

Hospital networks in Italy: state of the art and future perspectives.

Insights from a qualitative research study.

G. Damiani¹, M. Di Pumpo^{*1}, G. Giubbini², L. Lombi³, M.L. Specchia¹, L. Sommella⁴

¹ Università Cattolica del Sacro Cuore – Rome, Italy

² Fondazione Policlinico Universitario “A. Gemelli” IRCCS – Rome, Italy

³ Università Cattolica del Sacro Cuore – Milan, Italy

⁴ Fondazione Policlinico Universitario “Campus Bio-Medico di Roma” – Rome, Italy

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ABSTRACT

Background

Hospitals have undergone important changes that have led, in recent decades at the international level, to the need for greater integration between hospitals and local healthcare services. The main institutional networks that have been developed in Italy are, as commended by the institutional levels, of 4 main types: the Emergency-Urgency Network, the Time-Dependent Networks, the Oncological Networks, and the Networks with primary care settings. It was important to assess the state of the art and analyze it in relation to possible future developments.

Objective

The aim of the study was to collect insights from both evidence-based knowledge and personal experience gained by experts in the field regarding the current condition and possible future developments of hospital networks.

Material and methods

A qualitative research methodology was chosen. Four mini-focus group meetings were organized among participants with proven expertise on the subject. Discussions were guided by four open-ended questions corresponding to the four areas of interest. Directed content analysis was chosen as the methodology for data analysis and final reporting of results.

Results

Four main categories were explored: “hospital networks and complexity”, “hospital networks complexity and the need for integration”, “levers for hospital networks governance” and “the COVID-19 challenge and future developments for hospital networks”. In particular, the participants found that it is important to understand

healthcare systems as complex systems and, therefore, to study the properties of complex systems. In this way it is possible to achieve value-based healthcare in complex contexts. It is also necessary to keep in mind that complexity represents a challenge for coordination/integration in hospital networks. Mintzberg identified specific mechanisms to achieve it. Of them, mutual adaptation is the key to self-organization. Valentijn showed the organizational levels on which coordination/integration has to be obtained. Hospital network governance should include both hierarchy and self-determination logic to achieve integration in each of the four levels. The participants identified three key levers for governing complex organizations: “education”, which consists of multi-professional and multi-level training in governance in complex systems; “information” consisting in considering the data registering as an integral part of the clinical care process to informative value; “leadership”, which consists in convincing actors, directed towards personal gains, to achieve valuable goals. Finally, the challenge that COVID-19 served as an incentive for future developments of hospital networks.

Discussion

Various common points between the definitions of network and complex systems can be found. It is important to study the properties of complex systems in order to achieve value-based healthcare in the hospital networks context. The insights gained should be useful for all professionals from and across all levels of healthcare organizational responsibility, being able to orient roles and actions to achieve coordination/integration inside hospital networks.

Conclusions

Complexity literature can help understand how to achieve coordination/integration in healthcare settings and find levers for effective governance. It is important to study the current situation to anticipate and, possibly govern, future developments. In conclusion, governance of hospital networks should be interpreted as coordination/integration inside and across multiple organizational levels of co-responsibility.

RIASSUNTO

Background

Gli ospedali, negli ultimi decenni a livello internazionale, hanno subito importanti cambiamenti, con pertanto la necessità di una maggiore integrazione tra ospedali e servizi territoriali. Le principali reti istituzionali sviluppate in Italia sono, come definito a livello istituzionale, 4 principali tipologie: la Rete emergenza-urgenza, le Reti tempo-dipendenti, le Reti oncologiche e le Reti con strutture territoriali. Vi è la necessità di valutare la condizione attuale e analizzarla in relazione a possibili sviluppi futuri. Lo scopo dello studio era raccogliere spunti sia dalla conoscenza basata sull'evidenza scientifica che sull'esperienza personale acquisita da esperti del settore in merito allo stato dell'arte e ai possibili sviluppi futuri delle reti ospedaliere.

Materiale e metodi

È stata scelta una metodologia di ricerca qualitativa. Sono stati organizzati quattro mini-focus group tra partecipanti di comprovata esperienza in materia. Le discussioni sono state guidate mediante quattro domande a risposta aperta corrispondenti alle quattro aree

di interesse. La *directed content analysis* è stata scelta come metodologia per l'analisi dei dati e la rendicontazione finale dei risultati.

