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PhD IN BUSINESS ADMINISTRATION AND MANAGEMENT

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A Relational Approach to Health Care Management

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Index

Introduction

Beginning in the second half of the 20th century a tendency, away from individualist, essentialist and atomistic explanations toward more relational, contextual and systemic understandings has widely spread in the social sciences and, among them, in management (Borgatti and Foster, 2003).

Relational approaches to management research are part of this process and can be opposed to the still dominant individualist approaches. Taking an individualist perspective a scholar willing to investigate antecedents or consequences of an actors' behavior will look at the characteristics of the actor. For example, to investigate what determines the prescribing behavior of a general practitioner, individualist researchers would look at individual variables such as the age or the licensing examination performance of the general practitioner. Taking a relational perspective, instead, the researcher will also look at the relationships of an organizational actor to explain the antecedents or the consequences of its behavior. For example, to investigate what determines the prescribing behavior of a general practitioner relational scholars will also look at the structure and the content of the social or organizational relationships that connect that general practitioners to other physicians.

Being management a social science, the fact that relational approaches are considered "emerging" or "new" (even though they are already around since decades) in the field is in itself remarkable. Until today, at least in the academic community that publishes works in peer-reviewed, ISI-ranked journals, individualistic or atomistic views of reality are, in fact, dominant in management research.

The diffusion of the individualist perspective is probably a related to that of positivistic epistemologies. Positivism encourages a concern for an "objective" form of knowledge that

specifies the precise nature of laws, regularities, and relationships among phenomena measured in terms of social "facts" (Morgan and Smircich, 1980) and consequently often favors reductionism (Fattore, 2005).

Nonetheless, researchers of many schools of thoughts rejected the idea the positivistic approaches are useful in social sciences being in general unable to take into account context and the processes leading to the social construction of reality. These schools of thoughts are usually labeled as “subjectivist” (Morgan and Smircich, 1980) since they tend deny the existence of an objective reality to be studied as proposed by positivism.

Moreover, a concern with practical (or actionable) knowledge may also be conflicting with positivism: if practical knowledge applies to the specific situation and to the subjective experience of the actor than the concern with generalized applications loses importance (Raelin, 2007). This stance is typical of postmodernism, as is the idea that “understanding is transactional, open ended, and inherently social” and management research should not oversimplify reality (Van de Ven & Johnson, 2006).

From a different epistemological tradition, the Economia Aziendale paradigm that has spread in Italy in the XX century, similarly claims that the study of economic institutions such as organizations has to be a “second approximation theory” (Borgonovi, 1993). Being a second approximation theory means that it has to be able to offer knowledge that gives practitioners a practical understanding of organizations and this often contrasts with the search for universal mechanisms governing relationships among variables representing social facts.

Context matters in organizational studies (Rousseau and Fried, 2001) as it is a key variable to understand the contribute of a research. The three parts of this PhD thesis are devoted to the study of relations in a specific industry, health care, because of the assumption that context

matters and industry is one of the most important contextual variables. Moreover, as an industry, health care has interesting distinctive features which are in part discussed in the first part in this thesis, the chapter titled: “Physician Social Capital: Its Sources, Configuration, and Usefulness”.

Relational approaches, share with subjectivism and economia aziendale a concern with the context where processes happen. According to Andrew Abbott (2007), from a relational perspective this context can be defined as “a set of connections in social time and social space that created the concentric and cross-cutting loci for action”. Thinking of context as a set of connections, relational views of organizations may be well considered as an approach that opens new avenues to incorporate context in research with a positivistic approach. Far from being the ultimate research tool that can be applied for any research questions in any settings, or that can be applied to measure every contextual variable which researchers should take into account, relational approaches still represent a significant improvement in the way context is incorporated in theoretical and empirical developments. One of the drivers of this improvement are the recent advances in social network analysis, a methodology developed to study relationships that had allowed better operationalization of many relational concepts. The development of social network analytical methods is still making significant advances every year and offers new ways to operationalize context as a set of measurable phenomena in a positivistic fashion. “Network analysis enshrined the relational approach and made it a little mechanical in the process” (Abbott, 2007a). Doing so, it is offering new ways to measure and even to make statistical inference on contextual variables, thus making the relational approach more consistent with positivism. Organization theory studies often consider networks as a hybrid form of organizing that has some of the features of the market and some of the features of hierarchy (Powell, 1990); similarly, relational approaches to management research may be considered a hybrid way to research, being able to increase the accuracy of the techniques used

to model effects of the context while keeping the advantages of research from a positivistic epistemology.

THE THREE PARTS OF THIS THESIS

This PhD thesis is a structured in three parts: the first is a theoretical application of a relational approach to organizational design issues in the health care industry. The second is an empirical analysis of what encourages the creation of advice relationships in six teaching hospital in the United States. The third is an empirical investigation of antecedents and consequences of reforms promoting interpersonal network among general practitioners in Italy using data collected in an Italian Local Health Authority. In the first chapter I develop some theoretical ideas that are in the two empirical chapters are applied to two health care contexts that may be considered opposite in many dimensions.

The three chapters have been written to be read independently: the first has already been published as an article in 2006 on Health Care Management Review and made me win in 2007 the award of the European Health Management Association and the Karolinska Medical Center for the best article from a doctoral thesis. The other two will be soon sent to two other peer-reviewed journals.

Nonetheless, the three studies are “connected” by many common concepts having been developed during the years of study of the PhD program and are parts of a single research program that is illustrated in this thesis. The main focus of the thesis is with inter-personal networks of physicians and their consequences for management of organizations. In professional service organizations such as health care organizations, the structure and the

content of individual-level networks of professionals are highly relevant at the organizational level of analysis.

The first chapter, “Physician Social Capital: Its Sources, Configuration, and Usefulness” sets the theoretical ideas of the thesis. In this paper I maintain that the structure, the relational content, and the cognitive features of a network have different effects on the ability of health care organization to coordinate their activities. Table 1 shows how distinctive features of health care organizations (classified as concerning the knowledge complexity of medical science, the differentiation in the work organization of clinical activities, the information asymmetries between physicians and other actors, or the relevance of external stakeholders to organizations) imply different, and sometimes conflicting, features of the relationships in the organization. Available evidence suggests that networks of physicians tend to be dense networks made of colleagues in the same medical specialty; this type of networks are effective to promote social control among the medical professions but, on the other hand, may be detrimental for innovation, communication with patients, and resource acquisition.

The second chapter, “Who Do Academic General Medicine Attendings Turn to for Advice about Inpatient Care?” analyzes a very interesting dataset I have been able to access working with Professor David Meltzer at the Center for Health and the Social Sciences at the University of Chicago. The main finding is that the tendency toward homophily, that is to create ties to colleagues very similar according to some specialty-related or demographic characteristics, is the key driver of the spontaneous creation of relations among physicians. Therefore, consistently with the first chapter, evidence that physicians tend to form dense networks made of colleagues in the same medical specialty finds support.

The third and last chapter, “Interpersonal Networks of General Practitioners: the Case of Italian General Practitioners Collaboration Initiatives” uses data from general practitioners

collaboration initiatives in an Italian Local Health Authority to find out that, as also found in the second chapter, homophily drives the autonomous grouping of physicians in social networks. The subsequent very homogeneous networks that are created are not effective in order to reach any of the objectives collaboration initiatives were created for. Therefore, the spontaneous grouping creates homogeneity that, as suggested in the first chapter, is not effective for every objectives assigned to networking initiatives.

In the two empirical parts, context is not only modeled through relationships but also discussed with some qualitative evidence. Features of contexts for which relational data were not available, in fact, always play an important role. The choice of two very different contexts, although in the same industry, has been determined by an explicit research strategy. Chapter 2 uses data collected in 6 hospitals affiliated with top research universities in the United States. Chapter 3, instead, uses data from primary care in the Italian NHS. The relevance of prestige, money, politics, and the incentives created by the architecture of the health systems are completely different in the two settings. This strategy has been inspired by the theoretical part of the thesis (Chapter 1) which developed from the idea that management of health care organizations is specific because of the health-related nature of the activities taking place. Collecting data in two opposite settings allowed to hold constant the health-related nature of the activities while exploit variations in the most other features of the contexts.

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Physician Social Capital: Its Sources, Configuration, and Usefulness*

ABSTRACT

Specific characteristics of health care shape the social capital of physicians and, consequently, their behavior and the performance of organizations. In this article, propositions about how social capital is influenced by four characteristics of health care are developed. These propositions are analyzed with reference to the mechanisms through which social capital operates, to the contingencies that make it valuable, to the integrative power of a social capital framework in health care management, and to their practice implications.

Key words: social capital, networks, physicians, knowledge transfer, social control

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Physician Social Capital: Its Sources, Configuration, and Usefulness

During the last twenty years, the concept of social capital has been developed by a growing number of sociologists, political scientists, and economists and has also proved useful in a number of areas of central concern to management researchers (Adler and Kwon, 2002). The concept of social capital is a powerful tool in explaining individual, organizational and community-level outcomes because social capital gives access to resources which means it is a valuable resource in itself, and because it also acts as a conduit for influence and social control.

In this paper I shall discuss how four themes, typical in social science literature relating to health care, shape the characteristics of physicians' social capital and how social capital itself shapes their behavior and the functioning of health care organizations. These themes are: knowledge complexity of medical science; high differentiation in the work organization of clinical activities; information asymmetries between physicians and other actors, and; the relevance of external stakeholders to organizations. The implications of these themes are discussed with specific reference to the structural, the relational, and the cognitive dimensions of physicians' social capital, using a classification first introduced in of social capital studies by Nahapiet and Ghoshal (1998).

Social capital is "the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition" (Bourdieu, 1986).Management research has shown that social capital is related to benefits at the individual level, as well as the organizational, and the community levels of analysis. At the individual level social capital is related to power, leadership, mobility, employment, individual performance, individual creativity, and entrepreneurship. At the organizational level to privileged access to information, team performance, and opportunities for new business. Finally, at the community level social capital

is related to the creation of an environment favorable to trust that benefits transactions among all the members. For a review of the concept in the organizational literature see Adler and Kwon (2002).

The growth of the social capital literature profited from the parallel growth in work on Social Network Analysis, which has contributed a set of techniques and a theoretical approach that have been often used to operationalize the concept of social capital. Benefits from social capital are enacted by four *network mechanisms*: network closure, brokerage, contagion, and prominence (Burt, 2000) *Network closure* refers to the idea that, in a dense network structure, most actors know everyone else and information about unaccepted behaviors spreads quickly implying a high cost of exclusion for those behaviors (Coleman,1988). This is an advantage to people in such a network, and is thus named "capital", because transactions are easier since actors can rest assured that others will not behave opportunistically because of the high cost of exclusion they will face. *Brokerage* refers to the idea that actors have "capital" if they bridge structural holes between subgroups in the network and have the opportunity to broker the flow of information between people and control the projects that bring together people from the opposite side of the hole (Burt, 2000). The other, less debated, mechanisms underlying social capital are *contagion* and *prominence* (Burt, 2000). If contagion operates, actors adopt the behaviors of other actors with whom they interact (contagion by cohesion) or to whom they occupy a similar position (contagion by structural equivalence); whereas, if prominence operates, actors imitate the behaviors of the most prominent actor in the network. Which mechanism operates depends on the structural characteristics of network and the nature of the situation.

