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Factors contributing to nursing team work in an acute care tertiary hospital

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Nursing teamwork;
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Shared mental model

Summary
Background: Effective nursing teamwork is an essential component of quality health care and patient safety. Understanding which factors foster team work ensures teamwork qualities are cultivated and sustained.
Objective: This study aims to investigate which factors are associated with team work in an Australian acute care tertiary hospital across all inpatient and outpatient settings.
Methods: All nurses and midwives rostered to inpatient and outpatient wards in an acute care 600 bed hospital in Sydney Australia were invited to participate in a cross sectional survey between September to October 2013. Data were collected, collated, checked and analysed using Statistical Package for the Social Sciences (SPSS) Version 21. Factors reporting a significant correlation with where $p < 0.05$ were analysed in a multiple regression model.
Results: A total of 501 surveys were returned. Nursing teamwork scores ranged between 3.32 and 4.08. Teamwork subscale Shared Mental Model consistently rated the highest. Mean scores

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for overall communication between nurses and team leadership were 3.6 (S.D. 0.57) and 3.8 (SD 0.6) respectively. Leadership and communication between nurses were significant predictors of team work $p < 0.001$.

Conclusion: Our findings describe factors predictive of teamwork in an acute care tertiary based hospital setting across inpatient and outpatient specialty units. Our findings are of particular relevance in identifying areas of nurse education and workforce planning to improve nursing team work.

1. Background

The International Council of Nursing (ICN) recognises that health systems reforms are underway in all parts of the world (International Council of Nursing, 2010). The delivery of effective, high quality and safe nursing care has attracted much attention internationally (Valentine, Nembhard, & Edmondson, 2011) and more locally in Australia (O'Connell, Duke, Bennett, Crawford, & Korfiatis, 2006). In contemporary clinical practice, team nursing has become the widely accepted model for the delivery of patient care. Whilst there is a broad consensus of what team work entails, several nursing teamwork definitions and conceptual frameworks are reported in the literature.

Team work is considered to be a dynamic process encompassing an interplay of several factors (Xyrichis & Ream, 2008) inherently complex and too difficult to be defined by a single definition (Mickan & Rodger, 2000; O'Connell et al., 2006). Salas et al. uses a conceptual model to frame five core elements of teamwork including team leadership, back-up behaviour, adaptability, team orientation, and mutual performance monitoring supported by a circle of mutual trust, closed loop communication and shared mental models (Salas, Sims, & Shawn Burke, 2005). Kalisch et al. adapted Salas's conceptual framework and identified significant factors associated with nursing teamwork that formed the basis of a validated nursing teamwork survey (NTS) (Kalisch, Lee, & Rochman, 2010). The key factors identified to positively influence teamwork by Kalisch et al. include trust, team orientation, back up, shared mental model and team leadership (Kalisch, Weaver, & Salas, 2009; Kalisch & Lee, 2009). Although the various factors influencing team work are well established organisational structure, individual contribution and team processes play a fundamental role in team work (Mickan & Rodger, 2000).

The benefits of effective teamwork for both patients and nurses are well documented. For patients team work has been demonstrated to improve patient safety, reduced errors (Institute of Medicine, 1999; Leonard, Graham, & Bonacum, 2004; Nadzam, 2009) and reduce mortality (Wheelan, Burchill, & Tilin, 2003). For nurses, teamwork increases job satisfaction, staff retention (Kalisch et al., 2010; O'Connell et al., 2006) and enables a range of nursing skills and expertise to effectively and efficiently deliver high quality patient care (O'Connell et al., 2006; Wheelan et al., 2003). In addition team work provides adequate supervision and/or mentoring of less experienced nurses (Fairbrother, Jones, & Rivas, 2010; Ferguson & Cioffi, 2011; Nelsey & Brownie, 2012). In contrast, dysfunctional teams increase conflict, increase absenteeism, reduce performance and job satisfaction (Carver & Candela, 2008; Duffield, Roche, O'Brien-Pallas, Catling-Paull, & King, 2009).

