Relational coordination among nurses and other providers: impact on the quality of patient care

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Aim The present study examined nurse reports of relational coordination between nurses and other providers and the impact of relational coordination on patient care quality.

Background While communication between providers has been traditionally considered important to improve quality, relational coordination extends this view, emphasising the value of high-quality relationships exemplified by shared goals, shared knowledge and mutual respect; and high-quality communication that is timely, frequent, accurate and problem-solving.

Methods Direct care registered nurses (RNs) \( n = 747 \) completed surveys to assess relational coordination across five provider functions and six types of patient care units. Nurses also reported perceptions about patient care quality.

Results In all analyses, relational coordination between nurses and other providers was significantly related to overall quality, in the expected directions. As relational coordination increased, nurses reported decreases in adverse events such as hospital-acquired infections and medication errors.

Conclusions Enhancing relational coordination between nurses and other providers is central to improving the quality of patient care.

Implications for nurse managers and new knowledge The emerging theory of relational coordination provides a useful new research-based framework for managers to use to improve provider relationships, communication and the quality of care.

Keywords: coordination, interdisciplinary communication, interdisciplinary relationships, nursing, quality

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Spiraling Upward for Nurse Retention & Quality Care (D. S. Havens, principal investigator).
The information and content or conclusions presented in this article are those of the authors and should not be construed as the official position or policy of nor should any official endorsement be inferred by the DN, BHP, HRSA, DHHS, or the US government.
Introduction

Hospitals are complex organizations in which multiple healthcare professionals work interdependently to deliver care. Such conditions raise the potential for confusion, errors and delays. Consequently, quality and safety have emerged as prime foci in the delivery of hospital services. Thus, the landmark report *Keeping Patients Safe: Transforming the Work Environment of Nurses* (Page 2004) urged greater coordination among providers. Research has demonstrated that interdisciplinary coordination of care is critical for achieving cost and quality outcomes (Argote 1982, Baggs et al. 1992, 1999, Hearn & Higginson 1998, Gittell et al. 2000, Kaissi et al. 2003), and that quality provider relationships are crucial for achieving coordination (Gittell et al. 2000).

Accordingly, the Institute of Medicine (IOM) has called for increasing trust, open and respectful communication, good working relationships and teamwork to improve quality (Page 2004). Similarly, the Joint Commission (TJC) has launched an initiative to stem disruptive behaviour among healthcare providers (TJC 2009), responding to widespread concern (Johnson 2009, Dougherty & Larson 2010). In addition, TJC has worked with the Joint Commission International and the World Health Organisation (WHO) to develop recommendations for communication during patient handoffs (WHO 2007).

We propose relational coordination (RC) theory as a research-based framework to assist nurse managers in enhancing the quality of communication and relationships among providers to better coordinate care (Gittell 2006). According to RC theory, high-quality communication (frequent, timely, accurate and problem-solving) reinforced by high-quality relationships (shared goals, shared knowledge and mutual respect) enable providers to effectively coordinate work, with positive implications for quality, efficiency and workforce satisfaction (Gittell et al. 2008a). In this article, we introduce RC theory; report associations between RC and quality care; and discuss application of the theory in nurse manager practice.

Background

Conceptualising relational coordination

Coordination has traditionally been viewed as an information-processing problem (Galbraith 1977). However, the nature of work in general and healthcare in particular is characterised by increasing levels of interdependence and complexity. Thus, organisational scholars have begun to approach coordination from a relational perspective (Weick & Roberts 1994, Crowston & Kammerer 1998, Faraj & Sproull 2000, Faraj & Yin 2006).

RC theory offers a unique way to conceptualise the relational dynamics involved in coordination. Defined as a ‘mutually reinforcing process of interaction between communication and relationships carried out for the purpose of task integration’ (Gittell 2002), RC differs from other approaches to coordination by proposing three specific relationship dimensions that are needed for effective coordination: shared goals, shared knowledge and mutual respect; and four specific communication dimensions: frequent, timely, accurate and problem-solving rather than blaming. These communication and relationship dimensions are mutually reinforcing, forming the dynamic of RC as illustrated in Figure 1.

Dimensions of relational coordination

The ‘frequency’ of communication between participants contributing to a task has been recognised as key for coordination (Katz & Tushman 1979, Argote 1982, Ancona & Caldwell 1992). Frequent communication keeps participants updated on patient progress while building relationships through the familiarity that grows from frequent interaction (Keyton 1999).

‘Timely’ communication is also critical for effective coordination (Orlikowski & Yates 1991, Waller 1999), particularly in healthcare where delays may result in errors or treatment interruptions. Communication must also be ‘accurate’, because provision of inaccurate
information leads to errors and delays and may influence future knowledge seeking (Levin & Cross 2004).

Coordination is further enhanced through communication that focuses on ‘problem-solving’ rather than blaming. In healthcare settings, participants often resort to blaming when errors occur (Johnson 2009, TJ C 2009, Dougherty & Larson 2010); however, blaming undermines coordination by causing information to go underground rather than being shared (Deming 1986, Edmondson 1996).

Effective coordination also depends on the underlying relationships among participants. First, it depends upon participants having ‘shared goals’ for the work process in which they are engaged (Wageman 1995).