Social capital is the contextual complement to human capital (Coleman, 1988), and both human and social capitals are important antecedents of performance in professional service

organizations (Pennings, Lee, and van Witteloostuijn, 1998). Human capital is created by changes in persons that bring about skills and capabilities to act in new ways, while social capital is created by changes in the relations among persons that facilitates action (Coleman, 1988).

Although networks exist in the health care industry at every level of analysis, this article is primarily concerned with individual-level physician networks. While the social capital of individuals in other healthcare occupations, as well as organizational-level social capital, and community-level social capital also have important applications to healthcare, they are outside the scope of this article. Physicians' individual-level social capital also has effects on the organizational and community level, however, and these dynamics will be discussed in the paper.

In the next section the evidence available on physicians' social capital is briefly summarized. Few studies have been published on this specific topic, but some knowledge about the three different dimensions of physician social capital can be inferred from works on healthcare organizations addressing related issues.

In the following four sections, implications of four common themes in the health care organization discourse on physicians' social capital are discussed. These four common themes are: knowledge complexity of medical science; high differentiation in the work organization of clinical activities; information asymmetries between physicians and other actors, and; the relevance of external stakeholders to organizations. Shortell and Kaluzny (1996), whose nine points list of specificities is summarized in the four higher order themes I have identified, state that these characteristics are not unique to healthcare, but in no other industry these specificities coexist together. Also, these features are present to different extents across medical activities and specialties. In each of these four sections, the characteristics of social capital implied by the

theme are examined according to the three dimensions of the Nahapiet and Ghoshal's (1998) classification. The propositions developed in these sections are represented in table 1. Future research could test these propositions comparing social capital features of physicians that perform activities affected at different degrees by the four themes analyzed here. A proxy variable for the activities performed is the specialty they are in.

In the last part of the paper, the propositions are analyzed with reference to the mechanisms through which social capital operates, to the contingent value of social capital, to the integrative power of a social capital framework in health care management, and to implications for practice.

DIMENSIONS OF SOCIAL CAPITAL IN THE HEALTH CARE INDUSTRY

Health service provision and health systems are inherently relational because of the activities involved and are highly influenced by sociological variables because of the social relevance of health. Excluding the vast literature that relates social capital to patients' health, little empirical work has been published using the concept of social capital in this industry. The findings of published empirical works are that community social capital predicts citizens' trust in physicians (Ahern and Hendryx, 2003) and access to care (Hendryx, Ahern, Lovrich, and McCurdy, 2002), that physicians' social capital is negatively related to their job tension (Chang, Gotcher, and Chan, 2006), and that accountability to the community is unrelated to social capital (measured as the community participation in the hospital decisions) (Lee, Chen, and Weiner, 2004). Some knowledge about the three different dimensions of physicians' social capital in this industry can also be inferred from works outside the social capital stream of research, but addressing closely related issues.

The three dimensions identified by Nahapiet and Ghoshal (1998) represent a classification often used in the management literature. Although these three dimensions are highly interrelated, this classification has proven itself useful in the analysis of features of social capital.

Structural dimension. Structural embeddedness concerns the impersonal configuration of linkages between people or units. This dimension refers to the presence or absence of ties among actors and to network measures such as density or centrality that can be derived from the structure of a social network. Classical literature in the sociology of professions maintains that claiming and preserving a professional jurisdiction requires a complex organization and capability to mobilize profession's members (Abbott, 1988). Medicine is segmented in specialties ranked according to their intra-professional status or power, and physicians practice is seen as determined largely by the practitioner's relation to his colleagues and their institutions. West et al (1999), in a study of hospitals in England, found that the professional social networks of clinical directors of medicine tend to be much more densely connected than the directors of nursing social networks. This literature suggests that doctors may be embedded in tightly knit groups of peers.

Relational dimension. Relational embeddedness concerns the kind of personal relationships people have developed with each other through a history of interaction. This dimension refers to the content of the ties such as, for example, trust, norms, or expectations. There is no empirical data on how the relational dimension of physicians' social capital could differ from others'. However, a classical study made in the Fifties by Coleman et al. (1966) found that the trustworthiness of a physician leads to his being imitated by others in conditions of ambiguous information, and that friendship relationships among doctors dated back to their medical education process.

Cognitive dimension. Cognitive embeddedness concerns the network resources providing shared representations, interpretations, and systems of meaning among parties. Empirical studies consistently support the idea that physicians' cognitive schemes are "different". Golden, et al. (Golden, Dukerich, and Fabian, 2000) show that professionals and managers interpret identical issues differently. Both cognitive and affective conflicts may arise because of these issue interpretation differences (Shook, Payne, and Voges, 2005). Ferlie et al. (2005) find that cognitive boundaries between unidisciplinary communities of practice retard the spread of innovation. Moreover, among the assumptions of the sociology of professions is the idea that professional groups share strong and distinctive moral values.

COMPLEXITY OF MEDICAL KNOWLEDGE AND SOCIAL CAPITAL OF PHYSICIANS

The idea that most clinical activities are knowledge intensive is central to the way the industry is organized at the individual, organizational and societal levels. Medical research produces a remarkable amount of information[†] based on scientific studies. Yet, clinical decisions and methods of patient care are based on much more than just the results of controlled experiments: clinical knowledge consists of interpretive action and interaction, factors that involve communication, opinions, and experiences (Bosk, 1979; Malterud, 2001). Clinical knowledge is complex not only in the quantity of information it is based on but also in several other dimensions and, therefore, explicit information printed in handbooks and scientific journals is,

[†] MEDLINE, the premier bibliographic database covering the fields of medicine, nursing, dentistry, veterinary medicine, the health care system, and the preclinical sciences, adds each weekday to its archives of published research between 1,500-3,500 completed references (source: http://www.nlm.nih.gov/pubs/factsheets/medline.html accessed on 4/4/2006).

Table 1: The implications of knowledge complexity, work differentiation, information asymmetry, and stakeholders' relevance for physicians' social capital

	Structural dimension	**Relational dimension**	**Cognitive dimension**
Knowledge complexity of medical science	(P 1.a) uniprofessional network of strong ties	(P 1.b) advice and trustworthiness	(P 1.c) standardization of information and evaluation criteria
Differentiation in the work organization of clinical activities	(P 2.a) dense, close and multiprofessional	(P 2.b) trust	(P 2.c) standardization of coordination information
Information asymmetries between physicians and other actors	(P 3.a) dense, close and uniprofessional	(P 3.b) patient referrals	(P 3.c) behavior based on in-group prototype
Relevance of external stakeholders to organizations	(P 4.a) presence of few boundary spanner individuals	(P 4.b) friendship, trust and political support	(P 4.c) less specialized cognitive schemes

alone, not effective in knowledge transfer. How knowledge is created and transferred has been the focus of organizational knowledge management studies from the Nineties onward (Nonaka and Takeuchi, 1995). In this literature is often used the concept of *tacit knowledge* (as opposed to explicit knowledge) referring to those aspects of knowledge that cannot be codified, but can only be acquired through personal experience or transmitted via inter-personal contacts. Moreover, sociological literature on professionalization considers complex knowledge among the antecedents of professionalization of occupations (Abbott, 1988; Wilensky, 1964).

Studies on social capital of organizations maintain that through membership in a network and the resulting repeated and enduring exchange relationships, the potential

for knowledge acquisition by the network members is created (Inkpen and Tsang, 2005), and that social interaction, a manifestation of the structural dimension of social capital, and trust, a manifestation of its relational dimension, are related to the extent of actors' resource exchange. Social capital facilitates the creation of new human capital, defined as knowledge and knowing capability of a social collectivity, and gives an "advantage" to organizations (Nahapiet and Ghoshal, 1998). In health care, Gopee (2002) observes that "substantial informal teaching, learning and facilitation of learning occur through work-based contacts with other healthcare professionals".

Proposition 1*:* Knowledge complexity influences features of physician social capital in the three dimensions. Specifically:

a. the higher the tacitness of knowledge, the higher will be the number of strong ties physicians have to members of their medical specialty (structural dimension);

b. the higher the ambiguity of scientific evidence which knowledge is based on, the higher will be the advice and the trustworthiness content of the relationships among physicians in the same specialty (relational dimension);

c. the higher the quantity of new knowledge produced, the higher will be the standardization of physicians' cognitive schemes (cognitive dimension).

In its *structural dimension*, a physicians' social capital made of strong ties to peers let physicians access tacit knowledge in cases where it is difficult to make the knowledge explicit (i.e. surgical activities or decisional heuristics with ambiguous clinical data), or to obtain informal consultations about patients with "unusual" clinical situations. Peers in the same medical specialty, therefore, are the only one with whom specialty-specific knowledge may be exchanged, and if formal sources as journals aren't effective

because also tacit knowledge is involved, physicians need access to peers. Ties to peers also help physicians to select relevant new information out of the incredible amount of published work observing others behavior before deciding to invest time in paying attention to and learning new information and knowledge.

For the *relational dimension* of physicians' social capital, the complexity of medical knowledge implies that advice and trustworthiness relationships must be present in order to transfer complex knowledge. The evidence on which applied medical techniques or therapies is based is not always strong but often mixed. In the case of ambiguity of knowledge, doctors have to decide whether to adopt an innovation or not and, thus, they will seek the advice of other doctors in the same specialty who they consider trustworthy. They do so in order to have a reliable source of validation of new knowledge and to reduce uncertainty when scientific evidence is ambiguous. When physicians use their social capital to resolve uncertainty, ties, more than simply acting as conduits for technical knowledge, act as conduits for the trustworthiness of colleagues that are believed to be a reliable source. One of the main findings of the work on the diffusion of innovations by Coleman et al. (1966) was that a new drug's adoption rate increased after the decision to adopt it is made by few physicians central in the advice and friendship network.

With respect to the *cognitive dimension* of social capital, the transfer of knowledge is accelerated by sharing cognitive schemes that have been learned during the intense formation period of medical professionals. To deal efficiently with many "pieces" of knowledge, knowledge flows and criteria to evaluate new knowledge have to be highly standardized. Standardization of scientific information and of criteria for knowledge evaluation is very efficient to transfer high quantities of new information and

knowledge produced each year.

WORK DIFFERENTIATION IN HEALTH CARE AND SOCIAL CAPITAL OF PHYSICIANS

Health care systems are characterized by a high degree of differentiation that makes them segmented into many organizational subsystems. While this differentiation is a source of strength, it has to be compensated with integration mechanisms. High differentiation of work is necessary because knowledge is highly specialized but, on the other hand, it creates high interdependencies in clinical activities. Ordered according to their complexity, interdependences can be: *pooled*, when each parts render a discrete contribution to the whole and each part is supported by the whole; *sequential* when a direct interdependence (i.e. one part cannot act unless the other hasn't acted properly) is added to the pooled; and, *reciprocal*, referring to the situation in which the outputs of each become the input for the other (Thompson, 1967). The nature of the interdependencies and of the feasible coordination mechanisms depends on the activities each specialty performs. For many activities in health care, work is highly variable, and often of emergency and nondeferrable nature (Shortell and Kaluzny, 1996) while, for others, it may be subject to high standardization. Lamothe and Dufour (Lamothe and Dufour, 2002) report evidence suggesting that the differences in the organizational configurations developed by the operating units in a Canadian teaching hospital depended on the complexity (i.e. the number of the pathologies each patient may have, the number of professions involved by the technology, and the ambiguity of

the diagnosis) and uncertainty (i.e. the probability of emergency nature of the patient stay and the likelihood of complications during the procedure) of activities. They use ophthalmologic surgery, vascular surgery, rheumatology, and geriatrics as examples of the variability in these conditions and in the organizational coordination mechanisms showing that in ophthalmologic surgery a sequential line of communication is effective, in vascular surgery and rheumatology two or more professions are needed but all can be coordinated by a central actor, in geriatrics a team effort is required and each patient's treatment has to be integrated in group decisions.

