Original Research

Social capital and knowledge sharing: effects on patient safety

Chia-Wen Chang, Heng-Chiang Huang, Chi-Yun Chiang, Chiu-Ping Hsu & Chia-Chen Chang

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Abstract

Aims. This article is a report on a study that empirically examines the influence of social capital on knowledge sharing and the impact of knowledge sharing on patient safety.

Background. Knowledge sharing is linked to many desirable managerial outcomes, including learning and problem-solving, which are essential for patient safety. Rather than studying the tangible effects of rewards, this study examines whether social capital (including social interaction, trust and shared vision) directly supports individual knowledge sharing in an organization.

Methods. This cross-sectional study analysed data collected through a questionnaire survey of nurses from a major medical centre in northern Taiwan. The data were collected over a 9-month period from 2008 to 2009. The data analysis was conducted using the Partial Least Squares Graph v3.0 program to evaluate the measurement properties and the structural relationships specified in the research model.

Findings. Based on a large-scale survey, empirical results indicate that Registered Nurses’ perceptions of trust and shared vision have statistically significant and direct effects on knowledge sharing. In addition, knowledge sharing is significantly and positively associated with patient safety.

Conclusion. The findings suggest that hospital administrators should foster group trust and initiate a common vision among Registered Nurses. In addition, administrators and chief knowledge officers of hospitals should encourage positive intentions towards knowledge sharing.

Keywords: empirical research, knowledge sharing, learning, nurses, patient safety, social capital

Introduction

Achieving improved patient safety is a key healthcare objective at the start of the 21st century. Patient safety is critical to improving healthcare quality worldwide (Pittet et al. 2006). One of the many global challenges Registered Nurses (RNs) face in delivering healthcare quality is the ability to detect when patients are at increased risk for harm. This could be as a result of their conditions or from medical errors that might occur in the course of their treatment (Despins et al. 2010). By definition, patient safety reveals the degree to which care does not have a negative impact on...
patient health (Teng et al. 2009), and it is generally measured by the achievement of intended patient outcomes (Berland et al. 2008). Traditionally, patient safety is a critical indicator of healthcare quality (Berntsen 2004). A 2002 World Health Organization report indicates the urgent need for research in patient safety. To retain the competitive edge, patient safety has become an import element in many quality assurance programmes (Chao et al. 2007).

In the light of the importance of patient safety, various approaches have been implemented to identify medical errors and their causes (Boxwala et al. 2004). In pinpointing possible causes of errors, researchers have identified latent failures in the system (system error) (Kohn et al. 1999) and inadequacy of the responsible person (human error) (Phillips et al. 2001) as two major contributing factors that result in medication errors. Focusing on the RNs’ roles in medication service, Hsaio et al. (2010) argue that errors may be caused by performance deficit and insufficient knowledge. On the RNs’ side, lack of expertise and insufficient knowledge causes suboptimal performance, and every so often, infrequent knowledge sharing among RNs also leads to medical failures and jeopardizes patient safety. Preventing medical errors therefore requires substantial knowledge and experience sharing among RNs.

Ensuring patient safety is a constant concern of RNs and other healthcare professionals (Newbold et al. 2004). According to studies conducted in the mid-1990s by Clarian Health Systems, RNs spend most of their time on activities other than the one that they value most: direct patient care (Ball et al. 2003). RNs are the healthcare providers most likely to be aware of changes in a patient’s status or to detect that a medical error has occurred. They are on the front line for preventing or allaying a large number of medical errors by immediately responding and instituting corrective measures (Despins et al. 2010). Researchers find that increased nursing staff size might lower mortality and reduce the occurrence of adverse events (Kane et al. 2007, Elnour et al. 2008). Therefore, RNs have an essential role in improving patient safety.

An earlier study of safety programmes in critical industries, including the healthcare industry, argues that successfully achieving a safety culture requires a good learning environment (Milligan 2007). Knowledge sharing is instrumental in the dissemination of knowledge among members of an organization. It is a people-to-people process and a key management process (Ryuia et al. 2003). Moreover, knowledge sharing has been tied to various desirable outcomes including learning (e.g. Scarbrough 2003, Leana & Pil 2006) and problem-solving (e.g. Nonaka & Takeuchi 1995, Almeida 1996, Appleyard 1996, Ipe 2002), which are the fundamentals for patient safety. Therefore, we argue that knowledge sharing among RNs enhances patient safety.

