A Reflective Account of Social Network Analysis as a Leadership Tool

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Over the past 2 decades, the size and complexity of organizations have tended to increase.[1] There has been consolidation of hospitals and associated services into larger entities. In some parts of the world, a continuum-of-care approach has been developed in which primary, secondary, and tertiary services work as an integrated system.[2] Alongside these structural changes, the extended hierarchy of positions with direct linear reporting relationships has been replaced by matrix structures and advisory roles.[1] These changes often require nurse leaders to be able to function in a more dynamic environment in which influence rather than direct managerial competencies is seen as an essential requirement of the nurse executive.

These changes are not unique to healthcare systems or nurse leadership roles. Meier and O'Toole[3] made similar observations in their research of over 500 district educational school leaders when examining the US education system, noting that public policies are often developed and implemented via complex networks in which success necessitates collaboration and coordination across a wide range of parties over whom the individual can exercise very little formal control. Furthermore, McGuire and Siva,[4] in their national study of disaster and emergency response systems, examined the effects of leadership behaviors on network effectiveness and highlighted the fact that the literature rarely empirically examines such issues.

Recently, systematic reviews of nursing's use of and focus on network research reached similar conclusions.[5] In nursing, according to Benton et al,[5] although the numbers of networking studies are on the increase, the majority of the work completed to date tends to offer only superficial insights into network dynamics and the associated roles that individuals play in the network. Nursing research tends to describe the structure of existing networks at a single point in time, often uses a small number of measures, and typically uses relatively small convenience samples.

AIMS

This article draws upon a range of articles published by the author over the last 20-plus years. It serves as a reflective account of what can be learned from a series of studies that have used social network analysis techniques to greater or lesser extents. The aim is to identify lessons that can be learned from this work to offer contemporary nursing leaders a set of tools to assist them in shaping and influencing complex environments.

SOCIAL NETWORK ANALYSIS: MUCH MORE THAN DOING LUNCH

My interest in social network analysis began over 2 decades ago. I was asked to write a paper on leadership and became both intrigued and frustrated at the repeated mention of the importance of networking without any theoretical or empirical basis for the statements being made. These statements lauded the importance of networking and offered a range of suggestions on how to network: using conferences, exchanging business cards, and making a point of talking to the people you did not know in meetings. However, much of the work did not offer a means of understanding whether these activities were having any sort of impact. As a result, I turned to the wider scientific literature to see if a more robust understanding of networking could be revealed. The editor of the journal who had requested the paper on leadership was equally intrigued by my interests and asked that I write a second paper on networking.[6] The paper provided a basic introduction to social network theory and its application, while offering the reader an opportunity to gain continuing education credit. Most importantly for me, it provided the basis upon which I have developed an expanded understanding of the subject of how social networks analysis can be applied to a range of issues.

The intention of this article is not to offer a thesis on the topic, but rather to offer insights into how the various techniques can be applied in leadership settings. Multiple texts, such as those by Cross and Parker[7] or Scott,[8] are available to provide detailed theoretic and analytical explanations of the various techniques. The content of these texts will not be repeated here. Instead, a few basic terms are explained so as to provide a foundation for interpreting the rest of this paper.

WHAT IS SOCIAL NETWORK ANALYSIS?

Social network analysis is an analytical technique that examines the relationships between nodes, sometimes referred to as egos, and offers a means of describing the features of the network as a whole, describing certain characteristics and the way these nodes relate to one another.[8] The nodes can represent individuals, groups, organizations, countries, or any tangible object that can relate in some way to others in the network. The links, sometimes referred to as ties, edges, or connections, join nodes together to represent some form of relationship. This relationship can depict the transfer of information or a particular quality of a relationship such as trust.

