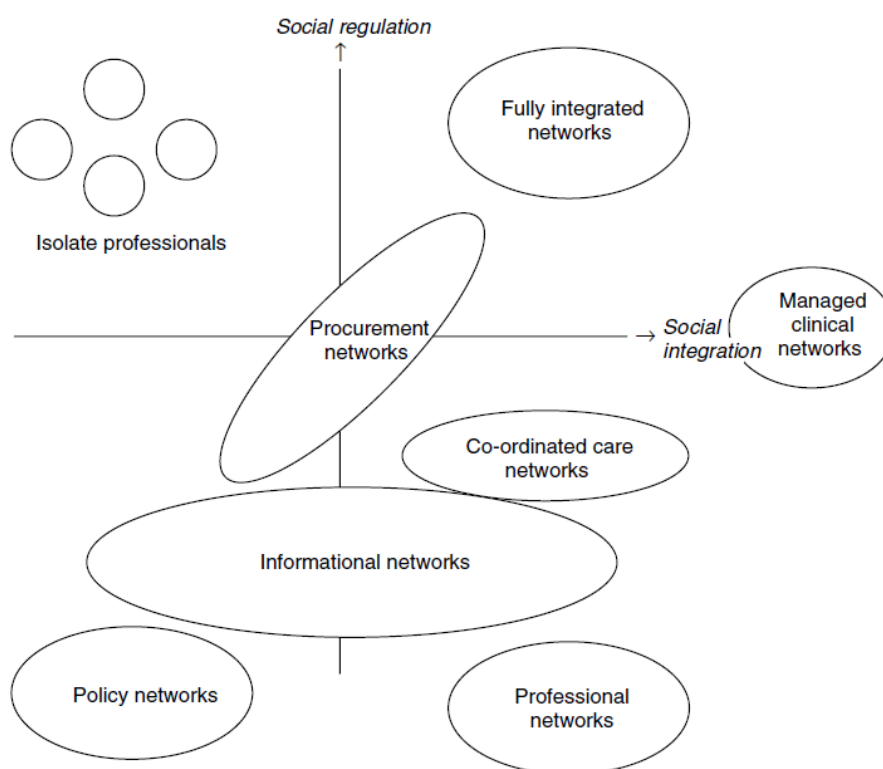
Informational and learning networks

Representing the most common form of networks in healthcare, informational networks are established with the main aim of bring individuals and organisations together to share best practices, to be involved in information sharing as well as to align policies for specific services among institutions. Therefore, the rationale for informational networks is not necessarily grounded on the development of integrated delivery structure, but it lays instead on the dissemination of knowledge.

It is possible to describe an informational network as composed by professional, acting as an enclave group, and needing managerial guidance based on negotiation. Informational networks are relatively unstable since their survival depends on the commitment of members to consistently engage with information sharing. In order to sustain the commitment, the network needs to be perceived as useful and enriching by members, who recognise the worth of participating. Thus, charismatic leaders are fundamental in the initial phase of the network to sell the participation to non-member peers. This is the main reason for mandated informational networks to fail, imposing what should represent a personal choice based on commitment and esteem is deemed a recipe for catastrophic outcomes. Informational networks are supported financially by participating members or organisations, and co-ordination is exerted by either a neutral coordinating body (e.g., an academic institution) or an elected representative body within the network. Hence, network management is not facilitated by a single person but rather is grounded on support and administrative activities aimed at guaranteeing cohesion and facilitate the relations among members. Therefore, an effective informational network does not guarantee success but, through a process of facilitation and mediation may provide help to participants to better build knowledge.

⁹⁴ PERRI, P., GOODWIN, N., PECK, E. AND FREEMAN, T., 2016. *Managing networks of twenty-first century organisations*. Op. cit.

Figure V: A conceptual representation of network forms in healthcare



Source: Perri et al. (2016)

Information technology (e.g., video conferencing, databases, telemedicine) is also found to play a crucial role in collaborative knowledge-sharing by allowing the spread of information among geographically-disperse members (in this case, the network assumes the name of information enhanced professional networks). Nevertheless, effective IT-based informational networks should connect peer-respected members. By behaving as enclave, informational networks are built on reputation and esteem, therefore when competition among professionals exists, network effectiveness is negatively affected.

Co-ordinated networks

Moving to the right of the continuum, co-ordinated networks are characterised by a more formal integration among participants, usually through integrated care pathways. The main aim of this typology of network is to redesign the service while promoting cross-institutional partnership among professionals without threaten the status of the diverse organisations involved. Co-ordinated networks are in fact composed by autonomous but interdependent organisations brought together to

provide an effective package of treatments. Described as unstable and dynamic, co-ordinated networks vary their composition over time by individuals or organisations entering or resigning. Instability is also brought by members of the network collaborating while simultaneously competing in other areas. Similarly, these networks strive to find an equilibrium since different forces work for establishing a comprehensive identity for the network while single members pursue individualistic goals. To address the issue, network's leadership must rely on both clinical and administrative support.

Although co-ordinated networks have taken multiple forms in different countries (e.g., managed clinical networks in Scotland, collaborative networks in England, medical programmes in Sweden), it is possible to represent them on a further continuum of their own, depending on the degree of formalisation. On the left end the *hospital networks* are hub and spoke models developed among healthcare providers, where the involved hospitals share several tasks in order to enhance the coordination between them. The model allows for the centralisation of specialist care and usually represents a useful solution when dealing with problems of rurality, that is small hospitals are able to survive only by participating in a bigger network. Such solutions reveal themselves appropriate when increasing specialisation is required, when providers need to share costs and risks or whenever equality in care accessibility needs to be monitored. The functioning of hospital networks is typically referred to inter-organisational protocols able to guarantee the continuity of care. At the other end of the spectrum, *clinical networks* develop integration both between and within care professionals. What differentiates this approach is the focus placed on professionals rather than institutions, the clinical network acts as a virtual organisation where participants jointly develop shared guidelines and tools by providing care as they were a single organisation. The reasons behind a clinical network are mainly to provide a more patient-focused care and to disseminate best practice. For this reason, clinical networks are often described as passive, namely politically driven to prevent the closure of existing hospitals or specialities. The Scottish Office Review (1999) broke new ground in its attempt to promote vertical integration by providing the definition of managed clinical networks as *linked groups of professionals from primary, secondary, and tertiary care working in a coordinated manner unconstrained by existing professional and existing organisational boundaries to ensure equitable provision*

of high quality clinically effective services. Managed care networks were proposed to address the rising difficulties in ensuring acceptable standards of care, especially in rural areas. Such forms of co-operation are centrally mandated and develop a strong regulation, placing them at the hierarchical end of the network continuum within the co-ordinated forms of networks.

Procurement network

The third type of network relies on the contractually based procurement as main mechanisms of clinical integration between hospitals. In the US, this phenomenon is defined as *integrated healthcare network*, namely a formal agreement among providers to deliver a comprehensive offer based on the continuum of care (including insurance, outpatient, and inpatient services to long-term care). The grounding belief is that contractual networks offer enhanced quality of care, better accessibility, reduced costs, and more effective operations. Procurement networks have shown to outperform when the integration achieved is moderated, in fact even though centralised hospital networks are deemed to better perform, over-centralised networks inhibited innovation and produced excessive bureaucracy. Moderated integration mainly regards financial and organisational activities, whereas low integration arose within clinical and physicians' integration. At the same time, achieving a centralised management has proven more difficult the broader the scope of activity within the network.

Nevertheless, a major tension uncovered by the literature is the relationship between costs and benefits. To date, there is no evidence supporting the effectiveness of the model, on the contrary contractual networks do not compensate the additional costs of providing integrated care across a continuum with the flourished benefits for patients. Moreover, despite the idea of public providers health systems being more effective thanks to the formalisation by contract, evidence demonstrated that the use of contractual forms of integration lessen the effectiveness degree while producing more costs.

Managed care networks

A growing interest has developed in fully integrated networks justified by the assumption that the closer to the hierarchical end of the continuum, the better the level of integration. Such affirmation deals with the idea of fully integrated

networks as endpoint thanks to which is possible to achieve long-term relationships among member organisations.

Despite the theoretical advantages ascribed to this model – which include drops in duration and occurrence of short-term hospitalisation, decreased admission to long-term structures and decrease in costs – evidence on effectiveness improvements is lacking. Nevertheless, researchers have proven this model to be appropriate for dealing with small subsets of patients frequently interacting with the structures due to their unstable conditions, that is hierarchical networks are appropriate models when care provision necessitates ongoing collaboration between professionals. However, success of the model has been hindered by the same professionals, unwilling to work with managed models.

Similarly, the Italian Federation of Health and Hospital Companies (FIASO) proposed an evolutionary classification of clinical networks in 2013, as shown in Figure VI.

Figure VI. Evolutionary classification of clinical networks



Source: Adapted from Osservatorio FIASO. 2013. Il ruolo delle Aziende Sanitarie nelle reti cliniche.

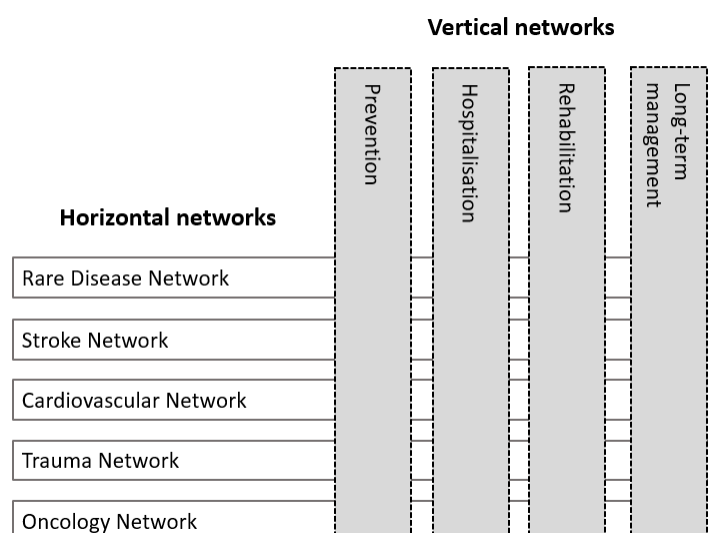
The proposed classification outlines three stages of network evolution. In the initial stage, professionals are connected through "weak" links, primarily relying on knowledge and sporadic collaboration requests. This phase is termed *enclaves or individualistic networks*, essentially reflecting professional networks in a narrow context. As networks progress, collaboration becomes more structured, characterised by organisational practices, routines, institutional support, and the use of facilitating technologies. This phase is categorised as clinical networks or *managed clinical networks*. The most advanced stage involves clinical networks

facilitating the development of diagnostic, therapeutic, and care pathways. These networks strengthen the hospital network and integrate it with territorial services, potentially centralising production platforms. This advanced stage is known as *managed care networks*, which extend the focus beyond clinical care to encompass the patient as a whole person.

3.4.3 Shaping networks in healthcare: principles and configurations

So far, we have examined the characteristics and factors that can influence networks in a general context. Regarding healthcare, the same characteristics can be observed but are tailored to this specific context. From a structural perspective, a fundamental initial characteristic is the configuration that the network assumes. Healthcare networks can be structured according to a horizontal criterion, in which networks are related to the concept of homogeneous clinical pathways by pathology, or according to a vertical criterion in which multiple pathologies are managed in a cross-cutting manner across various clinical pathways based on the severity of care (Figure VII).

Figure VII. Horizontal and vertical networks



Source: Adapted from Osservatorio FIASO. 2013.

Il ruolo delle Aziende Sanitarie nelle reti cliniche.

The horizontal configuration refers to forms of cooperation among facilities operating at the same level of care (e.g., a network of hospitals). These networks are established with the aim of reducing duplication in service provision and

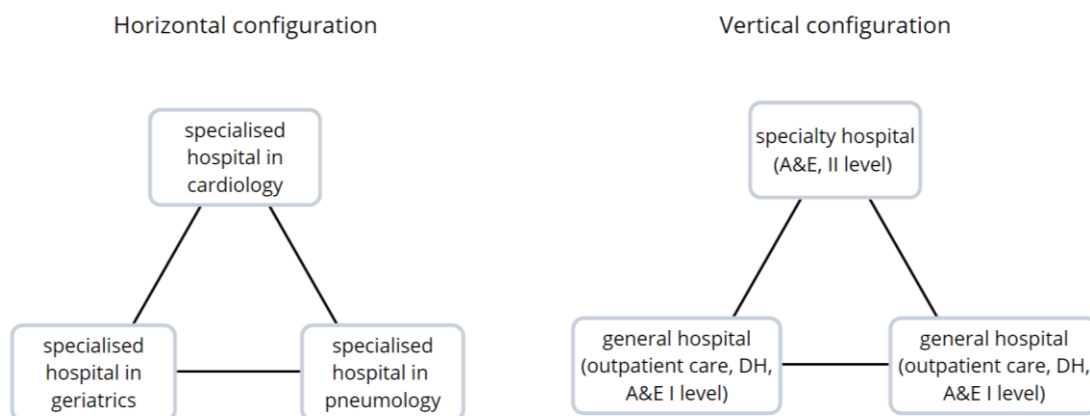
lowering service delivery costs. In healthcare, they may also represent coordination arrangements between organisations providing the same level of care but treating different severity of the disease (i.e., multihospital systems where hospitals are affiliated with other hospitals)⁹⁵. The principles guiding the formation of horizontal networks can be either territorial (the network is created to improve accessibility to care, particularly in geographically dispersed areas) or medical, related to the specialisation of care (to ensure alignment between demand and supply).

It is often argued that one of the main problems associated with horizontal integration is the development of *focused factories*. These multidisciplinary organisations, by identifying homogeneous groups of customers, seek to deliver a limited set of high-quality services. Taking advantage of their high specialisation, structures belonging to the network offer complementary services addressed to the same illness and possible adverse effects⁹⁶.

Referred to as the pole-satellite model (*configurazione poli - antenne*), the horizontal configuration involves patient reception at each participating facility within the network. In this model, each hospital serves as both a pole and a satellite. As a pole, it delivers specialised care through hospitalisation for specific severe diseases within its area of expertise. Simultaneously, the hospital functions as a satellite by providing general secondary care for less severe conditions related to other diseases. However, for acute cases requiring hospitalisation, the patient is referred to the specialised hospital within the same network. Figure VIII illustrates this scenario, where one hospital specialises in cardiovascular diseases and offers secondary care for mild conditions. Depending on the specific medical condition and its gravity, the patient can be either be treated locally in the receiving hospital (mild condition, diverse diseases) or be referred to the specialised hospital within the same network (critical condition requiring specialised care).

⁹⁵ On the effects of horizontal integration see: SARKA, P. AND PAVLA, S., 2016. *Horizontal Integration of Hospitals—Does it have an Impact on their Effectiveness?* Procedia Economics and Finance, 39, pp.553-561.

⁹⁶ On focused factories in healthcare refer to BREDENHOFF, E., VAN LENT, W.A. & VAN HARTEN, W.H. 2010. *Exploring types of focused factories in hospital care: a multiple case study*. BMC Health Serv. Res 10, 154

Figure VIII. Horizontal and vertical configurations in healthcare

Source: Adapted from Lega (2003)

Vertically integrated configurations encompass services provided by diverse organisations according with increasing clinical severity and complementarity of services. The vertical configuration refers to the integration of different levels of care, including basic or home care, specialised care, intermediate specialised care (university clinics and research centres), and a final level represented by long-term rehabilitation and residential care. The main objective is to treat the condition in the most clinically and economically appropriate setting, which means at the level of intervention that is both clinically effective (in terms of patient outcomes) and cost-effective⁹⁷. It can be stated that the vertical configuration is based on a real hierarchy of levels established on the complexity and severity of the condition, allowing the patient to move through the different levels as the disease worsens. In its vertical interpretation, the hub and spoke design arranges the healthcare structures according to the level of care they provide: Specialised treatments for complex medical cases are provided through the central structure (hub), while other structures in the network (spokes) are responsible for secondary care through outpatient facilities, first aid or hospitalisation for not complex cases⁹⁸. Nevertheless, while the acute phase is handled within a hospital environment, the

⁹⁷ LEGA, F., 2016. *Leadership e management dell'azienda sanitaria: conoscere il settore e il sistema, organizzare i servizi, dirigere i professionisti*. Op. cit.

⁹⁸ According to the Italian regulation, emergency departments are located into hospitals and are divided into first level DEA (*Dipartimento di Emergenza Accettazione*) and second level DEA depending on the user base and the services offered. DEA I is identified as a spoke, it serves a user base ranging from 150.000 to 300.000 and provides A&E service for minor to severe conditions. DEA II, acting as a hub, covers a user base between 600.000 and 1.200.000 and offers major A&E. For further detail on the specialities for each DEA refer to Ministerial Decree 70/2015.

vertical configuration reshapes the care journey, ensuring that care is provided in a community-based setting in line with the principle of care continuity. This involves engaging community facilities in the realms of prevention, diagnosis, and rehabilitation.

In both configurations, the focal point is represented by the patient, who, as it moves through different organisations and settings, must be accompanied by the presence of a tutor known as a case manager. Case managers are skilled individuals responsible for coordinating and overseeing the treatment of patients, particularly those facing complex medical conditions. They operate across diverse healthcare settings, aiming to guarantee patients receive all-encompassing and efficient care that is not only cost-effective but also tailored to the patient's needs. Their efforts play a pivotal role in enhancing patient outcomes, elevating patient contentment, and promoting cost-efficient healthcare provisions. Likewise, networks should place a strong emphasis on the diverse and multidisciplinary composition of their teams. As previously stressed, multidisciplinary consultations are pivotal in enhancing outcomes across a range of medical conditions. Consequently, the framework should incorporate processes designed to harness the expertise of professionals from various fields. The dissemination of recent medical innovations is of fundamental importance as well. Therefore, the network must include internal audit methods for evaluating Clinical Pathways and ensure training programs for network operators, aimed at both clinical discussion for the dissemination of new evidence-based skills and the enhancement of organisational and management capabilities.

Furthermore, when coordinating care across multiple settings, it becomes essential to establish well-defined communication protocols that can encompass the patient's clinical information, facilitating its transmission between different nodes within the network (i.e., criteria for patient management, discharge procedures, protected hospital discharge, internal transfer methods). Healthcare networks place considerable emphasis on crafting precise protocols, frequently in the shape of company-specific and regional Clinical Pathways, to secure seamless operational alignment throughout the diverse stages of the care process. These documents govern the methods of information exchange, delineate primary responsibilities, outline minimum information requirements, and establish timelines for information transfer. Furthermore, there is an expectation of well-defined formalisation for

information and monitoring systems. Organisations involved in the network are obliged to share pertinent information with the network-level authority concerning patients, cases, resources, and treatment schedules. The ultimate objective is to create an information system within the network framework that can effectively incorporate structural, procedural, and outcome indicators, which are fundamental for evaluating and overseeing the network's performance.

One of the most contentious aspects concerns the leadership of healthcare networks, understood as the entity responsible for strategic choices and overseeing network activities. Network governance involves various actors (regional representatives, physicians, nurses, volunteer associations, private organisations) who collaborate to address complex issues that require collective efforts and resources. Nevertheless, each network defines its own structure, its coordinating bodies, and its mechanisms and processes through which a healthcare network is organised. Moreover, the nature of the network holds significant importance within the public sphere. Networks that originate from collaboration agreements among organisations intending to converge into a networked form tend to demonstrate heightened levels of commitment, enhanced trust among their members, and an elevated degree of internal and external legitimacy. Conversely, in the context of healthcare, a public good to be preserved, networks are frequently imposed from the top-down by governmental authorities. These networks emerge as a pre-formed set of organisations compelled to collaborate within a specific geographical area and confronted with distinct challenges compared to the previous scenario. In this context, an initial ambience of scepticism, a feeling of coercion, and limited receptivity to collaboration often prevail. Consequently, the managerial approach must be flexible, tailored to the network's nature, and anticipate a diverse set of actions, mediations, and strategies.

As we conclude this chapter, we have analysed the theoretical evolution of managerial paradigms, from the foundational concepts of Old Public Administration to the collaborative and network-centric approaches of Public Governance. The analysis examined the multifaceted meanings, configurations, and defining characteristics of networks, both in general terms and within the complex field of healthcare. These crucial elements will now pave the way for the next chapter, where the concepts of effectiveness and networks will converge.

CHAPTER IV

DEFINING NETWORK EFFECTIVENESS: CONCEPTS AND DIMENSIONS

- 4.1. Effectiveness in networked collaborations: concepts and frameworks
- 4.2. Determinants of network effectiveness and their impact on outcomes
 - 4.2.1 Structural determinants
 - 4.2.2 Context determinants
 - 4.2.3 Process determinants

The primary intent of this chapter is to provide a comprehensive examination of the various frameworks employed to assess network effectiveness, tracing their evolution across different time periods and methodological advancements. It delves into the historical progression of research in this area, highlighting how early studies predominantly concentrated their attention on structural and contextual factors as key determinants of network performance.

In recent years, theoretical developments have broadened the scope by including process-related determinants, recognising the dynamic interplay of activities within networks. By presenting this historical trajectory, the chapter seeks to offer a nuanced understanding of how the conceptualisation of network effectiveness has evolved over time. The chapter introduces a preliminary framework for the study, which will be used as the foundational structure for analysing and assessing the determinants affecting network outcomes. This framework serves as the guiding structure through which analyse and evaluate the determinants of network effectiveness throughout the remainder of the research, ultimately contributing to a more robust and informed exploration of network performance in healthcare.

4.1 Effectiveness in networked collaborations: concepts and frameworks

It is noteworthy to recall that this analysis has embraced a tripartite definition of effectiveness: clinical, signifying the capacity of an intervention to positively impact health; internal, indicating the extent to which the entire healthcare system attains defined goals for specific, evidence-based clinical outcomes; and external, pertaining to the ability to not only properly treat patients but also satisfy their needs. So far, the reasoning developed around the concept of effectiveness relied on a partial, single-focused perspective. Common element among the provided definitions of effectiveness, is the use of the singular pronoun. Namely, effectiveness has been so far addressed to the single organisation (i.e., defined as the extent to which defined goals for set outcomes are achieved) or single user (i.e., activities of public organisations aimed at satisfying clients' needs). Nonetheless, the significant concerns raised regarding effectiveness become even more challenging when evaluating it on a network-wide scale. While effectiveness has been explored as an economic aspect concerning individual organisations, the uncertainty surrounding its measurement within a network context demands further examination. Defined as *the attainment of positive network level outcomes that could not normally be achieved by individual organisational participant acting independently*⁹⁹, network effectiveness relies on the assumption that organisations joint together in groups are more effective in delivering complex community-services than the same organisations acting autonomously¹⁰⁰.

Assessing effectiveness from a collaborative standpoint amplifies the challenges identified for individual organisations, as it requires considering the collective contributions of various organisations in producing one or more components of the same service. Previous studies on performance assessment traditionally distinguished between the macro level (where performance is measured in statistical terms and involves jurisdiction-wide issues) and micro level (performance of single organisations). Nevertheless, collaborative networked agreements refer to multi-organisational entities laying between the two levels and

⁹⁹ PROVAN, K.G. and KENIS, P., 2008. *Modes of network governance: Structure, management, and effectiveness*. Op. cit.

¹⁰⁰ ALTER, C., and HAGE, J., 1993. *Organisations Working Together*. Newbury Park, CA: Sage Publications.

requiring a further, intermediate, level of assessment. Integrated provision of the service focuses on cumulative outputs and their ability in satisfying the multifaced needs of users making evaluation approaches developed for single organisations highly inappropriate for network performance assessment. The single service provided by a member organisation (single part of the network) is merely considered a component of the overall service, it is the entire network performance that determines user's satisfaction. Consequently, conventional measures of performance introduced to evaluate single organisations need to be refocused to properly reflect the linked nature of entities participating in the network. On a more practical side, the traditional interpretation of performance at the micro level also resonates at the community level since efforts to evaluate public networks are strongly impacted by the role of external stakeholder groups. When expressing evaluations on network performance, external stakeholders focus solely on specific providers, while network performance is often measured by the presence or absence of a specific service within the network rather than the quality of the combined service.

The emphasis on the different levels of assessment produces two major considerations: the effectiveness of the single participants is deemed important for achieving network effectiveness but, at the same time, the effectiveness of the entire network does not imply that all members are effective in providing the service.

Second, a fundamental problem concerning networks arises from the little agreement on their evaluation. As previously stated, the multiple-stakeholders perspective implies dealing with different goals and expectations. The interests at stake vary in view of the perspective under consideration. Thus, effectiveness understanding may diverge among constituents, often stating conflicting views. Then, of the several critical questions proposed by Cameron (1986) the core question to ask concerning networks becomes *effectiveness for whom*, as members' perception of network effectiveness may vary significantly. These difficulties have been tackled by management literature by considering both the multi-dimensionality of network performance evaluation as well as the multi-perspective approach. The theoretical framework developed by Provan and Milward in 2001 identifies three levels of network performance (community, network, and single

Table IX. Level of network analysis and related effectiveness

Source	Level of network analysis	Effectiveness	Effectiveness criteria
Provan and Milward (2001)	Community	It reflects the perspective of clients; networks are evaluated by the benefits experienced by those served by the network by assessing aggregated outcomes and evaluating the costs of treatments for the client group within the community	Cost to community, building social capital, Public perceptions that problem is being solved, Changes in the incidence of the problem, Aggregate indicators of client well-being
	Network	Network-level effectiveness can be assessed by counting agencies entering/exiting the network, the range of services provided by the network, the strength of relationships among members and by analysing the administrative structure of the network	Network membership growth, Range of services provided, Absence of service duplication, Relationship strength (multiplexity), Creation and maintenance of network administrative organisation, Integration and coordination of services, Cost of network maintenance, Member commitment to network goals
	Participant	Effectiveness is analysed referring to each partner that makes up the network. It mostly refers to members' satisfaction in participating in the network and is reflected by higher legitimacy, enhanced resource acquisition, cost sharing and offering better outcomes for clients	Agency survival, Enhanced legitimacy, Resource acquisition, Cost of services, Service access, Client outcomes, Minimum conflict across multiple networks
Mandell and Keast (2008)	Environmental	Measures of effectiveness at this level therefore include how well conflicts can be resolved and the resulting changes in behaviour in how the parent organisations and other relevant stakeholders view the need for the continuance of the network	Support of external sponsors to legitimate network operations, Willingness of key stakeholders to continue support the network over the long term, Willingness to contribute (money, staff, time)
	Organisational	Effectiveness is determined by the degree to which the structural characteristics allow for the development of a common vision and commitment to the whole, the extent to which all stakeholders are included in the process and that the interdependence of the participants is recognised	Degree to which structural characteristics allow for goals to be accomplished, flexibility of both formal & informal rules and regulations, Degree to which sanctions (formal & informal) can be imposed when needed, Ability to secure resources from external sources, to maintain relations with key external stakeholders, to maintain commitment of 'parent' organisations/groups, Ability to meet changing social, political, economic & legal conditions in the external environment
	Operational	Effectiveness at this level is determined by the extent to which participants have developed not only a better understanding of each other, but whether they have developed a shared language and culture, new ways of communicating and the ability to find common ground.	Degree to which participants can carry out the formal rules & regulations in order to accomplish tasks, can get along in terms of working together effectively and resolving conflicts, can resolve their commitment to their parent organisation and their commitment to the whole, Development of new skills of participants

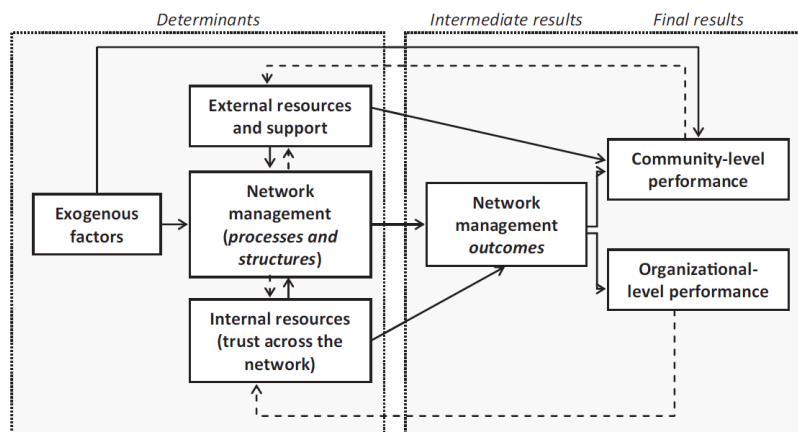
Source: Adapted from Provan and Milward (2001) and Mandell and Keast (2008)

participant), as illustrated in Table IX. Across the three levels, effectiveness is achieved only when the needs of three groups identified by the agency theory are satisfied¹⁰¹. Cepiku (2014) built on Provan and Milward paradigm by integrating performance determinants and grouping the three levels into intermediate and final results (Figure IX). The model widens the traditional dichotomy of performance determinants – exogenous vs. endogenous – by including two more determinants considered external to the network but partially laying in the management's sphere of influence. In the author's view, network performance is determined by the traditional endogenous factors whose government rests with management's abilities (i.e., process issues like network growth, service coordination, interactions among members) and exogenous factors over which management has little control (i.e., voluntary, or mandated nature of the network, complementarity of partners, existing level of trust, goal consensus). Among the latter, the development stage of the network is considered of great importance by the literature. Networks are time-sensitive entities, their performance shifts in nature and their evaluation should consider their maturity. Being a type of arrangement strongly centred on the development of relationships, the initial period is characterised by a limited base of relations and the willing to both expand the net and maintain the current connections. In the final stage, networks are expected to flourish and focus on collective tasks. Performance assessment is intended to evolve accordingly, in order to capture changes in every stage. The model further provides two more performance determinants: internal resources (i.e., trust across network) and external resources (i.e., support from public opinion, resource munificence); which, despite traditionally falling into exogenous factors out of management's control, can somehow be influenced by it.

In terms of outcome, the model distinguishes between intermediate results, corresponding to network-level outcomes concerning the quality of the interaction and final results, equivalent to the community and participants levels of performance. The dynamic model envisaged by Cepiku is eventually completed by influence loops where the community results affect external resources and participants performance produces effects on internal resources.

¹⁰¹ Agency theory declined in the network scenario distinguishes between principals, those who fund the network; agents, who work in the network and manage it and clients, those who benefit from the service provided.

Figure IX. A dynamic Multidimensional Model of Network Performance (MMNP)



Source: Cepiku (2014)

Three-sided is also the model proposed by Mandell and Keast (2008), (Table IX), who developed non-traditional performance measures for assessing networks effectiveness. The model encompassed three operational levels: environmental level of functioning, which is grounded on the belief that networks are made of interactions: internal - among members - and external - among stakeholders and other networks - each of whom holds different expectations. Consequently, effectiveness is determined by the legitimacy deriving from outside relevant stakeholders, their genuine commitment in working toward the alignment of the goals of the organisation that they represent and the whole network, and conflict resolution. The organisational level deals with the assumption that network performance is influenced by the structural characteristics of the network. Depending on the way these characteristics are arranged, participants are able to build commitment toward the whole network and enhance interdependence. The operational level deals with the key role played by interactions among individual participants. The development of a shared culture, values and rules helps participants to learn how to manage communication.

Complexity in assessing effectiveness at the network level is further enhanced by the nature of the network. Network effectiveness is deemed of considerable relevance, especially for the public sector. Nevertheless, networks may involve both private and public providers. Merging the evaluation of public and private entities, each stating different evaluation systems implemented on a voluntary or mandatory

basis, hinders the evaluation efforts. Consequently, regulatory differences must be taken under due consideration to consistently assess network effectiveness.

Concerning the final goals of networks and given the shortage of public funding, public policies should pursue the efficient allocation of resources to providers which adequately satisfy public needs¹⁰². With cost reduction as a primary objective of public interventions, the justification for public networks lies in their commitment to improving service quality through fair access policies, responsiveness, and seamless integration. At the same time, collaborative forms of work offer the opportunity to public providers to joint deliver the service while maintaining acceptable autonomy. Thanks to their ability to work together informally, public organisations experience an easier transition toward collaborative arrangements implying autonomy constrictions, contrary to private companies which must abandon the competition in favour of cooperation.

In conclusion, the significance of measuring effectiveness extends beyond the confines of individual organisations and holds particular relevance within network contexts, especially in the realm of public services. Understanding and enhancing effectiveness at the network level is vital as it directly impacts the quality and efficiency of services provided to the public. To delve deeper into this crucial topic, the following paragraph explores the key determinants that contribute to network effectiveness.

¹⁰² Relying on Provan and Milward (2001) paradigm, public sector networks adhere to the community level, namely the effectiveness of a network is defined by its ability in solve problems and serve clientele. As assessed by Cepiku et al. (2021) performance at community level has been the main focus of network research due to its major contribution in clients' needs satisfaction and simultaneous difficulty in analysing the three levels all together.

4.2 Determinants of network effectiveness and their impact on outcomes

In recent years, several studies investigating the determinants related to network effectiveness have proposed theoretical advances in their categorisation¹⁰³. Despite the varying paradigms for effectiveness assessment, some researchers decided to primarily focus on its determinants as the starting point for the whole assessment process, representing basic conditions leading to outcomes realisation. Some authors focused on the structure, while others identify the intangible elements as more relatable determinant of the network effectiveness, determining a division between two major theoretical schools: one side considering structure and governance more valuable categories concerning network effectiveness, the other emphasising the role ascribed to the management and the leadership¹⁰⁴. Nevertheless, both schools value the importance of context and process as serving structure and management to perform their role. Then, moving from the pioneering model proposed by Provan and Milward (1995), focused solely on network structure and context, researchers shed new light on the importance of the proper functioning of networks by adding new functions and conceptualisation to the key determinants.

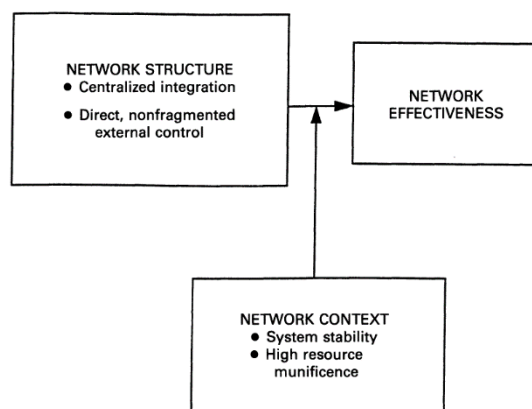
In an effort to come to an exhaustive investigation of the potential determinants of network effectiveness, the section that follow recreates a brief summary of effectiveness's determinants emerging from existing literature.

The earliest benchmark is represented by a study on community mental health systems conducted by Provan and Milward (1995), considered nowadays a milestone of the research on the determinants of network effectiveness. According to the authors, differences in terms of network effectiveness could be explained by four aspects related with network's structure and context, schematised in Figure X.

¹⁰³ TURRINI, A., CRISTOFOLI, D., FROSINI, F. AND NASI, G., 2010. *Networking literature about determinants of network effectiveness*. Public administration, 88(2), pp.528-550; PEETERS, R., WESTRA, D., VAN RAAK, A.J. AND RUWAARD, D., 2023. *So happy together: a review of the literature on the determinants of effectiveness of purpose-oriented networks in health care*. Medical Care Research and Review, 80(3), pp.266-282.

¹⁰⁴ SMITH, J.G., 2020. *Theoretical advances in our understanding of network effectiveness*. Perspectives on Public Management and Governance, 3(2), pp.167-182

Figure X. A preliminary model of network effectiveness



Source: Provan and Milward (1995)

According to the authors, networks are deemed effective under two structural conditions: centralised integration and direct, non-fragmented external control. The first assumption concerns the view of networks being centrally or decentrally integrated, namely whether the integration occurs through a central entity or among members. Network effectiveness is considered to enhance when the network is integrated through centralisation due to the time spared and the improved integration and coordination. Second, network effectiveness is enhanced by external, not fragmented controls. A centralised system of fiscal control appears to guarantee higher effectiveness compared with control exerted by local authorities based on the fact that establishing a local intermediary accounted for the funding and monitoring would inevitably aggravate the overall monitoring costs as the new intermediary necessitates control itself.

From a context-related perspective, networks are effective thanks to system stability and resource munificence. Stability is seen as a necessary condition for effectiveness, thereby external induced changes results in a deterioration at network level, especially when the service requires high integration and coordination among providers. Concerning resource allocation, the mere availability is not guarantee of effectiveness per se. Network must be shaped to take advantage of the munificent environment, in other words, other network characteristics may be more critical than resource availability in determining outcomes.

This preliminary theory has been expanded by the authors over the years. Provan and Sebastian (1998) suggested network effectiveness to be enhanced by cliques overlapping, namely a subset of organisations working together within the

network. Provan and Milward (2001) later underscored that effectiveness is to be assessed according to three different perspectives: community, network, and single organisation. Network effectiveness has also been identified as being affected by the governance form. Governance, as a prerequisite to ensure collective actions among actors, occupies a critical role in contexts shaped by the principal-agent theory. In the public sector, governance mainly concerns fundings and control the behaviour of management. In their study Provan and Kenis (2008) examine three different network governance forms - shared governance, lead governance, Network Administrative Organisation (NAO) - by outlining four critical components and managerial tensions affecting network effectiveness. In their view, according with four different structural characteristics of networks, the choice of a specific form of governance may result more successful in terms of effectiveness (Table X). Trust is deemed critical for network effectiveness depending on its distribution and its reciprocity among members. Seldom, trust requires considerable depth, rather network effectiveness is consistent with density, namely people in the network trusting each other. It is the trust density across the whole network that strongly determines the adoption of a specific network governance form and contributes to effectiveness achievements. A second determinant is the size of the network, defined as the number of organisations participating in the same network. According to logic, the more the number of participants, the more complex is the relationships management. Identifying a centralised entity charged with the coordination burden simplifies governance activities as the network grows in size.

Table X. Key predictors of effectiveness of network governance forms

<i>Governance form</i>	<i>Trust</i>	<i>N. of participants</i>	<i>Goal consensus</i>	<i>Need for network level competencies</i>
<i>Shared governance</i>	High density	Few	High	Low
<i>Lead organisation</i>	Low density, highly centralised	Moderate number	Moderately low	Moderate
<i>Network Administrative Organisation</i>	Moderate density, NAO monitored by members	Moderate to many	Moderately high	High

Source: Provan and Kenis (2008)

Goal consensus also contributes to network effectiveness. A similar domain of activities explains the higher commitment of participants in working toward

network-level goals. Different is to assess that goals of participants must be similar (similarity in purpose), since it can lead to conflicts due to the competing feelings among members. Eventually, single organisations join the network to achieve results impossible to achieve independently. Nevertheless, network-level goals require specialised competencies, different from the ones owned by individual members (coordinating skills, financial investments for enhancing such skills, task-specific competencies).

The preliminary examination of factors influencing network effectiveness, as previously discussed, marked the initial stride towards comprehending the significance of these concepts. It also laid the groundwork for categorising these determinants, primarily focusing on tangible aspects related to structure and contextual characteristics. However, recent theoretical advancements have evolved this initial framework, introducing a more nuanced classification that distinguishes between three broad categories: structure, context, and process¹⁰⁵.

According to these studies, structure is the category which encompasses the enduring features of the network configuration by defining its formal design, its boundaries and composition. Typical structural determinants are network size, governance form, inner stability, as well as linkages among members and their communication systems. Contextual characteristics are mainly referred to as the environment outside the network's boundaries. External events and process are in fact able to condition both the functioning and the performance of the network. Among contextual determinants it is possible to find the number of resources at network's disposal, the support offered by the community, competitive features among networks as well as impediments and advantages produced by the institutional environment. Eventually, the process category encompasses the functioning characteristics of the network and relates to the collaborative mechanisms occurring within the network's boundaries. Examples include trust, legitimacy, and integration strategies.

Building on this classification and based on the literature on effectiveness determinants, the following section investigates the significant factors for

¹⁰⁵ TURRINI, A., CRISTOFOLI, D., FROSINI, F. AND NASI, G., 2010. *Networking literature about determinants of network effectiveness*. Op. cit.; SMITH, J.G., 2020. *Theoretical advances in our understanding of network effectiveness*. Op. cit.; PEETERS, R., WESTRA, D., VAN RAAK, A.J. AND RUWAARD, D., 2023. *So happy together: a review of the literature on the determinants of effectiveness of purpose-oriented networks in health care*. Op. cit.

explaining network effectiveness in the field of healthcare accordingly to the three main categories.

4.2.1 Structural determinants

Control and accountability

First structural determinant driving network effectiveness is external control. Defined as the intervention of organisations outside the network, it is deemed positive when exerted by a central authority. A direct control exercised by the state has in fact been proved to positively influence network outcomes by lowering free riding of organisations within the network and consequently enhancing network effectiveness¹⁰⁶. Contradictory, scholars found that an indirect and fragmented control delegated to local authorities does not convey greater flexibility but rather appears more difficult and less safe since intermediary authorities necessitate monitoring and control themselves. Although state control is exerted formally, it is possible to observe other forms of informal supervision. External interference in network operations can occur through informal means of oversight by the State. In fact, despite being the state external to the network, its influence may affect network's behaviour via threats or inducements¹⁰⁷. In general, not only state intrusion but a larger stakeholders influence on managers' activities have to be considered among effectiveness determinants¹⁰⁸. External control comes with horizontal accountability, namely the requirement of being accountable to stakeholders laying outside networks' boundaries. The adoption of shared and explicit outcome measurements has been demonstrated to positively correlate with network success¹⁰⁹, hence transparency about results enhances participants commitment, which in turn drives higher motivation. Nevertheless, what appears fundamental, especially in the social services field, is the structural inclusion of a

¹⁰⁶ PROVAN, K.G. and MILWARD, H.B., 1995. *A Preliminary Theory of Interorganisational Network Effectiveness: A Comparative Study of Four Community Mental Health Systems*. Op. cit.; O'TOOLE JR, L.J. AND MEIER, K.J., 2004. *Public management in intergovernmental networks: Matching structural networks and managerial networking*. Journal of public administration research and theory, 14(4), pp.469-494

¹⁰⁷ SMITH, J.G., 2020. *Theoretical advances in our understanding of network effectiveness*. Op. cit.

¹⁰⁸ TURRINI, A., CRISTOFOLI, D., FROSINI, F. AND NASI, G., 2010. *Networking literature about determinants of network effectiveness*. Op. cit.

¹⁰⁹ FAWCETT, S.B., V.T. FRANCISCO, A. PAINE-ANDREWS, AND J.A. SCHULTZ. 2000. *A Model Memorandum of Collaborations: A Proposal*. Public Health Reports, 15, May–June, 175–90.

variety of voices to represent the diversified nature of the network stakeholders. Performance assessment has long been identified as multi-level and multi-perspective, consequently the incorporation of different interests and purposes represents a cornerstone of performance evaluation and accountability, needing structural adjustments to be implemented.

Integration mechanisms

Integration mechanisms are intended as major determinants of network effectiveness and are often represented as the architecture of communication within a network. Structurally, integration is traced back to the concepts of density and centralisation as well as to communication mechanisms within the network. Density, defined as the cohesion of the network, is deemed to foster network effectiveness as the closer the network members are, the more frequent their interactions. Density is found to play a higher role in small networks as, being closer to each other's, partners develop better interactions and enhance inner trust, leading toward effectiveness improvements¹¹⁰. On the contrary, larger networks experience high interaction complexity, enhancing the risk of conflicts and inefficiencies. Similarly, centralisation helps coordinate network's activities¹¹¹ but, despite its relevance, the association between integration and effectiveness is often contingent on other network features. Centralisation relates with the network governance form as presented by Provan and Kenis (2008). Referring to their classification of the governance forms, shared participant governance leans on the density concept and effectiveness is expected to enhance thanks to the spread communication links among members. In brokered networks (either lead organisation or NAO), it is the centralisation trait that fosters effectiveness. Consequently, whenever integration is achieved through centralisation, the network is expected to be more effective than

¹¹⁰ WANG, W., 2016. *Exploring the determinants of network effectiveness: The case of neighborhood governance networks in Beijing*. Journal of Public Administration Research and Theory, 26(2), pp.375-388.

¹¹¹ PROVAN, K.G. and MILWARD, H.B., 1995. *A Preliminary Theory of Interorganisational Network Effectiveness: A Comparative Study of Four Community Mental Health Systems* Op. cit.; RAAB, J., MANNAK, R.S., AND CAMBRÉ, B., 2015. *Combining structure, governance, and context: A configurational approach to network effectiveness*. Journal of Public Administration Research and Theory 25 (2): 479–511; LEMIEUX-CHARLES, L., CHAMBERS, L.W., COCKERILL, R., JAGLAL, S., BRAZIL, K., COHEN, C., LECLAIR, K., DALZIEL, B. AND SCHULMAN, B., 2005. *Evaluating the effectiveness of community-based dementia care networks: the Dementia Care Networks' Study*. The gerontologist, 45(4), pp.456-464; LORANT, V., NAZROO, J., & NICAISE, P., & THE TITLE107 STUDY GROUP. 2017. *Optimal network for patients with severe mental illness: A social network analysis*. Administration and Policy in Mental Health and Mental Health Services Research, 44(6), 877–887.

in decentrally integrated configurations. At the same time, mechanisms of integration positively related with effectiveness consists of one-stop integrated services, namely a central strategy able to improve service accessibility, as well as considerable advantages for integration apported by a shared information and communication system¹¹². To these mechanisms, the analysis conducted by Turrini et al. (2010) adds the concepts of joint staff activities and partnership synergy. Used by the literature to explain how partnerships outperform independent organisations¹¹³ and defined as the combination of perspectives, knowledge, and skills of different members, partnership synergy helps achieving stated goals of the collaboration. Despite being an outcome in itself, which results from a combination of sub-mechanisms, such as reduced duplication of effort, economies of scale, and competitive advantage, partnership synergy represents an intermediate outcome which precedes partnership effectiveness. Synergy appears to have a strict link with trust since higher levels of trust foster partnership synergy accomplishing better collaborative performances. On the importance of coordination in studying network success, Auger et al. (2021) highlight its fundamental role in reducing efforts duplication and gaps of services as well as spreading knowledge and skills across parties, making the facto coordination a mechanisms strictly linked with information sharing and communication. What the authors suggest is that whenever information exchange is lacking, coordination suffers favouring potential conflicts. Consequently, more interoperable systems together with greater interpersonal communication can nurture communication and coordination indirectly.

By analysing structural determinants, it is possible to include sub-groups formation as a mechanism of integration spontaneously emerging throughout the collaboration. The term clique refers to a group of mutually and directly connected actors within a larger network. Cliques are recognised to minimise transaction costs while establishing relationships based on cooperation and trust¹¹⁴. In their study,

¹¹² MITCHELL, R.E., FLORIN, P. AND STEVENSON, J.F., 2002. *Supporting community-based prevention and health promotion initiatives: Developing effective technical assistance systems*. Health Education & Behavior, 29(5), pp.620-639; CONRAD, D.A., CAVE, S.H., LUCAS, M., HARVILLE, J., SHORTELL, S.M., BAZZOLI, G.J., HASNAIN-WYNIA, R., SOFAER, S., ALEXANDER, J.A., CASEY, E. AND MARGOLIN, F., 2003. *Community care networks: Linking vision to outcomes for community health improvement*. Medical Care Research and Review, 60(4_suppl), pp.95S-129S.

¹¹³ LASKER, R.D., WEISS E.S., AND MILLER, R. 2001. *Partnership Synergy: a Practical Framework for Studying and Strengthening the Collaborative Advantage*. Milbank Quarterly, 79(2):179–205.

¹¹⁴ PROVAN, K.G., and SEBASTIAN J. G. 1998. *Networks within Networks: Service Link Overlap, Organisational Cliques, and Network Effectiveness*. Op. cit.

the authors found that integration across the full network is a poor predictor of network effectiveness whereas an intensive integration among small cliques might be more critical for the overall effectiveness. The grounding belief is that a more intensive relationship is achieved through few tightly connected organisations, especially when these organisations share multiple ties. According with the literature, effective ways to enhance intensity are traced to the frequency and the amount of both information and resource exchange within the network¹¹⁵. Hence, to be most effective, clique integration must entail several, overlapping links from both within and outside of the companies that make up the network's core¹¹⁶. A further structural characteristics is the hub and spoke configuration. It is described as an organisational approach employed to optimise the service provision and resource utilisation. In this model, there is a central hub that serves as the primary centre of expertise with advanced capabilities. Surrounding the central hub are multiple peripheral organisations or spokes, which rely on the hub for access to resources, distribution of services, or exchange of information.

Size

Size, expressed as the number of actors participating in the network, is defined as an exogenous variable¹¹⁷ which plays an important role in relation to network effectiveness¹¹⁸. Increased size is usually accompanied with benefits in terms of political advantages, larger professional staff, better sharing of ideas¹¹⁹ as well as

¹¹⁵ KLIJN, E., STEIJN, B. and EDELENBOS, J. 2010. *The Impact of Network Management on Outcomes in Governance Networks*. Public Administration 88(4):1063–82.

¹¹⁶ LEMIEUX-CHARLES, L., CHAMBERS, L.W., COCKERILL, R., JAGLAL, S., BRAZIL, K., COHEN, C., LECLAIR, K., DALZIEL, B. AND SCHULMAN, B., 2005. *Evaluating the effectiveness of community-based dementia care networks: the Dementia Care Networks' Study*. Op. cit.

¹¹⁷ CEPIKU, D. 2014. *Network Performance: Toward a Dynamic Multidimensional Model*, Op. cit.; CEPIKU, D., GIORDANO, F., MASTRODASCIO, M. and WANG, W., 2021. *What drives network effectiveness? A configurational approach*. Public management review, 23(10), pp.1479-1503.

¹¹⁸ HASNAIN-WYNIA, R., SOFAER, S., BAZZOLI, G.J., ALEXANDER, J.A., SHORTELL, S.M., CONRAD, D.A., CHAN, B., ZUKOSKI, A.P. AND SWENEY, J., 2003. *Members' perceptions of community care network partnerships' effectiveness*. Medical Care Research and Review, 60(4_suppl), pp.40S-62S; MARKOVIC, J. 2017. *Contingencies and Organizing Principles in Public Networks*. Public Management Review 19(3):361–80; AUNGER, J.A., MILLAR, R., GREENHALGH, J., MANNION, R., RAFFERTY, A.M., MCLEOD, H., 2021. *Why do some inter-organisational collaborations in healthcare work when others do not? A realist review*. Op. cit.

¹¹⁹ PROVAN, K.G. and MILWARD, H.B., 2001. Do networks really work? A framework for evaluating public-sector organisational networks. Op. cit.; FULOP N, PROTOPSALTIS G, HUTCHINGS A, KING A, ALLEN P, NORMAND C, WALTERS R. 2002. *Process and impact of mergers of NHS trusts: multicentre case study and management cost analysis*. Br Med 325(7358):246–9.

major possibilities to access economies of scale and scope¹²⁰ and as a solution to the problem of scarce financial resources in inefficient administrative systems¹²¹. Nevertheless, the larger the number of organisations within the network, the higher the coordinating efforts as the number of interaction among members rises exponentially¹²². Consequently, a large number of participants is considered to inhibit effectiveness¹²³. Although there is no evidence of the right number of participants to ensure network success, effectiveness can be assessed by the ebb and flow of agencies to and from the network as, depending on their developmental stage, networks are required to attract and retain members in order to survive¹²⁴. Undoubtedly, exceedance of a certain size leads to a decrease in effectiveness, hence it is possible to theorise a nuanced rather than a linear relationship between size and effectiveness¹²⁵. Increasing the number of participants fosters effectiveness up to a critical threshold above which competing logics may arise, leading to conflicts and communication meltdowns reducing effectiveness and goals achievement¹²⁶. Thus, it is worth considering capping the number of members or envisage selecting mechanisms to recruit new members¹²⁷ while making sure that

¹²⁰ MARKOVIC, J. 2017. *Contingencies and Organizing Principles in Public Networks*. Op. cit.

¹²¹ FADDA, N. and ROTONDO, F., 2022. *What combinations of conditions lead to high performance of governance networks? A fuzzy set qualitative comparative analysis of 12 Sardinian tourist networks*. International Public Management Journal, 25(4), pp.517-543.

¹²² VERWEIJ, S., E. KLIJN, J. EDELENBOS, AND A. VAN BUUREN. 2013. *What Makes Governance Networks Work? A Fuzzy Set Qualitative Comparative Analysis of 14 Dutch Spatial Planning Projects*. Public Administration 91(4): 1035–55; PROVAN, K.G. and KENIS, P., 2008. Modes of network governance: Structure, management, and effectiveness. Op. cit.; CEPIKU, D., GIORDANO, F., MASTRODASCIO, M. and WANG, W., 2021. *What drives network effectiveness? A configurational approach*. Op. cit.; AUNGER, J.A., MILLAR, R., GREENHALGH, J., MANNION, R., RAFFERTY, A.M., MCLEOD, H., 2021. *Why do some inter-organisational collaborations in healthcare work when others do not? A realist review*. Op. cit.

¹²³ BAZZOLI, G.J., CASEY, E., ALEXANDER, J.A., CONRAD, D.A., SHORTELL, S.M., SOFAER, S., HASNAIN-WYNIA, R. AND ZUKOSKI, A.P., 2003. *Collaborative initiatives: Where the rubber meets the road in community partnerships*. Medical Care Research and Review, 60(4, Suppl.), 63S–94S; HASNAIN-WYNIA, R., SOFAER, S., BAZZOLI, G.J., ALEXANDER, J.A., SHORTELL, S.M., CONRAD, D.A., CHAN, B., ZUKOSKI, A.P. AND SWENEY, J., 2003. *Members' perceptions of community care network partnerships' effectiveness*. Op. cit.

¹²⁴ PROVAN, K.G. and MILWARD, H.B., 2001. *Do networks really work? A framework for evaluating public-sector organisational networks*. Op. cit.

¹²⁵ FADDA, N. and ROTONDO, F., 2022. *What combinations of conditions lead to high performance of governance networks? A fuzzy set qualitative comparative analysis of 12 Sardinian tourist networks*. Op. cit.

¹²⁶ SAZ-CARRANZA, A., AND S. M. OSPINA. 2011. *The Behavioral Dimension of Governing Interorganisational Goal-Directed Networks—Managing the Unity-Diversity Tension*. Journal of Public Administration Research and Theory 21(2):327–65; SHORTELL, S.M., ZUKOSKI, A.P., ALEXANDER, J.A., BAZZOLI, G.J., CONRAD, D.A., HASNAIN-WYNIA, R., SOFAER, S., CHAN, B.Y., CASEY, E. AND MARGOLIN, F.S., 2002. *Evaluating partnerships for community health improvement: tracking the footprints*. Journal of Health Politics, Policy and Law, 27(1), pp.49-92.

¹²⁷ TURRINI, A., CRISTOFOLI, D., FROSINI, F. AND NASI, G., 2010. Networking literature about determinants of network effectiveness. Op. cit.

the selected number is not too small to foster collaboration¹²⁸. The number of participants is also proven to condition the adoption of particular governance forms¹²⁹. Small networks, with fewer than six to eight organisations, can prosper without a brokered governance structure, relying on shared self-governance. Governance is left to participants who can fully exert strategic control over the whole network and manage conflicts through face-to-face discussions. As the network enlarges, shared governance gets inefficient due to the coordination costs associated with the increased number of participants. Brokered governance forms (either a lead organisation or a NAO) are then most appropriate for dealing with coordination problems as centralised governance does not require participants to engage in direct interaction with each other, entrusting the lead organisation or NAO with the burden of guiding, coordinating, and mediating. Another structural element strictly related with size is the developmental stage of the network. Gaining new members and maintaining existing ones is a vital mechanisms to cope with early stages. On the contrary, once the network is mature and stable its rate of entry could only modestly exceed the rate of exit due to the refinement process of peripheral agencies dropout.

Composition

Composition relies on the concept of homophily, namely the similarity of the parties in terms of goals¹³⁰, values¹³¹, culture¹³² and structural characteristics. The grounding belief is that by sharing some operational logics, effectiveness and

¹²⁸ WILSON, T., BERWICK, D. M., and CLEARY, P. D. 2003. *What do collaborative improvement projects do? Experience from seven countries*. The Joint Commission Journal on Quality and Patient Safety, 29(2), 85–93

¹²⁹ PROVAN, K.G. and KENIS, P., 2008. *Modes of network governance: Structure, management, and effectiveness*. Op. cit.; PROVAN, K.G. and MILWARD, H.B., 2001. *Do networks really work? A framework for evaluating public-sector organisational networks*. Op. cit.

¹³⁰ PROVAN, K.G. and MILWARD, H.B., 2001. *Do networks really work? A framework for evaluating public-sector organisational networks*. Op. cit.