Coordination is further enhanced when participants have ‘shared knowledge’ regarding each other’s work so that they can clearly see how all participants’ work ‘fits together’ in the care delivery process. However, participants from different disciplines often reside in different ‘thought worlds’ because of differences in training, socialisation and expertise, creating obstacles to effective communication (Dougherty 1992). The lack of shared knowledge amongst healthcare professionals prompted the IOM report Health Professions Education: A Bridge to Quality which recommended redesigning educational experiences that mold future healthcare professionals ‘identities’ (Greiner & Knebel 2003).

Finally, mutual respect among participants enhances coordination. Members of distinct occupational communities may bolster their own status by cultivating disrespect for the work performed by others (Van Maanen & Barley 1984). Respect for the work of others encourages participants to value the contributions others make and consider the impact of their actions, reinforcing the inclination to act with regard for the overall work process. As a result of the status hierarchies that exist in healthcare, achieving mutual respect in this context may present challenges.

Patterns of relational coordination in healthcare

Like other industries, healthcare suffers from status divisions among people who are responsible for carrying out distinct yet interrelated functions. It may be easier to achieve RC among members of the same discipline. This hypothesis was supported by O’Leary et al. (2010), who found that disciplines involved in patient care held discrepant views about working together, posing potential communication barriers. We expected to find higher levels of RC between nurses than among nurses and their colleagues in other provider roles.

- Hypothesis 1: RC between nurses will be higher than RC among nurses and their colleagues from other disciplines.

Nurses and physicians engage in highly interdependent tasks; therefore nurse/physician communication and collaboration are critical for achieving patient outcomes (Knaus et al. 1986, Baggs et al. 1997, Gittell et al. 2008b). But because of contested boundaries between their practice over time and status and power differentials (Abbott 1988), this collaboration is often lacking (Page 2004, Rosenstein et al. 2002, Nadolski et al. 2006). Therefore, of the five providers, we expected to observe the lowest levels of RC between nurses and physicians. However, RC levels were expected to be higher for nurses with more years of experience on the unit as a result of the potential for experience to mitigate these divisions.

- Hypothesis 2: RC between nurses and physicians will be the weakest form of RC observed, but less weak for nurses with greater work experience.

Finally, it is easier to achieve RC between persons who work in the same geographical location because of proximity and shared experiences (Gittell et al. 2008b). Thus, we expected to find higher levels of RC between nurses on the same unit than between nurses on different units, even although coordination with nurses on certain other units may be critical for achieving desired outcomes.

- Hypothesis 3: RC between nurses on the same unit will be higher than RC between nurses on different units.

Impact of relational coordination on healthcare outcomes

There is a growing body of research exploring the impact of RC on healthcare outcomes. Most findings demonstrate positive associations between RC and outcomes. For total joint arthroplasty patients in nine medical centres, RC was associated with reduced length of stay, increased patient-perceived quality of care and patient-reported freedom from pain (Gittell et al. 2000). On medical units, nurse/physician RC significantly predicted reduced length of stay, total costs per day and readmits in 7 days and 30 days (Gittell et al. 2008b). In long-term care facilities, RC was associated with improved resident-reported quality of life and enhanced provider satisfaction (Gittell et al. 2008a). On medical/surgical units RC contributed to better patient perceived symptom management (Bacon et al. 2009).
In contrast on medical/surgical units, RC was associated with increased medication errors (Y. Chang, unpublished data) and no significant associations with length of stay or severe medication errors (W. Lin, unpublished data). Based on the predominant evidence thus far, we expect the following:

- **Hypothesis 4**: RC between nurses and their colleagues will be positively associated with patient care quality.

Figure 2 illustrates the model of RC and patient outcomes that were explored in this study.

**Methods**

While RC research is growing, to date, we have no knowledge about RC in community hospitals in rural areas. The parent study that generated the data for the research described in this article was a participatory action research project to improve communication and collaboration between nurses and other care givers in acute care community hospitals located in rural counties. The aim of the present study was to assess nurse perceptions of RC among registered nurses (RNs) and other providers and the associations between RC and nurse rated quality of care.

A non-experimental design was used to measure RC and its impact on the quality of care. The study was part of a 5-year initiative to improve the quality of nursing practice and patient care. Data reported here were collected in December 2008, prior to implementation of interventions.

Questionnaires were distributed to nurses in their work setting by hospital site coordinators (RNs-assigned to the project by each hospital). Nurses deposited questionnaires in collection boxes in sealed envelopes (provided). Site coordinators mailed the sealed envelopes to the research team. Data were scanned into a database, cleaned and analysed.

**Sample and setting**

We partnered with five acute care community hospitals in rural Pennsylvania counties to ‘Spiral Upward for Nurse Retention and Quality Care’. All hospitals were private, non-profit, non-religious, and they ranged in size from 75 to 179 licensed and staffed beds. Direct care RNs employed full- or part-time who had been on the facility’s payroll for at least 3 months (to ensure assimilation and socialisation into the organisation) were invited to participate in the survey.

**Instruments**

The questionnaire incorporated instruments that have demonstrated reliability and validity in prior research. Demographic questions were also included.