Risultati

Sono state esplorate quattro categorie principali: “reti ospedaliere e complessità”, “complessità delle reti ospedaliere e necessità di integrazione”, “leve per la governance delle reti ospedaliere” e “la sfida COVID-19 e gli sviluppi futuri delle reti ospedaliere”. In particolare, i partecipanti hanno riscontrato come è importante comprendere i sistemi sanitari quali sistemi complessi e, quindi, studiare le proprietà di tali sistemi. In questo modo è possibile ottenere un'assistenza sanitaria basata sul valore in contesti complessi. È inoltre necessario tenere presente che la complessità rappresenta una sfida per il coordinamento/integrazione nelle reti ospedaliere. Mintzberg ha identificato meccanismi specifici per raggiungerlo. Tra questi, l'adattamento reciproco è la chiave dell'auto-organizzazione. Valentijn ha mostrato i livelli organizzativi su cui deve essere ottenuta tale coordinamento/integrazione. La governance della rete ospedaliera dovrebbe includere sia la gerarchia che la logica di autodeterminazione per ottenere l'integrazione in ciascuno dei quattro livelli. I partecipanti hanno individuato tre leve chiave per governare le organizzazioni complesse: “formazione”, che consiste in una formazione multiprofessionale e multilivello sulla governance nei sistemi complessi; “informazione” consistente nel considerare la registrazione dei dati come parte integrante del processo clinico assistenziale con potenziale di valore informativo; “leadership”, che consiste nel convincere gli attori organizzativi, orientati a scopi personali, a raggiungere obiettivi di valore. Infine, i partecipanti hanno evidenziato come la sfida che il COVID-19 è servita da incentivo per gli sviluppi futuri delle reti ospedaliere. Le conoscenze acquisite dovrebbero dunque rivelarsi utili per tutti i professionisti a tutti i livelli di responsabilità delle organizzazioni sanitarie, in grado di orientare ruoli e azioni per raggiungere il coordinamento/integrazione all'interno delle reti ospedaliere.

Conclusioni

La letteratura sulla complessità può aiutare a capire come raggiungere il coordinamento/integrazione nelle strutture sanitarie e trovare leve per una governance efficace. È importante studiare la situazione attuale per anticipare ed eventualmente governare gli sviluppi futuri. In conclusione, la governance delle reti ospedaliere va interpretata come coordinamento/integrazione all'interno e attraverso più livelli organizzativi di corresponsabilità.

INTRODUCTION

The hospital has historically represented the place of "*hospitalitas*" (or hospitality) during the Middle Ages, giving hospitality to the poor and the sick in a non-specific manner according to the specific clinically framed needs but following a generic charitable-welfare model of social support. This model also offered assistance to patients with needs that were not classified according to the approach of modern medicine without making use of proven effective diagnostic-therapeutic interventions. This differentiation of the modalities and types of assistance on the basis of clinical problems took place starting from the 14th-15th century. In fact, over the course of these centuries there has been a

progressive differentiation of the pathways based on the clinical classification. We witnessed, albeit initially at a starting level, the separation of the spaces dedicated to patients in need of urgent care, often surgical and with the life of the patient at stake, compared to the spaces for patients with chronic diseases for which simple observation was sometimes combined with pharmacological remedies and also those dedicated to infected patients considered possible sources of contagion. Over the centuries and following the evolution of medical knowledge and the availability of new technologies, the contemporary hospital model appeared, made of blocks that are grouped together and developed vertically with both high technological concentration and high level of space optimization. This model is designed to provide treatments for complex acute conditions (characterized by a short time for intervention and a high level of resources needed) both in terms of diagnosis and therapy than for scientific research, with progressively reduced times and spaces for less complex and less intensive care cases (1).

At the international level it can be noted that, compared to a reduction in the total number of beds (from 567.62 / 100.000 inhabitants to 531.97 / 100.000 inhabitants in EU member states and from 351.73 / 100.000 inhabitants to 316.28 / 100.000 inhabitants in Italy, between 2011 and 2019) (2) and the average hospital stay (from 9.6 to 7.5 in EU member states and from 7.5 to 7.9 in Italy, between 2000 and 2014) (3), the rate of employed people is almost unchanged (from 78.8% to 76.9% in EU member states between 1995 and 2014 and from 78.1% to 77.3% in Italy from 1995 to 2013) (4).

Furthermore, we are witnessing the reorganization of healthcare which calls for the development of networks that link together hospitals and primary care services, through the adoption of guidelines for the integrated management of Diagnostic Therapeutic Assistance Pathways (PDTA), also called Clinical Pathways, and Protocols of Planned Discharge for fragile patients in post-acute clinical conditions (5).

The hospital clinical-assistance network, already introduced with the Italian Presidential Decree of 27.03.1992 (6) and redefined in the light of the Italian Ministerial Decree 70/2015 (7), has the objective of "ensuring global care in conditions of appropriateness, effectiveness, efficiency, quality and safety" (5). An essential element to ensure this is, therefore, "to relate professionals, structures and services that provide different types of care and social health interventions".

An institutional table was set up for the definition of clinical networks coordinated by the Italian National Agency for Regional Health Services (AGENAS) and composed of various institutional representatives, including the Ministry of Health, Regions, the Higher Institute of Health and the Italian Medicines Agency.