Proposition 2: Work differentiation influences features of physician social capital in the three dimensions. Specifically:

a. the higher the complexity of the interdependencies among two medical specialties, the higher will be the number of ties between physicians of the two specialties (structural dimension);
b. the higher the complexity of the interdependencies among two medical specialties, the higher will be the trust content of the relationship (relational dimension);
a. the higher the complexity of the interdependencies among two medical specialties, the higher will be the standardization of language (cognitive dimension).

The *structural dimension* of physicians' social capital represents a pre-condition to the flow of resources between specialties. Thus, for clinical activities that involve patients with multiple pathologies, or with characteristics making the diagnosis ambiguous, the presence of inter-specialties ties eases the mutual adjustment of doctors cooperating in a non-standardized situation. Activities that can be standardized don't need physicians'

social capital to run smoothly but can be performed just reading what others have written on the patient's clinical record.

Considering its *relational dimension*, social capital should conduit trust in order to support activities creating high sequential or reciprocal interdependences among specialties. Doctors providing services to the same patient have to rely upon each others' work if complex interdependencies exist among them. Without trust a doctor would be unable to make clinical decisions based on previous doctors' work.

The *cognitive dimension* of physicians' social capital speeds up the coordination by sharing a technical language. A shared language allows to reduce ambiguities in communication and to describe complex activities in few words. If the activities imply frequent mutual adjustment without a shared language could be unfeasible to manage the amount of communication needed.

INFORMATION ASYMMETRIES IN HEALTH CARE AND SOCIAL CAPITAL OF PHYSICIANS

Because of the complexity of medical knowledge the information possessed by the physicians as to the consequences and the possibilities of treatment is necessarily very much greater than that of the patient, or at least so is believed by both parties (Arrow, 1963). This information asymmetry makes difficult for patients to control directly the quality of services they are provided with as if they were buying a product in a perfect market, and therefore, is among the causes of market failure in health economics. Information asymmetries also create the potential for opportunistic behavior that transaction cost economists cite as the reason for non-market governance structures. But

even when care is provided under hierarchical governance structures (i.e. inside an organization such as an hospital), the extent to which top management can use formalization, hierarchy, or output standardization to control physicians is limited by professional resistance, failure of hierarchy when coordination require high quantity of information, and low efficacy of budget systems given task uncertainty. Professional controls and self-control mechanisms substitute for formal administrative controls used by organizations in other industries (Abernethy and Stoelwinder, 1995). Social control mechanisms are usually described as "clans" relying upon a relatively complete socialization process which effectively eliminates goal incongruence between individuals. Examples of professional controls, in the sociology literature, are schools that train practitioners, the examinations that test them, the licenses that identify them, and the ethics code that they are presumed to obey (Abbott, 1988; Bosk, 1979).

Proposition 3: Information asymmetries influence features of physician social capital in the three dimensions. Specifically:

a. the lower the ability to evaluate quality of a medical activity by patients and administrators, the higher will be the density of the doctors' network and the proportion of actors of the same specialty (structural dimension);
b. the lower the ability to evaluate quality of a medical activity by patients, the higher the number of patients referred by other physicians (relational dimension);
c. the lower the ability to evaluate quality of a medical activity by patients and administrators, the more relevant will be the professional group prototype as a benchmark for physicians' behaviors (cognitive

dimension).

In the *structural dimension* of physicians' social capital, information asymmetries imply that peers are in the best position for monitoring physicians. Physicians in the same specialty, in fact, have the knowledge needed to evaluate colleagues' behavior and the possibility to observe activities through direct interactions in clinical and scientific settings or indirect interactions providing services to the same patient. Dense and uniprofessional networks of doctors ease social and self control able to compensate a low ability to evaluate clinical results by patients and administrators.

In the *relational dimension*, one important resource mobilized by physician social capital is represented by the patients referred by others doctors. Because of information asymmetry, patients are often not able to judge the quality of the physicians and, therefore, to choose themselves the providers of each needed medical service. Compared to patients, physicians are in better position to assess the quality of others physicians' work because they have at least basic knowledge of other specialties, they can interact repeatedly with the same colleague, and they receive information flowing in the smaller colleagues' network.

As for the *cognitive dimension* of social capital, it elicits a form of self-control that, together with the peer control discussed referring to the structural dimension, supplements for the failures of market and hierarchies in professional settings. Social categorization of self cognitively assimilates self to the in-group prototype and brings self-perception and behavior in line with the contextually relevant in-group prototype (Hogg and Terry, 2000). The sociology of profession literature has described a typical physician for which altruistic motives and peers esteem are fundamental. Behavior based on such an in group prototype reduces the potential for opportunistic behavior

toward patients through doctor's self-control.

RELEVANCE OF EXTERNAL STAKEHOLDERS TO ORGANIZATIONS IN HEALTH CARE AND SOCIAL CAPITAL OF PHYSICIANS

As discussed in the three previous sections, much of the resources needed specifically to perform medical activities can be accessed through colleagues. However, physicians still need both financial resources and legitimacy as a profession from the world outside their professional community. One of the first empirical tests of resource-dependence theory (Pfeffer, 1973), found that board of directors function and composition of US hospitals did have an impact on the organization's ability to attract resources from the environment. It was concluded that boards are one possible mechanism linking the organization with its environment. On the other hand, high levels of social capital in the broad community served by hospital has been found to not influence hospital decisions, their community accountability nor provision of community-oriented health services (Lee, Chen, and Weiner, 2004). Professionals also need their representatives to obtain from the society legal recognition of a special jurisdiction over medical matters (Abbott, 1988; Wilensky, 1964). These evidences tend to support the idea that a small number of actors are in charge of keeping ties with external stakeholder.

Individuals being the interface as the organization and the external resources are labeled by the organizational literature as "boundary spanners". They have ties both inside and outside their organization and broker information or other resources both ways.

Proposition 4: The relevance of external stakeholders influences features of

physician social capital in the three dimensions. Specifically:

a. the higher the organizational dependence on external economic resources, the higher will be the presence of boundary spanners individuals who have ties to politicians and civil society (structural dimension);
b. the higher the organizational dependence on external economic resources, the higher will be the friendship, trust, or political support content of ties of the boundary spanners individuals (relational dimension);
c. the higher the need for patient compliance and health promotion of a medical activity, the less specialized will be the doctors' cognitive schemes (cognitive dimension).

The *structural dimension* of physician social capital in an organization with boundary spanners individuals is characterized by dense relationships mainly with colleagues and by the presence of few individuals well connected to relevant actors in the broader society, such as politicians or philanthropists. Professional association's representatives lobby politicians and hospital administrators attract resources from the environment keeping the most of the profession insulated from contacts with external stakeholder (except the patients they provide care to). Economic resources and social legitimacy are obtained through the ties of those individuals, usually at the top of organizational hierarchies. As a result, the others can be disconnected from the broader community since this doesn't affect the capability of the organization to access economic resources.

Focusing on the *relational dimension* of the social capital of the boundary spanner individuals, they should have with the politicians or philanthropists relationships of

friendship, trust, or political support as they are intended to guarantee that resources received because of altruistic motives would be used accordingly or, to exchange political support for resources the organization needs.

On what concerns the *cognitive dimension* of social capital, the relevance of external stakeholders also implies that physicians mainly connected to other physicians and structurally disconnected to non-doctors may have problems in communicating with patients because they develop distant languages and social identities. This may affect the capability of organizations to perform health promotion activities (Gopee, 2002) or to use therapies that require uncertain patients' compliance. Activities implying complex and effective communication require doctors to have less specialized cognitive schemes.

DISCUSSION

The previous four sections pointed out some implications of four themes typical of the literature on healthcare care organizations for the characteristics of physician social capital and, through the latter, on the functioning of health care organizations.

Table 1 summarizes the characteristics of social capital required by knowledge complexity, work differentiation, information asymmetries, and relevance of the external stakeholders and gives an overview of the propositions in the text. Future research may test these propositions by exploiting the variability of medical specialties' features and comparing the dimensions of physicians' social capital among specialties that can be classified as "high" or "low" in each of the four themes.

This section is organized in four parts. I discuss in the first the mechanisms that in the propositions are assumed to convert social relationships in a advantage that improve individual and, thus, organizational performance; in the second, how different form of social capital are an advantage in different contingencies; in the third, how social capital may provide an integrative framework to assess commonalities about different research traditions; and, in the last, the managerial implications of the propositions.

Closure, brokerage, contagion, and prominence

As mentioned, social capital operates through four mechanisms: closure, brokerage, contagion, and prominence (Burt, 2000).

Network closure is the main mechanism responsible for social control. It underlies propositions 2.a, 2.b and 3.a. The idea is that, if information about deviant behaviors spreads fast among all the people to whom an actor is connected, the actor has strong incentives to not deviate and, thus, trust is fostered and mechanisms of bureaucratic control may be avoided.

Resources transfer operates efficiently through the *brokerage* mechanism. It underlies the idea of boundary spanners and, thus, propositions 4.a and 4.b. It also works in proposition 3.b since physicians linked to both colleagues in their specialty and colleagues in the specialties feeding patients to it (i.e. cardiac surgeons and cardiologists) are those who control the patient supply of their specialty.

Shared language and meaning are spread trough the *contagion by cohesion* mechanism. This mechanism underlies the four propositions referring to the cognitive

dimension of physicians' social capital as language and meaning are created or learned during interactions among actors. But *contagion by cohesion* also operates when tacit knowledge is transferred and, thus, is the mechanism operating in proposition 1.a. Tacit knowledge is unlikely to be learned through weak ties with knowledgeable actors but it might be learned seeing knowledgeable actors using it or interacting frequently with them.

Behavioral choices in condition of uncertain information may depend on both the *contagion by structural equivalence* or by the *prominence* mechanisms. They may both work in proposition 1.b that state that if knowledge is ambiguous physicians will turn to peers for advice or imitate actors that they consider trustworthy.