**Relational coordination**

The Relational Coordination Survey for Patient Care (adapted from Gittell et al. 2000) was used to measure nurse perceptions of RC with five other caregivers: nurses on their unit, nurses working on other units,
physicians, support staff on their unit and therapists. The RC survey contains seven items (one item for each RC dimension). Four items address the frequency, timeliness, accuracy and problem-solving nature of communication and three address the nature of relationships: shared goals, shared knowledge and mutual respect. All items are scored on a five-point Likert-type scale. A sample item is: ‘How frequently do you communicate with these care providers about patients you are caring for on your unit?’ Nurses reported their perceptions regarding the frequency of communication with each of the five providers using the five-point scale (1 = never to 5 = constantly). RC was explored as a composite (the average of the seven RC items across five providers = 35 items) as well as by individual dimensions (e.g. seven items).

The quality of patient care

Five single-item measures were used to assess nurse perceptions of: (1) the overall quality of nursing care on their units (1 = poor to 4 = excellent) (used in regressions); (2) the frequency with which the wrong medication or dose was given involving the nurse or his/her patients in the past year (1 = frequently to 4 = never); (3) the frequency of patient and family complaints in the past year (1 = frequently to 4 = never); (4) the frequency of patient falls with injuries; and (5) the frequency of hospital-acquired infections (items 2–5 were used in correlations). These same nurse-rated measures are frequently reported in the existing literature upon which this study builds (Aiken et al. 2001, Rafferty et al. 2001, Sochalski 2001).

Nurse ratings of quality have been reported as valid and concordant with objective quality data. For example, concordance was reported between nurse ratings and actual reports of patient falls (Cina-Tschumi et al. 2009), physical restraint and aggressive/assaultive episodes (Gerolamo 2008) and paediatric quality of life (Klaassen et al. 2010). Nurse ratings of quality have been significantly correlated in the predicted directions with rates of adverse events such as medication errors and nosocomial infections (Sochalski 2001).

This method of collecting quality data was selected to be cost effective as well as to provide the opportunity for participating hospitals to compare quality data with the same outcomes from other studies. These same nurse quality ratings have been used in numerous studies including the Pennsylvania arm of the International Hospital Outcomes Study (Aiken et al. 2001).

Ethics

The study was approved by the University of North Carolina at Chapel Hill and partner hospital institutional review boards.

Statistical analysis

Hypotheses 1, 2 and 3 address patterns of RC between nurses and five providers. The degree to which differences in RC existed among nurses and other providers was assessed through a series of paired sample t-tests.

Hypothesis 4 addresses associations between RC and nurse-reported quality of care items. Pearson’s correlations and ordinary least squares (OLS) regression techniques were used to assess these relationships. Selection of analytical techniques was guided by assessment of intraclass correlations (ICC) which provided information about the strength of the relationships between observations (cases) within a cluster (e.g. nurses within work units). A 3-level unconditional means model of nurses’ perception of the quality of nursing care provided information on the ICCs for hospital and type of work unit. Higher intraclass correlations would indicate that nurses’ responses were related to one another or clustered. The ICC for hospital was 0.003, for unit 0.043 and for the interaction of hospital and unit 0.024. These values provided evidence that the within-hospital and within-unit correlation of nurse responses was sufficiently small to justify use of a standard OLS regression model to address hypothesis number 4. The moderating effect of type of patient care unit on the effect of RC on quality was also assessed. The regression models focused on multiple types of hospital units, selected to provide adequate RN sample size. Thus six types of patient care units were included: medical/surgical units (n = 138), emergency departments (ED) (n = 97), intensive care units (n = 72), maternity units (n = 83), peri-operative units (operating rooms and post-anaesthesia recovery rooms) (n = 68) and surgical units (n = 29), yielding a sample of 487 nurses. Units were dummy coded and included in the regression model, using maternity unit as the referent group based on prior research findings describing the differentiation of unit types by uncertainty (Overton et al. 1977, Leatt & Schneck 1984). Robust standard errors were estimated using the regression procedure in the STATA-9 statistical software.

The dependent measure was a single-item question which asked nurses to rate the quality of nursing care delivered on their unit. Responses were recorded on a four-point Likert scale ranging from poor to excellent.
The mean response was 3.25, the median was 3.0 and the standard deviation was 0.60. Item responses were not normally distributed (Shapiro–Wilks \( W = 0.757, P < 0.001 \)). A normal probability plot of the responses indicated relatively small deviations from an expected normal distribution which occurred at the upper end of the rating scale.

The relationship between quality of care and RC was modelled in three ways. In Model 1 RC was represented in terms of the collaboration among respondents and the five types of providers. Model 2 considered RC in terms of the seven distinct RC items. In Model 3 overall RC was assessed as the mean of the 35 items that comprised the RC instrument (seven items by five providers).

Respondent-level characteristics were included. These were age, measured in years; education, classified as diploma (the reference variable when dummy coded), associate degree, baccalaureate and higher degree, and years of experience on the current work unit.