With regards to the structure and characteristics of the main Italian hospital networks, four basic types are distinguished:

- The Emergency-Urgency Network, following the issuance of the Presidential Decree of 27.03.1992, enables the transformation of the management of clinical cases into an emergency-urgency regime from a "service" which provided an urgent response to the acute event and the subsequent transport of the patient to the nearest emergency room, to a real "rescue system", which consists in the integration of subsequent rescue phases in order to optimize management of the critical time interval for the delivery of therapies before transport to the most suitable place of care (6).
- Time-dependent networks, whose main characteristic is the time factor as a determining element for the quality and outcome of care and therefore require that protocols be

structured taking into account specific time cut-offs indicated by the scientific literature as necessary for the effectiveness of the treatments provided (8).

- The Oncological Networks, which enacts the purpose of coordinating and integrating the early diagnosis phase, treatment in specialized settings, also including the possibility of home care under oncological control, using new pharmacological treatment options, in order to improve appropriate recourse to hospital in the context of which a hierarchical scale of services must be envisaged based on the complexity of the case treated (9).
- The Networks with primary care settings, which enables the creation of forms of healthcare connecting the hospital and the primary care settings in order to implement models based on the so-called "initiative medicine" with the creation of multi-disciplinary teams in regular contact with professionals working in hospitals, on the other hand, responding to the health and social needs of elderly patients and people with disabilities with larger and more varied care needs (10).

Hospital networks have common and specific characteristics which can be summarized as follows (5):

- Organizational model: the network organizational model must guarantee timely access in order to achieve the best results in terms of quality, clinical outcomes, satisfaction of health needs and the humanization of care. This model must be based on data from the epidemiological framework and analysis of needs and on the humanization of care processes. The network is governed by a regional coordination that acts as a representative body of the professional institutional components and the main stakeholders. This coordination must provide for the organizational and professional integration of all the components present, validate the Network Plan, verify the achievement of the set objectives, draw up an annual report on the progress of the Network's activity, ensure the optimization of professional technological resources, and define the levels of responsibility and specific activities between the nodes of the Network.
- Network plan: the plan for structuring the Networks is prepared and validated by the Regional Coordination of the Network. It must be consistent with the objectives assigned and related indicators and with the resources available, as well as contain the guidelines and operational guidelines for their achievement. It is subject to periodic review. The various network components contribute to achieving the general and specific objectives.
- Connection between the nodes of the network: in order to provide an appropriate connection between the nodes, it is necessary to put in place tools that also allow the sharing of resources (technological, human and financial ones) as well as their use by the nodes. Therefore, flexible but well-defined organizational structures are needed to guarantee the homogeneity of the treatment according to the PDTA, the quality of the care levels between the various nodes of the Network, the uniform professional growth of the operators, the optimization of resources, the homogenization of ability of the Network to act.

The specific characteristics of each network are described below.

- **Emergency-Urgency Network:**

the choice of which organizational model to adopt is entrusted to the individual Regions and autonomous provinces. In this regard, Ministerial Decree 70/2015 defined care standards. The network includes:

- a health alarm system, equipped with a short and universal access telephone number "118", in connection with the Operations Centers. They guarantee the coordination of all interventions in the reference area and activate the hospital response 24 hours per day;
- a territorial rescue system, consisting of rescue vehicles distributed throughout the territory: basic rescue vehicles (with rescuers), advanced rescue vehicles (medical professionals and / or nurses), air emergency transport;
- a set of services divided into First Aid Points, Hospital First Aid Departments, Emergency Departments-Urgency Acceptance (DEA) distinct, on the basis of the level of complexity, in DEA of I and II level (6);

- **time-dependent networks:**

they are characterized by the need for PDTAs, protocols and operative procedures for the transport of patients through the various settings; the timing for changing the setting must be specified: it must be the shortest time possible and it needs to be in compliance with the standards indicated by scientific guidelines. The main time-dependent networks present at a national level (and variously represented at the regional level) are the Cardiology Network for emergencies, the Neonatology Network with the related obstetrics units, the Stroke Network and the Severe Trauma Network (8);

- **Oncology Networks:**

they are characterized by various organizational models (from large and complex centers based on the model of Comprehensive Care Centers to more contained and specialized centers); epidemiological analysis centers and cancer registries are provided for determining the needs, screening programs, access points, reference nodes for high specialization, all through a multi-disciplinary / multi-professional approach; it is foreseen the establishment, in integration with primary care settings, of the Local Network of Palliative Care and of the Pain therapy Network, with the definition of the transfer criteria between the different settings according to clinical and organizational quality standards (9);

- **Networks with primary care settings:**

They are characterized by hospital-primary care continuity: hospitals must ensure continuity of care from the admission setting to the discharge setting for patients, and the treatment of complex acute illness needs to relate to primary healthcare settings and social care. It is intended as a place for promoting dialogue between health and social institutions, according to their respective competencies, with particular reference to paths dedicated to non-autonomous individuals, rehabilitation and home-based/residential care. This hospital-primary care continuity must therefore include the primary care settings for taking care of chronic patients (health houses and further models, updated

according to the developments indicated by the Italian National Recovery and Resilience Plan or PNRR (11).

