

Theory-Building Paper
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Healthcare

*Application of Network Theory for Explanation of Power
Struggles between the Inpatient and Outpatient Sectors in
German Healthcare*

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ABSTRACT

The German health system is highly fragmented with cross-sectoral care solutions holding lots of potential. However, power struggles are prevalent between the inpatient and outpatient sectors, resulting in efficiency loss. Resolving power mismatches is likely to increase medical safety and patient experience, resulting in strong, value-creating patient-physician-hospital relationships. This theory-building paper proposes the use of the power model in network theory to detect and measure power mismatches, enabling regulators to make appropriate adjustments to negate such mismatches.

KEY WORDS

Healthcare, Hospitals, Cross-Sectoral Care, Fragmentation, Theory of Power

Introduction

As an unwell person's way back to a healthy state often requires a complex combination of treatments, health systems tend to be highly fragmented (Mitchell, 2019). Different specializations are required from health professionals at different stages of the patient journey.

Fragmented care also means that healthcare providers – hospitals, outpatient practices, therapists, etc. – tend to work together less effectively, leading to ineffective interfaces in healthcare, meaning that relevant information on patients' health and treatment plans is lost when a patient switches from one stage of treatment to the next (Korzilius and Osterloh, 2017). In the proposed paper, the hospital admission and discharge interfaces that connect to outpatient care will be relevant, as patients are usually admitted from outpatient care and then leave the hospital to continue treatment with their general practitioners. These are stages at which information is potentially lost, leading to higher costs through redundant examinations, inferior medical safety, and poor patient experience (Kübler, 2017).

In Germany, doctors working on an outpatient basis often join local health networks, which are registered associations that come with a yearly fee. Such networks – which could then be perceived as unions – are often approached by local hospitals to negotiate ways of interface improvement (Spielberg, 2020). This can, for example, be achieved through standardization of information transfer when patients are admitted or discharged.

However, such pilot projects do not always lead to win-win-win outcomes for the involved hospital, local practitioners, and patients (Reiners, 2020). Generally, local practitioners are the ones who have the highest influence on which hospital their patients are admitted to, while hospitals rely on those referrals for their economic survival (Wille et al., 2012). Thus, when local practitioners unionize in local health networks, due to high negotiation power, the outcome of such a pilot project may have an increased chance to be one-sided: only one interface is targeted, in which information flows one way – from the hospital to local practitioners, helping them with their work. Doing it the other way around, for example as part of admission management, would lead to a more equal exchange. However, this would also mean additional work for local practitioners, which – in contrast to hospitals that are often forced into compliance through regulatory means (Herr, 2018) – lack personal incentive to accept additional responsibilities.

In the past, German regulatory authorities have mostly targeted the inpatient sector for interface optimization (Halbe et al., 2015; Osterloh, 2017; Herr, 2018), forcing the already financially struggling hospitals into costly compliance (Augurzky et al., 2016). However, the other side – namely, local practitioners – could also be targeted for similar, maybe even better results (Fleischer, 2015).

In this theory-building paper, network theory (Borgatti and Halgin, 2011) will be used to explain the underlying power struggle between the inpatient and outpatient sectors in German healthcare. With respect to the *study of power* (Cook and Emerson, 1978), an approach will be proposed that could be used in further research to find out, what kinds of regulatory measures are likely to be the most promising in increasing medical safety and patient experience, resulting in strong, value-creating patient-physician-hospital relationships.

Network Theory

Borgatti and Halgin (2011) describe social network analysis as a research area of network theory that is quickly growing in popularity. From their point of view, theorizing in this area “encompasses two analytically distinct domains, which [are referred] to as network theory [...] and theory of networks” (Borgatti and Halgin, 2011, p. 1168). Network theory deals with

consequences of network variables, while theory of networks is about network structures, attempting to explain why networks are the way they are.

While Borgatti and Haldin (2011) mostly focus on the flow model as their fundamental model to identify characteristic elements of network theorizing, they also acknowledge that there are problems that cannot be reduced to it (p. 1173). Negotiation networks are such an example.

Cool and Emerson (1978) describe that a negotiation outcome in an exchange network is highly affected by the network structure. They also introduce the term *network balance* and the difference between high and low exchange value (p. 726). In academia, this is one of the first basic approaches toward the definition of the bond model, which is based on the underlying assumption that the network structure affects the nodes' negotiation power (Borgatti and Haldin, 2011, p. 1173). However, Cool and Emerson (1978) do not assume that the relevant structural determinants of power can purposefully be adjusted by nodes within a social network (p. 737).

Jones et al. (1997) describe the term *network organization*. The underlying idea is that multiple nodes consciously unionize and act together as one. Borgatti and Haldin (2011) describe this structure as *virtual amalgamation*, where the nodes "are bound together by ties of virtual solidarity" (p. 1173). This way, unionizations can be described, purposefully impacting the negotiation power of all participant nodes in a positive way.

