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Communities and Networks as an Organizational Form

Communities of Clinical Practice: Knowledge Exchange in Pediatric Communities

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1. Introduction

Knowledge exchange in clinical practice is one of the most important challenges because of the variety and variability of the competencies involved: in fact, health organizations include specialists from several different disciplines, and the competencies associated to clinical practice quickly change overtime. Italian pediatricians are often physically and organizationally separated from each others, with few occasions of interactions. However, asking for advice on clinical issues is a key factor for pediatrician practice. Clinical guidelines and handbooks are not the only sources of information. In this study we explore the role of colleagues in retrieving and adapting clinical knowledge and the antecedents of the selection of the colleagues for advice.

Mintzberg (1979) has defined health organizations as "professional bureaucracies", that is organizations characterized by the contribution of specialized and independent professionals interconnected through the standardization of capabilities based on education and practice rather than through communication. However, as he later added (Mintzberg and Glouberman, 2001: 75) medical practice can not be restricted only to a matter of *pigeonholing* – placing the case in a category: when unpredictable problems arise they can be solved in the best way only through the mechanism of *mutual*

adaptation, that implies peer collaboration, informal communication, teamworking and integration of different capabilities .

The existing knowledge management literature has explained the peculiarity of healthcare organizations in terms of the nature of clinical knowledge. Meijboom et al. (2004) argued that clinical knowledge is: (i) partly tacit: the understanding of the specific conditions of the specific patient under scrutiny can not be easily codified in written documents; and (ii) fragmented, that is distributed among different organizational and professional units.

These peculiarities produce respectively two consequences on knowledge acquisition. Firstly, instead of accessing explicit formal sources as *guidelines*, clinicians rely on their *mindlines* defined as "internalised, collectively reinforced, tacit guidelines in the head" (Gabbay & leMay, 2005: 1014), useful to overcome the know-do gap of clinical practice. Secondly, as the mindlines are "collectively reinforced", clinicians give an important role to colleagues' opinions and experiences, considered a trusted source of information on the basis of the understanding and sharing of the same practical concerns. Hands-on knowledge exchange in healthcare is fundamental.

The resulting organizational solution is the *community of* clinical *practice*, in which learning is both a social and a practical event: it is a social container for the negotiation of multiple perspectives into new practices (Gabbay & leMay, 2005). In fact, through a process of enrichment, control, refinement given by peer interaction, the *individual mindline* becomes a *collective mindline*, definitely better than guidelines.

The aim of the present paper is to enrich this field of study by linking the empirical findings with the theories of knowledge exchange among individuals. Also, by considering the paediatrician communities as social networks, where the nodes are the pediatricians and the links are the advice relations on specific patients, we test alternative network-based theories to explain the determinants of knowledge exchange in healthcare.

2. Theoretical framework

Many theoretical mechanisms have explained the antecedents of knowledge exchange among individuals. The network perspective is especially useful in this field because knowledge exchange is intrinsically a relational process (an exhaustive review of the

social network-based theoretical mechanisms is present in Monge and Contractor, 2003). We consider three mechanisms: social embeddedness, homophily, and physical proximity.

The Social Embeddedness Theory (Granovetter, 1985) proposes that individual behavior depends on pre-existing social structures and on established communication relations. In the case of knowledge exchange, individual A will be inclined to share knowledge with individual B, asking for advice and information, if A already has a relationship with B through admiration, work or friendship.

This mechanism is found in the so-called communities of practice (Lave and Wenger, 1991; Wenger, 1998), or groups of individuals *"who share a concern or a passion for something they do and learn how to do it better as they interact regularly"* (Wenger, 2008). In essence, the structure of informal and communication relations influences how the knowledge exchange network is structured.