¹³¹ KOPPENJAN, J., AND KLIJN E. 2004. *Managing Uncertainties in Networks: A Network Approach to Problem Solving and Decision-Making*. London: Routledge; VERWEIJ, S., E. KLIJN, J. EDELENBOS, AND A. VAN BUUREN. 2013. *What Makes Governance Networks Work? A Fuzzy Set Qualitative Comparative Analysis of 14 Dutch Spatial Planning Projects*. Op. cit.

¹³² VANGEN, S., 2017. *Culturally diverse collaborations: a focus on communication and shared understanding*. Public Management Review, 19(3), pp.305-325; HARLOCK, J., CAIELS, J., MARCZAK, J., PETERS, M., FITZPATRICK, R., WISTOW, G., FORDER, J. AND JONES, K., 2020. *Challenges in integrating health and social care: the Better Care Fund in England*. Journal of health services research & policy, 25(2), pp.86-93

collaboration between organisations are expected to enhance¹³³. In terms of culture, interorganisational collaboration brings together diverse actors, each stating personal interests, beliefs, and perceptions. Diverse effects of culture on outcomes originate the so-called culture paradox which affirms that *cultural diversity is simultaneously a source of advantage and source of inertia*. Namely, albeit cultural diversity is associated with friction and misunderstanding, similarity has its own downsides in excessive comfort and familiarity, responsible for diminishing productivity¹³⁴. Relatedly, the literature on governance networks reports mixed results as similarity may have both positive and negative outcomes in terms of collaboration. Despite heterogeneity among participants being often deemed to slowing the decision-making process due to different actors' perspectives¹³⁵ and consequently leading to tensions and conflicts¹³⁶, extant research has highlighted the positive effect of diversity on effectiveness¹³⁷. Diverse understanding, backgrounds, and competencies may stimulate innovation, heighten team performance and, by mixing complementary knowledge, increase the overall performance thanks to creative outputs¹³⁸. At large and according to what previously stated for size, the relationship between composition and effectiveness has been described curvilinear as similarity fosters effectiveness but, above a critical threshold, diversity may be conducive to success. At the same time, unity and diversity can be seen as two sides of the same coin, both essentials to network performance¹³⁹ as too much diversity as well as too little can lead to lack of significant outcomes. Similarity is also studied with respect to goals. Called domain

¹³³ WATTS, D. J. 2003. *Six Degrees: The Science of a Connected Age*. New York: W.W. Norton; CEPIKU, D., GIORDANO, F., MASTRODASCIO, M. AND WANG, W., 2021. *What drives network effectiveness? A configurational approach*. Op. cit.

¹³⁴ VANGEN, S., 2017. *Culturally diverse collaborations: a focus on communication and shared understanding*. Public Management Review, 19(3), pp.305-325.

¹³⁵ KOPPENJAN, J., and KLIJN E. 2004. *Managing Uncertainties in Networks: A Network Approach to Problem Solving and Decision-Making*. Op. cit.; FADDA, N. and ROTONDO, F., 2022. *What combinations of conditions lead to high performance of governance networks? A fuzzy set qualitative comparative analysis of 12 Sardinian tourist networks*. Op. cit.

¹³⁶ HASNAIN-WYNIA, R., SOFAER, S., BAZZOLI, G.J., ALEXANDER, J.A., SHORTELL, S.M., CONRAD, D.A., CHAN, B., ZUKOSKI, A.P. AND SWENEY, J., 2003. *Members' perceptions of community care network partnerships' effectiveness*. Op. cit.

¹³⁷ MITCHELL, R.E., FLORIN, P. AND STEVENSON, J.F., 2002. *Supporting community-based prevention and health promotion initiatives: Developing effective technical assistance systems*. Op. cit.; ZACOCS, R.C. AND EDWARDS E.M., 2006. *What Explains Community Coalition Effectiveness? A Review of the Literature*, American Journal of Preventive Medicine, 30, 4, 351–61.

¹³⁸ VANGEN, S., 2017. *Culturally diverse collaborations: a focus on communication and shared understanding*. Op. cit.

¹³⁹ SAZ-CARRANZA, A., AND S. M. OSPINA. 2011. *The Behavioral Dimension of Governing Interorganisational Goal-Directed Networks—Managing the Unity-Diversity Tension*. Op. cit.

similarity, it implies broad consensus on network-level goals and is proven to enhance network success. Although it does not necessarily mean alike goals, consensus fosters participants' involvement as, being committed to network goals, participants are expected to avoid conflicts and being more satisfied with the overall outcomes¹⁴⁰. At the same time, analysing the governance forms, shared governance requires a higher level of commitment to network goals, hence is deemed more difficult to maintain as network size increases.

Formalisation and inception

Formalisation denotes the mechanisms adopted to make the network work (i.e., formalised rules, meetings organisation, written agendas, and well-organised decision-making procedures). Coordination among participants may relate to formal mechanisms or impersonal coordination modes, described as distinct and alternative. According to the literature, formalisation involves pre-established plans, schedules, rules and procedures, the presence of a regulatory framework as well as development projects and scheduled meetings¹⁴¹. Scholars argue that the lack of a common system of norms - unbiased by the type of inception - affects network-level outcomes. Lack of measures of success or plan to measure success, lack of historical data for process validation and change in measurement tool are described as hampering effectiveness while common assessment and reporting tools, ongoing outcome measurement and target dissemination in program development facilitate network effectiveness¹⁴². On the contrary, network management is described as *coordination by feedback* namely, non-hierarchical management activities requiring mutual adjustments within the network. In particular, Fadda and Rotondo (2020) found that formalisation of the coordination mechanisms and network management can alternatively be used to facilitate interaction among participants. Relatedly, formalised coordination mechanisms are associated with governance forms based on relationships and a long-term

¹⁴⁰ YSA, T., SIERRA, V. AND ESTEVE, M., 2014. *Determinants of network outcomes: The impact of management strategies*. *Public administration*, 92(3), pp.636-655.

¹⁴¹ FISCHER, F. 2003. *Reframing Public Policy: discursive Politics and Deliberative Practices*. Oxford: Oxford University Press; MANDELL, M.P. and KEAST, R., 2008. *Evaluating the effectiveness of interorganisational relations through networks: Developing a framework for revised performance measures*. Op. cit.

¹⁴² PEETERS, R., WESTRA, D., VAN RAAK, A.J. AND RUWAARD, D., 2023. *So happy together: a review of the literature on the determinants of effectiveness of purpose-oriented networks in health care*. Op. cit.

perspective while network management is based on hierarchical structure and short-term projects¹⁴³. Formalisation is contingent on other network attributes among which accountability since formalisation fosters effectiveness by forcing horizontal accountability, in fact being accountable to external shareholders implies the adoption of shared evaluation measures for the whole network. At the same time, by disclosing network outcomes, support and participation of the community are encouraged. The degree of formalisation is hence associated with trust instillation among partners thanks to the possibility to laid down rules with a legal mandate and hold reasonable expectations that the other parties will follow them¹⁴⁴.

In a related study, the type of inception of the network (mandated or voluntary) is identified as a phase of formalisation affecting the selection of appropriate criteria for network evaluation¹⁴⁵. Voluntary networks rise bottom-up from the initiative of professionals involved in the network, whereas mandated networks are dictated by governments. Not only the appropriateness of the performance criteria at network level differs between mandated and voluntary networks¹⁴⁶, but also discrepancy is found between success criteria used to evaluate the network and defined by the central government (external) and operating-levels professionals (internal). Besides, mandated networks are considered to benefit from a stronger external legitimacy compared to emergent networks whose core strength relies in higher initial internal legitimacy¹⁴⁷. Based on the fact that internal legitimacy plays a fundamental role in successfully achieving network outcomes, mandated networks reasonably require managerial strategies able to foster both internal legitimacy and trust. Other studies demonstrate how mandated collaboration is likely to be less effective and requires additional goodwill by members to overcome outset features. Being enforced by the government, mandatory networks arise with an intrinsic power imbalance owed to the initial level of trust top-down imposed to members.

¹⁴³ MARKOVIC, J. 2017. *Contingencies and Organizing Principles in Public Networks*. Op. cit.

¹⁴⁴ AUNGER, J.A., MILLAR, R., GREENHALGH, J., MANNION, R., RAFFERTY, A.M., MCLEOD, H., 2021. *Why do some inter-organisational collaborations in healthcare work when others do not? A realist review*. Op. cit.

¹⁴⁵ KENIS, P. and PROVAN, K.G., 2009. *Towards an exogenous theory of public network performance*. Public administration, 87(3), pp.440-456

¹⁴⁶ VAN RAAIJ, D.P., 2006. *Norms network members use: An alternative perspective for indicating network success or failure*. International Public Management Journal, 9(3), pp.249-270; ADDICOTT, R. and FERLIE, E., 2006. *A qualitative evaluation of public sector organisations: Assessing organisational performance in healthcare*. Public service performance: Perspectives on measurement and management, pp.55-73.

¹⁴⁷ PROVAN, K.G., and LEMAIRE, R.H., 2012. *Core concepts and key ideas for understanding public sector organisational networks: Using research to inform scholarship and practice*. Public Administration Review 72 (5): 638–48

Reduced trust comes with lower perception of progress and reduced outcome achievement.

Developmental stage

The role played by the developmental stage in determining organisations' effectiveness is well known to researchers, who highlighted the need for different criteria depending on the different stages of the organisational life cycle. Network maturity is considered a determinant of network effectiveness¹⁴⁸ as different performance is expected from emergent and mature networks¹⁴⁹ and different performance criteria prove to be more appropriate depending on the network's stage¹⁵⁰. According to Mandell and Keast (2008), networks form due to the former malfunctioning status quo, consequently networks represent in the beginning a fragmented social system requiring a period of time to invest on the development of structural arrangements, building relationships and enhancing the commitment. Hence, newly emergent networks need time to build solid relationships leading to mutual trust among participants and establishing operational rules *ex novo*. Network start then to work toward gaining external legitimacy, stability and producing new skills to foster collaboration. Consequently, mature networks are expected to have already developed collaboration expertise, routinised co-operation and implemented shared vision and norms equally accepted by participants. Performance assessment is expected to evolve accordingly with network's developmental stage by adjusting the evaluation criteria. In the early-stage, networks will be evaluated on their efforts in establishing structures and processes rather than goal achievements, evaluation relies then on structural characteristics allowing for relations building, norms establishment and values settlement. Mature networks are likely to start struggling to continue working together due to the anticipated decline in commitment, effectiveness will then be evaluated on the basis of the tightness of the relationships developed during previous stages and the shared commitment to network goals. At the same time, as previously assessed with regard to size, scholars noted that mature, large networks are considered effective when

¹⁴⁸ KLIJN, E., STEIJN, B. AND EDELENBOS, J. 2010. *The Impact of Network Management on Outcomes in Governance Networks*. Op. cit.

¹⁴⁹ CEPIKU, D., GIORDANO, F., MASTRODASCIO, M. and WANG, W., 2021. *What drives network effectiveness? A configurational approach*. Op. cit.

¹⁵⁰ KENIS, P. and PROVAN, K.G., 2009. *Towards an exogenous theory of public network performance*. Op. cit.

maintaining a limited core agencies rather than constantly attracting more members. Evident is then the relationship between maturity and network stability since networks existing for some time are considered more stable than emergent networks in terms of participants involved in the network itself. Similar reasoning can be developed accordingly to the number of services provided by the network. Provan and Milward (2001) argued that newly emerging networks are deemed effective when providing essential services, seldom by a limited number of closely linked agencies. As the network evolves, the nature of services will equally evolve allowing the mix of services to expand through the inclusion of more peripheral services as well as other agencies more loosely connected. The authors further analyse the strength of ties among members as a measure of effectiveness. Early stages comprise tentative relationships among previously autonomous agencies learning to act collectively.

Inner stability

Inner stability of the network represents all those characteristics able to guarantee the permanence of members within the collaboration, whether they are organisations or individuals. The literature on governance networks, defines inner stability as the ability of the network to persist despite inherent tensions peculiar of the network form (i.e., power imbalances, competing logics, autonomy versus interdependence, stability versus flexibility, inclusivity versus efficiency, and internal versus external legitimacy)¹⁵¹. Stability of the personnel is indirectly conducive to higher effectiveness since it favours trust building, knowledge diffusion and continuity in relationships. In other words, inner stability insists over the concept of multiplexity defined as the strength of linkages among network's nodes. Hence, leader's turnover in the organisations composing the network has been proved to inhibit effectiveness¹⁵² since a longer length of management tenure would facilitate the trust building process contributing to the overall

¹⁵¹ SMITH, J.G., 2020. *Theoretical advances in our understanding of network effectiveness*. Op. cit.

¹⁵² HEARLD, L. R., ALEXANDER, J. A., AND SHI, Y., 2015. *Leadership transitions in multisectoral health care alliances: Implications for member perceptions of participation value*. Health Care Management Review, 40(4), 274–285; BAZZOLI, G.J., CASEY, E., ALEXANDER, J.A., CONRAD, D.A., SHORTELL, S.M., SOFAER, S., HASNAIN-WYNIA, R. AND ZUKOSKI, A.P., 2003. *Collaborative initiatives: Where the rubber meets the road in community partnerships*. Op. cit.

effectiveness¹⁵³. In their analysis of the determinants of effectiveness, Turrini et al. (2010) place among the factors hampering inner stability the competitiveness among network personnel studied by Conrad et al. (2003). The authors argue that competitiveness among staff acts as a barrier to effectiveness contrary to other internal factors able to positively influence the network environment such as trust between partners, a competent and committed leadership team, highly motivated partners, and a steering governance structure. As suggested by Aunger et al. (2021), also workforce turnover treats effectiveness since people may decide to leave the organisation due to the additional workload caused by the partnership or due to pay imbalance. Involving the lower-level staff into the decision-making process may lower conflicts within the network, avoiding wasting organisational time on conflict resolution and enhancing both the perception of progress and consequently organisation's effectiveness. Despite the shared agreement on the importance of inner stability, Provan and Lemaire (2012) found that networks are in need for stability at their core whilst requiring flexibility. Core of the network is represented by organisations most involved and critical for network's mission, while periphery encompasses organisations loosely connected and whose involvement is less critical. Inner stability plays a major role within the network core, while the periphery may benefit more from flexibility in membership considered to foster innovative ideas due to the ebb and flow of organisations.

4.2.2 Context determinants

Resource munificence

Resource munificence is defined as the amount of resources at network's disposal. Despite the believe that the more the resources, the better the outcome, management literature has produced mixed knowledge with regard to the munificence effect on effectiveness. Some authors identify the existence of significant resources as facilitator for effectiveness namely, networks are proven to better achieve their goals thanks to the more resources they receive¹⁵⁴. Other studies

¹⁵³ JÜENKE, E.G. 2005. *Management Tenure and Network Time: Non-Experience Affects Bureaucratic Dynamic*. Journal of Public Administration Research and Theory, 15, 1, 113–31.

¹⁵⁴ AGRANOFF, R. and MCGUIRE, M. 1999. *Managing in Network Settings*. Policy Studies Review. 16: 1 pp18–41.

provide evidence of mild positive effects as resource munificence is supposed to inhibit effectiveness only when other network determinants are present. Provan and Milward (1995) identify resources as necessary but not sufficient for guaranteeing network effectiveness since other system-level factors play a more fundamental role in determining favourable outcomes (i.e., integration, stability). Similarly, more recent cross-country studies highlighted that a resilient healthcare system requires sufficient resources, nevertheless more resources do not automatically imply better health outcomes¹⁵⁵.

Evidence also emerges from the correlation between the relevance of the resource provision and the maturity of the network, since during the developmental phase it is proven fundamental to have resources available due to the demanding feature of the early stages of network implementation. Despite the mixed evidence on the positive influence of resource munificence, lack of resources is unanimous deemed to inhibit effectiveness¹⁵⁶. Past research devoted great attention to the correct assessment of each participant's resources to understand how to collaborate correctly¹⁵⁷ since the sufficient provision of resources to individual organisations participating the network is considered of particular relevance to ensure network effectiveness¹⁵⁸. In fact, albeit larger network may rely on the benefits deriving from their size, it is fundamental to assess whether single organisations have direct access

¹⁵⁵ OECD, 2021, *Health at a Glance 2021: OECD Indicators*, OECD Publishing, Paris,

¹⁵⁶ CONRAD, D.A., CAVE, S.H., LUCAS, M., HARVILLE, J., SHORTELL, S.M., BAZZOLI, G.J., HASNAIN-WYNIA, R., SOFAER, S., ALEXANDER, J.A., CASEY, E. AND MARGOLIN, F., 2003. *Community care networks: Linking vision to outcomes for community health improvement*, Op. cit.; ALEXANDER, J. A., HEARLD, L. R., WOLF, L. J., AND VANDERBRINK, J. M., 2016. *Aligning forces for quality multi-stakeholder healthcare alliances: Do they have a sustainable future?* American Journal of Managed Care, 22(12, Suppl.), s423–s436; HERMANS, S., SEVENANTS, A., DECLERCQ, A., VAN BROECK, N., DELIENS, L., COHEN, J., & VAN AUDENHOVE, C. 2019. *Integrated palliative care for nursing home residents: Exploring the challenges in the collaboration between nursing homes, home care and hospitals*. International Journal of Integrated Care, 19(2), 3; HARLOCK, J., CAIELS, J., MARCZAK, J., PETERS, M., FITZPATRICK, R., WISTOW, G., FORDER, J. AND JONES, K., 2020. *Challenges in integrating health and social care: the Better Care Fund in England..* Op. cit.

¹⁵⁷ MANDELL, M.P. and KEAST, R., 2008. *Evaluating the effectiveness of interorganisational relations through networks: Developing a framework for revised performance measures*, Op. cit.; KOPPENJAN, J., and KLIJN E. 2004. *Managing Uncertainties in Networks: A Network Approach to Problem Solving and Decision-Making*, Op. cit.

¹⁵⁸ GUIHAN, M., MANHEIM, L. M., HUGHES, S. L., GUIHAN, M., MANHEIM, L. M., and HUGHES, S. L., 1995. *Predicting agency participation in interorganisational networks providing community care*. Medical Care, 33(5), 441–451; PEETERS, R., WESTRA, D., VAN RAAK, A.J. AND RUWAARD, D., 2023. *So happy together: a review of the literature on the determinants of effectiveness of purpose-oriented networks in health care*. Op. cit.

to the same benefits¹⁵⁹, since resource acquisition represents one of the main outcome of network affiliation for individual agencies¹⁶⁰. In the same study, Provan and Milward evaluate the extent to which resource munificence correlates with the NAO governance form, assessing that network effectiveness comes via the analysis of how the broker acquires and distributes resources across the network. Direct distribution of resources to providers enhances the risk of services duplication and conflict as single organisations compete to acquire the more resources. The core role of the NAO becomes increasingly important since she/he acts as agent for the community by being in charge with maximising overall network effectiveness, even at the expense of single members, in light of the centrality of the advantages for the served community. The NAO not being the agent of single members but rather their principal, legitimises her/his strong central control of resources, managed on behalf of the community.

System stability

Network effectiveness is further related with system stability namely changes impacting on the whole system in which the network operates. In network analysis, stability may be considered a range variable as its relationship with effectiveness follows a u-shaped configuration where stability is intended to enhance effectiveness up to a certain point but to hinder it afterwards¹⁶¹. Evidence emerges from other studies which reflect on negative outcomes of excessive or insufficient stability. On the one hand, the counterpart of stability is rigidity which, when excessively present leads to unproductiveness and innovation suppression. On the other hand, organisational flexibility, intended as the ability to deal with environmental disturbance and adaptability to emerging circumstances, is also considered a contextual element impacting on partnership's effectiveness by increasing trust and goals achievements. Relatedly, Provan and Milward (1995) identified stability as conducive of effectiveness but their research related stability importance to the presence of other network characteristics (i.e., high funding,

¹⁵⁹ HASNAIN-WYNIA, R., SOFAER, S., BAZZOLI, G.J., ALEXANDER, J.A., SHORTELL, S.M., CONRAD, D.A., CHAN, B., ZUKOSKI, A.P. AND SWENEY, J., 2003. *Members' perceptions of community care network partnerships' effectiveness*. Op. cit.

¹⁶⁰ PROVAN, K.G. and MILWARD, H.B., 2001. *Do networks really work? A framework for evaluating public-sector organisational networks*. Op. cit.

¹⁶¹ TURRINI, A., CRISTOFOLI, D., FROSINI, F. AND NASI, G., 2010. *Networking literature about determinants of network effectiveness*. Op. cit.

direct external control, and centralisation). Hence, stability represents a necessary but insufficient condition for effectiveness which needs close monitoring by network management.

System stability is further boosted by another contextual determinant of effectiveness, past collaborations among networks members. Positive previous collaborations contribute to facilitate effectiveness achievements¹⁶². Organisations that already have experienced collaboration, although through informal agreements¹⁶³, are likely to participate in future collaborations¹⁶⁴.

Furthermore, expertise with collaboration drives the ability to learn from other networks, facilitates trust due to the past long-standing relationships¹⁶⁵, reinforces community participation and support. Communities that boast a long history of successful collaboration are more likely to be conducive to partnerships¹⁶⁶, consequently positive previous experienced collaborations, social interactions between members, perceived effectiveness to date and mutual acquaintanceship are considered to facilitate effectiveness at network level¹⁶⁷. Former relationships may also modulate the pre-existing level of trust at the beginning of a new collaboration. Success or failure of previous collaborations, the historical context of collaboration in a specific geographical area and partners' reputation are deemed to affect the early levels of trust in new collaborations¹⁶⁸.

¹⁶² AUNGER, J.A., MILLAR, R., GREENHALGH, J., MANNION, R., RAFFERTY, A.M., MCLEOD, H., 2021. *Why do some inter-organisational collaborations in healthcare work when others do not? A realist review*. Op. cit.; CEPIKU, D. 2014. *Network Performance: Toward a Dynamic Multidimensional Model*, Op. cit.; SMITH, J.G., 2020. *Theoretical advances in our understanding of network effectiveness*. Op. cit.

¹⁶³ LEMIEUX-CHARLES, L., CHAMBERS, L.W., COCKERILL, R., JAGLAL, S., BRAZIL, K., COHEN, C., LECLAIR, K., DALZIEL, B. AND SCHULMAN, B., 2005. *Evaluating the effectiveness of community-based dementia care networks: the Dementia Care Networks' Study*. Op. cit.

¹⁶⁴ BRASS, D.J., GALASKIEWICZ, J., GREVE, H.R. AND TSAI, W., 2004. *Taking stock of networks and organisations: A multilevel perspective*. Academy of management journal, 47(6), pp.795-817.

¹⁶⁵ HEARLD, L. R., ALEXANDER, J. A., BEICH, J., MITTLER, J. N., AND O'HORA, J. L.. 2012. *Barriers and strategies to align stakeholders in healthcare alliances*. American Journal of Managed Care, 18(6, Suppl.), s148–s155

¹⁶⁶ HASNAIN-WYNIA, R., SOFAER, S., BAZZOLI, G.J., ALEXANDER, J.A., SHORTELL, S.M., CONRAD, D.A., CHAN, B., ZUKOSKI, A.P. AND SWENEY, J., 2003. *Members' perceptions of community care network partnerships' effectiveness*. Op. cit.

¹⁶⁷ PEETERS, R., WESTRA, D., VAN RAAK, A.J. AND RUWAARD, D., 2023. *So happy together: a review of the literature on the determinants of effectiveness of purpose-oriented networks in health care*. Op. cit.

¹⁶⁸ AUNGER, J.A., MILLAR, R., GREENHALGH, J., MANNION, R., RAFFERTY, A.M., MCLEOD, H., 2021. *Why do some inter-organisational collaborations in healthcare work when others do not? A realist review*. Op. cit.

In order to deliver their service, networks operate in conjunction with other organisations laying outside network's boundaries. Concerning system stability, the institutional environment in which the network operates may be shaped accordingly with institutional interests. Regulatory bodies above the parties involved in the collaboration, usually interfere with the network life by enabling or interdicting some of its activities. Regulation comes via constraints in resources, legal and bureaucracy requirements as well as via incentives¹⁶⁹ or through unexpected external influences, for example through national reforms¹⁷⁰. Especially in the public sector, and in particular in a delicate field as healthcare, institutional intervention is optimistically aimed at preserving community interests. In reality it is not uncommon that such changes are driven by the political interests of governments. Nevertheless, what is certain is the great impact that system changes have over the managerial and operative activities planned and implemented by the network. Changes in regulation forces networks, and organisations comprising them, to recalibrate the strategical direction previously imprinted by shifting plans, projects, goals¹⁷¹ and ultimately, internal evaluation criteria.

Support from the community

The importance of direct involvement of external stakeholders is twofold, their role can be appreciated both from an inner point of view, strictly related to the leading ability and from an outside perspective, as users benefitting from the service provided. First purpose of direct involvement of stakeholders concerns the governance function, namely stakeholders' participation in the network governance in terms of ideas, commitment, and contributes to accelerate the decision-making process. They may be involved in the early stages, during the design of the service to be delivered. Being mostly the main beneficiary (clients) or funders of the service (i.e., government and its subordinates in public funded networks) they allow for definition of the compelling needs to be addressed, help setting the right priorities

¹⁶⁹ BAZZOLI, G.J., CASEY, E., ALEXANDER, J.A., CONRAD, D.A., SHORTELL, S.M., SOFAER, S., HASNAIN-WYNIA, R. AND ZUKOSKI, A.P., 2003. *Collaborative initiatives: Where the rubber meets the road in community partnerships*. Op. cit.

¹⁷⁰ LING, T., BRERETON, L., CONKLIN, A., NEWBOULD, J., AND ROLAND, M., 2012. *Barriers and facilitators to integrating care: Experiences from the English Integrated Care Pilots*. International Journal of Integrated Care, 12, Article e129.

¹⁷¹ ALEXANDER, J. A., HEARLD, L. R., WOLF, L. J., AND VANDERBRINK, J. M., 2016. *Aligning forces for quality multi-stakeholder healthcare alliances: Do they have a sustainable future?*. Op. cit.

and to understand the impact of the social economic and political realities inhabiting the external environment¹⁷². Essential is then analysing true needs of users to better plan and calibrate the network activity.

Second, stakeholders' involvement intervenes in the feedback loop by providing critical evaluation of the produced output, offering a first-hand perspective on quality and appropriateness. At the same time, awareness of external judgment of managerial activities promotes a more accurate accountability. Unsurprisingly, satisfied stakeholders will less likely delay the decision process through opposition but rather will actively contribute to find solutions while promoting communication and knowledge within the network¹⁷³. Network effectiveness is therefore hampered whenever stakeholders are proven reluctant to engage in network activities or whenever their commitment dwindles along network's life. As previously stated while examining the structural determinants, extant research suggests that a major role in stakeholders' involvement is played by the intensity of collaboration, namely by their integration through cliques.

External competition

External competition in healthcare networks refers to the competitive environment that providers and organisations face from entities outside their own network. This competition can have a significant impact on how the networks operate, deliver services, and make strategic decisions. Whether not correctly governed at network level, competition may force organisation to rearrange both their structures and service design while affecting community perception. Networks compete mainly for limited resources, in order to secure the necessary resources (funding, talent, technology, or infrastructure) to achieve their goals. Nevertheless, other key aspects of external competition among networks include dominance, technological advancements, and market share. At the same time external competition can be influenced by regulatory frameworks that govern industries. Government policies and regulations can impact the competitive landscape by promoting fair competition, preventing monopolies, or encouraging innovation.

¹⁷² MANDELL, M.P. and KEAST, R., 2008. *Evaluating the effectiveness of interorganisational relations through networks: Developing a framework for revised performance measures*, Op. cit.

¹⁷³ MANDELL, M. P. 2001. *Getting Results through Collaboration: Networks and Network Structures for Public Policy and Management*. Westport, CT: Quorum Books

4.2.3 Process determinants

Network management

Network management holds the strategic functions necessary to build trust, legitimacy, and power. Defined as the deliberate attempt to govern processes in networks, it is strongly related with network outcomes¹⁷⁴. Owed to the fact that networks encompass a prevailing horizontal authority rather than vertical, as in hierarchy, network management requires a different approach. Traditional managerial work typically involves, among other activities, the implementation of adequate administrative systems, staff motivation strategies and the improvement of service delivery; nevertheless, network managers are required supplementary features to make networks work¹⁷⁵. To successfully lead the collaboration, managers need to engage in a leadership being facilitative, open, and participative¹⁷⁶, to demonstrate individual skills in establishing and supporting an organisational-wide, clear, and consistent communication, to conduct the network in an ethical way, able to build trust, and to secure genuine commitment of participants. Not only managers hold the responsibility to articulate a common vision and ensuring support for it, but they also need to balance participation across members while nurturing enough focus on the tasks. Network management has been described as coordination by feedback namely, non-hierarchical management activities requiring mutual adjustments within the network. In particular, formalisation of the coordination mechanisms and network management can alternatively be used to facilitate interaction among participants.

At the same time, tasks assigned to managers co-participate in the overall effectiveness assessment. Recent evidence suggests that size of the network affects the level of trust required among participants and the extension of management tasks, consequently dictating the need for diversified competencies among managers. Similarly, if the network task requires considerable interdependence among members, then management is expected to facilitate interaction and is required coordinating skills together with task-specific competencies. In this case,

¹⁷⁴ KLIJN, E., STEIJN, B. and EDELENBOS, J. 2010. *The Impact of Network Management on Outcomes in Governance Networks*. Op. cit.

¹⁷⁵ AGRANOFF, R., and M. MCGUIRE. 2001. *Big Questions in Public Network Management Research*. Journal of Public Administration Research and Theory 11(3):295–326

¹⁷⁶ YSA, T., SIERRA, V. AND ESTEVE, M., 2014. *Determinants of network outcomes: The impact of management strategies*. Op. cit.

the most effective governance form appears to be the brokered where a central structure (either leading organisation or NAO) is in possession of the required specific skills. Opposite is the case in which external tasks require the management to address network-level needs (i.e., protect the network from environmental shocks, recruiting new members, building external legitimacy). In this case, a lead organisation could provide centralised actions from different perspectives. Task complexity is further associated with both more resources and more manpower. Aunger et al. (2021) highlight how the perception of higher complexity steer toward lower trust and reduced synergy whereas the perception of simpler tasks required to solve the problem diminishes the trust requirement necessary to succeed.

Trust

Trust can be explained as the convincement that a partner will behave accordingly to one's expectations and involves vulnerability acceptance when relying on another's partner behaviours¹⁷⁷. Trust is considered a crucial mechanism to cope with uncertainty, typically affecting networks¹⁷⁸ and is often recognised having a positive effect on network effectiveness¹⁷⁹. Trust is conducive to cohesion among members and facilitates cooperation¹⁸⁰ by diminishing uncertainty and transaction costs. Interestingly enough, trust is granted major attention during the initial phases of the network building process due to its capability of influencing both the network structure and the management processes, whereas it is expected to decrease in importance as the network matures thanks to the enhanced coordination abilities leading to internal conflicts resolution. Arguably, what matters the most is both the distribution of trust (trust density) and its reciprocity among members. According to Provan and Kenis (2008), distribution of trust within the network guides the successful adoption of particular forms of governance. The authors argue that as ties get denser within the network, horizontal coordination

¹⁷⁷ PROVAN, K.G. and KENIS, P., 2008. *Modes of network governance: Structure, management, and effectiveness*. Op. cit.

¹⁷⁸ YSA, T., SIERRA, V. AND ESTEVE, M., 2014. *Determinants of network outcomes: The impact of management strategies*. Op. cit.

¹⁷⁹ PEETERS, R., WESTRA, D., VAN RAAK, A.J. AND RUWAARD, D., 2023. *So happy together: a review of the literature on the determinants of effectiveness of purpose-oriented networks in health care*. Op. cit.; SMITH, J.G., 2020. *Theoretical advances in our understanding of network effectiveness*. Op. cit.; AUNGER, J.A., MILLAR, R., GREENHALGH, J., MANNION, R., RAFFERTY, A.M., MCLEOD, H., 2021. *Why do some inter-organisational collaborations in healthcare work when others do not? A realist review*. Op. cit.

¹⁸⁰ CEPIKU, D., GIORDANO, F., MASTRODASCIO, M. and WANG, W., 2021. *What drives network effectiveness? A configurational approach*. Op. cit.

increases in importance by conceiving a dense web of ties constituting the basis for collaboration. Hence widely distributed trust is associated with improved effectiveness of the shared governance form. In contrast, networks characterised by low density trust perform more effectively through a centralised structure, either leading organisation or NAO, built around multiple dyadic ties. Another distinctive characteristics of trust is reciprocity. Reciprocal trust is associated with the possibility to lower conflicts to their minimum level and to the opportunity to endure the collaboration. Researchers also found that the level of trust within the network is enhanced by certain managerial actions. A facilitative leadership entails appointed and visible network managers, as well as their active involvement in creating the environmental conditions for favourable interactions¹⁸¹. By communicating and exchanging information, actors develop knowledge of one another learning whom to trust and whom not. Aunger et al. (2021) analysed the so-called trust-building loop applied to networks. At the beginning of the collaboration, a certain level of trust is required from partners to agree on the shared goals to achieve. Then, trust will progressively be reinforced as more is accomplished or diminished when failure occurs. These outcomes will affect the degree of trust in a cyclical manner, not only for the current service but also for future joint productions, by reinforcing or weakening trust of both parties. As previously stated, the level of trust is further linked with past collaborations by serving as a barrier or enabler to new collaborations, as well as to formalisation. Owing to the formal agreements set at the beginning of the collaboration, trust among actors is easily solidified fostering the belief that both parties will conform to shared rules.

Legitimacy

Legitimacy is also proven to affect network performance both in positive and negative terms¹⁸². Internal legitimacy mostly relates to the participants perception that engaging in the network is valuable, as well as reinforcing their commitment through trust building activities within the network and conflict resolution.

¹⁸¹ AGRANOFF, R., and M. MCGUIRE. 2001. *Big Questions in Public Network Management Research*. Op. cit.

¹⁸² HUMAN, S.E. and PROVAN, K.G., 2000. *Legitimacy building in the evolution of small-firm multilateral networks: A comparative study of success and demise*. Administrative science quarterly, 45(2), pp.327-365. SMITH, J.G., 2020. *Theoretical advances in our understanding of network effectiveness*. Op. cit.

Legitimacy among participants resonates with the need of shifting from the logic of competition to cooperation. Since competition often moves business activities, *legitimising interactions among other organisations, some of which may be actual or potential competitors, is a critical function of network governance*¹⁸³. Perceived fairness in the distribution of benefits and costs helps facilitating effectiveness while the differences in member perceptions of the network's impact can inhibit network effectiveness. Besides, lacking internal legitimacy, the network risks to only formally exist, deprived of participants' true commitment. Internal legitimacy is contingent to other network characteristics. For example, early stages of network's life and mandated inception have been shown to inhibit internal legitimacy¹⁸⁴. During the early stages of network's life, internal legitimacy owns significantly more importance due to the uncertainty of the collaboration and the contingent need to build trust and strong ties among participants. Similarly, when the nature of the collaboration is top-down mandated internal legitimacy requires some time to develop among parties. Moreover, internal legitimacy is also affected by the governance form. Shared governance, thanks to the horizontal integration among members, is considered the most suitable for addressing internal legitimacy needs. On the other hand, external legitimacy relates with outside stakeholders being satisfied in their expectations. In order to survive, networks are expected to meet outside groups' expectations hence external legitimacy is crucial in securing fundings and attracting customers. Opposite reasoning than internal legitimacy, can be developed for external legitimacy. Being assessed by criteria of outside actors, external legitimacy is easily achievable in mandated networks, especially in early stages. At the same time, dealing with public networks entangles an indirect involvement of participants in interactions with the wide plethora of stakeholders, consequently diminishing their sense of commitment. In analysing the contributing and inhibiting factors for network effectiveness, Peeters et al. (2023) highlight how the inability to develop a clear community identity within the network is considered the main factor hampering effectiveness. On the contrary credibility of the alliance, the constituent organisations, and the alliance leaders helps achieving higher effectiveness levels. Albeit considered both fundamental process determinants of

¹⁸³ PROVAN, K.G. and KENIS, P., 2008. *Modes of network governance: Structure, management, and effectiveness*. Op. cit.

¹⁸⁴ KENIS, P. and PROVAN, K.G., 2009. *Towards an exogenous theory of public network performance*. Op. cit.

effectiveness, necessary for the network to function correctly, the right balance between internal and external legitimacy is no easy to achieve. According to Human and Provan (2000) excessive external legitimacy at the expense on internal legitimacy is likely to lead to failure. Network managers may face incongruencies whenever internal needs are not compatible with the external ones, hence favouring the needs of the participants may result in unsatisfied outside stakeholders. In the same study, the authors demonstrated that success of a network is affected by the sequence in which legitimacy is built. Failure is expected whenever the networks prioritise external legitimacy over internal since while working for building external consensus, it faces severe internal crisis. On the contrary, building internal legitimacy first and dealing with external actors afterwards results in network success.

Power imbalance

Power has been loosely defined as the influence that one organisation has over another, often stemming from hierarchy, control over critical or scarce resources, and from legitimacy¹⁸⁵. Power in networks has been associated with size as collaborations dominated by the larger partner frequently entail lopsided power leading to a decline in trust and cohesion. At the same time, power imbalances may also steam from centralised governance. Highly centralised networks may conceive the idea of some members having a major influence compared to other members or the idea of influence being concentrated only in certain groups. This conception is supported in highly centralised network by the scarcity of meetings involving the whole participants which mines trust and commitment. Unhealthy power dynamics are also involved in relation to resource provision. Because of the dominant position, larger actors may establish an unequal resource distribution reserving the more resources for themselves and making the weaker actor dependent.

Management activities

Being charged with the leading of complex structures characterised by dense ties connecting members and being accountable for cumulative outputs, managers are called to demonstrate further additional abilities alongside the necessary

¹⁸⁵ AUNGER, J.A., MILLAR, R., GREENHALGH, J., MANNION, R., RAFFERTY, A.M., MCLEOD, H., 2021. *Why do some inter-organisational collaborations in healthcare work when others do not? A realist review*. Op. cit.

capacities to successfully lead single organisations. Thus, managerial activities necessitate to be carefully organised in a wider strategy able to tackle a long-term view of the network. Testing different types of network management strategies, Klijn et al. (2010) demonstrated that the *connecting* strategy is the most promising in achieving network outcomes. It consists of the selective activation of actors, securing interactions and mediation, as well as resource mobilisation and managerial actions to create incentives for cooperation. The daunting task assigned to network managers is addressed through various managerial activities synthesized into broad categories, variably defined by different authors. Many scholars support the idea that better results are produced whenever network management focuses on *activation* - the identification of the appropriate actors and resources. By recruiting the strategic actors to include in the network, managers indirectly build trust and commitment while attracting the skills, knowledge, and resources necessary for the network to function. They establish valid connections promoting knowledge and resource sharing, building consensus, and simultaneously working toward the improvement of these relationships¹⁸⁶. Associated to members selection, their coordination is also identified as a key attribute for managing networks. Collaboration as a valuable remedy for complex problems involves multiple actors' participation, consequently tensions are expected to arise more frequently in networks rather than in single organisations. In order to manage complex realities, network management is required to demonstrate remarkable abilities in *facilitating* interactions within the network as well as in relieving tensions and preventing conflicts while leading participant toward the achievement of the strategic purpose of the network. Scholars explain this ability by speaking of facilitative leadership intended as *the initial conditions and empowerment that serve as critical ingredients to bring the different parties to the table and to steer the network*¹⁸⁷. Facilitation includes the ability to build commitment and mutual goodwill among participants¹⁸⁸, fostering shared beliefs, willingness to share information and

¹⁸⁶ AGRANOFF, R., and M. MCGUIRE. 2001. *Big Questions in Public Network Management Research*. Op. cit.; KOPPENJAN, J., and KLIJN E. 2004. *Managing Uncertainties in Networks: A Network Approach to Problem Solving and Decision-Making*. Op. cit.; SAZ-CARRANZA, A., and S. M. OSPINA. 2011. *The Behavioral Dimension of Governing Interorganisational Goal-Directed Networks—Managing the Unity-Diversity Tension*. Op. cit.

¹⁸⁷ YSA, T., SIERRA, V. and ESTEVE, M., 2014. *Determinants of network outcomes: The impact of management strategies*. Op. cit.

¹⁸⁸ MANDELL, M.P. and KEAST, R., 2008. *Evaluating the effectiveness of interorganisational relations through networks: Developing a framework for revised performance measures*. Op. cit.

avoidance of blame¹⁸⁹. Interaction fostering comes via the promotion of a favourable environment, creating spaces for dialogue, promoting the dissemination of information within the network to reduce uncertainty and engendering members participation and involvement. A consequence of the involvement of diverse actors in the same collaboration – and consequently differing interests and purposes at stake –, is an increase in complexity accompanied by a significant potential for conflict. Since partnership's effectiveness is strongly impacted by how the participants overcome differences in opinions, *mediation*, intended not only as the mere act of solving conflicts but also as the management ability of anticipating and preventing conflicts before they even arise, secures its place among the essential abilities distinguishing the management of networks. Hence, how well conflicts are avoided and resolved represents a valid measure of network effectiveness. Owed to the fact that outcomes of a conflict are typically *a function of the effectiveness of the conflict resolutions in place and the type of relationship which already existed*¹⁹⁰, conflict mediation appears to have a tight bond with trust. Frictions and disputes can reduce trust and consequently lead to reduced faith in collaboration. Relatedly, when the management works toward shared understanding within the network, conflicts dwindle, and trust improves. Conflicts may also arise not within the network itself but rather within the organisations involved in the collaboration, specifically between the elected representative – formal member of the network – and the organisation she/he represents. Since the whole organisation is not formally part of the network, fully support is not guaranteed to the network. At the same time, interorganisational conflicts can be addressed by diverse mechanisms classified by Page et al. (2018) in minimising the perception of the difference existing among members (avoidance), highlighting the diverse values within the network in different moments of network's life (cycling), pursuing contrasting values through varying practices (hybridisation), reaching compromises (incrementalism), issues reframing (integration) and trade-offs.

Ethical leadership, intended as fair and able to build trust ties among members, is also proven to have positive relation with effectiveness. Harlock et al (2020), in

¹⁸⁹ HARLOCK, J., CAIELS, J., MARCZAK, J., PETERS, M., FITZPATRICK, R., WISTOW, G., FORDER, J. AND JONES, K., 2020. *Challenges in integrating health and social care: the Better Care Fund in England*. Op. cit.

¹⁹⁰ AUNGER, J.A., MILLAR, R., GREENHALGH, J., MANNION, R., RAFFERTY, A.M., MCLEOD, H., 2021. *Why do some inter-organisational collaborations in healthcare work when others do not? A realist review*. Op. cit.

analysing pooled budget arrangements as mean to foster healthcare integration, found that the willingness of leaders to relinquish some control while accepting joint responsibility for decision making, helped to resolve disputes more easily. In the same study clarity of roles enhanced staff confidence and a strong leadership able to display benefits of integrated working provided value contribution to progress.

Goals formulation is also determinant in achieving effectiveness, since some goals characteristics help better perusing network's priorities. Concerning ambitiousness of the goal setting process, Aunger et al. (2021) highlight the importance of the perception of progress defined as how successfully actors involved in the collaboration believe the organisation is moving toward the defined goals. Perception of progress is strictly linked with process determinants as trust and faith. Setting relatively unambitious intermediate goals is considered positive in the early stages of collaboration as conceives a better perception of progress, builds trust, and enhances risk appetite. Nevertheless, as collaboration evolves, overambitious goals are deemed to reduce the perception of progress and lead to conflict. Relatedly, Hasnain-Wynia et al. (2003), by carrying out an analysis on the factors contributing to partnership effectiveness, show how members' perception that their involvement in the partnership was *sufficiently broad to accomplish its objectives* was unexpectedly negatively related with effectiveness.

Furthermore, when analysing networks as a whole is crucial to remember that the objectives of the many organisations and groups that make up the network may not always align with one another. Members must therefore constantly strive to close the gap between what is decided upon inside the network and securing the backing of these decisions from their individual organisations and/or constituency groups.

CHAPTER V

CONNECTING THE DOTS: ITALY'S HEALTHCARE NETWORK EVOLUTION AND THE STROKE NETWORK CASE STUDY

5.1 Transforming the Italian healthcare sector: normative shifts and impact

5.2 Performance evaluation in Italy

5.3 Reshaping Italian healthcare: The network approach

5.4 Italian Stroke Network: Insights from Data and Care Configuration

5.4.1 Assessing the Impact of Stroke on Public Health

5.4.2 Pre-hospital phase: Prevention

5.4.3 Hospital phase: Acute emergency

5.4.4 Rehabilitation

5.4.5 Performance evaluation

5.4.6 The impact of the Covid-19 pandemic on stroke

This chapter offers a comprehensive analysis of the Italian healthcare system, tracing its normative and theoretical evolution from the inception of the national healthcare system in 1978 to the recent developments that emphasise a collaborative approach. It explores the initial introduction of networks in healthcare and the corresponding legislative framework, with a specific focus on the recent transformations in territorial care. Within this context, the chapter introduces the case study at the heart of the analysis: the stroke network in Italy. It begins by presenting a concise evaluation of stroke-related data, highlighting the disease's significance within the Italian healthcare landscape. The chapter then delves into a detailed examination of the key phases and components that constitute the stroke network. Additionally, it critically assesses the performance of the Italian healthcare system, providing specific metrics tailored to evaluate the stroke network's effectiveness and efficiency.

5.1 Transforming the Italian healthcare sector: normative shifts and impact

Italy has a National Health Service (NHS) that provides universal health coverage to citizens, mainly free of charge at the point of delivery. Established in 1978 by law no. 833, the Italian NHS is *made up of a complex of functions, structures, services, and activities aimed at promoting, maintaining, and recovering the physical and mental health of the entire population, without distinction of individual or social conditions, and according to methods that ensure equality of citizens with regard to the service*¹⁹¹. Despite the key role played by the Central Government, the NHS is highly decentralised. Regions are in fact entitled with the organisation and administration of health within their territory; they have the authority to deliver healthcare services through heterogeneous organisational models as a result of the freedom granted by the *devolution principle*¹⁹². On the higher level, the central Government is the coordinator of the healthcare system through the overall functions of planning and funding, while the middle level concerns Regions¹⁹³ and, eventually, the lower-level concerns healthcare providers responsible for the operative activities. Originally, the Italian Municipalities granted healthcare provision through direct involvement of local health authorities known as *Unità Sanitarie Locali* (USL) introduced by law n. 833 of 23 December 1978. Based on a functional hierarchy, they encompassed all public healthcare facilities and were directly managed by Municipalities. Failure of the organisational model based on ULSs is traceable to political intrusiveness in the administration of healthcare as well as to the failure in achieving a unitary approach¹⁹⁴. The urge for

¹⁹¹ *Istituzione del servizio sanitario nazionale*, law n. 833, 23 December 1978.

¹⁹² The vertical delegation of powers allows to convey some functions traditionally associated with the central Government to lower institutional levels in light of the more effective capability of local authorities to address people's needs by being spatially closer to citizens.

¹⁹³ For a more thorough explanation of the functions fulfilled by Regions see art. 2 Legislative Decree n.229, 19 June 1999.

¹⁹⁴ ULSs were considered operative structures headed by the Municipality. Their governance implied a fine line between politics and management since the administrative body of USLs (*Comitato di gestione*) was elected by Municipalities regardless of the professional experience and skills owned by the chosen people. This interference resulted in confusion concerning functions and responsibilities relieves. The lack of clear mechanisms for responsibility assessment, lead to a steep rise in public expenditure on healthcare. At the same time, the large number of ULSs and their high discretionary power, mislead the desired unitary approach. Albeit the functional hierarchy encouraged the pursuit of economies of scale and higher specialisation, the diverse providers worked accordingly with a *silo mentality* where healthcare units act autonomously regardless their affiliation to a more complex organisation.

further reform of the Italian NHS was driven by the marked deterioration of services' performance. Primarily implemented to stem the unsatisfactory performance of health providers, the reform pivoted on a renewed role of management. Under the bureaucratic approach, managers' ability of taking effective decisions was harmed by the rigid governance structure. The model envisaged in 1978 was, in fact, inspired by *Old Public Administration* theories, where management activities were deeply affected by norms and hierarchy.

This stern rhetoric was supplanted by the *New Public Management* (NPM) narrative¹⁹⁵, embodied by Legislative Decree no. 502 of 1992, the second major reform of the Italian NHS. In the healthcare sector, the change of paradigm and the newly introduced *managerialisation* have shaped the adoption of an innovative governance logic. Accountability needs were addressed through the introduction of a new apical position in local authorities, the *Direttore Generale* (General Director), who embodied the unity of command, stating clear responsibilities and an explicit division between politics and administration¹⁹⁶. Thanks to the 1992 reform, ULSs were drastically reduced in number and replaced by *Aziende Sanitarie Locali* (ASL, Local Health Authorities, hereafter LHA) boosted by enhanced autonomy making them *de facto* companies¹⁹⁷. LHAs are to these days in charge of guaranteeing

¹⁹⁵ Defined as a loose term, NPM can be traced back to a multitude of theories converging on a collection of common elements. In 1991, Hood formalised seven NPM components recurring in the literature. For further details see HOOD, C., 1991. *A public management for all seasons?*. Public administration, 69(1), pp.3-19.

¹⁹⁶ The General Director is appointed by the Region and is required proved managerial competences. Hired on private contract, it is appointed by law the monitoring of the proper utilization of resources and neutrality (art. 3 comma 6, 502/1992), it also reports to the Region for its performance. The General Director encompasses both the institutional responsibility, namely pursuing institutional goals decided on upper governance levels, while exerting management responsibility in identifying the efficient and effective use of resources. MELE R., TRIASSI M. (a cura di), 2008. *Management e gestione delle aziende sanitarie*, CEDAM, Padova.

¹⁹⁷ Art.10 law 833 recognised the USL as "the set of facilities, offices and services of the municipalities, either individual or associated, and of the mountain communities that, within a specific territorial area, perform the task of the national health service as established by law". LHA is depicted by art. 3 of the Legislative Decree n. 502 of 1992 as "a company with public legal personality, having organisational, administrative, patrimonial, accounting, management and technical autonomy, while respecting the right-duty of the representative bodies to express the social and health needs of the local communities". LHAs were granted different types of autonomy: organisational autonomy, namely independence in defining services' structure and organisation, patrimonial autonomy as the ability to have available own assets to valorise, accounting autonomy as LHAs develop specific accounting and information systems, management autonomy in defining their administrative body able to act freely within the regional framework and technical autonomy in deciding internal processes' organisation. LHAs' autonomy is further enhanced by art. 3 bis of the Legislative Decree n.229 of 1999 which entrusted the LHAs with entrepreneurial autonomy (*autonomia imprenditoriale*). Whilst maintain their public nature, the formal organisation of the company is regulated by a private deed of incorporation making LHAs able to act autonomously within the national framework.

citizens' health and of the adherence of the provision to the *Livelli Essenziali di Assistenza* (LEA, Essential Levels of Care)¹⁹⁸. The quasi-market approach and the correlated division of provision and production affected LHAs' efforts in pursuing their institutional mission. Acting as fundholders, the local authorities provide healthcare services either directly through their own facilities¹⁹⁹ or, acting on behalf of the patient, by purchasing the services from other providers, public or private.

The range of organisations providing health services has been further increased through the introduction of a new healthcare player, *Aziende Ospedaliere* (AO, public hospitals), created by hiving off major acute hospitals from LHAs and from the *Istituti di Ricovero e Cura a Carattere Scientifico* (IRCCS, Scientific Institutes for Research, Hospitalisation and Healthcare)²⁰⁰. These innovations impacted on Regions' role, holding them accountable for defining the competency area for each LHA accordingly to the geographical division of the regional territory, deciding which are the organisations participating the regional healthcare system (RHS), as well as decisions concerning organisations' role in the regional healthcare system and the relationships among them, and determining whether to detach AOs from IRCCS or LHAs due to their relevance. Nonetheless, unforeseen effects produced by higher specialisation and extreme competition encompassed weakened coordination across institutional levels due to the mushrooming of organisations between the central Government and citizens, patients' disorientation in facing a fragmented offer which forced them to move along different providers in the hope to benefit from the appropriated treatment, and the proliferation of cost centres implying an undesirable increase in public spending. Enhanced competition among

¹⁹⁸ The LEA stands as the foundational set of healthcare services and treatments provided to all Italian citizens within the national healthcare system. These essential care levels are legally defined and aim to secure access to essential medical services for every resident, irrespective of their financial situation. The LEA encompasses a comprehensive spectrum of healthcare offerings, spanning preventive measures to specialized therapies, serving as a cornerstone within Italy's healthcare structure. Art. 3, Legislative Decree n. 229, dated 19 June 1999.

¹⁹⁹ LHAs operate through specific structures, namely hospitals, districts, and the department of prevention. According to art. 3 quarter of the Legislative Decree 229/1999, the district provides primary care through both outpatient services and home care. It is also appointed for the coordination of general practitioners' and paediatricians' activities with hospitals and outpatient clinics. The district offers specialised outpatient care, prevention, women's and reproductive health services, assistance to disable and elderly people, local drug service, and end of life care. The Department of Prevention (art.7, L.D. 229/1999) is the operative body of the LHAs. It carries out the activity of health safeguarding concerning infectious and parasitic diseases, animal disease prevention, health consequences of pollution, workplace injuries and preventive nutrition.

²⁰⁰ Art. 4 of Legislative Decree 229/1999 granted the power to Regions to transform IRCCS and nationally or inter-regionally significant hospital centres into public hospitals (AO), namely public hospitals with legal personality and entrepreneurial autonomy. AOs provide outpatient and inpatient services and are granted organisational and patrimonial autonomy.

providers, prompted by the perverse effects of consumerism logic, forced healthcare organisation to deploy short-term approaches to satisfying patients' demand at the expense of the long-term view and the companies' main goal to endure over time. In order to promptly respond to healthcare needs, providers adopted organisational solutions aimed at specialisation and become progressively more efficient in managing resources.

The problem associated with tackling differentiation is the growing importance assumed by *integration*. Lacking the unity of effort, the diverse organisations suffer from responsibilities' fragmentation. A consequence of this are integration problems often leading to duplications, discontinuities in the provision of services, reduced information sharing, distorting access to services, and failure in achieving economies of scale and scope. New approaches that encourage partnership arrangements continue to have a considerable impact on outcomes for patients resulting from joint work across the cycle of care. Widespread dissatisfaction made the necessity of moving from competition toward collaboration increasingly evident both for users (citizens but also healthcare professionals) and researchers, stating that *partnership was no longer simply an option; it was a requirement*²⁰¹.

The increasing emphasis on integrated provision as a new form of organisation has coincided with the significant relevance of recent public issues. Units' disaggregation and extreme specialisation significantly contributed to the compelling need of a new reform leading toward an integrated provision of healthcare services²⁰². Lacking a systematic rearrangement at national level, independent movements arose spontaneously from lower levels. Hence, inter-organisation collaboration was initially born as spontaneous collaborations among healthcare professionals. *Enclave* or *individualistic networks* were characterised by weak relationships, namely bonds build on informal links among professionals or single collaborations requests²⁰³. Nevertheless, a more structured approach was

²⁰¹ DOWLING, B., POWELL, M. AND GLENDINNING, C., 2004. *Conceptualising successful partnerships*. Op. cit.

²⁰² On the compelling reasons for services reconfiguration Fattore et al. highlight the opportunity to achieve economies of scale through the bigger dimensions of organisations, enhancing collaborative efforts among companies and overcoming the dichotomy hospital-primary care, strengthening the holding control, and consequently reducing management costs thanks to a more straightforward chain of command, offer reorientation toward a stronger local primary care. FATTORE, G., GUGIATTI, A., LONGO, F., 2016. *Il riordino dei servizi sanitari regionali*. In Rapporto OASI 2016, Egea.

²⁰³ TESTI, A., PANERO, C., GIACHELLO, M., ANSALDI, F., LOCATELLI, W., 2019. *Governance delle reti sanitarie: i Dipartimenti Inter-Aziendali Regionali (DIAR) nel nuovo sistema sanitario ligure*, pp.57-81.

necessary to better manage the collaboration itself, leading to the implementation of the so-called *managed care networks* where the overall network activities are institutionally planned and programmed. Authority intervention in structuring voluntary collaboration originated the division between the so-called voluntary and mandated networks; the former arising from the compelling needs perceived by healthcare professionals, the latter being top-down imposed by the regional or national regulator²⁰⁴. As the normative landscape of the Italian healthcare sector evolved over time, one key milestone emerged: the emphasis on collaboration. This shift towards collaboration and integration set the stage for the development of healthcare networks in Italy. In the following paragraph, an exploration will be conducted into the complexities of these healthcare networks.