To clarify how and why RNs choose to share knowledge, their motivation must be understood. Many organizations implement reward systems to encourage knowledge sharing (Bock et al. 2005, Lin 2008, Seonghee & Boryung 2008). However, pro-social behaviours of knowledge sharing are above and beyond those prescribed by job descriptions, are voluntary and cannot be explicitly or directly rewarded because of their intangible effects (Mooradian et al. 2006). Cognitive theory conceptualizes knowledge as a reified entity that resides in the individual mind. According to the sociological view of learning, individuals continuously combine and modify knowledge through their everyday operations and interactions. Thus, context-specific, non-individual knowledge that resides in social relations is relevant and worth investigating (Tagliaventi & Mattarelli 2006). Social capital exists either among employees or between employees and external members (Reed et al. 2009). In this regard, social capital has been conceptualized as a set of resources that resides in relationships (e.g. Loury 1977, Burt 1992, Reed et al. 2009). This article empirically examines the influence of social capital on knowledge sharing, which in turn enhances patient safety.

Background

Social capital

As social capital is embedded in inter-employee relationships, the value of social capital depends on whether the position one occupies in the social network constitutes a valuable resource (Friedman & Krackhardt 1997). Drawing on a comprehensive review of previous works on social capital, Nahapiet and Ghoshal (1998) and Tsai and Ghoshal (1998) identify three facets of social capital: the structural dimension (social interaction), the relational dimension (trust) and the cognitive dimension (shared vision).

The structural aspect of social capital refers to the connections among members; i.e., with whom and with what frequency they share information (Nahapiet & Ghoshal 1998). According to this view, the structural dimension of social capital includes social interaction (Tsai & Ghoshal 1998). Second, the relational aspect of social capital ‘describes the kind of personal relationships people have developed with each other through a history of interactions’. Among its key attribute is trust among members (Nahapiet & Ghoshal 1998). The third dimension of social capital is labelled as the ‘cognitive dimension’ by Nahapiet and Ghoshal (1998). Cognitive dimension is embodied in attributes such as a shared code or a shared paradigm that
facilitates a common understanding of collective goals and proper ways of acting in a social system. Such a common understanding is appropriable by the collective as a resource (Portes & Sensenbrenner 1993).

Relationship between social capital and knowledge sharing

Knowledge sharing comprises a set of shared understandings that provide employees with access to relevant information and that enable them to build and use knowledge networks within organizations (Hogel et al. 2003). The attempt to share tacit knowledge may be defined as the attitude towards pro-social organizational behaviours. A pro-social attitude captures the general propensity of people anticipating good consequences not only for themselves but also for their colleagues and organization (Mooradian et al. 2006). We propose that social capital encompasses social interaction, trust and shared vision, which become the preconditions for knowledge sharing.

First, the structural dimension of social capital includes social interaction. Tacit knowledge is typically shared through socialization, such as through highly interactive conversations, apprenticeships and shared experiences and activities (Vera-Muñoz et al. 2006). Interaction implies that members must actively support each other in the learning process; thus, learners must be closely connected and must interact frequently (Mu et al. 2008). The more ambiguous and complex the learning process, the more learner interaction is needed for a successful exchange. Through this interaction process, members can acquire tacit knowledge by observing, imitating and interacting with other members (Mu et al. 2008).

Second, the relational dimension of social capital refers to assets that are rooted in these relationships, such as trust and trustworthiness. Many authors believe that relationships built on trust increase the willingness to provide useful knowledge (Bakker et al. 2006). In addition, trustworthiness is the basis for increased approachability and communication and therefore for increased knowledge sharing (Willem & Scarbrough 2006). Given the fact that sharing tacit knowledge is a form of sharing power with others, colleagues must trust each other before sharing tacit knowledge. Trust can reduce perceived uncertainty, facilitate risk-taking behaviours and foster a constructive orientation, which then enhances the willingness of employees to share tacit knowledge with coworkers (Lin 2007). Renzi (2008) also finds that when trust in management is high, knowledge sharing increases, because employees are confident in their individual value and are willing to contribute knowledge.