Before putting these theories to practical use, however, it is important to note that network theorizing is prone to endogeneity issues. Borgatti and Haldin (2011) empathize that it should be clear whether the independent and dependent variables are network variables or nonnetwork variables (p. 1177). As an example, the *strength of weak ties* theory is described, in which the outcomes are classified according to the domains, as illustrated in Table 1.

Independent variable	Dependent variable	
	Nonnetwork variable as outcome	Network variable as outcome
Nonnetwork variable as antecedent	(Nonnetwork theory)	Theory of networks
Network variable as antecedent	Network theory	Network theory of networks

Table 1. Network Theory and Theory of Networks (Borgatti and Haldin, 2011, p. 1177).

In *strength of weak ties* theory, it is argued that, due to social networks exhibiting g-transitivity, it can be derived that bridging ties are unlikely to be strong ties. Thus, Borgatti and Haldin (2011) point out that a nonnetwork variable is an antecedent and a network variable is the outcome. However, this is the opposite in the further *strength of weak ties* reasoning that a high number of weak ties is likely to be associated with a high number of novel information sources, leading to higher performance gains. In this example, Borgatti and Haldin (2011) reason that there is no need to know why networks have g-transitivity in order to arrive at the second assumption (p. 1178). Just the existence of g-transitivity is sufficient; and while a theory may feel somewhat unsatisfactory when we know that X leads to Y but have to disregard what leads to X due to possible endogeneity, it is still a valid approach. However, this example demonstrates the importance of exact classification.

Network Theory in Practice – Local Health Networks and Hospitals

Given a hospital H and six local practitioners – which are all potential referring doctors –, the hospital is able to approach each of them individually, offering its own standardized interface-improving cooperation approach. Figure 1 illustrates such a negotiation network.

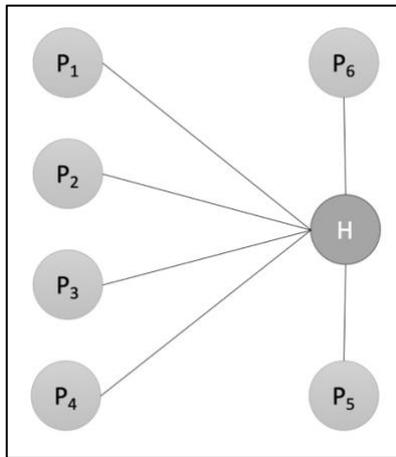


Figure 1. Simple Negotiation Network (adapted and expanded from: Borgatti and Haldin, 2011, p. 1173, Figure 7).

While the hospital is dependent on the practitioners' referrals, in Figure 1, it also has six different practitioners to strike deals with. Once a standardization of information exchange is established, it increases the chance for the involved local practitioners to refer their patients to this specific hospital (Fleischer, 2015). In the case of discharge management, it can mean that general practitioners receive information from the hospital about their patients shortly before their patients are discharged. Such information usually includes the diagnosis, treatments done, current bloodwork, proposed medication plan, and proposed further outpatient treatment. As a result, a general practitioner can prepare prior to their patient's post-hospital visit. For many general practitioners, such a cooperation can be the only way to even find out that one of their patients has been to the hospital, as only a fraction of hospital admissions are referrals (Spielberg, 2020). Many patients are admitted through emergency departments.

In reference to Borgatti and Haldin's (2011) notion of the negotiation network (p. 1173), it can be assumed that a high number of unconnected local practitioners can be associated with higher negotiation power for hospitals. Higher hospital negotiation power means that such a hospital is able to propose deals that also require the local doctors to provide information their way when a patient is referred and, thus, improving patient experience and making work easier for hospital staff. Such information could include the patient's known allergies, medication plan, recently conducted diagnostics, etc.

As mentioned in the Introduction, local practitioners in Germany have a high tendency to join local health networks where they agree on certain treatments standards, exchange information on current events, and generally help each other out. When a hospital approaches a doctor that is part of such a network, it is quickly referred to the health network's chairperson. Such a negotiation network is illustrated in Figure 2.

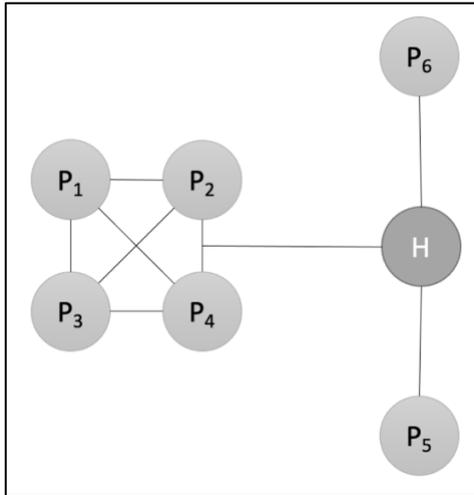


Figure 2. Practitioners P₁, P₂, P₃, P₄ in a Local Health Network (adapted and expanded from: Borgatti and Haldin, 2011, p. 1173, Figure 8).