According to *Homophily Theory*, instead, similarity among individuals is the driver of relations in terms of knowledge exchange, friendship, communication. McPherson et al. (2001: 416) suggested that *"contact between similar people occurs at a higher rate than among dissimilar people."* Individuals are more inclined to establish relations with people who are similar to them in terms of attributes such as age, gender, seniority within the organization, position within the organization, education, personality or social class, especially if these similarities are strong.

An example of this is provided by the *Social Identity Theory* (Ashforth and Mael, 1989), which suggests that people categorize others on the basis of salient similarities (or dissimilarities) to themselves to activate pro-social behavior towards the in-group and anti-social behavior towards the out-group.

In terms of knowledge exchange, this phenomenon also reflects the fact that the trading of knowledge is more immediate and easier among people who have the same professional background being easier the transfer or learning of specific informative content. In fact, homophily (particularly if it concerns similarities in activities and types of knowledge) is one of the main communities of practice mechanisms, as knowledge exchange takes place between people with similar skills and who perform similar roles, i.e. the same "practice" (Lave and Wenger, 1991; Wenger, 1998).

Another theory explaining the motivation behind creating social relations (particularly friendships and communication relations) is that of *physical proximity* (Borgatti and Cross, 2003; Kraut et al., 2002). Studies (Allen, 1977; Oldham and Brass, 1979; Monge et al., 1985) have shown that physical structure of work spaces affect communication within a group and between different groups in the same organization (for instance between team members involved in cross-functional projects).

Sharing a physical work space facilitates exchange because it increases the probability of communication and interaction (even accidental) between players (Monge et al., 1985), also lowering the cost of accessing the interlocutor (Borgatti and Cross, 2003). The likelihood of creating and fostering communication networks is increased by the easiness of meeting the people who work in the same building every day (Kraut et al., 2002) and is influenced also by the arrangement of furniture and infrastructures in the workplace (Peters, 1990).

The mechanism that leads to an increase in knowledge exchange through *proximity* is, however, indirect (Borgatti and Cross, 2003: 436): *"we suggest that for purposeful information-seeking the effect of proximity is indirect. Proximity leads to chance meetings in which people gradually come to learn about each other, become comfortable with each other, and develop bonds that enable future access."* In essence, proximity at first creates social networks such as friendships and relations based on communication; these are the foundations to generate then knowledge exchange.

In knowledge management literature, geographical distance is often interpreted as a barrier to knowledge exchange. This exchange will be particularly facilitated in case of proximity, especially with regards to complex or tacit knowledge that is not easily transferable long-distance.

In short, all the three theories attempt to answer the following questions: Why does the individual ask B for advice instead of asking A? Why is the individual motivated to share knowledge and information to A, but not to C?

This work aims to test the three theoretical approaches that are herein summarized in order to answer these questions in the case of Italian pediatricians.

3. The context

Since 1978, the Italian National Health Service (NHS) has provided primary pediatric care to children through local community-based pediatricians. In the Italian primary care sector, pediatricians are involved in taking care of children aged 0–16 years and they are organized in Health Districts, which belong to Local Health Units (Aziende Sanitarie Locali), which respond to Regions.

Most of the pediatricians, however, are physically isolated in their own ambulatories and dispersed territorially. One problem with that is the lack of coordination among pediatricians and between community-based pediatricians and hospital pediatricians which leads to lack of continuity of care and to an improper use of health services in NHS. In order to deal with this issue, pediatricians receive incentives to group together in "associations" or "groups" where they may share patients, information, and ambulatories, and from where they can more easily coordinate with hospitals.

This organizational solution promotes the creation of local communities of pediatricians where patients have an easier access to doctors and doctors can better take care of children with chronic diseases (Caso, 2004). The pediatrician communities may concentrate all the activities in a single centre (with internal shifts of pediatricians), and potentially enables an easier transfer of professional experiences while allowing a continuum of care to the patient.

This paper analyzes the case of pediatricians belonging to a Local Health Unit in the North of Italy. In that specific Region, there is a great awareness of the problem of integration of healthcare professionals in primary care, as confirmed by the incentives to pediatrician communities in the Regional Health Plan.