In the last decade Australia has experienced an increase in patient acuity, a shortage in nurses, a diverse skill mix, a poor retention rate of new graduate registered nurses (Nelsey & Brownie, 2012) and have an ageing nursing workforce The observed changes to the health care sector and to the nursing workforce prompted a review of the way nursing care was being delivered (O'Connell et al., 2006) in the public health care sector. Models of nursing care shifted from a model of patient allocation to a team nursing model of care where a small team of ward based nurses collaborate to provide all care to a patient group (Ferguson & Cioffi, 2011; Garling, 2007; Chiarella & Lau, 2006; Walker, Donoghue, & Mitten-Lewis, 2002, 2007). Since the implementation of team models of care limited studies have investigated which factors contribute to teamwork nursing teamwork in an acute care hospital across all specialty units (Kalisch & Lee, 2013) or in an Australian setting (Fairbrother et al., 2010). Most teamwork studies have investigated specialty units such as intensive care, operating theatres and emergency departments. Understanding which factors foster team work in a large hospital across inpatient and outpatient settings enables health care managers to consolidate teamwork strengths and develop strategies to improve areas of weakness.

2. Aims

This study aims to investigate which factors are associated with nursing team work in a large Australian acute care hospital setting

3. Methods

3.1. Design

All nurses and midwives rostered to inpatient and outpatient wards in a acute care 600 bed hospital in Sydney Australia were invited to participate in a cross sectional survey between September to October 2013. Nurses and midwives who were on leave and those who worked on a casual basis during the study period were excluded from the study. Ethical approval was obtained from the South Eastern Sydney Local Health District Human Research Ethics

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Committee and Research Governance Office, St George Hospital to undertake a de-identified nursing workforce survey. Nurse and Midwifery Unit Managers were informed of the study and their participation sought. All nurses and midwives were informed of the study through in-services. In order to increase response rate nurses were allotted additional time by hospital management to complete the questionnaire (Pit, Vo, & Pyakurel, 2014). Questionnaires were returned in a large envelope and placed in a box located on each patient care unit. The questionnaires were collected each day by a research assistant.

3.2. Data collection

Data were collected relating to nurse workforce demographics, communication between nurses, nursing team work, and perceived model of nursing care. Nurse workforce demographics included; gender, age, designation, education level, new graduate status, total length of time employed as a practising nurse, total length of time employed on current ward, employment status, type of shifts usually worked and specialty area.

Communication between nurses was assessed using a modified seven item instrument measuring openness of communication and accuracy of communication between nurses (Shortell, Rousseau, Gillies, Devers, & Simons, 1991). Nurses were asked to rate the communication between nursing staff using a five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neither disagree nor agree, 4 = agree and 5 = strongly agree). Although designed for use in ICU environments, the tool has been used successfully in other settings (Fernandez, Tran, Johnson, & Jones, 2010). The psychometric properties of the instrument have been reported to be satisfactory. Studies undertaken among 1700 ICU nurses (Shortell et al., 1991) and 169 general medical and surgical nurses (Fernandez et al., 2010) have reported a Cronbachs alpha coefficient for communication openness of 0.8. Cronbachs alpha coefficient for communication accuracy has been reported to range from 0.75 (Fernandez et al., 2010) to 0.78 (Shortell, 1991).

Team leadership was measured using the Nursing Leadership Questionnaire. This eight item survey utilises a five-point Likert scale, scored from ''strongly disagree'' to ''strongly agree'' to measure how nursing staff influence others. The questionnaire focused on nurse leaders' ability to promote a standard of excellence, communicate, respond to change and situations and too demonstrate an awareness of staff and the unit needs. The nursing leadership is a reliable tool reporting a Cronbach's alpha = 0.87 (Shortell et al., 1991).

Nursing teamwork was measured using the 33-item nursing team survey (NTS) (Kalisch et al., 2010). The questionnaire comprises of five subscales including trust (7 items), team orientation (9 items), backup (6 items), SMMs (7 items), and team leadership (4 items). Respondents were asked to rate items using a Likert scale ranging from rarely (1) to always (5). Testing of the Nursing Teamwork Survey among 1758 hospital nurses has demonstrated good test—retest reliability ($r = .92$ for overall 33 items; $r = .77$—$.87$ for the five subscales) and internal consistency (alpha = .94 for overall items; alpha = .74—.85 for the subscales) (Kalisch et al., 2010).

3.3. Data analysis

All data were entered into a data base designed for the study. Ten percent of the data were checked by an assistant not associated with the study in order to maintain data integrity.

Data were uploaded into using Statistic Package for the Social Sciences (SPSS) Version 21 and cleaned. Negative questions were recoded and checked by a second study investigator. Data reported as not applicable were excluded from the study analysis.

Demographic data were reported as a mean and standard deviation or as frequencies. Mean scores were calculated for nursing overall teamwork and for each of the five teamwork sub scale factors, total communication between nurses, openness and accuracy of communication between nurses and by specialty units.