AGENDA AND RESOURCE IDENTIFICATION OPPORTUNITIES

Social network approaches can be applied to a wide range of sources. In 1999, the first Scottish Parliament to meet in over 300 years formed a series of committees to pursue a wide range of policy issues. Discourse was well documented and soon published so the public could gain insights into the interests and action of their political representatives. The 12 committees met. At the inaugural meeting, members presented their thoughts on themes they believed were most important and needed to be addressed. Because many of these issues had relevance for nursing, it was possible to construct a map of topics comprising common interests shared by at least 2 of the committees.[9] A collaboration of select committee members and targeted issues were brought to the forefront. Topics included poverty and employment, drugs, diet, housing, and domestic violence. Not all of these topics emanated from the Health and Community Care committee. Indeed, the very first piece of legislation passed by the Scottish Parliament, clearly germane to nursing—domestic violence—unfolded with the development taking place in the Justice and Home Affairs committee. Examples like this legislation demonstrate how agendas align to secure opportunities to influence policy.

Using documentary sources can provide a wide range of opportunities if social network theory and the related analytical techniques are applied. Examination of who is publishing and what is being published in a particular field of study can also yield very valuable information.[10] This type of analysis is referred to as scientometrics or bibliometrics, and both methods use social network analysis to identify expert sources on a particular topic or indeed the priority issues being debated in the field of study. These types of analysis can help to identify

"invisible colleges of collaboration" that exist between coauthors in different institutions.[11]

More recently, as technology has advanced, it is possible to obtain an up-to-date picture of how a particular author's work has affected a topic. For instance, Linda Aiken is a well-known and respected author who has established a global reputation in the field of workforce, quality, and many other issues and their impact on patient care. To understand the reach of her work, information on the focus of her studies and the people with whom she collaborates can be easily obtained using the summary functions provided by Scopus. There are 183 of Dr. Aiken's publications indexed in Scopus. Her most prolific years of publication were 1997 and 2001 with 8 publications per year, although 2008 and 2009 were also highly productive with 7 publications each. In terms of collaborating authors, she most frequently collaborates with D.M. Sloane. The majority of her collaborating partners are based in the United States, but she does on occasion coauthor work with colleagues from the United Kingdom, Belgium, Canada, Germany, and Spain. The majority of her works, indexed by Scopus, are original journal articles.

Another tool that can provide a rudimentary social map of coauthor connections can be accessed via Web of Science. This tool enables a particular article to be examined in some detail. It allows for the review of 2 levels of citation, both backward and forwards from the work. In other words, it is possible to see the roots of the thinking. By looking at the references that the author has cited and, in turn, the references that that those references have used (i.e., the second antecedent level), the origins of a work can be seen. By looking forward, one can see how the paper has contributed to further work. Looking at who has gone on to cite the paper, a measure of how influential a particular study has been can be determined. From a leadership perspective, it is therefore possible to gain significant insights into what might be termed a virtual community of practice: the reach that a particular author has through the publication of their work both geographically and across time.

BUILDING A MORE COHESIVE LEADERSHIP GROUP

In a study of formal versus informal leadership structures, Cross et al[12] identified that the traditional hierarchical reporting arrangements provide only a partial picture of how information flows within an organization. Key individuals who play a major role in receiving and transmitting information across an organization can be located in what would appear to be insignificant levels or locations in the traditional organogram. These individuals may not be visible leaders; however, they play a significant role to guide the diffusion of information, shape views and opinions within the organization, and rally with leaders who want to bring about change or gather important organizational insights.[13] Identifying such individuals can be particularly valuable to a newly appointed director of nursing who is expected to "hit the road running." In today's climate, great things are expected of nurse directors; yet, without a sound

understanding of the key players in the organization, delivering results can be a challenge.

This is exactly the situation I faced when appointed to a newly formed health system in Scotland. By use of the work of Cross et al[12] and Collins et al,[13] I was able to glean rapid insights into the structure of the visible leadership group as well as precisely identify the key invisible opinion leaders. The study by Benton[14] initially mapped and then subsequently influenced the structure of the informal network. This changed the network architecture based predominantly on service linkages (acute, community, and maternal–child), previously reinforced by traditional reporting arrangements, to a more cohesive set of arrangements driven by a new strategic vision that stimulated the transfer of knowledge from 1 service to another.

