

Deploying New Perspectives of Network Organizations for Chronic Diseases' Integrated Management

Isabella Bonacci, Federico II University, Italy

Oscar Tamburis, ICAR – CNR, Italy

ABSTRACT

The social frame of healthcare organizations in Europe (and in particular in the Italian Public Sector), as a combination of relational, formal and informal aspects, is one of their most relevant sources of complexity, which leads to different approaches about decisional, clinical and organizational processes (Cicchetti, 2004). These issues have been enlightened as well by the increasing social incidence of chronic-degenerative pathologies, such as Diabetes Mellitus type 2. In this regard, the Italian national e-government strategy has first pointed out the need for paths of integration and interoperability among information systems to ensure a safe exchange of information (CNIPA, 2008). The activity of “integrated design” of information flows between doctors and patients allows the creation and development of reticular organizational forms in which many non contiguous actors work at the same time on the diagnosis and care process. This paper shows how the adoption of the Social Network Analysis (SNA), as theoretical and methodological perspective that emphasizes the social reality as reticular framework (Moreno, 1987), can provide an innovative approach for the study of the “pathology networks” and the “integrated management” of Diabetes Mellitus type 2, where ICT solutions are (or are about to be) currently involved.

Keywords: *Chronic Diseases' Integrated Management, Information & Communication Technologies, Information Flow, Network Organizations, Social Network Analysis*

INTRODUCTION

HealthCare Organizations (HCOs) can be defined as “[...] social entities guided by specific objectives and involved in the processes through which health assistance services are produced

and provided to healthy (e.g., prevention) or diseased subjects” (Mapelli, 1999).

Health assistance services spread over a health–disease–health continuum, since the gap between health and disease can be only reduced, so that a disease subject produces another disease subject with different needs (Ruta, 1993). Many levels of assistance complexity

DOI: 10.4018/jiss.2010070102

and intensity are so covered, comprised within a wider *corpus* of organizational forms that, with its many professional subgroups, complex work processes and power structures, represents a fluid and dynamic context with fewer formalized control mechanisms (Helmreich & Merritt, 1998) and suggests indefinite possible solutions of coordination and work assigning. Issues come from the difficulties to assess the alternative organizational forms proposed for the healthcare sector, in terms of efficacy, efficiency and equity (Grandori, 1999), as well as the different methodological approaches introduced for the study of its complexity: different levels of complexity can be detected in fact, from the agreement degree (among those working in the inside environment) to the uncertainty degree (how the inside environment connects to the outside environment), related in any case to three main different fields: culture and values; technological–formal issues; social legacies (Cicchetti, 2004).

In this dynamic context the emerging organisational form is the network organisation: the development of a reticular organizational structure rises from the need of a higher degree of organizational analysis than what requested for a single company (Martinez, 1997), and from the importance to deal with an interconnected organizations set as a higher ranking actor (Keen, 1990; Rockart & Short, 1991; Bonacci & Tamburis, 2007). The network appears therefore as the solution to the issues of integration between separated and specialized units (Cicchetti & Mascia, 2007); nonetheless, an accomplished sharing of values, social legacies and formal languages becomes possible in particular only within an “information and communication network”, where the knowledge framework that gives origin to the *government of the technological system* (Cosmi, 2003) – meant as pattern of analysis and management of coded information and data flows – takes the name of *Information and Communication Technology*.

THE IMPACT OF ICTS VS. THE LOGICS OF NETWORK

After the First Stage of Discovery of the “Health ICT world” (1989-1999), the Second Stage of Acceptance (1999-2009) began with recognition that nothing was going to happen by osmosis or just because of the enthusiasm of that community alone. The challenges were evident – there was no main stream credibility for health ICT within the technology sector or indeed within healthcare itself; there was no voice for innovation and new ideas; few who were aware or listening to the health telematics community (EHTEL, 2009). Opportunities have been beginning to open up during years. New technologies have been maturing which had relevance to healthcare. The growing pressures of demography, medical advances and patient empowerment were all in sharp contrast with finite resources available to address a growing demand from citizens and patients for more health attention.

The impact of increasing incidence of chronic disease, evidence based medicine, and early glimpses of personalized care, information based management and control, economics of transformation through technology support and development of strategic ideas from worldwide markets have been changing perceptions, priorities and the choice of health business models. In addition, as opportunities emerged, stakeholders began to be more aware of the opportunities and threats associated with ongoing change. There is therefore evidence that, when combined with proper organization, leadership and skills, innovative Information and Communication Technologies (ICTs) can help to address some of the societal challenges to (not only) Europe’s healthcare systems, first of all the achievement of the logics of “healthcare network” through which realize a level of technological integration capable of increase synergies between HCOs, and between them and the patients: a network of interconnected HCOs and healthcare operators

(General Practitioners, Specialists, ...) can lead to access to, deliver and share new forms and channels of relations, apart from consolidating and revitalizing the already existing ones. Nevertheless, researches examining organizational and socio-cultural factors have provided insight into variables which diminish or create barriers to the use of ICTs within HCOs. Recent works have paid attention to the interactive complexity of group works (Goodwin & Goodwin, 1998; Kaplan & Shaw, 2002) demonstrating the need to move outside the traditional individual decision-maker assessment and take account of the context of practice, team integration, and related cognitive as well as socio-cultural issues. Few studies (Santahanam, Guimaraes, & George, 2000; Kaplan, 2001) have traced as well the links between improvements in organizational outcome indicators and a diversity of predictive variables (technical, organizational and socio-cultural factors) within organizations as ICT were implemented. Another body of literature, focused on the diffusion of technological innovation (Rogers, 1995), has identified the processes by which innovation is communicated though certain channels over time among members of a social system: neither here much attention has been paid to the consequences for workers and organizations (and HCOs among these) of adopting technological innovations (Westbrook, Braithwaite, Iedema, & Coiera, 2004).

LITERATURE REVIEW

Our study draws upon two main areas of research in the literature: (i) the network organizations in the healthcare sector, (ii) the *Social Network Analysis* as work methodology. In this section, we provide a brief survey of pertinent studies in each area from the literature.