Alongside the main hospital networks described, there are a number of them currently at degrees of formalization in the various Regions, such as the Transfusion Network, the Network for Complications in Pregnancy, the National Network of Rare Cancers, the Transplant Network, the Network for Rare Diseases, the Pain therapy network, the specialist medicine networks, the pediatric network (12).

Therefore, the aim of the study was to collect insights from both evidence-based knowledge and personal experience gained by experts in the field, in order to assess the state-of-the-art and analyze the possible future developments of hospital networks.

MATERIALS AND METHODS

A qualitative research methodology was chosen. A mini-focus group was organized with 4 meetings. Five participants were invited to the focus group in order to gather experts from every knowledge area pertaining to the scope of the study. The focus groups were conducted between January and April 2022. Study subjects were identified through chart review, contacted telephonically, and requested to participate in the study after explaining the rationale of the research. Purposive sampling of experts was undertaken. Participants invited to take part in mini-focus groups, in addition to be aged ≥ 18 years old and to be able to give consent, had to cover the role of experts in public health, hospital management, primary care organization, healthcare networks, qualitative research methodology applied to healthcare so that each of the 5 fields was represented by at least one expert. Homogeneity within each group encouraged group members to participate equally. All experts provided written consent to participate. All participants took part actively in the debate and tried to give answers integrating both evidence-based knowledge and personal experience. Focus group discussions lasted about 60 minutes, were audio-recorded and transcribed verbatim. Discussions were guided with the help of 4 open-ended questions, pre-determined by the focus group leader with the 4 main areas that the study wanted to explore. The chosen categories were: “hospital networks and complexity”, “hospital networks complexity and the need for integration”, “levers for hospital networks governance” and “the COVID-19 challenge and future developments for hospital networks”.

Directed content analysis was chosen as the methodology for data analysis to obtain results for the final reporting (13). Transcript text was coded using the predetermined categories. After the first coding process, the focus group leader examined the data for each category to determine whether a second coding phase for subcategories was needed, which were all indicated as subparagraphs in the Results section. A peer debriefing was performed by a peer researcher external to the study reviewing and assessing the transcripts in order to detect any errors and biases before the last phase. Finally, the obtained results were synthesized and transposed to narrative form as reported in the Results section.

RESULTS

As reported below, after transposing coded data into narrative form, 4 paragraphs, corresponding to the 4 categories of choice to lead the discussion, and a total of 13 subparagraphs, corresponding to the subcategories, were obtained.

1. HOSPITAL NETWORKS AND COMPLEXITY

In order to begin the topic discussion, Networks were defined and the concept concerning Complexity theory and systems was explored.

1.1 *Network theory and complexity theory*

A clear definition of Network is given by Goodwin (14): "any moderately stable model of connections between organizations or between organizations and individuals, in which these ties represent some form of recognizable responsibility (however weak and in any case ready to be overcome), of a formal or informal, weak or strong, loose or tight, limited or unlimited nature". This definition underlines the importance of co-responsibility among organizational actors as a constitutive element of Networks. Co-responsibility is in fact a key concept in realizing organizational collaboration, integration and co-ordination. Another definition given by Morçöl (15) is: "a relatively stable and complex model of relationships between several interdependent and self-determined elements (for example, social, political, economic actors), which also constitutes a self-organized system as a whole". Morçöl, drawing elements from different literature on the theme of (16) (17) (18) defines the complex system as "a pattern of relationships between adaptive, self-organizing and interdependent agents, a pattern that shows coherence through change and emerging properties" (15). There are therefore some common elements between the definition of Network and complex systems such as the interdependence of agents, the existence of relatively stable relationships in an evolutionary context with an uncertain destination, the tendency to self-organization and the presence of properties emerging from all the components as a whole.

1.2 *Healthcare systems as complex systems*

The general definition of a complex system also fits healthcare systems. Lipsitz (19) underlines how, unlike mechanical systems in which the components interact linearly to produce a predictable output, the healthcare system includes agents (government systems, hospitals, prevention services and primary care organizations) who interact in a non-linear way on different scales (patients, families, providers and policy-makers) with possible unintended consequences (adverse drug reactions, healthcare-related infections, re-hospitalization, functional decline, etc.) (19). More specifically, healthcare systems are in fact characterized by a series of interdependent variables such as demographic and epidemiological transition with consequent variation in health needs (20), the increase in the use of technologies and both total and related costs (20), the increase in professionalism and the necessary skills, the interaction with patients who are more aware of their condition (21), the multiplicity of heterogeneous providers (22). All of these variables interact to generate a high degree of complexity.