Correlations between nursing team work and the following variables: model of care, and demographic variables, workforce characteristics, nurse designation including new graduate registered nurses, communication between doctors, team leadership and communication between nurses were undertaken. Factors reporting significance where $p < 0.05$ were analysed in a multiple stepwise linear regression model.

4. Results

A total of 501 surveys were returned reporting a 33% return rate. Participants were predominately female ($n = 431$, 89%), less than 39 years of age ($n = 298$, 61%), employed full time ($n = 336$, 67%) with representation from a broad range of nurse/midwife designations varying from an assistant in nursing to nurse practitioner (Table 1). Over half of participating nurses had qualifications higher than a bachelor degree ($n = 299$, 64%). The mean length of time nursing and midwifery staff worked in their profession was11.6 years (S.D. 11), and the mean number participants worked in their current department was 6 years (± 6.7).

4.1. Communication between nurses

The openness of communication between nurses rated a mean score of 3.9 (S.D. 0.66). Mean scores for total communication score and accuracy of information communicated between nurses were 3.6 (S.D. 0.57) and 3.2 (S.D. 0.79) respectively.

4.2. Team leadership

The overall mean score for team leadership was 3.8 (SD 0.6). No reported differences were reported between staff working on specialty units. A significant difference was demonstrated between team leadership scores that were rated by Nurse Unit Managers (NUM) and registered nurses ($p < 0.004$) and NUM and enrolled nurses (ENS) or assistants in nursing (AINS) ($p < 0.05$).

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Table 1 Workforce demographics.

Workforce demographics	Total sample *n* (%)
Gender	
Female	431 (86)
Male	53 (10.6)
Age	
20–29	173 (34.5)
31–39	125 (25)
40–49	91 (18.2)
50–59	77 (15.4)
60–69	20 (4)
≥70	1 (0.2)
Fulltime employment	336 (67%)
Nursing designation	
Assistant in Nursing	5 (1)
Enrolled Nurse	22 (4.4)
Registered Nurse/Midwife	331 (66.1)
Clinical Nurse/Midwife Specialist	67 (13.4)
Clinical Nurse/Midwife Consultant	14 (2.8)
Clinical Nurse/Midwife Educator	14 (2.8)
Nurse Practitioner	10 (2)
Nurse/Midwife Unit manager	14 (2.8)
Other	5 (1)
Qualification	
Bachelor degree, master degree or PhD	299 (64%)

Table 2 Mean nursing teamwork scores.

	n	Mean	Std. deviation
Trust	491	3.66	0.57
Team orientation	491	3.32	0.69
Back up	491	3.66	0.71
Shared mental model	491	4.08	0.53
Team leadership	490	3.82	0.75
Total teamwork	491	3.67	0.51

4.3. Nursing teamwork

The mean score for overall nursing teamwork was 3.67 (SD.0.5). Scores for the subscales trust, team orientation, back up, shared mental model and team leadership ranged from 3.32 to 4.08 as shown in Table 2. Experienced staff had significantly higher teamwork scores compared to new graduates ($p < 0.02$, df1, f 5.7). The Shared Mental Model (SMM) subscale rated highest across all groups of specialties and nurse designation and new graduate nurses ranging from 3.8 to 4.2 as shown in Table 3. No statistically significant differences between team work mean scores among specialty units or among nursing designation were found.

4.4. Predictors of teamwork

Significant correlations were found between overall teamwork, team leadership, and total communication where $p < 0.05$. Following a stepwise multiple regression analysis, team leadership ($p < 0.001$, CI: 0.28–0.39) and total communication between nurses ($p < 0.001$, CI: 0. 23–0.36) remained significant predictors of team work.

5. Discussion

Overall teamwork scores and the five sub scales of trust, team orientation, back up, team leadership and shared mental model were rated relatively high. The relationship between team work and numerous variables were analysed, however our study found total communication between nurses and team leadership were predictive of team work.

Overall communication between nurses measured slightly lower than studies reported in the literature (Kalisch & Lee, 2013). Perception of open communication between nurses is essential for effective teamwork. Encouraging openness and positive communication among staff builds strong, reliable relationships within nursing teams (Chadwick, 2010). Scores for accuracy of communication measured lower than openness of communication and perhaps regards further investigation considering lack of communication is cited as a contributing factor to serious adverse events (Nadzam, 2009). Consistent and accurate transfer of critical information within teams of health care professionals is paramount and relies on individual knowledge and communication. Communication between nurses reportedly varies and includes spontaneous and informal conversations or more structured communication such as change of shift hand over, intentional ward rounds or interim shift huddles,

Table 3 Mean team work scores × specialty units.