Findings

A total of 747 direct care RNs in the five hospitals responded to the survey yielding a response of 64%. On average, respondents were approximately 43 years old (PA mean = 45 years, US mean = 46 years and global mean = 42 years) (International Council of Nurses 2006), reported a mean of 12.6 years of experience in nursing, 14 years in their hospital and about 12 years on their current nursing unit. The majority (40%) reported the associate degree as their highest educational degree, thus more nurses in the sample were educated at the associate degree level than nurses in PA (26%) and in the US (34%). Table 1 presents demographics for all respondents and comparisons with direct care RNs in PA and in the US. Cronbach’s alpha for the RC survey (35 items) was 0.93.

Relational coordination between among and other providers

- Hypothesis 1: relational coordination between nurses will be higher than RC among nurses and their colleagues from other disciplines.

Hypothesis 1 was partially supported. Overall RC (35 items) was highest between nurses practicing on the same nursing unit (\( \bar{x} = 4.19, SD = 0.55 \) on a five-point scale). However, RC between nurses and nurses practicing on other units was significantly lower (\( \bar{x} = 3.00, SD = 0.77 \) \( t (746) = 44.11, P < 0.01 \)).

Relational coordination between nurses and physicians

- Hypothesis 2: relational coordination between nurses and physicians will be the weakest form of RC observed, although it will be less weak for nurses with greater work experience on the nursing unit.

Hypothesis 2 was not supported. Overall RC between nurses and physicians was the third highest observed (\( \bar{x} = 3.74, SD = 0.72 \) on a five-point scale). The lowest RC observed was between nurses and therapists (\( \bar{x} = 2.98, SD = 0.95 \) significantly lower than RC with physicians \( t (745) = 19.744, P < 0.01 \)). Nurse/physician RC was reported as highest in intensive care units (\( \bar{x} = 3.64, SD = 0.47 \) and lowest on surgical units (\( \bar{x} = 3.36, SD = 0.60 \)). Years of nurse experience on the nursing unit was not significantly associated with higher nurse/physician RC nor was the highest level of nurse education. Two nurse characteristics were significantly associated with nurse/physician RC: nurse age was negatively associated with the ‘frequency’ of communication.

Table 1

<table>
<thead>
<tr>
<th>Respondents* ( (n = 736) )</th>
<th>PA Comparison** ( (n = 179 , 132) )</th>
<th>US Comparison*** ( (n = 35 , 724) )</th>
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</thead>
<tbody>
<tr>
<td>Employed full time</td>
<td>74.9%</td>
<td>73.5%</td>
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<tr>
<td>Years employed as RN</td>
<td>12.64 years</td>
<td>NA</td>
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<td>Years at hospital</td>
<td>14.14 years</td>
<td>NA</td>
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<tr>
<td>Years on work unit</td>
<td>11.98 years</td>
<td>NA</td>
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<tr>
<td>Age in years</td>
<td>43.6 years</td>
<td>45.5</td>
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<tr>
<td>Highest educational degree =</td>
<td>Diploma in nursing</td>
<td>22.9%</td>
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<tr>
<td>Highest educational degree =</td>
<td>Associate degree</td>
<td>40.4%</td>
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<tr>
<td>Highest educational degree =</td>
<td>Baccalaureate degree</td>
<td>25.8%</td>
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<tr>
<td>Highest educational degree =</td>
<td>Masters degree</td>
<td>2.4%</td>
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</table>

*Reported by direct care staff RNs on Spiraling Upward survey, December, 2008.

**PA Department of Health 2006 Nurse Survey Report.


NA = Not available.
high because of patient flows from the ED to other nurses on other units, where task interdependence is SD = 0.76) was among nurses practicing in EDs and maternity nurses reported the lowest (x = 2.91, SD = 0.76) was among nurses practicing in EDs and nurses working in peri-operative settings reported the highest overall RC with nurses on other units (x = 3.26, SD = 0.69) whereas maternity nurses reported the lowest (x = 2.58, SD = 0.91). The second lowest score (x = 2.91, SD = 0.76) was among nurses practicing in EDs and nurses on other units, where task interdependence is high because of patient flows from the ED to other units.

Relational coordination between nurses on the same unit vs. other units

- Hypothesis 3: relational coordination between nurses on the same unit will be higher than RC between nurses on different units.

Hypothesis 3 was supported. Across all seven RC items, nurses reported significantly higher RC between nurses practicing on their unit than between nurses on different units. While high levels of RC might not be expected among nurses practicing on certain types of units and other nursing units (e.g. maternity), we would expect nurses practicing on units on which the nature of the practice calls for coordination of care with nurses on different units (task interdependence) to report high levels of RC with nurses on other units. Nurses working in peri-operative settings reported the highest overall RC with nurses on other units (x = 3.26, SD = 0.69) whereas maternity nurses reported the lowest (x = 2.58, SD = 0.91). The second lowest score (x = 2.91, SD = 0.76) was among nurses practicing in EDs and nurses on other units, where task interdependence is high because of patient flows from the ED to other units.

Relational coordination and quality of care

- Hypothesis 4: relational coordination among nurses and their colleagues will be associated with patient care quality.

Hypothesis 4 was supported. The strongest associations between nurse reports of the quality of nursing care on their nursing units and RC among the five providers was observed between nurses practicing on the same unit r (746) = 0.49, P < 0.01. The weakest association between nurse reports of quality of care and RC among providers was observed between nurses and therapists r (743) = 0.10, P < 0.01.