Due to P₁, P₂, P₃, and P₄ acting as one, according to Jones et al. (1997), they should have higher negotiation power. At the same time, H cannot approach negotiations as aggressively as in the previous scenario due to fear of burning its bridge with four local practitioners at once. In practical reality, a realistic number of members in such a local health network is rather 80 (Spielberg, 2020); thus, it can be assumed that such a unionization of local health practitioners lowers the hospital’s negotiation power – even though, in contrast to trade unions, the official, primary goal of such a health network is information exchange rather than negotiation power.

To complete this proposal, a change to the scenario should be assumed, which is additional hospitals (Figure 3).

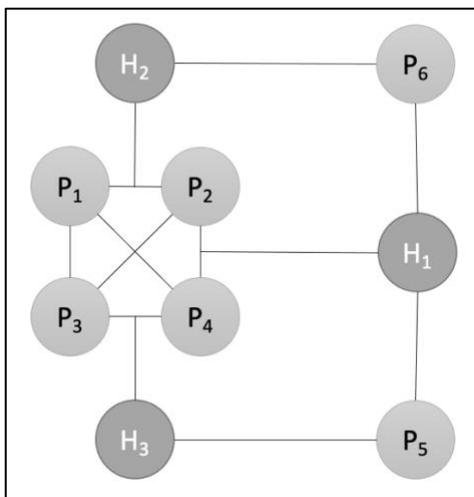


Figure 3. Three Unconnected Hospitals (own illustration).

If two additional hospitals enter the scenario, they are likely to compete for a deal with the local health network, as it would increase referral chances. While a health network can make multiple, different deals with hospitals, they do not rely on them; and the hospital providing the best deal – namely, high information flow from H to P with little work from P in exchange – would be the preferred hospital from the local practitioners’ perspectives (Tunder and Vitis, 2021).

However, there are cases where multiple hospitals join to form a cooperation network (“Über das JoHo”, 2021), as illustrated in Figure 4.

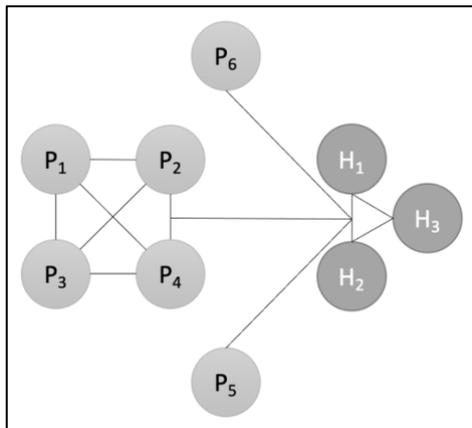


Figure 4. Three Hospitals in a Cooperation Network (own illustration).

When multiple hospitals make up a cooperation network, it can be assumed that the negotiation power increases the same way as with local practitioners forming a local health network. Thus, there are multiple ways regarding how power can vary on both sides. The more unconnected Ps, the lower the negotiation power of individual Ps. The more connected Ps, the higher their negotiation power. The same analogy applies to the Hs.

Practical Relevance and Further Research

The proposed utilization of network theory is promising in the description of power struggles between the inpatient and outpatient sector. Theory of power in network theory has potential to represent the basis for a power measuring tool in fragmented healthcare. In contrast to theories such as the *strength of weak ties* theory or *strength of strong ties* theory, it is free of any systemic endogeneity, with the network structure being the clear antecedent and the measurable power being the clear outcome.

These assumptions could theoretically be validated by measuring power in empirical research. One approach could be to measure the amount of information by the number of points in the standardized transfer form that is agreed upon between hospitals and local health networks.

In the future, a social network of Germany’s local practitioners, health networks, hospitals, and hospital cooperation networks could be created. Such an overview could be helpful in telling, which geographical areas may have a power mismatch that could potentially be slowing down innovation in interface optimization. Regulatory authorities could then react by putting more compliance pressure on the party with higher negotiation power.

Conclusion

The principal goal in this proposal has been to build a connection between the theory of network theory and the practice of fragmented healthcare.

It can be argued that the bond model – specifically with respect to the theory of power – is able to describe current issues that are present in Germany’s healthcare system, located

around the interfaces between inpatient and outpatient care, explaining possible power struggles that have previously been observed.

Hopefully, this proposal and potential further empirical research connected to it will help regulatory authorities to make more efficient, differentiated decisions in healthcare that may have a positive effect on medical safety and patient experience.

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