²⁰⁴ In their initial work on partnering between NHS providers in England, Miller and Millar (2017) traced a two-dimensional scale to map the partnering options according to the voluntary or mandated nature of the collaboration and the proportion of organisations involved in the integration (individual/structural). Mandated partnering is described as being brokered by a body outside of the organisation - such as a regulator - who sets expected outcomes, while voluntary collaboration is instigated by the involved organisations and outcomes are defined by contributing members. This classification sets a continuum based on the intrinsic vs extrinsic will to collaborate. Nevertheless, a posterior study by Aunger et al. (2021) on the development of a partnering theory, recognises the voluntary or mandated nature of the collaboration as a *contextual factor* affecting the implementation of partnership mechanisms. More insight on the theory of partnering across NHS providers is provided in the following paragraphs. MILLER R, MILLAR R., 2017. *Partnering for improvement: inter-organisational developments in the NHS*. Birmingham: University of Birmingham. Available at www.birmingham.ac.uk/Documents/college-social-sciences/social-policy/HSMC/news-events/2017/final-report-partnering-for-improvement-august-2017.pdf; AUNGER, J.A., MILLAR, R., GREENHALGH, J., MANNION, R., RAFFERTY, A.M. AND MCLEOD, H., 2021. *Why do some inter-organisational collaborations in healthcare work when others do not? A realist review*. Op. cit.

5.2 Performance evaluation in Italy

The evaluation of healthcare performance in Italy is a comprehensive process with the objective of enhancing healthcare quality, efficiency, and patient well-being. The process was motivated by the imperative to guarantee that healthcare services not only adhere to stringent quality standards but also operate efficiently, resulting in favourable health outcomes for the population. Italy operates an extensive healthcare outcomes assessment system called the *Programma Nazionale Esiti*, (PNE, National Outcomes Evaluation Program), which serves as an evaluative instrument designed to support clinical audits and organisational control programmes. The Italian Ministry of Health delegated the national coordination of PNE to the *Agenzia Nazionale per i Servizi Sanitari Regionali* (Agenas, the Italian National Agency for Regional Healthcare Services). Since 2010, PNE has been released annually, encompassing a broad spectrum of clinical areas²⁰⁵ and steadily expanding its scope, with the 2022 edition incorporating a total of 194 indicators. Out of these, 171 pertain to hospital care, while the remaining 23 are related to territorial care.

The PNE indicators are formulated and computed for the purpose of contrasting healthcare outcomes among various hospitals or across diverse geographical regions, tracking shifts in healthcare quality over time, pinpointing key areas warranting initiatives aimed at enhancing healthcare quality, and fostering both internal and external audit processes. Simultaneously, these indicators aim to convey to diverse stakeholders the attainable outcomes and challenges encountered by the system, accomplished through comparative assessments among facilities and regions. The PNE offers various categories of indicators where outcome indicators document changes in clinical care outcomes (i.e. mortality, clinical events), economic outcomes express direct, indirect, and intangible healthcare costs, and humanistic outcomes analyse symptoms, quality of life and patient satisfaction. In the 2022 edition, the following outcome measures were considered: Short-term mortality, short-term readmissions, hospitalisations for specific conditions, surgical procedures, short-term complications following specific interventions and waiting times. On the contrary, process indicators measure the appropriateness of the

²⁰⁵ The 2022 edition covered the following areas: cardiovascular, cerebrovascular, digestive, infectious, musculoskeletal, oncologic, otorhinolaryngologic, paediatric, obstetric, respiratory, transplant and urologic.

healthcare process according to what is defined by reference standards (guidelines and care pathways). These indicators allow for the identification of critical points in the pathway, providing early indications for process improvement interventions and information about the quality of professional performance (such as intervention timing). Notably, unlike outcome indicators, process indicators are less affected by variations in clinical complexity; examples include: 2 days of hospital admission for hip fracture in the elderly.

Concerning clinical interventions, the organisational, structural, and procedural aspects of healthcare services possess the potential to considerably influence the measures of effectiveness. Within these factors, activity volumes are a measurable process attribute that can have a substantial impact on altering the effectiveness of interventions. The primary outcome under scrutiny in the reviewed studies pertains to either in-hospital or 30-day mortality. There is ample evidence in the literature regarding the association between activity volume and treatment outcomes. Although it is not possible to directly define a volume cut-off value beyond which intervention effectiveness improves, outcomes tend to improve almost linearly with increasing activity volumes²⁰⁶.

The PNE is accompanied by another tool known as the *Nuovo Sistema di Garanzia* (NSG, New Guarantee System). It was introduced through the Ministerial Decree issued on March 12, 2019, titled *Nuovo sistema di garanzia per il monitoraggio dell'assistenza sanitaria* (New guarantee system for healthcare monitoring)²⁰⁷ and has been identified as a replacement for the previously used LEA Grid (up until 2019)²⁰⁸.

The NSG serves as the mechanism by which the Government ensures that the delivery of services included in the LEA adheres to standards of quality, appropriateness, and uniformity. The initial system involved around 100 indicators for monitoring and assessing healthcare services, all directed toward achieving the health protection objectives pursued by the National Health Service. The primary

²⁰⁶ Rationale of PNE 2022

²⁰⁷ The NSG is an evolution of the Guarantee System established in 2000 in conjunction with Legislative Decree No. 56/2000 and was made operational through the Ministerial Decree issued on December 12, 2001.

²⁰⁸ With the improvement of the *Nuovo sistema informativo sanitario* (NSIS, Ministry's Health Information System), there has been a need to adapt the Guarantee System to accommodate new obtainable data over the years. In 2010 (Health Pact 2010-2012), a new tool called the LEA Grid was introduced, consisting of indicators related to territorial, hospital-based care, and living and working environments. The LEA Grid has been operative until 2019 and replaced with the NSG.

purpose of the system was to establish a connection between the essential levels of care effectively provided by administrations in their respective territories and the dimensions of organisational efficiency and appropriateness, clinical effectiveness and appropriateness, and the safety of care²⁰⁹.

Starting from January 1, 2020, the NSG for monitoring healthcare has come into effect. This system encompasses a comprehensive set of 88 indicators distributed among macro-areas²¹⁰. However, within the NSG framework, a subset of 22 indicators, referred to as CORE²¹¹.

Both the PNE and the NSG provide a range of indicators primarily related to individual organisations (although aggregated data at the regional level is sometimes available). However, as mentioned in the preceding sections, these systems have certain drawbacks as they primarily assess the performance of individual healthcare providers, disregarding the interorganisational dimension. Incorporating data related to the care pathway can overcome the silo-vision of healthcare and promote the adoption of a personalised medicine approach. Consequently, this has the potential to elevate the overall quality of care pathways for individual patients, with a particular emphasis on achieving improved outcomes²¹².

Concerning the assessment of individual organisations' performance, it is essential to point out several challenges associated with the public sector. Primary issues in performance measurement encompass the suitability of indicators, the emergence of perverse incentives, and their influence on the external perception of the service²¹³. Certainly, these issues strongly arise in the public sector, characterised by a lacking culture of evaluation in the face of a greater prevalence of compliance. The predominant logic still adheres to bureaucratic principles,

²⁰⁹ Ministerial Decree of March 12, 2019. Article 1: New guarantee system for the monitoring of healthcare assistance. (Official Gazette, General Series, No. 138 of June 14, 2019)

²¹⁰ Of which 16 dedicated to collective prevention and public health, 33 focused on district-level care, 24 pertaining to hospital care, 4 contextual indicators designed for estimating healthcare requirements, 1 indicator addressing social equity, 10 indicators designated for the surveillance and evaluation of diagnostic-therapeutic care pathways, covering conditions such as COPD, heart failure, diabetes, breast cancer in women, colon cancer, and rectal cancer.

²¹¹ The CORE indicators serve to provide a concise assessment of the delivery of Essential Levels of Care by various regions and are categorised into three primary macro-areas: Collective prevention and public health, district-level care, and hospital care.

²¹² NUTI, S., DE ROSIS, S., BONCIANI, M. AND MURANTE, A.M., 2017. *Rethinking Healthcare Performance Evaluation Systems towards the People-Centredness Approach: Their Pathways, their Experience, their Evaluation*. Healthcare Papers.

²¹³ HEATH G., RADCLIFFE J., 2007. *Performance measurement and the English ambulance service*. Public Money and Management, 27(3), 223-228.

wherein measurement and evaluation are not centred on the capacity to achieve results (meeting needs) but rather on conformity to established procedures²¹⁴. Furthermore, the public environment is distinguished by robust external accountability, necessitating the adoption of performance measurement and evaluation systems in response to external pressures, reinforcing the notion of a lacking culture of evaluation.

The appropriateness problem concerning performance assessment arises from the difficulty in measuring outcomes and the growing reliance on proxies²¹⁵. Attention is often directed towards dimensions that are more straightforward to quantify²¹⁶. In a secondary aspect, performance measurement may give rise to opportunistic behaviours, such as the occurrence of effort substitution (placing emphasis on the measured performance dimensions while neglecting those not evaluated) and gaming (adopting behaviours to showcase, concerning the measured aspects, outcomes that are better than the actual achievements). The challenges in performance measurement are compounded by dysfunctions arising from the implementation of measurement methods. In fact, relying on performance measurement can give rise to poor measurement, misplaced incentives and sanctions, breach of trust, and politicisation of performance systems²¹⁷.

These difficulties are further exacerbated when the measurement and evaluation of performance occur concerning a set of organisations working together. The complexity naturally intensifies as networks are described as intricate constructs with numerous interconnected components. Likewise, the involved organisations may have established diverse metrics. This is particularly noticeable in heterogeneous contexts, as seen in the Italian healthcare scenario where regions independently determine service provision methods. Consequently, the identification of shared metrics often demands substantial effort.

Moreover, the establishment of a multifaceted measurement and evaluation system is imperative for a comprehensive understanding of network performance.

²¹⁴ MUSSARI R., 2022. *Performance e valore pubblico*. Cedam.

²¹⁵ BROADBENT, J., 2007. *If you can't measure it, how can you manage it? Management and governance in higher educational institutions*. Public Money and Management, 27(3), 193-198.

²¹⁶ This matter has been previously discussed in relation to the selection of the effectiveness dimension, frequently neglected due to its complex measurability.

²¹⁷ For a detailed discussion on the dysfunctional consequences of performance measurement schemes refer to MANNION, R., BRAITHWAITE, J., 2012. *Unintended consequences of performance measurement in healthcare: 20 salutary lessons from the English National Health Service*. Internal medicine journal, 42(5), 569-574.

This approach is essential as it allows the simultaneous consideration of various aspects, acknowledging the intricate and interconnected nature of organisational dynamics. By embracing a multifaceted framework, organisations can effectively capture the complexity of their operations, assess different dimensions of performance, and make informed decisions. This holistic approach not only enhances the accuracy of evaluations but also enables a more nuanced and strategic approach to addressing challenges and optimising overall performance.

To evaluate the overall performance of the healthcare system, the initiative conducted in Tuscany, and subsequently adopted by other Italian regions, proposes the implementation of a new measurement approach to evaluate the performance of a collaborative network comprising various healthcare service providers participating in the same care pathway. IRPES, which stands for the *Sistema di Valutazione del Network delle Regioni* (the Italian Regional Performance Evaluation System in healthcare), is a thorough assessment system created and put into practice by the Institute of Management at the Sant'Anna School of Advanced Studies in Italy. IRPES is considered a voluntary-based integrated performance measurement system whose results are publicly disclosed on a yearly basis. Composed of more than 300 indicators, it measures the performance of the participating healthcare organisations in terms of health status of the population; capacity to pursue regional strategies; clinical performance; efficiency and financial performance; patient satisfaction; and staff satisfaction. All regional health systems use the same standards and traditionally the performance representation relied on a dartboard graphs consisting of five bands. Indicators are given a rating from 0 to 5, linked to a colour spectrum spanning from dark green (signifying excellent performance) to red (indicating very poor performance). Each spoke on the target represents an indicator, and the corresponding dot evaluates the relevant performance. Nonetheless, the current orientation of IRPES is primarily centred on an organisation-focused viewpoint. It involves monitoring and reporting the performance of each unit and organisation separately. Nevertheless, concentrating solely on individual components may be misleading, especially considering that patients' care journeys typically traverse various care settings. In response to these constraints, IRPES has been reconfigured to also examine performance data at the level of care pathways. This adaptation involves integrating the original graph (the dartboard) with a novel tool that represents the performance of care pathways

(Figure XI). This is achieved by drawing upon the metaphor of a stave, similar to the set of horizontal lines and spaces used in sheet music. The IRPES indicators are repositioned based on the different phases that patients traverse along these pathways. Through the adoption of a pathway-oriented approach, the stave accomplishes two primary objectives. Firstly, it directs the user's focus towards the patient's viewpoint, aligning with the value creation paradigm. Secondly, by displaying the performance of various organisations serving the population within each phase of the care pathway, the stave emphasises the unique contributions made by each organisation, underscoring the collective responsibility for the overall outcomes of the care pathway²¹⁸. However, to date, five pathways have been chosen based on their significance. These include the maternal and paediatric pathway, the oncological pathway, the chronic diseases pathway, the mental health pathway, and the emergency care pathway.

Figure XI. The stave in Friuli Venezia Giulia for the chronic disease pathway



Source: Italian Regional Performance Evaluation System

In a similar direction, Agenas has also made recent efforts by formulating a series of proposals for the implementation and advancement of the stroke care network and the cardiology network for emergencies²¹⁹. In their report they advance a new reorganisation of network indicators into four consecutive phases, within which it is possible to identify key moments that act as sliding doors, significantly influencing the course and outcomes thereof.

²¹⁸ NUTI, S., NOTO, G., VOLA, F. AND VAINIERI, M., 2018. *Let's play the patients music: A new generation of performance measurement systems in healthcare*. Management Decision, 56(10), pp.2252-2272.

²¹⁹ AGENAS, 2021. *Gruppo Tecnico per l'elaborazione di proposte per l'attuazione e l'evoluzione della rete assistenziale dell'ictus: Relazione Conclusiva*; AGENAS, 2023. *Gruppo Tecnico per l'elaborazione di proposte per l'attuazione e l'evoluzione della rete cardiologica per l'emergenza: Relazione Conclusiva*.

5.3 Reshaping Italian healthcare: The network approach

Over the past decade, the trend toward collaboration has resulted in two major changes in the Italian healthcare sector. *Vertical centralisation* of decisions was pursued both by the State and Regions: the former imposing constraints in terms of organisational structures uniform across the national territory in an attempt to rationalise the healthcare offer, while the latter willing to strengthen the direct control exerted on cost centres to better manage public spending. Consequently, a generalised trend toward *centralisation* emerged and was pursued by local governments in two ways. Firstly, through the reduction in the number of LHAs²²⁰ and a consequent growth in organisations' dimension²²¹. Bigger LHAs reduced intra-organisation mobility of patients (advancing the *one stop shop* approach) and fostered the system logic by rationalising the healthcare offer moving from specialisation toward complementarity in functions. Downsides of these interventions are mainly ascribed to the detrimental impact on managerial activities affecting organisational efficiency and enhanced need for managerial expertise in coordinating complex entities both internally - in terms of services and functions - and externally - within a complex system of interrelated organisation participating in the delivery of a joint up service.

Secondly, centralisation was achieved through the delocalisation of administrative functions in central structures. Interventions toward cooperation rather than competition were undertaken in order to address complex needs of

²²⁰ The OASI report 2022 provides a review of the public healthcare organisations in Italy. Despite a first prevailing trend, in which LHAs remained relatively constant following the introduction of the Legislative Decree 502 in 1992, LHAs have been declining in number since 2001. Starting in 2002, a prevailing trend toward reconfiguration originated a gradual decline in LHAs' number from 197 in 2001 to 118 in 2021 (-40%) due to mergers within the regional context. Healthcare reconfiguration affected AOs as well by inverting the separation process and incorporating them back into the LHAs. AOs have halved in number from 97 in 2001 to 43 in 2021 (-56%). Recent trends highlight a slight increase in the number of LHA (from 118 in 2021 to 125 in 2022) due to the Sardinian reform of the regional healthcare system (Regional Law n.24/2020) which mandated the separation of the previous single Local Health Authority into 8 LHAs. This trend is also embraced by the Marche region leading toward a reconfiguration in the following years due to the Regional Law 19/2022 which converts its single Local Health Authority in 5 different local authorities. GUGIATTI, A., MANFREDI, S. AND MEDA, F., 2022. *La struttura e le attività del SSN*. In *Rapporto OASI 2022* (pp. 37-91). Egea.

²²¹ Consequence of the reduction in number of the healthcare organisations is their dimensional growth. The average population served by single LHA in 2022 is 471.865, Tuscany is the region having the highest average population served per LHA (1.225.428 citizens) while four Regions account for less than 300.000: Molise (290.769), Basilicata (270.000), Sardinia (197.398) and Aosta Valley (123.337). Regions having user bases minor to 300.000 are raising. In 2021 only Aosta Valley and Basilicata served less than 300.000 citizens per LHA. GUGIATTI, A., MANFREDI, S. AND MEDA, F., 2022. *La struttura e le attività del SSN*. Op. cit.

patients requiring an integrated approach and forced Regions to take back their coordination role of the RHS. Hence, institutional structures evolved toward holding structures where Regions took on the role of the holding company²²².

Nevertheless, regional decisions to hold some functions and not to transfer them to LHAs, exerts a strong influence on the organisational autonomy of the healthcare entities leading toward networked models of organising different by nature. As a consequence, Region's activities can be positioned on the spectrum of ascending intrusiveness, moving between the mere performance monitoring to exerting centralised control over the organisations²²³. Whenever the Region limits itself to the employment of a *regulatory* or *controlling* governance, networked models of organising among healthcare organisation arise spontaneously. High autonomy offers the possibility to organisations to self-determine their set-up and resort to collaborative forms of working. On the contrary, a formal regional healthcare network (*gruppo regionale sanitario*), is possible only when the Region exert a *strategical* or *operative* role in the governance of healthcare. On the basis of intensity and typology of functions summoned by regions, four main types of regional holding have been identified (Table XI). Regions' discretion in structuring the RHS resulted in heterogeneous forms concerning the number of regional organisations, their dimension and role in the RHS²²⁴. Despite the RHS is appointed

²²² Thanks to the legislative decree 502/1992, which granted the LHAs the possibility to self-determine their own organisation set-up (organisational and entrepreneurial autonomy).

²²³ Based on the governance incisiveness exert by regions toward healthcare organisations, Lega identifies four forms of governance power own by Italian regions. *Regulatory* governance is employed by regions whenever they act as healthcare authority offering a normative framework to which organisation must converge and establishing their role within the regional system. Managerial and quality controls are transfer to healthcare organisations with the region limiting its activity to the ex-post evaluation of their behaviour. *Controlling* governance widens the regulatory activity of regions and is expressed by the development of a specific regional structure committed to support organisations in the assessment of their performance. Main goal of the region is to hold organisations account, through the new structure, for outcomes, namely it provides an inspective control aimed at assessing legal requirements and to reinforce the control exert by organisations. In *strategic* governance the Region merges the regulatory and controlling functions with the strategical leadership by directing and coordinating the organisations' activities. Role of the region is comparable to a holding, where it is required to coordinate the diverse organisations within the regional system according to the autonomy granted them. Lastly, *operative* governance implies a divisional structure where the Region represents the strategic apex and organisations are operative units provided with human and financial resources, held responsible for achieved results. LEGA, F., 2003. *Gruppi e reti aziendali in sanità: strategia e gestione*. Op. cit.

²²⁴ As highlighted by the OASI report 2022, Regions' decisions in structuring the institutional configuration are strongly related with their territory's characteristics. Regions having low population density opted for single LHAs (i.e., Aosta Valley, Molise), while the majority of the Italian regions developed LHAs sized accordingly with the provincial area. The sole exceptions are Regions having main metropolitan areas (Rome, Naples, Turin) where LHAs serve wider areas than the provincial.

to organise both local and hospital care, the latter attracted legislator's attention due to the central role ascribed to urgent and acute care.

Table XI. Types of regional holding

Type of regional holding	Role of the holding	Role of the controlled company
Service provider	It offers support services on demand.	Organisations are managed autonomously; they own both strategical and managerial responsibility. Controlled companies freely decided whether to access support services provided by the holding.
Planning holding	It defines health and/or economic goals at a system level. Potentially, it defines strategies for individual organisations.	They define strategic plans to achieve centrally defined goals. They own both strategical and managerial responsibility.
Strategic holding	It defines both the strategical goals and the plans to achieve them.	Controlled companies own solely managerial responsibility.
Executive holding	It defines the strategical goals, the plans to achieve them. It owns both strategical and managerial responsibility.	Compliance to centred-determined procedures.

Source: Adapted from Cantarelli et al. (2017)

As a consequences of the introduction of Law 502 local healthcare companies grew in size and a further separation happened between the roles of purchasers (LHA) and providers (AO)²²⁵. It is in this context that the concept of healthcare networks has gradually gained the attention of the Italian healthcare system. Immediately after the year 2000 Italy began to witness a greater use of network organisation for services. This phenomenon was part of the efforts to integrate the regions, representing a systemic proposal for clinical governance in response to the increasing complexity of healthcare processes, the need to share expertise and make it accessible remotely in order to raise quality standards, to improve the overall utilisation of available resources, and ultimately optimise the care pathway²²⁶.

The importance of networks has been recognised since the preliminary document on the contents of the National Health Plan 2011-2010 which assess:

²²⁵ LEGA, F., 2016. *Leadership e management dell'azienda sanitaria: conoscere il settore e il sistema, organizzare i servizi, dirigere i professionisti*. Egea

²²⁶ Osservatorio FIASO. 2013. *Il ruolo delle Aziende Sanitarie nelle reti cliniche*.

Networks contribute to improving the effectiveness and efficiency of the system, as highlighted in the literature, allowing, among other things, the possibility of providing patients with continuity of care; integrated care in multidisciplinary and multi-professional terms; differentiation of professional contributions; more efficient use of staff systems; sharing of good and best practices; greater equity of access to services; patient centralisation in the care pathway; increased availability of resources; economies of scale; sharing of research and development costs; greater circulation of information, resulting in the acceleration of innovation diffusion processes²²⁷.

The consequence of this initial collaborative impulse was the multiplication of heterogeneous experiences in which each region acted autonomously in implementing networks in their own territorial context. Nevertheless, it was in 2015 that the Ministerial Decree n. 70 mandated a major national reconfiguration of the hospital network²²⁸. It prescribed national standards regarding volume (quantity) and outcomes (quality) as well as structural and technological requirements for hospitals. Issued with the main aim of reframing the healthcare provision accordingly with the integration among hospital and primary care networks, the Decree identified the expected outcomes in enhanced quality of the provision, by orienting patients toward the most appropriate level of care and by balancing roles and responsibilities among hospital and local care. Concretely, the regulator fostered the adequate utilisation of hospital services by narrowing their institutional mission to the acute care and allowing local providers to participate in the patients' admission and follow up in a community approach. In doing so, the Decree spurred regions to identify cogent admission criteria to hospital care and to implement alternatives to hospitalisation, especially for older people affected by chronic conditions and comorbidities, who may derive more benefit from being treated in other care settings. Consequently, hospitals are now expected to manage the *Percorso Diagnostico Terapeutico* (the diagnostic and therapeutic clinical pathways corresponding to the British Integrated Care Pathways, ICP) internally and externally, through the interaction with other healthcare settings appropriated to the specific care needs of the individual. Therefore, hospitals are expected to:

²²⁷ MINISTERO DELLA SALUTE. Preliminary document on the contents of the National Health Plan 2011-2013. November 18, 2010

²²⁸ Ministerial Decree 2 April 2015, no. 70 “*Regolamento recante definizione degli standard qualitative, strutturali, tecnologici e quantitative relative all’assistenza ospedaliera*”.

- Manage health needs of individuals affected by critical and acute conditions, both urgent and scheduled;
- Provide both continuous medical care for inpatients and day hospital care for acute conditions;
- Manage scheduled care requiring technologically advantaged treatments able to address not only the acute phase of the illness but also the post-acute care and rehabilitation.

Eventually, the Decree classified hospitals in a four-step hierarchy (disadvantaged areas, basic hospital, spoke and hub) based on increased complexity of the services provided and the user base served - and consequently defining the right number of beds for medical specialty²²⁹.

The hospital facility serving as a DEA I (Level I Emergency Department) (spoke) performs all the interventions required for a hospital with an Emergency Department and provides acceptance for emergency cases of greater complexity, short-term intensive observation, and emergency medicine. When necessary, it transfers patients to a Level II Emergency Department (hub), which offers a higher level of care, which serves as a reference for complex disease networks. In addition to the procedures carried out at a Level I Emergency Department, it provides emergency and urgent care functions for the treatment of highly complex acute pathologies, particularly those related to high-level specialties or specialties referring to regional or superregional centres (i.e., Burn Centres, Transplant Centres, Spinal Units, Cardiothoracic Surgery, Neurosurgery).

In spite of these noteworthy advancements, the MD 2015 is known for fostering cooperation among healthcare entities by mandating the establishment of four primary time-dependent clinical networks—myocardial infarction, stroke, major trauma, and neonatal. For each network, the MD outlined specific end goals, structural standards, and overall organisational attribute²³⁰.

²²⁹ Interestingly is that, for each medical speciality, the MD 70/2015 further prescribed volume and outcome standards, the minimum and maximum user base and produces recommendations for exceptional cases in which the minimum standards cannot be reached due to local characteristics (i.e., local viability, low population density). At the same time, the MD provided minimum outcomes measures, namely thresholds for effective and safe care provision which have been embedded into the main monitoring and evaluation programmes at national level.

²³⁰ The MD also defined networking form of organisation for non-urgent diseases treated in hospital settings (oncology, paediatrics, transplant, palliative and rare diseases) and for the emergency and urgent care.

However, it is in 2018 that networks were regulated more precisely at the national level through the introduction of the guidelines for the revision of clinical, time-dependent networks. A clear definition of the clinical care network was proposed as an organisational model capable of ensuring patient management by formally and co-ordinately linking professionals, facilities, and services that provide healthcare and social healthcare interventions of different types and levels, while respecting healthcare continuity and clinical and organisational appropriateness²³¹.

The document outlined the organisational model that should be implemented within each network. This framework was aimed at ensuring fairness and timely access to healthcare services by including a detailed depiction of network nodes and components, along with transportation schedules. Regarding governance, the agreement instituted the creation of a regional entity called Regional Network Coordination. This entity served as the regional planning body, facilitating interaction with the operational management of individual healthcare organisations. It held the responsibility of assessing the Network Plan which includes both strategic and operational guidelines, outlines the objectives set for each network, specifies the allocated resources for achieving these objectives, and outlines the performance indicators used for evaluation. The Regional Coordination was also responsible for defining the connections between network nodes, validating the Integrated Care Pathways, ensuring the attainment of network objectives, and producing an annual report detailing the network's operations.

The 2018 State-Regions Agreement further mandated the formal establishment of a suitable data collection system, aimed at accurately assessing and monitoring effectiveness, efficiency, quality, and safety levels in order to facilitate the detection of any critical areas requiring improvement efforts. Notably, the document underscored that *the indicators employed, along with their reference standards, should encompass all aspects of both hospital and territorial components within the network*. Indeed, it prioritised the connection between hospitals and the community, established through the creation of Integrated Care Pathways, the execution of individualised care plans, and the implementation of precise protocols for

²³¹ Agreement in accordance with point 8.1 of Annex 1 to Ministerial Decree April 2, 2015, No. 70, on the document 'Guidelines for the revision of clinical networks - time-dependent networks.'

operational coordination among network nodes with the final objective is to guarantee healthcare continuity.

In conclusion, the Ministerial Decree 70 of 2015 and the 2018 State-Regions Agreement collectively constitute the foundational framework for national clinical networks and continue to be the primary documents of reference for the establishment, structuring, and improvement of these networks to this day.

5.3.1 Collaborative healthcare: A Network-Based Model for Territorial Care

By making acute care a hub's priority, illnesses considered major, and extreme were addressed by a limited number of hospitals causing a strong centralisation based on case-mix characteristics²³². At the same time, over the past decade, the scope of hospital services suffered a sharp centralisation contributing to the national debate on the role ascribed to primary care. In light of the new separation of roles of healthcare providers, hospital networks are facing a contraction in terms of activity (discharge rate), structure (bed per hospital) and output (acute and critical care)²³³. Despite this marked trend, *the reorganisation of the hospital network will be insufficient in ensuring full coverage of healthcare needs that require hospital treatment, if the issue of strengthening territorial structures is not addressed in a continuity of care approach. The lack or absence of organisation of local structures has strong repercussions on the appropriate use of hospitals*²³⁴. Considering the integration among care settings, the proper coordination of hospital and primary care raises widespread concerns. As a precondition for the reorganisation of the hospital networks, Regions must first and foremost rearrange primary care - intended as both home and residential care – since one of its main function is the role of gatekeeping. In fact, local structures are appointed with the monitoring and

²³² On the network reconfiguration dictated by the 2015 reform see FURNARI, A. AND RICCI, A., 2016. *La rete ospedaliera per acuti del SSN alla luce dei nuovi standard ospedalieri: mappatura e potenziali di riorganizzazione*. In Rapporto OASI 2016 (pp. 313-337). Egea.

²³³ In analysing the evolution and re-configuration of the Italian hospital network, Buongiorno Sottoriva et al. highlight the reduction of hospital activities both in term of offer represented by a steep decline of hospital discharge (from 12,9 million in 2001 to 8,5 million in 2019, - 34%) and complexity. According with the improved role of primary care, hospitals are experiencing a variation in case-mix severity where the average weight of acute care increased from 1,07 in 2001 to 1,24 in 2019, signalling the transition of minor and moderate disease severity to the local sphere of authority. BUONGIORNO SOTTORIVA, C., FURNARI, A. AND RICCI, A., 2021. *Configurazione dell'offerta ospedaliera nazionale: dinamiche evolutive e rimodulazioni delle principali specialità medico-chirurgiche*. In Rapporto OASI 2021 (pp. 385-426). Egea.

²³⁴ Paragraph 10, MD 70/2015

management of ingoing flows by acting as a filter to inappropriate hospitalisations. Furthermore, primary care plays a key role in accommodating discharged patients (outgoing flows) requiring further care in diverse - and more appropriate – settings (*protected discharge*), namely effectively managing long-term conditions in the community accordingly with the continuum of care approach. To build a proper care pathway between hospital and territory it is hence necessary to strengthen intermediate care facilities to support the post-acute phase, to implement home healthcare services and develop integrated ICPs for long term and chronic conditions. In Italy, the weaknesses of territorial care have been recently addressed by resorting to the *Piano Nazionale di Ripresa e Resilienza* (PNRR, the National Recovery and Resilience Plan)²³⁵ which includes the health mission (coded as M6), centred on strengthening prevention and local health services as well as modernising and digitalising the healthcare system. To achieve these major goals, the mission encompasses two components: Local networks and telemedicine for local healthcare (M6C1), innovation, and digitalisation of the national health service (M6C2).

Consequently, the first step toward the implementation of local networks has been the definition of shared standards for primary care and the identification of healthcare providers participating in the network. Institutional efforts in reorganising territorial care have resulted in a novel Decree issued in 2022 concerning organisational models of primary care²³⁶. Implementation of primary care is intended to be realised through the goals and means represented in Table XII.

With regards to the home care, it is planned to introduce the *Case di Comunità* (CHH, Community Health Houses) to improve territorial health assistance, in the number of 1.350 by mid-2026²³⁷.

²³⁵ The PNRR is part of the Next Generation EU programme and negotiated by the EU in response to the pandemic crisis in 2021. It represents an ambitious programme of reforms rooted on three main strategic axes at European level (digitisation and innovation, ecological transition, and social inclusion) to be implemented by 2026. The PNRR, organised into six missions, allocates a total of €15.63 billion to healthcare strengthening, corresponding to 8.16% of the total amount invested. Piano Nazionale di Ripresa e Resilienza, p. 24

²³⁶ Decree 23 May 2022, no. 77 “*Regolamento recante la definizione di modelli e standard per lo sviluppo dell'assistenza territoriale nel Servizio sanitario nazionale*”.

²³⁷ CHH implementation is envisaged by investment R1 belonging to Mission 6C1 named “Community Health Houses to improve territorial health assistance”.

Table XII. Primary care development

Declared goal	Achieved through
Proximity care	District, Community Health Houses, Community Hospitals, Telemedicine, Operations centre (116117)
Strengthening of home care	Home care, Operations centre (116117)
Integration among professionals	Continuity of Care Unit, Local Operations Centre, shared information systems, Palliative care network, Family nurse practitioner
Proactive medicine	Preventive care department, Family nurse practitioners, women's and children's health centre, family counselling

Source: Adapted from MD 77/2022

Located in a single structure and provided with a multidisciplinary team of healthcare professionals (GPs, paediatricians, specialists, nurses, and social workers), CCHs represent the main node of local network by acting as Single Point of Access for proximity care but, at the same time, CHHs are distributed across the regional territory accordingly with the hub and spoke model. Due to their core role in the local network, CHH are coordinated by the *Centrale Operativa Territoriale* (LOC, Local Operations Centre) along the four axes illustrated in Table XIII. The PNRR is directed at enhancing home care both quantitatively, aiming by mid-2026 to treat at home 10% of the residents over 65 years old with chronic and multiple conditions, and qualitatively by improving services' integration through telemedicine and Local Operations Centres²³⁸.

Table XIII. Coordination of CHH with other healthcare services

Type	Description
Intra CHH network	It represents the networked model of collaboration among healthcare professionals working both in the same CHH and in the diverse CHH participating in the network.
Inter CHH network	It describes the network composed by CHH classified as hubs and spokes. Main goal is to effectively guarantee extensiveness of the network and proximity to patients, specifically declined for peculiar territorial needs
Local network	CCH participate in the wider network of primary care together with other local services: home care, outpatient specialist care, rural hospitals, and family counselling
Integrated local network	CHH are integrated with the hospital network thanks to shared information systems able to manage in and outgoing flows of patients

Source: MD 77/2022

²³⁸ Envisaged by the second investment of mission 6C1 named "R2. Homecare as first point of assistance for citizens".

Furthermore, telemedicine is expected to reduce geographical differences and enhance the quality of care thanks to shared standards on a national basis and to intervene in the consultation phase as well as in the monitoring of chronic conditions.

The last line of investment (M6C1, R3) deals with strengthening of *intermediate healthcare* and its facilities. Through the years, the major issue with regard to intermediate care has been the lack of a precise definition due to the peculiar Italian context where the intermediation takes place between the hospital and territorial care, both characterised by strong regional traits which hinder the generalisability of the term²³⁹. PNRR plans to enhance intermediate care through the improvement of *Ospedali di Comunità* (Community hospitals), namely short stay hospitals (max. 30 days) for minor to moderate severity diseases²⁴⁰. MD 77/2022 further details their functioning in regulating types of admissible patients²⁴¹, their role in the

²³⁹ MD 70/2015 loosely defines intermediate structures as healthcare facilities referable to territorial care, able to offer adequate assistance both to discharged patients and to patients from the territory. In detail, the structure accommodates patients discharged from acute hospital wards, for whom it is necessary to consolidate physical conditions, and continue the process of functional recovery as well as patients from the territory, for whom the GP requests a protected environment to implement/continue their therapies in order to avoid or prepare for hospitalisation.

²⁴⁰ Community hospitals were first introduced in the National Health Plan 2006-2008 as “a structure, managed by primary care physicians, dedicated to the implementation of home care in a protected environment, to the consolidation of physical conditions, and to the continuation of the recovery process in a non-hospital environment for patients discharged from acute or post-acute units”. The National Chronicity Plan in 2016 better defines Community hospitals as “a territorial healthcare facility managed by general practitioners that provides assistance to individuals and performs clinical and healthcare procedures with medium/low intensity and short duration, for the appropriate management of temporarily decompensated or acutely exacerbated pathologies with variable social risk. The community hospital acts as a link between the hospital reality and the territory, through the network of home services and residential structures, constituting the district organisational model with higher healthcare intensity”. The State-Regions Conference held the 20th of February 2020, in fulfilment of the Health Agreement 2014-2016, prescribed minimum structural, technological and organisation standards for Community hospitals. Ministry Of Health, 2016. piano nazionale cronicità. intesa stato regioni e province autonome, CSR del 15 settembre 2020; conferenza permanente per i rapporti tra lo stato, le regioni e le province autonome di Trento e Bolzano, repertorio atto n. 17/CSR del 20 febbraio 2020. On the evolution and implementation of Community hospitals see: FATTORE, G., MEDA F., MEREGAGLIA M., 2021. *Gli ospedali di comunità in Italia: passato, presente e futuro*. OASI report, 2021

²⁴¹ MD 77/2022 defines as eligible for Community hospital admission, patients having the following characteristics:

- a) Fragile and/or chronic patients, coming from home, due to the worsening of a pre-existing clinical condition, onset of an unexpected clinical picture, in which hospitalization is inappropriate;
- b) Patients, mainly affected by multimorbidity, coming from hospital facility, for acute or rehabilitative care, clinically dischargeable for the conclusion of the hospital diagnostic therapeutic pathway, but with conditions requiring continuous nursing care;
- c) Patients who need assistance in drug administration or in the management of aids and devices, who need support, education and training interventions for the patient and caregiver before returning home.
- d) Patients who need rehabilitative-educational support, which may consist of: evaluations aimed at proposing strategies useful for maintaining residual functions and abilities (e.g., proposals

national healthcare network and the nature (hospital vs. local) of the services provided.

In conclusion, this paragraph has provided a comprehensive overview of the main performance evaluation systems in Italy, such as PNE and NSG, highlighting their historical development and their focus on assessing the performance of individual healthcare organisations. These systems have played a crucial role in enhancing transparency, accountability, and quality improvement within the Italian healthcare landscape. However, as healthcare systems continue to evolve, it has become increasingly evident that evaluating the performance of single organisations alone is insufficient in addressing the complex needs of patients, particularly those with conditions that require coordinated care across multiple settings. A significant paradigm shift has emerged, guided by the patient-centred principle, which emphasises the importance of considering the entire care pathway from the patient's perspective. This shift has led to the development of innovative approaches that prioritise the evaluation of care pathways and the contributions of various healthcare organisations within these pathways.

for the supply of aids); therapeutic support and education to patients with motor, cognitive and functional disabilities; physiotherapy interventions as part of pathways/ICP/Protocols already activated in the originating department and aimed at returning home.

5.4 Italian Stroke Network: Insights from Data and Care Configuration

5.4.1 Assessing the Impact of Stroke on Public Health

Stroke is a clinical syndrome characterised by the rapid development of focal or general signs of cerebral dysfunction, with a vascular origin, that last for more than 24 hours and can lead to death. Looking ahead, Italy, like the rest of the European Union, anticipates a significant 27% increase in the number of individuals living with stroke from 2017 to 2047²⁴². This upward trend is largely driven by a growing aging population and improved survival rates, given that stroke predominantly impacts the elderly demographic. This underscores the pressing need for continued efforts in stroke prevention, care, and research to address the challenges posed by this condition in the coming decades. Furthermore, the risk of stroke increases with age: in practice, it doubles every 10 years starting at age 45, reaching its highest value in those over 80 years old.²⁴³ The progressive aging of the population and the understanding that the incidence of stroke is closely linked to age lead to the belief that in Italy, the estimated incidence of stroke for 2015–2035 is 53.1 strokes per 100,000 inhabitants annually²⁴⁴.

To gain a clearer insight into the structural setup of the network and the criteria used to monitor it effectively, it is essential to provide a concise overview of the various stroke types and the treatments administered during the emergency phase. There are primarily two main types of stroke: ischemic and haemorrhagic. Ischemic strokes occur when a blood clot obstructs a blood vessel in the brain, cutting off the blood supply to a part of the brain. Haemorrhagic strokes occur when a blood vessel in the brain ruptures or leaks, causing bleeding in or around the brain. There exist two sub-types of haemorrhagic strokes: intracerebral haemorrhage, when a blood

²⁴² Wafa, H.A., Wolfe, C.D., Emmett, E., Roth, G.A., Johnson, C.O. and Wang, Y., 2020. *Burden of stroke in Europe: thirty-year projections of incidence, prevalence, deaths, and disability-adjusted life years*. *Stroke*, 51(8), pp.2418-2427.

²⁴³ Permanent Conference for Relations Between The State, Regions, And The Autonomous Provinces Of Trento And Bolzano. Agreement, pursuant to Article 4 of Legislative Decree of August 28, 1997, No. 281, between the Minister of Health, the regions, and the autonomous provinces of Trento and Bolzano, concerning 'guidelines for the definition of the care pathway for patients with cerebral stroke.' (Official Gazette, General Series, No. 50 of March 2, 2005)

²⁴⁴ STROKE ALLIANCE FOR EUROPE. 2017. *The Burden of Stroke in Europe* report conducted by King's College London for the Stroke Alliance for Europe. Available at https://www.stroke.org.uk/sites/default/files/the_burden_of_stroke_in_europe_-_challenges_for_policy_makers.pdf (accessed October 2023)

vessel within the brain ruptures, and subarachnoid haemorrhage, when there is bleeding into the space between the brain and the surrounding tissue.

Patients with acute ischemic strokes can be eligible for *thrombolytic therapy*, a medical procedure which helps dissolve the blood clot causing the stroke thanks to the administration of a medication called tissue plasminogen activator (tPA) through an intravenous line. Thrombolytic therapy is time sensitive namely it is effective only if given within a certain time window, typically within 4.5 hours of symptom onset. Not all stroke patients are eligible for thrombolytic therapy, the decision to use this treatment depends on various factors evaluated by the Emergency Department. Thrombolytic therapy can be administered at spoke facilities before the referral to the hub. However, not all spoke facilities may have the capacity to provide tPA.

On the contrary, *mechanical thrombectomy* involves physically removing a blood clot. During this procedure, doctors use specialised tools to remove a blood clot that is blocking a blood vessel in the brain. This clot retrieval process helps restore blood flow to the brain, reducing the damage caused by the stroke. Mechanical Thrombectomy are usually performed in hubs and can extend the treatment window beyond the time limits for thrombolytic therapy, recent guidelines and studies suggest that mechanical thrombectomy can be performed up to 24 hours from the time of stroke symptom onset.

Approximately 80-85% of strokes are ischemic in nature, while about 15-20% are of haemorrhagic origin²⁴⁵. Cerebral stroke represents a significant public health issue, the impact of which leads to significant consequences, not only on the clinical conditions of the affected individuals but also on their families and on the economic and social sphere, due to the resulting disability. In Italy, stroke is the third leading cause of death after cardiovascular diseases and neoplasms (10%-12% of all deaths per year) and the main cause of permanent disability and the second cause of dementia.²⁴⁶ In fact, stroke is a high impact disabling condition. Currently, it is estimated that a percentage ranging from 25% to 50% of survivors of a cerebrovascular event have significant disability that requires specific rehabilitative treatment.

²⁴⁵ AGENAS, 2021. *Gruppo Tecnico per l'elaborazione di proposte per l'attuazione e l'evoluzione della rete assistenziale dell'ictus*.

²⁴⁶ OSSERVATORIO ICTUS ITALIA. 2018. *Rapporto 2018 sull'ictus in Italia. Una fotografia su prevenzione, percorsi di cura e prospettive*.

What emerges, therefore, is a complex healthcare need (primary prevention, acute phase, rehabilitation, and social reintegration) that is associated with a demand that can be quantified in terms of resource allocation.

As mentioned earlier, although the healthcare system is a national entity, the organisation of healthcare is delegated to regional governments. Therefore, the regions translate the main national strategic document (National Health Plan) into a triennial regional healthcare program. On a national level, there are no national stroke strategies or programs (i.e., National Disease Plan); instead, there are regional plans in place and national common guidelines inspired by international standards (i.e., the clinical guidelines published by the Italian Stroke Organisation, SPREAD)²⁴⁷. A first national indication was provided by the State-Regions Conference on March 2, 2005²⁴⁸, which established a national agreement on the guidelines for defining the healthcare pathway for patients with cerebral stroke. However, the agreement did not impose any mandatory implementation requirements on the regions, as they were responsible for their own healthcare organisation. Instead, it provided guidelines and recommendations. The document outlines for the first time a three-phase pathway:

- Pre-hospital Phase: Aimed at the early recognition of stroke, involving specific training for general practitioners, 118 emergency personnel, and ambulance staff for patient transport.
- Hospital Phase: For the management of patients with acute stroke. Stroke units must meet specific requirements to ensure organised and multidisciplinary patient care.
- Post-hospital Phase: Primarily focused on minimising disabilities resulting from stroke.

At the same time, effective stroke care encompasses several other critical elements, including a multidisciplinary approach (by brings together diverse healthcare expertise), early initiation of rehabilitation interventions (pivotal in promoting better outcomes for stroke patients), and the use of explicit protocols (which help

²⁴⁷ STEVENS, E.G.V., EMMETT, E.S., WANG, Y., MCKEVITT, C.J. AND WOLFE, C.D.A., 2017. *The Burden of Stroke in Europe: Overview of stroke burden and care in each EU and SAFE member country*.

²⁴⁸ Agreement, under Article 4 of Legislative Decree August 28, 1997, No. 281, between the Minister of Health, the regions, and the autonomous provinces of Trento and Bolzano, regarding guidelines for defining the healthcare pathway for patients with cerebral stroke. (Official Gazette General Series No. 50 of 02-03-2005)

preventing major complications, enhancing patient safety and well-being). Lastly, the implementation of targeted interventions for ongoing education and staff motivation ensures that stroke care teams stay current and motivated to provide the best possible care to patients. These elements collectively contribute to a comprehensive and patient-centred approach to stroke care²⁴⁹.

It was with Ministerial Decree 70 of 2015 that the network took on a more formalised structure. The decree, by defining structural, organisational, and operational standards, aimed to bring uniformity to the regional variations across the Italian territory. However, it is the 2018 State-Regions Agreement that provides the initial clear definition of the stroke network as *an organisational model designed to ensure patient care. This agreement establishes formalised and coordinated relationships among professionals, facilities, and services providing healthcare and socio-health interventions of various types and levels, all while maintaining continuity of care and clinical and organisational appropriateness. The network identifies the nodes and their connections, defining operational rules, monitoring systems, process and care pathway quality and safety requirements, professional qualifications, and citizen involvement methods.*

It is worth noting that Ministerial Decree 70/2015 and the 2018 State-Regions Agreement complement each other in defining the Italian stroke network. The first document provides a structural framework, focusing on bed capacity, resource allocation, personnel, and technology for hub and spoke facilities. On the other hand, the State-Regions Agreement is more process-oriented, regulating network governance, goal planning, result assessment, and introducing key aspects of modern medicine such as continuity of care and the inclusion of patient satisfaction indicators in monitoring systems at a regulatory level. Together, they create a comprehensive framework for the Italian stroke network, addressing both its structural and operational aspects. In the upcoming sections, we will delve into each of the three phases of the stroke pathway, emphasising their individual importance and evolutionary aspects, while also providing the most up-to-date data from the Italian context.

²⁴⁹ Permanent Conference for Relations Between the State, Regions, And The Autonomous Provinces Of Trento And Bolzano. Agreement, pursuant to Article 4 of Legislative Decree of August 28, 1997, No. 281, between the Minister of Health, the regions, and the autonomous provinces of Trento and Bolzano, concerning 'guidelines for the definition of the care pathway for patients with cerebral stroke.' (Official Gazette, General Series, No. 50 of March 2, 2005)

This distinction and the analysis of the care process phases are essential in preparation for the concluding discussion on network performance evaluation.

5.4.2 Pre-hospital phase: Prevention

In acute stroke cases timing is crucial because prompt treatment not only enhances the effectiveness of the intervention but also minimises brain damage, thereby improving the prospects for recovery. While measures such as improving emergency department efficiency, hospitals' reorganisation, and personnel education have been shown to enhance the management of time for the disease, a notable amount of time is still frequently lost before reaching the hospital, primarily because stroke symptoms are not promptly recognised, and individuals do not seek help quickly²⁵⁰. It is therefore essential to inform the citizens about the importance of not wasting time (*time is brain*) and to provide initial training on recognising the symptoms through simple and immediate assessment methods such as the FAST²⁵¹. The main reason for the lengthening of *door-to-needle* times, namely the time interval between a stroke patient's arrival at a healthcare facility (typically a hospital emergency department) and the administration of a thrombolytic medication to dissolve a blood clot causing an ischemic stroke, is the lack of awareness among the general population about stroke. Albeit their inability to recognise stroke symptoms, many individuals do not perceive the situation as an emergency. It is believed that the lack of awareness about the need to act promptly when faced with stroke symptoms is the primary reason for not administering thrombolytic treatment²⁵². Furthermore, ignorance about stroke as a time-dependent condition also plays a significant role. In other words, there is a lack of awareness that early medical intervention can have a significant impact on residual disability. Lastly, even when people are aware that something is wrong, there is a tendency to

²⁵⁰ TEUSCHL Y, BRAININ M. 2010. *Stroke education: discrepancies among factors influencing prehospital delay and stroke knowledge*. Int J Stroke. 2010 Jun;5(3):187-208

²⁵¹ The FAST evaluation is a quick and effective way for individuals to identify potential stroke symptoms, it is an acronym used to help individuals recognise the common signs and symptoms of a stroke quickly: Face (Ask a person to smile for Checking if one side of the person's face is drooping or numb), Arm (Ask the person to raise both arms to check if one is weaker), Speech (to check whether the person having trouble speaking or slurring) and Time (seek emergency medical attention immediately if one of these symptoms is observable). For further information on this topic, please refer to the guidelines provided by the American Stroke Association at <https://www.stroke.org/en/about-stroke/stroke-symptoms>

²⁵² MINISTERO DELLA SALUTE. *Organizzazione dell'assistenza all'ictus: le Stroke Unit*. Quaderni del Ministero della Salute, n.2 marzo - aprile 2010.

underestimate the situation and initially consult their primary care physician or go to the emergency department individually, rather than calling 118.

However, it has been widely demonstrated that stroke is a reversible condition. Italy has recognised stroke as a treatable medical emergency since 2003, with the approval of the National Health Plan for the years 2003-2005, which recognised the role of prevention by stating that:

The fight against stroke is based on the primary foundation of preventing the disease, and this effort should involve community activities, with a particular focus on those of general medicine²⁵³.

Although some risk factors associated with stroke are non-modifiable (such as age, gender, family history, and atrial fibrillation), by reducing modifiable risk factors, it is possible to delay and decrease the number of events occurring in the population²⁵⁴. These factors include blood pressure, weight, blood sugar levels, cholesterol levels, smoking, and proper nutrition²⁵⁵.

Merely a third of patients recognise they have experienced a stroke, and the majority are unfamiliar with the potential indicators or symptoms of brain injury. Consequently, it becomes crucial to boost public awareness and invest in preventative measures to improve stroke recognition. Nevertheless, a 2017 survey in Italy revealed that a mere 4.9% of healthcare expenditure is dedicated to preventive initiatives²⁵⁶.

5.4.3 Hospital phase: Acute emergency

Stroke is a time-dependent disease since time plays a critical role in its treatment and outcome. Rapid recognition of stroke symptoms, a prompt call to emergency

²⁵³ Official Gazette, General Series, No. 139 of June 18, 2003 – Supplement No. 95

²⁵⁴ Risk factors can be distinguished as follows: demographic factors (age, gender); intermediate risk factors (blood pressure, cholesterol levels, blood sugar); behavioural habits (smoking, alcohol consumption, diet, physical exercise). The factors in the first group are not modifiable; those in the second group may require pharmacological treatment as well as preventive measures; those in the third group can benefit from lifestyle modifications. OSSERVATORIO ICTUS ITALIA. 2018. *Rapporto 2018 sull'ictus in Italia. Una fotografia su prevenzione, percorsi di cura e prospettive*.

²⁵⁵ Concerning Italy, the prevalence of risk factors is estimated as follow: high blood pressure: 27.6%, high cholesterol: 62.2%, smoking: 24.2%, raised glucose: 8.5%, atrial fibrillation: 1.3%. STROKE ALLIANCE FOR EUROPE. 2017. *The Burden of Stroke in Europe* report conducted by King's College London for the Stroke Alliance for Europe. Available at https://www.stroke.org.uk/sites/default/files/the_burden_of_stroke_in_europe_-_challenges_for_policy_makers.pdf (accessed October 2023)

²⁵⁶ CITTADINANZA ATTIVA, 2017. *Ictus: le cure in Italia. Analisi civica dei Percorsi diagnostici, terapeutici e assistenziali*.

services, and swift treatment are crucial in mitigating the devastating effects of a stroke, preserving brain tissue, and improving outcomes.

To deal with the short treatment windows, the emergency department must develop standardised protocols that allow for a rapid response to stroke patients and that are seamlessly integrated with an equally effective hospital network for managing stroke emergencies. Hence, healthcare first responders should have the ability to recognise a suspected stroke and handle it as a medical emergency, particularly when there are indications for thrombolysis or endovascular treatment, during telephone triage, using the STROKE CODE protocol to pre-alert the hospital about the arrival of a stroke patient²⁵⁷

The network model applied to the stroke emergency as proven to be economically advantageous and effective in various contexts²⁵⁸. In Italy, the network approach relies on a networked configuration introduced back in 2005²⁵⁹ as a recommendation and made mandatory by the 2015 Ministerial Decree n.70. The Decree reorganised the hospital network in hubs and spokes where hubs provide intravenous thrombolysis and/or endovascular treatments for patients who are primarily referred for these services, as well as for those transferred from a spoke, while spokes only administer intravenous thrombolysis with secondary centralisation of only those patients identified by Angio CT as potential candidates for endovascular treatments.

The hub and spoke model distributes stroke care across multiple facilities where the hub provides specialised care and acts as the primary referral centre for complex cases, while the spokes offer initial stroke care and stabilisation, which may include thrombolysis. Nonetheless, the hub and spoke model is just one of the available approaches to stroke care. An alternative and equally valid option is the mothership model, where a single high-level stroke centre referred to as the mothership serves

²⁵⁷ CONSIGLIO SUPERIORE DI SANITÀ. 2018. *Codice BLU: percorso Ictus. Strategia, Principi attuativi ed Analisi dell'impatto socioeconomico del Percorso Ictus in Italia*.

²⁵⁸ MOYNIHAN B, DAVIS D, PEREIRA A, CLOUD G, MARKUS HS. 2010. *Delivering regional thrombolysis via a hub-and-spoke model*. J R Soc Med. 2010 Sep;103(9):363-9; NARDETTO L, GIOMETTO B, MORETTO G, MANTOAN D, SAIA M. 2017. *Hub-and-spoke stroke network in the Veneto region: a retrospective study investigating the effectiveness of the stroke pathway and trends over time*. Neurol Sci. 2017 Dec;38(12):2117-2121; DEMAERSCHALK BM1, SWITZER JA, XIE J, FAN L, VILLA KF, WU EQ. *Cost utility of hub-and-spoke tele stroke networks from societal perspective*. Am J Manag Care. 2013 Dec;19(12):976-85.

²⁵⁹ Permanent Conference for Relations Between The State, Regions, and The Autonomous Provinces Of Trento And Bolzano. Agreement, pursuant to Article 4 of Legislative Decree of August 28, 1997, No. 281, between the Minister of Health, the regions, and the autonomous provinces of Trento and Bolzano, concerning 'guidelines for the definition of the care pathway for patients with cerebral stroke.' (Official Gazette, General Series, No. 50 of March 2, 2005)

as the central hub for all stroke-related care. In this scenario, when a stroke patient is detected at a spoke facility, they are subsequently transferred to the mothership to receive specialised care. This model's primary advantage is often recognised in regions where the transportation time between the mothership and spokes is deemed feasible. Hence, the hub and spoke approach spreads out care throughout several facilities, with the hub delivering specialised services and the spokes providing initial treatment, as opposed to the mothership model, which concentrates stroke care at a single high-level facility. Similarly, the drip and ship model combines elements of both, with immediate care available at spokes, which have the capability to deliver thrombolytic therapy, and transfer to specialised centres for complex cases. According to the model, in instances where more complex interventions like thrombectomy are necessary for complex cases, patients are promptly transferred (dripped) to comprehensive stroke centres, hubs. As an alternative, tele stroke models can be put into practice. In such scenarios, spoke facilities are linked to hub centres through telemedicine technology, facilitating immediate consultation and decision-making. This setup assists smaller facilities in delivering expert stroke care remotely. Table XIV compiles the data on the stroke network generated by the Second National Survey on the Implementation Status of Time-Dependent Networks conducted by Agenas in 2021.