In a strictly organizational meaning, the network is defined as a set of relations between actors, and ties between subjects and/or systems of coordination and governance, converging upon the same output and/or business process (Grandori, 1999). There are two main branches

of research focused on the healthcare networks: the first one aims to analyze the pattern and its strategic and organizational properties from the network *nodes* standpoint, paying attention on their dynamics of aggregation. Many experiences (Cicchetti, 2002; Miolo, Vitali, & Nuti, 2003; among the others) made possible to depict two main categories: the horizontally-integrated networks and the vertically-integrated networks. In the first case, literature widely refers to the so-called "hub & spoke model", where a medical centre of excellence able to provide high specialized performances – often because of higher resources availability – is surrounded by a number of peripheral facilities aimed to less specialized tasks (Cicchetti, 2002; Lega, 2002). In the second case, the network is related to the concept of assistance continuity (Lega, 1998), and the research focuses on the enhancement of the patient assistance path, with particular regard to the prevention performances.

The other main body of literature concerns the kind of flows – meant as exchange of resources – that origin inside the network (*co-ordinate mobilization*: Warren, Stephen, & Bergunder, 1974). Researches focus on the dynamics of integration, coordination and interdependence occurring between two or more organizations (Milner, 1980; Fennell & Warnecke, 1988; Kaluzny & Warnecke, 1996). Such contributes differ from the previous ones because, besides drawing the network organizational framework, highlight the impact on performances level by analyzing management and clinical outcomes: this leads therefore to an evaluation of the efficacy for both the whole network and the single nodes and ties (Provan & Milward, 1995).

The co-ordinate mobilization is a typical form of healthcare services supplying, and is the first stage in a much longer path along which the relational tissue gets steadier thanks to information exchange and agreements settling among the actors involved (e.g., dynamics of patients exchange between HCOs) (Van de Ven, Walker, & Liston, 1979; Van de Ven & Walker, 1984). The networks studies appear

as connected to other disciplines, such as sociology, and in particular with the body of literature about the *social network analysis*. Assuming that the relationships occurring between actors are held to actors' roles inside the network (Cross & Parker, 2004; Meneguzzo & Cepiku, 2008), the whole set of nodes/actors (with their peculiar features), and the set of ties (e.g., connections, relations and/or interactions for the exchange of resources) give origin to a *social network* (Powell, 1990), that can be articulated on different levels: *interpersonal* (a single person belonging to an organization); *intra-organizational* (a specific people group within an organization); *inter-organizational* (a set of relations existing between organizations). Such levels concern different kind of social ties, from casual contacts, to working relationships, to family bonds (Chiesi, 1999, 2006).

The Social Network Analysis (SNA) is a methodology for the analysis of social relationships, developed from the research of Jacob Levy Moreno (among the others), founder of *sociometry* (a discipline focused on the study of interpersonal relationships), that in 1934 tried for first to visualize the social interactions as reticular objects. The SNA makes a wide use of topics, concepts and instruments coming from the branch of mathematics known as "theory of graphs", focusing especially on the possibility to analyze, interpret (and somehow foretell) the ties existing between the nodes of a network. In the healthcare sector the organizational actors are strongly interconnected each other, and then influenced by the surrounding social environment, so the SNA appears as the most suitable theoretical and methodological perspective to investigate the spreading of innovations and good practices (clinical, organizational and technological) among healthcare operators, or how multidisciplinary teams for the treatment of chronic-degenerative pathologies work. The above mentioned level of analysis can be featured as follows:

- *Interpersonal*: performance supplying, definition and development of decisional and information processes for practitioners

and specialists (Coleman, 1974; Valente, 2002), operations of multifunctional teams (West, Barron, Dowsett, & Newton, 1999);

- *Intra-organizational*: designing of HCOs, where social relations play a key role in the performance analysis of the organizational units (Lomi, 1991; Donatini et al., 2001);
- *Inter-organizational*: designing of assistance networks (Agranoff & McGuire, 2001).

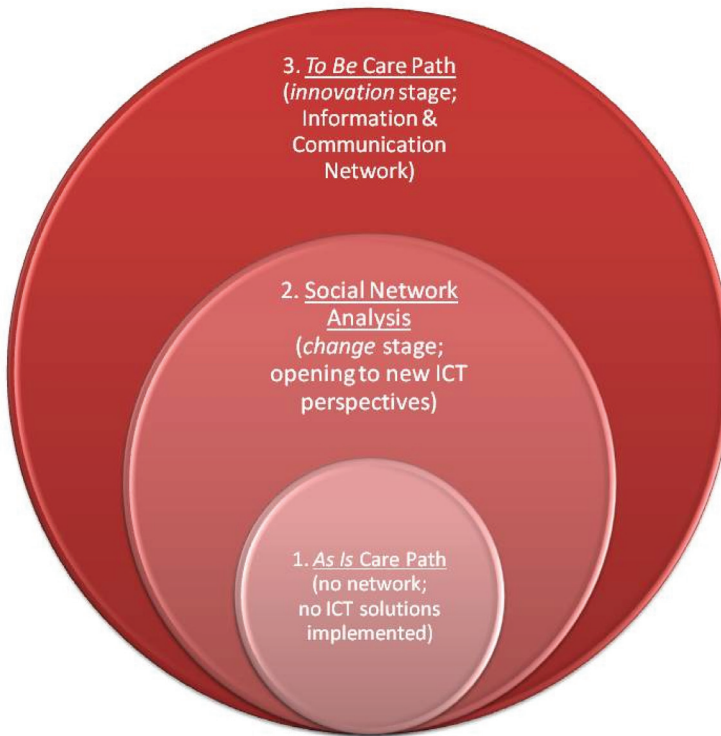
The adoption of the SNA fits with the research objective, because of its capability to feature correctly the organizations involved, by using appropriate sets of indicators and graphic instruments. Within this logic, it becomes possible to investigate any kind of relationships that origin in a healthcare system, comparing therefore the "formal" and the "real" organization frameworks (Cicchetti, 2007); that makes also possible to improve the ability to develop evaluation models that are adaptive and sensitive to the characteristics of wicked problems and provides a strong theoretical basis from which to analyze and interpret findings (Westbrook et al., 2007).