To achieve this shift from nodes to network, key opinion leaders in each of the 3 major service groups were identified, along with those individuals who were peripheral to the overall network, so a series of working groups could be formed. I will refer to the 2 distinct groups as "opinion leaders" and "invisible leaders." These working groups were asked to address key leadership challenges and to develop system-based, rather than service-based, solutions. The impact of these working groups was assessed after 6 months, both in terms of the solutions generated, as well as the effect on the social network of nurse leaders. Overall, all nurse leaders were more densely connected. There was a wider range of individuals playing key connector roles, as the general architecture of the informal network structure no longer mirrored the service-based groupings; instead, cross-service links were more common. This provided an opportunity to unlock and disseminate solutions from one part of the organization to other services experiencing similar problems. In short, by understanding the pre-existing structure and then providing an opportunity for individuals who would not normally work together to focus on common problems, it was possible to build a more cohesive leadership group across the organization. It also increased the problem-solving capacity by bringing proven solutions and new perspectives from one part of the organization to challenges being faced in other part of the system.

IDENTIFYING TALENT AND LEARNING FACILITATORS

The International Council of Nurses has provided leadership development through its Leadership for Change (LFC) program in over 60 countries around the world. The program is based on an action learning philosophy and offers specific contemporary leadership content. The program uses a 360° assessment, problem-based learning, and project-driven experiences. A typical cohort recruits a diverse range of 30 to 35 leaders from across a country and, after they have completed the program, a subset of these individuals go on to act as trainers for subsequent groups.

Until recently, the selection of trainers was based on a negotiated agreement between the director of the LFC program and the national country coordinator. There was no

Figure 1. Social Network Mapping of LFC Group With Nodes Scaled by Betweenness Scores
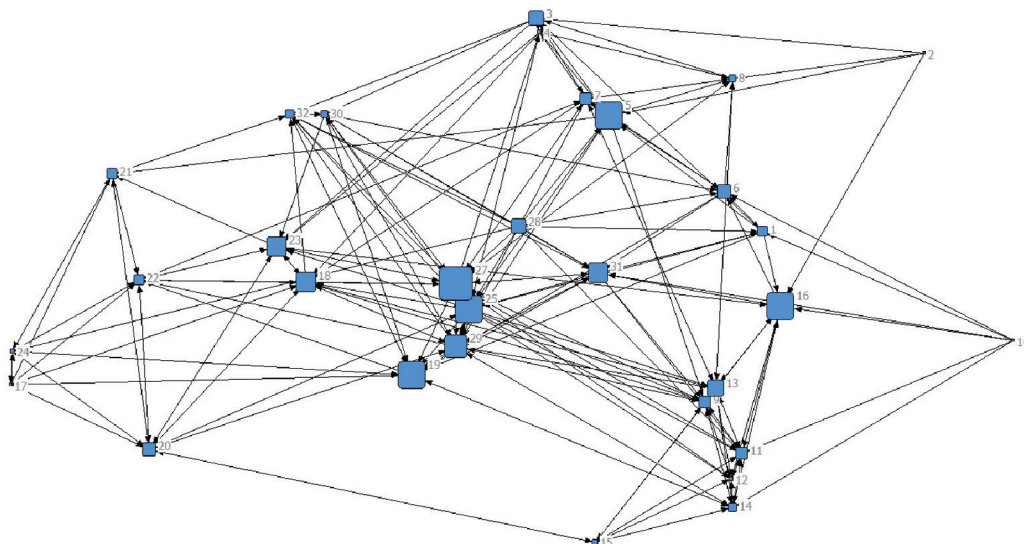
quantitative measure used in the selection process. However, work by Benton and Fernández-Fernández[15] identified a correlation between the opinion-based selections of the LFC director, the national coordinator, and a specific social network analysis measure; that is, betweenness. An individual with a high betweenness score is someone who connects different parts of the network or subgroups within the network together. Such individuals may not have the highest numbers of connections; rather, it is the diversity of those connections that contribute to the high betweenness score. The data displayed in Figure 1 highlight those individuals with high betweenness scores. The higher the betweenness score, the larger the proportional size of the node. So, in the case of the LFC program, if there is a need to identify people who are good at facilitating connections within a group and who are capable of bringing together differing perspectives, then using those individuals with a high betweenness score would be a logical choice.