Contingencies and social capital

Social capital is not an all-purpose good but one that is goal specific (Flap and Volker, 2001) and the four themes discussed in this paper cause different and sometimes conflicting issues. Social capital of physicians has traditionally developed in a way that deals with some of these issues. For example, the long professional education process, or the role of scientific societies associations, may be seen as mechanisms to create and maintain social capital that let physicians cope with the problems in controlling medical work and with the exponential growth and change of medical knowledge. A dense and uniprofessional network is effective at circulating quickly new medical knowledge inside these sub-groups of actors connected by multiple and short paths but, at the same time, make difficult to absorb new knowledge from outside the sub-groups. Social capital may, therefore, also be a cause of some of the most critical features of health

systems as resistance to managerial change, lack of patient orientation, and lack of cooperation among physicians in different specialties. Although most of the themes imply, as shown in Table 1, a physician's social capital made of a dense network of other physicians (structural dimension), that circulate advice, trust, and trustworthiness (relational dimension), and that support common cognitive schemes and role model prototypes (cognitive dimension), some themes require different characteristics. First, while in some propositions a network that mainly includes physicians in the same specialty is effective, in other propositions the nature of activities require a network that includes physicians in more than one specialty. Second, a number of boundary spanners individuals, is needed to allow the organization or the profession to access resources from actors in the broader society. These individuals' social capital should be such as that effective flow of resources between the organization and its environment is possible. Third, if highly specific cognitive schemes are essential in allowing the flow of information and the self-control of physicians they also represent a barrier to effective communication with non-doctors. These barriers are more relevant in medical activities related to health promotion or requiring patients' compliance to therapies. Moreover, cognitive schemes take time to develop and are difficult to discard and when the structure of the network changes (i.e. an exogenous innovation introduces a new organization of work, the network structure evolves because of endogenous factors, or the actor changes its relative position) cognitive scheme may be a barrier to knowledge acquisition (Ferlie,Fitzgerald, Wood, and Hawkins, 2005).

Social capital and the scientific fields relevant to management of medical organizations

Social capital can also represent a broad but parsimonious theoretical concept for

health care management studies, allowing to view the connections among many heterogeneous phenomena in the field. Those phenomena are currently explained by different theoretical perspectives. The social capital concept does not replace previous theoretical approaches, instead, it bridges them and highlights their relationships. In table 2, research fields relevant to the characteristics of social capital are listed as they have been mentioned in the proposition discussion. Although reviewing the literature in these fields is outside the scope of this article and only few of the most representative authors for each field could have been cited, the table is intended to show how the social capital framework builds on previous literature.

Table 2 also implies that different fields have developed theories on the same specificities of health care and that interdisciplinary studies are highly important in health care management.

Implications for practice

Previous studies (Chang, Gotcher, and Chan, 2006; Hoelscher, Hoffman, and Dawley, 2005) have emphasized that health care managers should: redesign the workplace in order to increase the interaction among employees; encourage employee participation in the organization and in the community; support a culture conducive to trust; and hire people with high level of individual social capital. The discussion in this article contributes by better specifying the contingencies under which these managerial prescriptions should be applied and adding a focus on Organizational Design and Human Resource Management (HRM).

Table 2: Relationships sections-streams of literature

Knowledge complexity	Diffusion of innovations (e.g., Coleman, Katz, and Menzel, 1966), knowledge management (e.g., Nonaka and Takeuchi, 1995), medical sociology (e.g., Wilensky, 1964)
Work differentiation	Organization theory (e.g., Thompson, 1967), self-categorization theory (e.g., Hogg and Terry, 2000), diffusion of innovations (e.g., Coleman, Katz, and Menzel, 1966), knowledge management (e.g., Nonaka and Takeuchi, 1995).
Information asymmetries	Health economics (e.g., Arrow, 1963), organizational economics , medical sociology (e.g., Wilensky, 1964), control in professional organizations (e.g., Abernethy and Stoelwinder, 1995).
Relevance of external stakeholders	Resource dependence (e.g., Pfeffer, 1973), medical sociology (e.g., Abbott, 1988), organization theory (e.g., Thompson, 1967).

The contingencies under which investing in policies that support the development of social capital should be considered because specialties differ in the type of knowledge they use, in the complexity of interdependencies, and in the feasibility of bureaucratic control mechanisms. Therefore organizational policies supporting social capital should acknowledge these differences and *concentrate efforts on the specialties that are more complex in these three dimensions*. Also, as not every physician in the organization needs ties to the wider society, *participation in the community should be supported only for selected boundary-spanners physicians who have managerial responsibilities* implying external contacts.

The focus on knowledge, coordination, control, and relations with the environment also add some managerial implication on the role of organizational design and HRM. Keeping in mind the discussed contingencies, *organizational design should consider intra and inter-organizational coordination mechanisms such as periodic meetings, employee rotations, and project managers* in order to ease the formation of ties conducive of social capital. *HRM policies should adopt mechanisms that incentive*

knowledge sharing and creation (for instance by organizing mentoring programs, or using publications as a criteria for career advancement), *foster social control* (for instance by adopting group-based incentives), and *consider the cognitive dimension of social capital and ties to relevant stakeholders in the selection process* for managerial roles.

Managers should also understand that social capital have significant economic and cultural costs of development and may have negative effects such as unwanted conformity, opposition to external groups and may hide illegal behaviors. This is important to consider during technological or organizational change processes and in the selection of physician for managerial position.

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Who Do Academic General Medicine Attendings Turn to for Advice about Inpatient Care?[iii]

ABSTRACT AND KEY WORDS

Context: Physicians often turn to colleagues for advice in providing clinical care. Physicians would seem likely to choose advisors based on professional qualifications associated with greater knowledge. However, in other contexts, individuals have been found to seek advisors based on their similarity to them in personal characteristics. It is not known how physicians prioritize such professional and personal factors.

Objective: To determine how professional and personal factors affect who inpatient general medicine attendings ask for advice about clinical care.

Design, Setting, and Participants: 281 attending physicians on the general medicine services of 6 academic hospitals were surveyed concerning demographic and professional attributes. They were also asked to name three general medicine attendings to whom they were most likely to turn for advice during a typical month on the inpatient general medical services.

Main outcome measure: Whether a physician named another physician as one they were most likely to turn for advice.

[iii] I would like to thank David Meltzer and Daniel Menchik for their valuable and constructive comments on an earlier draft of the manuscript.

Results: Both professional and personal factors affected who attendings asked for advice. Attendings were more likely to name colleagues who were more experienced (older), graduated from a higher-ranked medical school, and read more journals. However, attendings were also less likely to seek advice from colleagues who differed from them in personal and professional attributes, including gender, experience (age), sub-specialty, medical school rank, and journal readership. Women were more likely to name men as advisors than men were to name women.

Conclusion: Academic general medicine physicians choose advisors based on both professional attributes of the advisor plausibly associated with greater knowledge and attributes unlikely to be associated with greater knowledge, such as the advisor's similarity to them in personal and professional factors. These patterns of advice-seeking behavior may have implications for understanding practice variations and the diffusion of medical innovation, and for identifying effective opinion leaders.

Keywords: Opinion leaders. Physician practice variations.

Who Do Academic General Medicine Attendings Turn to for Advice about Inpatient Care?

INTRODUCTION

Medical practice requires the continuous incorporation of information into care from many sources, including one's professional colleagues. Although patterns of formal consultation across areas of medical specialization have been frequently studied, far less is known about informal patterns of consultation among colleagues. The patterns of such consultations are potentially important because they may determine the structure through which practices are adopted by physicians, and affect both practice variations among physicians at a point in time and changes in practices over time as innovations diffuse.

This study investigates how professional and personal factors affect who inpatient general medicine attendings ask for advice about clinical care. Understanding how the choice of the colleagues to whom ask an informal consultation may have important implications on dealing with of practice variations and in understanding the factors influencing the social network of physicians.

Variations in use of medical practice across small areas has been shown to be evident across time and space (Wennberg and Gittelsohn, 1973; Glover, 1938). This variation is widely believed to be greatly caused by physician practice style (Wennberg, 2005) and not be explained by patient or health system factors. Practice variation has also been shown to have an impact of the cost of care (Fisher et al., 2003; 2003a) and, as it has large welfare implications, has been the target of many quality improvement

efforts. Social networks are a key factor influencing the diffusion of innovations and, therefore, should be among the main objects of study when the origins of medical practice variations are matter of interest. Research on the informal patterns of advice may contribute to address the issue of practice variation and inform strategies of intervention by studying the social network through which similarity in practice may diffuse.

METHODS

Sample and context

In 2003, 281 attending physicians in the general internal medicine departments of six US teaching hospitals were surveyed concerning individual-level and relation-level data. The survey was sent to every attending physician employed that year by the departments.

Compared those in other types of settings, physicians in a teaching hospital may be assumed to place a higher value on collegial esteem than those practicing elsewhere (Bosk, 1979).The total number of attendings in each site and response rates are reported in Table 1.

Data

The questionnaire contained items concerning the attendings' use of scientific information sources, demographic data, and social network questions. Hospitals' administrative databases provided information on subspecialties, medical school of

study and residency. A summary of the descriptive statistics for the physician-level data used in this study is presented in table 2. The evaluation of the medical school from which each physician graduated was taken from the "peer assessment score" of the Americas Best Graduate School ranking published by the magazine *U.S.News & World Report* in 2003, the year of the study (U.S.News & World Report, 2003). This peer assessment score is determined by asking the presidents, provosts, and deans of admissions (or equivalent positions) at other medical schools a rating on a scale from 1 (marginal) to 5 (distinguished). For attending graduated from a non-ranked school, that is, a school below the top-50 or a school in a country other than US, the score for the 50^{th} school in the published ranking was used to fill the missing values.

Table 3: Number of General Internal Medicine Attendings and Response Rates by Site

Site	Attendings	Response Rates (%)
Site 1	66	77
Site 2	74	54
Site 3	50	62
Site 4	25	76
Site 5	35	74
Site 6	31	84
Total	281	69

Table 4: Individual-level descriptive statistics

	All (n=281)					Respondents (n=135)			Partial respondents (n=58)				Non-respondents (n=88)			
	Obs	Mean	95%	Min	Max	Obs	Mean	95%	Obs	Mean	95%	P-	Obs	Mean	95%	P-
Age	217	43.1	41.9 -	29	73	134	42	41.1 -	55	44	42.2 -	0.12	28	42	38.8 -	0.95
Percentage male	281	0.6	0.54 -	0	1	135	0.67	0.59 -0	58	.56	0.44 -0	0.19	88	0.52	0.42-0	0.03*
MedSchool ranking	281	3.6	3.5 -	2.8	4.9	135	3.6	3.5 -	58	3.6	3.4 -	0.99	88	3.6	3.5 -	0.62
Number of Journals	176	4.3	3.95 -	0	20	135	4.3	3.8 -	41	4.6	3.7-	0.57				
Uses of Medline	187	12	10.2 –	0	100	135	13.4	11.0 -	52	8.7	6.4 -	0.02*				
Specialties:																
Only gen. int. med.	157	0.60	0.54 -	0	1	85	0.63	0.55 -	36	0.63	0.50-	0.97	46	0.53	0.42 -	0.11
Geriatrics	28	0.10	0.06-	0	1	13	0.09	0.04-	8	0.14	0.05 -	0.29	7	0.08	.002 -	0.81
Nephrology	22	0.08	0.05 -	0	1	8	0.06	0.02 -	2	0.03	-0.01-	0.48	12	0.13	0.06-	0.04*
Endocrinology	18	0.06	0.03 -	0	1	5	0.04	0.00 -	4	0.07	0.00 -	0.32	9	0.10	0.04 -	0.04*
Rheumatology	17	0.07	0.04 -	0	1	10	0.07	0.03 -	4	0.07	0.00 -	0.91	5	0.06	0.01 -	0.62
Infectious diseases	16	0.05	0.03 -	0	1	9	0.07	0.02 -	4	0.07	0.00 -	0.93	3	0.03	0.00 -	0.29
Other[v] subspecialties	24	0.09	0.06-	0	1	14	0.10	0.05-	2	0.03	-0.01 -	0.11	9	0.11	0.05 -	0.80

[iv] P-value of a t test with equal variances for the difference of the mean (or of two-sample test of proportion, for binary variables) with the respondent group.