METHODOLOGICAL REMARKS

The present work supports an explorative/descriptive analysis (Yin, 1993; Mari, 1994), featuring as the first step of a wider research path described in its overall in Figure 1. The two main research objectives are:

- Verify if and how the SNA can address the instances of *change* and knowledge management within a territorial context featuring a low use of ICTs and a limited spreading of information flows concerning the chronic patients' care paths;
- Verify if and how the SNA can appear as the "way" to a perspective of *innovation*, whereas the realization of an information framework (*social healthcare network*) for the circulation and the exchange of accurate, individual and complete clinical data,

Figure 1. The research path



can improve the dynamics of communication and interaction/integration between the subjects involved in the patients' care paths.

The concept of *change* means any kind of modification of the organizational and technological knowledge gained from the outside environment and/or improving the use of resources extant, but not properly exploited (Corti, 2002): this descriptive side of the analysis is enhanced by the increasing body of literature about the network designing in the healthcare sector as well. The explorative analysis refers instead to the concept of *innovation*, meant as any qualitative/quantitative modification of the use of extant technologies, able to lead "somehow" to a very change, perceived as positive (Corti, 2002). The deployment of the analysis of social networks requires a methodology for the evaluation of relational data.

The quantitative-relational approach provided by the SNA features as analysis units the set of relationships that the actors (nodes) involved in the care path (HCOs, GPs, patients) origin inside the network, while the relations' properties (ties) belong to couples of actors, instead of single nodes (Mazzoni, 2007; Marchi, Schifini D'Andrea, Maggino, & Mola, 2007). Strengths of the SNA are the exploitation of the Theory of Graphs to handle the relational data (the couple of actors), and the Matrix Algebra to describe the interactions framework (Scott, 2000; Wasserman & Faust, 1996): relational data are first depicted through the use of "n x n" sociometric matrixes, whose rows and columns refer to the nodes, while the cells refer to their connections. The "weight" of each connection depends on the definition of a *suitable evaluation parameter* adopted for drawing the social network.

The graphs (here called “sociograms”) are bi-dimensional descriptions of the social relations, wherein the points mean the nodes and the lines mean the ties between couple of nodes. The use of sociograms makes finally possible to highlight many formal network properties (such as density, cohesion, centrality, and connectivity). The analysis of the problematics on a complex environment in which information & communication technologies are increasingly being implemented led to recognize that there aren’t suitable evaluation frameworks yet, by which to assess their impact on clinical work and organizational outcomes. The two main challenges the research path should try to address are to conceptualize the design features of an evaluation framework and to specify what data will be gathered and how.

THE EMPIRICAL VERIFICATION

The empirical analysis coming from the research strategy consisted of two main steps:

- The first step focused on the identification of possible areas of implementation of ICT solutions in the Districts of the Local Health Authority “Na 2 Nord” (located in the north of Naples’ province, Italy), in relation to the sustainability of programmes of Integrated Management for chronic–degenerative pathologies, in particular Diabetes Mellitus type 2. The quantitative research was founded on a survey administering;
- The second step aimed to elaborate the results achieved using qualitative methods (participant observation, creation of a “Pathology Group”). The implementation of the SNA made possible to draw a network to investigate the relations occurred, according to the logic of disease management.

The sample group consisted of nearly 50 General Practitioners (GPs) and Specialists (in particular diabetologists), working in the Districts of the Local Health Authority Na 2

Nord; chronic–degenerative pathologies, including the Diabetes Mellitus type 2, present similar clinical courses, and their incidence on the population has been increasing mostly because of the raising of life expectancy. In Italy, surveys concerning the Diabetes incidence on national scale are not available, while there are studies performed on local areas (see: Bonora et al., 2004 (Bolzano area); Bruno et al., 2005 (Turin area); Pelella, Tamburis, & Tranfaglia, 2007; Bonacci, Pelella, & Tamburis, 2008 (Benevento area)). In addition, from ISTAT yearbook data (Zaccarin & Rivellini, 2007) emerges that 4,6% of Italians are diabetic, equal to 2,7 millions people (4,9% women and 4,4% men). The standard prevalence increased, during the last years, from 4,2% in 2002 to 4,6% in 2007. The prevalence of Diabetes Mellitus increases with the age, up to the 17,6% in the over 75 age group. In the age group from 35 to 74 years, the prevalence is greater for the men, while in the over 75 age group is greater for the women. The administered 50–item questionnaire for the data collection, mostly structured with fixed questions, was divided in three main areas:

- *Knowledge of the pathology*: the analysis focused on the main topics concerning the handling of the diabetic patient by the GPs, in order to verify their correct behavior as well as the respect of the guidelines for the treatment of the pathology;
- *Approach to the ICT*: the first purpose was to evaluate, among the GPs, their knowledge and experience with information instruments as well as with electronic data delivering and warehousing tools. The second purpose was to analyze their propensity toward the adoption of Electronic Medical Record protocols;
- *Management of communication flows*: the analysis focused on evaluation of the degree of interaction/integration between the subjects involved in the diabetic patient care path.

The answers analysis from the sample group members led to a first “picture” of the three levels of the social network, and to the set of flows occurring among the actors themselves (co-ordinate mobilization). A strong dichotomy appeared between their will to equip with ICT solutions, and the lack of a real sense of their use, as well as their effects on work performances, services efficiency and operators expertise. The emerging scenario showed once one how “the deployment of ICTs, either as change or innovation, is still perceived as an out-of-the-ordinary, avoidable experience: a definitely remarkable chance of improvement for the service performances supplying, but ready to turn out as negative, since cause of modification for actors’ behaviors and roles” (Corti, Iasiello, Marino, & Tamburis, 2004).

THE GENERAL CARE PATH (AS IS)

Figure 2 describes the General Care Path, as drawn upon the elaboration and the analysis of the questionnaires. The flow chart turned out as the best pattern to highlight the logical sequence of the episodes forming the Care Path in a territorial context, and allocate the performances delivered by the GPs, together with the diabetological team (composed by diabetologist, diabetic centre, cardiologist, nephrologist, optician, dietician, podiatrist and psychologist) and the territorial hospital(s), for the treatment of a particular kind of patients.