Following the example of organised coronary care units in cardiology, primarily in the United States and England, the concept of treating stroke patients in an organised manner and in dedicated care areas dates back to the 1960s²⁶⁰. However, this idea initially stemmed from uncontrolled studies, and it took 30 years before the first randomised clinical study comparing the effects of care provided in a specialised ward versus that in a general medicine ward was published in the literature²⁶¹.

²⁶⁰ MINISTERO DELLA SALUTE. *Organizzazione dell'assistenza all'ictus: le Stroke Unit*. Quaderni del Ministero della Salute, n.2 marzo - aprile 2010.

²⁶¹ Permanent Conference for Relations Between The State, Regions, And The Autonomous Provinces Of Trento And Bolzano. Agreement, pursuant to Article 4 of Legislative Decree of August 28, 1997, No. 281, between the Minister of Health, the regions, and the autonomous provinces of Trento and Bolzano, concerning 'guidelines for the definition of the care pathway for patients with cerebral stroke.' (Official Gazette, General Series, No. 50 of March 2, 2005)

Table XIV. Nodes of the Italian stroke network

Region	Hub	Spoke
Aosta Valley ¹	-	-
Abruzzo	2	6
Apulia ²	-	-
Basilicata ³	2	4
Calabria	3	7
Campania	16	11
Emilia-Romagna	5	7
Friuli-Venezia Giulia	3	4
Lazio	4	10
Liguria ⁴	2	6
Lombardy	10	29
Marche	1	6
Molise ⁵	1	2
Piedmont	5	20
Sardinia ⁶	2	5
Sicily	4	11
PA Bolzano ⁷	1	3
PA Trento	1	6
Tuscany	4	38
Umbria	2	5
Veneto	8	14

Source: Agenas, 2021. Gruppo Tecnico per l'elaborazione di proposte per l'attuazione e l'evoluzione della rete assistenziale dell'ictus

¹ The Aosta Valley region has not identified the Hub and Spoke centres

² The Apulia Region responded by stating that it had not identified the Hub/Spoke Centres for the Stroke Network but subsequently transmitted the summary file of the identified facilities.

³ In hospitals that serve as Primary Stroke Centres (with a designated stroke team), the possibility of administering thrombolysis before centralizing patients in Level I or Level II stroke units is considered in specific conditions and cases. The general medicine departments of these hospitals collaborate to ensure that stroke patients who do not require admission to a stroke unit receive inpatient care based on regionally shared protocols, including early rehabilitation.

⁴ In Liguria, the centralization project is being implemented following the "mothership" model. This organisational model is currently in the process of comprehensive implementation, with a particular focus on the metropolitan area of Genoa and the western part of Liguria.

⁵ In the Emergency Departments of the Spoke facilities, thrombolysis is authorised, subject to a teleconsultation and prescription by the neurologist specialist from the Stroke Unit at the Hub

⁶ All Hub facilities are authorized for fibrinolysis. The Spoke Centres are Level I Stroke Units.

⁷ Currently, there is a single Hub centre at the Neurology Division of the Central Hospital of Bolzano. A formal review/consolidation of the company network in the Bolzano Public Administration territory is underway.

A stroke unit (SU) is a dedicated section within a hospital ward that primarily caters to stroke patients and is staffed by a specialised multidisciplinary team. The key members of this team include professionals from the fields of medicine, nursing, physiotherapy, occupational therapy, speech and language therapy, and social work²⁶². All types of patients, regardless of gender, age, stroke subtype, and stroke severity, appear to benefit from treatment in stroke units. Among the main

²⁶² ESO, European Stroke Organisation 2008. *Guidelines for Management of Ischaemic Stroke and Transient Ischaemic Attack*.

clinical advantages of using stroke units compared to patients treated in general wards, there are significant reductions in mortality, improved autonomy at the time of discharge, and a consequent contraction of the need for institutional care. The reasons for the better clinical outcome can be attributed to the integrated organisation of services, the acquisition of specific skills, and a multidisciplinary approach by healthcare professionals²⁶³, as well as to measures for preventing recurrences and early planning of rehabilitation. At the same time, SU offer economic advantages to hospitals. The use of stroke units is capable of significantly reducing the costs associated with stroke due to their strong rehabilitative focus. In order to minimise disability, stroke units initiate rehabilitation during the acute phase of stroke. From a purely managerial standpoint, an improvement in outcomes due to reduced disability represents long-term cost savings in healthcare. Similarly, the practice of treating a specific condition and the standardisation of protocols in stroke units contribute to a reduction in potential complications that would prolong hospital stays. Consequently, the use of stroke units results in a reduction in hospitalisation days. Similarly, stroke units lead to cost savings in terms of bed occupancy, thanks to the reduction in average length of stay²⁶⁴.

Stroke units are classified into different functional levels based on various instrumental resources and the characteristics of the hosting hospital structure. Initially, stroke units in Italy were organised into three functional levels. Stroke units of first level (SU I) were necessary to respond broadly at the territorial level to the care needs of the majority of patients with cerebral strokes. Second level SU (SU II) were capable of providing intravenous fibrinolytic therapy, cerebral CT scans, and angiographic CT scans 24 hours a day with 16 slices, as well as having immediate neurosurgical availability. Finally, Stroke units of third level (SU III) represented reference and excellence centres equipped with 24-hour neuroradiology with 24-slice CT, 24-hour neurosurgery and vascular surgery, and clinical research activities. However, in 2010 there was already a call for a swift reduction to just two functional levels, moving the SU I to SU II.

²⁶³ Permanent Conference For Relations Between The State, Regions, And The Autonomous Provinces Of Trento And Bolzano. Agreement, pursuant to Article 4 of Legislative Decree of August 28, 1997, No. 281, between the Minister of Health, the regions, and the autonomous provinces of Trento and Bolzano, concerning 'guidelines for the definition of the care pathway for patients with cerebral stroke.' (Official Gazette, General Series, No. 50 of March 2, 2005)

²⁶⁴ MINISTERO DELLA SALUTE. *Organizzazione dell'assistenza all'ictus: le Stroke Unit*. Quaderni del Ministero della Salute, n.2 marzo - aprile 2010.

In Italy, the stroke units were introduced in 2005²⁶⁵. However, the agreement did not impose any implementation obligations on the regions, which were responsible for internal healthcare organisation; instead, it offered recommendations. As of the beginning of 2010, the Italian scenario was highly diversified, with some leading regions capable of already implementing the concept of stroke units and organising dedicated care pathways for stroke patients (such as Lombardy, Veneto, and Lazio), while others lagged behind (such as Friuli Venezia Giulia, Liguria, and Sardinia). It has been the Ministry of Health Decree No. 70 of April 2, 2015 (MD 70/2015) that officially codifies the organisation of care for cerebral stroke into two levels. The first level consists of centres where only intravenous thrombolysis is performed, located in hospitals serving populations ranging from 150,000 to 300,000 residents²⁶⁶. The second level consists of centres where, in addition to intravenous thrombolysis, endovascular treatments are also performed²⁶⁷. However, as of today, out of the 300 required neurovascular units, approximately 190 are operational, with 80% of them in the Northern regions²⁶⁸.

The coordination between the various phases of care, as well as among the various involved facilities, is operationally regulated by the Integrated Care Pathways, designed to ensure that all healthcare professionals involved in a patient's care, across various healthcare settings and disciplines, work together seamlessly to provide consistent, evidence-based, and patient-centred care.

It is important to distinguish between networks and ICPs based on the role assigned to patients. Networks consist of various structures and professionals collaborating to offer a range of treatments to a diverse group of patients. Patients within networks move between different nodes in a non-linear way, driven by the potential benefits of various treatments, depending on their individual needs. In

²⁶⁵ Agreement, under Article 4 of Legislative Decree August 28, 1997, No. 281, between the Minister of Health, the regions, and the autonomous provinces of Trento and Bolzano, regarding "guidelines for defining the healthcare pathway for patients with cerebral stroke." (Official Gazette General Series No. 50 of 02-03-2005)

²⁶⁶ This resulted in an average of 1 centre per 200,000 residents, which, for a population of nearly 61 million people, translates to a total need for approximately 304 centres. CONSIGLIO SUPERIORE DI SANITÀ. 2018. *Codice BLU: percorso Ictus. Strategia, Principi attuativi ed Analisi dell'impatto socio-economico del Percorso Ictus in Italia*

²⁶⁷ Situated in hospitals serving populations ranging from 600,000 to 1,300,000 residents, which results in an average of 1 centre per 1,000,000 residents, leading to a total need for approximately 60 centres.

²⁶⁸ OSSERVATORIO ICTUS ITALIA. 2018. *Rapporto 2018 sull'ictus in Italia. Una fotografia su prevenzione, percorsi di cura e prospettive.*

contrast, ICPs are centred on the similarity of patients' clinical conditions and involve patients following a predetermined path in a linear manner²⁶⁹.

The uneven distribution of the Integrated Care Pathways across the territory is an element that highlights the need for constant and structured efforts to ensure an equitable level of care guarantee for all patients. To bridge this gap, it would be desirable to have collaboration involving institutions. It is widely demonstrated that well-structured national and regional healthcare plans can have a positive impact on improving the prognosis of individuals affected by cerebral stroke, particularly in terms of permanent disability. Nevertheless, as of 2021, not all regions have approved a regional network plan, while there is only a theoretical proposal for the establishment of a National ICP system led by the Ministry of Health in collaboration with the regions. This system should ensure the development of national ICPs, their continuous updating, and the identification of key points in the care process to be ensured throughout the national territory²⁷⁰. Therefore, the coexistence of a strategic position of the region (network plan) capable of encompassing an operational-management aspect (ICP) is crucial. The table below highlights the regions that adopted a network plan in 2018 and in 2021 and those whose plan includes the formalisation of a regional ICP (Table XV).

²⁶⁹ RICCIO, F. AND PICCIOLI, A., 2019. *Governance di rete: sfida complessa e innovazione consapevole*. Mecosan: management ed economia sanitaria. 109, 1, Franco Angeli, pp.105-112

²⁷⁰ OSSERVATORIO ICTUS ITALIA. 2018. *Rapporto 2018 sull'ictus in Italia. Una fotografia su prevenzione, percorsi di cura e prospettive*.

Table XV. Organisation of Stroke Care in Italy

	2018*		2021**	
Region	Presence of a regional ICP	Presence of a regional ICP for rehabilitative care	Approval of the Stroke network plan	Presence of a regional ICP
Aosta Valley	YES	YES	NO	IN PART
Abruzzo	NO ¹	NO	YES	IN PART
Apulia	NO ²	NO	IN PART	NO
Basilicata	YES ³	YES	YES	YES
Calabria	YES	YES	YES	YES
Campania	NO ¹	YES ⁵	YES	YES
Emilia-Romagna	YES	YES	YES	YES
Friuli-Venezia Giulia	YES	YES	IN PART	IN PART
Lazio	YES	NO	YES	YES
Liguria	NO ¹	YES	YES	YES
Lombardy	YES	YES	YES	YES
Marche	YES	NO	YES	YES
Molise	NO	NO	NO	YES
Piedmont	YES	YES	IN PART	YES
Sardinia	NO ³	NO	IN PART	NO
Sicily	NO ⁴	NO	YES	YES
Trentino-Alto Adige	YES	NO	NO	IN PART
Tuscany	YES	YES	YES	YES
Umbria	YES	YES	NO	YES
Veneto	YES	YES	YES	YES

* OSSERVATORIO ICTUS ITALIA. Rapporto 2018 sull'ictus in Italia: una fotografia su prevenzione, percorsi di cure e prospettive.

** Agenas. Rapporto 2021. II Indagine Nazionale sullo stato di attuazione delle reti tempo-dipendenti.

¹ There are ICPs for cerebral stroke at the level of healthcare companies and hospital facilities.

² ICPs are only available at the level of certain healthcare companies and hospital facilities.

³ As of the report date, the ICP was in the process of implementation.

⁴ The Neurovascular Units and Emergency Departments of Sicilian hospitals establish direct contact with the Stroke Unit at the Policlinico G. Martino when dealing with patients affected by potentially treatable endovascular reperfusion for ischemic stroke.

⁵ The project for patient transfer to rehabilitation centres is active in some parts of the region.

5.4.4 Rehabilitation

Stroke is a highly disabling condition. Currently, it is estimated that a percentage ranging from 25% to 50% of survivors of a cerebrovascular event experience significant disability that requires specific rehabilitative treatment²⁷¹. Rehabilitation can be defined as an educational and problem-solving process aimed at optimising

²⁷¹ OSSERVATORIO ICTUS ITALIA. 2018. Rapporto 2018 sull'ictus in Italia. Una fotografia su prevenzione, percorsi di cura e prospettive.

an individual's functioning. This is achieved both by containing the damage and dysfunction that may arise from illness and by intervening in the environment. It is essential to consider the limitations imposed by both available resources and the underlying medical condition²⁷².

The care requirements for an individual impacted by a stroke differ based on the nature of the brain damage, pre-existing clinical conditions, and factors associated with the event. Hence, the rehabilitation process consists of various phases that occur over time, each with specific and distinct objectives. *Secondary damage prevention* occurs during the acute phase of stroke with the primary goal is to prevent further harm arising from immobility and functional impairment. Following this, the *intensive rehabilitation* takes place, typically right after the acute phase and when the clinical situation has stabilised. This phase often involves inpatient rehabilitation for individuals severely or moderately affected by stroke. However, for those with milder impairments, hospitalisation may not be necessary, and treatment can be provided in outpatient or home-based settings. Subsequently, the *extensive rehabilitation* comes into play, focusing on achieving a complete recovery. It generally follows the discharge from the intensive rehabilitation unit. Finally, the *maintenance and/or prevention of disability progression* extends throughout the individual's remaining lifespan and its main objective is to uphold the acquired abilities and prevent any further deterioration of function. After the acute phase of a stroke has passed, patients require relocation to different facilities or units. The most severely affected patients, with no potential for motor recovery, are transferred to *Residenze Sanitarie Assistenziali* (RSA, long-term care units). Those with milder conditions are relocated to other wards or rehabilitation centres, while individuals with less significant outcomes or no necessity for regular medical supervision are discharged to their residences.

At the hospital level, the management of the individual should be carried out through an Individual Rehabilitation Plan (IRP) by a multidisciplinary or interdisciplinary team, with coordination by a physician experienced in post-stroke rehabilitation. The plan should consider the patient's needs and preferences, define residual disabilities and abilities, as well as desired outcomes, and clarify the role of each member of the rehabilitation team.

²⁷² MINISTERO DELLA SALUTE. *Criteri di appropriatezza strutturale, tecnologica e clinica nella prevenzione, diagnosi e cura della patologia cerebrovascolare*. Quaderni del Ministero della Salute, n.14 marzo – aprile 2012.

It is important to note that accessibility to rehabilitation stays varies among regions, depending on their specific healthcare policies. While there is a necessity to minimise the duration of stay in the Stroke Unit (high-intensity care) to the shortest possible period, it is important to acknowledge that a patient in the acute or post-acute stage of a stroke remains unstable and at a heightened risk. Additionally, ensuring therapeutic continuity is a critical prerequisite for achieving a positive prognosis and ultimate outcomes. Thus, accessibility to rehabilitation stays varies among regions, depending on their specific healthcare policies. Particularly important is the treatment of certain disorders that can complicate functional recovery, such as dysphagia, postictal depression, spatial neglect, language disorders, and other neuropsychological disturbances. Regrettably, not all healthcare settings may offer specialised rehabilitative interventions for dysphagia and visuospatial disorders. Notably, assessing potential swallowing problems should be deemed not only relevant but also a time-sensitive priority, requiring the implementation of specific measures, both in terms of rehabilitation and dietary adjustments. Likewise, the inclusion of specific depression treatments should be considered standard practice. One of the main difficulties is associated with the codes assigned to rehabilitation centres. In recent years, innovative rehabilitation techniques have been introduced (i.e., robotics, virtual reality, and non-invasive brain stimulation). However, not all rehabilitation facilities can provide these treatments. Specifically, treatments for dysphagia and cognitive-attentional disorders are primarily available at specialised centres, particularly those designated as Neurorehabilitation centres under code 75. Unfortunately, many regions reserve this code (and its corresponding treatment capabilities) only for individuals who have experienced a coma, which is a rare event in stroke cases. Consequently, cerebrovascular patients are categorised under code 56 (designating motor rehabilitation facilities), resulting in lower healthcare and rehabilitation workload and, naturally, lower costs. However, the norm allows code 75 not only for post-comatose patients but also for patients with severe behavioural impairments, resulting in multiple and complex disabilities, and requiring evaluative and therapeutic interventions that cannot be provided by other facilities offering intensive rehabilitation²⁷³.

²⁷³ Minister of Health's Guidelines for Rehabilitation Activities (Official Gazette No. 124 of 30/5/1998).

Extremely important is also the involvement of the family in the rehabilitation process, and, in particular, it is crucial that the family is provided with clear communication regarding the treatment goals, expected outcomes, and the temporal modalities in which the treatment will be delivered. While the rehabilitation process spans the outlined phases (intensive, extensive, and maintenance), extending beyond discharge from the Rehabilitation Hospital Ward, failure to adequately clarify this transition can frequently create conflicts and misunderstandings among family members. Hence, it is essential to explain to both the patient and their family that discharge from the rehabilitation hospital ward does not signify the end of treatment but merely marks the transition to the next phase.

In conclusion, stroke rehabilitation represents the crucial phase in the comprehensive care pathway for stroke patients. It is a multifaceted process that spans various phases, from the early post-acute stage to extensive recovery and long-term maintenance. During these phases, stroke patients receive rehabilitative care that addresses their individual needs, striving to optimise their functional recovery and overall quality of life. These rehabilitation efforts take place in diverse settings, ranging from specialised stroke units to long-term care facilities and home-based care. Importantly, successful stroke rehabilitation necessitates the active engagement of multidisciplinary teams and effective communication with both patients and their families. By tailoring rehabilitation plans to individual requirements and ensuring continuity of care, we can significantly improve outcomes for stroke survivors and enhance their prospects for a fulfilling life beyond stroke.

5.4.5 Performance evaluation

Stroke indicators play a pivotal role in the assessment and management of stroke care. These metrics are vital tools that healthcare professionals and policymakers use to measure and evaluate the quality of stroke prevention, treatment, and post-stroke care. By measuring various aspects of stroke incidence, treatment efficiency, patient outcomes, and healthcare system performance, stroke indicators provide valuable insights into the state of stroke care within a region or healthcare facility. In this context, we will delve into some key stroke indicators, shedding light on their significance in enhancing stroke care and patient outcomes.

In a broader context, these metrics oversee the monitoring of various aspects related to stroke, including the count of newly reported stroke cases (incidence) and the overall population living with stroke (prevalence). Additionally, they encompass the evaluation of stroke mortality rates (measured as the number of stroke-related deaths per 100,000 individuals), hospitalisations stemming from stroke, readmissions within 30 days, the rate of thrombolytic therapy and thrombectomy (expressed as the percentage of eligible stroke patients receiving these specific treatments), functional outcomes assessments (which gauge the extent of a patient's disability and independence following a stroke), and the scrutiny of post-stroke rehabilitation efforts.

Furthermore, as a condition where time is crucial, the assessment of stroke care quality heavily relies on time-to-treatment indicators. Notably, thrombolytic therapy should ideally be administered within 60 minutes of a stroke patient's hospital arrival (the target standard) and within 4.5 hours from the onset of the stroke (previously 3 hours). Similarly, for thrombectomy, the procedure involving endovascular clot removal, the recommended timeframe is within 90 minutes from the patient's arrival at the hospital. Within the category of time-to-treatment indicators, the following metrics are considered:

Among time-to -treatment indicators there are the following:

- Onset-to-Door Time: The time from the onset of stroke symptoms (stroke onset) to the patient's arrival at the hospital (door)
- First Medical Contact-to-Needle: The time interval between a first contact with the emergency medical services and the administration of thrombolytic therapy or thrombectomy (needle)
- Door-to-Needle Time: the time it takes from a stroke patient's arrival at the hospital (door) to the administration of intravenous thrombolytic therapy (needle)
- Door-in-Door-out Time (DIDO): The time interval between a patient's arrival at a spoke and their transfer to a hub for advanced interventions

Stroke indicators within the Italian healthcare system serve as vital metrics for the evaluation and continuous monitoring of stroke cases, encompassing both ischemic and haemorrhagic syndromes. These indicators play a crucial role in assessing not only the occurrence of strokes but also the treatment and resulting

outcomes. National stroke data in Italy are derived from comprehensive information sources, which include the *Schede Dimissioni Ospedaliere* (SDO, Hospital Discharge Records), demographic data pertaining to healthcare facilities (referred to as HSP stream), information related to the emergency and urgency system (EMUR stream), the *Anagrafe Tributaria*, utilised for the analysis of mortality data and the *Registro Endovascolare Ictus* (REI, the Italian Registry of Endovascular Treatment in acute stroke).

These extensive information streams are harnessed by two prominent Italian evaluation programs, namely the PNE and the NSG. Together, these programs utilise this data to furnish annual stroke indicators at the national level, offering valuable insights into the state of stroke care in Italy. Despite the inclusion of 88 indicators in the New Guarantee System, with 10 specifically designated for monitoring and assessing diagnostic-therapeutic care pathways, there is a notable absence of monitoring for stroke. Table XVI provides a summary of the available indicators for stroke in the year 2021, divided by typology.

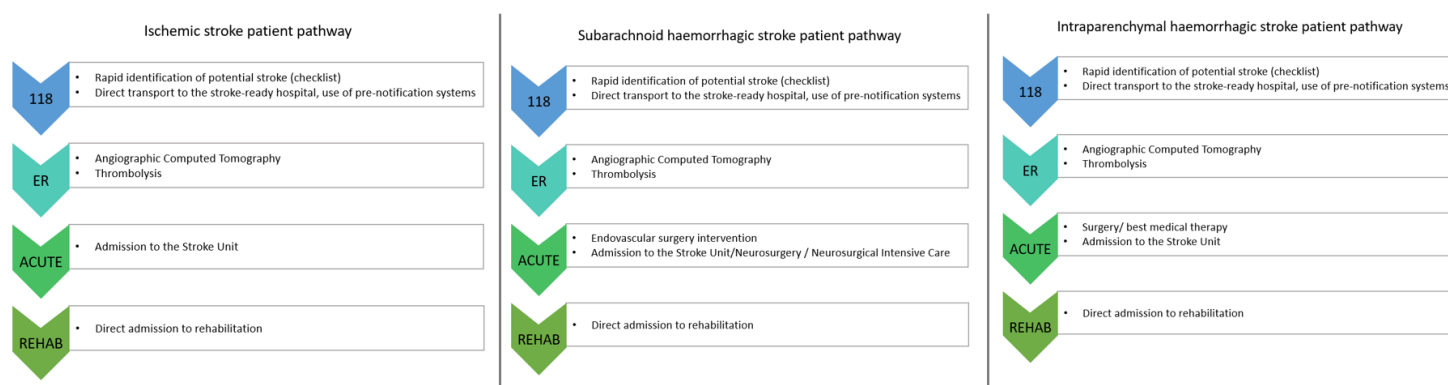
The work conducted by Agenas in 2021 holds significant importance²⁷⁴. The agency has crafted a report outlining suggestions for advancing and developing the stroke care network. It acknowledges the lack of a standardised national network organisation model for all regions, as noted by several OECD studies, underscoring Italy's requirement for a national-level monitoring system to measure disparities and pinpoint strategies for improvement.

Agenas's report emphasises that there is currently a scarcity of indicators at the national level that can effectively assess the performance of stroke networks. Its aim is to reorganise stroke indicators in alignment with the care pathway. For this purpose, four stages of the stroke patient's progression are recognised, during which critical junctures or gates are identified, serving as crucial determinants that significantly impact the course and results of the journey.

²⁷⁴ AGENAS, 2021. Gruppo Tecnico per l'elaborazione di proposte per l'attuazione e l'evoluzione della rete assistenziale dell'ictus: Relazione Conclusiva

These pathways encompass ischemic stroke, subarachnoid haemorrhagic stroke, and intraparenchymal haemorrhagic stroke gate (Figure XII).

Figure XII. Stroke pathway



Source: AGENAS, 2021. Gruppo Tecnico per l'elaborazione di proposte per l'attuazione e l'evoluzione della rete assistenziale dell'ictus: Relazione Conclusiva

As evident from the analysis of the indicators, it is clear that the primary emphasis in various regions has been on the early stages of care, including pre-hospital and hospital care. There are comparatively fewer regulatory measures addressing the integration between hospital and community care, specifically during the discharge and post-discharge phases. Among the proposed indicators, only six are categorised as territorial indicators according to the guidelines. These include one volume indicator (Ischemic Stroke: Rate of ischemic strokes in the population per 10,000 residents), one process indicator (Number of interventions for First Hour Quintet (FHQ) pathologies performed with advanced emergency means out of the total interventions for FHQ pathologies per year) and four outcome indicators (Ischemic Stroke: 1-year Mortality, Proportion of ischemic stroke patients discharged to rehabilitation facilities, Analysis of discharge methods for post-stroke patients and Proportion of Major Adverse Cardiac Cerebrovascular Events (MACCE) within 12 months of an ischemic stroke episode). In particular, the 12-month MACCE (Major Adverse Cardiac and Cerebrovascular Events) is calculated to assess the correct clinical-therapeutic management of the patient in the community following hospitalisation for a stroke.

Table XVI. National stroke indicators

National Outcomes Evaluation Program	Italian National Agency for Regional Healthcare Services
1. Subarachnoid Haemorrhage: Hospitalisation Volume 2. Ischemic Stroke: 1-year Mortality 3. Ischemic Stroke: Hospitalisation Volume 4. Repair of Unruptured Cerebral Aneurysm: Hospitalisation Volume 5. Repair of Ruptured Cerebral Aneurysm: Hospitalisation Volume 6. Ischemic Stroke: Hospitalisation Volume with Thrombolysis 7. Proportion of Major Adverse Cardiac and Cerebrovascular Events (MACCE) within 12 months of an ischemic stroke episode 8. Ischemic Stroke: 30-day Mortality (admission) 9. Ischemic Stroke: Hospital Readmissions at 30 days	1. Ischemic Stroke: Rate of ischemic strokes in the population (per 10,000 residents) 2. Ischemic Stroke: Thrombolysis Treatment (%) 3. Ischemic Stroke: Thrombectomy Treatment (%) 4. Ischemic Stroke: Thrombectomy Rate among Residents (per 100,000 population) 5. Ischemic Stroke: Non-Admission to Stroke Unit (%) 6. Ischemic Stroke: 30-day Mortality from Admission (%) 7. Ischemic Stroke: 30-day Mortality from Admission (%), patients admitted to Stroke Unit 8. Ischemic Stroke: 30-day Mortality from Admission (%), patients not admitted to Stroke Unit 9. Ischemic Stroke: 30-day Mortality (admission) 10. Ischemic Stroke: 30-day Mortality from Discharge (%), population over 75 11. Ischemic Stroke: 30-day Mortality from Admission (%), patients over 75 admitted to Stroke Unit 12. Ischemic Stroke: 30-day Mortality from Admission (%), patients over 75 not admitted to Stroke Unit
New Guarantee System	
1. Brain-dead organ donor 2. Death Determinations with Neurological Criteria 3. Brain Deaths relative to deaths from acute brain injury in intensive care 4. 30-day Mortality from the first admission for ischemic stroke 5. Proportion of Major Adverse Cardiac and Cerebrovascular Events (MACCE) within 12 months of an ischemic stroke episode 6. Number of interventions for First Hour Quintet (FHQ) pathologies performed with advanced emergency means out of the total interventions for First Hour Quintet (FHQ) pathologies per year	13. Subarachnoid Haemorrhage: Admission to Stroke Unit, subarachnoid haemorrhage (%) 14. Subarachnoid Haemorrhage: Treatment of Subarachnoid Haemorrhage (%) 15. Haemorrhagic Intraparenchymal Stroke: Admission to Stroke Unit, haemorrhagic intraparenchymal stroke (%) 16. Haemorrhagic Intraparenchymal Stroke: Treatment of Haemorrhagic Intraparenchymal Stroke (%) 17. Subarachnoid Haemorrhage: Treatment of Subarachnoid Haemorrhage within 48 hours (%) 18. Haemorrhagic Intraparenchymal Stroke: Analysis of the Temporal Distribution of Surgically Treated Patients 19. Subarachnoid Haemorrhage: Effects on Mortality from Admission to Stroke Unit 20. Haemorrhagic Intraparenchymal Stroke: Effects on Mortality from Admission to Stroke Unit 21. Haemorrhagic Stroke: Effects on Average Length of Stay in Stroke Unit (days) 22. Analysis of discharge methods for post-stroke patients 23. Ischemic Stroke: Temporal Distribution of Thrombectomy Treatment from PS (absolute values and percentages) 24. Ischemic Stroke: Temporal Distribution of Thrombectomy Treatment from Admission (absolute values) 25. Ischemic Stroke: Regional Average Thrombectomy Treatment Times (minutes)

The clinical-therapeutic pathway includes a secondary prevention program that should encompass dietary recommendations, lifestyle modifications, and the definition of an appropriate pharmacological strategy.

Similarly, the 30-day mortality following a hospitalisation for stroke indicator assesses the patient's outcome starting from the date of their hospital admission, which coincides with their stroke admission. It is regarded as a reliable and meaningful indicator for assessing the adequacy and efficiency of the diagnostic and therapeutic procedures initiated upon hospital admission.

5.4.6 The impact of the Covid-19 pandemic on stroke

Due to the Covid-19 pandemic several drastic measures were implemented to mitigate the disease's transmission. These measures included the conversion of general medical wards into quarantine units for patients who had contracted the virus. Moreover, extra ICU beds were swiftly introduced, and routine outpatient clinics were suspended, along with the postponement of all elective procedures.

In the years leading up to the pandemic (2015-2019), there was an approximately 8% decrease in hospitalisations for ischemic strokes. Despite a notable decline in 2020 (11% lower than expected), hospitalisation numbers in 2021 remained relatively constant, at approximately 73,000 cases. When compared to the pre-pandemic trend, the reduction is estimated to be around 9%, equivalent to roughly 7,000 fewer hospitalisations than anticipated²⁷⁵. During this phase, a decrease in the number of stroke patients presenting at hospitals has been noted. Typically, individuals experiencing mild stroke-like symptoms refrain from seeking immediate medical attention, often opting to wait for symptoms to improve or resolve on their own. This could account for the observed reduction in admissions for suspected stroke and/or significant delays in hospital arrival. These factors render some stroke patients ineligible for acute treatment and lead to an increasing number of patients arriving too late for reperfusion therapy. Simultaneously, there has been an underestimation of acute stroke cases in patients already hospitalised due to Covid-19, with challenges arising in their management. Acute stroke may complicate or co-occur with Covid-19 disease. Regarding 30-day mortality following hospitalisation for ischemic stroke, there was a slight reduction in 2021

²⁷⁵ AGENAS. *Programma Nazionale Esiti* 2022. Available at https://pne.agenas.it/main/doc/Report_PNE_2022.pdf (accessed October 2023)

compared to the previous year, with a rate of 10.8% (11.2% in 2020), although it still remains distant from a realignment with the trend (estimated value of 9.2%)²⁷⁶. Throughout the pandemic, the majority of ICU beds were primarily allocated to Covid-19 patients, and entire hospitals were exclusively dedicated to the treatment and care of those with Covid-19. This disruption significantly impacted the organisation of SU, necessitating the mandatory reconfiguration of stroke pathways, especially in regions severely affected by the pandemic. The impact on stroke pathways varied depending on the incidence of Covid-19. Northern regions, which were more heavily affected by the pandemic, implemented changes in their network including the reduction of SU number to accommodate the increasing availability of ICU and sub-intensive ICU beds for Covid-19 patients (such as in Lombardy), transitioning from a drip and ship organisation to a mothership organisation (as seen in Emilia Romagna), and implementing Covid-19 sanitisation procedures, particularly for radiology emergency services, which extended the timelines for vascular emergencies (as in Lazio)²⁷⁷. In contrast, in the southern regions, the impact of the pandemic did not lead to significant modifications. The centres identified in regional resolutions as hubs for intravenous thrombolysis and endovascular treatment remained unchanged, with only adjustments to patient management procedures to ensure safety during procedures. However, it is expected that, despite minimal changes in stroke pathways, the fear of hospital access, the need for pre-triage, and the necessity to rule out the coexistence of Covid-19 may result in overall increased times for managing acute strokes, even in the prehospital phase. To address these developments, Agenas conducted an analysis to assess whether the Region has formulated a plan for managing time-dependent patients during both the epidemic and post-epidemic phases and established precise directives for managing territorial emergencies outside hospitals, defined particular routes for hospital entry and admission for patients with Covid-19²⁷⁸.

²⁷⁶ AGENAS. *Programma Nazionale Esiti* 2022. Available at https://pne.agenas.it/main/doc/Report_PNE_2022.pdf (accessed October 2023)

²⁷⁷ ZEDDE, M., PEZZELLA, F.R., PACIARONI, M., COREA, F., REALE, N., TONI, D. AND CASO, V., 2020. *Stroke care in Italy: an overview of strategies to manage acute stroke in COVID-19 time*. *European Stroke Journal*, 5(3), pp.222-229.

²⁷⁸ AGENAS, 2021. *II Indagine Nazionale sullo stato di attuazione delle reti tempo-dipendenti. Rapporto 2021*.

CHAPTER VI

RESULTS AND DISCUSSION

- 6.1 Introduction
- 6.2 Selection Dynamics: Exploring the Reasons and Criteria Guiding Determinant Choices in Stroke
- 6.3 Methodology
- 6.4 Results
- 6.5 Key insights into outcome indicators
- 6.6 Discussion
- 6.7 Final remarks

The chapter describes the methodology adopted and showcases the empirical evidence obtained through the analysis. The main research question is answered through a cross-case analysis with the aim to shed light on the relationship among network effectiveness determinants and outcomes.

The research employs a multiple case study approach to evaluate and compare regional stroke networks. The case analysis provides a brief introduction on network implementation and evolution in each regional context and follows the framework outlined for the categorisation of effectiveness determinants into three groups: structural determinants, contextual determinants, and process determinants. This chapter presents the results of the analysis pertaining to the determinants of network effectiveness within the selected networks. These determinants are systematically discussed within the categories of structure, context, and process, and are presented in comparative tables.

The deductions derived from this analysis have been employed to formulate five research propositions holding theoretical significance as they introduce a novel interpretation of the concept and measurement of effectiveness within the domain of healthcare networks. Additionally, the research delineates a pathway for the implementation of diverse forms of effectiveness contingent upon the level of network development and formalisation.

6.1 Introduction

The analysis presented in this research focuses on the healthcare context, as existing literature underscores a notable transformation in recent years. The shift has moved away from a fragmented, hyper-specialised environment where organisations competed for resources and toward a collaborative mindset. Likewise, the clinical approach has transitioned from a traditional model focused solely on individual providers to a patient-centric approach that prioritises the unique needs, preferences, and active involvement of each patient. Similarly, the traditional hospital-centred perspective of healthcare has demonstrated its shortcomings in providing high-quality care, underscoring the need for a redefined role of local care during the pre- and post-hospitalisation phases of the healthcare continuum. To manage these compelling problems, many countries have sought to enhance healthcare performance through the implementation of a reorganisation of the provision of care among different settings and according to diverse levels of severity by developing networking forms of organising. For the purpose of this study, the collaboration among providers is defined as a network, characterised by an interconnected system of nodes (healthcare providers, facilities, and services) that work together to deliver medical care, while no single unit simply serves as a formal subordinate within a larger hierarchical arrangement²⁷⁹. This choice is motivated by the hybrid nature of networks, which encompass aggregates of individual organisations positioned between the realms of a free market and voluntary cooperation based on loose connections.

However, existing evaluation frameworks are primarily built on single organisation's performances neglecting a comprehensive evaluation of the network's role in evaluating effectiveness at the regional level. Especially in public contexts where services are primarily funded through taxation, the absence of a definitive price mechanism capable of indicating the value generated enlarges the concept of performance embedding other dimensions among which effectiveness is deemed a cornerstone of high-quality healthcare. In clinical terms, effectiveness ensures that healthcare interventions and practices are evidence-based, deliver positive outcomes, and prioritise patient safety. Since the primary goal of healthcare

²⁷⁹ O' TOOLE, L. J., 1997. Treating Networks Seriously: Practical and Research-Based Agendas in Public Administration. Op. cit.

is to improve patient outcomes, effectiveness ensures that treatments, interventions, and medical practices lead to positive health outcomes for patients. In this analysis, a tripartite definition of effectiveness has been adopted: clinical, signifying the capacity of an intervention to positively impact health; internal, indicating the extent to which the entire healthcare system attains defined goals for specific, evidence-based clinical outcomes; and external, pertaining to the ability to not only properly treat patients but also satisfy their needs.

This research responds to the demand for more empirical studies on effectiveness at the regional level, with the goal of strengthening the current body of knowledge, which is often criticised for lacking a comprehensive theory addressing the overall performance of the network. At the same time more research is advocated for analysing the elements that determine effectiveness in the network configuration of care. Hence, the main research goal is to investigate whether a connection exists between specific network attributes and the effectiveness of care provision. This work seeks to address this gap by examining how Italian regions supervise their networks in relation to the structure, context, and process within the domain of stroke. It aims to identify conditions that enhance the effectiveness of a stroke network, offering insights into stage-specific determinants and outcomes related to different types of effectiveness, ultimately proposing a series of propositions to explain the evolution of the effectiveness concept alongside network's formation, the network formalisation path and potential deviations from it, as well as the role and intensity of trust.

Italy was selected as a significant case primarily due to the diversity in its healthcare system. Healthcare administration is decentralised to regions, leading to substantial variations in approaches adopted at the regional level and offering the opportunity to observe diverse characteristics of networks. Investigating healthcare networks across these diverse regions can yield valuable insights into regional inequalities and potential remedies as well as enabling cross-regional comparisons to learn from best practices. Moreover, the evolution of the healthcare field in Italy, with a focus on inter-company collaboration, has resulted in the legislature requiring the network structure as the preferred configuration for certain medical conditions. This has, in turn, given collaboration a mandated character and a significant level of formalisation. This is the case for time-dependent diseases, among which stroke, being the leading cause of disability and the third leading

cause of death, has been identified as a time-dependent condition that highlights the need for integrated care across multiple levels of complexity and different care settings. Time-dependent pathologies are conditions for which clinical outcomes are highly influenced by decisions and interventions implemented in the first few hours after symptom onset, necessitating a well-defined network of operational structures capable of ensuring timely interventions as recommended by guidelines and best practices, taking into account the geographic characteristics of the region. Furthermore, the significant disability impact of strokes underscores the need for integration between hospital and community care, an aspect that has garnered legislative attention in recent years.

6.2 Selection Dynamics: Exploring the Reasons and Criteria Guiding Determinant Choices in Stroke

The analysis of the literature on the determinants of network effectiveness has led to the categorisation of these determinants into three groups: structural, contextual, and process determinants²⁸⁰. In order to analyse the context of stroke care, the relevant characteristics are included in table XVII.

Among the structural characteristics, the governance model is of particular importance when referring to stroke since it investigates the level of centralisation and the division of planning, programming, and control activities, as well as network coordination activities. The reason for including governance lies in the fact that in brokered networks (either lead organisation or NAO), it is the centralisation trait that fosters effectiveness. Consequently, whenever integration is achieved through centralisation, the network is expected to be more effective than decentrally integrated configurations²⁸¹.

Density, defined as the cohesion of the network, is deemed to foster network effectiveness as the closer the network members are, the more frequent their interactions. Density is found to play a higher role in small networks as, being closer to each other's, partners develop better interactions and enhance inner trust, leading toward effectiveness improvements²⁸². Density is also analysed through the presence of cliques, spontaneous subgroups of organisations characterised by intense informal collaboration. The grounding belief is that a more intensive relationship is achieved through few tightly connected organisations, especially when these organisations share multiple ties²⁸³.

²⁸⁰ TURRINI, A., CRISTOFOLI, D., FROSINI, F. AND NASI, G., 2010. *Networking literature about determinants of network effectiveness*. Op. cit.; SMITH, J.G., 2020. *Theoretical advances in our understanding of network effectiveness*. Op. cit.; PEETERS, R., WESTRA, D., VAN RAAK, A.J. AND RUWAARD, D., 2023. *So happy together: a review of the literature on the determinants of effectiveness of purpose-oriented networks in health care*. Op. cit.

²⁸¹ PROVAN, K.G. and KENIS, P., 2008. *Modes of network governance: Structure, management, and effectiveness*. Op. cit.; PROVAN, K.G. and MILWARD, H.B., 2001. *Do networks really work? A framework for evaluating public-sector organisational networks*. Op. cit.

²⁸² WANG, W., 2016. *Exploring the determinants of network effectiveness: The case of neighborhood governance networks in Beijing*. *Journal of Public Administration Research and Theory*, 26(2), pp.375-388.

²⁸³ PROVAN, K.G., AND SEBASTIAN J. G. 1998. *Networks within Networks: Service Link Overlap, Organisational Cliques, and Network Effectiveness*. Op. cit.; KLIJN, E., STEIJN, B. AND EDELENBOS, J. 2010. *The Impact of Network Management on Outcomes in Governance Networks*. *Public Administration* 88(4):1063–82

Table XVII. Determinants of stroke network effectiveness

STRUCTURE	CONTEXT	PROCESS
Integration mechanisms	Resource munificence	Network management
- Mode of governance	- High resources	- Training activities
- Density		
- Cliques	System stability	Trust
- Communication system	- Past collaborations	
- Organisational model	- Flexibility	Legitimacy
		- Internal
Size and composition	Support from the community	- External
- Organisations' number	- Stakeholders' needs	Power imbalance
- Cap to growth	- Stakeholders' involvement and accountability	Management activities
- Composition		- Activation
Formalisation		- Facilitation and mediation
- Documental formalisation		- Goal assessment
Developmental stage		
Inner stability		
- Management tenure		

Furthermore, communication plays a fundamental role in network performance since whenever information exchange is lacking, coordination suffers favouring potential conflicts. Consequently, more interoperable systems together with greater interpersonal communication can nurture communication and coordination indirectly²⁸⁴. In the specific context of stroke, both density and communication play a prominent role since timeliness of intervention comes via quick interventions among different professionals and across different settings. The timeliness of interventions and the quality of care are significantly impacted by the seamless interactions among healthcare professionals operating in various capacities across different healthcare settings. In essence, the density of these professional connections and the effectiveness of communication channels are vital elements in ensuring that stroke patients receive swift and well-coordinated care, leading to better outcomes and reduced disability. This dynamic network structure fosters a collaborative environment where timely decision-making and streamlined processes are key to delivering optimal care to patients experiencing ischemic or haemorrhagic strokes.

²⁸⁴ AUNGER, J.A., MILLAR, R., GREENHALGH, J., MANNION, R., RAFFERTY, A.M., MCLEOD, H., 2021. *Why do some inter-organisational collaborations in healthcare work when others do not? A realist review*. Op. cit

Network configuration in accordance with a formalised organisational model is also relevant as a structural characteristics. The hub and spoke configuration is the most used form of network in healthcare. It is described as an organisational approach employed to optimise the service provision and resource utilisation. In this model, there is a central hub that serves as the primary centre of expertise with advanced capabilities. Surrounding the central hub are multiple peripheral organisations, or spoke, which rely on the hub for access to resources, distribution of services, or exchange of information.

The hub and spoke model plays a prominent role in stroke care, and stroke networks can be categorised into two distinct subtypes within this model: the mothership model, characterised by centralised care, and the drip-and-ship model, which follows a decentralised approach. These two configurations are integral to the effective management of stroke patients, offering different strategies to ensure that patients receive the most appropriate care based on their unique clinical needs and geographic locations.

Size and composition of the network also matter since increased size is usually accompanied with benefits in terms of political advantages, larger professional staff, better sharing of ideas as well as major possibilities to access economies of scale and scope and as a solution to the problem of scarce financial resources in inefficient political or administrative systems²⁸⁵. Nevertheless, the larger the number of organisations within the network, the higher the coordinating efforts as the number of interaction among members rises exponentially²⁸⁶. Consequently,

²⁸⁵ HASNAIN-WYNIA, R., SOFAER, S., BAZZOLI, G.J., ALEXANDER, J.A., SHORTELL, S.M., CONRAD, D.A., CHAN, B., ZUKOSKI, A.P. AND SWENEY, J., 2003. *Members' perceptions of community care network partnerships' effectiveness*. Medical Care Research and Review, 60(4 suppl), pp.40S-62S; MARKOVIC, J. 2017. *Contingencies and Organizing Principles in Public Networks*. Public Management Review 19(3):361-80; AUNGER, J.A., MILLAR, R., GREENHALGH, J., MANNION, R., RAFFERTY, A.M., MCLEOD, H., 2021. *Why do some inter-organisational collaborations in healthcare work when others do not? A realist review*. Op. cit., PROVAN, K.G. and MILWARD, H.B., 2001. Do networks really work? A framework for evaluating public-sector organisational networks. Op. cit.; FULOP N, PROTOPSALTIS G, HUTCHINGS A, KING A, ALLEN P, NORMAND C, WALTERS R. 2002. *Process and impact of mergers of NHS trusts: multicentre case study and management cost analysis*. Br Med 325(7358):246-9

²⁸⁶ VERWEIJ, S., E. KLIJN, J. EDELENBOS, AND A. VAN BUUREN. 2013. *What Makes Governance Networks Work? A Fuzzy Set Qualitative Comparative Analysis of 14 Dutch Spatial Planning Projects*. Public Administration 91(4): 1035-55; PROVAN, K.G. and KENIS, P., 2008. Modes of network governance: Structure, management, and effectiveness. Op. cit.; CEPIKU, D., GIORDANO, F., MASTRODASCIO, M. and WANG, W., 2021. *What drives network effectiveness? A configurational approach*. Op. cit.; AUNGER, J.A., MILLAR, R., GREENHALGH, J., MANNION, R., RAFFERTY, A.M., MCLEOD, H., 2021. *Why do some inter-organisational collaborations in healthcare work when others do not? A realist review*. Op. cit.

increasing the number of participants fosters effectiveness up to a critical threshold above which competing logics may arise, leading to conflicts and communication meltdowns reducing effectiveness and goals achievement. Thus, it is worth considering capping the number of members or envisage selecting mechanisms to recruit new members while making sure that the selected number is not too small to foster collaboration²⁸⁷. Similarly, homophily, the similarity of the parties in terms of goals, values, culture and structural characteristics is proven to enhance the network performance thanks to shared operational logics, culture and goals²⁸⁸. The composition of the network plays a crucial role when dealing with a long-term condition such as stroke. Once the acute hospitalisation phase is surpassed, the ideal scenario involves transitioning the patient to the community. The handover process, effective communication among various healthcare professionals, and the reduction in intensity of the disease become essential for achieving better patient outcomes. This approach recognises the importance of a continuum of care that extends beyond the hospital setting, ensuring that patients receive comprehensive and coordinated support throughout their recovery journey, being cared for by different healthcare professionals.

Coordination among participants may relate to formal mechanisms or impersonal coordination modes, described as distinct and alternative. Lack of measures of success or plan to measure success, lack of historical data for process validation and change in measurement tool are described as hampering effectiveness while common assessment and reporting tools, ongoing outcome measurement and target dissemination in program development facilitate network effectiveness²⁸⁹. However, network management can also be described as *coordination by feedback* namely, non-hierarchical management activities requiring mutual adjustments within the network. Hence, formalisation of the coordination mechanisms and network management can alternatively be used to

²⁸⁷ TURRINI, A., CRISTOFOLI, D., FROSINI, F. AND NASI, G., 2010. Networking literature about determinants of network effectiveness. Op. cit.; WILSON, T., BERWICK, D. M., and CLEARY, P. D. 2003. *What do collaborative improvement projects do? Experience from seven countries*. The Joint Commission Journal on Quality and Patient Safety, 29(2), 85–93

²⁸⁸ WATTS, D. J. 2003. *Six Degrees: The Science of a Connected Age*. New York: W.W. Norton; CEPIKU, D., GIORDANO, F., MASTRODASCIO, M. AND WANG, W., 2021. *What drives network effectiveness? A configurational approach*. Op. cit.

²⁸⁹ PEETERS, R., WESTRA, D., VAN RAAK, A.J. AND RUWAARD, D., 2023. *So happy together: a review of the literature on the determinants of effectiveness of purpose-oriented networks in health care*. Op. cit.

facilitate interaction among participants²⁹⁰. Concerning stroke, two essential components of the care process are the Integrated Care Pathways (ICPs), which offer a comprehensive, evidence-based framework to steer healthcare professionals in providing high quality care, and the network plan, which provides a meticulous roadmap delineating the roles, duties, schedules, and anticipated results within the care process. Furthermore, as different performance is expected from emergent and mature networks²⁹¹ and different performance criteria prove to be more appropriate depending on the network's stage²⁹², network maturity is considered a determinant of network effectiveness²⁹³. The organisation of stroke care is a regional responsibility, resulting in diverse approaches with varying timelines, specific to each region. Evaluating the network's level of development is essential not only for tracking its progress but also for conducting a thorough analysis of its evolution. Equally important is leader's turnover in the organisations composing the network, which has been proved to inhibit effectiveness²⁹⁴ since a longer length of management tenure would facilitate the trust building process contributing to the overall effectiveness²⁹⁵.

Among the contextual characteristics, the definition of the technological and quantitative equipment of the network, its alignment of the equipment with the established national parameters and standards and the adequacy of bed capacity are analysed since networks are proven to better achieve their goals thanks to the more resources they receive²⁹⁶. However, more resources do not automatically imply better health outcomes²⁹⁷.

²⁹⁰ FADDA, N. and ROTONDO, F., 2022. *What combinations of conditions lead to high performance of governance networks? A fuzzy set qualitative comparative analysis of 12 Sardinian tourist networks*. International Public Management Journal, 25(4), pp.517-543

²⁹¹ CEPIKU, D., GIORDANO, F., MASTRODASCIO, M. and WANG, W., 2021. *What drives network effectiveness? A configurational approach*. Op. cit.

²⁹² KENIS, P. AND PROVAN, K.G., 2009. *Towards an exogenous theory of public network performance*. Op. cit.

²⁹³ KLIJN, E., STEIJN, B. AND EDELENBOS, J. 2010. *The Impact of Network Management on Outcomes in Governance Networks*. Op. cit.

²⁹⁴ HEARLD, L. R., ALEXANDER, J. A., AND SHI, Y., 2015. *Leadership transitions in multisectoral health care alliances: Implications for member perceptions of participation value*. Health Care Management Review, 40(4), 274–285; BAZZOLI, G.J., CASEY, E., ALEXANDER, J.A., CONRAD, D.A., SHORTELL, S.M., SOFAER, S., HASNAIN-WYNIA, R. AND ZUKOSKI, A.P., 2003. *Collaborative initiatives: Where the rubber meets the road in community partnerships*. Op. cit.

²⁹⁵ JUENKE, E.G. 2005. *Management Tenure and Network Time: Non-Experience Affects Bureaucratic Dynamic*. Journal of Public Administration Research and Theory, 15, 1, 113–31.

²⁹⁶ AGRANOFF, R. AND MCGUIRE, M. 1999. *Managing in Network Settings*. Policy Studies Review. 16: 1 pp18–41.

²⁹⁷ OECD, 2021, *Health at a Glance 2021: OECD Indicators*, OECD Publishing, Paris,

Past collaborations, understood as those predating the 2015 legislation that introduced the network configuration for time-dependent care networks, contribute to facilitate effectiveness achievements²⁹⁸ since organisations that already have experienced collaboration, although through informal agreements²⁹⁹, are likely to participate in future collaborations³⁰⁰. Flexibility, intended as the ability to deal with environmental disturbance and adaptability to emerging circumstances, is also considered a contextual element impacting on partnership's effectiveness by increasing trust and goals achievements³⁰¹. Consequently, it is investigated as adaptations of the network for patient management in relation to shocking events like the Covid-19 pandemic. Emergencies arising from time-dependent medical conditions require prompt intervention. Therefore, a region's capacity to handle emergency situations during a pandemic may have influenced the effectiveness of care delivery to different extents.

Support from the community is of detrimental importance in network configuration since patients' and associations' involvement in the definition of the compelling needs to be addressed, help setting the right priorities and to understand the impact of the social economic and political realities inhabiting the external environment³⁰². Unsurprisingly, satisfied stakeholders will less likely delay the decision process through opposition but rather will actively contribute to find solutions while promoting communication and knowledge within the network³⁰³. Stakeholder support plays a more significant role in conditions with extended treatment courses. Conditions like stroke offer ample opportunities for rehabilitation, demanding active patient collaboration. Additionally, stroke is

²⁹⁸ AUNGER, J.A., MILLAR, R., GREENHALGH, J., MANNION, R., RAFFERTY, A.M., MCLEOD, H., 2021. *Why do some inter-organisational collaborations in healthcare work when others do not? A realist review*. Op. cit.; CEPIKU, D. 2014. *Network Performance: Toward a Dynamic Multidimensional Model*, Op. cit.; SMITH, J.G., 2020. *Theoretical advances in our understanding of network effectiveness*. Op. cit.

²⁹⁹ LEMIEUX-CHARLES, L., CHAMBERS, L.W., COCKERILL, R., JAGLAL, S., BRAZIL, K., COHEN, C., LECLAIR, K., DALZIEL, B. AND SCHULMAN, B., 2005. *Evaluating the effectiveness of community-based dementia care networks: the Dementia Care Networks' Study*. Op. cit.

³⁰⁰ BRASS, D.J., GALASKIEWICZ, J., GREVE, H.R. AND TSAI, W., 2004. *Taking stock of networks and organisations: A multilevel perspective*. Academy of management journal, 47(6), pp.795-817.

³⁰¹ AUNGER, J.A., MILLAR, R., GREENHALGH, J., MANNION, R., RAFFERTY, A.M., MCLEOD, H., 2021. *Why do some inter-organisational collaborations in healthcare work when others do not? A realist review*. Op. cit.

³⁰² MANDELL, M.P. and KEAST, R., 2008. *Evaluating the effectiveness of interorganisational relations through networks: Developing a framework for revised performance measures*, Op. cit.

³⁰³ MANDELL, M. P. 2001. *Getting Results through Collaboration: Networks and Network Structures for Public Policy and Management*. Westport, CT: Quorum Books

considered a preventable condition, hence effective prevention strategies not only reduce risk factors but also enhance public awareness, making citizens more alert to the importance of swift intervention.

As organisational paradigms within the healthcare sector continue to evolve, there is a notable shift away from the traditional siloed perspective towards a more collaborative approach. This transformation signifies a fundamental change in the competencies and skills required from healthcare managers and administrators. In light of these shifts, among process determinants, it becomes imperative to include investments in the training and development of the emerging management care, equipping them with the necessary knowledge, guidance, and tools to effectively navigate the collaboration.

Trust is conducive to cohesion among members and facilitates cooperation³⁰⁴ by diminishing uncertainty and transaction costs. It is considered a crucial mechanism to cope with uncertainty, typically affecting networks³⁰⁵ and is often recognised having a positive effect on network effectiveness³⁰⁶. Similarly, legitimacy is also proven to affect network performance both in positive and negative terms³⁰⁷. Internal legitimacy mostly relates to the participants perception that engaging in the network is valuable, as well as reinforcing their commitment through trust building activities within the network and conflict resolution. On the contrary, external legitimacy as the perception of the network as being credible, valid, and accepted by external stakeholders, is easily achievable in mandated networks, especially in early stages.

Power has been loosely defined as the influence that one organisation has over another, often stemming from hierarchy, control over critical or scarce resources,

³⁰⁴ CEPIKU, D., GIORDANO, F., MASTRODASCIO, M. and WANG, W., 2021. *What drives network effectiveness? A configurational approach*. Op. cit.

³⁰⁵ YSA, T., SIERRA, V. AND ESTEVE, M., 2014. *Determinants of network outcomes: The impact of management strategies*. Op. cit.

³⁰⁶ PEETERS, R., WESTRA, D., VAN RAAK, A.J. AND RUWAARD, D., 2023. *So happy together: a review of the literature on the determinants of effectiveness of purpose-oriented networks in health care*. Op. cit.; SMITH, J.G., 2020. *Theoretical advances in our understanding of network effectiveness*. Op. cit.; AUNGER, J.A., MILLAR, R., GREENHALGH, J., MANNION, R., RAFFERTY, A.M., MCLEOD, H., 2021. *Why do some inter-organisational collaborations in healthcare work when others do not? A realist review*. Op. cit.