[v] Hematology 4; Preventive Medicine 4; Oncology 3; Pediatrics 3; Cardiac Diseases 1; Hospice 1; Palliative Care 1; Psychology 1; Pulmonary 1; Cardiology 1; Clinical Immunology 1; Immunology 1; Metabolism 1;
*P < .05.; ** P < .01.

Table 5: Dyad-level Descriptive Statistics

	Label	Obs	Mean	95% C. I.	Min	Max
Dependent Variable						
Advice	Ego names Alter as a source of advice	7501	0.04	0.03 -0.04	0	1
Independent Variables						
Both_male	Ego and Alter are both male	14814	0.35	0.34 -0.36	0	1
Both_female	Ego and Alter are both female	14814	0.16	0.16 -0.17	0	1
Diff_age	Age of Alter minus age of Ego	8280	0	-0.44 - 0.44	-68	68
Diff_school_rank	USNews peer ranking of Alter's school minus Ego's	14862	0	-0.02- 0.02	-2.1	2.1
Diff_journals	Number of journals Alter reads minus number of journals Ego reads	5062	0	-0.11 -0.11	-20	20
Diff_mediline	Number of time Alter accesses Medline minus number of times Ego does it	6084	0	- 0.49 -0.49	-100	100
Both_same_specialty	Ego and alter are in the same specialty	14862	0.041	0.038 -0.045	0	1
Both_geri	Ego and Alter are both in geriatrics	14862	0.011	0.009 - .013	0	1
Both_renal	Ego and Alter are both in nephrology	14862	0.009	0.007 -0.010	0	1

	Label	Obs	Mean	95% C. I.	Min	Max
Dependent Variable						
Both_endo	Ego and Alter are both in endocrinology	14862	0.004	0.003 -0.005	0	1
Both_rheum	Ego and Alter are both in rheumatology	14862	0.005	0.004 - 0.006	0	1
Both_inf_dis	Ego and Alter are both in infectious diseases	14862	0.003	0.002 - 0.003	0	1
Both_other_specialty	Ego and Alter are both in a specialty other than those above	14862	0.008	0.007- 0.009	0	1
Both_Only_GIM	Both Ego and Alter GIM without any subspecialty	14862	0.581	0.574 - 0.590	0	1

With respect with the social network questions, respondents were asked “to what three attending physicians do you most often turn for advice and information?”, a commonly used question in network studies used first by Coleman, Katz, and Menzel (1966).

The dyad as unit of analysis

The unit of analysis of this study is the directed dyad: the relation between one attending (named “Ego” in the social network analysis terminology) and another attending (named “Alter”). There are 14,862 possible dyads given by all the possible combinations of a physician with all the other physicians in her/his same site. If Ego named Alter as a source of advice, the dependent variable was coded 1 for the dyad. If Ego did not name Alter, the dependent variable was coded 0. Other dyad-level variables were computed as the difference of an individual-level variable between the two physicians in the dyad (variables with the prefix “Diff_”) or the co-presence of the same binary attribute (variables with the prefix “Both_”). A summary of the descriptive statistics for the dyad-level data used in this study is presented in Table 3.

Statistical analysis

The data have been analyzed using the Stata statistical software (StataCorp, 2005). The main analysis performed is a logistic regression for which the dependent variable is the advice relationship between Ego and Alter. This variable is binary and is defined as the presence of Alter’s name among those that Ego reported as the three persons she/he asks advice to. If Ego reported to ask advice to someone outside of the General Internal Medicine department of her/his site, the relationship has been dropped out of the dataset

since no other information was available on Alter. The independent variables used are both individual- and dyad-level. The variables of the type of Alter_[Name_Specialty] have been defined as present only when Alter is in the considered specialty but Ego is not. Indicator variables were created for the five more frequent subspecialties and for being in one of the other subspecialties. The frequencies of each subspecialty are reported in table 2.

Since each respondent generated as many observations as the number of attendings in her/his site minus one and, therefore, many of the observations are non-independent, the logistic regression has been clustered on Ego to take into account the correlation among individual responses by adding an Ego-specific random effect term to the regression.

RESULTS

In Table 4 the results of the statistical analysis are reported in two estimated models. Model A and Model B differ in the way the membership in a medical specialty is treated as in Model B the most frequent specialties are analytically analyzed using for each a variable for co-membership of the dyad in the specialty and a variable for the membership of Alter, and not of Ego, in the subspecialty.

Table 6: Factors associated with the presence of an Advice relationship in the dyad

Odds Ratio (Robust St. Err.) [vi]		
Variable	Model A	Model B
Both_male	2.89** (0.73)	2.99** (0.78)
Both_female	2.20* (0.72)	2.28* (0.73)
Only_alter_male	1.82* (0.47)	1.75* (0.47)
Diff_age[vii]	0.94** (0.01)	0.95** (0.01)
Age_alter	1.03** (0.01)	1.05** (0.01)
Both_same_specialty	1.58 (1.56)	
Freq_specialty (%)	0.83** (0.03)	
Both_same_specialty*Freq_specialty	1.39** (1.15)	
Both_geri		7.40** (1.54)
Both_renal		2.86* (1.40)
Both_endo		6.18* (5.48)
Both_rheum		0.91 (0.96)
Both_inf_dis		5.24**(2.85)
Both_other_specialty		0.47 (0.44)
Both_hospitalists		7.78** (2.00)
Only_alter_geri		0.33** (0.12)
Only_alter_renal		0.08** (0.08)
Only_alter_endo		0.08* (0.08)
Only_alter_rheum		0.14** (0.08)
Only_alter_inf_dis		0.19** (0.10)
Only_alter_other_specialty		1.02 (0.28)
Only_alter_only_GIM		0.52* (0.14)
Only_alter_hospitalist		0.89 (0.28)
Diff_school_rank[IV]	0.75* (0.08)	0.73** (0.08)
Alter_school_rank	1.12 (0.12)	0.99 (0.11)
Diff_journals[IV]	0.94 (0.03)	0.96 (0.02)
Alter_journals	1.11** (0.04)	1.11* (0.04)
Diff_mediline[IV]	0.99 (0.01)	1.01 (0.01)
Alter_Medline	1.01 (0.01)	1.00 (0.01)
Number of obs	4026	4026
Log pseudolikelihood	-698.61579	-651.20092
Wald chi2	263.86	380.85
Prob > chi2	0.0000	0.0000
Pseudo R2	0.1151	0.1751
Pearson chi2	3827.85	3576.66

[vi] Std. Err. adjusted for clusters in ego

[vii] Absolute value of Alter minus Ego

*P < .05.; ** P < .01.

Gender and age

The first three variables of both models address the importance of gender for the likelihood of presence of an advice relationship between two physicians. In both the models, attendings were more likely to name others of the same gender as people they turn to for advice. Women were somewhat more likely to name a man than men were to name a woman as the variable "Only_alter_male" is greater than 1 and significant at a confidence level <0.05 in both models.

Age's effect on the likelihood that Ego reports to ask advice to Alter is twofold. On one hand, internists tend to ask for advice to other internists of a similar age to theirs. On the other hand, the likelihood that Ego asks advice to Alter also increases with the age of Alter. Both effects are small but significant.

Subspecialties

Sub-specialization is strongly related to the likelihood an advice relationship will form. It both increases the likelihood that attendings in the same subspecialty ask for advice from each other and decreases the likelihood that non-specialized attendings ask advice to sub-specialized colleagues. Figure 1 visualizes the network of advice in one of the teaching hospital analyzed. Each node of the diagram represents a physician. The color of the node has been used to represent the physician subspecialty and the shape is used to represent the gender.

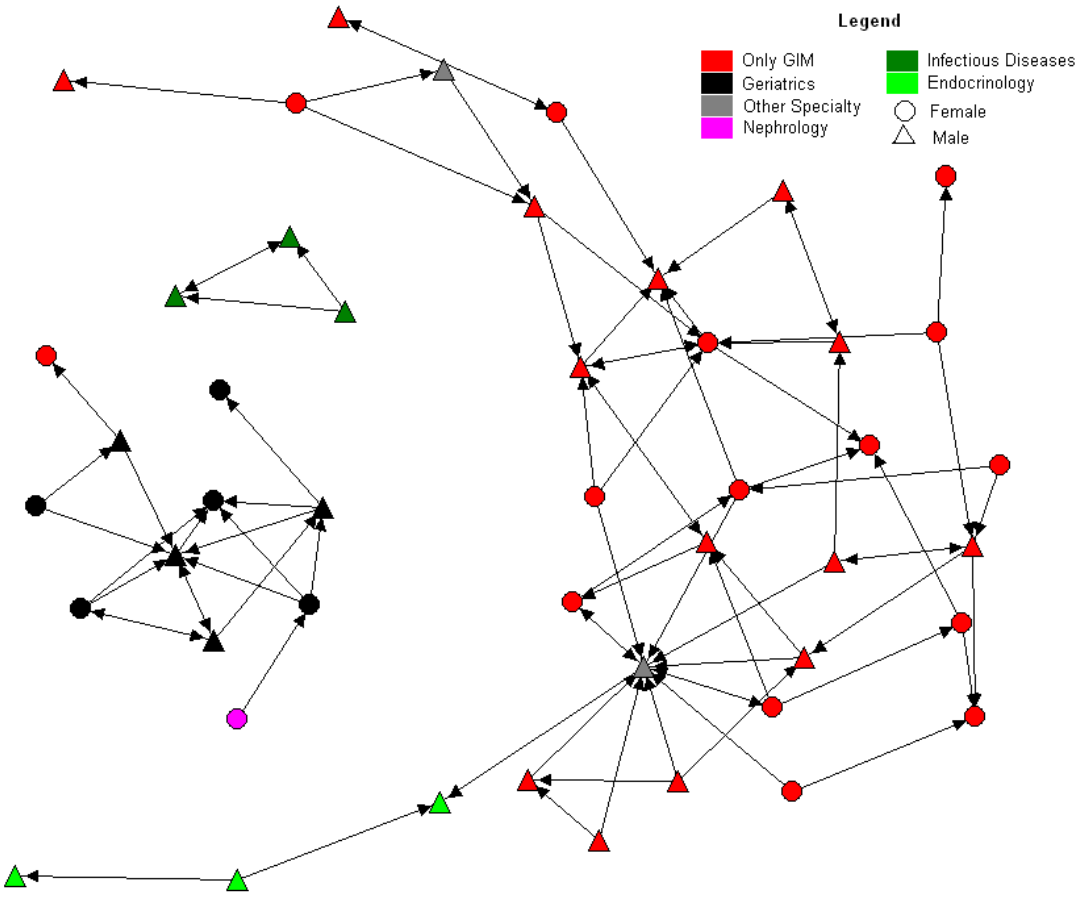
Model A shows that the bigger a subspecialty is in terms of number of attendings, the less its members are asked for advice, and thus, the more the subspecialty is isolated from the rest of the General Internal Medicine section. Moreover, the positive effect of

being member of the same subspecialty is significant only when interacted with the size of the subspecialty.