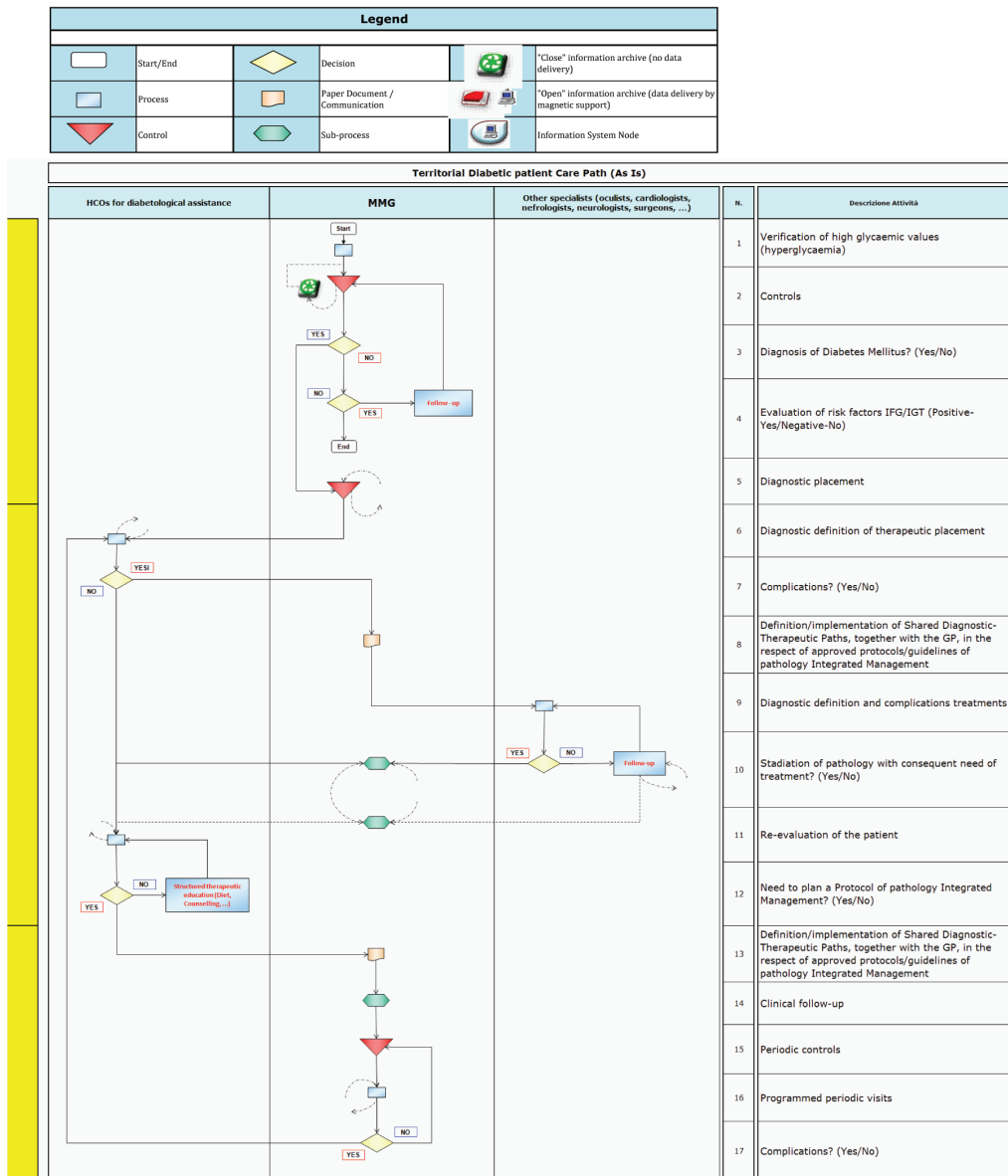
The realization of the General Care Path started with the analysis of the *real* care path adopted by each GP (i.e., the visualization, for the diabetic patients followed, of the actual sequence of the episodes their assistance process is made of). The best assistance path realized by each GP has been named Reference path. The synthesis of the most efficacious (from the clinical standpoint) and most effective (from the organizational standpoint) Reference paths has originated finally the General Care Path (*As Is*). The relational approach overlapped to the previous logical one firstly required, to draw

correctly the network, the identification of the best fitting evaluation parameter to assign a weight to the connections found: that was the *therapeutic continuity* settled between every couple of actors of the care path, expressed by a numeric value ranging from 1 to 7, according to the great part of literature. Such step was conducted with the help of the members of the “Pathology Group”, comprised by those physicians and administrators belonging to the sample group, that showed higher levels of expertise and collaboration; the output was the sociometric matrix in Table 1. Finally, dedicated software (UCINET) translated the matrix in a sociogram (see Figure 3). The analysis of the resulting network shows an appearing *structural equivalence* between patient, GP, diabetologist and diabetic centre (e.g., a similitude of their relational framework with the other nodes of the network).

The exploitation of the UCINET software allows pointing out many relevant properties of sociograms, the first of which is the network cohesion, which ranges from 0 to 1. The resulting value is 0.764 (i.e., in the network are present about the 75% of all the possible connections). The density value is confirmed by the standard deviation value (0.4406) that suggests the presence of a significant level of variability in the connections. Such high percentage, rather than being a positive output, highlights instead a non rational (and even mostly redundant) distribution of the connections, centered among the four nodes with the highest *connectivity* values (e.g., the number of nodes that have to be removed in order to disconnect the network on the whole. High values for $k(G)$ mean significant levels of connectivity in the graph/network).

The *cliques analysis* gives information about the number of couple of actors sharing the same group; a clique is a high density subgroup of the network, made of three or more nodes. In this case, it was possible to recognize only four extremely similar cliques: (i) Patient – GP – Diab. – DC/LHA – Cardiol. – Opt. – Nephrol. – Hospital, (ii) Patient – GP – Diab. – DC/LHA – Pod. – Hospital, (iii) Patient – GP – Diab. – DC/LHA – Psychol., (iv) Patient – GP – Diab.