³⁰⁷ HUMAN, S.E. and PROVAN, K.G., 2000. *Legitimacy building in the evolution of small-firm multilateral networks: A comparative study of success and demise*. Administrative science quarterly, 45(2), pp.327-365. SMITH, J.G., 2020. *Theoretical advances in our understanding of network effectiveness*. Op. cit.

and from legitimacy³⁰⁸. It often steams from size, as collaborations dominated by the larger partner frequently entail lopsided power leading to a decline in trust and cohesion, and centralised governance since highly centralised networks may conceive the idea of some members having a major influence compared to other members. Trust, legitimacy, and the perception of power balance play vital roles in stroke networks because they affect the quality of communication, collaboration, and decision-making among healthcare professionals, institutions, and stakeholders. In stroke care, time is of the essence, and effective communication is crucial for rapid and well-coordinated interventions.

Furthermore, among the management activities, activation is intended as the management involvement in the identification of the appropriate actors to include in the network. By recruiting the strategic actors to include in the network, managers indirectly build trust and commitment while attracting the skills, knowledge, and resources necessary for the network to function³⁰⁹. Similarly, remarkable abilities in facilitating interactions within the network as well as mediation of existing conflicts, secures its place among the essential abilities distinguishing the management of networks³¹⁰. Lastly, network management activities involving active engagement with the stakeholders in developing network objectives help to foster the perception of progress defined as how successfully actors involved in the collaboration believe the organisation is moving toward the defined goals³¹¹.

Considering the primary objective of evaluating whether specific network characteristics influence the provision of care in the context of stroke, the

³⁰⁸ AUNGER, J.A., MILLAR, R., GREENHALGH, J., MANNION, R., RAFFERTY, A.M., MCLEOD, H., 2021. *Why do some inter-organisational collaborations in healthcare work when others do not? A realist review*. Op. cit.

³⁰⁹ AGRANOFF, R., and M. MCGUIRE. 2001. *Big Questions in Public Network Management Research*. Op. cit.; KOPPENJAN, J., AND KLIJN E. 2004. *Managing Uncertainties in Networks: A Network Approach to Problem Solving and Decision-Making*. Op. cit.; SAZ-CARRANZA, A., AND S. M. OSPINA. 2011. *The Behavioral Dimension of Governing Interorganisational Goal-Directed Networks—Managing the Unity-Diversity Tension*. Op. cit.

³¹⁰ MANDELL, M.P. and KEAST, R., 2008. *Evaluating the effectiveness of interorganisational relations through networks: Developing a framework for revised performance measures*. Op. cit, HARLOCK, J., CAIELS, J., MARCZAK, J., PETERS, M., FITZPATRICK, R., WISTOW, G., FORDER, J. AND JONES, K., 2020. *Challenges in integrating health and social care: the Better Care Fund in England*. Op. cit.

³¹¹ AUNGER, J.A., MILLAR, R., GREENHALGH, J., MANNION, R., RAFFERTY, A.M., MCLEOD, H., 2021. *Why do some inter-organisational collaborations in healthcare work when others do not? A realist review*. Op. cit.

subsequent indicators have been employed in the analysis, encompassing ischemic and haemorrhagic strokes. Table XVIII synthesises the indicators according to the different phases to which they refer.

The incidence rate of ischemic strokes within the population, calculated as the number of cases per 10,000 residents, serves as a crucial metric for assessing the disease's burden on the community. This data provides valuable insights into the prevalence and impact of ischemic strokes, which, in turn, facilitate the development of tailored and effective organisational frameworks within healthcare systems.

The percentage of patients treated with thrombolysis assesses the proportion of patients receiving this treatment, summarising the continuum of care up to the access to treatment. The metric helps evaluate the comprehensive journey that these patients undergo from the onset of symptoms to their access to the initial level of specialised stroke treatment. Similarly, the percentage of patients treated with thrombectomy helps assess the effectiveness of the preceding phases before the second-level procedure. It is worth remembering that thrombectomy is administered solely in hubs and must be provided within a short time window. Consequently, a higher number of patients reaching thrombectomy intervention indicates better pre-hospital care and patient transportation, more efficient in-hospital selection, and clinical and logistical management.

The non-admission to Stroke Unit indicator monitors the appropriateness of the care continuum since admission to a stroke unit is associated with better outcomes and less disability for stroke patients.

Mortality is subject to a comprehensive examination from two distinct points. First, it is observed concerning discharges, providing insights into the patient's outcome starting from the date of their discharge from the hospital following a stroke diagnosis. Second, a separate analysis is performed based on the patient's admission date, evaluating the outcome from the moment of their hospitalisation with a confirmed stroke diagnosis. This dual perspective on mortality is particularly noteworthy due to its association with the patient's age and their admission to a stroke unit (SU). As individuals age, they become increasingly susceptible to various health conditions, with stroke being particularly prevalent among older demographics. This intricate connection between age and stroke incidence

underscores the importance of exploring and analysing data specifically for those aged 75 and above.

Haemorrhagic stroke is monitored through dedicated indexes differentiating between Subarachnoid Haemorrhage and Haemorrhagic Intraparenchymal Stroke. For both typologies' incidence, admission to SU and the mortality from the missed admission to SU have been monitored. Nevertheless, the element of time plays a particularly significant role. In the context of Subarachnoid Haemorrhage, the administration of treatment within a 48-hour window has been closely monitored due to its considerable impact on reducing the risk of fatal rebleeding, irrespective of the patient's clinical condition upon admission. When dealing with Haemorrhagic Intraparenchymal Stroke, the focus shifts to the temporal distribution of surgically treated patients. Within the initial 6 hours following the event, there is a notable increase in hematoma size. Paradoxically, an immediate surgical intervention may not be the most suitable course of action. Instead, if there are no ongoing bleedings, the decision is deferred until the final hematoma evaluation. As a result, this indicator evaluates the overuse of surgery within the first 6 hours. Lastly, the analysis of discharge methods for patients helps assessing the outcomes of post-acute stroke.

Table XVIII. National stroke indicators by pathway

Indicator	Pre-hospital	Emergency	Hospitalisation	Post-acute
Ischemic Stroke: Rate of ischemic strokes in the population (per 10,000 residents)	✓			
Ischemic Stroke: Thrombolysis Treatment (%)	✓	✓	✓	
Ischemic Stroke: Thrombectomy Treatment (%)	✓	✓	✓	
Ischemic Stroke: Thrombectomy Rate among Residents (per 100,000 population)	✓	✓	✓	
Ischemic Stroke: Temporal Distribution of Thrombectomy Treatment from PS		✓	✓	
Ischemic Stroke: Temporal Distribution of Thrombectomy Treatment from Admission		✓	✓	
Ischemic Stroke: Regional Average Thrombectomy Treatment Times (minutes)		✓	✓	
Ischemic Stroke: Non-Admission to Stroke Unit (%)			✓	
Ischemic Stroke: 30-day Mortality from Admission (%)	✓	✓	✓	✓
Ischemic Stroke: 30-day Mortality from Discharge (%), population over 75	✓	✓	✓	✓
Ischemic Stroke: 30-day Mortality (admission)	✓	✓	✓	
Ischemic Stroke: 30-day Mortality from Admission (%), patients admitted to Stroke Unit	✓	✓	✓	
Ischemic Stroke: 30-day Mortality from Admission (%), patients over 75 admitted to Stroke Unit	✓	✓	✓	
Ischemic Stroke: 30-day Mortality from Admission (%), patients not admitted to Stroke Unit	✓	✓	✓	
Ischemic Stroke: 30-day Mortality from Admission (%), patients over 75 not admitted to Stroke Unit	✓	✓	✓	
Subarachnoid Haemorrhage: Admission to Stroke Unit, subarachnoid haemorrhage (%)			✓	
Subarachnoid Haemorrhage: Treatment of Subarachnoid Haemorrhage (%)			✓	
Haemorrhagic Intraparenchymal Stroke: Admission to Stroke Unit, haemorrhagic intraparenchymal stroke (%)			✓	
Haemorrhagic Intraparenchymal Stroke: Treatment of Haemorrhagic Intraparenchymal Stroke (%)			✓	
Subarachnoid Haemorrhage: Treatment of Subarachnoid Haemorrhage within 48 hours (%)	✓	✓	✓	
Haemorrhagic Intraparenchymal Stroke: Analysis of the Temporal Distribution of Surgically Treated Patients	✓	✓	✓	
Subarachnoid Haemorrhage: Effects on Mortality from Admission to Stroke Unit	✓	✓	✓	
Haemorrhagic Intraparenchymal Stroke: Effects on Mortality from Admission to Stroke Unit	✓	✓	✓	
Haemorrhagic Stroke: Effects on Average Length of Stay in Stroke Unit (days)	✓	✓	✓	
Analysis of discharge methods for post-stroke patients				✓

Source: AGENAS, 2021. *Gruppo Tecnico per l'elaborazione di proposte per l'attuazione e l'evoluzione della rete assistenziale dell'ictus: Relazione Conclusiva.*

6.3 Methodology

Considering the tripartite definition of effectiveness employed in this analysis (clinical, internal, and external), the research responds to the demand for more empirical studies on effectiveness, with the goal of strengthening the current body of knowledge, which is often criticised for lacking a comprehensive theory addressing the overall performance of the network. It specifically focuses on identifying the elements that determine effectiveness within the healthcare networks and their implications for outcomes.

The study adopted a multiple case study approach to assess and compare regional stroke networks, given their high sensitivity to effectiveness due to the preventable nature of the diseases and the timeliness required for treatment. The case study methodology proves effective in examining contemporary events in real-life contexts and enhancing the comprehension of the dynamics within specific settings, particularly in areas where evidence or theory is limited³¹². The utilisation of cross-case comparison serves a valuable function by shedding light on the evident effects of networking characteristics on the overall effectiveness of healthcare provision. This analytical approach allows for a comprehensive exploration of how various aspects of networking, such as communication structures, collaborative practices, and the integration of diverse stakeholders, play a crucial role in shaping the quality and effectiveness of healthcare services. Through a detailed examination of multiple cases, a nuanced understanding of the complex dynamics at play within healthcare networks can be cultivated. This, in turn, paves the way for the articulation of a set of research propositions which serve as building blocks for further investigation and can guide future studies aimed at enhancing the performance and impact of healthcare networks in delivering high-quality patient care.

Case selection

The initial phase of the research was aimed at identifying the regions and their stroke network. This identification was facilitated by referring to the Agenas analysis conducted in 2021, which focused on the extent of implementation of national time-dependent networks and provided the basis for identifying the stroke

³¹² YIN, R.K., 2003. *Case Study Research: Design and Methods*. Sage, Thousand Oaks (CA).

networks for the analysis. The ministerial provisions regarding time-dependent networks were updated in 2018 with the State-Regions Agreement of January 24, 2018, which provided guidelines for the revision of clinical networks - the time-dependent networks. In 2021, Agenas conducted a national survey to investigate the status of the implementation of time-dependent networks, specifically to assess the state of implementation of the new ministerial provisions³¹³. The report presented the survey conducted by Agenas between September 15, 2020, and January 18, 2021, using questionnaires directed to the regions and based on a data collection grid. The grid identified the requirements that must be common to each regional Clinical Network based on the State-Regions Agreement of January 24, 2018. It consisted of 41 requirements (items) distributed across three thematic areas. First area was the structure which included requirements related to planning, organisational-functional governance, and structural, personnel, technological, and economic resources. Second category was the operational mechanisms which encompassed requirements related to the functioning and qualitative aspects of the networks, such as patient care, clinical pathways, protected discharges, training of the professionals, research, and monitoring. Furthermore, it encompassed the need for seamless integration among patients, professionals, and operators. Third, the outcomes evaluation examined requirements concerning process and outcome data, applicable to both network activities and the evaluation of citizen satisfaction in terms of perceived quality and humanisation aspects.

During the compilation of the grid, regions had the opportunity to respond in four different ways for each individual requirement:

Yes: The item is present in the clinical network as required by the norm

No: The item is not present in the clinical network, as required by the norm

Partly: The requirement is only partially present.

Not Applicable: The requirement is not applicable in this context.

In each of the three thematic areas, a *Indice sintetico* (Synthetic Index, IS) was computed to represent the scores of each Region within that specific area. For each thematic area of the grid, the Synthetic Index was calculated as follows:

- each item in the grid was assigned a weight so that the sum of the weights for all items in a single thematic area equals 1

³¹³ The report is available at:

https://www.agenas.gov.it/images/agenas/In%20primo%20piano/2021/reti/Report_Reti_Tempo_dipendenti.pdf

- each thematic area was given a weight of 0.33 so that the sum of the weights of the three thematic areas equals 1
- For each response, a value was assigned as follows: 100 for Yes, 50 for Partly, and 0 for No or Not Applicable.

By summing all the values of the Synthetic Indices (IS) and multiplying them by the weight of the respective thematic area, the overall Synthetic Index (ISCO) of each network was obtained.

Overall, a 100% response rate to the survey was observed for the Cardiology, Emergency, Stroke, Neonatology Networks. However, the Trauma Network had a response rate of 90%, with the Campania and PA di Bolzano regions not participating. However, concerning Stroke, the regions Abruzzo and Campania only partially contributed to Agenas's analysis, hence initial case selection was primarily based on the response rate of regions to Agenas's report, with a focus on regions that disclosed complete data regarding their stroke networks. Subsequently, employing a replication logic, the selection of cases was meticulously carried out by considering higher ISCOs to examine the regions with anticipated similar outcomes (literal replication). Theoretical saturation was achieved upon the completion of the exploration of five cases³¹⁴, depicted in Table XIX.

Table XIX. Selected Regions based on ISCO scores

Region	ISCO	Structure (IS 1)	Operational mechanisms (IS 2)	Outcomes evaluation (IS 3)	Survey Completion
Lazio	92,07	100	80	99	YES
Liguria	89,04	96,15	74,67	99	YES
Lombardy	85,22	88,46	80,67	89,1	YES
Tuscany	78,18	96,15	84,67	56,1	YES
Sardinia	75,44	84,62	78	66	YES

Similarly, an analysis has been conducted on recent advancement on network evaluation by selecting stroke measurement and reframing them according to the phases of the care cycle. Data were extracted from three different national sources: PNE, NGS and the Agenas report 2021 on the advancements of the stroke network³¹⁵.

³¹⁴ EISENHARDT, K., 1989. *Building theories from case study research*. Ac. Man. Rev. 14 (4), 532e550.

³¹⁵ AGENAS, 2021. *Gruppo Tecnico per l'elaborazione di proposte per l'attuazione e l'evoluzione della rete assistenziale dell'ictus: Relazione Conclusiva*

Data collection

To build upon the findings from the first stage, a qualitative approach has been employed to investigate the challenges associated with the implementation of an effective network configuration within the Italian healthcare context.

Case studies were developed based on interviews with key members of the selected network. The interviews, conducted in September-October 2023, were carried out with the coordinators of the regional stroke network, medical managers with coordination responsibilities, directors, and responsible individuals of the Stroke Units at both hub and spoke facilities. The interviews were conducted over the phone and lasted approximately one hour. The purpose of the interviews was to verify the presence of structural, contextual, and process conditions within the network of the region under examination. For this reason, the questionnaire was structured in accordance with the classification proposed for the determinants of network effectiveness. Each question served a triple purpose:

1. To confirm or deny the presence of the requirement according to the schema proposed by Agenas (yes, no, partly).
2. To confirm or deny whether the requirement had an effect on network outcomes.
3. To provide space for the personal considerations of the professionals

The interviews followed the following logical framework:

1. Introduction of the research objective and confirmation of the interviewee's role within the network.
2. The first cluster of questions investigated the physical structure of the network (composition, number, past collaborations, any expansion to territorial entities, limits to growth).
3. The second cluster of questions aimed to define the governance (centralisation, division of planning and programming functions, objective formulation process).
4. The third cluster explored procedural aspects and operational mechanisms (trust, legitimacy, power imbalance management activities).

Then, the interviews have been recorded and transcribed.

To data triangulation, document analysis was employed as a supplementary source of information. The documentation relied on regional norms, strategic plans (Regional Healthcare Plan), and operative documents (Network plan, plans for the reorganisation of the network). The documentation for each region and the transcribed interviews were organised and coded using the software Atlas.ti, following the established code scheme previously developed.

6.4 Results

In the following section, the cases will be presented individually by analysing the development of the network, the impact of Covid-19 on data³¹⁶ concerning stroke as well as network's structural, contextual and progress determinants. The cross-case search for determinants able to impact on outcomes leads to the definition of a set of research propositions addressed below. Appendix 1 integrates the analysis by displaying the documentation analysed.

6.4.1 Lazio

Network implementation and evolution

The introduction of the Stroke Units (to these days called by the Lazio region *Unità di Trattamento Neurovascolare* UTN), dates back to 1999. UTNs were generically recognised as a sub-intensive care units³¹⁷. Originally, UTNs were not formally distinguished into first and second level but rather a first idea of UTN as self-standing ward in DEA II was emerging, but it is only in 2002 that the Regional Healthcare Plan (PSR 2002-2004) recognised the early treatment and hospitalisation of patients affected by stroke in dedicated areas (Stroke Unit) as more effective. In 2006, the need for a more structured functioning of the UTNs led the Regional Committee to reinforce UTNs' role³¹⁸. For the first time the document mentioned an early idea of care network. In 2007, in an attempt to rearrange the acute offer, the hub and spoke model of organising has been introduced³¹⁹. The model was put into practice late that year³²⁰, when the Regional Committee established the first stroke care network (*rete per l'assistenza all'ictus cerebrale acuto*). Interestingly enough the Lazio Region acted as pioneering for the definition

³¹⁶ The analysis has the concise objective of examining any potential impact of Covid pandemics on the measures outlined in the 2021 Agenas report, *Gruppo Tecnico per l'elaborazione di proposte per l'attuazione e l'evoluzione della rete assistenziale dell'ictus: Relazione Conclusiva*. It is important to note that indicators related to ischemic stroke are analysed over a three-year period (2019-2021). In contrast, data for haemorrhagic stroke, pertaining only to 2019, currently cannot be subjected to any comparison.

³¹⁷ Sub intensive units are hospital ward area dedicated to the treatment of critically ill patients at risk of acute events that could compromise their survival, or for severe conditions that have just passed the most immediate phase of acuteness and require special care efforts. DGR 553/1999

³¹⁸ Regional Executive Committee Resolution No. 424 of July 14, 2006

³¹⁹ Regional Executive Committee Resolution No. 267 of April 16, 2007

³²⁰ Regional Committee Resolution n. 420 (12 of June 2007)

of a networked form of organising, the establishment of a minimum volume of activity, and for the implementation of regional protocols, bringing forward some of the normative dictations entering into force at national level much later in the years (MD 70/2015). The last rearrangement of the stroke network in 2020³²¹ followed the guidelines for the revision of the time-dependent networks, issued in 2018³²². The new document updated the previous care pathway mainly by identifying the nodes and connections of the network, expanding the network.

Structure

What emerges from the documentation is a hierarchical governance where integration is achieved through centralisation. Despite operating since early 2000s, Lazio's documentation mainly focused on the operational functioning adopting a medical point of view. The priority was to standardise care delivery through the development of ICPs able to conform the operations of all members of the network. The stroke network was provided with a formally recognised governance only in 2018, when the Region introduced a new body called *Coordinamento Regionale della Rete Ictus* (the Regional Stroke Network Coordination body)³²³. However, the description of the functions and responsibilities of the body is only found in the recent network plan approved in 2020³²⁴, and reiterated in the hospital network planning 2021-2023³²⁵, where the governance of the network is described as a two-level structure: at the regional level, the functions of planning and control are carried out, while at the company level, organisational and managerial aspects are managed. At the regional level, the functions of planning and control are carried out by the *Coordinamento Regionale* (CR, Regional Coordination body). The CR includes regional representatives, hospital, and territorial operators, as well as key stakeholders, including representatives of patient and citizen associations. The CR operates under the supervision of the Head of the Hospital and Specialist Network Area and, in addition to developing and validating the network plan, it is responsible for ensuring the integration of all components and professionals involved in the

³²¹ Determination of the Health and Sociohealth Integration Directorate No. G11799 of October 13, 2020

³²² Agreement of the State-Regions and Autonomous Provinces Conference of January 24, 2018,

³²³ Regional Executive Committee Resolution No. G03468 of March 21, 2018

³²⁴ Determination of the Health and Sociohealth Integration Directorate No. G11799 of October 13, 2020

³²⁵ Regional Executive Committee Resolution No. G01328 of February 10, 2022

network, defining organisational methods to connect network's nodes, validating ICPs and monitoring their progress conducting an annual audit with the Hub & Spoke Area Coordination to develop an improvement program consistent with the review of monitoring results, monitoring annual outcomes, to be disseminated to involved professionals, and to identifying the training needs of the network. The second governance level is the organisational-management level under the responsibility of the Hub and Spoke Area Coordination (CAHS). The Lazio regional stroke network is composed by four CAHS, one for each Hub, coordinated by the Medical Director of the reference Hub and composed of representatives from the Hub and its affiliated Spokes. Among CAHS responsibilities: implementing the network plan and the Diagnostic Therapeutic Assistance Path, identifying criticalities and audit for defining appropriate improvement actions, ensuring integration among professionals and facilities involved in the clinical-assistance process, ensuring the use of information systems to enable effective monitoring of activities by the CR and conducting semi-annual Area Audits to evaluate activity volumes and outcomes or to analyse critical issues in the clinical-assistance process, with the results transmitted to the CR. The Lazio stroke network shows a dense web of intense collaboration in which interactions among members are described as frequent, mutual, and widespread. The partners' synergy emerges as a friendly form of collaboration among physicians, who affirm *I, working in a hub hospital, have a personal relationship with colleagues at the IRCCS who are responsible for rehabilitation. I may call to inform them about the patient I'm sending to their structure. On their part, if they have any issues with patients who deteriorate during the rehabilitation phase, they contact us again, and we immediately accommodate the patients. In short, there is this atmosphere of informal collaboration.* Network's density, defined as intense, evolved to some extent through spontaneous communication, where professionals operating in different nodes of the network informally collaborate to facilitate each other's work. This becomes apparent from the interviewed physicians operating in the network's hospitals where it is affirmed: *Among professionals, we have helped each other reciprocally, we met during conferences or meetings, and we have become excellent colleagues. **I believe that the personal relationship is the lubricant that keeps the mechanism running fast.** That is, if I have a patient ready for rehabilitation but still in the stroke unit, and there's an emergency, an acute patient coming to the emergency room, and I need*

to free up the bed in the stroke unit quickly, I call the colleague working in rehabilitation. I know that she/he will do everything on her/his end to assist me. Interesting enough, despite the presence of a bed manager working within the DEA and recognised as efficient and trustworthy in managing the transition of the patient among different stages of the disease, occasionally informal relationships are implemented as the fastest way to solve urgencies.

Another fundamental aspect of the integration is constituted by the communication systems both within the hospitals belonging to the network and the relations between hospital and local care. The development of a teleconsultation system proves particularly useful in the treatment of stroke, as it reduces treatment initiation times, minimises unnecessary transfers, and enables pre-alerting the stroke team. The communication system among hospitals composing the network relies on an image transmission and teleconsultation system, called ADVICE, and implemented at regional level in 2018³²⁶. Initially, the teleconsultation has been identified as a useful solution to the excessive cost and consequent congestion of secondary transportation due to impossibility to carry out thrombolysis in the spoke centres³²⁷. By allowing the teleconsultation, and following the appropriate structural adaptation and skill development, thrombolysis could be performed in peripheral centres of the network under the tele monitoring of the hub. Ultimately, it is recognised the significant emotional impact of the disease, consequently the stroke network plan allows the multidisciplinary team to make use of the professional expertise of psychologists and/or cultural mediators, in order to develop appropriate times and methods for communicating the diagnosis, with particular attention to those who may be more vulnerable due to personal and/or social circumstances.

Concerning the organisational model, the first implementation of the stroke network as a formal organisation for acute stroke care activities dates back to 1999³²⁸ with the introduction of UTNs. Since there wasn't a specific collaboration

³²⁶ Determination of the Health and Socio-Health Integration Directorate dated December 12, 2018, No. G16185 implementing Regional Council Resolution No. 626 of October 30, 2018, "Improvement and Requalification Program (Article 1, paragraph 385 and following, Law No. 232 of December 11, 2016) Intervention 2.1 Telemedicine in Emergency Hospital Networks. Activation of the 'ADVICE' platform for teleconsultation between 'Hub' and 'Spoke' centres of Emergency Networks, Time-dependent and Infectious Diseases."

³²⁷ Decree of the Commissioner ad acta dated September 20, 2010, No. U0075, containing the Plan for the reorganisation of hospital networks. Acute cerebral stroke care network

³²⁸ Regional Executive Committee Resolution No. 559 of February 16, 1999

model for the stroke network at that time, stroke care was managed alongside other acute conditions. It is in 2006³²⁹ that the region introduced the differentiation among UTN II and UTN I, shaping the structural, organisational, and technological requirements for their implementation within the regional hospitals. In addition, the region introduced neurovascular teams, which consisted of groups of doctors, physiotherapists, and experts in vascular disease care, tasked with coordinating and overseeing interventions for patients with cerebral stroke upon request. However, in 2007, it was observed that there was a lack of adoption of a network-based organisational form for the management of the acute phase of stroke, and a complete absence of organisation for the management of the post-acute phase. Therefore, the regional health plan for 2008 - 2010 envisaged the implementation of the hub and spoke network model for the management of patients with acute cerebral stroke, starting from the already existing UTNs in collaboration with the emergency and urgent care services. Through the approval of the plan for the reorganisation of hospital networks, the stroke network further evolved with the introduction of a new functional node of the peripheral access point of the network³³⁰. The "expert" Emergency Department (PSe) was a peripheral hospital authorised to perform intravenous thrombolytic therapy in telemedicine connection with the Hub centre.

The stroke network has undergone dimensional changes over the years, until it reached its current composition prescribed in 2020 composed by public and private hospitals as well as care facilities. Despite the network has increased in size from 2007 to 2022 (29 to 45 members), there is no regulatory imposition on the maximum number of members participating in the network. Interviewed physicians working within the network indicate that the only possible cap to growth is the provision in MD 70/2015³³¹. Similarly, accordingly with the most recent plan (2020) the reference model is the drip and ship. Formalisation come through the implementation of a structured plan for the stroke network. The Lazio region implemented the first document on the network for acute cerebral stroke care in 2007³³². Following updates were implemented in 2010 (Hospital Network

³²⁹ Regional Executive Committee Resolution No. 424 of July 14, 2006

³³⁰ Decree of the Commissioner ad acta No. U0075 of September 29, 2010

³³¹ The Ministerial Decree states that Stroke Units of the second level must treat at least 500 cases of stroke per year, as well as the requirements related to the capability and capacity of Emergency Departments: DEA I (serving a catchment area of 150,000 to 300,000 inhabitants with an annual volume of appropriate accesses exceeding 45,000) and DEA II (serving a catchment area of 600,000 to 1,200,000 inhabitants with an annual volume of appropriate accesses exceeding 70,000)

³³² Regional Executive Committee Resolution No. 420 of June 12, 2007

Reorganisation Plan: Acute Cerebral Stroke Care Network), in 2014 (Reorganisation of the hospital network to safeguard the strategic goals of financial recovery for the Lazio Region's healthcare system), in 2015 (Care pathway for non-traumatic acute cerebrovascular accident patients - From the emergency phase to the post-acute phase), and in 2020 (Stroke network plan). The frequency with which network plans are updated reflects a strong regional interest and places Lazio among the leading regions in the development of the stroke network since the approval of a formal plan for the network is deemed to enhance quality of care thanks to a more standardised care path, especially for time-dependent diseases.

Context

The region promptly defined the technological equipment, the number of beds, and the organisation of the network. The network maintains staff levels in all nodes in line with national standards (MD 70/2015). All facilities participating in the network comply with the authorisation and institutional accreditation criteria outlined in national and regional regulations (TRAC). The qualitative and quantitative technological requirements for the network have been explicitly specified. Regional collaboration for stroke care preceded the MD 70 of 2015 by several years. The interviewed professionals operating in the network acknowledge the region's pioneering role and consider it fundamental for the successful implementation of the network since *it is the professionals who are visible, who discuss, organise themselves, deliberate on cases, and in some way, there is a bottom-up effect where proposals originate at the local level before being formalised*. Concerning adaptability to environmental changes, the Lazio region has swiftly established the Covid-19 network from the ground up, following a hub-and-spoke model. Like other regions, some neurology and stroke unit departments were repurposed for Covid-19 care. However, unlike the northern regions, Lazio reported fewer confirmed Covid-19 cases. As a result, the Lazio Region kept its hospital network unchanged. In turn, has mandated organisational lines of intervention since it had defined the Plan for the management of time-dependent patients during the epidemic and post-epidemic phase³³³, had defined specific

³³³ Decree of the Commissioner ad Acta No. U00096 of July 21, 2020

guidelines for the extra-hospital management of territorial emergencies³³⁴, and also established specific procedures for accessing rehabilitation services.

However, it is probable that treatment times have increased due to additional sanitation procedures, especially impacting the management of vascular emergencies, notably in radiology services³³⁵.

Furthermore, each network plan approved by the region includes an assessment of needs and an analysis of the epidemiological context. The region has established specific guidelines for this, emphasising that in the development of ICPs, facilities should pay particular attention to defining the timing and methods for effective communication with the involved parties, with the goal of providing them with the best possible guidance through a challenging process and enhancing compliance with therapeutic and healthcare choices. In 2006, the Lazio has activated a regional monitoring system for healthcare activities and their quality, in coordination with the national outcome evaluation program. The system takes the name of *Programma regionale di valutazione degli esiti degli interventi sanitari del Lazio* (PReValE, Regional Outcome Evaluation Program) and documents the available evidence of the effectiveness of the treatments provided in the region. It is composed of indicators capable of clearly expressing the outcome of care (e.g., short-term mortality, hospitalisations for specific conditions, etc.); evaluating the health status of the population; or comparing the health status in different geographic areas. At the same time, some of the outcome indicators have also been included among the Budget and Mandate Objectives for the General Directors. Likewise, there is an ongoing development of a program within the Participation Act³³⁶ regarding the role and tools of citizen organisations in the planning and evaluation of Regional Health Services.

Process

A compelling initiative envisaged by the region is the continuous training of operators which can be traced back to the PSR 2002-2004, where a specific intervention was scheduled in order to best address the issue of stroke. The

³³⁴ Regional directorate: health and integrated healthcare. Order of the president no. z00003 dated March 6, 2020.

³³⁵ ZEDDE, M., PEZZELLA, F.R., PACIARONI, M., COREA, F., REALE, N., TONI, D. AND CASO, V., 2020. Stroke care in Italy: an overview of strategies to manage acute stroke in COVID-19 time. Op. cit.

³³⁶ Regional Executive Committee Resolution No. 736 of October 15, 2019

document highlighted the need for training on pharmaceutical and surgical therapies, as well as targeted informational campaigns about stroke for personnel involved in emergency management. During the triennial period from 2017 to 2019, various training activities were conducted by the Network Hubs (UTN II), in collaboration with those promoted by the Italian Stroke Organisation and the Angels initiative. Among the process determinants, trust is considered as ambivalent and shifting in time depending on the governance transition. Recently, the planning function ascribed to the Regional Coordination body has been translated into the Ares 118, the emergency department. The Hospital Network Planning for 2021-2023³³⁷ included the establishment of a pathology network coordination function at ARES 118 and, consistently, the new corporate act approved in 2022³³⁸ states that the implementation of a UOC. The *UOC Coordinamento regionale di reti patologia* (the Regional Coordination Unit for Pathology Networks) inside the Ares 118. This UOC performs all the coordination functions requiring a single, supra-company control centre, to ensure an overall system-level governance within the assigned healthcare activities, therefore governing not only the stroke network but also the other time-dependent networks. What emerges from the interviews is a contradictory feeling, professionals perceive both trust and distrust due to the recent changes in governance: *I perceive trust in our knowledge of partners; I have great trust in some partners while having great distrust in others precisely because I know them. The problem is that I used to have great trust in the management area of the region's healthcare networks, but now this structural change and shift make me less trusting of the governing body.*

At the same time, the goal-setting process and the subsequent assessment of their achievement is currently involved in a phase of adjustment to the new management balances, however it can be analysed from two different points of view: goal assessment between the hub and corresponding spoke or within hubs. Previously, the region sent periodic reports to the hub facilities, which individually organised discussion meetings to review the specific indicators. The meeting included the internal network in which the hub was located, as well as key stakeholders, that is: representatives from the region, the 118-emergency system,

³³⁷ Directorate of Health and Sociosanitary Integration, Determination No. G01328 of February 10, 2022. Amendment to Determination No. G07512 of June 18, 2021.

³³⁸ The Determination of the Health and Socio-Health Integration Directorate on March 25, 2021, No. G03256, concerning the approval of partial modifications to the ARES 118 Corporate Document adopted by the Director-General with Resolution No. 127 of February 16, 2021.

the healthcare management, the emergency department management, the stroke unit and/or neurology departments, spokes, and PSe. Both technical-organisational expertise and clinical professional expertise were invited to the discussion table by the hub. Meanwhile, the comparison between hubs takes place semi-annually within the clinical governance of the network. This establishes a moment for reviewing the results achieved, as well as for discussing guidelines and the latest developments in the literature.

Similarly, the interviewees recognise the importance of their work and believe they contribute not only to the well-being of patients in clinical terms but also to the effectiveness of the entire system. They reject the spirit of disillusionment that often prevails in the hospital context, reaffirming their continuous commitment to seeking improvements both from a clinical and organisational-procedural perspective because they *truly believe in the network*. On the contrary, they do not consider external effectiveness to be noteworthy. They believe that patients, and citizens in general, are not aware of the network and still think in terms of merit. The power imbalances are primarily attributed to the changes that have occurred in terms of network governance and the natural differentiation of responsibilities between the hubs and spokes. However, the network has not formalised any type of personnel rotation among the nodes of the network to rebalance the perception of individual professionals operating in the diverse facilities.

The stroke network of the region is mainly composed by hospitals, leaving aside the care facilities at primary care level. Although the interviewed professionals confirm that the network is not looking for new members, they state the importance of an integration among hospital and local settings. Concerns arise with respect to the new governance configuration since, moving the coordination body of the time-dependent networks within an organisation that governs the emergency phase: *doesn't align with the future goal of integrating different components of the system where the final aim is to place the patients and their needs at the centre of the care pathway*.

Finally, there is no formalised method for conflict resolution, nor any prevention measures in place. The interviewed professionals believe such a function would be very useful, especially if established within the regional health administration.

Brief considerations on data shifts amidst Covid

The analysis of the data provided by Agenas allows highlighting the temporal trend (2019-2021) of indicators for ischemic stroke during the Covid-19 pandemic, providing only snapshot data (2019) for haemorrhagic stroke³³⁹. Delving into the specifics of ischemic stroke trends within the regional population of Lazio, a decline becomes apparent, showcasing a reduction from 10.7% in 2019 to 9.55% in 2021. Interestingly, this decline is juxtaposed with a noteworthy surge in the adoption of thrombectomy treatments, indicating an increase of 4.57% over the same period. However, the analysis unveils a contrasting trend in the utilisation of stroke units, with a significant decrease of 9.96% observed over the three-year span.

Shifting the focus to mortality patterns, it is intriguing to observe that the 30-day mortality post-discharge exhibits relative stability. However, a distinctive observation emerges from the scrutiny of the 30-day mortality from admission data, indicating a consistent mortality rate among patients receiving care in stroke units (+0.28%) and a slight 1.74% reduction for those outside the stroke unit. This trend is mirrored in the over-75 age group, where mortality shows a 2.4% increase among those admitted to the stroke unit, while witnessing a decline of 1.95% for the over-75 cohort not under stroke unit care. These findings underscore the nuanced interplay of factors influencing stroke outcomes and emphasise the importance of tailoring healthcare strategies to specific age groups and care contexts for more effective stroke management.

³³⁹ AGENAS, 2021. *Gruppo Tecnico per l'elaborazione di proposte per l'attuazione e l'evoluzione della rete assistenziale dell'ictus: Relazione Conclusiva*. Available at https://www.agenas.gov.it/images/agenas/RETI/reti_ictus/board_agenas_reti_ictus-relazione_conclusiva.pdf (accessed October 2023)

6.4.2 Liguria

Network implementation and evolution

The Liguria region defines its own healthcare model as an organisation with *variable geometry*³⁴⁰, as a unique model would be highly inappropriate both in terms of sustainability and in its actual capacity to respond to the needs of citizens, diversified across the territory. That is because Liguria is described having a geomorphological duality characterised by high coastal urbanisation and sparsely populated inland areas. Since the Regional Health Service reorganisation in 2006³⁴¹, the region has established the departmental organisation as the standard model for the operational management of the activities of healthcare companies, promoting inter-company collaboration. However, it was in the same year³⁴² that the creation of the *Azienda sanitaria della Regione Liguria* (A.Li.Sa, the Ligurian Healthcare Company), was envisaged. As an entity operating within the strategic guidelines defined by the region, its task was to uphold the principles of efficiency, effectiveness, rationality, and cost-effectiveness in the use of resources to ensure equitable access to services included in the Regional Healthcare Service. Furthermore, in 2016, the *Dipartimenti Interaziendali Regionali* (DIAR, intercompany departments) were developed³⁴³ with the aim of establishing a cohesive clinical governance system to facilitate coordination among organisational units from various companies. This new organisational structures were aimed to address issues related to integrating different nodes in the network and ensuring a seamless continuum of care by managing interdependencies both within companies (e.g., operational units within the same department) and between companies. The DIARs governing the stroke care network are two in number: the DIAR for emergency and urgency, and the DIAR for neuroscience. Of these, the DIAR for neuroscience facilitates the exchange of medical expertise within the region, primarily involving neurologists and radiologists.

³⁴⁰ PSSR 2023 2025

³⁴¹ Regional Law No. 41 of December 7, 2006

³⁴² Regional Law No. 17 of July 29, 2016

³⁴³ Regional Law No. 27 of November 18, 2016

Structure

At the regional level, A.Li.Sa is responsible for performing functions related to healthcare and socio-healthcare planning. This includes generating analyses, assessments, and proposals to support regional healthcare planning. A.Li.Sa also oversees the coordination, direction, and governance of healthcare companies and other entities within the Regional Healthcare System, as well as associated activities, including the management of technical-specialised activities that support healthcare companies and other entities within the regional framework. Hence, the main tasks assigned to the agency include the planning, governance, and policies related to procurement, staff training, experimentation with innovative organisational models, and the definition of objectives and outcomes for healthcare companies. The Regional Board exercises direction, supervision, and control functions over A.Li.Sa. in accordance with current legal provisions. As a result, the region annually sets guidelines for A.Li.Sa.'s activities and monitors their implementation; it establishes guidelines and constraints for financial planning and management and issues guidelines and directives for the conduct of control, inspection, and verification activities under A.Li.Sa.'s authority. Regional governance was enhanced in 2016 through the introduction of regional intercompany departments, which were composed by clinicians and entrusted with clinical governance, pursuing a *networked approach* as well as the coordination of activities and the improvement of service quality. The department's functions mainly encompassed service and activity coordination to manage integrated diagnostic and treatment pathways, team activity planning, performance assessment, sharing guidelines, operational protocols, clinical auditing, and professional staff training. The DIAR, therefore, serves as the organisational tool for strategic planning, with a mission *to provide an effective response to the needs of integrating and ensuring continuity in healthcare for the population of Liguria*³⁴⁴.

As early as 2009, the architecture of the new regional system was conceived as a set of integrated service networks, structured along two distinct directions: The vertical direction within which four thematic areas were developed (Prevention, Acute care-emergency-urgent care, Fragility/chronicity, Rehabilitation) and the horizontal direction where clinical networks or networks of conditions were

³⁴⁴ Extraordinary Commissioner's Resolution No. 253 of August 7, 2019

established. These networks gave rise to and maintained horizontal diagnostic and therapeutic pathways that crossed the four aforementioned vertical networks, representing the physical connections among the four vertical networks. As depicted by the region: *designing the architecture of the new Regional Healthcare System means identifying the main nodes of the vertical and horizontal networks and the connections that link these nodes, creating a structure capable of integrated governance in the four areas at both the regional and optimal area levels. The primary goal is to offer all residents in Liguria a system that meets their healthcare needs and can anticipate the need for integrated services, sometimes unexpressed.*

The hub and spoke model for care provision has been envisioned within the actions implemented by the A.Li.Sa in 2017 to strengthen the healthcare system in response to a changing demographic context³⁴⁵. The Liguria region established eight stroke centres, composed by public hospitals, of which two hubs primarily dedicated to 24-hour thrombectomy and are located in each of the two territorial divisions of the region (1 centre per 800,000 inhabitants), while all other centres are authorised for administering thrombolysis. To better steer services towards 'hospitals and high-volume professionals,' centralisation was reinforced by introducing the mothership model for thrombectomy³⁴⁶. To facilitate the adoption of this new model, an independent working group was formed as per DIAR's guidance, tasked with defining patient inclusion criteria, conducting specific audits, and identifying useful indicators. With the introduction of the network model, the region immediately recognised the need to implement a regional healthcare information system capable of connecting the knowledge from all service delivery points. The need was further addressed when transitioning to the mothership model by including a shared patient registry for stroke cases initially within the Genoa metropolitan area, which was later expanded to cover the entire regional context. At the same time, the 2023-2025 socio-health plan envisions the strengthening of telemedicine and teleconsultation within the stroke network, including the potential for second-level diagnostic test reporting.

Professionals within the network express contrasting evaluations of collaboration density, offering a dual assessment. They highlight the robust and interactive nature of intra-company collaboration, which is marked by frequent and

³⁴⁵ Extraordinary Commissioner's Resolution No. 1 of January 12, 2017

³⁴⁶ Extraordinary Commissioner's Resolution No. 653 of August 7, 2019

widespread interactions. However, when it comes to inter-company collaboration and engagement with the regional decision-making body, a different picture emerges. Here, the interaction is perceived as weak, with just one annual meeting scheduled. However, it is essential to highlight the gatekeeping role performed by the DIAR, who is seen as having more frequent interactions with the regional level. Informal collaboration predominantly finds its place within the individual healthcare institutions, especially concerning the discharge process for patients. This collaborative effort primarily revolves around the hospital's neurology department heads, particularly when it pertains to the transfer of patients following the acute phase of hospital care.

Nowadays, the progression of the network is deemed to have reached a state of maturity, indicative of an advanced level of collaboration where procedures are well-established and mutually agreed upon among its members. This stage is marked by a shared network culture where there is a collective consensus regarding the network's objectives and its significance in the broader healthcare landscape. However, within this advanced state, a notable weakness comes to light, primarily in the phase of transitioning patients from acute care to community-based care. While the network has evolved and matured significantly, the distinct backgrounds and training of the professionals involved, including neurologists, physiatrists, and geriatric specialists, pose a significant challenge in terms of effective communication and coordination.

Context

The region has taken steps to partially formalise a specialised funding framework, complete with traceability mechanisms to ensure transparency and accountability in the allocation of resources. The healthcare facilities actively participating in the network have successfully met the requirements for institutional authorisation and accreditation, as mandated by national legislation. Furthermore, a comprehensive technological and quantitative infrastructure has been carefully delineated to support the operations of the network. While it is noteworthy that the provision of beds within Stroke Units is in alignment with the regional demand, a notable concern arises in the context of post-hospital rehabilitation services. The current provision of beds for post-hospital rehabilitation falls short of meeting the region's requirements effectively. This disparity between the number of SU beds

and those designated for rehabilitation highlights an area where further attention and resource allocation may be needed to optimise patient care, ensuring that stroke patients receive comprehensive care from acute treatment through to rehabilitation and recovery.

In the region of Liguria, a culture of intra-company and intra-professional collaboration had taken root long before the compulsory implementation of networks in 2015. This robust tradition was characterised by an ongoing dialogue and cooperation, primarily among neurologists, who regularly held annual meetings for in-depth clinical exchanges. The professionals who were interviewed emphasise the extensive benefits that this pre-2015 collaboration yielded. They view it as a foundation upon which they built a wealth of positive outcomes and experiences. This early commitment to collaboration not only fostered strong connections among healthcare professionals but also played a crucial role in enhancing patient care, refining clinical practices, and sharing knowledge within the field of neurology.

The pandemic prompted the strengthening of care services for Covid-19 patients. During the initial pandemic wave, it also led to a reduction in elective procedures, notably affecting surgical and outpatient activities. The restructuring of healthcare pathways in the height of the pandemic's impact necessitated more complex care models, involving both diagnosis and treatment, for conditions unrelated to Covid-19. The Resolution of the Regional Executive No. 1136/2020, titled “Guidelines for the initial preparatory measures of the reorganisation of the Ligurian healthcare system”, delineated a restructuring of the healthcare system in Liguria, which involved a redefinition of A.Li.Sa.'s role within the Regional Health Service. This restructuring entailed the enhancement of A.Li.Sa.'s coordination, healthcare management, and monitoring functions in response to healthcare emergencies, encompassing various scenarios, including epidemics and pandemics. The region then efficiently established a plan for handling patients with time-sensitive conditions during both the epidemic and post-epidemic phases and provided guidance on managing emergency care in the community³⁴⁷. Then, it established distinct procedures for accessing hospital services in the case of a positive Covid test and for accessing rehabilitation services. Furthermore, Liguria has long initiated a careful analysis of needs and morpho-geological conditions that can influence the delivery of care. The regional average population density is higher

³⁴⁷ A.Li.Sa Resolution No. 164 of May 6, 2020

compared to both the national and European averages, and a strong population concentration in the province of Genoa (54.2% of the Ligurian population) has laid the foundation for the development of hospital care. Upon its establishment, A.Li.Sa assumed a strategic role in healthcare service governance by consolidating responsibilities for assessing health needs and demand, as well as overseeing planning and performance monitoring. Indeed, starting from the analysis of health needs and demand, A.Li.Sa ensured the appropriate delivery of essential healthcare services. Furthermore, it developed care models for individuals throughout the healthcare service network. The region's focus on customer satisfaction practices dates back to 2002 with the implementation of the project “Construction, experimentation, and validation of tools for assessing perceived quality using an integrated qualitative-quantitative methodology”. Furthermore, in 2017, customer satisfaction played a primary role in identifying the guidelines. Patient satisfaction with the services provided regained its significance in light of the adoption of a new paradigm, that of patient-centeredness. The goal was to enhance quality in all phases of the process contributing to service delivery. Even though both the stroke network and the association of stroke survivors Alice have invested significant efforts and resources in funding awareness campaigns to promote stroke prevention, emphasising its time-critical nature, there is currently no mechanism in place for discussing the results achieved by the network with the general population. As of now, the sharing of performance data primarily occurs within the professional healthcare community, with the nationally required indicators (PNE) working alongside the Angels project, which involves the non-profit association conducting biannual surveys to evaluate additional outcomes, such as the disability ranking upon discharge.

Process

The region acknowledges the need for advanced managerial skills in network management since *to effectively govern the Hub & Spoke model, advanced managerial culture and competencies are required. These skills enable the organisation of a complex network, continuous performance evaluation (hence, the availability of constant monitoring systems), and the ability to reorganise resources.* The development of training initiatives for staff within the Regional Healthcare System has been centralised within A.Li.Sa's responsibilities since

2016. In 2017, regional authorities have recognised staff training activities as both a right and responsibility for every professional, following the principle of continuous education. Following the establishment of the intercompany departments, the function of professional training is then transferred to these new entities.

The level of trust within the network, segmented by geographic areas, is reported to be satisfactory according to the input of the interviewees. However, it is worth noting that while there are certain difficulties related to communication and collaboration between different healthcare settings, a more substantial emphasis is placed on the trust established among the hospitals operating within the network itself. This heightened trust is attributed, in part, to the shared educational backgrounds of the network's neurology department directors. The fact that they all originate from the same university training program means they share a common cultural and professional foundation. This cultural cohesion and professional kinship foster an environment of mutual understanding and cooperation that underpins the network's successful operation. Internal legitimacy is viewed positively, with healthcare professionals within the network recognising the value of their contributions. Likewise, external legitimacy, characterised by the network's acknowledgment by external stakeholders, is deemed to be on solid ground. The Liguria region boasts two significant factors contributing to this external legitimacy. First, the ongoing partnerships with scientific organisations specialising in stroke, such as the Italian Stroke Association. Second, the network's collaboration with ALICE (*Associazione Lotta all'Ictus Cerebrale*), a prominent patient association for stroke survivors, has played a pivotal role in bolstering external legitimacy. This partnership has resulted in the funding of informative campaigns in both 2018 and 2022, effectively spreading awareness about the critical importance of swift response in stroke situations. These campaigns utilised a variety of channels, including pharmacies, newspapers, TV broadcasts, and bus billboards, leading to increased public recognition of the regional stroke management organisation's effectiveness. The power imbalances perceived within the network are seen by interviewed professionals as inherent to the hub and spoke model, that is *part of the DNA of the hub and spoke model*. This recognition draws attention to the systemic nature of the disparities in authority and influence that exist among hospitals operating at different levels of disease severity. However,

despite the awareness of these imbalances, the network currently lacks established mechanisms for a rotational distribution of responsibilities between the hub and spoke hospitals. While the network is not actively pursuing the addition of new hospitals or territorial members, it faces a noteworthy challenge when it comes to patient discharges. The absence of rehabilitation beds remains a pressing concern in the region's healthcare landscape. Although the region has made significant strides in establishing an adequate number of stroke units, the issue of not incorporating territorial members exacerbates the complexities surrounding patient discharges. Despite the recognising that conflicts are a natural byproduct of the hub and spoke model due to the allocation of distinct clinical competencies among its various nodes, there is currently a notable absence of a designated managerial function responsible for addressing these inter-company conflicts and those that may arise among healthcare professionals. Consequently, the responsibility for managing such conflicts is largely placed in the hands of individual professionals. Lastly, the responsibility for defining the goals and outcomes of Healthcare Companies and other entities within the Regional Healthcare Service is typically vested in A.Li.Sa, the regional body encompassing both clinicians and patients associations. Furthermore, as it carries out its mission, A.Li.Sa is further supported by the DIARs, who serve as an advisory mechanism for A.Li.Sa when it comes to the organisation of the healthcare network.

Brief considerations on data shifts amidst Covid

The trend over the three years (2019-2021) indicates a decline in the percentage of ischemic strokes in the Liguria region (-2,98%)³⁴⁸. This reduction may suggest a potentially positive trend, indicating a lower proportion of ischemic strokes in the overall stroke cases during the period. Encouraging outcomes are also noted in the adoption of thrombectomy treatments (+1,49%) and thrombolysis (+2.3%). This shift towards more advanced and effective treatments seems suggesting a commitment to enhancing patient outcomes. Moreover, the marginal decrease in the avoidance of Stroke Units (-0.4%) highlights a promising beginning in

³⁴⁸ AGENAS, 2021. *Gruppo Tecnico per l'elaborazione di proposte per l'attuazione e l'evoluzione della rete assistenziale dell'ictus: Relazione Conclusiva*. Available at https://www.agenas.gov.it/images/agenas/RETI/reti_ictus/board_agenas_reti_ictus-relazione_conclusiva.pdf (accessed October 2023)

recognising the significance of specialised care units for effectively handling stroke cases.

However, there are concerning observations regarding mortality rates. An overall increase of 1.7% in mortality from admission raises questions about the effectiveness and implications of the broader healthcare approach. The 30-day mortality rate for patients admitted to the stroke unit demonstrates a 1.3% increase, contrasting with a 12.58% rise for those not admitted to the SU. Likewise, a similar pattern emerges when analysing the over-75 age group, revealing a 2.1% uptick in mortality for those hospitalised in stroke units, in contrast to a 9.56% increase for those not admitted in SU. In conclusion, while advancements in treatment methods are evident, the simultaneous rise in mortality rates calls for a comprehensive evaluation of the overall stroke management strategy, with a particular focus on post-treatment care and age-specific considerations.

6.4.3 Lombardy

Network implementation and evolution

In 2002, the Lombardy region had yet to establish specific stroke protocols, but it had begun to show a general interest in neurosurgical patients requiring urgent care. The 2002-2004 socio-sanitary plan was thus in the initial stages of mapping out the territorial distribution of competencies among various neurosurgery units for emergencies. It also sought to evaluate the characteristics of hospital facilities in relation to the local population to identify potential areas for improvement since the region pointed out differences in patient admission processes among Lombard Neurosurgery units. These differences were mostly due to variations in available resources across different facilities. Consequently, it advocated for the establishment of in-hospital pathways for emergency patients. This was intended to efficiently address the demands while mitigating potential conflicts between elective and emergency activities.

The challenges identified extended across multiple aspects of emergency healthcare and the hospital-territory interface, including delays in conducting the initial brain CT scan upon a patient's arrival in the Emergency Department, the implementation of an image tele transmission system to a limited number of centres with Neurosurgery capabilities, extended transfer durations and the necessity for patient relocation among structures, involving the transfer of a patient from a hospital with Neurosurgery to another facility. The document then described a new programming strategy capable of guiding the growth of services by combining integration and competition within a "network" framework, considering the complexity of the system. The concept is reiterated in 2005³⁴⁹, which states that the socio-sanitary system can provide effective responses (and make efficient use of available resources) only when a high level of participation and collaboration is achieved among the various entities representing society, institutions, service providers, the media, and individual citizens. Hence, since 2002, the region's actions were aimed at developing a plan that ensured the initiation of primary and secondary prevention actions for cardiovascular and cerebrovascular diseases. The 2005 documentation highlighted the need for constantly improving an integrated service system with the dual purpose of preventing inappropriate resource

³⁴⁹ Resolution of the Regional Executive No. 20592 dated February 11, 2005.

consumption and ensuring that everyone had access to necessary care. It proposed the adoption of integrated service networks as a solution. It immediately emphasised "how through the network, the focus could shift from individual services to the entire diagnostic and therapeutic pathway of the patient. This pathway could be consistently followed by various stakeholders in the healthcare system." Among the measures taken prior to implementing the integrated network, it involved defining the catchment areas, outlining the services involved in preventive, diagnostic-therapeutic, and rehabilitative phases, specifying their functional interdependencies and network placement. This further included forming interdisciplinary working groups and enhancing the communication system for both remote information storage and transmission essential for care management, as well as for collaborative utilisation of guidelines and care pathways. It is clear how, since the very beginning, the idea of an integrated network relied on the recent elements of the modern medicine.

Structure

The governance has been tackled since the early adoption of the integrated view by detailing the role of each actor of the future network placing greater emphasis on the role of the region. The Region was designated as the governing body responsible for the development of specific and shared rules for planning, guidance, and control. In terms of governance, the main turning point has been the transition from a clinical-scientific network model (pathology network) to a model with an organisational focus (clinical care network). The pathology network served as the framework for addressing stroke-related issues in the Lombardy region until then 2019. It functioned as a specialised network with a primary goal of delivering precise and high-quality care for a particular medical condition. Within this network, a community of clinicians was dedicated primarily to managing, diagnosing, and treating this specific condition. The imperative for developing a fresh network approach stemmed from the need to efficiently coordinate the entire healthcare service delivery system and a growing recognition of the significance of a more comprehensive management. Clinical care networks redirect the emphasis toward interventions that could promote enhanced service integration, particularly between hospital and community levels. The clinical care network is, therefore, a model primarily designed to support regional planning in defining and evolving the

organisational processes of the entire healthcare supply chain, encompassing both hospital and community services.