Model B shows that the effect of being in the same subspecialty varies across subspecialties. With the exception of rheumatologists, an Ego that is member of one of the biggest subspecialty has a high and significant likelihood of asking advice to attendings in her/his same subspecialty. In Model B have also been included the variables concerning the effect of Alter having a specialization different from Ego's. The negative impact of these variables is significant and strong and doesn't show the same differences among sub-specialties showed by the variables concerning effect of being in the same sub-specialty.

Defining one self as an hospitalist, a physician whose practice focuses on the care of hospitalized general medicine patients (Meltzer, 2001), has a similar effect to those of more established sub-specialization. Indeed, an hospitalist has an higher likelihood of asking advice to another hospitalist. On the other hand, hospitalist status doesn't decrease the likelihood of being asked advice by non-hospitalists, as it happens for the subspecialties.

Figure 1: Network diagram of the relationship of advice in site 2



Medical school peer ranking

Attendings were more likely to ask advice to someone who went to a medical school that scored similar to their own in the peer-assessment ranking. This ranking could be considered a proxy of both the status of the attending and of the quality of her/his education. There is no evidence that the prestige of the teaching hospital in which the physicians work influences the relation between the difference of the medical school ranking of the two attendings and the likelihood of one asking advice to the other (results not reported here).

Sources of scientific information

The last set of variables is concerned with the access to new scientific information through formal sources such as journals and database searches and not through the network of colleagues. Both model B and model C show that the higher the number of scientific journal a physician reads, the higher will be the likelihood that she/he is chosen as a source of advice by other physicians. The same pattern is not present for the number of time the database Medline is accessed, indicating a difference in the profile of the attendings using the two sources and in the motivation to access them.

COMMENT

The reported results show that sociological factors, as well as professional characteristics and proximity, influence the patterns of advice relationship in the teaching hospitals studied. Interpersonal relationships provide the social structure through which innovation spread and, therefore, a key factor influencing why a medical practice is adopted by a physician and not by another. Literature in the field of communication studies has shown how the social networks structured by advice relationships offer a crucial lens for understanding diffusion of information. Although physicians have access to many formal sources for medical information, including journals, on-line databases, conferences, and continuing medical education, there are some kind of information, for instance organization-specific information such as the social characteristics of the community, of individual patients, and those of neighbor specialists and organizations for referrals, which mainly spread through informal advice

networks. Diffusion of innovation studies have also shown that social networks influence the adoption of a scientific innovation (for instance, a new drug) even when formal sources of information are readily available. Colleagues share their experiences with new medical practice and, thus, informal relationships are fundamental for the actual adoption of new medical discoveries by physicians (Coleman, Katz, and Menzel, 1966; Greenhalgh, et al., 2005) because individuals seek to minimize the risk of adopting a new medical procedure by learning from experiences of peers and by adapting their behavior to what most colleagues do.

The finding that sociological factors also influence the patterns of advice relationship inside hospitals could be relevant to the study of practice variation as, even inside small areas, variation could be great and related to sociological factors. For instance, previous studies have found evidence of physician gender-related variations in practice, reporting that women tend to spend more time for each patient, to prescribe more screening tests, and to refer more to specialists (Bensing, Vandenbrinkmuinen, and Debakker, 1993; Boulis and Long, 2004; Ewing, Selassie, Lopez, and McCutcheon, 1999; Henderson and Weisman, 2001; Kim, et al. 2005; Kreuter, et al. , 1995; but see Franks and Clancy, 1993; and Franks and Bertakis, 2003 for evidence that practice differences are significant mainly in gender-sensitive procedures). Women physicians also tend to engage in more patient centered communication (Franks and Bertakis, 2003; McKinstry, Colthart, Elliott, and Hunter, 2006; Roter, Hall, and Aoki, 2002; Levinson and Lurie, 2004).

Studies in settings different from health care organizations support the idea that homophily, the similarity in personal attributes such as ethnicity, age, religion, education, occupation, and gender, increases the likelihood of connection among

individuals (McPherson, Smith-Lovin, and Cook, 2001) as well as being part of a larger environmental unit: geographic or organizational (for instance, school, job, church and family).

Along with the flow of information and the decision to adopt a practice, social connections have been shown by the sociological literature to shape several other outcomes such as the career paths of individuals and the performance of organizations. Studies on career paths have shown that social networks may also stratify professionals. The "social capital" associated with connection to those in leadership positions has been shown to determine the likelihood of promotion of individuals and their success in finding a new job. In the medical profession this can be important for understanding why some professional minorities are underrepresented in the higher ranks of health care organizations, and the conditions under which they have been able to attain leadership positions. The percentage of women graduated in US medical colleges was 47% in 2005 and has been growing at a rate of around 1% in the previous four years (Association of American Medical Colleges, 2006) but, even taking into account the time that it takes to reach high organizational roles, the same proportion is not mirrored among the leadership positions. The fact that female physicians mainly have ties to other women may also contribute to reproduce the "glass ceiling" effect that makes women underrepresented in leadership positions relative to their number in the profession. At the same times, the lower presence of women in powerful position may reproduce this situation as individuals that seek "instrumental" ties to leaders are less likely to develop relationships with female colleagues.

The consequences on performance of social networks have been mainly studied in the management field. This literature provide evidence that relationship may support the

creation of a collaborative environment, reducing inefficiencies through better communication and, applying these insights to health care, may improve the treatment of the individual patients whose cases can be informally discussed by physicians.

Age of Alter, the physicians to whom advice is asked, is a demographic variable that may be considered as a proxy of the knowledge she/he acquired with experience and of her/his status in the organization and it is, as expected, positively correlated to the likelihood of presence of the advice relationship. However, in order to be able to ask advice a physician needs access to the one who is asking and the difference in age (variable Diff_Age), which has an inverse effect on the presence of an advice relationship in a dyad, may be considered a proxy variable of this accessibility construct as it is easier to have access to someone in the same cohort than to someone much older.

The effect of subspecialty on the likelihood of an advice relationship may also be explained by the effect of access. Being in the same subspecialty gives more occasions of interactions and, thus, eases the creation of a required condition to ask advice. In the General Internal Medicine sections in the sample, the physician sub-specialization doesn't determine the selection of patients she/he receives, so the higher likelihood of asking advice to someone in the same specialty can not be explained by the similar type of patients the physicians get. Moreover, this effect is present only for bigger subspecialties and not for all of them, suggesting the presence of more sociological explanations driving the advice relationship in the medical profession. For instance, a medical doctor social identification (Tajfel, Billig, Bundya, and Flament, 1971) maybe be highly based on her/his subspecialty in an environment in which there are enough members of the specialty. Also, the subspecialty in which physicians have been trained

may influence their cognitive style and information seeking routines. Physicians trained in subspecialties where diagnoses are often ambiguous, and social and psychological characteristics of the patient are highly relevant may have developed a learning style that makes them asking for advice to people on their specialty, while physicians trained in specialty where the diagnoses are less ambiguous may be more used to seek information in formal sources such as journals or Medline queries and to ask advice to people they think may be knowledgeable on the specific question of their interest.

The results concerning the rank of the medical school attended may suggest an influence of the prestige of the school on interpersonal relations. In fact, the ranking of the school that Alter attended, that may be a proxy variable for the quality of Alter's education and, thus, of her/his knowledge, doesn't significantly affect the likelihood of the advice relationship. Instead, the absolute value of the difference of the ranking of Alter's school and Ego's school has an effect on the dependent variable suggesting that people have more access to others who are similar to them in the prestige of the school attended and, thus, in social status among the profession.

The last group of variables, those concerning the use of formal sources of information such as scientific journals and Medline, suggests that also the interest of Alter in being updated affects the dependent variable and that exists an interesting difference in how physicians use these sources of information. In fact, academic general internal medicine attendings are more likely to ask advice to other attendings who read many journals independently of the similarity with their reading behavior. On the other hand, doing many searches on Medline doesn't have the same significant effect suggesting that attendings read journals to increase their general medical knowledge, but query Medline only on specific issues they need for their clinical or research work.

This finding could also be explained by the fact the reading journals may be more visible to colleagues seeing journals on another's desk than reading on-line or printed versions of the same article.

Overall, the reported results suggest that the choice of colleagues to ask advice is driven by both factor related to how knowledgeable a colleague is and by sociological factors. The importance of the knowledge is suggested by the results related to the number of journals a physician reads and of her/his age. However, most of the significant variables are related to the homophily of the two attendings in the dyads concerning their demographic characteristics, membership in a specialization, and status in the profession.

These results are relevant for the design of interventions that want to spread the adoption of practices inside an organization, that wants to foster collaboration and team work, and that want to remove the barriers women have to reach leadership position in medicine. Manipulations of social structure may play a role in management of technical change and practice management. Hospitals' policies should adopt mechanisms that provide provides situations for multi-specialty interaction and incentive the sharing of information and experiences. Organizational policies could also use these findings to support the use of opinion leaders or opinion leadership teams, creating a portfolio of opinion leaders, selected not only on the basis of their competences but also of their sociological attributes, which may make them accessible by more physicians than opinion leaders selected by traditional strategies.

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Interpersonal Networks of General Practitioners: the Case of Italian General Practitioners Collaboration Initiatives

ABSTRACT

As the academic and lay press interest on networks and networking grew, the idea of applying networking principles to improve primary care in the Italian NHS gained legitimacy and found wide adoption through the institutionalization of General Practitioners (GPs) collaboration initiatives. The implementation and the diffusion of GPs collaboration initiatives is an interesting case of diffusion of managerial practices in a NHS system. In this article I describe the organization of GPs collaboration initiatives in Italy and discuss preliminary evidence on their antecedents and consequences using administrative and survey data from one Italian Local Health Authority and an analysis of the Italian practitioner-oriented literature on the organization of primary care. The narrative of this case provides lessons on the introduction of a managerial practice which involves social networks dynamics in a highly political context and on the impact of networking strategies among general practitioners.

Interpersonal Networks of General Practitioners: the Case of Italian General Practitioners Collaboration Initiatives

INTRODUCTION

The word “network”, even if used with a variety of loosely defined meanings, has certainly got a lot of popularity among scholars and practitioners in the last thirty years. Since 1970’s in academic publications a series of network-related field have emerged such as, for example, the concepts of network governance in public management, network form of organization in organization theory, social network in organizational behaviour, or health networks in health care management. In practitioner-oriented publications the network term has seen a parallel growth in diffusion and different types of networks have often been pointed as the key to personal or organizational success.

In organization theory, the idea that networks are a form of organization of activities just as hierarchy (i.e., a company or a public organization) or market has found legitimacy during the first half of 1990 (Powell, 1990; Uzzi, 1994). The network form of governance of activities which is characterized by “reciprocal patterns of communication and exchange” (Powell, 1990) has consequently widely spread as it offers some advantages over pure hierarchies and pure markets as forms of organization of activities. Compared to market exchange, networks allow a greater efficiency mainly because repeated interactions create greater knowledge of others actors’ features and needs as well as greater trust that in turn facilitates transactions. Compared to hierarchy, networks allow a greater flexibility and better control over knowledge-intensive activities mainly because networks do not imply the formalization needed by

hierarchies and because networks control the behaviour through norms of reciprocity and reputational concerns that don't need the ex-ante specification of activities needed by bureaucratic control.