Finally, the cognitive dimension of social capital refers to those resources that provide shared representations, interpretations and systems of meaning among members. People who share the same mental models about their work are more likely to share information regularly than are people with different mental models (Leana & Pil 2006). When members have the same perceptions about how to interact with one another, they can avoid possible misunderstandings in their communications and have more opportunities to exchange their ideas freely (Tsai & Ghoshal 1998). When a community collectively holds a set of goals, the likelihood of ‘opportunistic behaviour’ problem is diminished.

Relationship between knowledge sharing and patient safety

Meurier et al. (1997) find that the most important reason for mistakes in the hospital is a lack of knowledge and experience. Numerous studies indicate that knowledge sharing is essential, because it enables organizations to reduce redundant learning efforts (Scarborough 2003). Knowledge sharing can provide the right vehicle for transferring needed knowledge through different means suitable to each group of receivers, including patients (Jabr 2007). Sometimes individuals learn and gain knowledge by storytelling and reflective dialogue; such situational learning is thought to enhance performance, particularly in knowledge-intensive organizations (Leana & Pil 2006).

The RNs present the most numerous group in healthcare organizations, and they usually work together to complete diversified tasks. Every nurse takes on particular responsibilities, and the nursing care often requires mutual help and teamwork. In a teamwork situation, frequent workplace communication among RNs will sponsor knowledge sharing behaviour and will reduce response times. As RNs work shifts on a 24-7 basis, they must ensure that patients’ medical conditions and prescribed treatments are precisely documented, and all handovers between shifts are accurate and complete. Besides, exchange of patient-caring knowledge and sharing of nursing experience among RNs is also conducive to error-free medication services. Therefore, knowledge sharing will minimize medical mistakes while contributing to patient safety.

The study

Aims

This study applies social capital theory to develop a conceptual framework to identify the conditions under which
knowledge sharing among RNs is likely to emerge. We argue that knowledge sharing is influenced by three dimensions of social capital and can subsequently improve patient safety. We hypothesize the following:

\[ H1: \text{Social interaction is positively related to knowledge sharing.} \]

\[ H2: \text{Trust is positively related to knowledge sharing.} \]

\[ H3: \text{Shared vision is positively related to knowledge sharing.} \]

\[ H4: \text{Knowledge sharing is positively related to patient safety.} \]

Design

A cross-sectional design was employed. Data samples were collected through questionnaires that included the following sections: social capital, knowledge sharing, patient safety, and personal information. Questions were designed after a comprehensive literature review. In addition, before final distribution, the questionnaires were tested in a pilot study composed of five RNs to clarify ambiguous or misleading questions, which were modified or eliminated, if necessary.

Participants

The sampling frame comprised 1026 full-time RNs (including those in managerial roles, such as head nurses) employed in a major medical centre in northern Taiwan. All full-time RNs employed at this institution participated in this study, except those who did not meet the criteria. The exclusion criterion was to leave out those RNs who had not worked in the hospital for at least 3 months, and therefore had not yet completed new employee training. A total of 919 RNs at this hospital met the inclusion criteria.

Data collection

Data were collected using questionnaires distributed to each of the 919 participating RNs. The RNs returned the completed questionnaires in a return envelope. The respondents answered all questions in total anonymity, without any personal identity information. A gift worth approximately US$2 was given as a reward for participation. In the end, 825 contacts completed and returned the survey questionnaire. Data were collected between August 2008 and April 2009. Among the returned 825 questionnaires, 28 were excluded because of incomplete responses. This left us with 797 valid questionnaires in the final sample. Using the Council of American Survey Research Organizations (CASRO) (1982) response rate calculation method, we found a response rate of approximately 86.7%.

Ethical considerations

The study was approved by the participating medical centre. Each questionnaire was prefaced with a note assuring respondents of anonymity about their responses. All the participants were also informed that the survey was only for academic purposes. The introduction to the questionnaire discussed potential risks, and stated that joining the survey implied consent. Participants were informed that participation was not mandatory.

Data analysis

Data analysis was conducted using the partial least squares (PLS) Graph v3.0 program (Soft Modeling Inc., Houston, TX, USA) to evaluate the measurement properties and the structural relationships specified in the research model. The PLS, also called ‘soft modelling’, estimates the latent variables as exact linear combinations of observed measures, and therefore assumes that all measured variance is useful variance which should be explained. This technique is based on regression, path and principal components factor analyses. This research used PLS not only because of its mathematical rigour but also because it is free from distributional assumptions of normality. This technique, which is similar to conventional structural equation modelling (SEM), allows the simultaneous estimation of parameters among both exogenous and endogenous variables, taking into account the other correlations. The analyses were conducted in two stages. First, the measurement model was tested to ensure that the constructs had sufficient psychometric validity. The hypotheses were then tested in the structural model. \( P < 0.05 \) was considered as statistically significant.

