



Social Network Analysis of peer-specific safety support and ergonomic behaviors: An application to safe patient handling

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ABSTRACT

This study applied Social Network Analysis (SNA) to test whether advice-seeking interactions among peers about safe patient handling correlate with a higher frequency of equipment use. Patient-care workers (n = 38) at a community hospital in Oregon nominated peers they would consult for advice regarding safe patient handling. Results show a positive correlation between identifying more peers for safe patient handling advice and using equipment more frequently. Moreover, nurses with more reciprocal advice seeking nominations used safe patient handling equipment more frequently. However, employees who would be more consulted about safe patient handling by their peers did not use equipment more frequently than nurses with fewer nominations. Despite the small sample size, the magnitude of the adjusted regressions coefficients ranged between 3 to 4 standard deviations. These results suggest that having more or reciprocal sources of peer-based support may trigger ergonomic related behaviors such as frequent utilization of equipment.

1. Introduction

Equipment-assisted patient transfers reduce the risk of musculoskeletal disorders (MSDs) (Evanoff et al., 2003; Mayeda-Letourneau, 2014), a prominent occupational health issue which continues to harm patient-care workers (Bureau of Labour Statistics, 2015). However, factors such as fast-paced work, constant interruptions, emotional and physical demands, unavailable technology and insufficient support from administration hampers the likelihood of using patient-transfer equipment (Bernal et al., 2015; Lipscomb et al., 2012). Peer-based support can partially remedy some of these barriers because safe patient handling requires regular communication and coordination with co-workers to operate equipment safely and adequately (Kalisch and Aebersold, 2010; McCaughey et al., 2014). Increasing research that maps social interactions with Social Network Analysis (SNA) indicates an association between peer-based social support with health behaviors (Benton et al., 2015). This article investigates whether peer-based support regarding safe patient handling also correlates with higher or lower frequency of equipment utilization, a key injury prevention behavior.

1.1. Gaps on social support research: specificity and directionality

Social support refers to the stock of resources that flow among members of a group. These tangible and intangible resources help group members overcoming obstacles or accomplishing goals (Uchino, 2006). Social support manifests in independent and interactive types such as *informational* (e.g., increasing knowledge or awareness on a topic), *instrumental* (e.g., facilitating access to materials resources or services), *appraisal* (e.g., providing advice), or *emotional* (e.g., companionship and affection) (Heaney and Israel). Social support among co-workers affects safety-related behaviors via different mechanisms. For example, the provision of information or advice on how to operate equipment or complete procedures, role modeling or the demonstration of the applicability of safety behaviors in everyday settings, the practice of assertive communication which enhances the coordination of tasks (Burke et al., 2006). Systematic reviews and meta-analytic studies have concluded that social support at work buffers the harm of work stressors (Halbesleben, 2006; Viswesvaran et al., 1999). Social support among peers also plays an important role establishing a culture of workplace safety; a cross-sectional study among gas and oil workers in China found that workers who perceived that their co-workers were more knowledgeable and compliant with safety guidelines reported a higher frequency of safety-related behaviors such as using personal protective

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equipment and compliance with safety procedures (Jiang et al., 2010). Likewise, another cross-sectional report among transportation workers in the United Kingdom argued that co-worker safety support – reflected in indicators such as discussing and encouraging safety conversation – was correlated with the extent to which workers perceived that safety was a firm priority (Tucker et al., 2008).

Most measures of social support are about declaring the extent to which they perceive that their family, friends, co-workers or other parties are supportive (Shor and Roelfs, 2015). However, social support flows among interactions among certain individuals of a group, and as such is not a generic abstraction about how supportive people are in general (Finfgeld-Connett, 2005). Said differently, the association of peer-based support is not general as one peer could be more or less helpful and collaborative depending on the subject matters of the help requested or needed. Therefore, signaling which individuals are considered supportive for distinct matters is important to understand how the flow of resources among people correlates with behaviors.

Focusing on the specificity and the direction of social support among co-workers is significant because these relations happen among workplace equals with no formal hierarchical rank. The specificity of support refers to the tendency of people to seek out others for help depending on the content and contexts of support needed (Kossek et al., 2011; Thrasher et al., 2004). A worker may request technical advice from a set of co-workers, yet the same worker may seek emotional support from different co-workers. The directionality of support refers to the identification of the “sender” and “receiver” of the support requested or provided. The direction of peer-based social support may be unidirectional (e.g., one person perceives support from a peer) or reciprocal (e.g., both peers perceived that they support each other symmetrically). Studies show a correlation between reciprocal support with health behaviors; a cross-sectional study found that reciprocal social support between patients and their informal caregivers was associated with higher treatment adherence (Knowlton et al., 2011). A longitudinal study based on the Framingham Heart Study cohort found that reporting being obese was more likely among two respondents who mutually identified as friends as compared with participants without reciprocal support (Christakis and Fowler, 2007).

