The nature and scope of patient-sharing network research: a novel, important area for network science

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Abstract

A robust literature exists that draws on social network approaches to understand connections among individuals, and healthcare and behavior-related implications. This article offers commentary on the scoping review conducted by Dugoff et al. that examines “patient-sharing” networks, their characteristics, and various methodological approaches. The scoping review conducted by Dugoff et al. examines the characteristics and methods employed in patient-sharing network studies. It identified the most common measures used in patient-sharing network research, as well as theories used in patient-sharing network studies. Dugoff et al. also identified many studies that examined healthcare utilization considerations for patient sharing. Understanding the connections between providers and the flow of patients between providers could lend insight into barriers and enablers to efficient healthcare systems.

Keywords

Social networks, Patient sharing networks, Healthcare, Health

Implications

Research: Researchers stand to benefit from use of electronic medical records (EMR) and administrative claims data as a potentially readily available, high-quality data source for network research.

Practice: Practitioners can benefit from understanding patient sharing and any barriers or enablers to efficient patient flow on their pathway of care.

Policy: Policymakers may benefit from knowledge of patient-sharing characteristics to better monitor or improve the pathway of care.

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Human beings are affected by others in their social environment [1]. Networks of social actors are mapped and often used to quantify social influence. A robust literature exists that draws on social network approaches to understand connections among individuals, and healthcare and behavior-related implications. For example, social network analysis has been utilized to examine health-related behaviors, such as smoking [2] and alcohol consumption [3]. Also, social network analysis examining obesity has shown that this chronic condition is highly patterned across socially connected individuals [4]. In this manner, social network research can be useful for understanding health behaviors among social groups.

While the examination of health behaviors (e.g., smoking or alcohol consumption) is one application for social network analysis in healthcare, other possible functions may include examination of how information or resources spread through healthcare networks [5]. The scoping review conducted by Dugoff et al. examines this question in the context of “patient-sharing” where providers share patients in a healthcare system. Important inclusion criteria for the review included (a) use of patient-sharing data, such as electronic medical records (EMR) or

administrative claims data, and (b) actors in the networks including individual providers, hospitals, or other healthcare organizations. In fact, the Patient-Centered Outcomes Research Institute (PCORI) launched PCORnet, a major initiative to support national web-based research infrastructure to advance the development and use of EMR [6, 7]. As part of PCORnet, there are collaborative data research networks (CDRNs) located across the USA to facilitate large-scale research and ultimately drive insights into efficient healthcare delivery and healthcare quality improvement [6–8].

With the development of technologies, such as the EMR, and initiatives such as PCORnet, mapping the spread of information through provider networks could be easier than ever before. For instance, these technologies can easily map the pathway of patient care from one provider to another, the patterns of treatment and procedures advised, and referrals between providers and agencies. Thus, these components of healthcare are now traceable and hold potential for advancing our understanding of how patients, processes, or information spread through healthcare delivery systems.

In their scoping review, Dugoff and colleagues sought to extract the guiding frameworks authors use in studies using patient-sharing network data. The

authors found that most studies emphasized models of care coordination and collaboration among providers. Less common were frameworks that utilized theories on weak ties or diffusion of innovation. The paucity of studies using these prevailing theories, such as the strength of weak ties (e.g., how weak ties hold disparate groups together to facilitate greater spread of information) [9] or diffusion of innovation (e.g., the idea that information and behavior spread through networks, which is mediated often by influential individuals) [10], greatly limits our ability to understand patient-sharing from a network perspective.

It is interesting to note that Dugoff and colleagues identified 180 discrete measures of social network concepts related to patient sharing. The authors distinguish between studies that measured providers as individual nodes, dyads, or triads in the network studies. In addition, Dugoff et al. identify common measures included in patient-sharing network studies, including degree (centrality of providers in the network), density (or, cohesiveness of the network), assortativity (or, measuring whether actors connect preferentially to other nodes), and reciprocity (measuring bi-directional sharing of patients among providers), among other variables. At the patient level, network concepts included measures of care density (number of patients shared by a provider) and team size (composition of patient care teams per provider). The vast number of concepts identified in the current review suggests the need for agreement on conceptual definitions and terminology.

Dugoff et al. also distinguish between the types of networks in patient-sharing network research. With regard to providers, Dugoff et al. found that providers who share patients were more likely to be connected via a professional relationship. This finding somewhat competes with earlier work on patient-sharing networks that found medical innovation (e.g., prescription of a new drug) spread through provider friendship networks faster than professional networks [11]. The authors also examine patient sharing across geographically disparate healthcare systems, vis-à-vis multidimensional scaling with Ward clustering or zip code matching.

While the scoping review by Dugoff et al. offers much insight into the characteristics of research on patient-sharing network studies, it misses other key elements of network research, such as centrally located individuals within the network (opinion leaders). As previous research suggests, these individuals can play a strong role in network structure and outcomes. For instance, Kelly et al. found promising outcomes in a network-style behavioral intervention that engaged socially influential gay males in urban environments in the delivery of HIV risk reduction messages [12]. Although not examined in Dugoff et al., as the authors note, using an opinion leader approach to identify centrally located providers in sharing networks might represent a promising

area for future research to understand the flow of patients and care. Another concept missing from the studies selected for review is that of homophily [13]. The concept of homophily could be interesting to explore, for instance, how similar providers share patients perhaps more so than providers who differ on demographic, or other dimensions.

In addition to mapping network structures and pathways, a promising avenue for future research may be to examine how provider characteristics of the patient-provider relationship (e.g., communication quality) or individual parameters (e.g., patient and provider race/ethnicity) interact to effect patient outcomes. These micro-level factors (e.g., individual and interpersonal) may add greater understanding to the structural relationships identified in network research. Research in hypertension and oncology suggests that different patient-provider communication styles affect patient-level outcomes, such as medication adherence [14].

Social network analysis has been employed for several decades in a diverse array of areas including the spread of public opinion and the rate of adoption of farm equipment in rural communities among others [10, 15]. It could be argued that mapping the spread of information through provider networks could be easier than ever before with EMR that make patient sharing, among other healthcare processes, readily traceable. Patient-sharing networks thus are a compelling area for applying the methodology of network science. Dugoff et al. identify common trends in theory and method in patient-sharing network studies as a starting point for this fruitful area of inquiry. Understanding the connections between providers and the flow of patients from one provider to another could lend insight into barriers and enablers to efficient healthcare systems.

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Compliance with Ethical Standards

Conflict of Interest: The authors have no conflicts of interest.

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