Figure 2. As Is care path flow chart



– DC/LHA – Diet (Figure 4). That means the lack of an arranged set of relations. This happens because every diabetic patient, deprived of a real guide, can actually make different choices along the path, share single parts of the path with other patients, be stuck in a loop with the same episode, or even skip one or more

episodes. There is a remarkable heterogeneity among the care paths originally identified by the GPs involved, and in particular there is a gap between those and what recommended in the guidelines for the Integrated Management of Diabetes Mellitus type 2; the SNA provides a “photography” that enlightens the lack of a

Figure 3. Sociogram of the healthcare network originated from the As Is Care Path

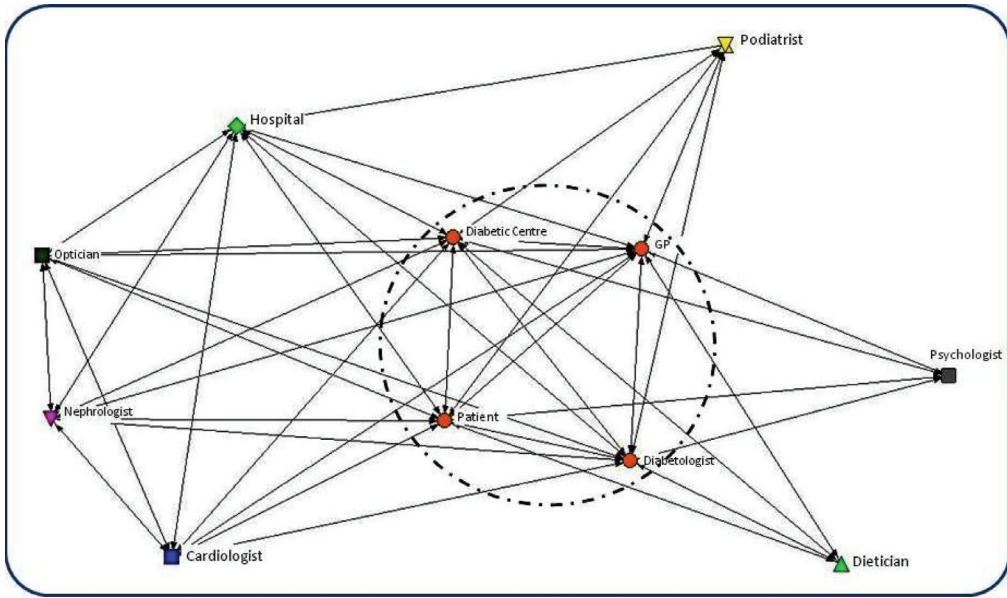


Figure 4. As Is Sociometric Matrix

	Patient	General Practitioner	Diabetologist	Diabetic Centre / Local Health Authority	Dietician	Podiatrist	Psychologist	Cardiologist	Optician	Nephrologist	Hospital
Patient	7	7	7	7	4	5	4	6	6	6	4
General Practitioner	7	7	7	7	4	6	6	6	6	6	5
Diabetologist	7	7	7	7	6	5	4	4	4	4	4
Diabetic Centre / Local Health Authority	7	7	7	7	5	4	4	4	4	4	4
Dietician	4	4	6	5	7	3	3	3	3	3	3
Podiatrist	5	6	5	4	3	7	3	3	3	3	4
Psychologist	4	6	4	4	3	3	7	3	3	3	3
Cardiologist	6	6	4	4	3	3	3	7	4	4	5
Optician	6	6	4	4	3	3	3	4	7	6	4
Nephrologist	6	6	4	4	3	3	3	4	6	7	4
Hospital	4	5	4	4	3	3	3	5	4	4	7

real *network organization*, although the number of HCOs through which, in the same territorial context, the assistance process of the diabetic patient is supposed to be set and organized: GPs have generally a very low knowledge degree of the care paths followed by their patients; the clinical data are delivered by the patient himself, that moves among the HCOs with his (paper) clinical history.

The deployment of ICT solutions is very limited for all three levels of study (interpersonal, intra- and inter-organizational), since exploited mainly to automate already existing operation processes (Data Resource Technology: Pontiggia, 1997). The final outcome is that the instances of *change* perspective and complexity management (as to culture and values, technological-formal issues and social legacies) have been addressing along an unequal development of those macro-assets (instruments, professional skills, organizational bonds, information) on which ICTs are based on, leading so to an impossibility to come to a rational organization of the assistance supplying processes (Bonacci & Tamburis, 2009).

NETWORK DEVELOPMENTS

By exploiting the SNA to “take snapshots” of the current organization it is possible a longitudinal study of the related network, through which aims to: an efficacious path of patients’ empowerment; a more appropriate handling of the disease for the GPs; an improvement of the capabilities of the territorial care supplying facilities. Deploying a sort of “evolution logic”, the mentioned instances of change and knowledge management can be interpreted, foretold, and even somehow *driven*: this can be called “innovation”. It takes first a passage from a “Data Resource Technology” to a “Communication Technology”, and therefore to a “Relation Technology” condition, where ICT should impact pervasively in order to redesign the value chain on the whole. It is supposed to happen through the implementation of an “ERP-like” integrated information framework,

supporting an Electronic Health Record system. The realization of an “information connecting tissue” (*middleware*) can become the first step toward the achievement of an interoperating and interconnected environment, where the Care Path itself would get to the status of *social healthcare network*, and GPs would aim to the key role of *process owner* of the integrated management of the pathology, called to:

- Coordinate and control the dynamics of communication and interaction/integration between the subjects involved in the diabetic patient care path;
- Promote the activation of suitable systems for the strategic planning and the performances measurement in a sort of “information virtual ward”;

Such network should feature a lower density value (less connections, but better organization of the data flows) and, consequently, a higher number of subgroups, with smaller dimension but a major proximity index (that is the capacity for each node to create ties with the other nodes), thanks to a redefinition of roles and social relationships. In such new view, the strategic subject called to the government and the monitoring of the assistance processes can appear as more “expanded”, and feature as a “decision-making composite actor” (Achard, 1999).