Overall RC (35 items) was significantly associated with additional nurse ratings of the quality of nursing care on their units r (744) = 0.38, P < 0.01. Furthermore, as RC increased, nurses reported (1) less frequent patient and family complaints r (733) = −0.16, P < 0.01; (2) less frequent administration of the wrong medication or dose involving the nurse or the nurse’s patients r (733) = −0.14, P < 0.01, (3) fewer hospital-acquired patient infections r (733) = −0.14, P < 0.01, and (4) fewer patient falls with injuries r (736) = −0.08, P < 0.05.

Three models using OLS regression were run. Table 2 presents descriptive statistics and correlations for variables in the models.

Table 2

Descriptive statistics and correlations matrix for variables in regression models

<table>
<thead>
<tr>
<th>Mean</th>
<th>SD</th>
<th>1</th>
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<td>Age</td>
<td>43.6</td>
<td>11.01</td>
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<td>Experience (years on unit)</td>
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<td>Relational coordination dimensions</td>
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<td>High quality communication</td>
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<td>Frequent</td>
<td>3.75</td>
<td>0.63</td>
<td>−0.06</td>
<td>−0.05</td>
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<td>Timely</td>
<td>3.67</td>
<td>0.66</td>
<td>−0.10</td>
<td>−0.03</td>
<td>0.67</td>
<td>1.00</td>
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<td>Accurate</td>
<td>3.83</td>
<td>0.67</td>
<td>−0.07</td>
<td>−0.03</td>
<td>0.56</td>
<td>0.76</td>
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<tr>
<td>Problem-solving</td>
<td>3.37</td>
<td>0.94</td>
<td>0.05</td>
<td>0.03</td>
<td>0.20</td>
<td>0.39</td>
<td>0.40</td>
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<td>Shared goals</td>
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<td>0.75</td>
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<td>0.02</td>
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<tr>
<td>Shared knowledge</td>
<td>3.38</td>
<td>0.57</td>
<td>−0.04</td>
<td>−0.01</td>
<td>0.42</td>
<td>0.54</td>
<td>0.52</td>
<td>0.43</td>
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<tr>
<td>Mutual respect</td>
<td>3.36</td>
<td>0.70</td>
<td>−0.04</td>
<td>0.01</td>
<td>0.38</td>
<td>0.52</td>
<td>0.53</td>
<td>0.57</td>
<td>0.65</td>
<td>0.72</td>
<td>1.00</td>
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<tr>
<td>RC composite</td>
<td>3.56</td>
<td>0.53</td>
<td>−0.05</td>
<td>−0.01</td>
<td>0.66</td>
<td>0.81</td>
<td>0.80</td>
<td>0.68</td>
<td>0.76</td>
<td>0.82</td>
<td>0.80</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relational coordination among different professionals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physicians</td>
<td>3.74</td>
<td>0.72</td>
<td>−0.05</td>
<td>−0.01</td>
<td>0.38</td>
<td>0.52</td>
<td>0.49</td>
<td>0.54</td>
<td>0.50</td>
<td>0.59</td>
<td>0.58</td>
<td>0.67</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nurses on the unit</td>
<td>4.19</td>
<td>0.55</td>
<td>−0.02</td>
<td>&lt;0.01</td>
<td>0.38</td>
<td>0.55</td>
<td>0.32</td>
<td>0.60</td>
<td>0.55</td>
<td>0.63</td>
<td>0.62</td>
<td>0.49</td>
<td>0.73</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nurses on other units</td>
<td>3.00</td>
<td>0.77</td>
<td>−0.06</td>
<td>−0.02</td>
<td>0.53</td>
<td>0.61</td>
<td>0.60</td>
<td>0.43</td>
<td>0.56</td>
<td>0.58</td>
<td>0.58</td>
<td>0.32</td>
<td>0.42</td>
<td>0.73</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Therapists</td>
<td>2.98</td>
<td>0.95</td>
<td>−0.08</td>
<td>0.01</td>
<td>0.55</td>
<td>0.58</td>
<td>0.60</td>
<td>0.37</td>
<td>0.50</td>
<td>0.44</td>
<td>0.47</td>
<td>0.22</td>
<td>0.28</td>
<td>0.50</td>
<td>0.65</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Unit support staff</td>
<td>3.76</td>
<td>0.76</td>
<td>0.03</td>
<td>−0.03</td>
<td>0.53</td>
<td>0.62</td>
<td>0.58</td>
<td>0.51</td>
<td>0.56</td>
<td>0.61</td>
<td>0.57</td>
<td>0.38</td>
<td>0.54</td>
<td>0.40</td>
<td>0.39</td>
<td>0.75</td>
<td>1.00</td>
</tr>
<tr>
<td>Quality of nursing care on your unit</td>
<td>3.25</td>
<td>0.60</td>
<td>0.08</td>
<td>&lt;0.01</td>
<td>0.15</td>
<td>0.24</td>
<td>0.22</td>
<td>0.29</td>
<td>0.26</td>
<td>0.34</td>
<td>0.32</td>
<td>0.29</td>
<td>0.41</td>
<td>0.25</td>
<td>0.15</td>
<td>0.25</td>
<td>0.35</td>
</tr>
</tbody>
</table>

*P < 0.05, **P < 0.01.