1.3 Properties of complex systems

In order to correctly interpret healthcare organizations as complex systems, it is necessary to organically lay out the main properties of these systems. A first property consists in the non-linearity of the relationships between elements which makes the direct and predictable correspondence relationship between input and output disappear. A second fundamental property to mention is the tendency to self-organize the interrelated individual components. It involves the tendency of complex systems to self-organize (generally in progressively more stable configurations) without the intervention of external forces guiding the process (23). A third property is the tendency to "emerge". In fact, there is the emergence of new organizational configurations, in particular in times of reduced stability of the organizational/environmental contexts, without the final configuration being uniquely attributable to the summation of the individual components' effects. A fourth property, which is found like the others with common elements to the definition of Network, is that, in a complex system, the elements are linked by relationships in constant evolution, generating high uncertainty about the configurations that the system will reach (23). A fifth property is that in the complex system "simple rules" apply: general indications (purposes), prohibitions (limits) and resources or permits (incentives) (19).

1.4 Achieving value-based healthcare in complex contexts

Regarding these rules, value-based healthcare is emphasized as the first simple rule or purpose to be pursued (25), where the "value" is obtained by the relationship between a series of qualifying dimensions (clinical outcomes, quality and safety of care processes, patients' experiences, and satisfaction of professionals) and the costs incurred to achieve these results (26) (27) (28) aims to pursue health in a sustainable way. Sustainability is a concept that includes the economic, social and environmental dimensions. The pursuit of value must be placed in a dynamic of continuous improvement of the organization to respond to the health needs of both the individual and the population, fundamental dimensions of the integration of care systems as shown in the figure (29).

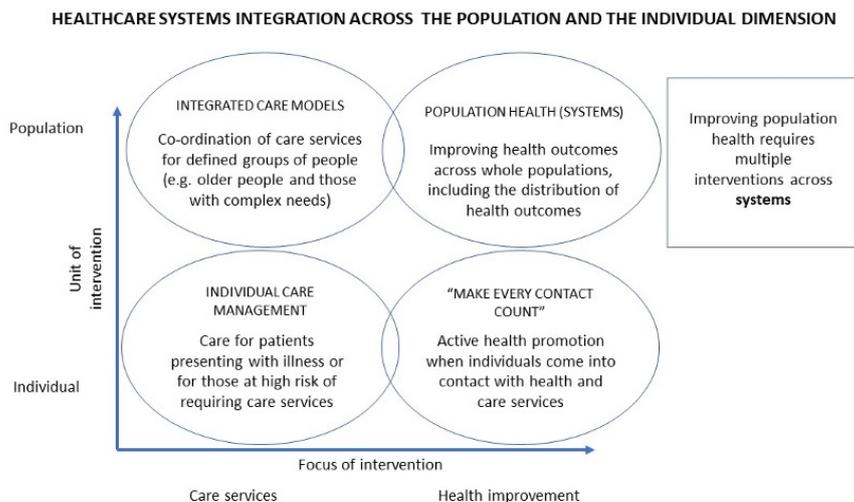


Figure 1. Modified from: the focus of population health systems (from Ham, 2018 (29))

1.5 Complexity as a challenge for coordination/integration

The complexity of health systems as described above highlights how, in order to achieve value in a perspective of continuous improvement, the activation of interdependence mechanisms is necessary as shown by Contandriopoulos according to the paradigm of collective coordination (30). It provides for the presence of a team of professionals who jointly assume responsibility for healthcare, according to predefined methods in a coordinated manner. This form of coordination is necessary when the degree of interdependence between interested individuals and organizations is high. It is particularly suitable for cases involving multiple or complex health problems with uncertain evolution. This integration is also reported in the literature in the conceptual framework of value-based integrated healthcare (31), with the aim to provide value-healthcare.

The challenge of complexity must therefore be understood as a challenge for integration. In this sense, the simple rules of incentives (bonuses)/disincentives (limits) are aimed at achieving the aforementioned purpose of value-based healthcare, rewarding coordination mechanisms that generate greater coordination/integration and hindering the fragmentation mechanisms of the systems/services (such as organizational silos in care processes, isolated and non-cooperative behaviors of professionals, separation of settings).

2. HOSPITAL NETWORKS COMPLEXITY AND THE NEED FOR INTEGRATION

From the discussion reported up to this point, it is clear how the hospital is a complex healthcare organization whose survival and development is progressively placing itself in a network system dimension.

2.1 Hospitals as complex systems

Specific elements of complexity of the hospital are determined by: a decrease of beds (from 2011 to 2019, EU 27: - 9.5%, Italy: - 4.9%) (32), an increase in the intensive nature of services (USA: intensive beds / total beds 2000-2010: + 20.4% (33); Italy: intensive beds by 79% for COVID-19 emergency) (34), development of new advanced technologies (average cost of procurement of medical-surgical devices per hospital in the USA: \$ 9 million in 2014, \$ 11.9 million in 2018) (35); organizational development (organizational quality: transfer of services from ordinary hospitalization to Day Surgery and Day Hospital up to Outpatient Clinic and Unification of Outpatient Services (in Italy APA) and Complex Outpatient Packages (in Italy PAC); errors in medicine (patient safety: in 2009, in Italy about 32,000 patients were subjected to preventable damage, in the USA the average cost per hospital error is 939 \$: 170.201 errors for 1 billion \$) (36) (37).