As a result, the Lombardy region has strategically laid out the establishment of this network type across three key domains: organisational and managerial (establishing the network's structure in relation to prevention, diagnosis, treatment, and continuous care), clinical-scientific (where professionals, beginning with healthcare requirements and the epidemiological context, develop guidelines and protocols), and information and communication (targeted at the patients). Therefore, a Coordination Body named *Organismo di Coordinamento della rete* was introduced for each specific network with the aim of creating a bridge between the regional programmatic aspect and the operational and management aspect of healthcare institutions. The new entity was composed by was composed of representatives from the General Welfare Directorate, the General/Health Directorate of the ASST and ATS, representatives from the Regional Emergency and Urgency Company, as well as the Health Directorate of the Facilities and reference clinicians. The body also included Scientific Societies, General Practitioners, and Paediatricians, as well as representatives of voluntary associations and/or patients³⁵⁰. Its main tasks encompassed the identification of participating facilities within the given network and their structural arrangements, the establishment of network node connectivity methods, the formulation and regular revision of patient care pathways, and the recommendation of a system for evaluating and overseeing the efficiency, effectiveness, quality, and safety of the conducted activities. The Coordination Body, in its role, designated a *Commissione Tecnica* (Technical Committee) having a variable composition, typically consists of the network's referring clinicians already present in the Coordination Body, to which additional members may be added as needed. These committees functioned as technical-scientific instruments facilitating the completion of specific tasks delegated to the Coordination Body and the in-depth examination of particular subjects to advance the network's goals and aims. Since the network's establishment, there have been continuous initiatives to foster communication and cooperation between hospitals and the community. The region has recognised the value of implementing information systems to enable seamless data exchange among stakeholders, and telemedicine, synonymous with "remote medicine," has

³⁵⁰ Resolution of the Regional Executive No. 1694 of June 3, 2019

gained prominence. In addition to monitoring and disseminating critical epidemiological information, the region also envisages creating a stroke registry. The relationship between network nodes is described as intense, characterised by frequent, mutual, and widespread interactions. Competence, expertise, and relationship fluidity are enhanced through professional collaboration and the discussion of challenges. In this sense, criticalities in patient management (i.e., wrong assignment of codes or incorrect selection of the patient for medical procedures) contribute to the trust building process and enhance the multiplexity namely, the presence of multiple layers of interactions between the same set of nodes. However, despite the formal documentation and procedures, informal collaboration practices persist among the various professionals involved in the network. Between 2002 and 2004, the region was actively engaged in standardising care for neurosurgical patients in emergency situations, emphasising that many preventable deaths still resulted from less-than-optimal organisation and efficiency within hospital facilities. In the context of stroke, the awareness process began in those facilities dedicated to the care of acute stroke patients which had a significant impact on reducing mortality and disability. Hence, it was mandated that all patients suffering from acute stroke should be admitted to Stroke Units equipped with dedicated beds for stroke patients and staffed by professionals with multidisciplinary expertise (including neurology, cardiology, and physiotherapy) and a multi-professional team (nurses, physiotherapists, etc.). The region, therefore, aimed to promote the implementation of a stroke unit network by identifying specific indicators. These considerations led to the development of the initial shared protocols for Stroke Units and emergency medical services and to the definition of therapeutic pathway which focused on the treatment of the acute phase and rehabilitation. Simultaneously, efforts were initiated to map existing Stroke Units. In 2007, the region detailed the composition of the network in terms of expertise and provided a logical sequence of phases to guide the development of the pathology network. As an outcome of these actions, the inaugural network plan in 2008, labelled Network Organisation and Guidelines for Recognising Cerebrovascular Care Units (UCVs), defined the Lombardy stroke unit network as an essential component of the broader network for addressing cardiovascular and cerebrovascular illnesses. This initial stroke network³⁵¹ was structured in

³⁵¹ Decree of the Directorate General of Health No. 10068 of September 18, 2008

accordance with the national classification of Stroke Units (formerly known as UCV) and featured three tiers, with the hope of a rapid transition to a two-level system. The document also outlined patient eligibility criteria, immediate response procedures from the initial call through treatment administration, and specified timeframes. In essence, this marked a shift from emphasising prevention to recognising stroke as a healthcare emergency, necessitating prompt intervention and collaboration among various healthcare professionals. However, the region's shift away from the tripartite model of healthcare units (SU) to a more evolved approach occurred relatively late, approximately in 2019. In the same year, the separation between cardiology and neurology had been effectively implemented, the stroke network was nonetheless integrated into a higher-level network: the neuroscience network which ensures the care of patients affected by neurological diseases in a broad sense, including conditions such as dementia, Alzheimer's, Parkinson's, epilepsy, multiple sclerosis, and headaches, where stroke represents one of the many complexities. The model further evolved in 2022, when the network plan emphasised the utilisation of a hybrid centralisation model, including both mothership and drip and ship approaches. In the mothership model, centralisation occurs at the Stroke Unit of level II when the travel distance from the event location is equal to that of level I Stroke Units or is less than 45 minutes. In rural areas, the drip and ship model is implemented, except in situations where the level I Stroke Unit is temporarily incapable of conducting radiological imaging of the ischemic penumbra. However, the professionals interviewed highlight that the latest projections indicate that applying these criteria would eliminate emergency medical service access to 70% of the spokes. As a result, the model is still under discussion.

In Lombardy, the determination of the maximum number of network members is established in consideration of the prevailing demand for stroke units or, conversely, the absence of such demand. This decision is closely tied to factors such as the size of the patient population in a given area and the proximity of existing stroke units. Concerning composition, the network is mainly composed by public hospitals but also includes private hospitals and care facilities. In terms of its formal structure, the region appears to be highly developed. It boasts a well-documented and procedural framework, underpinned by established guidelines that are consistently followed by its members. The spirit of cooperation is the driving force

behind the relationships that unfold within this network, and there is a clear acknowledgment of the value it brings to those who operate within its boundaries. However, when professionals are interviewed regarding their perspective on the network, a different view emerges. Despite all the indicators of a mature and well-organised network, members tend to perceive it as being in its initial stages. This discrepancy in perception can be traced back to recent alterations introduced to the documentation and procedural aspects of the network. These changes have had the unintended consequence of disrupting and potentially undermining the formerly well-entrenched practices that had become widely adopted within the network. This shift has essentially led to a sense of upheaval and transformation within the network, causing professionals to view it as more nascent in nature, even though, on paper, it appears to be quite advanced and evolved.

Context

Regarding the allocation of technical resources, since the inception of the network in 2002 under the Health Plan, the region delineated the prerequisites for establishing hospital facilities dedicated to patients with cerebrovascular incidents, with a primary focus on repurposing existing bed spaces. The region has partially formalised dedicated funding with its related traceability procedures. Furthermore, the Network partially complies with the requirements of Decree No. 70, and activities for alignment are currently in progress.

Professionals acknowledged the existence of collaboration in the region before 2015, characterised by a three-tiered intensity division of stroke units and the successful establishment of a regional stroke registry. Nevertheless, the collaboration that occurred prior to 2015 is not considered to have positively influenced the developments that followed that year. This is because the new regulatory guidelines introduced a distinct logic that differed from the one implemented within the region, making it challenging to align the pre-existing collaborative structures with the new regulatory framework.

In response to the emergency phase of the Covid-19 pandemic, the region formulated a plan for managing patients with time-sensitive medical conditions during both the epidemic and post-epidemic periods. As part of this reorganisation, an expansion of intensive and sub-intensive care beds for Covid-19 patients took place. Moreover, new centralisation criteria were introduced, leading to the

designation of specific Hub hospitals where the provision of services related to time-sensitive conditions would be primarily focused. The main centres for consolidating stroke emergencies have been identified, with the instruction that if a patient arrives independently at the emergency department, they can receive fibrinolysis treatment on-site and be transferred subsequently. The involvement of stakeholders, particularly citizens, has been recognised since the 2002 Healthcare Plan. In this plan, preventive strategies are outlined with the aim of promoting the active role of citizens. This entails encouraging citizens to play an active role in addressing and mitigating risk factors. With the shift of network paradigm from pathology network to clinical care network, the role of stakeholders has been revitalised with the introduction of Consultation Tables aimed at amplifying the role of patient associations. This is manifested through the reporting of issues, concerns, and proposals for enhancement, thus aiding in the pursuit of institutional objectives. Additionally, the network envisions fostering collaboration between corporate management departments and associations on a range of sensitive subjects, including initiatives related to patient education, caregiver training, and psychological support projects.

Process

The network fosters the development and improvement of skills and competencies, aiming for ongoing enhancement. The region specifies that training for network personnel should be guided by identifying training needs that align with the network's function. This encompasses internal organisational models, procedures, protocols, and the latest, most effective diagnostic and therapeutic approaches for patients. To address the challenges dictated by the interaction among emergency and acute phases, the region called for increased expertise among first response teams and a more organised hospital approach. It is desirable that the personnel working in spoke facilities continually gain expertise and motivation to treat these patients. As emerges from the interviews, *an emergency department, which may not be fully specialised to stroke care, receives an acute patient and subsequently transfers them to the hub for treatment, never seeing the patient again. However, when the spoke facility receives the patient back after treatment at the hub, the staff witnesses the patient regaining movement in their limbs, improving their speech, and overall recovery. This experience boosts motivation and enhances*

the competence of the staff. If the patient doesn't return to the spoke facility, there is a risk that knowledge and sensitivity towards stroke-related conditions won't increase as it should.

In line with the principle of permeability between areas and for harmonious management, the Lombardy region has established disease-specific networks (such as the stroke network, headache network, and dementia network), which are then integrated into a higher-level network known as the neuroscience network. The region has established a technical committee for each network. Despite the fact that the care process involves different professionals operating at various stages of the network (emergency personnel, neuroradiologists, physicians in hubs and spokes), the formation of the stroke committee did not adhere to the criterion of representativeness and was heavily skewed towards the medical component of the hubs.

Strong trust relationships exist within the network between hubs and corresponding spokes. However, at the systemic level, what becomes apparent is that the average sentiment of trust is insufficient. A prevailing sense of dissatisfaction and mistrust is pervasive, and in the best of cases, one can only detect a sense of resignation. The predominant factor contributing to this situation lies in the unequal engagement of network members in the phases of planning and programming, which fail to involve the diverse roles held by individuals operating at different levels within the network. This disparity in involvement has given rise to a palpable sense of discontent and scepticism among network participants. Hence, while trust may flourish at the micro-level, where close relationships exist between hubs and corresponding spokes, the overarching sentiment at the macro-level appears to be lacking. Similarly, dissatisfaction has a detrimental impact on internal legitimacy. Network members, particularly those working in locations that will be most affected by the new reorganisation, do not perceive that their contributions are regarded as significant or that they genuinely add value to the network. This perception of underrepresentation and undervaluation of their roles and expertise within the network diminishes their sense of legitimacy and engagement, potentially leading to dissatisfaction and disconnection from the broader network goals and initiatives. External legitimacy is not acknowledged either. The general public does not perceive the network as a cohesive entity; instead, they continue to rely on individual hospitals for their healthcare needs.

Another consequence of the insufficient representation of the various professional roles is a notable power imbalance. It not only results in a sense of marginalisation and frustration among network members but also raises concerns about the fairness and equity of decision-making processes and resource allocation. Concerning the management activities, at present, there is no active plan to expand the network by incorporating new members for local care, despite the fact that the significance of such an expansion has been underscored by the experts who were interviewed. At the same time, the network lacks a formalised approach to addressing conflicts. Rather than having a predefined set of procedures or mechanisms for conflict resolution, the responsibility for managing and resolving conflicts largely falls upon the individual professionals who are part of the network.

Brief considerations on data shifts amidst Covid

The data from the Agenas³⁵² sheds light on the evolving landscape of stroke in Lombardy over a three-year span, revealing a slight decline of 0.94% in the rate of ischemic strokes within the population. Amidst these trends, an uptick is observed solely in the utilisation of thrombectomy procedures, registering a 2.10% increase, while the application of thrombolysis maintains a consistent pattern. Another noteworthy aspect is the positive indication regarding the non-utilisation of stroke units, demonstrating a substantial -1.79% decrease over the triennium. The complex dynamics of mortality further unfold, with a slight increase observed 30 days after discharge, amounting to 0.76%, as opposed to the relatively lower 0.6% rise in mortality from admission. Delving deeper into the analysis of mortality from admission, a distinct trend emerges, showcasing the beneficial impact of resorting to stroke units on the overall population. This is evidenced by a mitigated increase in mortality at 0.43%, compared to a 1.21% in cases where stroke units are not employed. This positive effect is particularly accentuated among individuals aged over 75, where the increase stands at 0.4%, contrasting with a higher 0.85% increase in mortality for those not receiving care in stroke units. These nuanced findings resonate with the findings of other regions concerning the role ascribed to admission to stroke units.

³⁵² AGENAS, 2021. *Gruppo Tecnico per l'elaborazione di proposte per l'attuazione e l'evoluzione della rete assistenziale dell'ictus: Relazione Conclusiva*. Available at https://www.agenas.gov.it/images/agenas/RETI/reti_ictus/board_agenas_reti_ictus-relazione_conclusiva.pdf (accessed October 2023)

6.4.4 Sardinia

Network implementation and evolution

The matter of stroke care in Sardinia was brought to the forefront with the introduction of the 2006-2008 healthcare plan³⁵³. This plan was founded on the belief that within the regional domain, *the care for individuals affected by stroke was insufficient both for acute treatment and for neurorehabilitation and social reintegration*. Right from the start, it became evident that there were significant organisational hurdles at the regional level when it came to stroke management leading Sardinia to face national-level scrutiny for its inadequate approach to stroke management. The Ministry of Health included a distinct section in its report on organisation of stroke care³⁵⁴, shedding light on how the 2006-2008 healthcare plan inadequately addressed the matter of stroke and resulted in *the non-execution of almost all planned initiatives*. The 2006-2008 plan was criticised for addressing cerebrovascular disorders (cerebral stroke) *in a limited and generic manner, without ever mentioning the role played by neurologists in the management of Sardinian patients with acute strokes*. The start of the rationalisation efforts outlined in the 2006-2008 Plan occurred in October 2008³⁵⁵ when it was initiated the establishment of the regional network of Stroke Units (in Cagliari, Nuoro, and Sassari) and the activation of Stroke Teams in other Healthcare Companies.

To ensure consistency in network plans, the Region introduced guidelines for defining Integrated Care Networks and specified mandatory criteria for their functioning³⁵⁶. This marked the beginning of the Regional Health Service reorganisation process, aimed at enhancing functional integration between territorial and hospital facilities. This document outlined the objectives of the networks, which aimed to address disparities in the delivery of healthcare services, maintain consistency in addressing individuals' health needs through a multidisciplinary and multi-professional approach, and collaboratively enhance system efficiency while mitigating potential sources of inefficiency. The guidelines stressed the significance of tailoring the organisational model to align with the distinctive requirements of the Sardinia region. They highlight the need for an

³⁵³ Regional Executive Committee Resolution No. 51/9 of November 4, 2005

³⁵⁴ MINISTERO DELLA SALUTE. Quaderni del Ministero della Salute, n.2 marzo - aprile 2010. Organizzazione dell'assistenza all'ictus: le Stroke Unit

³⁵⁵ Resolution of the Sardinia Region (RAS) No. 52/16 dated October 3, 2008

³⁵⁶ Regional Executive Committee Resolution No. 34/10 of July 3, 2018

assessment of the epidemiological landscape, healthcare demands, and service areas. Moreover, they advised considering the region's distinct geographic characteristics and transportation schedules, as these elements hold a pivotal role within the regional context. However, to these days Sardinia has no formalised protocols for inter-nodes activities nor a Stroke Network Plan.

Structure

Concerning the governance of the network, the 2006-2008 healthcare plan envisioned the establishment of a Regional Group for Cerebral Stroke to support the reorganisation of healthcare services. This group was intended to be composed of experts in the field, with responsibilities including problem analysis, proposing practical solutions for the implementation of protocols, as well as evaluating the achieved results. However, despite its formal establishment in 2008³⁵⁷, the group was still not operational as of 2010³⁵⁸. Similarly, the 2015 document introduced the creation of a new strategic entity known as the *Comitato di Organizzazione delle Reti Integrate* (CORI, Committee for the Organisation of Integrated Networks). This committee operated within the Regional Health and Hygiene Department and was composed of officials (*dirigenti*), department executives, and experts specialising in healthcare service planning and organisation. CORI's primary function was to facilitate methodological coordination among regional technical committees responsible for the development of specific integrated care networks, it formulated governance methodologies to ensure uniform management across different medical conditions within the networks. CORI was comprised of both department officials and experts in healthcare service planning and organisation, thereby providing methodological coordination to regional technical committees entrusted with the creation of distinct integrated care networks. In 2018, a *Tavolo tecnico regionale di rete* Regional (Technical Network Committee) was established within the Department of Hygiene and Health and Social Assistance. This committee was specific to each integrated care network and was composed of experienced professionals. Their role was to prepare a network plan proposal that aligns with the available resources and assigned objectives, containing the guidelines and operational directions for their achievement. Similarly, the

³⁵⁷ Assessorial Decree No. 20 of July 25, 2008

³⁵⁸ MINISTERO DELLA SALUTE. Quaderni del Ministero della Salute, n.2 marzo - aprile 2010. Organizzazione dell'assistenza all'ictus: le Stroke Unit

document detailed the network's governance stating that each network was governed by a Regional Network Coordination (*Coordinamento di rete*), composed of at least one representative for each specialty involved and one representative of healthcare professions, with the authority to involve other specialists and/or professional figures within its tasks and for the execution of specific activities. The Regional Network Coordination had the responsibility of overseeing the achievement of objectives and ensuring compliance with various parameters, it was tasked with preparing and submitting an annual report on the network's functioning to both the Regional Health Assessor and the General Directorate of Health, based the outcomes of the monitoring activities. However, even though the documentation anticipated the rotation of various governing bodies over the years, the region currently does not possess a functioning entity to oversee the stroke network. It lacks a clear identification of supra-company bodies for coordination and planning hence, attempting to gauge stability based on contractual terms, would not yield meaningful insights in this context. Instead, it is essential to delve deeper into the dynamics and relationships that truly shape the network's functioning and development.

Concerning communication, the 2006-2008 plan made an initial mention of hospital-territory partnerships, including within its implementation measures the creation of operational procedures for emergency transport to specialised centres. This was intended to shorten the time between the event's onset and specialised care. The plan introduced collaboration protocols with general practitioners (to monitor high-risk patients and coordinate discharge and rehabilitation plans) and emphasised the need to enhance the quality of rehabilitation services to ensure the effective recovery of temporarily impaired functions. In 2015, the reorganisation of the hospital network introduced for the first time, a three-phase management of the condition: pre-hospital, hospital, and post-hospital, while leaving out operational details. It outlined crucial aspects during the discharge phase, including engaging both the family and the patient in the discharge plan, initiating preliminary contact with territorial rehabilitation services, prescribing essential aids for homecoming, ensuring the uninterrupted provision of healthcare to prevent delays in territorial care, and furnishing comprehensive information about the available healthcare, sociosanitary, social, and volunteer services. However, due to the absence of explicit regional-level directives, companies are dedicating their efforts to crafting

inter-company operational protocols. Interviews bring to light that despite arising from challenging negotiation efforts, these protocols are of a voluntary nature, and not all regional companies have engaged in their formulation. Additionally, the protocols are informally put into practice by the participating companies, yet there is a lack of formal approval. The direct consequence of the absence of a comprehensive regional perspective is the inhibition of regional objectives formulation. Therefore, professionals turn to the contractual goals that have been designated for them. As a consequence, professionals describe the collaboration as being moderate, based on established routines and frequent interactions between a select few well-known operators. Moreover, cliques are present particularly in the relationships between the satellite facilities (spokes) and the central hub within the region.

The 2006-2008 healthcare plan formally recognised Stroke Units as an organised response for individuals experiencing acute strokes. In accordance with international standards, the Plan identified three reference centres: one in Cagliari at the Brotzu Hospital, one in Nuoro at the San Francesco Hospital, and one in Sassari. Additionally, to enhance the network, other healthcare facilities might activate Stroke teams in alignment with national guidelines. However, the initial structure did not gain the Ministry of Health's approval, which in 2010 recommended a structure more aligned with the hub-and-spoke model, introducing new network centres. By 2010 of the three planned centres, only the one in Cagliari was operational (a complex neurology-stroke unit at the Brotzu Hospital in Cagliari with 16 beds), despite there were no provisions for rehabilitation therapists or speech therapists. The Sassari centre was established by 2010 but had not yet been authorised for thrombolysis, and the Nuoro centre had not yet been established. Subsequently, the Ministry of Health stepped in with a proposal to reorganise the Sardinian Stroke Unit network, taking into account Sardinia's geographical features and the guidelines outlined in the 2006-2008 plan³⁵⁹. Four SU II: one located in Cagliari at the Brotzu Hospital, one located in Nuoro at the San Francesco Hospital and one located in Sassari (by creating an inter-company framework that combined the disciplinary and professional assets found within the AOU of Sassari, specifically the Neurology Clinic and the Institute of Radiological Sciences, along

³⁵⁹ MINISTERO DELLA SALUTE. Quaderni del Ministero della Salute, n.2 marzo - aprile 2010. Organizzazione dell'assistenza all'ictus: le Stroke Unit.

with those of the SS. Annunziata Hospital), and one located in Olbia (at the Olbia hospital facility integrated with the San Raffaele structure).

- Three SU I: one located in the Oristano Hospital (ASL di Oristano), one in the Carbonia-Iglesias Hospital Complex (ASL di Carbonia-Iglesias), and one in the AOU of Cagliari.
- Stroke Teams in all hospitals with an emergency department, lacking the dedicated facilities of Stroke Units but admitting at least 50 acute stroke patients per year.

It was the reorganisation of the hospital network in 2015³⁶⁰ that aimed to formalise the network by specifying the hub and spoke nodes, composed solely by public hospitals. In 2015, the network had 2 SU II, 5 SU I (later detailed as 7 Level I Stroke Units, in the operational table of network nodes) and 2 Emergency Departments (ED). The following hospital network reorganisations reiterated the structure envisaged by the 2015 reorganisation³⁶¹. Both documents and interviews do no mention possible cap to growth. It was not until 2018 that the region began contemplating a new reference organisational model, outlining the potential configurations of regional clinical networks based on two network models. On one hand, there was the hub and spoke model, which classifies service-providing facilities based on the complexity of the cases they handle. On the other hand, there was the Poles and Antennas model, which relied on the complementarity of specialised expertise. In this framework, "Poles" represented centres specialised in particular disciplines, serving as the core components of the system, while "antennas" functioned as the initial points of access, providing diagnosis and basic treatment for the disciplines covered by the poles. More intricate cases were referred to the specialised pole relevant to their condition and each facility had the capacity to act as a pole for a specific discipline and as an antenna for others.

Concerning formalisation, in 2018 a significant development occurred as the document Guidelines for defining Integrated Care Networks introduced the concept of network plans for the very first time. This inclusion came with a detailed breakdown of their content, encompassing a multitude of crucial aspects including the identification of the facilities and services involved in the network, the explicit

³⁶⁰ Regional Executive Order No. 38/12 of July 28, 2015

³⁶¹ Consistently the network has expanded beyond the initial projection through the inclusion of the private hospital Mater Olbia, which was not yet operational in 2017 and has entered into private agreements with the Sardinia region.

delineation of various network nodes, and the strategic approaches for effectively interconnecting them. While the Agenas 2021 report suggests that the plan has been partly formulated and given approval, there is presently no established plan for the stroke network and the primary reference document for the professionals is still the 2017 hospital network reorganisation plan. The professionals who were interviewed have been recently engaged by the region and acknowledge its transition from *being unaware of stroke-related issues to a phase of increased awareness and sensitivity*. Nevertheless, healthcare practitioners involved in stroke treatment are currently working without a regional-level network plan or an integrated care pathway in place. Hence, based on the analysis conducted thus far, the network can be described as being in its initial stage of development, characterised by prevailing informal collaborative dynamics, high trust among members, and significant legitimacy. However, it is evident that there is a clear absence of a regional framework capable of providing strategic guidance and operational directives through the development of network plans or regional protocols.

Context

As previously highlighted, the human and fiscal resources appear under dimensioned. Furthermore, the facilities involved in the stroke care have partially meet the authorisation and institutional accreditation requirements as stipulated by regulations. Those interviewed point out a marked inadequacy of stroke unit beds, which arises from a hospital capacity that is notably below the demand and is worsened by ineffective bed management, resulting in a congestion in bed utilisation and leading to structural incapacity to accommodate all stroke patients in the stroke unit. The most significant challenge is encountered during the transition to the community at the time of discharge. Concerning adaptability to environmental changes, the region has established a plan for managing patients with time-sensitive conditions during the epidemic and post-epidemic phases. The region then defined specific guidelines for the management of territorial emergency care outside of hospitals, as well as specific pathways for the admission and access to hospitals for patients with suspected, probable, or confirmed Covid-19 infections. Measures were subsequently taken regarding the containment of secondary

transportation for which specific protocols were established³⁶², as well as specific procedures for accessing rehabilitation services³⁶³.

While the key role of the patient and the support of the broader community are recognised, precise data disclosure methods are not described. Despite since 2005 it was acknowledged that preventive activities were severely lacking and had an episodic nature, relying on individual initiatives, not much has been done. Notably, initiatives from individual centres are interesting, as they have suggested bottom-up solutions in an attempt to enhance practice. One compelling development is the creation of a ward phone application capable of providing additional information about stroke to the patient. In addition to the explanations provided by medical personnel, this offers patients the opportunity to deepen their understanding of their condition. Furthermore, given the success and positive feedback from users, there are plans to expand this application to collect data on the patient experience directly from the patients themselves.

Process

In Sardinia, since 2005, there has been awareness of the need to develop specific training programs for the prompt recognition of strokes, primarily targeting general practitioners, physicians, emergency medical services physicians, and nursing staff. However, it was acknowledged that in Sardinia a comprehensive personnel policy was missing primarily due to the widespread use of temporary, interim, and precarious personnel. Hence, the plan presented two key actions: the initiation of a regional project for training professionals in the sector and the formulation of personnel policies designed to address temporary staffing. Regarding stroke-related conditions, the year 2015 continued to underscore the importance of medical personnel training. This pertained specifically to the consistency in the application of severity codes during the emergency and hospital phases, aimed at ensuring timely admissions. Similarly, medical personnel training in telemedicine was introduced in 2017. In 2018, efforts were made to standardise training within a network perspective, emphasising that training and personnel development programs should align with the programmatic guidelines outlined in the Network Plan. In 2022, a more programmatic approach was introduced, detailing objectives,

³⁶² Resolution No. 28-18/2020; Resolution No. 35-38/2020

³⁶³ Regional Decree No. 58-3/2020

intervention guidelines, and funding for training, not only for medical personnel but also for various corporate roles. Similarly, training actions related to the prevention and recognition of risk factors for major pathologies were detailed, along with specific training programs regarding hospital-territory continuity with reference to pathology networks.

Trust plays a crucial role, particularly in contexts that lack formal regulations and protocols. Within the professional community, a deep sense of trust prevails, and they articulate a strong belief in the significance of their contributions, even within resource-limited setting. Collaboration is established not only between different hospitals but also, and above all, between the various stages of care. There is a strong synergy, particularly concerning sub-intensive therapy and rehabilitation, which, despite belonging to different operational units, is collaborative in promptly taking care of patients from the acute phase onwards. With regard to internal legitimacy, professionals acknowledge that they perceive the value they bring to the network, especially in light of the existing challenges that are compensated for by the availability of the staff. Although the context in which they operate may be lacking in terms of services and human resources, they believe they are adequately recognised by the Region, which investigates their needs. Hence, with regard to external legitimacy, the stroke network is neither known nor adequately valued at the regional level. The interviewed professionals believe that awareness of the network only occurs in emergency situations when a patient experiences a stroke and is admitted to the stroke unit. However, once patients find themselves in the stroke unit, they acknowledge its value retrospectively. Furthermore, there are pronounced disparities in power perception among the involved facilities, driven more by the appeal to healthcare professionals rather than economic factors. The current landscape is characterised by a nationwide shortage of medical personnel. This scarcity is particularly felt in less attractive contexts like Sardinia, which is disadvantaged due to its insularity, significant population dispersion, and a healthcare environment in constant flux. Professionals, therefore, *hold the upper hand* and, through their choices, influence the human resources available to companies by *preferring fixed-term contracts at a central facility over indefinite contracts at a more peripheral one that lacks diagnostic services*. The attractiveness of the facilities, therefore, depends on their availability in terms of departments and services. In fact, *working in a central*

hospital, as a doctor, you have more ease in your work. If you work in a peripheral centre, you don't have the specialties, or they are only available at certain times. So, if you work in a peripheral hospital, you are much more exposed to professional risks and often have to travel to reach the facility. Despite the highlighted shortcomings, the region stands out with a high score. When questioned, professionals have pointed out the possible reasons for this high performance, which include dedication to their profession and the effort invested in making the care chain function, along with some practical elements. Firstly, there is a strong focus on stroke among all cerebrovascular diseases. This emphasis on stroke has allowed for a better concentration of care. At the same time, the continuous attention to national guidelines ensures that service delivery aligns with recent evidence-based developments.

While the network is not actively pursuing the addition of new hospital or territorial members, a significant issue arises in patient discharge due to the limited availability of rehabilitation facilities. This leads to increased costs associated with extended stays in acute care units. Introducing new territorial members, such as hospice facilities for challenging cases, would ideally alleviate admission delays, ensuring sufficient turnover of acute care beds and enhancing overall well-being. Furthermore, no measures have been implemented for the prevention and management of conflicts, which are informally resolved among the network members. Nevertheless, individual companies operate autonomously, and there is an active psychological counselling service, even though it has never been used by the interviewees. Furthermore, attention is given to the stress levels of personnel, monitored through questionnaires. Hence, the missing element appears to be a post-event awareness stage in addressing issues through improvement actions. Lastly, despite the presence of central bodies tasked with formulating systemic objectives, it remains a common practice for professionals to primarily adhere to the specific goals stipulated in their contractual agreements with their respective organisations. While the region exhibits a degree of receptivity to change, the active engagement and alignment of these professionals with the broader systemic objectives appear to be somewhat limited or lacking. This situation underscores the potential for further collaboration and coordination to bridge the gap between individual contractual goals and the region's more comprehensive vision for healthcare services.

Brief considerations on data shifts amidst Covid

A distinctive trend emerges in the region of Sardinia, setting it apart as the singular participant in the sample to showcase a marginal uptick in the rate of ischemic strokes within its population, registering a modest increase of 0.43%. Amidst this landscape, the outcomes related to treatment strategies are notably encouraging. Specifically, there is a positive upswing in the implementation of thrombolysis, witnessing an increase of 2.4%, and an even more substantial surge of 2.7% in the adoption of thrombectomy procedures.

Equally noteworthy is the diminishing reliance on stroke units, evidenced by a notable decrease of 7.04%. However, there are no substantial variations in the 30-day mortality rates after discharge (0.15%) and admission (0.90%) within the Sardinia region.

Intriguingly it is observed a decrease of 0.48% in mortality for cases involving admissions to stroke units. This stands in stark contrast to a considerable 3.66% increase in mortality for patients not admitted to the stroke unit. Likewise, among individuals aged over 75 a 1.3% uptick in mortality is observed for those hospitalised in stroke units, in contrast to a 3.95% increase for those not admitted in SU. These multifaceted findings underscore the complexities of stroke management in Sardinia, hinting at both areas of progress and potential areas for targeted intervention.

6.4.5 Tuscany

Network implementation and evolution

Since the inception of the Tuscany stroke dedicated care³⁶⁴, the region has been notable for its commitment to establishing a networked pathway that envisions the integration of every Health and Hospital Agency, both at the territorial and hospital levels, as well as for the establishment of multidisciplinary teams. Primary care in the community healthcare sector plays a pivotal role and has been organised into *Moduli di cure primarie* (Primary Care Units) consisting of general practitioners, nurses, and healthcare assistants which since 2010 have extended their activities to include the Stroke Care Pathway³⁶⁵. Despite the integrated network organisation being acknowledged as a fundamental element of the healthcare process since 2012, it is in 2014 that the region issued its Initial Guidelines for implementing the Stroke Care Pathway and Network, which outlined the networked organisational model as the operational approach for the management and handling of stroke cases. De facto, this marked the inception of the Tuscan Stroke Network. Since its inception, the stroke network has been characterised as a comprehensive network comprising emergency-urgent care facilities, hospitals, and community healthcare services, all of which are dedicated to the management of stroke patients. The initial step involved standardising procedures and equipment across the territorial and hospital-based Emergency and Urgent Care System to align with recommended parameters. Therefore, each *Area Vasta* (Health District) approved a clinical-care protocol aimed at ensuring the accurate and timely management of patients with stroke. Early on, the region emphasised its investment in collaboration, clearly identifying the *transition from the concept of self-sufficiency of individual centres to the integration of knowledge*³⁶⁶.

As a result, following the healthcare system reorganisation in 2015, two key innovations emerged: a system architecture that includes both a vertical dimension (focusing on emergency and acute care areas) and a horizontal dimension (forming networks that lead to diagnostic, therapeutic, and rehabilitative pathways) and the introduction of Health Districts as the optimal context for implementing regional strategic planning.

³⁶⁴ Resolution of the Regional Council No. 53 dated July 16, 2008

³⁶⁵ Resolution of the Regional Council No. 91 dated November 5, 2014

³⁶⁶ Regional Executive Committee Resolution No.1378 dated December 27, 2016

It is in 2018 that a paradigm shift occurs, highlighting the need to transition from organisations structured within a network (*organizzazione in rete*) primarily centred on technical-scientific coordination and the sharing of diagnostic-therapeutic and care pathways, to a networked organisation (*organizzazione a rete*) conceived as a collection of interdependent services in a functional relationship through highly structured connections and modes of interaction. A new concept is thus being introduced, that of *governance network* referring not to the governance of the network itself but to the governance of the network system. It is highlighted that healthcare systems are increasingly taking the form of networks of networks, highly permeable and interconnected with the aim of facilitating and making healthcare responses more effective and consistent. Therefore, the region highlights two priorities in its actions: Firstly, facilitating the formation of associations that allow the development of a *network of networks* through horizontal interactions, and secondly, reinforcing the connections between these associations and the regional governing level through vertical interactions.

Structure

During the implementation phase of the Stroke Network, a regional monitoring body for the planning and management of the Stroke Care Pathway was established. This body, known as O.R.P.G. (*Organismo Regionale di monitoraggio per la progettazione e gestione del PDTA ictus*), was composed of the Head of the Care Planning and Organisation Department and healthcare professionals from the Tuscan healthcare system with expertise in organisational models, healthcare pathways, quality, and safety of care, as well as information systems. The primary objective of this body was to assist the General Directorate in defining and structuring the organisational changes necessary for the implementation and evaluation of the diagnostic-therapeutic care pathway for stroke. Stroke care then evolved accordingly with the clinical network model, identified at various levels. First, regional clinical networks encompassed a range of expertise aimed at ensuring governance and supporting the development of healthcare policies (e.g., time-dependent networks). Second, Health District networks (*Area Vasta*): these were interorganisational subnetworks that facilitated stable and formalised collaboration among operational units and professionals from different healthcare

organisations³⁶⁷. Over the years, the network's development has led to the introduction of new governance roles and positions. The strategic coordination and monitoring function of the network is now entrusted to a *Comitato Regionale* (CoRe, Regional Committee). This committee is responsible for defining the network's development guidelines, establishing organisational and technological network standards, monitoring network performance, and developing training programs. In time-dependent networks, the committee includes a Clinical Leader and an Organisational Leader (*Responsabile clinico*, *Responsabile organizzativo*), both consisting of experienced professionals designated by healthcare organisations or technical programming units. Additionally, the committee collaborates with citizen representatives. The regional stroke network is now structured into three Health District subnetworks, each of which establishes a coordinating body called *Coordinamento di rete di Area Vasta* (CoRAV, Health District Stroke Subnetwork Board), consisting of a clinical leader and an organisational leader, responsible for planning and monitoring the network's implementation. They are joined by professionals capable of ensuring the effectiveness of care pathways. The coordination of these Health District networks serves as the operational and management arm of the Regional Committee and its primary role is to ensure the proper execution of the clinical care pathway according to formalised procedures by defining objectives and responsibilities. Although network governance is formalised and hierarchical, the network is described by participants as shared, where participation involves all professional roles at different levels. This establishes a concept of a *flat* network in which the density of the network is defined as not only intense but also *reverberating*, as different professional roles at all network levels are actively engaged in frequent interactions.

The Tuscany region stands out for its precise formalisation of governance tools³⁶⁸, which include the network plan (which identifies the strategic objectives for the development and proper functioning of the network), the annual work plan (which translates the objectives and priorities identified in the network's strategic plan into specific actions to be carried out within the specified time frame), the annual report (providing activity data, achieved results, identified challenges, and planned improvement actions), and the semi-annual reports (brief summaries of the

³⁶⁷ Regional Executive Committee Resolution No.1378 dated December 27, 2016

³⁶⁸ Regional Executive Committee Resolution No. 958 dated August 27, 2018

progress made in relation to the annual work plan). This high level of formalisation appears to have eradicated informal relationships among professionals, as they primarily rely on codified procedures and network communication systems.

Despite the network being well-established, its members consider it to be in an intermediate developmental stage, primarily due to the inadequate monitoring in the post-acute phase and in the training of volunteer emergency personnel. However, the establishment of the stroke network started in 2014 with the identification of network hospitals authorised to administer thrombolysis. Initially, these hospitals were categorised into two levels, both of which were coordinated by a stroke team responsible for managing the overall patient pathway. However, it was clearly stated that the objective was not to establish hierarchical levels of hospital care but to create healthcare facilities that, in an integrated manner, provide services tailored to the needs of their respective regions and the Health District's planning³⁶⁹. As a temporary measure, it was stipulated that a patient admitted to a facility lacking an in-house Stroke Team must undergo thrombolysis guided by teleconsultation procedures and data transmission. Regarding the hospital phase, the organisational model stipulates that hospitals are categorised as hub centres (DEA II) and spoke centres (DEA I and ER). For each of the three Health District subnetworks, a DEA II hospital is designed and authorised for both intravenous and intra-arterial thrombolysis. Similarly, the regional territory includes accredited DEA I hospitals for intravenous thrombolysis. Nevertheless, connections between nodes belonging to different Health District subnetworks for endovascular treatment are admissible when estimated travel times are shorter or when the node within the relevant subnetwork is unable to meet the demand. The selection of cases to be accepted for intra-arterial treatment must be based on a teleconsultation with image transmission between the sending facility (DEA I) and the interventional neuroradiologist at the second-level hospital. An exception is made for the Island of Elba, where transportation times are excessively long. In this case, a structured telemedicine service (telestroke) is established to facilitate the administration of systemic thrombolysis. Despite an initial phase during which regional hospitals sought to join the network, the network's configuration now appears stable and well-established over the years. Since 2014, in which the network consisted of 3 hubs and 18 spokes, the network expanded in 2021 by only adding two spoke hospitals.

³⁶⁹ Regional Executive Committee Resolution No. 145 dated March 3, 2016

Currently the Central Health District comprises 9 nodes, the Health District South comprises 4 nodes and the Health District North includes 10 nodes. The model includes both primary centralisation at the centre, which performs both thrombolysis and endovascular treatment (mothership model), and secondary centralisation after thrombolysis has started at an accredited centre (drip and ship model). Decentralisation is also recommended in cases where endovascular treatment is not performed, and in any case, after the clinical framework has been shared among professionals from the Stroke Teams of the involved nodes. In 2021, it is emphasised that the majority of rehabilitation facilities in the Tuscany Region are located outside the affiliated Hospital Facility, in separate structures. This situation poses a bottleneck in the patient flow, both in transitioning from the acute care setting to the rehabilitation setting and in readmission to the hospital when necessary during the rehabilitation phase. Furthermore, significant in terms of the organisational structure is that the network encompasses intra-hospital procedures designed for patients with substantial comorbidities, particularly those in the perioperative phase leading to an onset of stroke.

Concerning telecommunication systems, the region defines them as a fundamental prerequisite to ensure the functionality of the network's operational procedures. Consequently, emergency response teams must be equipped with a direct number which ensures a 24-hour response from the Stroke Team at the local territorial competence node for teleconsultation in cases of uncertainty regarding diagnosis and destination. Teleassistance is also recognised as a valuable tool for the primary care units operating in the community, serving as an instrument to streamline the follow-up process for citizens under their care³⁷⁰. According to this projection, citizens will no longer need to physically visit locations for booking appointments, undergoing medical procedures, or collecting test results. Instead, they should be able to rely on an organisation that provides a multidisciplinary team, medical facilities, clinics and equipment. However, the region underscores that the network necessitates not only technical tools (efficient information systems, appropriate technologies, common training) but also relational aspects (sharing expectations from a network, defining the roles of network nodes, model flexibility, and determining levels of responsibility).

³⁷⁰ Resolution of the Regional Council No. 91 dated November 5, 2014

Context

The Tuscany Stroke Network predates the regulatory mandate of 2015, which didn't radically transform the pre-existing structure but rather enhanced it. Among the preliminary actions taken prior to the activation of the network, the assessment of population's needs represented a cornerstone. The region initiated the process by promptly working on defining the catchment areas. This involved specific discussions among healthcare organisations, professionals, and Health District programming directors, with the ultimate goal of establishing the most effective network configuration³⁷¹. The region strongly asserted that the primary key factor for the functioning of time-dependent networks is the concept of *patients feeling welcomed, supported, understood, and cared for, which emphasises the importance of listening to patients as people, not just as carriers of symptoms or illnesses*³⁷². The region clearly defines the patient-healthcare professional relationship, including roles related to listening and interaction. It promotes the active role of citizens in reducing informational disparities and encourages collective efforts by citizen associations specifying that their involvement should occur during the design phase, monitoring, and in all subsequent changes. In the region, there are also outpatient and telephone follow-up mechanisms in place, where patients are contacted by professionals capable of assessing post-acute disability levels expressed using the modified Rankin Scale (mRS)³⁷³. This intervention proves to be particularly valuable in light of the intention to develop new outcome indicators for monitoring the consequences of strokes. As stated by the interviewed professionals, *stroke is the leading cause of disability in Italy, yet we continue to use mortality as an outcome indicator. It is much more useful to know how many patients we have had, how many were independent at discharge, how many were independent at three months, and how many were independent at six months*. Despite the region has partially formalised a dedicated funding to the network, what appears most interesting is the emphasis placed on the resources available within the network. The regional guidelines for the Stroke Network include a thorough analysis of resource and technological provisions, tailored to the requirements of both the pre-hospital and in-hospital phases, as well as for facilities that perform thrombolysis or thrombectomy.

³⁷¹ Regional Executive Committee Resolution No. 145 dated March 3, 2016

³⁷² Regional Executive Committee Resolution No.1378 dated December 27, 2016

³⁷³ Regional Executive Committee Resolution No. 1106 dated October 28, 2021

In 2020, despite the pandemic emergency, the Stroke Network managed to maintain its efficiency. However, during the first (March-April) and second (October-November) waves of the pandemic, there was a significant reduction in admissions of ischemic stroke patients to the emergency department. Additionally, there was a noticeable delay in patients arriving at the emergency department compared to the onset of stroke symptoms. This delay was due to the fact that patients tended to remain at home and would call 118 only when their symptoms had become more severe. Consequently, treatments in 2020 primarily targeted more severe cases and were administered later³⁷⁴. As a solution, the Stroke Network's existing organisation and algorithms were adapted with the implementation of a *protected stroke code*³⁷⁵. The primary objectives of this adjustment were to enhance the sense of safety for citizens seeking hospital care, ensure the well-being of healthcare personnel, and provide rapid decision-making tools for healthcare professionals in choosing the most suitable hospital pathway, even amidst the pandemic crisis.

Process

Since 2008, Tuscany has placed a strong emphasis on education, going so far as to mandate the implementation of a continuous education system in each of the 3 Health Districts as a prerequisite for the accreditation of facilities and specific activities. The 2012 plan not only emphasises systematic and continuous public awareness efforts using effective social communication channels, centred around factors that pose a risk for stroke and the importance of not delaying hospital arrival but also reaches out to administrators and policymakers. The aim is to gain their support and involvement in decision-making processes related to the implementation, organisation, and continuous monitoring of the integrated healthcare and care system. Training plays a pivotal role in the management of the network and receives in-depth attention from the region which has identified a *Commissione Tecnico-scientifica Regionale* (Regional technical-scientific commission) responsible for planning the training program, a *Commissione di Area Vasta* (Health District commission) overseeing the implementation of the training pathway between the hubs and spokes, and *Referenti di Presidio* (site-specific

³⁷⁴ Regional Executive Committee Resolution No. 1106 dated October 28, 2021

³⁷⁵ Executive Decree No. 6556 dated May 8, 2020

representatives) who serve as the reference points for all the involved professional figures. Additionally, the region delineates the training objectives, specific content for each phase of the care pathway, and the evaluation of training³⁷⁶.

Although the network is not actively seeking new members, innovations driven by the National Recovery and Resilience Plan are gaining traction. This includes the experimentation with new types of healthcare providers (i.e. *Case della Salute*), which were initially established during the Covid emergency phase and are now being transformed into local outpatient clinics. The network in the Tuscany region is described as *egalitarian* by its members. It is characterised by high levels of trust, low conflict presence, and minimal power imbalances. The region explicitly outlines legitimacy objectives by stating that *the value of the network must be acknowledged and recognisable*³⁷⁷. Furthermore, it specifies objectives in terms of external legitimacy as *the network should, in the external environment, cultivate an understanding and consensus regarding the added value it brings compared to traditional healthcare delivery methods. It should also foster appreciation and trust among the citizens*. Similarly, internal legitimacy is a key element in the Tuscan configuration. To reflect the value attributed to network members, the Angels initiative was endorsed, publicly recognising top performances. As emphasised during interviews, *the initiative doesn't have inherent value, but it allows Tuscany to reward the efforts of professionals, it allows them to comprehend the importance and value they hold and boost the morale*.

The network is defined parity-based, namely involvement of the members is considered equal as they contribute to the goal development and assessment. However even in parity-based networks, internal conflicts do exist. However, the sharing of objectives, the involvement of personnel in strategic and planning activities, and commitment help mitigate their effects. Additionally, the inherent difference between hub and spoke facilities is not perceived as a source of discord, as professionals are consistently engaged in an equal manner.

Brief considerations on data shifts amidst Covid

In the context of Tuscany, observing the stroke-related trends over a three-year period, a measured decline of 0.67% in the rate of ischemic strokes within the

³⁷⁶ Regional Executive Committee Resolution No.1380 dated December 27, 2016

³⁷⁷ Regional Executive Committee Resolution No.1380 dated December 27, 2016

regional population emerges, reflecting a nuanced dynamic in the health landscape. Equally noteworthy is the substantial 4.07% decrease observed in the non-utilisation of stroke units, underscoring a positive shift in healthcare practices and resource utilisation. However, the exploration of 30-day mortality rates introduces an interesting complexity. While mild increases are noted in mortality both post-discharge (0.44%) and from admission (1.4%), an unexpected and counterintuitive finding surfaces in the relationship between stroke unit usage and mortality. Contrary to expectations, and similarly to Lazio, the utilisation of stroke units is associated with a 2.01% increase in mortality, presenting a paradoxical scenario. This contrasts with a comparatively lower 0.32% increase for patients not admitted to the stroke unit. The complexity deepens when considering individuals aged over 75, revealing a 1.4% increase in mortality for those admitted to stroke units compared to an 0.61% increase for those not admitted to stroke units. These findings emphasise the need for thorough evaluation and targeted interventions to optimise healthcare outcomes in diverse demographic contexts.

6.4.6 Structural determinants

The Italian healthcare system operates under the prominent influence of the devolution principle, which fosters a pronounced decentralisation in healthcare administration. This principle entrusts regions with the responsibility of structuring healthcare services within their territories. As a consequence, regions possess the authority to define the modalities and procedures for delivering healthcare services. This significant decentralisation, coupled with the inherent diversity among the regions, leads to varying approaches in how they manage the stroke network. Each region, guided by its unique demographic, geographical, and healthcare characteristics, tailors its stroke network management to address the specific needs and challenges faced within its borders. This approach results in a diverse landscape of healthcare management strategies for stroke patients across Italy, reflecting the adaptability and flexibility of the healthcare system to accommodate regional variations. Table XX presents data on structural determinants per region.

The regional healthcare system plays a central role in network governance, but marked differences can be observed based on the presence or absence of regional intermediate entities. In regions such as Liguria and Tuscany, the governance of healthcare networks is facilitated by regional intermediaries that oversee the entire regional healthcare system. For example, Liguria has subdivided its regional territory into areas organised sequentially from west to east. The Liguria region relies on A.Li.Sa, established in 2016, with a strategic role in healthcare service governance. A.Li.Sa serves as an organisational tool for planning and integrating various levels of healthcare and healthcare-related activities at the regional level. Similarly, A.Li.Sa plays a crucial intermediary role in the management of the stroke network, capable of interacting with both the regional strategic level and the clinical-operational level represented by the DIAR. It acts as a producer of data for various healthcare aspects, including health planning, financial planning (accounting), procurement and governance.

A similar structure is observed in Tuscany, which in 2015 undergone a reorganisation of the regional healthcare provision through the merger of the twelve Local Health Authorities (*Aziende USL*) into three entities, one for each Health District.

Table XX. Structural determinants of network effectiveness

Structure	Determinant	Lazio	Liguria	Lombardy	Sardinia	Tuscany
	<i>Mode of governance</i>	- Regional Coordination Body - Hub/spoke area coordination	- Region Board - A.Li.Sa - DIARs	- Region - Stroke Coordination Body - Technical Committee	- Regional Network Coordination - Regional Technical Committee	- Regional Committee - Sub-Network Board
	<i>Density</i>	Intense	Moderate (intense intra-company, low inter-company)	Intense	Moderate	Intense (Riverberating)
	<i>Cliques</i>	Between hospital and rehabilitation phases	Among neurology department heads at the moment of discharge	Among physicians	Among hub and corresponding spokes	None
	<i>Communication system</i>	Teleconsultation between hospitals (ADVICE)	Shared patient registry for stroke cases, telemedicine and teleconsultation	Stroke registry, telemedicine	Customary practices, intercompany protocols	Teleconsultation between hospital and territory, teleassistance for patient in post-acute phase
	<i>Organisational model</i>	Drip and ship	Mothership model for thrombectomy	Mothership/drip and ship	Hub and spoke	Mothership/drip and ship
	<i>Organisations' number</i>	Increasing from 2007 to 2022 (29 to 45)	Stable (8 stroke centres)	2022: 90	Increasing from 2006 to 2015, then constant (9)	Increasing from 2014 to 2021 (23)
	<i>Cap to growth</i>	MD 70/2015	MD 70/2015	MD 70/2015	MD 70/2015	MD 70/2015
	<i>Composition</i>	Public hospitals and care facilities	Public hospitals, one IRCCS and a nationally recognised, highly specialised hospital	Public/private hospitals and care facilities	Public/private hospitals	Public hospitals
	<i>Documental formalisation</i>	5 network plans, ICP for the whole network	High, due to geomorphological and population duality	Recent documentation is deemed insufficient	Scarce: no network plan, no regional ICP	High: network plan, annual work plan, annual and semi-annual reports
	<i>Developmental stage</i>	Mature	Mature	Initial due to the 2022 reform	Initial	Intermediate
	<i>Management tenure</i>	Stable until 2022, then moved into the ER	Stable since 2016	Stable but not representative	No formal coordination body is deemed operative	Stable since 2016

By consolidating the Local Health Authorities into three larger entities, Tuscany sought to create a more coordinated and cohesive approach to healthcare management within each Health District. As a consequence, Tuscany has adopted the division into Health Districts as the basis for its stroke network management. The region has concentrated its efforts on organising the stroke network in alignment with these district divisions and has established coordinating entities for each Health District. These intermediate bodies are entrusted with the tasks of planning and overseeing the network implementation and monitoring the proper execution of Integrated Care Pathways. This approach ensures that stroke care and management are adapted to the unique characteristics and requirements of each Health District, thereby facilitating efficient and tailored healthcare services throughout the region.

In contrast, other regions have established specific bodies for stroke management covering the whole regional territory. The Lazio region, for example, has created the CAHS (Hub and Spoke Area Coordination), which are coordinating entities focused on the division between hub and spoke facilities. Each CAHS is established within a hub to oversee the activities of both the hub itself and the corresponding spoke facilities, as defined in the regional network plan. The role of a CAHS is to adapt the content of the regional network plan to the healthcare companies within its jurisdiction, define specific Integrated Care Pathways, identify any issues that require area audits, and promote integration among its members. This approach ensures that stroke care is well-coordinated, further enhancing the effectiveness of the healthcare services provided. Similarly, Lombardy has established a Regional Coordination Body for the stroke network, serving as a link between the entire regional planning level and the organisational and management level of healthcare companies. This entity is responsible for identifying network members, developing structural arrangements and node connectivity, formulating Integrated Care Pathways, and overseeing the control systems.

A different discussion is warranted for Sardinia, which over the years has experienced a series of changes in its governing bodies for stroke care. These changes have evolved from the Cerebral Stroke Organisation Committee in 2008 to the Committee for the Organisation of Integrated Networks (CORI) in 2015 and eventually to the Regional Technical Network Committee and Regional Network Coordination in 2018. This continuous alternation has led to confusion among

network operators who, in the absence of a clear regional framework, often rely on the organisational logic of their respective healthcare companies as their reference point for evaluation. This dynamic highlights the need for consistent and stable governance structures to ensure effective stroke care in the region.

In general, regarding the composition of various entities, two levels have been identified. The first level, which is broader and more focused on planning, typically coincides with the regional level. In this level, the coordinating bodies of the network are primarily composed of clinicians from the network, representatives of the technical bodies, regional representatives, and representatives from patient and citizen associations. In some regions, these entities also involve the local community, for example, through general practitioners and paediatricians (Lombardy, Lazio). Conversely, the more technical bodies are primarily composed of physicians working within the network. At times, questions about representation are raised because these bodies tend to predominantly include the medical (neurological) component, potentially overlooking the roles of nurses, physiotherapists, or internists (Lombardy, Liguria). Similarly, equal representation of hubs and spokes within operational bodies is not always adhered to in practice.

Consistently, the monitoring and control function is entrusted to regional bodies in all the analysed regions. However, the development of network plans can differ among regions. In some cases, the regional body may oversee the creation of the plan, followed by its implementation and supervision by a technical body, which can be consulted during the planning process (as seen in Lazio, Lombardy, and Liguria). Alternatively, the responsibility for plan development may be delegated to the operational body, as is the case in Tuscany for the various Health Districts.

Moreover, it is interesting to highlight the unique approach of these regions in integrating the stroke network into more extensive neuroscience's frameworks. Specifically, Liguria delegates the technical organisation of the network to the DIARs of Neurosciences (collaborating with the DIAR of Emergency and Urgent Care), while Lombardy incorporates the stroke network into the larger network of neurosciences. Both regions recognise the significance of stroke due to its time-critical nature and lasting disabilities but embed it within a broader planning and programming context.

Regarding theoretical approaches, a significant reflection is presented by the Lombardy region starting in 2019. The region undergone a paradigm shift, allowing

a transition from disease-specific networks understood as a clinical-scientific model (*rete di patologia*) to a model that fully supports planning functions, characterised by strong organisational orientation (*rete clinico-assistenziale*). In this model, the involved stakeholders participate in taking charge of the disease with a collaborative approach, contributing to the development of the entire care process. The contribution from the Tuscany region, known for its pioneering healthcare innovations at the national level, is also of significant interest. Tuscany acknowledges the vital role of interconnected relationships among different clinical networks within the region. This recognition has given rise to the concept of a governance network (*network di governance*), or a network of networks, which has the capacity to encompass various regional networks. Essentially, this concept outlines the future challenges in the field of healthcare: On the one hand, facilitating the formation of alliances that enable the development of a network of networks (horizontal integration), and on the other hand, strengthening the connections between these networks and the regional governing level (vertical integration).

Regional networks are at different stages of their evolutionary development. Some can be considered in an initial phase (e.g., Sardinia) characterised by high instability, frequent changes in governance, lack of communication systems, and limited formalisation of regional procedures. These networks heavily rely on informal collaboration, where individual proactive professionals play a more significant role than coherent regional protocols. Other regions are in an intermediate stage (e.g., Tuscany) where they acknowledge their achievements but also recognise substantial room for improvement (e.g., developing new network indicators, training emergency volunteer personnel). Lastly, some networks are in a mature phase (e.g., Lazio, Liguria) where validated and shared procedures among network members, a culture of collaboration, and well-established practices predominate.

The evolutionary stage goes hand in hand with the formalisation of the network. A clear definition of network nodes, communication procedures, stable governance and the frequency of interaction among members paves the way for advancing to a higher stage. However, networks that were considered to be in more advanced stages could regress if the innovations introduced at regional level damage trust among members and modify the network's prior functionality. This scenario seems to be occurring in Lombardy, where alterations to the regional operational model

not uniformly accepted across various network levels, have led to the perception that the network needs to start building an ex-novo organisation based on different assumptions than the previous model. This underscores the fundamental significance of fostering collaboration and active participation among the diverse healthcare professionals engaged in the care continuum, extending to various healthcare settings (hub/spokes, hospital/local care). The potential risk lies in the introduction of modifications driven by a misdirected perspective of the healthcare landscape. Such alterations could have the unintended consequence of eroding the trust that forms the bedrock of effective healthcare networks, damaging the essential relationships among healthcare providers, administrators, and patients. In a broader context, the success and resilience of these healthcare networks hinge on their ability to create an inclusive and comprehensive approach, one that recognises the multifaceted nature of healthcare and integrates the expertise, perspectives, and experiences of all participants. Similarly, changes in governance appear to yield similar effects in terms of trust and collaboration. The case of Lazio, where the management of the network was initially within the regional context but was later shifted to the emergency and urgency department, highlights how the exclusion of an entity considered a neutral mediator can lead to discontent and internal conflicts. The organisational choice, in which, given the time-sensitive nature of the condition, management is entrusted to the emergency and urgency department, is perceived by network members as an excessive focus on the acute phase of the condition. This approach may seem to disregard the patient-centred principle that emphasises the need for continuous care throughout the entire treatment process. Such governance shifts can lead to a fragmentation of the healthcare network and erode trust, underscoring the importance of carefully considering governance decisions to maintain the network's cohesion and effectiveness.