**Table 2: Descriptive statistics and correlations matrix for variables in regression models.**
In all models, RC significantly predicted nurse reports of the quality of nursing care on their units, in the expected direction.

Model 1 assessed quality in terms of RC by provider roles. Relational coordination with two providers (physicians and nurses on the unit) significantly predicted quality (model $R^2 = 0.29$). Differences in quality by unit type were found. Compared with nurses on maternity units, nurses in EDs and Medical/Surgical units perceived the quality of care on their units to be lower. Nurse characteristics were not significantly related to perceived quality. Despite the non-normal distribution of the dependent variable there was not significant evidence of heteroscedasticity in the residuals. A normal probability plot of residuals did not identify significant departures from the expected distribution, and the distribution of residuals followed a normal distribution ($Kolmogorov–Smirnov = 0.40$, $P = 0.114$). The Durbin–Watson statistic (DW = 1.90) showed minimal autocorrelation among respondents, consistent with ICC analysis that concluded that within-cluster correlation was minimal.

Model 2 assessed quality in terms of the seven RC dimensions. One dimension ‘respect for the work nurses do with patients’ was positively and significantly related to higher reports of quality (model $R^2 = 0.26$). The same differences in quality among unit types found in previous models were present in Model 2. Again, nurse characteristics were not significantly related to perceived quality. Again, there was no evidence of significant heteroscedasticity in the residuals. A normal probability plot of residuals did not identify significant departures from the expected distribution, and the distribution of residuals followed a normal distribution ($Kolmogorov–Smirnov = 0.40$, $P = 0.114$). Similarly, the Durbin–Watson statistic (DW = 1.94) was consistent with the initial ICC analysis.

Model 3 considered RC as a composite measure (35 items) which significantly predicted higher perceived quality (model $R^2 = 0.25$). The same differences in quality between type of unit found in previous models were present in Model 3. Again, no nurse characteristics were significantly related to perceived quality. Again, there was no evidence of significant heteroscedasticity in the residuals. A normal probability plot of residuals did not identify significant departures from the expected distribution, and the distribution of residuals followed a normal distribution ($Kolmogorov–Smirnov = 0.40$, $P = 0.114$). Similarly, the Durbin-Watson statistic (DW = 1.93) was consistent with the initial ICC analysis. Table 4 displays the three regression models.

### Discussion

The most compelling finding is the consistent relationship observed in RC and nurse reports of quality. In all analyses, RC among nurses and other providers was significantly related to quality in the expected direction. Furthermore, as RC among providers increased, key adverse events decreased. In particular, nurse reports of RC with physicians and nurses on their own unit significantly predicted quality. While RC is typically considered as a unified concept, we disaggregated it in our analyses in order to look for specific action opportunities for managers. While all RC dimensions are important, ‘respect for the work that nurses do with patients’ emerged as the most important predictor of quality. This highlights the significance of promoting respect amongst providers for their unique contributions to patient care. This dimension can be

---

**Table 3**

Descriptive statistics for regression models by type of nursing unit ($n = 487$)

<table>
<thead>
<tr>
<th>Type of unit</th>
<th>ER</th>
<th>ICU</th>
<th>Med/Surg</th>
<th>Maternity</th>
<th>Perioperative</th>
<th>Surgical</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Respondent characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>Mean</td>
<td>40.73</td>
<td>44.44</td>
<td>40.65</td>
<td>41.98</td>
<td>45.00</td>
</tr>
<tr>
<td>SD</td>
<td>10.89</td>
<td>9.02</td>
<td>11.21</td>
<td>10.90</td>
<td>9.81</td>
<td>10.48</td>
</tr>
<tr>
<td>Diploma in Nursing</td>
<td>Percent</td>
<td>12.37%</td>
<td>23.61%</td>
<td>15.22%</td>
<td>19.28%</td>
<td>30.88%</td>
</tr>
<tr>
<td>Associate degree</td>
<td>Percent</td>
<td>51.55%</td>
<td>34.72%</td>
<td>60.14%</td>
<td>39.76%</td>
<td>33.82%</td>
</tr>
<tr>
<td>Baccalaureate &amp; Higher degree</td>
<td>Percent</td>
<td>35.05%</td>
<td>41.67%</td>
<td>24.57%</td>
<td>40.96%</td>
<td>35.29%</td>
</tr>
<tr>
<td>Years of experience on work unit</td>
<td>Mean</td>
<td>7.84</td>
<td>8.17</td>
<td>6.08</td>
<td>9.94</td>
<td>11.04</td>
</tr>
<tr>
<td>SD</td>
<td>7.02</td>
<td>6.78</td>
<td>5.65</td>
<td>7.20</td>
<td>7.51</td>
<td>7.00</td>
</tr>
<tr>
<td><strong>Relational coordination composite</strong></td>
<td>Mean</td>
<td>3.56</td>
<td>3.64</td>
<td>3.54</td>
<td>3.37</td>
<td>3.51</td>
</tr>
<tr>
<td>SD</td>
<td>0.56</td>
<td>0.47</td>
<td>0.53</td>
<td>0.55</td>
<td>0.54</td>
<td>0.60</td>
</tr>
<tr>
<td><strong>Quality of care</strong></td>
<td>Mean</td>
<td>3.00</td>
<td>3.43</td>
<td>3.12</td>
<td>3.41</td>
<td>3.48</td>
</tr>
<tr>
<td>SD</td>
<td>0.56</td>
<td>0.55</td>
<td>0.61</td>
<td>0.59</td>
<td>0.53</td>
<td>0.55</td>
</tr>
</tbody>
</table>
enhanced by managers through organisational support and targeted initiatives.