The rapid evolution of some clinical situations often leads decisions to be made on the choice of the most appropriate setting in a short time, the high cost of technologies and infrastructures demands for always accurate use of resources and a continuous decision on priorities, from grants resources to diagnostic-therapeutic interventions to be performed. Due to the dynamic relationship of the elements of complexity just listed, the

hospital, internally and in relation to other organizational actors, has therefore an important organizational need for integration and coordination. This should not be understood as a secondary element but as a matter of survival and development for the hospital organization in a complex health system, which otherwise risks the dispersion of its internal energies towards dissipation and disintegration.

2.2 Organizational requirement integration/coordination

Lawrence and Lorsch (38) well defined the organizational requirement of integration/coordination. They proposed to study organization no longer from the perspective of single elements but from the set of actors through a sociological approach and provided a characterization in the literature of integration and coordination. They described the differentiation process as “the state of segmentation of the organizational system into subsystems, each of which tends to develop particular attributes concerning the requirements posed by its external environment”. Integration was instead defined as “the process of achieving unity of effort between the various subsystems in carrying out the task”. Moreover, Lawrence and Lorsch specified how modern organizations are complex and how their governance is constantly engaged in the challenge of integrating the need for specialization, required by the external environment, with that of coordination between differentiated subsystems.

2.3 Mechanisms to achieve coordination/integration

With regards to the achievement of coordination, an important conceptual approach was proposed by Mintzberg (39). who identified five coordination mechanisms: direct supervision, standardization of work processes (understood as the elaboration of procedures and protocols to guide work), standardization of outputs (understood as the explicit report by organizational actors of the results expected and those obtained), standardization of profession (understood as standardization of the skills and competences necessary through training and orientation towards continuous improvement) and mutual adaptation. The latter consists of a non-hierarchical coordination/integration mechanism in which there is informality and immediacy in interpersonal communication processes (39). The mechanisms described so far underline the progressive transition from hierarchical coordination to self-determination of organizational actors.

2.4 Organizational levels of coordination/integration achievement

Mintzberg illustrated how it is possible to define the main mechanisms for responding to the coordination/integration needs. However, the levels of decision-making responsibility at which integration must be achieved need to be explained through the Valentijn rainbow model (40). This model identifies four levels. The first is the “macro” level, the cross-sector strategic level for which policy-makers are responsible. This is the level of institutional actions (regulatory and legislative sources and system stewardship, i.e. the set of decisions concerning health carried out at a national or regional level). The second level is the “meso” level, the level between organizations (for example between hospitals and Local Health Authorities). At this level, responsibility is exercised by healthcare administrators through regulations, agreements and market rules. The third is the “micro” level. At this level responsibility is exercised by the interaction between professionals with the aim of clinical governance. Actions at this level therefore consist of institutional

guidelines and company procedures. The fourth and last one is the "nano" level. At this level the responsibility is exercised by the patient as an individual with the aim of co-producing health. To achieve this, it is of paramount importance how the patient is engaged in the care processes, as expressed in the literature by the "patient engagement" model (41).

Integration must be achieved at all levels for the development of widespread accountability, according to the principle whereby all stakeholders of a health system are made responsible for achieving the established health objectives and making them account on an individual and civic, professional, economic and even political level (42).

2.5 Governance of integrated healthcare networks

Therefore, in order for hospital networks to dynamically represent the most appropriate organizational configuration, it is necessary that their governance includes both the implementation of the hierarchy and the facilitation of self-determination logics to achieve integration in each of the four levels previously described (43).

De Toni (44), quoting Greiner (45) indicates how hierarchy and self-organization can coexist according to two dimensions: that of time, as self-organization tends to prevail in moments of change and hierarchy tends to re-emerge in periods of stability; that of space, as within the organization units where self-organization emerges and units in which traditional hierarchical models prevail coexist (44). With the elements collected so far it is possible to obtain co-responsibility on each same level and across every organizational level.

3. LEVERS FOR HOSPITAL NETWORKS GOVERNANCE

According to what has been described so far, it is necessary to clarify on what basis the action of change can be exercised towards a complexity-oriented system governance of hospital networks. Three main levers can be identified.

3.1 The "education" lever

The first of these is the "education" lever. It consists in providing moments of learning and subsequent verification of knowledge with the aim of multi-professional and multi-level training in governance of complex systems. It is essential that operators and administrators of different hierarchical levels and training participate together in educational interventions that thus see their training effectiveness multiplied (46). Key themes to be addressed are: communication, understood as an organizational glue tool (47), innovation management, understood as a set of tools, techniques and methodologies to help organizations to systematically adapt to the continuous changes of their context (48); team-building, understood as a set of models, meetings and simulations aimed at increasing the well-being, cohesion and effectiveness of the entire organization (49); leadership, understood as the ability to orient complex organizational actions towards objectives of value (12); management, understood as the responsible use of resources to achieve valuable healthcare goals (12) (25); digitization, understood as the process of replacing communication technologies based on analogue modalities with digital technologies (50) (51); planning and control tools such as health technology assessment

(52), health impact assessment (53), use of specific indicators for continuous improvement (54) and audit templates and feedback (55).