During the same period, Italian governments of the time have deeply reformed the Italian National Health System (INHS), starting with the reform of 1992, but have left almost untouched the activity and the organization of general practitioners (GPs). GPs had (and still have) a peculiar contract agreement with the INHS (they are independent but exclusive contractors and are not formally employees of any INHS organization). The diffusion of network forms of organization eventually reached the organization of Italian general practitioners through their definition in the national level contract agreement and represented the main, if not the only, major organizational innovation of GPs' activity since the second world war. GPs in Italy had only worked in solo practices so far and their role is widely considered one of the weakest in the INHS. They have a reputation (even featured in popular movies) for being more interested in money than other doctors and an occupational prestige very low among fellow doctors and urban patients, a little better in the countryside.

Collaboration initiatives are presented as the solution to many of the problems affecting the organization of GPs in Italy as they create an organizational structure and facilitate knowledge exchange, while keeping the administrative autonomy that Italian GPs had always enjoyed. In this article, I discuss how, consistently with a postmodernist interpretation of other reforms in public administration (Fox, 1995), GPs collaborative initiatives quickly became a symbol of "good" in general practice. The meaning attached to collaboration initiatives disconnected from the substantive organizational processes they imply consistently with a postmodernist interpretation according to which "words, symbols and signs are increasingly divorced by real-word

experience" (Fox, 1995).

BACKGROUND

The Italian National Health Service was established in 1978 and modelled after the British NHS. The NHS model implies that coverage is universal and theoretically uniform through the country (Fattore, 1999; France and Taroni, 2005) and financing and delivery of care are mostly public, 77% of expenditure for medical services being paid by the INHS (OECD, 2007). From an organizational viewpoint the INHS is structured into three tiers: the central government at the top, 21 Regions in between, and 180 Local Health Authorities (LHA) and 95 public Independent Hospitals at the bottom (Anessi-Pessina et al., 2004). The LHA is responsible for the provision of comprehensive care to its resident population. It can achieve this objective by either of two options: a) provide care directly with its own personnel and facilities, or b) fund other LHAs, Independent Hospitals or accredited private providers for care offered to its residents. The LHA is comprised of organizational subunits called districts, which are in charge of provision and coordination of care over a specific geographical area within the LHA.

GPs are primary care physicians working for LHAs as independent contractors and act as gatekeepers of higher levels of care. In 2005 there were 47,022 GPs in Italy (1.19 every 1000 residents) costing 5 billion euros or the 6% of public health expenditure (Agenzia Nazionale per i Servizi Sanitari Regionali, 2007). Traditionally Italian GPs work in solo practices without any auxiliary staff and any institutional linkages with other GPs. In the institutional architecture of the Italian health system, consistently with other NHS systems, GPs are mainly meant to be the gatekeepers of the public system.

Their status of independent but exclusive contractors with a LHA is coupled with a financing system based on capitation. GPs are, therefore, paid on the basis of the number of patients on their list. The freedom of patients to choose the list they are on and to switch GP in every moment induces a form of competition among GPs to keep or acquire patients. Since their employment status doesn't guarantee a stable fixed income as most other doctors, they are often accused of being more concerned with money than other doctors. Moreover, their gatekeeping role in Italian NHS involves some bureaucratic paperwork. Not surprisingly, GPs in Italy have been found to have higher levels of emotional exhaustion compared to hospital practitioners (Grassi and Magnani, 2000) and many of them developed alternative interests. Being a general practitioner in Italy, for instance, means being part of a highly political occupation: in 2004, 67% of GPs was member of an union (Cipolla, Corposanto, and Tousijn, 2006), 11% of them had been an elected politician (Cipolla, et al., 2006), and they are traditionally the most powerful group in the Italian Medical Association, being often able to elect a GP as the national president of the association. Consequently, the prestige of GPs is generally low among specialized colleagues and the overall population, even though they keep a high prestige in non-urban areas, where they have been able to maintain a personal knowledge of all their patients or they are the only medical service available.

The health system reforms started in the 1990s have slowly but constantly shifted resources and responsibilities to non-hospital settings. The number of hospital beds in Italy decreased by 28% from 1995 to 2005 (Lecci and Maestri, 2007); non-hospital care received 51.2% of public health expenditure in the year 2000 and 54.4% in 2002 (Pellegrini, 2005), starting a trend that has probably continued during the last five years. This process of de-hospitalization of care has increased the workload and the

responsibilities of GPs, as they are a central part of non-hospital care, given their gatekeeping role and their direct knowledge of patients. Nonetheless, none of the reforms that have been made changed the role nor the organization of the GPs' activities, despite the major changes in the role of GPs in health reforms taking place in the United Kingdom, country that had inspired the original architecture of the Italian NHS.

GENERAL PRACTITIONERS COLLABORATION INITIATIVES

The contract according to which GPs provide services to citizens enrolled in their list and financed by the INHS, according to the number of patients, is negotiated every three years by the GPs unions with a governmental agency and represents the main document that regulates the relationship of GPs with the INHS. Additionally, integrative contracts may be signed by unions and local governments at the regional or local level. Through the national level contract, organizational innovation, such as the collaborative initiatives, has been introduced in the Italian Health System. The first national contract mentioning the idea that organizational forms creating some collaboration among GPs could be negotiated at the local level was signed in 1996, but only when the contract was signed again in 2000 the regulation of GPs collaboration initiatives was detailed and has been confirmed in subsequent contracts.

In the current form of the contract, GPs willing to undertake some form of collaboration among themselves involving the provision of health services to their patients can choose among three forms, typified in the national contract. By joining one of these typified forms GPs have the right to additional compensation from the INHS. Collaborative initiatives are not legal entities and any contractual relationship is among

the INHS and the individual GPs members of the initiative. The association ("medicina in associazione") is the less intense form. Three to ten GPs may join one association; they have to coordinate their office hours to be open till 7pm during weekdays, and they commit to share guidelines and meet to discuss and improve their work. Each patient stays listed with one of the GPs of the association even if she may be visited by any GP in the collaborative initiative. The freedom of patients to leave their GP and to enrol in the list of another in the same association is limited in order to mitigate the fear of GPs that, by collaborating, they lose patients in favour of colleagues. By joining one association, a GP gets an additional 6% over her base revenues. The collaborative initiative of intermediate intensity is the net ("medicina in rete"). Nets have all the features of association. In addition, GPs who join one net have to share an electronic database of their patients. In exchange they get a 12% increase over the base revenues. Groups ("medicina di gruppo") have all the features of nets and GPs who join one have to share one single office. Being in one office they may also share investment in medical equipment or employ a nurse or administrative staff. The maximum number of GPs in a group is eight. Being the initiative that implies the most intense collaboration, the additional remuneration for member GPs is equal to an additional 18% over the base remuneration.

The basic idea behind these projects is that organizational and professional development in primary care requires collaboration between GPs and sharing of resources and knowledge, but also operational advantages are envisaged with collaboration initiatives. In the national contract the goals of those initiatives are clearly stated as:

1. to ease the relationship citizen-GP;
2. increase quality;

3. increased office opening hours;
4. economy of scale to invest in technologies (i.e., ECG);
5. implement guidelines.

According to a survey of GPs conducted in 2001 in the area of Milan (Brambilla and Landau, 2001), GPs rank the advantages of collaboration initiatives in this order:

1. cultural exchanges with other GPs;
2. easy substitution;
3. increased office opening hours;
4. economy of scale to invest in technologies (i.e., ECG).

Together with these declared goals, the introduction of GPs collaboration initiatives may also be explained by institutional isomorphism (Di Maggio and Powell, 1983), because it has been somehow influenced by the introduction of primary care organizations in health systems worldwide and by the fundholding experience in the UK (Fattore, 2001). But the collaborative initiatives that have been introduced by the Italian national level contract for GPs are organizational forms that entail very weak ties compared to other countries' experiences with primary care organizations, and are better seen as network organizations than as integrated ones. The interest of GPs and the role of unions have, in fact, been very influential in the introduction of collaboration initiative in the Italian NHS compared to the more top-down reforms passed by law in other countries (Fattore, 2001).

As of 2004, 59% of Italian GPs had entered into a type of collaboration initiative, 22% of which joined a group, the more intense organizational form (Ministero della Salute, 2004).

GPs collaboration initiatives of the three forms are, indeed, network of peers, which each individual GP is free to choose whether to join or not and to join one with

the colleagues he/she prefers. Contrarily to experiences in other countries with primary care organizations, collaboration initiatives are organizational arrangements for which every member is a GP and specialists are not involved. Although most groups (the more intense and less adopted form) employ a nurse or an administrative assistant, associations, nets, and groups are better understood as uniprofessional networks.

GPs who are member of one initiative are free to choose their governance structure which, given that collaboration initiatives are small networks of peers which GPs can leave whenever they prefer, is very likely to be such that any decision is taken by unanimous agreement. Moreover, sharing of guidelines and meeting to discuss and improve their work, two of the main requirements of any of the collaboration initiatives, are vaguely defined and very difficult to verify by the LHA.

THE QUANTITATIVE DATA

The quantitative data used in this article comes from a LHA in a central region of Italy. This LHA is responsible for an area with approximately 280.000 inhabitants and comprises a town of 100.000. Data comes from two sources:

1. the administrative information systems the LHA uses to manage the GPs working in its area and the provision of services to its residents;
2. a survey submitted to all the GPs working in the LHA who took part in the medical education meetings the LHA organized in May and June 2006 (with a response rate of 67% of the total population of GPs in the LHA).

In 2006, in the LHA there was one GP every 1234.5 residents; 69% of GPs had entered into a type of collaboration initiative and 16% of them joined a group.

From a social network analysis perspective collaboration initiatives can be

considered affiliation networks. Affiliation networks are two-mode data consisting of a set of actors (the GPs) and a set of events (the GPs' collaboration initiatives) to which the actors belong. Connections among members of one of the modes are based on linkages established through the second mode (Wasserman and Faust, 1994), meaning, indeed, that a connection between two GPs exists when they are members of the same collaboration initiative.

Seeing collaboration initiatives as networks allows to focus on the study of the relationships among GPs and to analyze what are the causes of the presence of relationships and what are their consequences.

In the LHA studied, the network created by the collaboration initiatives has a density equal to 0.012 and each GP, or each node in social network terminology, has an average degree of 2.669.

ANTECEDENTES OF COLLABORATION INITIATIVES

An important feature of GPs collaboration initiatives in Italy is that GPs have a strong incentive to join given the significant increase in compensation they obtained in the negotiation of their contract. As mentioned, in the contracts signed at the national level by GPs unions and a national agency, an incentive that may be as big as the 18% of the base salary was agreed for physicians who join an association, a net or a group. The economic incentive plays for sure a role in the choice of joining a network by Italian GPs. Being not available any data on the role of economic incentives, I used data available in the LHA administrative information system to study factors predicting the membership of a GP in any of the three forms of collaborative initiatives. As table 1 shows, among the GPs of the studied LHA, the number of patients has a small but

highly significant effect and gender (being female) also has an effect significant at the 0.10 level. These results suggest that the 31% of GPs that did not join any collaboration initiative are probably GPs with few enrolled patients maybe because they are new or have another predominant occupation. The result concerning the gender may indicate that female GPs have a higher tendency to join collaboration initiatives.