The developmental stage is then related to the perceived density. More mature networks are associated with intense and reverberating density, while poorly developed ones have only modest density. A noteworthy case is Liguria, which perceives a higher density at the intra-company level compared to the inter-company level despite being described as a mature network.

The process of formalisation is primarily reflected in the presence of a network plan capable of detailing actions, responsibilities, timelines, and network

composition. This is notably evident in regions where the network has evolved to an intermediate or mature stage of development. In such regions, network plans are thoughtfully designed with a territorial perspective and are consistently updated over time. Conversely, in regions where the network plan is recently introduced or awaits formal approval from the regional authorities, there are more pronounced structural challenges (including communication issues among network nodes, technological disparities across network components, and variations in service delivery times that add to the workload of central hubs), as well as interpersonal hurdles (representation in governing bodies, the absence of regional protocols, and a greater degree of informality in relationships within the network).

The process of formalisation extends to the chosen organisational model as well. At the national level, the hub and spoke model is mandated, though individual regions have the discretion to further tailor it as needed. In general, there's a prevalent adoption of both the mothership model (typically associated with urban areas and timely ambulance travel) and the drip and ship model. Nevertheless, these models, while derived from shared insights across various medical and non-medical professions, are beginning to raise concerns among clinicians. These concerns are primarily rooted in ethical considerations (the decision to treat patients in spoke locations even when the hub is reachable within 30 minutes to minimise potential disabilities) and practical daily operations (an excessive focus on the stroke hub, which may also serve as a hub for other medical conditions sharing common equipment like CT scans, leading to extended response times compared to spokes).

Regarding communication, regions tend to establish protocols and teleconsultation platforms, showcasing their effectiveness in various phases of stroke care. These platforms are valuable both in the pre-hospital phase, enabling the transmission of essential data to pre-alerting the receiving hospital, and in the acute phase. In the latter, they empower spoke facilities to seek guidance from hub centres, facilitating data and image exchange or guidance in performing procedures. This is especially valuable in more isolated areas where rapid intervention in spokes would enhance treatment effectiveness. Additionally, telecommunications play a vital role in the follow-up phase, allowing for telephone-based communication between hospitals and patients to assess residual disabilities, an essential aspect for the innovation of the evaluation process (Tuscany).

Regardless of the level of network maturity and formalisation, there is a prevalent use of spontaneous and recurrent interpersonal relationships among a subgroup of network participants. These connections are primarily formed among clinicians in the acute phase and between hub facilities and their corresponding spokes (Liguria, Sardinia, Lombardy), but can also extend to interactions with territorial rehabilitation entities (Lazio). However, well-established formalisation over time and an equitable, participatory governance structure appear to dissolve informal relationships (Tuscany).

The number of companies involved in the network does not seem to play a significant role and there is no immediate need to impose a maximum limit on the number of participating companies, considering a potential decrease in performance. What is of greater importance for the analysis is the specific type of entities engaged in the network. While all regions acknowledge the vital role of the local context in both the pre-event (prevention and emergency) and post-event (rehabilitation and long-term care) phases, the network documents primarily focus on hospital-based members. Primarily, these networks include public hospitals (Sardinia, Tuscany, Liguria), but they may also involve private hospitals (Lombardy) and care facilities (Lombardy, Lazio). The connection with the territory is a key theme perceived by professionals from various perspectives. Firstly, in terms of communication, involving different professionals leads to different communication methods, operational procedures, and priorities. Furthermore, the post-acute territorial phase poses a problem during discharge, as rehabilitative bed capacities are inadequate in almost all territorial areas. This, in turn, results in longer hospitalisations during the acute phase, which not only significantly increases hospital costs but also frequently congests the limited beds in Stroke Units. In more affected healthcare settings, this can lead to the inability to treat patients in Stroke Units, which are associated with better levels of effectiveness and improved outcomes in terms of disability.

In summary, the structural analysis of regional stroke networks in Italy reveals a diverse landscape characterised by varying degrees of maturity, formalisation, and organisational models. While the presence of interprofessional relationships and the composition of the networks play significant roles, it is the level of formalisation and governance that seem to influence their effectiveness the most. The choice of

organisational models, such as the hub-and-spoke system, introduces ethical and practical considerations that can impact patient care. The involvement of various healthcare entities, both public and private, and their connection with the territory are vital but present communication and logistical challenges. Eventually, the limited availability of post-acute rehabilitation facilities leads to longer acute hospital stays and potential overcrowding in Stroke Units, affecting the quality of care. The continuous evolution of these networks indicates the need for a balance between formalisation and flexibility, recognising the importance of trust, collaboration, and adaptability among network members. As different regions continue to refine their approaches, there is an opportunity to learn from one another's experiences and develop a best practice model for networks management across Italy.

6.4.7 Context determinants

The analysis then delves into the discussion of contextual determinants, represented in Table XXI. Contextual factors are crucial in assessing network effectiveness, beginning with resource allocation. In this analysis, the focus was not primarily on the quantity of resources at the network's disposal but rather on the political commitment to promote the network and the network's capacity to meet the technical requirements outlined in the MD 70/2015. In this regard, regions show variability in their willingness to allocate dedicated funding to support the stroke network, with some regions formalising it (Lazio) while others not allocating such funding (Sardinia). On the other hand, most regions comply with the provisions of MD 70/2015, with the exception of Lombardy, which is currently in the process of adaptation. Even though the analysis is not primarily focused on quantitative aspects, a recurring topic in both planning and discussions with professionals pertains to the connection between the acute hospital phase and community-based rehabilitation. This issue highlights not only the collaborative challenges stemming from the diverse professions of the involved healthcare providers but also a significant shortage of community-based beds. It seems that local resources are notably insufficient and ill-equipped to receive patients ready for rehabilitation, leading to discharge delays and increased hospital costs. Therefore, it seems desirable that network programs go beyond emphasising the importance of collaboration and discharge procedures. Instead, it would be advisable to make a cognitive effort and truly implement a patient-centred network that extends beyond the acute phase through the inclusion of the entities responsible for community-based rehabilitation among the members.

At the same time, when analysing the context determinants, it is crucial to explore past collaborative efforts. The MD 70/2015 introduces a nationwide framework for managing time-dependent pathologies, unifying diverse regional practices that had previously developed independently across the country. Nevertheless, the national provisions incorporated some pre-existing realities. All regions point out that before 2015 there was already some form of collaboration in place, though it varied in its level of formalisation.

Table XXI. Context determinants of network effectiveness

Context	Determinant	Lazio	Liguria	Lombardy	Sardinia	Tuscany
	<i>Resource munificence</i>	Quantitative technological requirements explicitly specified for each node	Undersized post-rehabilitation services	Ad hoc funding and requirements fulfilment	Bed capacity significantly undersized (both SU and rehab)	Resource provisions tailored to the pre- and in-hospital phases, as well as for facilities performing thrombolysis or thrombectomy
	<i>Past collaboration</i>	Informal collaboration before the implementation of the network deemed positive	Extensive benefits recognised to past collaboration, mainly among neurologists	Past collaboration deemed not relevant	The network is currently in an informal collaborative phase	Pre-existing collaboration enhanced by MD 70/2015
	<i>Flexibility</i>	Covid network, SU repurposed for Covid, plan for time-dependent diseases	Enhancement of A.Li.Sa.'s functions in response to healthcare emergencies	Plan for the management of patients with time dependent diseases, novel centralisation criteria	Management of territorial emergency and secondary transport	Procedural changes for time dependent diseases, protected stroke code
	<i>Stakeholders' needs</i>	Population needs, epidemiological analysis, and psychological support for acute patients	Highly prioritised given the geographical and population differences within the region	Implementation of consultation tables	Initiatives at organisational level	Highly prioritised during the initial configuration of the network and constantly monitored
	<i>Stakeholders' involvement and accountability</i>	Especially in prevention (Participation Act) and data disclosure (PREValE)	Regional campaigns to promote stroke prevention, in alignment with ALICE	Prevention initiatives aimed at mitigating risk factors	Prevention and disclosure methods are not provided	Prevention and intense follow up post-acute. Involvement of administrators and policymakers

However, while past collaboration is typically seen in a positive light, it is rarely considered irrelevant for the purpose of new collaborative efforts. Some regions consider past collaboration to be significant, suggesting that it played a role in developing shared competencies and experiences that were useful for refining clinical practices (Lazio and Liguria), others emphasise that the MD 70 succeeded in strengthening the existing configuration (Tuscany). Nonetheless, past collaboration can also be viewed as not relevant since the regulatory framework adopted different principles from those previously in place (Lombardy).

Furthermore, analysing the needs of stakeholders serves a dual purpose, as it not only facilitates the appropriate allocation of resources to the network but also exerts a formative influence on the network's configuration from its very inception. This strategic approach enables the establishment of regional networks based on a set of well-considered criteria, such as morpho-geological factors and considerations tied to the clinical characteristics and demographic composition of the local population. A notable example of this approach can be observed in the regions of Liguria and Tuscany. In these regions, a proactive and comprehensive preliminary analysis was initiated at the regional level. This initial step was a key component in the formation of a territorial division of healthcare facilities. By taking into account the geographical features of the area, as well as the age distribution of the population, these regions were able to design a network that is finely tuned to meet the unique needs of their respective communities. This methodology not only optimises the allocation of resources but also ensures that the network is well-suited to address the specific health-related challenges and demands of the regions it serves.

Similarly, prevention plays a pivotal role in stroke care. It is essential not only to promote active listening by healthcare professionals but also to invest in encouraging the population to take an active role in reducing risk factors. In this context, the easy and immediate sharing of risk factors leading to the condition as well as education about key factors during the onset of symptoms play a crucial role. Recognising these factors clearly empowers patients to promptly alert emergency services, thus reducing the primary delay factor in stroke management. The dissemination of informative campaigns, in addition to having a significant impact on outcomes, is also attributed to an increased recognition of the value of the network by the population and therefore contributes to overcoming the prevailing silo perspective with which healthcare is still perceived.

The analysis of the population's needs is often incorporated into network plans in the form of an epidemiological context, where the burden of ischemic and haemorrhagic pathologies is calculated in relation to the population. However, it is important to note that an assessment of patient satisfaction is typically absent from these strategic plans. A network should be structured around the patient's needs, which extend beyond clinical factors. Therefore, while contextual analyses aid in the allocation of technological and human resources, it is advisable to directly gather insights into patient needs from the primary source of information: the patients themselves. Incorporating patient satisfaction into network planning not only ensures a more patient-centred approach but also provides valuable feedback on the effectiveness of healthcare services. This patient-centric approach can lead to enhancements in the quality of care and the overall patient experience within the healthcare network. It underscores the significance of attentively listening to and comprehending the viewpoints and preferences of the individuals who are at the core of the healthcare system. Some regions have extended the national-level performance analysis by including additional indicators specifically tailored to regional needs (Lazio and Tuscany). However, these indicators still primarily focus on managerial aspects without delving into the more personal aspects related to patient satisfaction. Nevertheless, interesting initiatives involve the inclusion of outcome indicators among the mandate objectives for general directors or the bottom-up implementation of new indicators for diagnostic follow-up.

Moreover, it is noteworthy that stroke is a highly disabling condition, yet the primary measure of treatment effectiveness still relies on mortality rates. Recent innovations in assessment are indeed moving towards the development of procedures and indicators capable of estimating the degree of residual disability in patients as a metric for treatment effectiveness (Tuscany). Another bottom-up initiative, originating within individual healthcare organisations but with the potential for network-wide application, involves the development of a mobile application aimed at providing essential information to stroke patients (Sardinia). Recognising that stroke is a disruptive medical condition that often leaves patients feeling disoriented and overwhelmed, this approach seeks to reinforce the informative role of healthcare professionals. By offering a comprehensive source of educational content and support, it empowers stroke patients to broaden their understanding of their condition and its management autonomously. Furthermore,

its extended development to include a feedback mechanism from the patient, allows for a genuine comprehension of their needs and expectations. By creating a two-way communication channel, it not only serves as an informative tool but also a platform for patients to actively engage in their care. In a healthcare landscape increasingly characterised by the patient-centred approach, this application not only responds to the immediate needs of stroke survivors but also represents a pivotal shift in the delivery of medical information since it effectively leverages technology to bridge the gap between patients and healthcare providers, facilitating greater patient engagement and autonomy in managing their health.

Lastly, the contextual analysis cannot overlook the network's ability to promptly adapt to adverse external events. Therefore, there has been an investigation into the network's inclination to implement measures suitable for addressing the Covid-19 pandemic. Various common measures have been implemented to adapt to the shocking event, including the establishment of a dedicated plan for managing time-dependent pathologies during pandemic times. These plans included creating dedicated pathways for Covid-19-positive patients and emphasising the emergency nature of the condition. Regulations were also put in place for managing emergency care outside of hospitals and handling secondary transport. Some regions opted for new centralisation criteria (Lombardy) while others reinforced the governing role of regional coordination bodies (Liguria). However, what became evident once again was a lack of effective communication with the population. Many patients were arriving at the emergency department with significant delays from the onset of symptoms. The primary cause was that patients tended to stay at home out of fear and would only call 118 when their stroke symptoms worsened. Procedures were then implemented to educate the population about the importance of promptly activating the local emergency response system when experiencing symptoms. Simultaneously, efforts were made to reassure patients by creating protected stroke codes to enhance the sense of safety for citizens (Tuscany).

In summary, various regions have taken proactive measures to enhance the network's effectiveness in addressing the challenges posed by stroke, both in terms of prevention and acute care. Moreover, the recognition of the need to adapt to external crises, such as the Covid-19 pandemic, highlights the importance of a network's flexibility and its capacity to respond to unforeseen challenges. The

evolving landscape of stroke care within regional networks not only emphasises the importance of collaborative, patient-centred approaches but also the need for adaptability and innovative solutions to meet the unique needs of patients and the communities they serve. By addressing these challenges and building upon the successful initiatives discussed, regional healthcare networks can continue to improve their ability to manage and prevent strokes effectively, ultimately leading to better outcomes and a higher quality of life for those affected by this critical medical condition.

6.4.8 Process determinants

The analysis of process determinants underscores the importance of intangible aspects of managerial oversight, concisely represented in Table XXII.

Managing a network entails a multifaceted approach that extends beyond the conventional skills required for overseeing individual entities. In addition to the essential managerial competencies, it necessitates a unique set of skills focused on fostering effective collaboration. This means not only understanding how to lead a single entity but also how to facilitate cohesive teamwork within a broader network of interconnected organisations. To address this, it is crucial to offer comprehensive training and development opportunities to the managerial personnel involved in network management. This training should encompass conflict resolution strategies to handle potential internal disputes, proactive measures for conflict prevention, the cultivation of integrated goals that align with the network's mission, and the establishment of efficient coordination mechanisms for all the constituent activities. Ultimately, the end goal is to ensure the seamless delivery of services to the patient, which often involves various entities working together harmoniously. While the importance of these competencies is well-acknowledged, it is noteworthy that the current training initiatives predominantly focus on clinical aspects, potentially leaving a gap in the development of these essential collaborative skills. Addressing this gap through tailored training programs can significantly enhance the effectiveness of network management and the quality of care provided to patients.

During the early phases of network establishment, one recurring concern revolves around raising awareness among both medical and non-medical emergency personnel regarding the critical nature of stroke conditions (Lazio, Lombardy, Sardinia). The complexity of stroke management necessitates the involvement of professionals from diverse backgrounds, each bringing their unique skills and expertise to the table. To ensure a cohesive approach, it becomes imperative to organise educational initiatives. These initiatives focus on key aspects of stroke management, such as the crucial need for timely intervention, the significance of pre-alerting the receiving hospital to prepare for incoming stroke cases, the accurate assignment of severity codes to streamline patient care, and the importance of adopting a multi-professional approach in delivering the best care to stroke patients.

Table XXII. Process determinants of network effectiveness

Process	Determinant	Lazio	Liguria	Lombardy	Sardinia	Tuscany
	<i>Training activities</i>	Raising awareness among medical staff about stroke also through external collaborations (ISO, Angels)	Recognised as right and responsibility for every professional, need for advanced managerial skills	Raising awareness among medical staff about stroke	Raising awareness among medical staff about stroke, affected by the absence of personnel policies	Mandatory for accreditation, involvement of policymakers and development of technical roles
	<i>Perceived level of trust</i>	Ambivalent: High within partners Low toward the governance	Ambivalent: High within acute care (shared educational backgrounds) Low within the whole network	Ambivalent: High within partners Low toward the governance	High across settings	High within the whole network
	<i>Internal legitimacy</i>	High, (sense of contributing to the welfare of both patients and the healthcare system)	High	Low due to underrepresentation in governance	High	High (enhanced by the Angles initiative)
	<i>External legitimacy</i>	Low (single hospital's merit)	High (Partnerships with scientific organisations and ALICE)	Low (single hospital's merit)	Low (difficulty in understanding stroke)	High (explicitly outlined in plans)
	<i>Perceived power imbalance</i>	Imbalance inherent to the nature of the hub and spoke model	Imbalance inherent to the nature of the hub and spoke model	Imbalance inherent to disparities within the governance	Imbalance inherent to resources availability	None
	<i>Activation</i>	None	None	None	None	None
	<i>Facilitation and mediation</i>	None	None	None	Counselling service at organisational level	Not necessary
	<i>Goal assessment</i>	Concerns about future assessment due to changes in governance	Conducted at regional level (A.Li.Sa)	Low level of interaction	Personnel rely on individuals' contractual goals	Parity-based network, high involvement of different professions at different levels

Recognising that the stakeholders in this network may have different levels of experience and understanding, these training efforts are designed to not only inform but also create a shared foundation of knowledge and best practices.

The importance of training is emphasised in all network plans; nonetheless, certain considerations prove to be particularly effective. For instance, the Tuscany region has made it mandatory to implement an ongoing education system as a prerequisite for accrediting facilities and at the same time emphasises the need to involve administrators and policymakers in raising awareness about stroke. Similarly, although training typically falls within the purview of the regional authority, Tuscany has clearly defined roles and responsibilities for training at various levels, involving a Regional technical-scientific commission, a Health District commission, and site-specific representatives. Additionally, delivering training through agreements with scientific organisations (such as the Italian Stroke Organisation) or participating in international initiatives (e.g., Angels) proves to be beneficial (Lazio).

An essential aspect when analysing internal processes within networks is the development of a foundation of trust among network members, considered a crucial mechanism to cope with uncertainty, which typically affects networks and serving as a catalyst for effective collaboration and relationship-building. Interestingly, the nature of trust in these network contexts varies significantly. Trust seems to develop not only among the partners in the acute phase (Liguria, Tuscany, Lombardy) but also between professionals operating within the hospital setting and those working in the community (Lazio, Sardinia). Trust is described as high in highly formalised contexts with low levels of informal relationships (Tuscany), but also, conversely, in nearly entirely informal contexts (Sardinia). However, a clear ambivalence regarding trust emerges when network members question the true representativeness of the governing bodies or when they lack direct involvement with decision-making structures (Lazio, Liguria, and Lombardy). In these instances, trust is considered to be high, especially during the acute phase where collaboration is pronounced between hub and spoke centres, and when professionals share a common educational background (stemming from the same university programs). However, this level of trust tends to wane when considering the network as a whole.

External legitimacy, defined as the perception of the network's value by users and stakeholders, appears to be closely tied to the engagement initiatives

undertaken by the network. In contexts where significant efforts have been invested in preventive measures, including public awareness campaigns about the condition directed towards the general public (Liguria), and where follow-up initiatives for patients who have passed the acute phase are actively pursued (Tuscany), external legitimacy is considered positive. Effective communication by the network appears to reduce the tendency of users to evaluate healthcare based on individual facilities, a pattern more noticeable in contexts with low external legitimacy (Lazio, Lombardy) and appears to diminish the inclination to perceive stroke as foreign context due to the utilisation of English words (Sardinia). In these cases, patients tend to perceive the quality of care received from the individual hospital, and the transfer between hub and spoke centres merely a "transfer to a better hospital," often without a full awareness of the need for hospitals to equip themselves with more specialised technologies. These observations highlight the role of effective communication and engagement efforts in shaping the perception of healthcare networks and the importance of public awareness campaigns and patient follow-up initiatives in strengthening external legitimacy. Conversely, there seems to be a relationship between participation in goal assessment and internal legitimacy. In contexts where participation is considered satisfactory, there is also a positive perception in terms of internal legitimacy, defined as participants' perception that engaging in the network is valuable (evident in regions like Lazio, Liguria, and Tuscany). On the contrary, when the network's goal assessment process lacks participation and engagement, the perceived value that members contribute to the network diminishes. Another aspect to analyse involves goal assessment procedures, which vary within healthcare networks. Goal assessment can be managed by regional bodies (A.Li.Sa, Liguria) or by the network itself through its governing entities (Lazio, Tuscany, Lombardy). On the other hand, in contexts where governance is not sufficiently developed or stable, professionals may refer to personal objectives outlined in their employment contracts with the individual facilities that have hired them (Sardinia). Moreover, power imbalances are often attributed to the inherent role of disparities between hub and spoke centres (Lazio, Liguria) since hubs typically deliver specialised second-level care, while spokes provide first-level care. However, the regions do not have a mechanism in place for staff rotation between hub and spoke centres, deemed to enhance the perceived value, and facilitate the exchange of knowledge. Conversely, in more collaborative

and participatory networks, where a culture of equitable participation prevails, and the traditional hierarchical hub-and-spoke model is transcended, power imbalances are not perceived as an issue and do not pose challenges for network management (Tuscany).

Regarding managerial functions, the activation process, which involves recruiting strategic actors to include in the network, does not seem to be actively pursued in the regions. Activation should play a crucial role in stroke networks, not only due to the multi-phase care pathway involving hospital and community-based actors but also because of the growing importance of community care at the national level (MD 77/2022). However, all regions highlight the challenge of transitioning patients from the hospital phase (acute or rehabilitative) to community-based rehabilitation (whether in dedicated facilities or at home). Criticisms arise primarily due to the lack of available rehabilitation beds (Liguria, Sardinia, Tuscany). This bed shortage, in turn, prolongs acute care stays, leading to the congestion of stroke units and increased costs for hospitals. The challenges also stem from theoretical concerns, such as the concentration of network governance in emergency and urgency departments, which primarily handle the initial phase of the care process (Lazio).

Lastly, the mediation function, understood as the managerial activity aimed at preventing and managing network conflicts, is not structurally provided for by any of the regions. Conflicts are managed on a personal basis by the individual professionals involved. Hence, the responsibility for conflict prevention and resolution predominantly falls on the shoulders of the individual professionals. This approach highlights the decentralised nature of conflict management, where the frontline healthcare workers, administrators, and professionals involved in the network take on the task of addressing and resolving conflicts as they arise. Nonetheless, the structuring of the network with a parity perspective allows its members not to perceive the real need for a specifically designated conflict management function (Tuscany). Conversely, disparities in governance drive the demand for a regional-level conflict management function (Lazio). Lastly, it is worth noting that while the network context does not inherently fulfil the role of a mediator function, this role can be assumed by individual healthcare facilities through services such as psychological counselling offered to staff and organisational assessments of perceived stress levels (Sardinia).

6.5 Key insights into outcome indicators

The analysis of networks, even when approached from a managerial perspective, cannot disregard the examination of outcomes, typically expressed in medical terms. At the national level, the two main databases (PNE and NSG) provide data on the two types of strokes (ischemic and haemorrhagic), primarily focusing on admission volumes and outcomes, expressed in terms of mortality and hospital readmissions. Although these indicators contribute to providing a general overview of the impact of the disease and serve as a useful foundation for medical considerations, from a managerial standpoint, they offer very few useful insights for managing a complex entity such as the network.

Mortality alone, while being a good medical parameter, appears to be less relevant if not adjusted for the severity of the condition. This is particularly evident in the analysis of the use of stroke units which, to date, have still no specific coding system. De facto, they are typically reconstructed as proxies using neurology and intensive care codes. Therefore, it is not possible to map stroke units directly from national data. Medical evidence highlights how admission to a stroke unit results in medical benefits for the patient, mainly related to the promptness of care and the specific focus of healthcare professionals' training, as well as their diverse expertise across various medical disciplines (multidisciplinary teams). Data on stroke unit utilisation are not provided in PNE or NSG but rather they represent one of the main suggestions proposed by the neurology experts consulted by Agenas. Analysing the effects of mortality on admissions to stroke units provides a utilisation metric independent of the severity of the condition. Similarly, analysing mortality in stroke units for patients over 75 presents the same challenges. Instead, it would be advisable to examine the regional utilisation rate of stroke units and compare the length of stay in a stroke unit to the length of stay in other hospital areas.

As often happens in daily practice, solutions to the problem have been identified by regions with a bottom-up approach. Interesting solutions have been proposed by Lazio and Tuscany. Both regions involve the formalisation of supplementary indicators in addition to the national ones, organised according to the stages of the care process. Lazio has included a set of indicators within the 2020 network plan, which are used by the Regional Coordination to carry out auditing activities and develop improvement plans. Furthermore, they have developed a regional

monitoring system (Pre.Va.Le) that is regularly updated and accessible, providing data on the stroke pathology.

Similarly, Tuscany has gradually introduced additional specific indicators for the stroke network over time. Significant work has also been carried out in Tuscany by the *Laboratorio Mes* of the Scuola Sant'Anna, which identifies additional indicators for stroke monitoring and works on integrating indicators for different stages of care. The developed indicators not only pertain to the clinical aspects (e.g., definition of severity with the NIHSS scale, definition of disability with the Rankin Scale) but also investigate fundamental elements for the proper management of the network. Some critical indicators include monitoring times, as defined by the literature: Time from symptom onset to 118 call, door-to-needle, door-to-groin, door-in-door-out, average and median waiting time between admission to the Emergency Department and CT scan execution, to name a few.

In a similar vein, the network should benefit from systemic process indicators focusing on the relationships between nodes. To achieve this, it is essential to provide comprehensive information on primary transports for stroke patients to different network nodes, secondary transfers both from the emergency department to SU II and from SU I to SU II or by tracking the number of patients within the stroke network who are transferred following teleconsultation. These indicators serve not only to map the network's regional activity, ensuring its wide coverage but also to make assessments regarding the appropriate assignment of network levels (SU I/SU II).

Furthermore, it is worth noting that, although stroke represents the third leading cause of death, it still remains the primary cause of permanent disability. Similarly, out of 122,658 hospital admissions in Italy in 2021, only 16,879 resulted in in-hospital deaths. This means that 86% of patients are discharged and subsequently transition to a different care setting. Clinical analysis alone is therefore insufficient, and there is a need to expand national indicators, for example, by including the place of discharge (as suggested by Agenas commission on stroke care) or residual disability at the time of discharge. Such data would provide valuable support for the managerial planning phase, as they provide evidence of the shortage of hospital beds and resources allocated to non-hospital care, as emphasised by all interviewed professionals. The post-hospital phase indicators are also proposed by the regions of Lazio and Tuscany, which investigate the following: functional assessment at

discharge to rehabilitation settings, percentage of patients discharged with a diagnosis of stroke who return to work within 1 year, adherence to treatment after discharge, modified rankin scale at 30 and 90 days. These indicators provide valuable insights into the outcomes and follow-up care of stroke patients beyond their hospital stay.

In conclusion, the analysis of stroke networks and their performance goes beyond mere clinical aspects and calls for a comprehensive approach that considers various dimensions. Some forward-thinking regions have taken a proactive approach by developing supplementary indicators that focus on different aspects of stroke care, from promptness to functional outcomes and adherence to treatment. These indicators not only improve the evaluation of stroke network performance but also aid in the allocation of resources and level of care within the network. Therefore, a holistic and multi-dimensional assessment, is essential for enhancing the management and effectiveness of stroke networks on a national scale.

6.6 Discussion

The evolution of networks is a dynamic process that can be envisioned as a journey from an initial enclave stage to a more integrated model referred to as a managed care network³⁷⁸. The progression from an enclave to a managed care network signifies an evolutionary path that aligns with the growing formalisation of relationships³⁷⁹. In stroke care, the transition from an enclave situation to a managed one, therefore, necessitates a series of *incremental* formalisations. It is possible to outline a series of sequential phases in the implementation and evolution of time-dependent networks, as exemplified by Table XXIII. The first step involves identifying the primary care location and conducting a contextual analysis. Subsequently, a selection of units takes place, and their mapping across the region is carried out to gather data on their quantity and distribution throughout the regional territory.

Table XXIII. Incremental formalisation in analysed cases

Stroke network evolution	Lazio	Lombardy	Tuscany	Sardinia	Incremental formalisation
Stroke unit network	553/1999	462/2002	53/2008	51-9/2005	Identification of the units
SU as dedicated area for stroke	144/2002	462/2002	91/2014	none	Recognition of the value
Stroke ICP	420/2007	10068/2008	1186/2014	none	ICP
Hub and spoke model	267/2007	10068/2008	1380/2016	38-12/2015	Defining the model of organisation
List of hub and spokes	420/2007	7473/2022	1380/2016	38-12/2015	Detailed configuration
Network plan	U0075/2010	7473/2022	1380/2016	none	Network plan

³⁷⁸ PERRI, P., GOODWIN, N., PECK, E. AND FREEMAN, T., 2016. *Managing networks of twenty-first century organisations*. Op. cit.

³⁷⁹ LEGA, F., 2003. *Gruppi e reti aziendali in sanità: strategia e gestione*. Milano, Egea.

This process leads to the definition of units, which are the individual entities authorised to provide treatments. Within the same territory, units start to collaborate within each other establishing informal relationships built upon trust, reputation, and mutual respect³⁸⁰. These relationships are then recognised at a regulatory level through the implementation of a primitive set of nodes linked by semi-structured relationships. Essentially, this creates the condition where the unit represents the preferred location in terms of expertise and resources to manage time-dependent emergencies. As collaboration evolves, it moves toward a more formal agreement. The networking of units inevitably involves the formalisation of the clinical protocol for the development of the care process. The systematic structuring of actions to be taken must first and foremost follow a clinical approach (ICP) and then develop into a network management model. Integrated Care Pathway is a healthcare tool employed to standardise and enhance the care process for patients through the implementation of a structured, evidence-based approach to patient care. It delineates the crucial steps, interventions, and timing that healthcare providers should adhere to throughout each phase of a patient's care path.

Based on clinical evidence, the following step is to develop the organisational model that supports healthcare professionals in delivering care. This involves identifying the suitable organisational model (e.g., hub and spoke, pole and satellite) and defining the roles and responsibilities of the various network nodes. Technical and structural requirements, along with resource allocation, are also determined. Responsibilities are established based on the severity of the condition (e.g., division into DEA I/II or SU I/II). Only after this process, the facilities that will be integrated into the network are selected. In essence, the reference theoretical model is detailed based on regional needs, and network members (hospital facilities) are subsequently identified through a joint strategic (organisational model) and operational (pre-existing mapping of SU) decision-making process.

Subsequently, or sometimes concurrently with the development of the organisational framework, the formalisation process continues through the systematisation of the network. This leads to the drafting of the network plan, a strategic document that provides a comprehensive overview of the structure, goals, and operational details of a healthcare network.

³⁸⁰ LEUTZ W. 1999. *Five laws for integrating medical and social services: lessons from the United States and the United Kingdom*. The Milbank Quarterly, 77(1): 77-110

Through the evolutionary process experienced by the regions, it is possible to identify clear sequential phases that allow for a transition from an enclave to a managed network concept. This transition is realised through a greater formalisation of relationships, taking into consideration the reference context in which the clinical component necessarily precedes the managerial one.

Proposition 1: In time dependent networks, formalisation is incremental and is represented by sequential phases.

The described phases entail a progressive increase in the formalisation of the network. However, the extent of formalisation has distinct effects on the effectiveness of the network³⁸¹. Hence, the absence of a sequential approach in formalisation leads to the emergence of diverse management methods. The case of Sardinia provides an intriguing counterpoint to the typical path of network formalisation since, in 2015 (when MD 70 was introduced), still lacked a formally established network. At that time, there was only a basic arrangement of healthcare units across the regional landscape, with no formal documents or protocols in place. The sudden imposition of a configuration without the previously mentioned sequential process resulted in a hasty implementation. To date, Sardinia lacks a network plan and a stable governance structure. The relationships between hub and spoke are defined by the programmatic document of the hospital network, and the implementing protocols are developed by the individual organisations within the network. However, despite these challenges, the analysis of key effectiveness indicators indicates performance on par with the top regions in Italy. It is worth noting the rationale for selecting the regions analysed, which involved a literal replication across regions with the best performance based on the data provided by Agenas.

Sardinia has been forced to accelerate the process by the ministerial decree 2015, as a result formalisation exists in the documents, but management relies on collaborative informal agreements among structures, still leading to high results in terms of treatments provided and mortality. Sardinia's ability to adapt and perform well without a formal network plan suggests that the flexibility and adaptability of

³⁸¹ CRISTOFOLI, D. AND MARKOVIC, J., 2016. *How to make public networks really work: A qualitative comparative analysis*. Public Administration, 94(1), pp.89-110.

the healthcare network might be just as crucial as formalisation. This is explained by the emergence of a different management approach. The absence of a sequential process leads to a management by feedback, carried out through mutual adjustments within the organisations and exercised through a personal mode³⁸². In this context, trust and informal collaboration gain greater significance. However, while Sardinia's informal approach has shown success in the short term, there may be concerns about the sustainability and long-term vision of such an approach since effective healthcare management often requires strategic planning and long-term goals.

Proposition 2: If the route of incremental formalisation is not adhered to, the process is halted, and alternative management approaches are implemented.

Evaluating effectiveness within healthcare contexts encompasses a multifaceted approach³⁸³. As described during the analysis, effectiveness takes on various meanings and can be categorised differently depending on the field or discipline under consideration. In this context, a tripartite meaning of effectiveness has been identified: clinical, internal, and external. Within the stroke network context, awareness of these three meanings of effectiveness is gradually adopted over time. Each meaning leads to innovations in terms of collaboration characteristics (determinants of effectiveness) and their corresponding evaluation metrics (outcomes).

Firstly, clinical effectiveness is defined as the capacity of an intervention to exert a positive impact on health. In other words, it refers to the extent to which improvements in health that are now possible are actually attained³⁸⁴. Clinical effectiveness, therefore, represents the ultimate aim of effective healthcare systems, that is to deliver health care adherent to an evidence base and resulting in improved

³⁸² FADDA, N. AND ROTONDO, F., 2022. *What combinations of conditions lead to high performance of governance networks? A fuzzy set qualitative comparative analysis of 12 Sardinian tourist networks*. International Public Management Journal, 25(4), pp.517-543

³⁸³ CAMERON, K.S. 1986. *Effectiveness As Paradox: Consensus and Conflict in Conceptions of Organisational Effectiveness*. Management Science 32, no. 5, p:539-53; AXELSSON L, ENGSTRÖM AK. 2001. *The concept of effectiveness--a blind alley? A study of different interpretations in a Swedish county council*. The International Journal of Health Planning and Management. 16(1):61-71.; ROSEN, R. 2000. *Applying research to healthcare policy and practice: medical and managerial views on effectiveness and the role of research*. Journal of Health Service Research and Policy, Vol. 5 No. 2, pp. 103-8

³⁸⁴ DONABEDIAN, A., 2003. *An Introduction to Quality Assurance in Health Care*. New York, Oxford University Press.

health outcomes for individuals and communities, based on needs³⁸⁵. Consequently, clinical effectiveness was the first dimension to be considered when addressing the topic of networks, both in terms of determinants (i.e., network characteristics and requirements in order to produce positive outcomes for patients) and in terms of the indicators adopted (to evaluate the provision of care).

In order to provide a service that has a positive impact on health, time-dependent networks began by creating structural conditions to enable the network to function. This initial step involved the selection of an organisational model, the establishment of a governance system within the network, and the implementation of communication systems and protocols. These elements, referred to in the literature as structural components³⁸⁶, laid the foundation for the service, ensuring the provision of appropriate care for stroke emergencies. This is corroborated by the documentary analysis conducted on regional regulations and planning documents. The analysis involved identifying determinants of effectiveness extracted from relevant literature and encoding them using unique codes. These determinants were then categorised into three primary categories outlined in the literature: structure, context, and process. The table XXIV represents the percentages of codes attributed to each category, weighted by the number of codes employed. As observed, the structural component carries significantly more weight than the context and process components.

Table XXIV. Weight of the codes attributed to each category

Category	Weighted number of codes for each category
Structure	246
Context	114
Process	86

This underscores how regulatory interventions have primarily focused on standardising structural aspects to ensure the initial delivery of the service. Similarly, indicators were developed primarily based on the epidemiological and

³⁸⁵ WHO, 2006. *Quality of Care: A process for making strategic choices in health systems*. Op. cit.

³⁸⁶ TURRINI, A., CRISTOFOLI, D., FROSINI, F. AND NASI, G., 2010. *Networking literature about determinants of network effectiveness*. Public administration, 88(2), pp.528-550; PEETERS, R., WESTRA, D., VAN RAAK, A.J. AND RUWAARD, D., 2023. *So happy together: a review of the literature on the determinants of effectiveness of purpose-oriented networks in health care*. Medical Care Research and Review, 80(3), pp.266-282; SMITH, J.G., 2020. *Theoretical advances in our understanding of network effectiveness*. Perspectives on Public Management and Governance, 3(2), pp.167-182

demographic profile (incidence of stroke in the population by stroke type, and age groups, 30-day mortality, hospital readmissions) and hospital volumes (the number of admissions for ischemic and haemorrhagic strokes, the number of discharges).

However, there has been an increased awareness of stroke from a medical perspective, leading to the development of enhanced protocols and best practices for treatment. It became evident that patients could benefit significantly from treatment in stroke units, involving a multidisciplinary team's care, the introduction of a case manager to deal with the complexity of therapies, and the need to organise the care pathway according to incremental stages of disease severity. This shift in focus emphasised the organisation's ability to ensure these conditions by incorporating the concept of internal effectiveness, which refers to the extent to which the entire healthcare system achieves defined goals for specific, evidence-based clinical outcomes. In this context, these goals are aimed at providing care with a more significant impact. Hence, there has been a paradigm implementation by adding to the concept of effectiveness as mere treatment capable of improving an individual's health, an internal conception in which clear internal objectives are established for healthcare providers. Consequently, the network's configuration had to adapt, modifying its characteristics both structurally and evaluatively. From a structural perspective, additional characteristics of the system were then defined, including the division of stroke units by level, the implementation of protocols for both the emergency and acute phases, the formation of neurovascular teams, and the specific requirements for administering thrombolytic therapy (first level) and thrombectomy (second level).

Similarly, performance indicators were adjusted in line with the new determinants. This involved analysing the percentage of stroke patients treated out of the total number of stroke patients, the percentage of patients treated with thrombectomy, emergency department admissions categorised by arrival mode (self-arrivals or through emergency services), hospitalisation days, and the average length of stay in stroke units. The concept of internal effectiveness has, therefore, been added to, rather than replaced, the concept of clinical effectiveness. It guides both regional actions in planning healthcare facilities and operational actions related to their provision.

Nevertheless, what we are currently witnessing is a transitional phase towards a new structuring of the service that goes beyond the purely internal and clinical

aspect and focuses on the patient, both in terms of their care journey, ensuring support through different phases, and in terms of awareness, encompassing prevention, accountability, and satisfaction. This transition appears coherent with the shift in care paradigm, transitioning from pathology to clinical networks.

Recent innovations are emerging from the bottom up to include new elements, both in terms of structural and evaluative aspects. From a structural standpoint, the relationship between the hospital and the community is being investigated. After structuring the acute phase and mastering its analysis through indicators, the focus is then broadened to encompass a complex reality characterised by interactions among different healthcare professionals and settings. In terms of determinants of effectiveness, this translates into considerations regarding the composition of the network, including the evaluation of the inclusion of new community members (e.g., nursing homes, *Case della Salute*) and, in terms of resource availability, exploring the possibility of increasing rehabilitation beds and human resources.

The turning point, therefore, concerns an increased awareness of external effectiveness, which relates to the ability to satisfy patients and not only to cure them properly. New performance variables are introduced to investigate patient satisfaction with the care journey (through bottom-up solutions, such as phone applications, follow up procedures at organisational level) and are also useful in providing clinical and managerial guidance by analysing indicators of residual disability. These variables not only assess the patient's quality of life but also help in organising post-acute services effectively, by optimising the allocation of rehabilitation resources and providing services conducive to the recovery phase (automated exam scheduling for post-stroke periodic check-ups, for example).

From an operational perspective, this translates into two management standpoints. Firstly, in order to provide the right service, it is necessary to address all three dimensions of effectiveness while being mindful of their progression. This aligns with the concept of network's maturity. The developmental stage of a network is widely recognised as a critical determinant of its effectiveness³⁸⁷. Networks are inherently time-sensitive entities, and their performance evolves in nature and evaluation in tandem with their maturity³⁸⁸. Consequently, performance

³⁸⁷ KLIJN, E., STEIJN, B. AND EDELENBOS, J. 2010. *The Impact of Network Management on Outcomes in Governance Networks*. Public Administration 88(4):1063–82

³⁸⁸ CEPIKU, D. 2014. *Network Performance: Toward a Dynamic Multidimensional Model*. In *Network Theory in the Public Sector*, edited by R. L. Keast, M. P. Mandell, and R. Agranoff, 188–204. New York, NY: Routledge; CEPIKU, D., GIORDANO, F., MASTRODASCIO, M. and

evaluation is expected to undergo a parallel transformation, adapting the evaluation criteria to match the network's developmental stage³⁸⁹. In the nascent phases, a network may be considered effective when it delivers essential services, often through a limited number of closely interconnected organisations³⁹⁰. In their initial phases, networks are assessed based on their endeavours to set up structural foundations and operational processes, rather than merely focusing on the attainment of specific goals. This evaluation emphasises the significance of structural characteristics that facilitate relationship building, norm establishment, and the consolidation of shared values. However, as networks mature, their scope of service provision typically broadens, necessitating the development of new and more complex criteria to gauge their effectiveness. Thus, the assessment shifts to evaluating effectiveness by considering commitment to the broader network's objectives.

Consequently, there is a need to program attention to different aspects depending on the network's level of maturity. This entails focusing on the implementation of varying characteristics in accordance with the developmental stage and, from a monitoring and control perspective, using different indicators.

Similarly, it is of paramount importance for management to govern not only the network dimension and the community aspect but also to keep a close eye on the individual companies that comprise the network³⁹¹. The root of this necessity lies in the fact that innovations, especially when they are not of a clinical nature, often emerge organically from the professionals actively involved in daily network activities. As a result, there are prospects for development initiated by individuals within the network (such as creating a digital application to provide data to patients and receive qualitative feedback) as well as by individual companies (including the development of ranking-based indicators for residual disability).

WANG, W., 2021. *What drives network effectiveness? A configurational approach*. Public management review, 23(10), pp.1479-1503

³⁸⁹ KENIS, P. AND PROVAN, K.G., 2009. *Towards an exogenous theory of public network performance*. Public administration, 87(3), pp.440-456

³⁹⁰ PROVAN, K.G. and MILWARD, H.B., 2001. *Do networks really work? A framework for evaluating public-sector organizational networks*. Public administration review, 61(4), pp.414-423

³⁹¹ MANDELL, M.P. and KEAST, R., 2008. *Evaluating the effectiveness of interorganizational relations through networks: Developing a framework for revised performance measures*. Public management review, 10(6), pp.715-731; PROVAN, K.G. and MILWARD, H.B., 2001. *Do networks really work? A framework for evaluating public-sector organizational networks*. Public administration review, 61(4), pp.414-42

Proposition 3: In time-dependent networks, the understanding of effectiveness widens as the network's development progresses.

Proposition 4: In time-dependent networks, the implementation and development of determinants are consistent with the evolution of the concept of effectiveness.

Trust can be explained as the conviction that a partner will behave accordingly to one's expectations and involves vulnerability acceptance when relying on another's partner behaviours³⁹². By diminishing uncertainty, trust is conducive to cohesion among members and facilitates cooperation³⁹³. According to the analysis, a high level of trust is found in informal networks, considered to be in the early stages of collaboration. This is coherent with the trust building loop identified by the literature³⁹⁴ where in the initial stages of collaboration, partners must establish a foundational level of trust to align on shared objectives. Subsequently, trust undergoes a continuous cycle of reinforcement when successes are achieved and erosion when failures occur. These outcomes have a lasting impact on the level of trust, affecting not only the current service but also future collaborative endeavours, either bolstering or weakening the mutual trust of both parties. According to the data, trust appears to diverge in more developed contexts, where it is defined ambivalent: high level when referring to relationships among network members but a lower level when referring to governance. Conversely, trust seems to increase again with the rising formalisation of the network. Trust then remains remarkably robust in moderately developed, highly formalised contexts, where formalisation has effectively dissolved informal member relationships (cliques). This underscores how the two evolutionary poles of network node relationships, driven by different needs, require participants' efforts to build a strong foundation of trust. On one hand, the drive arises from the necessity to strengthen the budding collaboration, while on the other, greater adherence to regulations enhances the belief that the partner will behave as expected.

³⁹² PROVAN, K.G. and KENIS, P., 2008. *Modes of network governance: Structure, management, and effectiveness*. Op. cit.

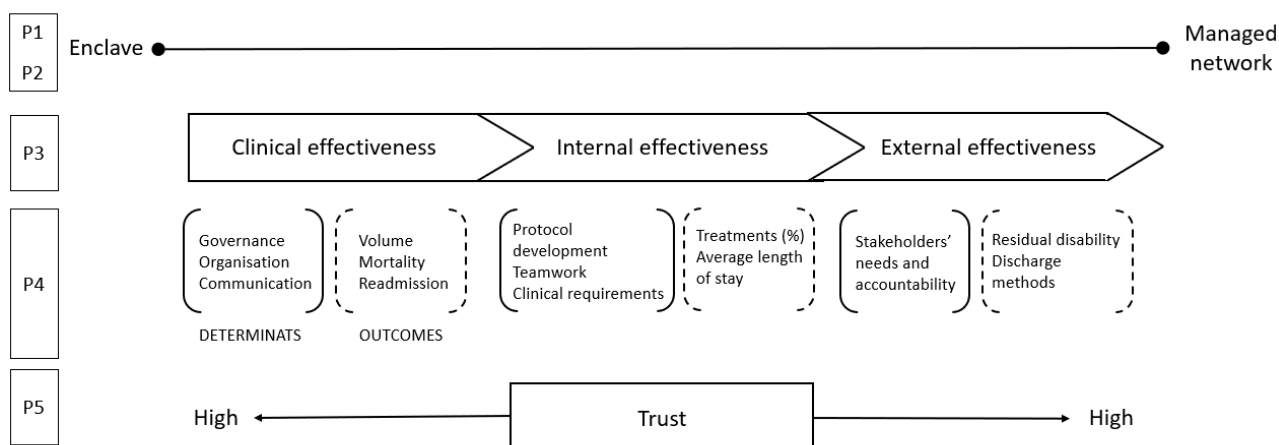
³⁹³ CEPIKU, D., GIORDANO, F., MASTRODASCIO, M. and WANG, W., 2021. *What drives network effectiveness? A configurational approach*. Op. cit.

³⁹⁴ AUNGER, J.A., MILLAR, R., GREENHALGH, J., MANNION, R., RAFFERTY, A.M., MCLEOD, H., 2021. *Why do some inter-organisational collaborations in healthcare work when others do not? A realist review*. Systematic reviews, 10, pp.1-22.

Proposition 5: Trust can equally thrive within both highly formalised and highly informal network settings.

Ultimately, the research question was approached from a managerial perspective, utilising a comparative analysis of multiple case studies. The evidence gathered has offered the opportunity to draw inferences regarding the role of determinants on network outcomes in terms of effectiveness. The knowledge generated has been used to formulate a set of theoretical propositions, summarised in Figure XIII.

Figure XIII. A model of the determinants and outcomes of network effectiveness



6.7 Final remarks

The research question behind the study aimed to investigate whether a connection exists between specific network attributes and the effectiveness of care provision. In a public context increasingly marked by economic constraints and an epidemiological decline characterised by an increase in chronic conditions and comorbidities, organisations have chosen to abandon the individualistic logic of service delivery (silo logic) and move towards a collaborative approach. Service delivery has thus taken on a new form in which individual actions constitute part of the final outcome.

The study embraced a managerial standpoint, recognising the evolving landscape of service delivery. It acknowledged that the contemporary service delivery methods demanded a fresh perspective on performance analysis. With this awareness, the study sought to explore innovative paradigms that would effectively assess and enhance the performance of network focusing on aspects closely related to healthcare activities and the peculiarities of the public context.

The effectiveness of care appears to be an aspect that is less commonly investigated by traditional performance systems due to measurement challenges and significant variations in meaning across different application areas. It was decided to analyse effectiveness from a clinical perspective (achievement of health-related outcomes), internal perspective (achievement of system objectives), and external perspective (patient satisfaction). To address the research question, a qualitative approach based on a multiple case study methodology was adopted, in which top-performing regions at the national level were selected to investigate their organisation and results.

The adopted context is that of time-dependent networks, where a dual clinical and managerial approach is necessary to deliver quality care. Time-dependent conditions require immediate intervention from the onset of the first symptoms and often lead to a prolonged rehabilitation journey due to residual disabilities. Stroke has been chosen as the subject of analysis to understand how the network's structure enables the inclusion of determinants that can influence the effectiveness of care.

The findings of the study reveal a gradual process of network formalisation. As we trace the journey from an enclave to a managed network within the framework of time-dependent networks, it becomes evident that there is a clearly defined

sequence of phases. This sequential progression highlights the structured transformation that these networks undergo, underscoring the importance of a systematic approach to adapt to the evolving demands of time-dependent healthcare delivery.

The evolutionary journey incorporates an expanding definition of effectiveness. It becomes evident that clinical effectiveness represents the key dimension in the enclave phase, where individual nodes collaborate informally to achieve a common health objective. As the network's development progresses, new clinical insights set organisational and managerial priorities for service delivery. To align quality with new standards, organisations are therefore tasked with acting on the network by setting new internal effectiveness goals. New requirements to be met and system-level procedures are established. With the shift in the medical paradigm, transitioning from a network concept based on individual conditions to one organised around and with the patient, the external dimension is reacquired. The network then undergoes a configuration change by incorporating contextual determinants that allow for an exploration of patient satisfaction.

The network is, therefore, a construct capable of traversing various evolutionary phases. Consequently, the evaluation system must evolve coherently. This transition involves moving from the evaluation of clinical-structural elements through volume and mortality indicators to an evaluation based on the alignment of the service delivered with system objectives. Finally, the indicators must evolve to incorporate the concept of satisfaction, thus assessing the external dimension of the effectiveness of care. This evolution of the evaluation system reflects the dynamic nature of healthcare networks and underscores the need to adapt assessment methodologies to address the changing landscape of healthcare delivery.

Overall, this study underscores the need for a flexible and adaptive approach to healthcare network management and evaluation to meet the changing demands and standards of modern healthcare. In these terms, the determinants of effectiveness seem to be implemented incrementally, and their connection with outcomes evolves in a coherent manner. The study provides insightful perspectives for policymakers and healthcare professionals aiming to improve the organisation of care delivery, offering clear guidelines for the development of effective time-dependent networks. From a theoretical point of view, the outcomes of the research contribute to a clearer understanding of the concept of effectiveness by offering a three-part definition,

taking into account its systemic and multifactorial nature, as well as advancing the understanding of what conditions enhance a time-dependent network's effectiveness. These defined terms (clinical, reflecting the intervention's ability to positively influence health; internal, measuring the healthcare system's achievement of specific, evidence-based clinical goals; and external, addressing the capability to adequately treat patients and meet their needs), within the time-dependent networks, are gradually adopted over time along with different determinants and outcomes of effectiveness. The findings of the analysis contribute to the existing literature by shedding new light on the connection existing between specific network determinants and outcomes indicators of care provision. Specifically, the research delineated stage-specific determinants and outcomes associated with different types of effectiveness. Moreover, the study provided insights into a clear pathway for the implementation of diverse forms of effectiveness contingent upon the level of network development and formalisation.

The sequential implementation of effectiveness dimensions—clinical, internal, and external—within the evolving landscape of time-dependent networks has novel theoretical implications. The initial focus on clinical effectiveness, centred on defining determinants and indicators for positive patient outcomes, established a foundation for structuring the network. The subsequent shift towards internal effectiveness emphasised achieving defined goals for evidence-based clinical outcomes, indicating a paradigmatic expansion beyond the traditional treatment-centric approach. This evolution underscores the dynamic interplay between structural modifications and evaluative adjustments in response to changing healthcare paradigms. The current transitional phase towards a patient-centred approach reflects a broader understanding of external effectiveness, highlighting the importance of patient satisfaction, support through diverse care phases, and holistic awareness encompassing prevention and accountability. For policymakers, this suggests the need for flexible frameworks that accommodate the evolving dimensions of effectiveness and consider the inclusion of new community members in network compositions. The emphasis on patient satisfaction and the introduction of novel performance variables also signals a shift towards a more comprehensive and responsive healthcare system. Policymakers can leverage these insights to craft policies and evaluation strategies that align with the evolving care paradigm,

ensuring a patient-centric network structure that goes beyond mere treatment to encompass the holistic well-being of individuals.

Furthermore, the research outlines a series of sequential phases in the implementation and evolution of time-dependent networks constituting an incremental path for formalisation of the network. The major implications of this research lie in its capacity to enhance our understanding of the complex processes involved in the implementation and evolution of time-dependent networks. By delineating sequential phases and emphasising the formalisation path, the study contributes to theoretical frameworks that underpin network dynamics. This deeper comprehension of network formalisation is particularly relevant for policymakers, providing them with valuable insights into the alternative hypothesis of external imposition and its effects on network management. Policy makers can leverage this knowledge to develop policies able to acknowledge the sequential nature of formalisation phases and consider external influences. Ultimately, these theoretical insights can inform policy decisions aimed at fostering resilient and adaptable networks, thereby optimising their impact on health provision.

Eventually, the findings from the analysis reveal intriguing considerations regarding trust within network dynamics. The disclosure that trust can flourish in both highly formalised and highly informal network settings challenges conventional assumptions, suggesting that the nature of trust evolves alongside the developmental stages of collaboration. For policymakers, understanding this nuanced relationship between trust and network formalisation is crucial. The ambivalence observed in more developed contexts underscores the need for tailored strategies that address the multifaceted nature of trust, considering both interpersonal relationships and governance structures. Moreover, the data indicating a resurgence of trust with increased formalisation implies that strategic efforts towards formalising networks can contribute positively to trust-building. This insight can guide policymakers in crafting interventions that foster trust in networks, emphasising the importance of balancing formalisation without compromising the organic relationships among members.

However, the study presents certain limitations that point towards future research paths. First, the analysis conducted is specific to the Italian context, implying that the conclusions drawn from it warrant further testing in diverse healthcare systems. It is essential to recognise that the dynamics of healthcare,

including regulatory intervention and service delivery mechanisms, vary significantly across different countries. Consequently, the validity and generalisability of the findings should be assessed in contexts characterised by contrasting regulatory frameworks and distinct delivery models. This approach ensures that the insights derived from the Italian context can be applied with confidence in a broader, more globally representative context. For instance, it could be appropriate to investigate private settings. The current analysis operates within a public context, given Italy's universalistic healthcare system. However, numerous nations around the world employ diverse healthcare models, including private systems or a combination of public and private elements. Investigating these alternative frameworks helps gain a comprehensive understanding of healthcare dynamics across different contexts. Expanding the research to include countries without a public healthcare system allows for a nuanced exploration of how varied healthcare structures impact outcomes. This broader approach ensures that research findings are not confined to a singular system but contribute to a more inclusive knowledge base applicable to a diverse range of healthcare environments.

Secondly, this analysis aims to delve into the relation between specific network attributes and the effectiveness of care provision employing a literal replication approach by selecting top-performing regions with anticipated similar outcomes. In the context of Italian analysis, regions that Agenas identified as exhibiting higher performance have been specifically chosen. The selection criteria were based on the 2021 report, which sought to examine the implementation status of time-dependent networks, with a focus on identifying and highlighting the top performers. Understanding the potential limitations of a narrow focus that overlooks regions with distinct challenges or unique characteristics is crucial in the realm of comprehensive development analysis. While such a limited perspective might impede a thorough understanding of the complex factors influencing overall development, there is an ongoing effort through an initial exploratory analysis. However, it is emphasised that a more holistic research approach, encompassing a variety of regions with diverse performance levels, is essential. This broader perspective becomes instrumental in shaping comprehensive national development strategies that account for the multifaceted nature of regional disparities and contribute to more inclusive and equitable progress. For this reason, future research should aim at exploring the proposed considerations while taking into account

regions with varying levels of performance, for instance by comparing medium to low performers against the top performers already analysed. Hence, an important direction for future research would be to initiate a comparative assessment based on the performance and regulatory compliance of different regions.