It is important to make use of all the aforementioned logics and tools in training professionals for complexity according to the “T-shaped education” model (56). This model requires professional figures to develop both an in-depth specialist knowledge (vertical dimension) and skills in multi-professional and multidisciplinary collaboration (transversal dimension) (57).

3.2 The “information” lever

The second one is the “information” lever. It consists in considering the data registering as an integral part of the clinical care process. In this way, it will be possible to obtain health documentation providing data with an informative value both at an individual and population level (57). It is important to promote such a culture of health data, no longer reduced to a component of an administrative process but elevated to an integral part of the care process (as a qualifying credit for the care activity and not as an information debt). With these assumptions it is possible to properly address the issues of Big Data, intended as a very extensive collection of data in terms of volume, speed and variety of acquisition (58) useful for orienting decision-making processes and such as to require specific analytical technologies and methods for the extraction, processing and production of parameters with an informative value, including Artificial Intelligence. This consists of a branch of computer science that studies the development of hardware/software systems equipped with capabilities such as support for decision-making, problem solving, recognition and automated self-learning, able to autonomously pursue a defined purpose by making decisions that, until then, were usually entrusted to humans (59) (60). The previously mentioned digitization, of which a large part is played by the technological developments allowed by the world of Big Data, is a support of the information lever understood in the modern sense. This support, however, more than as an end in itself, must be included in a definition oriented towards value objectives.

3.3 The “leadership” lever

Third key lever is leadership (12). There are multiple definitions of leadership, one of which may be: convincing other actors to achieve valuable goals taking into account that everyone regulates his/her own actions towards personal gains. It recognizes the dynamic interactions that occur within organizations as they change, create innovation and evolve with a focus on complex relationships and network interaction rather than control and standardization processes. It must therefore be traced back to the double meaning previously explored of amplifying self-determination represented by the positive proactivity of organizational actors towards forms of integration and in parallel silencing negative self-determination that dissipates the energy of the system by facilitating fragmentation between operators/patients/institutions and away from valuable goals.

De Toni indicates that the leadership model appropriate for complex contexts is no longer the traditional one of “leading” the group towards predefined results, but that of “building contexts”, that is a model where the actors “become self-leaders and the boss creates a system of values, favors the sharing of vision, gives an example, accompanies learning and execution” (44).

The leader of the governance of hospital networks does not control the future but indicates a direction, does not focus on responsibility but encourages the innovative and

original contributions of all members of the care team and interprets for them the events emerging from the organization itself. In particular, the dimensions that leadership influences are the type and complexity of intervention, the communication and type of relationships between the actors involved, the degree of engagement and the set of values shared within the organizational system, the level of bureaucratization of processes and methods of allocating resources.

4. THE COVID-19 CHALLENGE AND FUTURE DEVELOPMENTS FOR HOSPITAL NETWORKS

An important example of the integrated response of health structures - with a prominent role on the part of the emergency system, hospitals and other healthcare settings - occurred precisely during the COVID-19 pandemic.

A key element of progress that emerged was the development and diffused distribution of online communication platforms that enhanced telemedicine use (61). Also, hospitals were forced to develop high organizational flexibility with the establishment of temporary structures, they were forced to promptly update preparedness plans and checklists, and to create of new distinct dirt-clean paths (62) (63) (64). Furthermore, a new approach to clinical risk management was developed (65), as also new specific indicators for the assessment of the quality of care were established. A key element was the ability of professionals to self-organize and to adapt to the knowledge newly acquired by the scientific community. In the height of the pandemic countermeasures as well as in the past, accreditation programs provided by international institutions (i.e. Joint Commission International) have proven to be effective in enhancing the safety and quality of healthcare processes. A recent systematic review by Araujo CAS et al. (66) indicates, in fact, that “accreditation may have a positive impact on efficiency, safety, effectiveness, patient-centeredness and timeliness dimensions (67). The next frontier would be therefore the accreditation of entire healthcare networks (68). Despite having not found, to the best of our knowledge, any cases in Italy of network accreditation programs, there are some examples of institutions that are starting to define appropriate indicators for this task, such as the National Healthcare Outcomes Program (PNE) by the aforementioned Italian National Agency for Regional Health Services (AGENAS).