Table 1: Results of a Logistic Regression Model for the membership in a collaboration initiative (-2 Log likelihood = 232.720; Cox & Snell R Square = 0.220; Nagelkerke R Square = 0.303).

Variable	Beta (standard errors)
Gender[1]	0.812 (0.440)*
Years since graduation	0.032 (0.023)
Being specialized	-0.453 (0.343)
Number of patients	0.002 (000)**
Constant	-2,115 (0.614)**

[1] Male =0; Female=1.

* p< 0.10; ** p< 0.05.

According to social capital theories, who are the other members of the same network is also very relevant because it determines what resources they give access to. One variable that most authors have been concerned with is the redundancy of connections, which is the degree to which an actor's ego network is made by contacts connected to each other as well. Being connected to a highly redundant network implies having

access to fewer resources than someone connected to a non-redundant network has (Burt, 1992). Non redundant contacts create social capital through the brokerage mechanism (Salvatore, 2006).

In table 2 data from the analyzed LHA are used to study factors predicting the presence of a connection between two GPs. The analysis uses an exponential random graph model (ERGM), also called the *p** class of models, that is a probability model for networks on a given set of actors allowing generalization beyond the restrictive dyadic independence assumption (Robins et al., 2007a; Robins et al., 2007b). The analysis has been performed using the software SIENA (Snijders, et al, 2007). In the reported model, the dependant variable is the co-membership of two GPs in the same collaboration initiative (the level of analysis is, thus, dyadic) and the independent variables are: being of the same gender, the difference of the year since graduation form medical school of the two GPs in the dyad, the fact that the two GPs have both a specialization or they both do not have one, and the similarity in the number of patients enrolled with each GP.

As reported in table 2, the two significant variables are the similarity of the year of graduation and the similarity in the number of patients enrolled. These two results may mean that GPs tend to join a collaboration initiative with colleagues of their generation and with colleagues that have a similar number of patients (therefore a similar use of common resources).

CONSEQUENCES OF COLLABORATION INITIATIVES:

As aforementioned, the goals of collaborative initiatives are to increase the quality of patients care by sharing knowledge among GPs and to allow for some operational

advantages.

One of those operational advantages originates from the increased office hours that patients may enjoy given the possibility to go to the other doctors of the same collaboration initiative of the GP they are enrolled with, when their GP is not working. The survey respondents in the studied LHA reported to meet on average three patients enrolled with other physicians every week, less than 2% of all the patients visited in a week. They also believe that, on average, one of their patients meets another GP in the collaboration initiative, suggesting that information about patients does not reach the GP with whom a patient is enrolled. Very similar figures are reported by a study on a LHA in another Italian region (Pastorino, 2006). The same study reports qualitative evidence that most of the visits to patients of another GP concerns bureaucratic issues, such as repeated prescription of drugs.

Moreover Brambilla and Landau (2001) found among the groups they surveyed a very low level of organized sharing of knowledge among members of groups.

Table 2: Results of a ERGM Regression Model for the existence of a connection between two actors (n=223).

Variable	Estimates (standard errors)
Same Gender	-0.0639 (0.1490)
Years since graduation Similarity	1.5726 (0.5109)**
Same Being specialized	-0.0606 (0.1226)
Number of patients Similarity	1.7080 (0.3132)**

** p< 0.05

Fattore and colleagues (2006), analyzing data on the collaboration initiatives in the LHA of Empoli, in Tuscany, report that they don't find a significant effect of the centrality (measured as the number of connections each GP has through the collaboration initiatives) on performance (measured as the capability to meet a target on pharmaceutical expenditures assigned by the LHA). They report, indeed, a significant effect of the pharmaceutical expenditure of connected colleagues on a GP individual expenditure. These results are used to suggest that collaboration initiatives ease the action of social influence mechanisms rather than social capital mechanisms. They conclude that, probably because of redundancy in the structure of the networks and in the competences that each actor takes into the network, collaboration initiatives do not induce an improvement in GPs performance. The same redundancy, on the other hand, favours the action of social control and, therefore, collaboration initiatives make performances of member GPs more similar but not necessarily better from the LHA point of view.

In table 3, I report an analysis very similar to that of Fattore and colleagues (2006), although not identical, given some differences in the data that the Empoli LHA provided to the authors and the data provided by the LHA for this article. In the analysis I used an ordinary least square (OLS) regression in which, because network data may not always meet the requirements of OLS with regard to the distribution of error terms, standard errors and significance were estimated using the random permutations method for constructing sampling distributions of R-squared and slope coefficients (Snijders and Borgatti, 1999). This method is more appropriate for use in regressions with relational variables and was performed using the UCINET software package, version 6.172 (Borgatti, Everett, & Freeman, 2002). Compared to the value obtained with

Empoli's data (0.41), the adjusted R-square value of the analysis in Table is incredibly low (-0.01). Even looking for significant variables in this LHA, neither the social capital mechanism nor the social influence mechanism find support. The main difference in the two settings is that in Empoli a local-level contract agreement created a new form of network, called équipes. The composition of équipes is determined by the Empoli LHA on a geographical basis and objectives and incentives are assigned to this form of collaborative arrangement, and not to the individuals themselves. For example, GPs members of an équipe get an additional compensation if their équipe meets, on average, the target assigned by the LHA. In the Empoli case, équipes and the group incentives associated to équipes may increase the group pressure and, indeed, the social influence effect in a way similar to that described by the famous Asch (1956) experiments. Lacking group incentives, as in the case of the studied LHA that did not negotiate at the local level additions to the collaboration initiatives as defined at the national level, group pressure may decrease to a level for which is impossible to find a significant social influence mechanism in action.

To analyze the consequences of collaborative initiatives at the dyadic level a technique called Multiple Regression QAP (Krackhardt, 1988) can be used. This technique is used to regress a valued matrix on other matrixes and does not assume independence of observation. In table 4 a MR-QAP, performed using the UCINET software package, version 6.172 (Borgatti, et al., 2002), is reported. The dependant variable is the difference of pharmaceutical expenditure of any pair of GPs in the LHA. As the results in table 4 show being in the same group, association, or net doesn't increase the probability that two GPs have to prescribe a similar amount of drugs per patient. Results at the dyadic level reported in table 4 are, therefore, consistent with

results at the individual level reported in table 3.

Table3: Regression standardised coefficients from OLS estimates. Standard errors and significance have been estimated using the random permutations method. Dependant variable is the pharmaceutical expenditures of the GP (R-square = 0.018; Adjusted R-square = -0.010).

Variable	Un-standardized coefficient
Intercept	106.852717**
Years since graduation	-0.367627
Degree	0.553889
Average pharmaceutical expenditure for the connected GPs	0.004810
Risk adjustment index	6.231585**
Percentage of GP with the same specialization in the network	-0.927181

** p< 0.05

DISCUSSION

The case of Italian GPs collaboration initiatives can be considered an interesting case which can convey lessons on:

- consequences and antecedents of interpersonal networks of peers;

- the introduction of a of a management tool involving social networks dynamics.

Table 4: Multiple regression QAP via double Dekker semi-partialling. Dependant variable difference of pharmaceutical expenditure in the dyad (R-square = 0.098; Adjusted R-square = 0.098).

Variable	Un-standardized coefficient
Intercept	-0.002760**
Years since graduation Similarity	1.821132
Same Group	0.003250
Same Association	0.401218
Same Net	0.244809
Risk adjustment index Similarity	88.578163**
Same Gender	-0.001039
Same Being specialized	0.000011

** p< 0.05

The evidence reported suggests that collaboration forms have little or no consequences on the ability of GPs to care for patients. Specifically, informal sharing of knowledge, if present, does not have an impact on the performance of GPs measured as the ability to control the pharmaceutical per capita expenditure according to LHAs' needs. The creation of an interpersonal network, indeed, does not imply that resources, knowledge

or others, actually flow through the connections that have been created.

Studies on social networks are often heralded as the tool to uncover the informal dynamics behind organizational charts (Krackhardt and Hanson, 1993), but, being empirically difficult to gather data on actual flow of resources in network, most empirical studies have focused on network structure assuming that structure is a good proxy for the flow of resources. Many scholars have posited that structure has consequences on its own; in management the work of Ronald Burt typifies this approach. A concern with structure can also be found in many reforms of public bureaucracies (Borgonovi, 2005) as it is considered the more objective part of the organization. But the experience of GPs collaboration initiatives suggests that the creation of a network structure through the concession of monetary incentives to "get together" and join a collaboration initiative does not guarantee that sharing of resources that rhetoric on network promises. Several features of the Italian collaborative initiatives limit the potential to obtain advantages out of the created structure. The main is redundancy: being essentially uni-professional organizational forms, the diversity of knowledge resources is not leveraged. Moreover, the spontaneous birth of social networks is widely believed to be influenced by homophily, the tendency to create relationships with someone similar on relevant respects (McPherson, Smith-Lovin, and Cook, 2001). The tendency to join collaboration initiatives with GPs who graduated from medical school in the same period, as shown in table 2, confirm the homophily hypothesis. Colleagues who graduated in the same period are likely to have a similar education and knowledge, therefore, creating redundancy in the type of information a GP is able to access. Moreover, by joining colleagues with a similar number of patients, GPs show that a financial concern is an important driver in creating the collaboration forms since having GP with a similar number of patients reduces the probability that a

GP's contributions to the collaborative initiative are bigger than the rewards she gets back. The preliminary evidence reported, suggests that very little knowledge sharing goes on in associations, nets, and groups. Patients exchange, one important occasion to observe each others work, is rare and probably avoided by GPs not willing to lose a patient to another GP. At the same time, other structured occasions for interaction are not planned.

To implement as many collaborative initiatives as possible became an objective of both LHAs and GPs independently from the substantive organizational processes they imply consistently with a postmodernist interpretation according to which "words, symbols and signs are increasingly divorced by real-word experience" (Fox, 1995).

These findings suggest that managerial strategies that try to increase networking among employees should not focus solely on the creation of structure, as has been done in the INHS, but should rather focus on the creation of a need to access others' resources. Italian GPs in the same initiative are not interdependent, and therefore, being part of the same network does not imply interaction nor exchange.

The second lesson suggested by the story of GPs collaboration initiatives in Italy concerns the introduction of a management tool involving social networks dynamics. Given the "social" in social networking, will be unethical to use hierarchical authority to introduce most managerial innovation involving a social network dynamic. The national contract signed in 2000 defines an agreement very favourable to GPs who retain full control on whether to create a network or not and on who should join it. LHAs, the institutions to which reforms of the INHS gave an ample autonomy over the organization of health service provision in a territory, do not have control over the creation of collaborative initiatives if not adding additional financial resources to negotiate at the local level modification to the national level contract. Even more than

other organizational choices, the effectiveness of networking strategies depends on contextual factors that are better managed at the local level.

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