Instruments

All questionnaire items are closed-ended and they measure RNs’ perceptions on 5-point Likert-type scales. The survey questionnaire consisted of four parts. The first part related to the measurement of social capital. RNs were asked to indicate their agreement with the items on a Likert-type scales, ranging from 1 (strongly disagree) to 5 (strongly agree). Following Nahapiet and Ghoshal (1998), this study specifies three facets of internal social capital: structural, relational, and cognitive. Social interaction is measured on a modified version of a two-item scale developed by Smith et al. (1994). Measures of trust are adapted from Leana and Pil (2006). Four items are used to measure trust among RNs. Shared vision is measured using a modified version of the four-item scale developed by Leana and Pil (2006).
The second part relates to the measurement of knowledge sharing. RNs were asked to indicate their agreement with the items on a Likert-type scales ranging from 1 (strongly disagree) to 5 (strongly agree). Knowledge sharing is measured using a three-item scale adapted from Van den Hooff and Van Weenen (2004). The third part of the questionnaire pertains to the measurement of patient safety. Patient safety refers to the concept that patients in healthcare settings are achieving intended outcomes (Berland et al. 2008). RNs were asked to self-report the extent of their goal achievement on a Likert-type scales ranging from 1 (very low) to 5 (very high). This article makes use of the indicators proposed by JCAHO to measure patient safety, because this medical centre has adopted them to measure medical care outcomes related to nurses. An eight-item scale is used to measure the extent to which predetermined patient safety goals were achieved. The fourth part of the questionnaire contains questions about RNs’ demographics (e.g. age, gender, education and marital status) (Table 1).

Wickens (2002) argues that individuals’ ability to recognize and correctly interpret signals will be influenced by their level of training. Therefore, RNs were also asked to self-report their level of training, and this was used as a control variable. The items used in the questionnaire are shown in Table 1.

### Table 1 Sample demographics.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>11</td>
<td>1.3</td>
</tr>
<tr>
<td>Female</td>
<td>784</td>
<td>98.4</td>
</tr>
<tr>
<td>No response</td>
<td>2</td>
<td>0.3</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20–25</td>
<td>181</td>
<td>22.7</td>
</tr>
<tr>
<td>26–30</td>
<td>298</td>
<td>37.4</td>
</tr>
<tr>
<td>31–35</td>
<td>185</td>
<td>23.2</td>
</tr>
<tr>
<td>35–40</td>
<td>60</td>
<td>7.5</td>
</tr>
<tr>
<td>&gt; 40</td>
<td>68</td>
<td>8.5</td>
</tr>
<tr>
<td>No response</td>
<td>5</td>
<td>0.6</td>
</tr>
<tr>
<td>Highest level of education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associate</td>
<td>304</td>
<td>38.1</td>
</tr>
<tr>
<td>BS/BSN</td>
<td>426</td>
<td>53.5</td>
</tr>
<tr>
<td>Masters</td>
<td>47</td>
<td>5.9</td>
</tr>
<tr>
<td>Others</td>
<td>6</td>
<td>0.6</td>
</tr>
<tr>
<td>No response</td>
<td>15</td>
<td>1.9</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>534</td>
<td>67</td>
</tr>
<tr>
<td>Married</td>
<td>258</td>
<td>32.4</td>
</tr>
<tr>
<td>No response</td>
<td>5</td>
<td>0.6</td>
</tr>
</tbody>
</table>

BS/BSN, Bachelors of Science/Nursing.