Finally, the challenge of complexity can facilitate the implementation of the proposals for the hospital of the future, as proposed in 2016 by the Center for Research in Healthcare Innovation Management IESE Business School (69), as listed below:

1. triple challenge is given by scarcity of resources, modification of social values and health needs;
2. smaller dimensions but increased complexity, high concentration of spaces and processes (with outsourcing of non-core activities);
3. personalized medicine and healthcare services via enhanced diagnostic capacity, technologies and dedicated personnel (for therapeutic purposes and not only for diagnostic confirmation);

4. orientation of dual-level networks with specialist and primary care links different professionals;
5. reorganization of knowledge-driven services, evidence-based efficiency and quality, redesign of knowledge-based care;
6. organizations open to homogeneously distributed services as the structure does not coincide anymore with its structural limitations, fewer on-site patients, care processes on many widespread locations;
7. centers of innovation and with a high degree of technological innovation; technology assessment tools to make appropriate decisions on services, technologies and management;
8. centrality of research and training of professionals according to the development of technologies; hospitals become places of production of know-how and application;
9. fair sharing of risk among all stakeholders and accordingly new payment methods, reduction of expenditure for care services in light of greater investments in prevention;
10. increased responsibility for governance and collaborations between hospital professionals and primary care protagonists; it is important to increase managerial and leadership skills, such as team management, conflict management, and communication with the patient;
11. integrated care and team-oriented processes; the hospital will have both a coordination role and a strategic development of the processes together with other facilities and providers;
12. new methods of interaction between patient and hospital, Information and Communication Technologies to predict health needs, personalization of processes and therapies, patient tele-monitoring, on-site team visits;
13. emergence of new professional roles (skill-mix change) change in the type of activities that characterize the development of certain processes; among the new roles, Health coaches, Case managers, experts in genetics, engineering and analysis and evaluation of information flows;
14. patient-centered reorganization process with a systematic evaluation of the experience of patients, considered as an active part of the reorganization process itself.

DISCUSSION

Many themes have emerged from the debate during the 4 mini focus groups meetings. As reported by scientific literature, various common points between the definitions of network and complex systems can be found: the interdependence of agents, the existence of relatively stable relationships in an evolutionary context with an uncertain destination, the tendency to self-organization, the presence of properties emerging from all components as a whole. As supported by the data reported in the paper and confirmed by scientific literature (19) and by the participants' personal experience, healthcare systems are complex systems, and they have therefore to be understood as such in order to correctly interpret them. It is important to study the properties of complex systems in order to achieve value-based healthcare in the hospital networks context. As discussed in the Results section, Lawrence PR and Lorsch JW (38) detail how that organizations have a

high requirement of integration/coordination. This is especially true for complex organizations, for which appropriate mechanism and governance guidelines are, therefore, needed. In reference to this point, all participants agree concerning the “education”, “information” and “leadership” levers that can be adopted for governance. The participants believe that these levers will show more effectiveness the more healthcare professionals progressively come to understand education, medical data producing, recording and leadership as indicated in the paper.

In addition, the language, the logics and the tools presented in the paper for the definition and governance of hospital networks, as an organizational form intended to face the challenge of complexity, allow for proposals for the hospital of the future that are evidence-based and grounded in years of experience.

These insights should be useful for all professionals from and across all levels of healthcare organizational responsibility, being able to orient roles and actions to achieve coordination/integration inside hospital networks. In particular, policy-makers at the “macro” level should understand that institutional actions are necessary but not enough to bring forth positive organizational change. Healthcare administrators at the “meso” level should go beyond regulations and market rules to achieve a value-based model of healthcare. Individual healthcare professionals at the “micro” level should base their activity on institutional guidelines and company procedures but also resist individualistic tendencies and establish fruitful collaborations with colleagues. The patients and caregivers at the “micro” level should actively participate in the care process as co-producers of health without overstepping their own competence boundaries.

This study has some limitations. A first one may consist in the small number of participants. However, we are quite confident that all the main areas of knowledge regarding the chosen topic were well represented by the expertise of the invited participants, as indicated by scientific literature (70). Furthermore, the mini focus group methodology is well defined and accepted in scientific literature (71) (72). In addition, Wong suggests that “smaller groups (four to six participants) are preferred when the participants have an intensive experience to share about the topic” (73). A second limitation could be that the chosen methodology of directed content analysis could somehow pilot the answers of the participants or induce participants to agree with the questions not to disagree with the scientific literature standpoints. However, all the participants had many years of personal experience in the evidence-based research process and were, therefore, fully able to give a critical perspective whenever considered it appropriate.

CONCLUSION

Hospitals and hospital networks are complex entities. Complexity literature can help us to understand how to achieve coordination/integration in healthcare settings and find levers for effective governance. We hope this is useful as more and more healthcare professionals, inside or outside hospital settings, will see their practice integrated in one form or another of network. It is important to study the current models of hospital network to be able to anticipate and, possibly govern, future developments. Further work on this issue is, therefore, highly encouraged.

In conclusion, a key take-home message is that the governance of hospital networks needs to be interpreted as coordination/integration inside and across multiple organizational levels of co-responsibility.

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***Corresponding author:**

Marcello Di Pumpo MD

dipumpomarcello@gmail.com