As expected, nurses reported the highest overall RC with nurses on their units, followed by unit support staff, physicians, nurses on different units and lastly therapists, suggesting similar ‘thought worlds’ (Dougherty 1992) for caregivers who are proximally engaged on a regular basis to deliver care. This finding has relevance for integrating new staff into a unit and for preparing those who ‘float’ to other areas.

Most prior RC healthcare research reports the lowest RC between nurses and physicians, which was not observed in this study. This finding may be related to the nature of practice in rural communities. This finding is important and warrants further research to explore whether RC patterns vary by hospital characteristics.

Bivariate correlations identified that nurse age and years of experience on the unit were negatively associated with nurse/physician RC. Nurse experience was negatively related to ‘accuracy’ of nurse/physician communication and ‘shared goals’ with physicians. Weinberg et al. (2009) reported that medical residents’ trust in the accuracy of information relayed by nurses was influenced by their perception of nurse competence and clinical judgment. The same dynamic may hold true for nurses and influence their perceptions of physician competency and clinical judgement – which could influence development of shared goals between the nurses and physicians. Because physician data were not collected, we do not know if generational diversity influenced nurse perceptions (Weingarten 2009, Kramer 2010). Differences in professional education and socialisation may partially account for these findings. According to Weingarten (2009, p. 27), more mature nurses ‘expect to be respected and looked up to’, which they may not have perceived to be the case. Regardless of the explanation, these findings cause concern because they may not have perceived to be the case. Regardless of the explanation, these findings cause concern because of the highly interdependent nature of ED practice – coordinating care with nurses in multiple areas of the hospital to ensure safe patient flow.

### Table 4
Regression models of patient care quality as a function of relational coordination

<table>
<thead>
<tr>
<th></th>
<th>Model 1 (95% CI)</th>
<th></th>
<th>Model 2 (95% CI)</th>
<th></th>
<th>Model 3 (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient P</td>
<td>Lower</td>
<td>Upper</td>
<td>Coefficient P</td>
<td>Lower</td>
</tr>
<tr>
<td>Constant</td>
<td>1.13</td>
<td>0.00</td>
<td>0.54</td>
<td>1.59</td>
<td>1.77</td>
</tr>
<tr>
<td>Respondent characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.00</td>
<td>0.47</td>
<td>0.00</td>
<td>0.01</td>
<td>0.77</td>
</tr>
<tr>
<td>Associate’s Degree</td>
<td>0.11</td>
<td>0.14</td>
<td>–0.04</td>
<td>0.26</td>
<td>0.12</td>
</tr>
<tr>
<td>Baccalaureate &amp; Higher Degree</td>
<td>0.03</td>
<td>0.70</td>
<td>–0.12</td>
<td>0.17</td>
<td>0.03</td>
</tr>
<tr>
<td>Years of experience on work unit</td>
<td>0.01</td>
<td>0.26</td>
<td>0.00</td>
<td>0.02</td>
<td>0.01</td>
</tr>
<tr>
<td>UNIT (relative to obstetrics)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ED</td>
<td>–0.42</td>
<td>0.00</td>
<td>–0.59</td>
<td>–0.25</td>
<td>–0.45</td>
</tr>
<tr>
<td>Intensive Care</td>
<td>0.00</td>
<td>0.99</td>
<td>–0.19</td>
<td>0.19</td>
<td>–0.07</td>
</tr>
<tr>
<td>Medical/Surgical</td>
<td>–0.21</td>
<td>0.02</td>
<td>–0.38</td>
<td>0.03</td>
<td>–0.34</td>
</tr>
<tr>
<td>Perioperative</td>
<td>–0.01</td>
<td>0.95</td>
<td>–0.20</td>
<td>0.19</td>
<td>–0.02</td>
</tr>
<tr>
<td>Surgical</td>
<td>–0.03</td>
<td>0.84</td>
<td>–0.27</td>
<td>0.22</td>
<td>–0.04</td>
</tr>
<tr>
<td>Relational coordination</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physicians</td>
<td>0.12</td>
<td>0.01</td>
<td>0.03</td>
<td>0.22</td>
<td></td>
</tr>
<tr>
<td>Nurses on the unit</td>
<td>0.33</td>
<td>0.00</td>
<td>0.19</td>
<td>0.46</td>
<td></td>
</tr>
<tr>
<td>Nurses on other units</td>
<td>0.08</td>
<td>0.08</td>
<td>–0.01</td>
<td>0.16</td>
<td></td>
</tr>
<tr>
<td>Therapists</td>
<td>0.00</td>
<td>0.93</td>
<td>–0.08</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>Unit support staff</td>
<td>0.02</td>
<td>0.70</td>
<td>–0.07</td>
<td>0.11</td>
<td></td>
</tr>
<tr>
<td>Frequent communication</td>
<td>0.03</td>
<td>0.62</td>
<td>–0.09</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>Timely communication</td>
<td>0.12</td>
<td>0.10</td>
<td>–0.03</td>
<td>0.27</td>
<td></td>
</tr>
<tr>
<td>Accurate communication</td>
<td>–0.04</td>
<td>0.52</td>
<td>–0.17</td>
<td>0.09</td>
<td></td>
</tr>
<tr>
<td>Problem solving communication</td>
<td>0.05</td>
<td>0.18</td>
<td>–0.02</td>
<td>0.12</td>
<td></td>
</tr>
<tr>
<td>Shared Knowledge</td>
<td>0.03</td>
<td>0.66</td>
<td>–0.10</td>
<td>0.16</td>
<td></td>
</tr>
<tr>
<td>Mutual respect</td>
<td>0.18</td>
<td>0.01</td>
<td>0.05</td>
<td>0.32</td>
<td></td>
</tr>
<tr>
<td>Shared goals</td>
<td>0.07</td>
<td>0.21</td>
<td>–0.04</td>
<td>0.18</td>
<td></td>
</tr>
<tr>
<td>Composite</td>
<td></td>
<td></td>
<td></td>
<td>0.45</td>
<td>0.00</td>
</tr>
<tr>
<td>Model FIT</td>
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<td></td>
<td></td>
<td>0.29</td>
</tr>
<tr>
<td>$R^2$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.90</td>
</tr>
</tbody>
</table>