CONCLUSION AND FUTURE PROSPECTS

The main consequences of the emerging of a new paradigm for the ICT in the healthcare sector, based upon clinical, organizational and administrative information sharing and integration among the operators, is depicted and summarized in Figure 5. The exploitation of social healthcare networks is meant to “compress” the lead line that links the outside environment of the HCOs (inter-organizational perspective) and their inside processes of Healthcare Technology Management and, in particular, deployment of

Figure 5. As Is Cliques Diagram

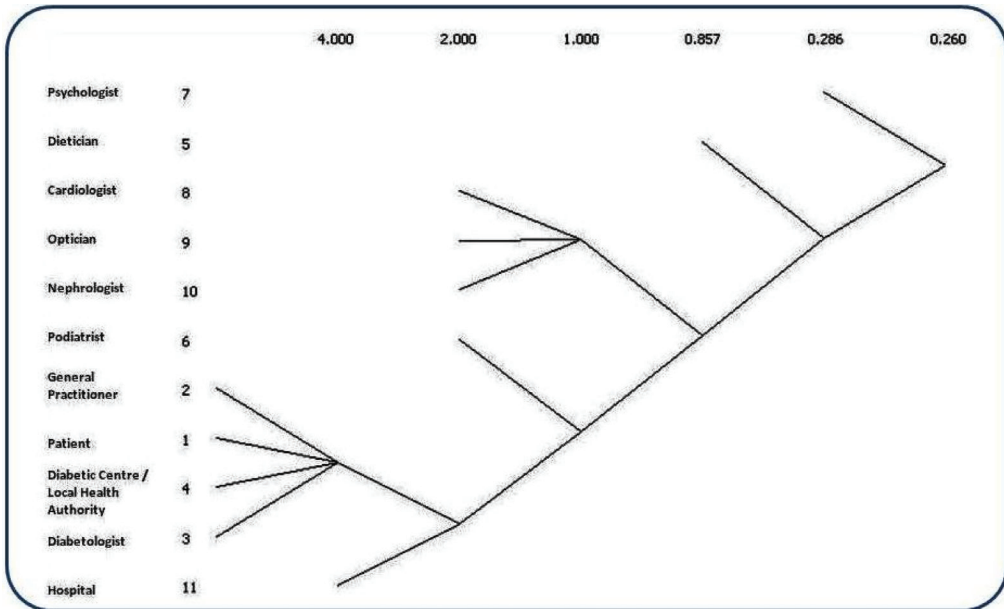
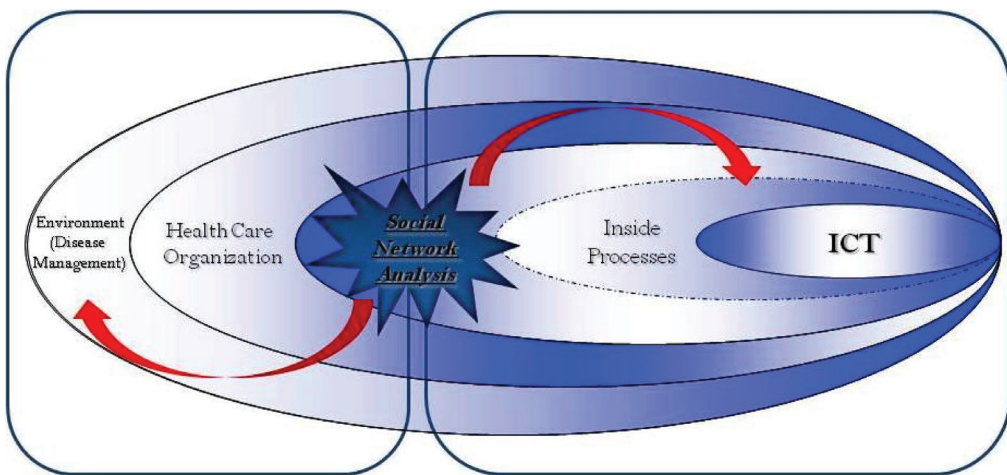


Figure 6. The SNA as “cultural bond” between outside environment and inside processes of the HCOs



ICT solutions (intra-organizational and interpersonal perspectives), increasing the cohesion of the whole organizational tissue and featuring the SNA as “cultural bond” based upon common principles (Fontana & Lorenzoni, 2004).

This process could help to redefine the connections between general management and clinical management, allowing a better handling of the main risk concerning the deployment of evolved healthcare technologies, that is an as much intrinsic as unaware dissociation of the

medical act between its operative, informative and hierarchical factors.

This is the main reason why the approach suggested in the present work can take a strong competitive advantage from its being focused on a relatively not much explored sector yet, suggesting a large-scale, longitudinal, quali-quantitative research and experimental method analysis of a social network related to the Chronic Diseases' Integrated Management. The next research step will be focused therefore on a deeper investigation of the extant network, already ongoing deep structural changes, to show the advantages that a rational organization of the assistance supplying processes may bring to the treatment of the diabetic pathology and, more in general, to the organization of the healthcare systems.

ACKNOWLEDGMENT

The authors acknowledge the Editor-in-Chief of the journal, Professor John Wang, and the anonymous reviewers for their indispensable input that improved the paper significantly.