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### Validity and reliability

The adequacy of the measurement model was assessed by examining (a) individual item reliabilities, (b) the convergent validity of the measures associated with each construct and (c) their discriminant validity. First, individual item reliability was assessed by examining the factor loadings of the measures on their corresponding constructs. A common rule of thumb in PLS analysis is to accept items with more explanatory power than the error variance would account for. In practice, a factor loading exceeding 0.7 is considered acceptable, because it implies that a construct explains more than 50% of the variance in the measurement. Examination of the initial measurement model reveals that all 21 items have loadings greater than 0.7. Overall, these statistics are above the cut-off suggested by Hulland (1999) and indicate that all items examined in this study had good individual item reliability. Next, the composite scale reliability for each construct, a measure of internal consistency, was assessed using a cut-off of 0.7. Composite scale reliability is similar to Cronbach’s alpha as a measure of internal consistency, but is unaffected by the scale length. Table 2 shows the internal consistency values for the constructs. The composite reliability of all constructs is higher than 0.7, which indicates adequate reliability (Hulland 1999). Finally, convergent and discriminant construct validities were tested. As Tables 2 and 3 show, the average variances extracted from all the constructs are no lower than 0.50, which is indicative of convergent validity. The overall model provides sufficient evidence of discriminant validity, in that the square root of average variance extracted (AVE) for these constructs is larger than any respective interconstruct correlations, and all measures are loaded higher on intended constructs than on other constructs (Hulland 1999). Overall, these statistics indicate that the psychometric properties of the model are sufficiently robust for interpreting structural estimates.

### Results

Our findings support Hypothesis 2 and Hypothesis 3, but not Hypothesis 1. Restated, trust and shared vision significantly and directly affect knowledge sharing. However, the relationship between social interaction and knowledge sharing is not statistically significant. Hypothesis 4 states that knowledge sharing is positively related to patient safety. As expected, knowledge sharing is significantly and positively associated with patient safety. Figure 1 and Table 4 show PLS estimation results.

Next, we test the mediating role of knowledge sharing using Baron and Kenny (1986) four-step procedures adapted
for PLS regression (Pavlou et al. 2007). The mediation test is
conducted while controlling for the influences of all other
variables in the model. This approach has been adopted in
many SEM studies (Holmbeck 1997, Maxham & Netemeyer
2002, Guenzi et al. 2009). First, the independent variable

Table 2 Measurement items, composite reliabilities and average variances extracted.

<table>
<thead>
<tr>
<th>Construct/Item</th>
<th>Standardized item loading</th>
<th>Composite reliabilities</th>
<th>Average variances extracted (AVE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social interaction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meeting between nurses tends to be very informal in nature</td>
<td>0.916</td>
<td>0.887</td>
<td>0.798</td>
</tr>
<tr>
<td>The frequency of informal, friendship-based and face-to-face meetings between nurses is high</td>
<td>0.871</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trust</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I can rely on the nurses I work with in this hospital</td>
<td>0.883</td>
<td>0.945</td>
<td>0.812</td>
</tr>
<tr>
<td>Nurses have confidence in one another in this hospital</td>
<td>0.883</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nurses in this hospital show a great deal of integrity</td>
<td>0.922</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall, nurses at this hospital are trustworthy</td>
<td>0.917</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shared vision</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nurses share the same vision for the hospital</td>
<td>0.906</td>
<td>0.951</td>
<td>0.829</td>
</tr>
<tr>
<td>Nurses pursue collective goals and mission</td>
<td>0.928</td>
<td></td>
<td></td>
</tr>
<tr>
<td>There is a commonality of purpose among nurses at this hospital</td>
<td>0.928</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Everyone is in total agreement with hospital’s vision</td>
<td>0.910</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge sharing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nurses willingly share their knowledge and experiences with one another</td>
<td>0.919</td>
<td>0.954</td>
<td>0.875</td>
</tr>
<tr>
<td>In discussing problems, nurses share their ideas and opinions to the best of their abilities</td>
<td>0.947</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nurses are willing to answer their colleagues’ questions to the best of their abilities</td>
<td>0.940</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient safety (the extent to which the following goals were achieved)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improve the accuracy of patient identification</td>
<td>0.823</td>
<td>0.945</td>
<td>0.682</td>
</tr>
<tr>
<td>Improve the effectiveness of communication among caregivers</td>
<td>0.884</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improve the safety of using medications</td>
<td>0.866</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduce the risk of healthcare-associated infections</td>
<td>0.861</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accurately and completely reconcile medications across the continuum of care</td>
<td>0.869</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduce the risk of patient harm resulting from falls</td>
<td>0.751</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eliminate wrong-site, wrong-patient, wrong-procedure surgery</td>
<td>0.869</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improve recognition and response to changes in a patient’s condition</td>
<td>0.795</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3 Square roots of average variance extracted and correlation matrix.