Our sample includes 23 pediatricians out of 25 belonging to the same Local Health Unit. The pediatricians are organized in two Health Districts: North and South. 20 out of 25 belong to 5 pediatric formal communities.

4. The model

The hypotheses to be tested are:

Social Embeddedness

H1 Pediatricians who collaborated in the past are more likely to exchange ideas on how to treat patients than pediatricians who did not.

H2 Pediatricians who belong to the same pediatric communities are more likely to exchange ideas on how to treat patients than pediatricians who do not.

H3 Pediatricians who exchange advices on one pathology are more likely to exchange advices on other pathologies.

Homophily

H4 Pediatricians who are similar in terms of years of experience or gender are more likely to exchange ideas on how to treat patients than pediatricians who are not.

Physical Proximity

H5 Pediatricians with ambulatories physically close to each other are more likely to exchange ideas on how to treat patients than pediatricians who are far away.

5. Methodology

We developed a survey that was submitted online during the month of December 2009 to all the 25 pediatricians belonging to the Local Health Unit under analysis.

The survey included questions about: the attributes of the respondents (experience, expertise, affiliations), the advice relationships with all the other community pediatricians (names were listed in the survey) and with the specialists in the healthcare organizations of the area and outside the area. Specifically, we collected data about the advice relationship concerning three pathologies (selected through a focus group composed of primary care experts and pediatricians): asthma, urinary tract infections, and gastro-intestinal pathologies.

Response rate was 92% (23 out of 25). Advice networks have been symmetrized with the average criterion (so that if A links to B but B does not links to A the resulting link is 0.5).

Results

Social embeddedness: H1, H2, and H3

In order to test H1 we performed a Pearson correlation between the advice networks about the three pathologies with the relation of past collaboration: pediatricians collaborated in the past if they belonged to the same teams devoted to the development of clinical pathways for different pathologies.

Tab. 1 – Pearson correlations between advice networks and past collaboration

Asthma advices – past collaboration	0.227***
Gastrointestinal advices – past collaboration	0.200**
Urinary tract infections – past collaboration	0.212***
	*=p>0.05; **=p>0.01; ***= p>0.001

Past collaboration seems to play a small but significant role in creating advice relations. We then tested H2 by correlation advice networks with the affiliation to the same health districts and the same associations. The assumption here is that is A and B belong to the same groups, chances are they collaborated in the past or at least knew each others.

Tab. 2 - Pearson correlations between advice networks and affiliation to same district

Asthma advices – same health district	0.273***
Gastrointestinal advices – same health district	0.278***
Urinary tract infections – same health district	0.291***
	*=p>0.05; **=p>0.01; ***= p>0.001

Tab. 3 - Pearson correlations between advice networks and affiliation to same association

Asthma advices – same association	0.650***
Gastrointestinal advices – same association	0.685***
Urinary tract infections – same association	0.685***
	*=p>0.05; **=p>0.01; ***= p>0.001

Results show that being affiliated to the same associations greatly increase the likelihood of starting advice relationships across all pathologies. District affiliation plays a smaller but still significant role.

Tab. 4- Pearson correlations between advice networks across pathologies

Asthma – Gastrointestinal pathologies	0.910***
Asthma – Urinary tract infections	0.899***
Urinary tract infections – Gastrointestinal p.	0.957***
	*=p>0.05; **=p>0.01; ***= p>0.001

The most striking result, however, is that advice networks across pathologies are almost the same. This means that as soon as a pediatrician A gains access to a trustworthy advice relationship with a pediatrician B on a certain pathology, then it is almost certain that advice relationships on other pathologies will result. H3 is then confirmed.

We may conclude that the theory of social embeddedness is also confirmed. Advice relationships benefit from the existence of other and pre-existing social relationships.