REFERENCES

- Achard, P. O. (1999). *Economia e organizzazione delle imprese sanitarie*. Milano, Italy: FrancoAngeli.
- Agranoff, R., & McGuire, M. (2001). Big questions in public network management research. *Journal of Public Administration: Research and Theory*, 11(3), 295–326.
- Bonacci, I., Pelella, E. F., & Tamburis, O. (2008). Fattori di rischio nella gestione delle patologie cronico-degenerative: Analisi dei flussi informativi nel territorio sannita. In *Proceedings of XIII AIES Conference (Associazione Italiana di Economia Sanitaria)*.
- Bonacci, I., & Tamburis, O. (2007). Paths of organizational change in the healthcare structures: The role of ICT. In *Proceedings of Mediterranean Conference on Information Systems (MCIS07)* (Vol. 1).
- Bonacci, I., & Tamburis, O. (2009). The Social network analysis as key factor for improving interoperability standards on patients care paths. In *Proceedings of VI Conference of the Italian Chapter of AIS (ItAIS)*.
- Bonora, E., Kiechl, S., Willeit, J., Oberhollenzer, F., Egger, G., & Meigs, J. B. (2004). Population-based incidence rates and risk factors for type 2 diabetes in white individuals: The Bruneck study. *Diabetes*, 53, 1782–1789. doi:10.2337/diabetes.53.7.1782
- Bruno, G., Runzo, C., Cavallo-Perin, P., Merletti, F., Rivetti, M., Pinach, S., Novelli, G., Trovati, M., Cerutti, F., & Pagano, G., & Piedmont Study Group for Diabetes Epidemiology. (2005). Incidence of type 1 and type 2 diabetes in adults aged 30-49 years: Population-based registry in the province of Turin, Italy. *Diabetes Care*, 28, 2613–2619. doi:10.2337/diacare.28.11.2613
- Centro nazionale per l'informatica nella Pubblica Amministrazione – CNIPA. (2008). *Piano triennale per l'ICT della pubblica amministrazione centrale per il triennio 2008-2010*.
- Chiesi, A. M. (1999). *L'analisi dei reticoli*. Milano, Italy: FrancoAngeli.
- Chiesi, A. M. (2006). Perspectives of network analysis applied to social sciences. In *Proceedings of XLIII SIS Conference (CLEUP)*, Torino, Italy.
- Cicchetti, A. (2002). *L'organizzazione dell'ospedale*. Milano, Italy: Vita e Pensiero Ed.
- Cicchetti, A. (2004). *La progettazione organizzativa*. Milano, Italy: FrancoAngeli/Sanità.
- Cicchetti, A., & Mascia, D. (2007). Organizzare le reti in sanità: teoria, metodi e strumenti di social network analysis. *Mecosan*, 61, 9–32.
- Coleman, J. S. (1974). *Power and the structure of society*. New York: W. W. Norton & Company Inc.
- Corti, E. (2002). *Gestione dell'innovazione*. Napoli, Italy: ESI.
- Corti, E., Iasiello, F., Marino, A., & Tamburis, O. (2004). Innovazione tecnologica nel contesto sociale e organizzativo. L'impatto delle tecnologie informatiche nell'ospedale di elevata specializzazione: Il caso della Campania. In *Proceedings of XV AiIG Conference (Associazione italiana di Ingegneria Gestionale)*.

- Cosmi, L. (2003). Razionalità dei processi di diffusione nei sistemi aziendali di tecnologia sanitaria innovativa. Un modello delle variabili 'non convenzionali'. In *Proceedings of VIII AIES Conference (Associazione Italiana di Economia Sanitaria)*.
- Cross, R., & Parker, A. (2004). *The hidden power of social networks: Understanding how work really gets done in organizations*. Boston: Harvard Business School Press.
- Donatini, A., Rico, A., D'Ambrosio, M. G., Lo Scalzo, A., Orzella, L., Cicchetti, A., & Profili, S. (2001). Health care system in transition. In *Italy, country profile, European observatory on health care systems*, Copenhagen, Denmark.
- European Health Telematics Association – EHTEL. (2009). *Reflections on a decade of eHealth: The second stage in healthcare transformation*. Retrieved October 22, 2009, from <http://www.ehtel.org/>
- Fennell, M. L., & Warnecke, R. B. (1988). *Diffusion of medical innovations: An applied network analysis*. New York: Plenum.
- Fontana, F., & Lorenzoni, G. (2004). *Le architetture strategiche nelle aziende sanitarie: una indagine empirica*. Milano, Italy: FrancoAngeli.
- Goodwin, C., & Goodwin, M. (1998). Seeing as situated activity: Formulating planes. In Engeström, Y., & Middleton, D. (Eds.), *Cognition and communication at work* (pp. 96–129). Cambridge, MA: CUP.
- Grandori, A. (1999). *Organizzazione e comportamento economico*. Bologna, Italy: Il Mulino.
- Helmreich, R., & Merritt, A. (1998). *Culture at work in aviation and medicine: National, organizational and professional influences*. Aldershot, UK: Ashgate.
- Kaluzny, A. D., & Warnecke, R. B. (1996). *Managing a health care alliance*. San Francisco, CA: Jossey-Bass.
- Kaplan, B. (2001). Evaluating informatics applications - some alternative approaches: Theory, social interactionism, and call for methodological pluralism. *International Journal of Medical Informatics*, 64, 39–55. doi:10.1016/S1386-5056(01)00184-8
- Kaplan, B., & Shaw, N. (2002). People, organizational and social issues: Evaluation as an exemplar. In Haux, R., & Kulikowski, C. (Eds.), *Yearbook of medical informatics 2002* (pp. 91–99). Stuttgart, Germany: Schattauer.
- Keen, P. G. W. (1990). Telecommunications and organizational choice. In Fulk, J., & Steinfield, C. (Eds.), *Organizations and communication technology*. Newbury Park, CA: Sage.
- Lega, F. (1998). Scelte strategiche e definizione dei confini dell'ospedale. Dalla struttura focalizzata alla struttura a rete. *Organizzazione sanitaria*, 1, 43-66.
- Lega, F. (2002). *Gruppi e reti aziendali in sanità*. Milano, Italy: Egea.
- Lomi, A. (1991). *Reti organizzative. Reti, tecniche e applicazioni*. Bologna, Italy: Il Mulino Editore.
- Mapelli, V. (1999). Sanità: La rivincita del piano sul mercato. In Bernardi, L. (Ed.), *La finanza pubblica italiana, Rapporto 1999* (pp. 319–341). Bologna, Italy: Il Mulino.
- Marchi, M., Schifini D'Andrea, S., Maggino, F., & Mola, T. (2007). *Studio delle reti di supporto: Un'applicazione ai dimessi ospedalieri*. Working paper, University of Florence, Department of Statistics.
- Mari, C. (1994). *Metodi qualitativi di ricerca. I casi aziendali*. Torino, Italy: Giappichelli.
- Martinez, M. (1997). *Teorie di organizzazione in economia aziendale. Dall'organismo al network*. Milano, Italy: FrancoAngeli.
- Mazzoni, E. (2007). La Social network analysis a supporto delle interazioni nelle comunità virtuali per la costruzione di conoscenza. *TD*, 35(2), 54-63.
- Meneguzzo, M., & Cepiku, D. (Eds.). (2008). *Network pubblici: Strategia, struttura e governance*. Milano, Italy: McGraw-Hill.
- Milner, M. (1980). *Unequal care: A case study of interorganizational relations in health care*. New York: Columbia University Press.
- Miolo Vitali, P., & Nuti, S. (2003). *Ospedale in rete e reti di ospedali: Modelli ed esperienze a confronto*. Milano, Italy: FrancoAngeli.
- Moreno, J. L. (1987). *Manuale di psicodramma (Vol. 2)*. Roma, Italy: Astrolabio.
- Pelella, E. F., Tamburis, O., & Tranfaglia, R. (2007). Indicatori di qualità nell'attività dei MMG: L'impatto di strumenti economici di efficacia ed efficienza nella gestione delle patologie cronico-degenerative. In *Proceedings of XII AIES Conference (Associazione Italiana di Economia Sanitaria)*.