In all three models, nurses from EDs and medical/surgical units reported significantly lower quality of care than nurses in the referent unit. The literature on the context of practice on these units may provide insights. The ED milieu has been described as high pressure, crowded, chaotic, short staffed and uncertain, where the ‘door is always open’ (IOM Committee on the Future of Emergency Care in the United States Health System, 2007). According to Hospital-Based Emergency Care: At the Breaking Point, ‘The situation is creating a widening gap between the quality of emergency care Americans expect and the quality they actually receive’ (IOM Committee on the Future of Emergency Care in the United States Health System, 2007). The report noted that one of the ‘most long-standing problems with the emergency care system is that services are fragmented’.

The finding that nurses on medical/surgical units reported significantly lower quality of care is consistent with findings from the Robert Wood Johnson Foundation research on why nurses were leaving the profession (Hassmiller & Bolton 2009). The findings identified that most nurses were unhappy with their work environments but that the ‘busiest turnstiles’ were on medical/surgical units, motivating national efforts to improve the quality of practice and care on medical/surgical units (Hassmiller & Bolton 2009).

Across numerous studies over the years, nurses who reported poor practice environments (such as those described in the literature for EDs and medical/surgical units) also reported poor quality of care, highlighting the influence of the practice environment on nurse ratings of quality.

Implications for nurse managers

The nurse manager role encompasses developing and maintaining practice environments that promote high-quality work and high-quality care. Thus building RC among nurses and other providers is highly relevant to nurse manager practice. In this section, we describe strategies and tools to build RC.

Gittell (2009) suggests that RC can be fostered through a set of organisational practices that includes hiring all providers (including physicians) for teamwork abilities, measuring and rewarding team performance, resolving cross-disciplinary conflicts proactively, investing in front-line leadership, developing cross-disciplinary care pathways, broadening participation in interdisciplinary patient rounds and developing shared information systems. Additional strategies might include interdisciplinary interviewing, interdisciplinary orientation and inter-professional committees and patient conferences. Nurse managers can facilitate these recommendations.


Appreciative inquiry (AI) (Cooperrider & Sekerka 2003) is emerging as a framework for change that enhances relationships. In our initiative to improve practice and care, nurses have engaged providers across departments in AI conversations about ‘peak experiences’ of communication/collaboration that resulted in exceptional quality, so that these positive practices can be illuminated and replicated. This paradigm – ‘building on success’ – has helped caregivers to understand one another (Havens et al. 2006). AI may be a powerful nurse manager tool for building RC.

Limitations

This is the first study to assess RC among nurses and other providers in acute care community hospitals in rural areas, an understudied hospital group representing 41% of US hospitals (Newhouse et al. 2009). While this study makes key contributions by extending RC theory to understudied groups, caution is urged when generalising to nurses working in different types of hospitals in different locales. Research is needed to explore RC between nurses and other providers and quality in a broad sample of hospitals.

In the present study, RC was measured from the nurse perspective only. Including the perceptions of all providers involved in the coordination of care will provide deeper understanding.

Finally, like all RC studies published to date, a cross-sectional survey design was used. Longitudinal and intervention studies are needed.

Conclusion

Improving patient care quality and safety is a global aim (International Council of Nurses 2007a,b) that is
directly affected by the quality of the nursing practice environment, including the quality of provider communication and relationships (p. 2004). Nurses play a vital role in promoting quality care in hospitals because of their unique ‘24/7’ functions that include serving as safety sentinels and coordinating care activities across providers and departments. Enhancing coordination between nurses and other providers is central to quality patient care.

The theory of RC is a promising framework for improving communication and relationships among healthcare providers. With the ability to facilitate a practice environment that promotes quality practice and quality care, the nurse manager is pivotal to achieving these aims.

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References