ASSESSING EXISTING GLOBAL CONNECTIONS

In today's increasingly connected world, in which heads of state or ministers of health frequently meet to discuss and set policy, it is important for nurses to be able to exert influence, not simply through bilateral discussions with their own policy maker, but as part of a complex network of influence.[16] In such a network, messages that are mutually reinforcing can be sent via multiple pathways, thereby generating synergy. Not only does the minister receive the briefing directly from his or her local nurse leaders, but also via discussions with peers from other countries who mutually reinforce ideas. The total effect can be greater than the sum of the individual parts as the message is amplified and echoes across the policy system. In today's parlance of social media, it can, in reality, "go viral."

However, the connections between nurses leaders as reported in studies of participants in the ICN Burdett Global Leadership Institute can be few in number and, as can be seen in Figure 2, often highly dependent on 1 or 2 key individuals.[16] Figure 2 illustrates the pre-existing connections between a small group of nurse experts who were brought together to develop potential content for an International Council of Nurses' International Nurses' Day publication. The size of the nodes reflects the number of connections the person has to his or her colleagues. Participant number 20 has marginally more connections than the other participants in the meeting. Some individuals (2, 5, 10, 11, 12, 17, 18, 21, 22, 24, and 25), in the top left corner of the figure, did not know any of the other participants before joining the meeting.

Although mapping the network is a useful starting point, we need to focus on how the network is strengthened and expanded if nurse leaders are to use the latent capacity of millions of nurses across the world to truly change policy. By harnessing such capacity, we could become the architects of the future of our profession and optimize our contribution to health and social care systems.

REFLECTING ON SOCIAL NETWORK ANALYSIS USAGE

Social network analysis is a powerful and flexible tool that can be a great asset to nurse leaders who wish to gain understanding of and influence over a diverse range of issues, opportunities, or groups. The usage of the technique has markedly increased over the past 2 decades. It is relatively easy to identify relevant nursing examples to provide ideas and information to support its local application to one's own specific context or area of inquiry. The technique, with little effort, generates valuable insights into previously invisible structures that can then be used to facilitate or, if intentional, frustrate the existing information flow. I would encourage you to take the time to develop the necessary skills to use this technique. By doing so, you can make sure that the next time you talk about networking, it is from a sound theoretical and

Figure 2. Pre-existing Connections Between a Group of Content Experts
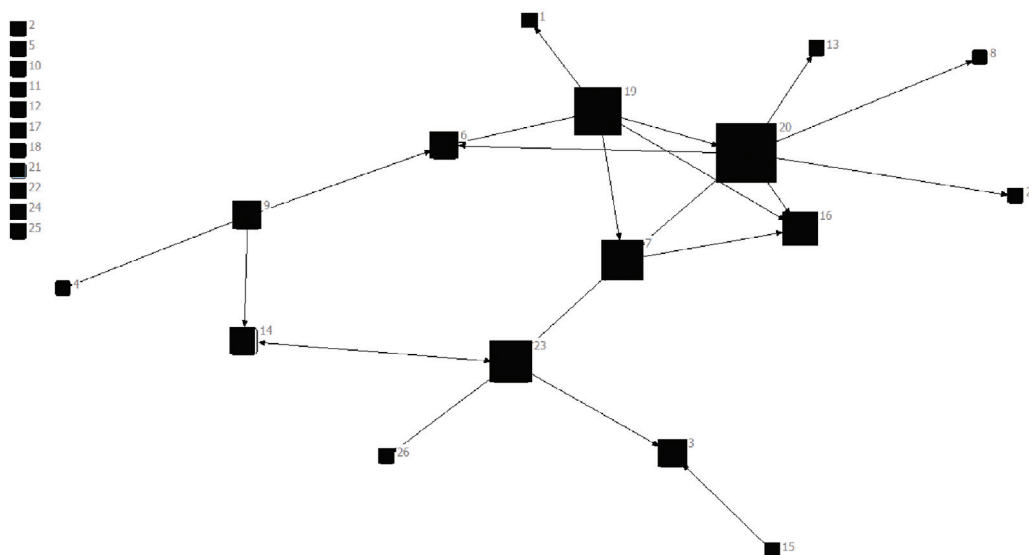
practical base and not simply pursuing a ritualistic activity that may or may not deliver a desired outcome beyond hav–ing lunch. NL

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Note: No conflict of interest has been declared by the author.