Social Network Analysis (SNA) is a statistical technique that examines who interacts with whom for a given purpose (Valente, 2010). Consequently, SNA is suitable to address the gaps related to the directionality and specificity of social support because this technique indicates which peers seek support from others for a distinct matter. Although SNA has provided powerful insights regarding peer-effects and health behaviors, this technique has rarely been used for occupational health problems despite its appropriateness to study team dynamics and interpersonal effects (Cunningham et al., 2012; Hatala, 2006). A cross-sectional study used SNA among 18 construction crews finding a positive correlation between network density (e.g., the ratio of connections between a member of a group out of all possible connections) and higher communication about safety hazards (Albert and Hallowell, 2014). However, another cross-sectional study from the same workforce reported that relational metrics measured with SNA was not associated with safety communication practices (Alsamadani et al., 2013). One cross-sectional study among infantry soldiers found that was positively correlated with safety climate (Zohar and Tenne-Gazit, 2008). Thus, more research is needed to inform how peer and social interaction in the workplace can promote safety (Ruan et al., 2013).

1.2. Relevance of peer-based support for safe patient handling

Safe patient handling has been a longstanding ergonomic concern in the healthcare industry, affecting both patient and worker safety (Evanoff et al., 2003). Unsafe patient transfers accounting for over a third of worker's compensation claims (Kim et al., 2012; Pompeii et al., 2009). Equipped-assisted handling is not only safer but can be faster than manual transfers (Howard and Ideally, 2010; Pellino et al., 2006).

The National Institute for Occupational Safety and Health (NIOSH) recommends utilizing equipment for any lift over 35 lbs., with the caveat that this limit is under ideal circumstances (e.g., compliant patient, stationary body, appropriate posture). NIOSH also recommends that manual lifting should be avoided whenever possible (Waters et al., 2006). Peer coordination is vital to utilize safe patient handling equipment appropriately. Gait belts –the most frequent piece of equipment– may be used individually with patients who require partial assistance, but occasionally must be cleaned thoroughly before suitable for re-use (Garg and Kapellusch, 2012). Other equipment such as lateral aids (e.g., slider sheets) and mechanical lifts always require at least two nurses for safe and effective operation. Such pieces of equipment have all demonstrated efficacy or played a key part in multi-component programs that reduce nurse injuries and improve patient safety (Alexander et al., 2005).

Mutual support between peers is therefore necessary for safe patient transfers that require more than one nurse. Nurses seek advice and support from each other given the proximity, accessibility, and familiarity of peers. For instance, a nurse often needs to retrieve the equipment from another room which may require another nurse to attend to their patient. Likewise, peers can provide include updated information about patients' condition and mobility which affects transfers and handling. Peers also have the ability to identify and report barriers to safe patient handling and track outcomes of hospital initiatives in order to make evidence-based decisions.

1.3. Study aims and hypotheses

This study used SNA to examine whether peer-based advice-seeking interactions about safe patient handling were associated with equipment utilization. SNA was applied to address scientific gaps regarding the directionality and specificity of social support and safety-related behaviors. The direction of these peer nominations was characterized as *out-degree* (i.e., the number of nominations made by an individual worker); *in-degree* (i.e., the number of nominations received by an individual) or *reciprocal* (i.e., when two workers nominated each other). This study tested the following hypotheses:

Hypothesis 1. A higher frequency of safe patient handling equipment utilization will be positively associated with a higher number of *in-degree* nominations of support.

Hypothesis 2. A higher frequency of safe patient handling equipment utilization will be positively associated with a higher number of *out-degree* nominations of support.

Hypothesis 3. A higher frequency of safe patient handling equipment utilization will be positively associated with a higher number of reciprocal nominations of support than *in-degree* or *out-degree* alone.

2. Methods

2.1. Study design and participants

Cross-sectional study with data collected in 2016 at a community hospital in Oregon, USA. Registered Nurses (RNs) or Certified Nursing Assistants (CNAs) from the medical/surgical and intensive care units of the hospital were eligible to complete a survey administered by research assistants on-site during paid work time at a private meeting room. Medical directors, charge nurses, as well as administrative, clerical and janitorial staff were not eligible. The response rate was 77.5 percent (n = 38). The Institutional Review Board at Oregon Health & Science University approved the methods and procedures for this study.

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