<table>
<thead>
<tr>
<th>No.</th>
<th>Construct</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Social interaction</td>
<td>0.893*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Trust</td>
<td>0.531</td>
<td>0.901*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Shared vision</td>
<td>0.521</td>
<td>0.820</td>
<td>0.915*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Knowledge sharing</td>
<td>0.390</td>
<td>0.560</td>
<td>0.544</td>
<td>0.935*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Patient safety</td>
<td>0.129</td>
<td>0.196</td>
<td>0.220</td>
<td>0.260</td>
<td>0.826*</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Training</td>
<td>0.303</td>
<td>0.624</td>
<td>0.593</td>
<td>0.534</td>
<td>0.268</td>
<td>0.873*</td>
</tr>
</tbody>
</table>

*Diagonal elements in bold are square roots of average variance extracted (Hulland 1999).

for PLS regression (Pavlou et al. 2007). The mediation test is
conducted while controlling for the influences of all other
variables in the model. This approach has been adopted in
many SEM studies (Holmbeck 1997, Maxham & Netemeyer
2002, Guenzi et al. 2009). First, the independent variable

must be related to the dependent variable. Our findings show
that one dimension of social capital, shared vision ($\beta = 0.195$, $P < 0.05$), has a significant effect on patient safety. Social

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interaction ($\beta = 0.020, P > 0.05$) and trust ($\beta = 0.032, P > 0.05$) do not have significant direct effects on patient safety. Second, the independent variable must be related to the mediator. Our findings show that each dimension of social capital, including social interaction ($\beta = 0.103, P < 0.05$), trust ($\beta = 0.325, P < 0.05$) and shared vision ($\beta = 0.224, P < 0.05$), has a significant effect on knowledge sharing. Third, the mediator must be related to the dependent variable. Our results show that knowledge sharing has a significant effect on patient safety ($\beta = 0.193, P < 0.05$). The fourth step is that the effect of the independent variable on the dependent variable must be lower (or non-significant) when the mediator is included in the model. Our results show that when the mediator is included, social interaction ($\beta = -0.008, P > 0.05$), trust ($\beta = -0.026, P > 0.05$) and shared vision ($\beta = 0.149, P > 0.05$) have no significant effect. Thus, in contrast to the first step, we find that the relationship between shared vision and patient safety is fully mediated by knowledge sharing, whereas the effects of social interaction and trust on patient safety are not mediated by knowledge sharing. We further verify such mediator effect through the use of the Sobel test, which can examine whether shared vision exerts an indirect effect on patient safety through knowledge sharing. The Sobel test produces a test statistic ($Z$), along with accompanying significance levels. We use Preacher and Leonardelli’s (2006) interactive mediation tool to conduct the Sobel test. We find that the indirect effect from shared vision to patient safety through knowledge sharing is statistically significant ($z = 3.85, P < 0.05$). This confirms that at least one component of the social capital dimensions, namely the ‘shared vision’, has an impact on patient safety mediated by knowledge sharing. Thus, the mediating role of knowledge sharing should not be neglected.

Despite our rigorous efforts to maintain the appropriateness of our data, this study may still be subject to the common method bias problem, which is prevalent in most survey research using self-reported data. In this study, we use Harman’s one-factor test to check common method bias (Podsakoff & Dennis 1986). The first factor is found to account for 24.97% of the variance, which does not reveal any evidence of a dominant factor. Therefore, common method bias is not a significant problem in this study.

### Discussion

#### Study limitations

This study has a few limitations. First, the relevance of this study remains confined to the area of knowledge sharing behaviour among one particular professional group: RNs. Thus, the findings and implications drawn from this study cannot be readily generalized to other professional groups. Second, data from a single medical centre limit the applicability of the results to other medical institutions. Future studies can verify or extend the results of this study by a cross-hospital validation process. Third, this study is a cross-sectional survey design, and so concomitant variations among various constructs are hypothesized to form causal links in accordance with the theoretical foundations and practices in the nursing setting. The possibility of reversed hypothesized relationships among constructs cannot be ruled out, given the cross-sectional nature of our data. Further research could re-examine the causal order and intensity of the linkages among social capital, knowledge sharing and patient safety using longitudinal data sets. Finally, we cannot rule out the possibility of multicollinearity among explanatory variables that may cause the estimated coefficients to become unstable. Thus, future research can resolve this potential problem by fine-tuning the causal model.