- Pontiggia, A. (1997). *Organizzazione dei sistemi informativi. Modelli per l'analisi e per la progettazione*. Milano, Italy: Etaslibri.
- Powell, W. W. (1990). Neither market nor hierarchy. *Research in Organizational Behavior*, 12, 295–333.
- Provan, K. G., & Milward, H. B. (1995). A preliminary theory of interorganizational network effectiveness: A comparative study of four community mental health systems. *Administrative Science Quarterly*, 40, 1–33. doi:10.2307/2393698
- Retrieved September 2, 2008, from www.cnipa.gov.it/site/_files/Piano_triennale_2008_10b.pdf
- Rockart, J. F., & Short, J. E. (1991). IT in the 90s: Managing organizational interdependence. *Sloan Management Review*, 7–17.
- Rogers, E. (1995). *Diffusion of Innovations*. New York: Free Press.
- Ruta, C. (1993). *Sanità & Management*. Milano, Italy: Etaslibri Ed.
- Santahanam, R., Guimaraes, T., & George, J. F. (2000). An empirical investigation of ODSS impact on individuals and organizations. *Dec Supp Sys*, 30, 51–72. doi:10.1016/S0167-9236(00)00089-0
- Scott, J. (2000). *Social network analysis. A Handbook*. London: Sage.
- Valente, A. (Ed.). (2002). *Percorsi e contesti della documentazione e comunicazione scientifica*. Milano, Italy: FrancoAngeli.
- Van de Ven, A. H., & Walker, G. (1984). The dynamics of interorganizational coordination. *Administrative Science Quarterly*, 29, 598–621. doi:10.2307/2392941
- Van de Ven, A. H., Walker, G., & Liston, J. (1979). Coordination patterns within an interorganizational Network. *Human Relations*, 32(1), 19–36. doi:10.1177/001872677903200102
- Warren, R., Stephen, M. R., & Bergunder, A. F. (1974). *The structure of urban reform*. Lexington, MA: Lexington Books.
- Wasserman, S., & Faust, K. (1996). *Social network analysis. Method and applications*. Cambridge, MA: Cambridge University Press.
- West, E., Barron, D., Dowsett, J., & Newton, J. (1999). Hierarchies and cliques in the social networks of health care professionals: Implications for the design of dissemination strategies. *Social Science & Medicine*, 48, 633–646. doi:10.1016/S0277-9536(98)00361-X
- Westbrook, J. I., Braithwaite, J., Georgiou, A., Ampt, A., Creswick, N., Coiera, E. W., & Iedema, R. (2007). Multimethod evaluation of information and communication technologies in health in the context of wicked problems and sociotechnical theory. *Journal of the American Medical Informatics Association*, 14(6), 746–755. doi:10.1197/jamia.M2462
- Westbrook, J. I., Braithwaite, J., Iedema, R., & Coiera, E. W. (2004). Evaluating the impact of information communication technologies on complex organizational systems: A multi-disciplinary, multi-method framework. In M. Fieschi et al. (Eds.), *Proceedings of MEDINFO 2004*. Amsterdam: IOS Press.
- Yin, R. K. (1993). *Application of case study research*. Newbury Park, CA: Sage.
- Zaccarin, S., & Rivellini, G. (2007). *Reti di relazioni e comportamento individuale: L'approccio della social network analysis*. Milano, Italy: ISTAT Office of Milan.

Isabella Bonacci is Research Professor of Corporate Organization at the Federico II University, Naples, and at the Second University of Naples (SUN), Italy. She obtained her Ph.D in Business Economics and the degree in Economics both from Federico II University of Naples. She was visiting scholar at the CMER, INSEAD Institute, Fontainebleau, France. Her research interests include economics of information systems, corporate relationships and new organizational forms, strategic use of ICTs to improve public corporate performances, with particular concern for the healthcare sector. She presented her research at several national and international conferences, including the Italian Chapter of AIS (ItAIS), the Mediterranean Conference of Information

Systems (MCIS), and the International Conference of Society for Global Business & Economic Development (SGBED). Her articles and works appeared in Politiche Sanitarie and for the Italian Society of Health Technology Assessment (SIHTA). She also published several book chapters.

Oscar Tamburis () is a Researcher at CNR (Italian Research National Council), Institute of High Performances Networks, Naples, and Dept. of Technology Innovation, Rome, Italy. He obtained his Ph.D degree in Management of Healthcare Organizations and the degree in Management and Industrial Engineering both from Federico II University of Naples. His research interests include the role of ICTs in the organisational change of public services, with particular concern for the healthcare sector. He presented his research at several national and international conferences, including the Italian Association for Healthcare Economics (AIES), the Italian Chapter of AIS (ItAIS), the Mediterranean Conference of Information Systems (MCIS), and the International Conference of Society for Global Business & Economic Development (SGBED). His articles appeared in the International Journal of Electronic Healthcare and International Journal of Healthcare Technology and Management and Hospital IT Europe.*