Homophily theory: H4

We tested homophily by looking at the correlations between advices and similarity in terms of same experience (tenure classes) and same gender. Both variables have either very low or insignificant correlations with advices. Homophily theory is therefore rejected.

Tab. 5 - Pearson correlations between advice networks and belonging to the same tenure class

Asthma advices – same tenure class	0.085
Gastrointestinal advices – same tenure class	0.057
Urinary tract infections – same tenure class	0.057
	*=p>0.05; **=p>0.01; ***= p>0.001

Tab. 6 - Pearson correlations between advice networks and belonging to the same gender

Asthma advices – same gender	0.078
Gastrointestinal advices – same gender	0.148*
Urinary tract infections – same gender	0.174*
	*=p>0.05; **=p>0.01; ***= p>0.001

Physical proximity: H5

Physical proximity has a positive and significant correlation with advice networks for all the pathologies. Pediatricians working 5 kilometers or less apart are more likely to exchange advices.

Tab. 7 - Pearson correlations between advice networks and physical proximity

Asthma advices – distance < 5 km	0.426***
Gastrointestinal advices - distance < 5 km	0.483***
Urinary tract infections – distance < 5 km	0.504***
	*=p>0.05; **=p>0.01; ***= p>0.001

Putting all together in regression models (specifically Multiple Regression QAP models) the results, for each pathology, are the following:

Tab. 8 – Regression models about advice networks

1) Asthma

Independent variables	**Un-stdized Coefficient**	**Stdized Coefficient**
Intercept	-0.089	0.000
Past collaboration	0.091	0.168*
Same association	0.916	0.558***
Physical proximity	0.489	0.246**
Same district	0.045	0.038
Same tenure class	0.094	0.077
Same gender	0.068	0.056
Adjusted R-squared:	0.522***	

2) Gastrointestinal pathologies

Independent	Un-stdized Coefficient	Stdized Coefficient
Intercept	-0.136	0.000
Past collaboration	0.075	0.138*
Same association	0.958	0.581***
Physical proximity	0.610	0.305**
Same district	0.022	0.018
Same tenure class	0.058	0.047
Same gender	0.150	0.123*
Adjusted R-square	0.595***	

3) Urinary trait infections

Independent	Un-stdized Coefficient	Stdized Coefficient
Intercept	-0.082	0
Past collaboration	0.041	0.151*
Same association	0.470	0.570***
Physical proximity	0.325	0.325***
Same district	0.018	0.029
Same tenure class	0.028	0.045
Same gender	0.091	0.150*
Adjusted R-square	0.620***	

Discussion and conclusions

One of the main results is that there is a strong correlation among advice networks in the three pathologies. This means that, regardless of the individual specializations, pediatricians tend to rely on the same trusted colleagues for all their knowledge needs. Pediatricians who need expertise on pathologies A and B, instead of looking for experts

on these pathologies prefer to communicate with trusted colleagues. These colleagues not necessarily have the required expertise. A management implication is that Local Health Unit managers may need to set up new strategies for supporting expertise recognition and expertise access among pediatricians. In principle

Past collaboration, associations, and physical proximity have also a significant impact on advice networks. These variables, however, permit to connect to those who are already known, who belong to the social capital of each pediatrician. They do not allow access to experts of certain pathologies, if they are outside of this circle of known people. Local Health Unit managers may try to set up ways for extending the benefits of these variables: new teams (with different members) for the development of clinical pathways may be put in place; associations may be granted incentives to meet and exchange knowledge with other associations; periodical plenary meetings of the LHU pediatricians may be organized.

Homophily has no significant impact in terms of experience. Experts do not bond with experts, because we already found that expertise is not the issue in creating links. Same gender collaboration has some significant but minor result.

Finally, pediatric associations in our case study proved to be effective in promoting the exchange of knowledge. A future development of this study will be an assessment of the results of this exchange: to what extent advice networks are useful for pediatric effectiveness. This will provide the means to understand the opportunity of the monetary incentives for the development of pediatric associations.

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