Eventually, there is a compelling need to delve deeper into the causal links between the variables under scrutiny and their potential impact on effectiveness. Recent research has increasingly emphasised the interconnected nature of various variables and how their combined effects can significantly shape healthcare network performance. This avenue of inquiry holds promise for providing valuable insights into the complex relationship among factors that influence the delivery of care within these networks and, ultimately, the outcomes experienced by patients.

References

- ADAY L.A., BEGLEY C.E., LAIRSON D.R., BALKRISHNAN, R. 2004. *Evaluating the Healthcare System: Effectiveness, Efficiency, and Equity* (3rd ed.). Chicago: Health Administration Press.
- ADDICOTT, R. and FERLIE, E., 2006. *A qualitative evaluation of public sector organizations: Assessing organizational performance in healthcare*. Public service performance: Perspectives on measurement and management, pp.55-73.
- ADDICOTT, R., MCGIVERN, G. and FERLIE, E., 2006. *Networks, organizational learning and knowledge management: NHS cancer networks*. Public Money and Management, 26(2), pp.87-94. <https://doi.org/10.1111/j.1467-9302.2006.00506.x>
- AFSANEH K.H. 2014. *Communication from the Commission on Effective, Accessible and Resilient Health Systems*. European Institute for Gender Equality.
- AGENAS, 2006. *Gli Indicatori per la qualità: strumenti, metodi, risultati*. Supplemento al n. 15 di Monitor.
- AGENAS. *Programma Nazionale Esiti 2022*. Available at https://pne.agenas.it/main/doc/Report_PNE_2022.pdf (accessed October 2023)
- AGENAS, 2021. *Gruppo Tecnico per l'elaborazione di proposte per l'attuazione e l'evoluzione della rete assistenziale dell'ictus: Relazione Conclusiva*. Available at https://www.agenas.gov.it/images/agenas/RETI/reti_ictus/board_agenas_reti_ictus-relazione_conclusiva.pdf (accessed October 2023)
- AGENAS, 2021. *II Indagine Nazionale sullo stato di attuazione delle reti tempo-dipendenti. Rapporto 2021*. Available at https://www.agenas.gov.it/images/agenas/In%20primo%20piano/2021/reti/Report_Reti_Tempo_dipendenti.pdf (accessed October 2023)
- AGENAS, 2023. *Gruppo Tecnico per l'elaborazione di proposte per l'attuazione e l'evoluzione della rete cardiologica per l'emergenza: Relazione Conclusiva*. Available at https://www.agenas.gov.it/images/agenas/RETI/cardio/relazione_finale_board_cardio.pdf (accessed October 2023)
- AGRANOFF, R. and MCGUIRE, M. 1999. *Managing in Network Settings*. Policy Studies Review. 16: 1 pp18–41. <https://doi.org/10.1111/j.1541-1338.1999.tb00839.x>
- AGRANOFF, R., and M. MCGUIRE. 2001. *Big Questions in Public Network Management Research*. Journal of Public Administration Research and Theory 11(3):295–326. <https://doi.org/10.1093/oxfordjournals.jpart.a003504>
- ALBERS, S., WOHLGEZOGEN, F. and ZAJAC, E.J., 2016. *Strategic alliance structures: An organization design perspective*. Journal of Management, 42(3), pp.582-614. <https://doi.org/10.1177/0149206313488209>
- ALEXANDER, J. A., HEARLD, L. R., WOLF, L. J., AND VANDERBRINK, J. M., 2016. *Aligning forces for quality multi-stakeholder healthcare alliances: Do they have a sustainable future?* American Journal of Managed Care, 22(12, Suppl.), s423–s436. PMID: 27567516
- ALMQVIST R. 2001. *Management by contract – a study of programmatic and technological aspects*. Public Administration, 79(3):689–706 <https://doi.org/10.1111/1467-9299.00275>
- ALTER, C., and HAGE, J., 1993. *Organizations Working Together*. Newbury Park, CA: Sage Publications.

AIOP, Associazione Italiana Ospedalità Privata/Luiss Business School. 2016. *L'evoluzione dei modelli sanitari internazionali a confronto. Per costruire il Servizio Sanitario Nazionale del futuro*. ISBN 9788888656090

ANSARI, S., MARTINA, T., SALFITRI, M., HANNY, & ERNESTA, R., 2023. *Organizational Effectiveness: Bibliometric Analysis*. International journal of economics and management review, 1(1), 39–46. <https://doi.org/10.58765/ijemr.v1i1.71>

ARMENI, P., BORSOI, L., NOTARNICOLA, E., ROTA, S., 2022. *La spesa sanitaria: composizione ed evoluzione nella prospettiva nazionale, regionale ed aziendale*, in Rapporto OASI 2022, Milano, Egea, p. 95 ff.

ARYANKHESAL A., SHELDON T.A., MANNION R., MAHDIPOUR S., 2015. *The dysfunctional consequences of a performance measurement system: the case of the Iranian national hospital grading programme*. Journal of Health Services Research & Policy. 20(3):138-145. doi:10.1177/1355819615576252

AUNGER, J.A., MILLAR, R., GREENHALGH, J., MANNION, R., RAFFERTY, A.M., MCLEOD, H., 2021. *Why do some inter-organisational collaborations in healthcare work when others do not? A realist review*. Systematic reviews, 10, pp.1-22. DOI: <https://doi.org/10.1186/s13643-021-01630-8>

AUSCHRA, C., 2018. *Barriers to the integration of care in inter-organisational settings: a literature review*. International journal of integrated care, 18(1). 10.5334/ijic.3068

AXELSSON L, ENGSTRÖM AK. 2001. *The concept of effectiveness--a blind alley? A study of different interpretations in a Swedish county council*. The International Journal of Health Planning and Management. 16(1):61-71. 10.1002/hpm.610.

BAKER, C.D., and LORIMER, A.R., 2000. *Cardiology: the development of a managed clinical network*. British medical journal, 321(7269), p.1152. <https://doi.org/10.1136/bmj.321.7269.1152>

BARRENHO, E., HAYWOOD, P., KENDIR, C. AND KLAZINGA, N.S., 2022. *International comparisons of the quality and outcomes of integrated care: Findings of the OECD pilot on stroke and chronic heart failure*. OECD Health Working Papers, No. 142, OECD Publishing, Paris, <https://doi.org/10.1787/480cf8a0-en>

BASYS, D., INSTEAD, C., IRDES, F., IGSS, L., 2005. *Development of a methodology for collection and analysis of data on efficiency and effectiveness in health care provision*. Final Report EU Commission, Eurostat, pp.2000-2010.

BAZZOLI, G.J., CASEY, E., ALEXANDER, J.A., CONRAD, D.A., SHORTELL, S.M., SOFAER, S., HASNAIN-WYNIA, R. AND ZUKOSKI, A.P., 2003. *Collaborative initiatives: Where the rubber meets the road in community partnerships*. Medical Care Research and Review, 60(4, Suppl.), 63S–94S. <https://doi.org/10.1177/1077558703259082>

BEHN, R.D., 2003. *Why Measure performance? Different purposes require different measures*. Public Administration Review 63(5), pp.586-606.63, <https://doi.org/10.1111/1540-6210.00322>.

BERTINI, U., 1995. *Scritti di politica aziendale*. Torino, Giappichelli.

BENSON, T., 2020. *Measure what we want: a taxonomy of short generic person-reported outcome and experience measures (PROMs and PREMs)*. British medical journal open quality, 9(1), p.e000789. <http://dx.doi.org/10.1136/bmjopen-2019-000789>

BEVAN, G., HOOD, C. 2006. *What's measured is what matters: Targets and gaming in the English public health care system*. Public Administration, 84 (3), 517-538. <https://doi.org/10.1111/j.1467-9299.2006.00600.x>

- BITITCI, U., GARENGO, P., DÖRFLER, V., NUDURUPATI, S. 2012. *Performance measurement: challenges for tomorrow*. International Journal of Management Reviews, 14(3), pp. 305-327. 10.1111/j.1468-2370.2011.00318.x
- BORGONOV E., 1990. *Il controllo economico delle aziende sanitarie*, Milano, Egea.
- BORGONOV E., 2000. *Gli indicatori di efficacia e di efficienza nella sanità*. Rivista Trimestrale Di Scienza Dell'Amministrazione. Milano, Franco Angeli
- BORGONOV E., 2005. *Principi e sistemi per le amministrazioni pubbliche*, Egea.
- BOYNE, G.A., 2003. *What is public service improvement?* Public administration, 81(2), pp.211-227. <https://doi.org/10.1111/1467-9299.00343>
- BOYNE, G. A., 2004. *Explaining Public Service Performance: Does Management Matter?* Public Policy and Administration, 19(4), 100-117. <https://doi.org/10.1177/095207670401900406>
- BRASS, D.J., GALASKIEWICZ, J., GREVE, H.R. AND TSAI, W., 2004. *Taking stock of networks and organizations: A multilevel perspective*. Academy of management journal, 47(6), pp.795-817. <https://doi.org/10.5465/20159624>
- BREDENHOFF, E., VAN LENT, W.A. & VAN HARTEN, W.H. 2010. *Exploring types of focused factories in hospital care: a multiple case study*. BMC Health Serv. Res 10, 154. <https://doi.org/10.1186/1472-6963-10-154>.
- BROADBENT, J., 2007. *If you can't measure it, how can you manage it? Management and governance in higher educational institutions*. Public Money and Management, 27(3), 193-198. <https://doi.org/10.1111/j.1467-9302.2007.00579.x>
- BUONGIORNO SOTTORIVA, C., FURNARI, A. and RICCI, A., 2021. *Configurazione dell'offerta ospedaliera nazionale: dinamiche evolutive e rimodulazioni delle principali specialità medico-chirurgiche*. In Rapporto OASI 2021 (pp. 385-426). Egea.
- BURCH, S. AND BORLAND, C., 2001. *Collaboration, facilities, and communities in day care services for older people*. Health & Social Care in the Community, 9(1), pp.19-30. <https://doi.org/10.1046/j.1365-2524.2001.00276.x>
- BURCHES, E., BURCHES, M., 2020. *Efficacy, effectiveness and efficiency in the health care: The need for an agreement to clarify its meaning*. International Archives of Public Health and Community Medicine, 4(1). 10.23937/2643-4512/1710035
- CALCIOLARI, S., CANTÙ, E., FATTORE, G., 2011. *Performance management and goal ambiguity: Managerial implications in a single payer system*. Health Care Management Review 36(2): p 164-174. 10.1097/HMR.0b013e318204bcb8
- CANTARELLI, P., LEGA, F., LONGO, F., 2017. *La regione capogruppo sanitaria: assetti istituzionali e modelli organizzativi emergenti*. In Rapporto OASI 2017 (pp. 363-380). Egea.
- CAMERON, K.S. 1986. *Effectiveness As Paradox: Consensus and Conflict in Conceptions of Organizational Effectiveness*. Management Science 32, no. 5, p:539-53. <https://doi.org/10.1287/mnsc.32.5.539>
- CEPIKU, D. 2014. *Network Performance: Toward a Dynamic Multidimensional Model*. In Network Theory in the Public Sector, edited by R. L. Keast, M. P. Mandell, and R. Agranoff, 188-204. New York, NY: Routledge.
- CEPIKU, D. and MENEGUZZO, M., 2011. *Public administration reform in Italy: a shopping-basket approach to the new public management or the new Weberianism?* International Journal of Public Administration, 34(1-2), pp.19-25. <https://doi.org/10.1080/01900692.2010.506088>

CEPIKU, D., GIORDANO, F., MASTRODASCIO, M. and WANG, W., 2021. *What drives network effectiveness? A configurational approach*. Public management review, 23(10), pp.1479-1503. <https://doi.org/10.1080/14719037.2020.1764084>

CHILD, J., FAULKNER, D. AND TALLMAN, S.B., 2005. *Cooperative strategy*. Oxford University Press, USA

CINAROGLU S., ONUR BASER O., 2016. *Understanding the relationship between effectiveness and outcome indicators to improve quality in healthcare*. Total Quality Management & Business Excellence. 10.1080/14783363.2016.1253467

CITTADINANZA ATTIVA, 2017. *Ictus: le cure in Italia. Analisi civica dei Percorsi diagnostici, terapeutici e assistenziali*.

COCHRANE A., 1972. *Effectiveness and efficiency: Random reflections on health services*. Nuffield Trust

CONCATO J., LAWLER E.V., LEW, R.A., GAZIANO J.M., ASLAN M., HUANG G.D., 2010. *Observational Methods in Comparative Effectiveness Research*. The American Journal of Medicine, Volume 123, Issue 12, Supplement, pp. e16-e23, <https://doi.org/10.1016/j.amjmed.2010.10.004>

CONRAD, D.A., CAVE, S.H., LUCAS, M., HARVILLE, J., SHORTELL, S.M., BAZZOLI, G.J., HASNAIN-WYNIA, R., SOFAER, S., ALEXANDER, J.A., CASEY, E. AND MARGOLIN, F., 2003. *Community care networks: Linking vision to outcomes for community health improvement*. Medical Care Research and Review, 60(4_suppl), pp.95S-129S. <https://doi.org/10.1177/1077558703259096>

CONSIGLIO SUPERIORE DI SANITÀ. 2018. *Codice BLU: percorso Ictus. Strategia, Principi attuativi ed Analisi dell'impatto socio economico del Percorso Ictus in Italia*.

CRISTOFOLI, D. AND MARKOVIC, J., 2016. *How to make public networks really work: A qualitative comparative analysis*. Public Administration, 94(1), pp.89-110. <https://doi.org/10.1111/padm.12192>

CUGANESAN, S., JACOBS, K., LACEY, D. 2014. *Beyond new public management: does performance measurement drive public value in networks?*, in Guthrie, J., Marcon, G., Russo, S., Farneti, F. (Eds), Public value management, measurement and reporting (Studies in Public and Non-Profit Governance), 3, pp. 21-42

DEKKER, H.C. 2016. *On the boundaries between intrafirm and interfirm management accounting research*. Management Accounting Research, 31, pp. 86-99, <https://doi.org/10.1016/j.mar.2016.01.001>

DEMAERSCHALK B.M., SWITZER J.A., XIE J., FAN L., VILLA K.F., WU E.Q. 2013. *Cost utility of hub-and-spoke tele stroke networks from societal perspective*. The American journal of managed care. 2013 Dec;19(12):976-85. PMID: 24512034.

DETSKY AS, NAGLIE IG. 1990. *A clinician's guide to cost-effectiveness analysis*. Annals of Internal Medicine. 113(2):147-54. 10.7326/0003-4819-113-2-147

DONABEDIAN A., 1990. *The seven pillars of quality*. Archives of pathology & laboratory medicine, 114(11), pp.1115-1118. PMID: 2241519

DONABEDIAN, A., 1996. *The effectiveness of quality assurance*. International Journal for Quality in Health Care, Volume 8, Issue 4, pp. 401-407, <https://doi.org/10.1093/intqhc/8.4.401>

DONABEDIAN, A., 2003. *An Introduction to Quality Assurance in Health Care*. New York: Oxford University Press.

DOWLING, B., POWELL, M. AND GLENDINNING, C., 2004. *Conceptualising successful partnerships*. Health & social care in the community, 12(4), p. 309. <https://doi.org/10.1111/j.1365-2524.2004.00500.x>

EDWARDS, N., 2002. *Clinical networks: Advantages include flexibility, strength, speed, and focus on clinical issues*. British medical journal, 324(7329), p.63. <https://doi.org/10.1136/bmj.324.7329.63>

EISENHARDT, K., 1989. *Building theories from case study research*. The Academy of Management Review. 14 (4), 532e550. <https://doi.org/10.2307/258557>

ESO, European Stroke Organisation 2008. *Guidelines for Management of Ischaemic Stroke and Transient Ischaemic Attack*.

EUROPEAN COMMISSION, 2005. *Development of a methodology for collection and analysis of data on efficiency and effectiveness in health care provision*. In: 4th Health Systems Working Party Meeting.

EZZA, A., MARINÒ, L. AND GIOVANELLI, L., 2019. *Assessing the impact of tourism on hospitals' performance in a coastal destination*. Tourismos: An International Multidisciplinary Journal of Tourism, Vol. 1, No. 14: pp. 55-76. Online at <https://mpira.ub.uni-muenchen.de/93999/>

FADDA, N. and ROTONDO, F., 2022. *What combinations of conditions lead to high performance of governance networks? A fuzzy set qualitative comparative analysis of 12 Sardinian tourist networks*. International Public Management Journal, 25(4), pp.517-543. 10.1080/10967494.2020.1755400

FATTORE, G., GUGIATTI, A., LONGO, F., 2016. *Il riordino dei servizi sanitari regionali*. In Rapporto OASI 2016, Egea.

FATTORE, G., MEDA F., MEREGAGLIA M., 2021. *Gli ospedali di comunità in Italia: passato, presente e futuro*. In Rapporto OASI 2021, Egea.

FAWCETT, S.B., V.T. FRANCISCO, A. PAINE-ANDREWS and J.A. SCHULTZ. 2000. *A Model Memorandum of Collaborations: A Proposal*. Public Health Reports, 15, May-June, 175-90. 10.1093/phr/115.2.174

FERRARIS FRANCESCHI, R., CALAVIERI E. (a cura di), 2005. *Economia aziendale*, vol. I, Torino, Giappichelli.

FISCHER, F. 2003. *Reframing Public Policy: discursive Politics and Deliberative Practices*. Oxford: Oxford University Press

FULOP N, PROTOPSALTIS G, HUTCHINGS A, KING A, ALLEN P, NORMAND C, WALTERS R. 2002. *Process and impact of mergers of NHS trusts: multicentre case study and management cost analysis*. British Medical Journal 325(7358):246-9. <https://doi.org/10.1136/bmj.325.7358.246>.

FURNARI, A. AND RICCI, A., 2016. *La rete ospedaliera per acuti del SSN alla luce dei nuovi standard ospedalieri: mappatura e potenziali di riorganizzazione*. In Rapporto OASI 2016 (pp. 313-337). Egea.

GIOVANELLI, L. 2000. *Modelli contabili e di bilancio in uno stato che cambia*, Giuffrè.

GIOVANELLI, L., 2011. *Elementi di economia aziendale*. Torino, Giappichelli Editore.

GIOVANELLI, L., 2012. *L'area del potere aziendale nelle amministrazioni pubbliche*. In FORTUNA F. (a cura di), *Liber amicorum per Umberto Bertini. L'uomo, lo studioso, il professore*, Milano, Franco Angeli.

GIOVANELLI L. (a cura di), 2013. *La valutazione delle performance in ambito sanitario profili teorici ed evidenze empiriche*, Torino, Giappichelli.

GLASBY, J., DICKINSON, H. AND MILLER, R., 2011. *Partnership working in England—where we are now and where we've come from*. International journal of integrated care, 11(Special 10th Anniversary Edition). 10.5334/ijic.545

GOODWIN, N., PECK, E., FREEMAN, T. and POSANER, R., 2004. *Managing across diverse networks of care: lessons from other sectors*. Report to the NHS SDO R&D Programme. Birmingham: Health Services Management Centre, University of Birmingham.

GUGIATTI, A., MANFREDI, S., MEDA F., 2022. *La struttura e le attività del SSN*, in Rapporto OASI 2022, Milano, Egea.

GUIHAN, M., MANHEIM, L. M., HUGHES, S. L., GUIHAN, M., MANHEIM, L. M., and HUGHES, S. L., 1995. *Predicting agency participation in interorganizational networks providing community care*. Medical Care, 33(5), 441–451. 10.1097/00005650-199505000-00001

HARDY, C, PHILLIPS, N and LAWRENCE, TB., 2003. *Resources, knowledge and influence: The organizational effects of interorganizational collaboration*. Journal of Management Studies, 40(2): 321–47. <https://doi.org/10.1111/1467-6486.00342>

HARLOCK, J., CAIELS, J., MARCZAK, J., PETERS, M., FITZPATRICK, R., WISTOW, G., FORDER, J. and JONES, K., 2020. *Challenges in integrating health and social care: the Better Care Fund in England*. Journal of health services research & policy, 25(2), pp.86-93. <https://doi.org/10.1177/1355819619869745>

HASNAIN-WYNIA, R., SOFAER, S., BAZZOLI, G.J., ALEXANDER, J.A., SHORTELL, S.M., CONRAD, D.A., CHAN, B., ZUKOSKI, A.P. and SWENEY, J., 2003. *Members' perceptions of community care network partnerships' effectiveness*. Medical Care Research and Review, 60(4_suppl), pp.40S-62S. DOI: <https://doi.org/10.1177/1077558703260272>

HEARLD, L. R., ALEXANDER, J. A., AND SHI, Y., 2015. *Leadership transitions in multisectoral health care alliances: Implications for member perceptions of participation value*. Health Care Management Review, 40(4), 274–285. 10.1097/HMR.0000000000000029

HEARLD, L. R., ALEXANDER, J. A., BEICH, J., MITTLER, J. N., and O'HORA, J. L. 2012. *Barriers and strategies to align stakeholders in healthcare alliances*. American Journal of Managed Care, 18(6, Suppl.), s148–s155. PMID: 23286710.

HEATH G., and RADCLIFFE J., 2007. *Performance measurement and the English ambulance service*. Public Money and Management, 27(3), 223–228. <https://doi.org/10.1111/j.1467-9302.2007.00583.x>

HEFFRON, F. 1989. *Organization theory and public organizations*. Englewood Cliffs, NJ: Prentice Hall, p. 323

HERMANS, S., SEVENANTS, A., DECLERCQ, A., VAN BROECK, N., DELIENS, L., COHEN, J., & VAN AUDENHOVE, C. 2019. *Integrated palliative care for nursing home residents: Exploring the challenges in the collaboration between nursing homes, home care and hospitals*. International Journal of Integrated Care, 19(2), 3. <https://doi.org/10.5334/ijic.4186>

HOOD, C., 1991. *A public management for all seasons?*. Public administration, 69(1), pp.3-19. <https://doi.org/10.1111/j.1467-9299.1991.tb00779.x>

HOOD, C., 2000. *Paradoxes of public-sector managerialism, old public management and public service bargains*. International public management journal, 3(1), pp.1-22. [https://doi.org/10.1016/S1096-7494\(00\)00032-5](https://doi.org/10.1016/S1096-7494(00)00032-5)

HUMAN, S.E. and PROVAN, K.G., 2000. *Legitimacy building in the evolution of small-firm multilateral networks: A comparative study of success and demise*. Administrative science quarterly, 45(2), pp.327-365. <https://doi.org/10.2307/2667074>

HURST, J., JEE-HUGHES, M., 2001. *Performance measurement and performance management in OECD Health Systems*. Labour Market and Social Policy Occasional Papers, No. 47, OECD Publishing, Paris. <https://doi.org/10.1787/788224073713>

IMPELLIZZERI, A. 2000. *Gli indicatori di efficacia e di efficienza nelle amministrazioni locali*. Rivista trimestrale di scienza della amministrazione. Milano, Franco Angeli, 2000.

IO STORTO, C., GONCHARUK, A. G., 2017. *Efficiency vs Effectiveness: A benchmarking study on European healthcare systems*. Economics and Sociology, 10(3), 102-115. [10.14254/2071-789X.2017/10-3/8](https://doi.org/10.14254/2071-789X.2017/10-3/8).

ISTAT, 2017. *Elderly: health conditions in Italy and in the European Union*, 2017.

ISTAT, 2022. *BES 2021: Il benessere equo e sostenibile in Italia, 2022*. Available at https://www.istat.it/it/files//2022/04/BES_2021.pdf (accessed October 2023).

JUENKE, E.G. 2005. *Management Tenure and Network Time: Non-Experience Affects Bureaucratic Dynamic*. Journal of Public Administration Research and Theory, 15, 1, 113–31. <https://doi.org/10.1093/jopart/mui006>

KINGSLEY C. and PATEL S. 2017. *Patient-reported outcome measures and patient reported experience measures*. British Journal of Anaesthesia Education.17:137–44. <https://doi.org/10.1093/bjaed/mkw060>

KEAST, R., BROWN, K. and MANDELL, M., 2007. *Getting the right mix: Unpacking integration meanings and strategies*. International public management journal, 10(1), pp.9-33. <https://doi.org/10.1080/10967490601185716>

KENIS, P. AND PROVAN, K.G., 2009. *Towards an exogenous theory of public network performance*. Public administration, 87(3), pp.440-456. <https://doi.org/10.1111/j.1467-9299.2009.01775.x>

KELLEY, E., HURST J., 2006. *Health care quality indicators project: Conceptual framework paper*. OECD Health Working Papers, No. 23, OECD Publishing, Paris, <https://doi.org/10.1787/440134737301>

KLIJN, E., STEIJN, B. AND EDELENBOS, J. 2010. *The Impact of Network Management on Outcomes in Governance Networks*. Public Administration 88(4):1063–82. <https://doi.org/10.1111/j.1467-9299.2010.01826.x>

KOPPENJAN, J., AND KLIJN E. 2004. *Managing Uncertainties in Networks: A Network Approach to Problem Solving and Decision-Making*. London: Routledge;

KRUK, M.E., FREEDMAN, L.P., 2008. *Assessing health system performance in developing countries: a review of the literature*. Health policy, 85(3), pp.263-276. <https://doi.org/10.1016/j.healthpol.2007.09.003>

LAINE, J., LINNA, M., HÄKKINEN, U., NORO, A. 2005. *Measuring the productive efficiency and clinical quality of institutional long-term care for the elderly*. Health Economics, 14(3), 245-256; <https://doi.org/10.1002/hec.926>

LASKER, R.D., WEISS E.S., AND MILLER, R. 2001. *Partnership Synergy: a Practical Framework for Studying and Strengthening the Collaborative Advantage*. Milbank Quarterly, 79(2):179–205. <https://doi.org/10.1111/1468-0009.00203>

LE GRAND J., 1991. *Quasi-market and social policy*. The Economic Journal, 101. <https://doi.org/10.2307/2234441>

LEGA, F., 2003. *Gruppi e reti aziendali in sanità: strategia e gestione*. Milano, Egea.

LEGA, F., 2016. *Leadership e management dell'azienda sanitaria: conoscere il settore e il sistema, organizzare i servizi, dirigere i professionisti*. Egea.

LEGA, F. and SARTIRANA, M., 2011. *Managed clinical networks: scope, evidence, and feasibility*. *International journal of clinical practice*, 65(7), p.725. <https://dx.doi.org/10.1111/j.1742-1241.2011.02686.x>

LEMIEUX-CHARLES, L., CHAMBERS, L.W., COCKERILL, R., JAGLAL, S., BRAZIL, K., COHEN, C., LECLAIR, K., DALZIEL, B. and SCHULMAN, B., 2005. *Evaluating the effectiveness of community-based dementia care networks: the Dementia Care Networks' Study*. *The gerontologist*, 45(4), pp.456-464. <https://doi.org/10.1093/geront/45.4.456>

LEUTZ W. 1999. *Five laws for integrating medical and social services: lessons from the United States and the United Kingdom*. *The Milbank Quarterly*, 77(1): 77-110. <https://doi.org/10.1111/1468-0009.00125>

LING, T., BRERETON, L., CONKLIN, A., NEWBOULD, J., and ROLAND, M., 2012. *Barriers and facilitators to integrating care: Experiences from the English Integrated Care Pilots*. *International Journal of Integrated Care*, 12, Article e129. <https://doi.org/10.5334/ijic.982>

LORANT, V., NAZROO, J., & NICAISE, P., & THE TITLE107 STUDY GROUP. 2017. *Optimal network for patients with severe mental illness: A social network analysis*. *Administration and Policy in Mental Health and Mental Health Services Research*, 44(6), 877–887. <https://doi.org/10.1007/s10488-017-0800-7>

MANDELL, M. P. 2001. *Getting Results through Collaboration: Networks and Network Structures for Public Policy and Management*. Westport, CT: Quorum Books.

MANDELL, M.P. and KEAST, R., 2008. *Evaluating the effectiveness of interorganizational relations through networks: Developing a framework for revised performance measures*. *Public management review*, 10(6), pp.715-731. <https://doi.org/10.1080/14719030802423079>

MANNION, R., BRAITHWAITE, J., 2012. *Unintended consequences of performance measurement in healthcare: 20 salutary lessons from the English National Health Service*. *Internal medicine journal*, 42(5), 569-574. <https://doi.org/10.1111/j.1445-5994.2012.02766.x>

MANNION, R., GODDARD, M., SMITH, P, 2019. *On the Limitations and Pitfalls of Performance Measurement Systems*. *Quality in Health Care: Strategic Issues in Health Care Management*, pp. 158-169. Routledge. <https://doi.org/10.4324/9781315192611>

MAOR, M., 1999. *The paradox of managerialism*. *Public Administration Review*, 59, 5–18. <https://doi.org/10.2307/977475>

MARINÒ, L., 2008. *La ricerca dell'economicità nelle aziende sanitarie locali: concetti, modelli, decisioni*. Torino, Giappichelli.

MARINÒ L., 2014. *L'azienda pubblica nel quasi-mercato: Il management sanitario tra autonomia formale ed opzioni di scelta reali*. Torino. Giappichelli.

MARKOVIC, J. 2017. *Contingencies and Organizing Principles in Public Networks*. *Public Management Review* 19(3):361–80. <https://doi.org/10.1080/14719037.2016.1209237>

MARTINI, G. M., BERTA, P., MULLAHY, J., VITTADINI, G. 2014. *The effectiveness – efficiency trade-off in health care: The case of hospitals in Lombardy, Italy*. *Regional Science and Urban Economics*, 49, 217-231 <https://doi.org/10.1016/j.regsciurbeco.2014.02.003>

MELE R., TRIASSI M. (a cura di), 2008. *Management e gestione delle aziende sanitarie*, Padova, CEDAM.

MILLER R, MILLAR R., 2017. *Partnering for improvement: inter-organisational developments in the NHS*. Birmingham: University of Birmingham. Available at

www.birmingham.ac.uk/Documents/college-social-sciences/social-policy/HSMC/news-events/2017/final-report-partnering-for-improvement-august-2017.pdf (Accessed October 2023)

MINISTERO DELLA SALUTE, 2022. *Relazione sullo Stato Sanitario del Paese 2017 – 2021*. Available at https://www.salute.gov.it/imgs/C_17_pubblicazioni_3270_allegato.pdf (accessed October 2023).

MINISTERO DELLA SALUTE. *Preliminary document on the contents of the National Health Plan 2011-2013*. November 18, 2010

MINISTERO DELLA SALUTE. *Organizzazione dell'assistenza all'ictus: le Stroke Unit*. Quaderni del Ministero della Salute, n.2 marzo - aprile 2010.

MINISTERO DELLA SALUTE. *Criteri di appropriatezza strutturale, tecnologica e clinica nella prevenzione, diagnosi e cura della patologia cerebrovascolare*. Quaderni del Ministero della Salute, n.14 marzo – aprile 2012.

MITCHELL, R.E., FLORIN, P. and STEVENSON, J.F., 2002. *Supporting community-based prevention and health promotion initiatives: Developing effective technical assistance systems*. Health Education & Behavior, 29(5), pp.620-639. <https://doi.org/10.1177/109019802237029>

MOYNIHAN B, DAVIS D, PEREIRA A, CLOUD G, MARKUS HS. 2010. *Delivering regional thrombolysis via a hub-and-spoke model*. Journal of the Royal Society of Medicine. 2010 Sep;103(9):363-9. <https://doi.org/10.1258/jrsm.2010.090434>

MUSGRAVE R.A., 1959. *The theory of public finance: a study in public economy*, New York, McGraw-Hill.

MUSSARI R., 2017. *Economia delle amministrazioni pubbliche*, Milano, McGraw-Hill Education.

MUSSARI R., 2022. *Performance e valore pubblico*. Cedam.

NARDETTO L, GIOMETTO B, MORETTO G, MANTOAN D, SAIA M. 2017. *Hub-and-spoke stroke network in the Veneto region: a retrospective study investigating the effectiveness of the stroke pathway and trends over time*. Neurological Sciences. 2017 Dec;38(12):2117-2121. <https://doi.org/10.1007/s10072-017-3118-z>

NUTI, S., 2008. *La valutazione della performance in sanità*. Bologna. Il Mulino

NUTI, S., DE ROSIS, S., BONCIANI, M. AND MURANTE, A.M., 2017. *Rethinking Healthcare Performance Evaluation Systems towards the People-Centredness Approach: Their Pathways, their Experience, their Evaluation*. Healthcare Papers. <https://doi.org/10.12927/hcpap.2017.25408>

NUTI, S., NOTO, G., VOLA, F. AND VAINIERI, M., 2018. *Let's play the patients music: A new generation of performance measurement systems in healthcare*. Management Decision, 56(10), pp.2252-2272. <https://doi.org/10.1108/MD-09-2017-0907>

O' TOOLE, L. J., 1997. *Treating Networks Seriously: Practical and Research-Based Agendas*. Public Administration. Public Administration Review 57 (1): 45–52. <https://doi.org/10.2307/976691>

O' TOOLE JR, L.J. and MEIER, K.J., 2004. *Public management in intergovernmental networks: Matching structural networks and managerial networking*. Journal of public administration research and theory, 14(4), pp.469-494. <https://doi.org/10.1093/jopart/muh032>

OECD, 2020. *Who Cares? Attracting and Retaining Care Workers for the Elderly*. OECD Health Policy Studies, OECD Publishing, Paris. <https://doi.org/10.1787/92c0ef68-en>.

OECD, 2021, *Health at a Glance 2021: OECD Indicators*. OECD Publishing, Paris, <https://doi.org/10.1787/ae3016b9-en>.

OECD/EUROPEAN UNION, 2022. *Health at a Glance: Europe 2022: State of Health in the EU Cycle*. OECD Publishing, Paris, <https://doi.org/10.1787/507433b0-en>

ONGARO, E. and VALOTTI, G., 2008. *Public management reform in Italy: explaining the implementation gap*. International Journal of Public Sector Management, 21(2), pp.174-204. <https://doi.org/10.1108/09513550810855654>

OSSERVATORIO ICTUS ITALIA. 2018. *Rapporto 2018 sull'ictus in Italia. Una fotografia su prevenzione, percorsi di cura e prospettive*.

OSSERVATORIO FIASO. 2013. *Il ruolo delle Aziende Sanitarie nelle reti cliniche*.

PAGE, S.B., STONE, M.M., BRYSON, J.M. and CROSBY, B.C., 2018. *Coping with value conflicts in interorganizational collaborations*. Perspectives on Public Management and Governance, 1(4), pp.239-255. <https://doi.org/10.1093/ppmgov/gvx019>

PALMER, S., TORGERSON, D. J. 1999. *Definitions of efficiency*. British Medical Journal, 318, 1136. <https://doi.org/10.1136/bmj.318.7191.1136>

PEETERS, R., WESTRA, D., VAN RAAK, A.J. and RUWAARD, D., 2023. *So happy together: a review of the literature on the determinants of effectiveness of purpose-oriented networks in health care*. Medical Care Research and Review, 80(3), pp.266-282. <https://doi.org/10.1177/10775587221118156>

PERRI, P., GOODWIN, N., PECK, E. AND FREEMAN, T., 2016. *Managing networks of twenty-first century organisations*. Springer. <https://doi.org/10.1057/9780230286115>

PORTER, M.E., 2010. *What is value in health care?* The New England Journal of Medicine, 363(26), pp.2477-2481. <https://doi.org/10.1056/nejmp1011024>

POWELL, W. W. 1990. *Neither market nor hierarchy: Network forms of organization*. In Barry M. Staw and L. L. Cummings (eds.), *Research in Organizational Behavior*, 12: 295-336. Greenwich, CT: JAI Press.

PROVAN, K.G. and KENIS, P., 2008. *Modes of network governance: Structure, management, and effectiveness*. Journal of public administration research and theory, 18(2), pp.229-252. <https://doi.org/10.1093/jopart/mum015>

PROVAN, K.G., and LEMAIRE, R.H.. 2012. *Core concepts and key ideas for understanding public sector organizational networks: Using research to inform scholarship and practice*. Public Administration Review 72 (5): 638-48. <https://doi.org/10.1111/j.1540-6210.2012.02595.x>

PROVAN, K.G. and MILWARD, H.B., 1995. *A Preliminary Theory of Interorganizational Network Effectiveness: A Comparative Study of Four Community Mental Health Systems*. Administrative Science Quarterly 40 (1): 1-33.

PROVAN, K.G. and MILWARD, H.B., 2001. *Do networks really work? A framework for evaluating public-sector organizational networks*. Public administration review, 61(4), pp.414-423. <https://doi.org/10.1111/0033-3352.00045>

PROVAN, K.G., and SEBASTIAN J. G. 1998. *Networks within Networks: Service Link Overlap, Organizational Cliques, and Network Effectiveness*. The Academy of Management Journal 41(4):453-63. 10.2307/257084

RAAB, J., MANNACK, R.S., and CAMBRÉ, B.. 2015. *Combining structure, governance, and context: A configurational approach to network effectiveness*. Journal of Public Administration Research and Theory 25 (2): 479-511. <https://doi.org/10.1093/jopart/mut039>

RICCIO, F. and PICCIOLI, A., 2019. *Governance di rete: sfida complessa e innovazione consapevole*. Mecosan: management ed economia sanitaria. 109, 1, Franco Angeli, pp.105-112.

ROSEN, R. 2000. *Applying research to healthcare policy and practice: medical and managerial views on effectiveness and the role of research*. Journal of Health Service Research and Policy, Vol. 5 No. 2, pp. 103-8. <https://doi.org/10.1177/135581960000500208>

ROTONDO, F., GIOVANELLI, L., FADDA, N. and EZZA, A., 2018. *A methodology to design a performance management system in preventive care*. BMC Health Services Research, 18, pp.1-11. <https://doi.org/10.1186/s12913-018-3837-8>

RUSSELL, L.B., GOLD, M.R., SIEGEL, J.E., DANIELS, N., WEINSTEIN, M.C., 1996. *The role of cost-effectiveness analysis in health and medicine*. Jama, 276(14), pp.1172-1177. 10.1001/jama.1996.03540140060028

SARKA, P. and PAVLA, S., 2016. *Horizontal Integration of Hospitals—Does it have an Impact on their Effectiveness?*. Procedia Economics and Finance, 39, pp.553-561. [https://doi.org/10.1016/S2212-5671\(16\)30299-4](https://doi.org/10.1016/S2212-5671(16)30299-4)

SAZ-CARRANZA, A., and S. M. OSPINA. 2011. *The Behavioral Dimension of Governing Interorganizational Goal-Directed Networks—Managing the Unity-Diversity Tension*. Journal of Public Administration Research and Theory 21(2):327–65. <https://doi.org/10.1093/jopart/muq050>

SHORTELL, S.M., ZUKOSKI, A.P., ALEXANDER, J.A., BAZZOLI, G.J., CONRAD, D.A., HASNAIN-WYNIA, R., SOFAER, S., CHAN, B.Y., CASEY, E., MARGOLIN, F.S., 2002. *Evaluating partnerships for community health improvement: tracking the footprints*. Journal of Health Politics, Policy and Law, 27(1), pp.49-92. <https://doi.org/10.1215/03616878-27-1-49>

SIMONEN, O., BLOM, M., VIITANEN, E., 2011. *Knowledge of effectiveness and its application in secondary healthcare management*. International Journal of Productivity and Performance Management, 60(8), pp.797-812. <https://doi.org/10.1108/17410401111182198>

SMITH, P.C., 1993. *Outcome-related Performance Indicators and Organizational Control in the Public Sector*. British journal of Management, 4(3), pp.135-151. <https://doi.org/10.1111/j.1467-8551.1993.tb00054.x>

SMITH, J.G., 2020. *Theoretical advances in our understanding of network effectiveness*. Perspectives on Public Management and Governance, 3(2), pp.167-182. <https://doi.org/10.1093/ppmgov/gvz032>

SOX, H.C., and GREENFIELD, S., 2009. *Comparative effectiveness research: a report from the Institute of Medicine*. Annals of internal medicine, 151(3), pp.203-205. <https://doi.org/10.7326/0003-4819-151-3-200908040-00125>

STEIJGER, D., CHATTERJEE, C., GROOT, W., PAVLOVA, M., 2023. *Challenges and Limitations in Distributional Cost-Effectiveness Analysis: A Systematic Literature Review*. International Journal of Environmental Research and Public Health, 20(1), p.505. <https://doi.org/10.3390/ijerph20010505>

STEVENS, E.G.V., EMMETT, E.S., WANG, Y., MCKEVITT, C.J., WOLFE, C.D.A., 2017. *The Burden of Stroke in Europe: Overview of stroke burden and care in each EU and SAFE member country*. King's college London. In Stroke Alliance for Europe. ISBN 0661.651.450, p 108.

STROKE ALLIANCE FOR EUROPE. 2017. *The Burden of Stroke in Europe report* conducted by King's College London for the Stroke Alliance for Europe. Available at https://www.stroke.org.uk/sites/default/files/the_burden_of_stroke_in_europe_-_challenges_for_policy_makers.pdf (accessed October 2023)

- TESTI, A., PANERO, C., GIACHELLO, M., ANSALDI, F., LOCATELLI, W., 2019. *Governance delle reti sanitarie: i Dipartimenti Inter-Aziendali Regionali (DIAR) nel nuovo sistema sanitario ligure*. Mecosan: management ed economia sanitaria:109,1, pp.57-81. Milano. Franco Angeli.
- TEUSCHL Y, and BRAININ M. 2010. *Stroke education: discrepancies among factors influencing prehospital delay and stroke knowledge*. International Journal of Stroke. 2010 Jun;5(3):187-208. <https://doi.org/10.1111/j.1747-4949.2010.004>
- THE DALTON REVIEW, 2014. *Examining New Options and Opportunities for Providers of NHS Care*.
- THE SCOTTISH OFFICE, Department of Health. 1999. *Introduction of Managed Clinical Networks within the NHS in Scotland*. Leeds: NHS Executive.
- THOMAS, P.G, 2006. *Performance measurement, reporting and accountability. Recent Trends and Future Directions*, ANU Press.
- THOMPSON, G., 2003. *Between Hierarchies and Markets – The Logic and Limit of Network Forms of Organization*. Oxford: Oxford University Press.
- TURRINI, A., CRISTOFOLI, D., FROSINI, F., NASI, G., 2010. *Networking literature about determinants of network effectiveness*. Public administration, 88(2), pp.528-550. <https://doi.org/10.1111/j.1467-9299.2009.01791.x>
- VAN RAAIJ, D.P., 2006. *Norms network members use: An alternative perspective for indicating network success or failure*. International Public Management Journal, 9(3), pp.249-270. <https://doi.org/10.1080/10967490600899549>
- VAN THIEL, S., LEEUW, F.L., 2002. *The performance paradox in the public sector*. Public performance & management review, 25(3), pp.267-281. <https://doi.org/10.1080/15309576.2002.11643661>
- VANGEN, S., 2017. *Culturally diverse collaborations: a focus on communication and shared understanding*. Public Management Review, 19(3), pp.305-325. <https://doi.org/10.1080/14719037.2016.1209234>
- VERWEIJ, S., KLIJN E., EDELENBOS J., VAN BUUREN A.. 2013. *What Makes Governance Networks Work? A Fuzzy Set Qualitative Comparative Analysis of 14 Dutch Spatial Planning Projects*. Public Administration 91(4): 1035–55. <https://doi.org/10.1111/padm.12007>
- WAFI, H.A., WOLFE, C.D., EMMETT, E., ROTH, G.A., JOHNSON, C.O., WANG, Y., 2020. *Burden of stroke in Europe: thirty-year projections of incidence, prevalence, deaths, and disability-adjusted life years*. Stroke, 51(8), pp.2418-2427. <https://doi.org/10.1161/STROKEAHA.120.029606>
- WANG, W., 2016. *Exploring the determinants of network effectiveness: The case of neighborhood governance networks in Beijing*. Journal of Public Administration Research and Theory, 26(2), pp.375-388. <https://doi.org/10.1093/jopart/muv017>
- WATTS, D. J. 2003. *Six Degrees: The Science of a Connected Age*. New York: W.W. Norton.
- WHO, 1946. *Constitution of the World Health Organization*, New York, July 22, 1946.
- WHO, 2006. *Quality of care: A process for making strategic choices in health systems*. WHO Press, Geneva
- WHO, 2015. *Priorities for health systems strengthening in the European Region 2015-2020: walking the talk on people centredness*. Copenhagen: WHO Regional Office for Europe.
- WHO, 2016. *Strengthening people-centred health systems in the WHO European Region: framework for on integrated health services delivery*.

WILLIAMSON O., 1975. *Market and hierarchies: analysis and antitrust implication*. New York Free Press.

WILSON, T., BERWICK, D. M., CLEARY, P. D. 2003. *What do collaborative improvement projects do? Experience from seven countries*. The Joint Commission Journal on Quality and Patient Safety, 29(2), 85–93. [https://doi.org/10.1016/s1549-3741\(03\)29011-0](https://doi.org/10.1016/s1549-3741(03)29011-0)

YIN, R.K., 2003. *Case Study Research: Design and Methods*. Sage, Thousand Oaks (CA).

YSA, T., SIERRA, V., ESTEVE, M., 2014. *Determinants of network outcomes: The impact of management strategies*. Public administration, 92(3), pp.636-655. <https://doi.org/10.1111/padm.12076>

ZACOCS, R.C. and EDWARDS E.M.. 2006. *What Explains Community Coalition Effectiveness? A Review of the Literature*. American Journal of Preventive Medicine, 30, 4, 351–61. <https://doi.org/10.1016/j.amepre.2005.12.004>

ZANOTTI A., 2000. *Economia e governo dei gruppi aziendali*. Milano. Egea.

ZEDDE, M., PEZZELLA, F.R., PACIARONI, M., COREA, F., REALE, N., TONI, D. AND CASO, V., 2020. *Stroke care in Italy: an overview of strategies to manage acute stroke in Covid-19 time*. European Stroke Journal, 5(3), pp.222-229. <https://doi.org/10.1177/2396987320942622>.

Appendix

Analysed documents: Lazio

Normative intervention	Content
Regional Executive Committee Resolution No. 559 of February 16, 1999	Plan for intensive and sub-intensive areas in the hospital facilities of the Lazio Region
Regional Council Resolution No. 114 of July 31, 2002	Guidelines for Regional Health Programming for the three-year period 2002 - 2004
Regional Executive Committee Resolution No. 424 of July 14, 2006	Minimum Requirements for the Authorization of the Establishment and Operation of Healthcare and Socio-Health Activities in Healthcare Facilities
Regional Executive Committee Resolution No. 301 of April 24, 2006	Approval of the Regional Program for the Evaluation of Health Intervention Outcomes, known as P.Re.Val.E.
Regional Executive Committee Resolution No. 149 of March 6, 2007	Regional Health Plan 2008-2010
Regional Executive Committee Resolution No. 267 of April 16, 2007	Guidelines for the Establishment and Development of High-Specialty and Emergency Care Networks in the Lazio Region
Regional Executive Committee Resolution No. 420 of June 12, 2007	Identification, Organisation, and Functioning of Healthcare Networks in the Lazio Region
Decree of the Commissioner ad acta No. U0087 of December 18, 2009	Regional Health Plan 2010-2012
Decree of the Commissioner ad acta No. U0075 of September 29, 2010	Acute Cerebral Stroke Care Network
Decree of the Commissioner ad Acta No. U00247 of July 25, 2014	Adoption of the new edition of the Operational Programs 2013-2015 to safeguard the strategic objectives for the Recovery from Healthcare Budget Deficits in the Lazio Region
Decree of the Commissioner ad Acta No. U00368 of October 31, 2014	Reorganisation of the hospital network to safeguard the strategic objectives for the recovery from healthcare budget deficits in the region
Decree of the Commissioner ad Acta No. U00257 of July 5, 2017	Planning of the hospital network for the biennium 2017-2018, in accordance with the standards provided in MD 70/2015
Decree of the Commissioner ad Acta No. U00226 of June 5, 2018	Reorganisation of rehabilitation pathways in both hospital and community settings
Decree of the Commissioner ad Acta No. U00314 of August 29, 2018	Implementation of the Agreement, pursuant to point 8.1 of Annex 1 to Ministerial Decree April 2, 2015, No. 70, regarding the document 'Guidelines for the Revision of Clinical Networks - Time-Dependent Networks
Determination of the Health and Sociohealth Integration Directorate No. G12771 of October 10, 2018	Emergency procedure in case of unavailability of a HUB for interventional neuroradiology activity
Determination of the Health and Sociohealth Integration Directorate No. G16185 of December 12, 2018	Activation of the ADVICE platform for teleconsultation between 'Hub' and 'Spoke' centres in the Emergency, Time-Dependent, and Infectious Diseases Networks.
Regional directorate: health and integrated healthcare. Order of the president no. z00003 dated March 6, 2020	Measures for the prevention and management of the Covid-2019 epidemiological emergency.
Determination of the Health and Sociohealth Integration Directorate No. G11799 of October 13, 2020	Stroke Network Plan

Decree of the Commissioner ad Acta No. U00096 of July 21, 2020	Plan for the reorganisation of the hospital network in response to the Covid-19 emergency
Determination of the Health and Sociohealth Integration Directorate No. G07512 of June 18, 2021	Hospital Network Planning 2021-2023 in accordance with the standards provided in Ministerial Decree 70/2015
Regional Executive Committee Resolution No. 643 of July 26, 2022	General Guidelines for the Planning of Territorial Reorganisation Interventions in the Lazio Region

Analysed documents: Liguria

Normative intervention	Content
Regional Law No. 41 of December 7, 2006	Reorganisation of the Regional Health Service
Regional Council Resolution No. 22 of September 30, 2009	Regional Socio-Health Plan 2009 - 2011
Regional Law No. 17 of July 29, 2016	Establishment of the Ligurian Healthcare Company of the Liguria Region (A.Li.Sa.) and Guidelines for the Reorganisation of Regional Provisions in Healthcare and Socio-Health Matters
Regional Law No. 27 of November 18, 2016	Amendments to Regional Law of December 7, 2006, No. 41 (Reorganisation of the Regional Healthcare Service) and to Regional Law of July 29, 2016, No. 17 (Establishment of the Ligurian Healthcare Company of the Liguria Region - A.Li.Sa. - and Guidelines for the Reorganisation of Regional Provisions in Healthcare and Socio-Health Matters).
Extraordinary Commissioner's Resolution No. 1 of January 12, 2017	Operational Guidelines for Healthcare and Socio-Health Activities for the Year 2017
Regional Executive Committee Resolution No. 104 of February 8, 2017	Inter-Company Departments. Initial Identification
Extraordinary Commissioner's Resolution No. 131 of November 9, 2017	Approval of the General Regulation for Regional Inter-Company Departments (DIAR)
Resolution of the Regional Council No. 21 of December 5, 2017	Regional Socio-Health Plan 2017 - 2019
Regional Government Resolution No. 7 of January 11, 2019	Operational Guidelines for Healthcare and Socio-Health Activities for the Year 2019
Extraordinary Commissioner's Resolution No. 130 of April 17, 2019	Provisions regarding the reorganisation of Neurosurgery activities in the Genoa Metropolitan Area and the stroke pathway at the regional level in accordance with the proposals identified by the DIAR
Extraordinary Commissioner's Resolution No. 253 of August 7, 2019	Provisions regarding the regional pathways identified and defined by the DIAR: clinical and organisational guidelines
A.Li.Sa Resolution No. 164 of May 6, 2020	Provisions regarding the consolidation of good practices implemented during phase 1 of the Covid-19 pandemic and organisational identification for in-hospital care management
Regional Executive Committee Resolution No. 155 of March 4, 2022	Regional Inter-Company Departments (DIAR): Coordination and Direction Functions
General Director's Resolution ASL 1 No. 168 of March 11, 2022	Institution of the Inter-Company Department of Neurosciences and Neurorehabilitation for the Ligurian Ponente Region, ASL 1 and ASL 2
General Director's Resolution No. 153 of May 4, 2022	Update and Approval of the New General Regulation for Inter-Company Departments
Administrative Measure No. 70 of March 24, 2023	Regional Socio-Health Plan 2023 – 2025

Analysed documents: Lombardy

Normative intervention	Content
Regional Council Resolution No. 462 of March 13, 2002	Regional Socio-Health Plan 2002-2004
Regional Executive Committee Resolution No. 20592 of February 11, 2005	Cardio-cerebrovascular diseases: Prevention, Diagnosis, and Treatment Interventions
Regional Executive Committee Resolution No.257 of October 26, 2006	Regional Socio-Health Plan 2007-2009
Directorate General of Health Decree No. 10068 of September 18, 2008	Determinations Regarding the Network Organisation and Criteria for Recognition of Cerebrovascular Care Units (UCV - Stroke Units)
Regional Law No. 33 of December 30, 2009	Consolidated Text of Regional Laws on Health Matters
Regional Council Resolution No. 88 of November 17, 2010	Regional Socio-Health Plan 2010-2014
Regional Executive Committee Resolution No. 1694 of June 3, 2019	Social and health networks: further development of the model for the activation and implementation of new clinical-assistance and organisational networks
Regional Executive Committee Resolution No. 2672 of December 16, 2019	Decisions regarding the management of healthcare and social health services for the year 2020
Decree of the General Welfare Directorate No. 18447 of December 17, 2019	Clinical assistance and organisational networks - appointment of the members of the coordination bodies and approval of network plans for the cardiovascular, diabetic-endocrinological, neuroscience, oncology, and rheumatology networks.
Regional Executive Committee Resolution No. 2986 of March 23, 2020	Further provisions regarding the epidemiological emergency due to Covid-19 – territorial area
Regional Executive Committee Resolution No. 3115 of May 7, 2020	Guidelines for the organisation of healthcare activities in relation to the course of the Covid-19 epidemic.
Regional Executive Committee Resolution No. 3264 of June 16, 2020	Hospital network reorganisation plan: implementation of article 2 of law decree 34/2020
Regional Executive Committee Resolution No. 3876 of November 19, 2020	Determination for the integrated hospital-territory management for patients with Covid-19 or suspected cases.
Regional Executive Committee Resolution No. 7473 of November 30, 2022	Stroke Network in the Lombardy Region. Identification of adult stroke patients in the pre-hospital phase. Centralization criteria. Definition of network nodes.

Analysed documents: Sardinia

Normative intervention	Content
Regional Executive Committee Resolution No. 51/9 of November 4, 2005	Regional Healthcare Plan 2006 2008
Regional Executive Committee Resolution No. 38/12 of July 28, 2015	Reorganisation of the regional hospital network
Regional Executive Committee Resolution No. 6/15 of February 2, 2016	Reorganisation of the regional hospital network 2015 - 2018
Document 16, 2017	Reorganisation of the regional hospital network
Regional Executive Committee Resolution No. 34/10 of July 3, 2018	Guidelines for the Definition of Integrated Care Networks
Regional Executive Committee Resolution No. 9/22 of 24 March, 2022	Regional Health Services Plan 2022-2024

Analysed documents: Tuscany

Regional Council Resolution No. 53 dated July 16, 2008	Regional Health Plan 2008 - 2010
Regional Council Resolution No. 91 dated November 5, 2014	Regional Integrated Health and Social Plan 2012 - 2015
Regional Executive Committee Resolution No. 1186 dated December 15, 2014	Preliminary Guidelines for the establishment the Stroke Network
Regional Law No.84 dated December 28, 2015	Reorganisation of the Institutional and Organisational Structure of the Regional Healthcare System.
Regional Executive Committee Resolution No. 145 dated March 3, 2016	Guidelines for the Reorganisation of the Hospital Network in Implementation of the Health Pact 2014/2016 and Decree No. 70 dated April 2, 2015
Regional Executive Committee Resolution No.1378 dated December 27, 2016	Time-dependent clinical networks as per Decree No. 70/2015. Approval of guidelines for the establishment of regional networks
Regional Executive Committee Resolution No.1380 dated December 27, 2016	Time-dependent clinical networks, as per Decree No. 70/2015. Approval of the regional network programming documents
Regional Executive Committee Resolution No. 958 dated August 27, 2018	Guidelines for Regional Clinical Networks
Regional Council Resolution No. 73 dated October 9, 2019	Regional Integrated Health and Social Plan 2018 - 2020
Executive Decree No. 6556 dated May 8, 2020	Covid Emergency - Time-dependent pathways.
Regional Executive Committee Resolution No. 1106 dated October 28, 2021	Regional Guidelines for Time-Dependent Clinical Networks – Stroke Network