journal homepage: www.intl.elsevierhealth.com/journals/ijmi

Social network analysis of medication advice-seeking interactions among staff in an Australian hospital

Nerida Creswick, Johanna I. Westbrook*

Health Informatics Research & Evaluation Unit, Faculty of Health Sciences, The University of Sydney, PO Box 170, Lidcombe, NSW 1825, Australia

ARTICLE INFO

Article history:
Received 25 February 2008
Received in revised form
1 August 2008
Accepted 18 August 2008

Keywords:
Communication
Interprofessional relations
Health personnel
Hospitals
Social support
Medication systems

ABSTRACT

Purpose: To examine the medication advice-seeking network of staff in a hospital ward.
Methods: Social network analysis was carried out in a renal ward of an Australian metropolitan teaching hospital. The medication advice-seeking interactions of doctors, nurses, allied health professionals (including a pharmacist) and a ward clerk were examined using data from questionnaires administered to staff. The questionnaire listed all staff who worked in the ward and sought information from respondents regarding their interactions with each staff member. Data were analysed using social network software, UCINET. Analyses performed included geodesic distance, network density, strength of ties, reciprocation of relations, and centrality of individuals. NetDraw was used to produce social network diagrams.
Results: A very high response rate of 96% was achieved with 45 of 47 staff returning the questionnaire. On average, there is little interaction between each of the staff members in the medication advice-seeking network, with even less interaction between staff from different professional groups. Nurses are mainly located on one side of the network and doctors on the other. However, the pharmacist is quite central in the medication advice-seeking network as are some senior nurses and a junior doctor.
Conclusions: When hospital clinical staff seek medication advice from other members of a ward it tends to be sought from those in their profession. However key individuals in the ward are relied upon for the provision of medication advice by staff from all professions. Social network analysis can be used to examine the complex medication advice-seeking interactions amongst staff in a hospital ward, providing useful quantitative baseline data against which to compare the effect of interventions, such as an electronic medication system, on interactions.

1. Introduction

It is vital to evaluate information and communication technologies introduced into health care settings in order to determine whether they produce the outcomes desired. Like many hospitals worldwide there are plans to introduce electronic medication management systems into Australian hospitals. These systems allow medication to be prescribed electronically and for administration of medication to be recorded electronically. They are designed to improve the safety of medication management by, for example, reducing errors due to illegible handwritten prescriptions, providing

* *Corresponding author*. Tel.: +61 2 9351 9987.
E-mail address: n.creswick@usyd.edu.au (N. Creswick).
1386-5056/$ – see front matter © 2008 Elsevier Ireland Ltd. All rights reserved.
doi:10.1016/j.ijmedinf.2008.08.005

decision-support at the point of prescribing and allowing ready access to patients' medication charts from anywhere within the hospital or even from doctors' homes. As such, the frequency, topic and context of discussions about medication between health professionals, particularly between doctors and nurses is likely to change, yet we have relatively few empirical data about how these changes manifest themselves and further what the outcomes of such changes may have for patient care. Beuscart-Zephir et al. [1] found that when an electronic medication system was introduced in a hospital in France, doctors and nurses had less chance to communicate, particularly regarding prescribing decisions. In hospitals, people regularly rely on information from their peers in the course of their work [2]. Since these relationships are so important in the diffusion of innovation [3,4] and in the provision of high quality patient care [5,6], any disruption to them could have negative consequences.

Social network analysis is an approach that allows the detailed study of complex communication and interaction patterns, like those in a hospital setting. It is used to study people and organisations and the structure of the links between them. Data for social network analysis of individuals in organisations are traditionally collected through questionnaires. They can also be obtained by mining databases of electronic communications, for example email servers. Social network data are usually presented in a sociogram (see Fig. 1), with the shapes representing individuals and the lines representing the relational ties between individuals.

Studies of communication in health care organisations using social network analysis have revealed hierarchical structures in the clinical settings under study [7,8]. Cott's [7] study of multidisciplinary long-term care teams found a hierarchical structure in the ward, with doctors, senior nurses and allied health professionals working together to make decisions, and with junior nurses carrying out most of the day-to-day work. Social network analysis has been previously used to study the impact of information technology (IT) on relationships and communication patterns, and to study how existing relationships and communication patterns affect the use of IT systems. These studies have been carried out in health care organisations [9–18] and in other settings [19,20]. Some of the studies in health care organisations show that the use of new computer systems increased interaction between staff, particularly in order to communicate about a new system [9,16,17]. In another social network study, key network members were found to increase use of a computerised system by influencing those around them to use the system [18].

In order to evaluate the impact of a new system, work, communication and interaction patterns need to be studied both before and after system introduction. The study reported here is the first stage of research aimed at examining how interaction networks on hospital wards change following the introduction of an electronic medication management system. The paper reports pre-system implementation results from one ward. It is part of a larger project evaluating the electronic medication management system in this hospital [21]. This stage of the research answered the following questions about the network of seeking advice regarding medication decisions and tasks in a hospital ward:

Table 1 – Profile of ward staff by profession.

Profession	Number of staff
Medical	10
Nursing	30
Allied health	6
Administration	1
Total	47

1. What are the key features in the appearance of the network?
2. What is the distance between individuals in the network?
3. What is the density of interactions?
4. How frequently on average is advice regarding medication decisions and tasks sought?
5. Is advice sought from those of the same profession or from other professions?
6. Are the medication advice-seeking relationships reciprocated?
7. Who are the key providers of medication advice in the network?
8. Who are the powerful individuals in the network?

2. Methods

The study was conducted using social network analysis. As most communication in a hospital setting is carried out using face-to-face communication, and not all health professionals use or even have access to email at work, the data in this study were collected using a questionnaire administered to each staff member in the ward.

2.1. *Setting and sample*

The study was conducted in the renal ward of an Australian metropolitan teaching hospital. At the time of the study, the ward consisted of 47 staff who regularly worked there, including doctors, nurses, allied health professionals (including a pharmacist) and administrative staff. A profile of the hospital ward staff by their professions is presented in Table 1.

2.2. *Social network questionnaire*

A social network questionnaire was designed with reference to standard social network questions used in other studies [7,8,17,22–25]. A roster format was used. This involves listing the names and positions (e.g. Person X, Registered Nurse) of all staff members on the ward. Respondents were required to answer five social network questions about each person named on the list. In this paper, results are presented for the responses to one of the questions, namely "How often do you seek advice from [each person] about medication decisions and tasks?". Response categories provided were in terms of frequency of medication advice-seeking, ranging from 0 to 7, as shown in Table 2. The questionnaire was completed by 45 of the 47 staff, giving a response rate of 95.7%. One junior doctor and one senior Registered Nurse failed to complete the questionnaire.