### Discussion of results

Social capital differs from other types of capital, in that it is neither an individual asset (like human capital) nor a business

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**Table 4 Results of PLS analysis: standardized path coefficients.**

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Standardized coefficients</th>
<th>T-value</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: Social interaction is positively related to knowledge sharing</td>
<td>0.044</td>
<td>0.961</td>
<td>Not supported</td>
</tr>
<tr>
<td>H2: Trust is positively related to knowledge sharing</td>
<td>0.220**</td>
<td>3.157</td>
<td>Supported</td>
</tr>
<tr>
<td>H3: Shared vision is positively related to knowledge sharing</td>
<td>0.184*</td>
<td>2.487</td>
<td>Supported</td>
</tr>
<tr>
<td>H4: Knowledge sharing is positively related to patient safety</td>
<td>0.156**</td>
<td>3.520</td>
<td>Supported</td>
</tr>
</tbody>
</table>

**PLS, partial least squares.**

* Means statistical significance at $P < 0.05$.

** Means statistical significance at $P < 0.01$.
asset (like traditional capital). Rather, social capital develops among RNs through meaningful relationships co-created by RNs. To explain knowledge sharing behaviour among RNs, this study explores the applicability of social capital (including social interaction, trust and shared vision). We argue that knowledge sharing is influenced by three dimensions of social capital and can subsequently improve patient safety.

The relational dimension of social capital refers to assets that are rooted in these relationships, such as trust and trustworthiness. The results reveal that trust among RNs is significantly and positively related to knowledge sharing, which is consistent with the literature (e.g. Bakker et al. 2006, Willem & Scarbrough 2006, Lin 2007, Renzi 2008). Trust can reduce both tangible and intangible barriers among RNs. Thus, high trust enables RNs to discuss problems they faced, and they thereby either acquire new knowledge or enhance existing knowledge. The finding suggests that administrators need to ensure that relationships among RNs are structured carefully to foster mutual interaction and trust. Enablers of interactions and relationships may include spatial designs in an atmosphere of cordiality, such as chat room or coffee corner for RNs.

Cognitive capital refers to the shared representation and systems of meaning among RNs. It enables the RNs to share a common understanding towards the achievement of common goals and outcomes. Building cognitive capital requires the ongoing dialogue of shared meanings among RNs. The finding in this article confirms that shared vision is significantly and positively related to knowledge sharing. As noted by Tsai and Ghoshal (1998), when members in an organization have similar perceptions about interacting with one another, they can avoid possible misunderstandings and have more opportunities to freely exchange their ideas. Thus, it is important for the administrators, through vision setting and other managerial practices, to build a networking-friendly environment where the RNs are willing to share knowledge with others. Lastly, in contrast to our expectation, social interaction did not have a significant impact on knowledge sharing.

The results indicate that relational and cognitive dimensions of social capital are significant predictor of knowledge sharing. Social capital can play a critical role in providing knowledge accumulation and sharing, to which the RNs would not otherwise have access. With social capital building in progress, RNs can expand their knowledge base and make use of valuable knowledge. In the end, they can improve patient safety. In essence, social capital facilitates exchange and combination of explicit and tacit knowledge, which in turn enhances patient safety. Thus, administrators responsible for managing patient safety should develop strategies or create mechanism to foster a social networking climate and encourage knowledge sharing among RNs.

Conclusion

Patient safety is critically needed to improve healthcare quality worldwide. Although some studies have discussed the patient safety issue, few studies have examined it from the social capital perspective. RNs usually work together, and therefore, it is important for them to share knowledge and...
Social capital and knowledge sharing

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Conflict of interest
No conflict of interest has been declared by the authors.

Author contributions
CWC was responsible for the study conception and design, and performed the data collection. CWC and HCH performed the data analysis. CWC, CYC and CPH were responsible for the drafting of the manuscript. CWC, HCH, CYC and CPH made critical revisions to the paper for important intellectual content and supervised the study. HCH provided statistical expertise. HCH, CYC and CPH provided administrative, technical or material support.

References

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extrinsic motivators, social-psychological forces, and organizational climate. MIS Quarterly 29(1), 87–111.


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