Specialty unit	Participant numbers × specialty	Trust mean score (SD)	Team orientation mean score	Back up mean score	Shared mental model mean score (SD)	Team leadership mean score (SD)	Overall mean score (SD)
Critical care units & emergency department	95	3.6 (0.6)	3.4 (0.7)	3.7 (0.6)	4.0 (0.5)	3.9 (0.7)	3.7 (0.5)
Medical units	111	3.6 (0.5)	3.1 (0.7)	3.5 (0.7)	4.0 (0.5)	3.7 (0.7)	3.6 (0.5)
Surgical units	85	3.7 (0.6)	3.3 (0.7)	3.7 (0.7)	4.1 (0.5)	3.8 (0.7)	3.7 (0.5)
Pre-operative units	20	3.6 (0.4)	3.0 (0.4)	3.7 (0.7)	4.0 (0.4)	4.1 (0.6)	3.6 (0.4)
Aged care & rehabilitation	39	3.7 (0.6)	3.1 (0.7)	3.6 (0.7)	4.1 (0.6)	3.8 (0.6)	3.6 (0.5)
Midwifery staffed units	30	3.4 (0.7)	3.0 (0.6)	3.1 (0.9)	3.8 (0.6)	3.4 (0.9)	3.3 (0.6)
Other units	89	3.7 (0.5)	3.6 (0.7)	3.8 (0.7)	4.2 (0.5)	3.8 (0.9)	3.8 (0.5)

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communication boards and unit meetings (Kalisch et al., 2009; Leonard et al., 2004). Effective communication within a healthcare setting is a necessity, however such skills are not necessarily innate and may require training to improve the confidence and skill set to communicate openly and accurately (Leonard & Frankel, 2011; Leonard et al., 2004).

Whilst our study did not aim to measure leadership styles implemented within the ward setting, staff's responses provided the basis to understand the quality of ward based team leadership. Team leadership scores were slightly higher than previous studies (Shortell et al., 1991) suggesting that ward/unit based leadership is efficient and effective. In addition, a clear difference was observed in the leadership scores between nurse leaders such as a Nurse Unit Manager in comparison to registered nurses, enrolled nurses or assistance in nursing consistent with the literature (Kalisch & Hee Lee, 2013). Theses findings are not surprising considering that effective leadership requires knowledge and experience to provide guidance for solving complex problems related to nursing care delivery (Davidson et al., 2007; Salas, Sims, & Shawn Burke, 2005) and appropriate delegation of work. The ICN recognise that nurse leadership development is an international mandate (International Council of Nursing, 2010). Supporting all levels of nurses to develop as leaders empowers staff, improves job satisfaction increases the level of organisation commitment and decreased intention to leave (Duffield et al., 2009; MacPhee, Skelton-Green, Bouthillette, & Suryaprakash, 2012). On-going leadership training of ward staff will enable the benefits of leadership skills to continue from the ground up.

The strong presence of teamwork suggests that the current work environment and staff were conducive to teamwork. Mean teamwork scores were slightly higher than previous studies of large hospitals (Kalisch & Hee Lee, 2013) and in addition reported no significant difference between specialties units which is in contrast to some of the literature (Kalisch & Hee Lee, 2010; Kalisch & Hee Lee, 2013). Kalisch et al. reported a significant difference between specialty units and reported that psychiatric services and perioperative units rated team work highest. In this study specialty services grouped as 'Other' including ambulatory care units, outpatient clinics, radiology units, haemodialysis day units, oncology day units rated the highest overall teamwork score and subscale score of SMM. Previous studies have not measured teamwork within such units however the continuity and regularity of nursing staff working together on a day shift may influence the high level of team work reported. Consistent with previous studies, the subscale of SMM persistently rated the highest irrespective of specialty area (Kalisch & Hee Lee, 2013). Teams who share comparable mental models communicate more effectively and are more likely to demonstrate team behaviours such as back up (Salas, Sims, & Burke, 2005). Sharing a common nursing speciality may be a surrogate for behaviours supportive of SMM, clinical expertise and well developed insight of what particular patient's needs are (Kalisch & Hee Lee, 2013). Our findings contrast a study by Kalisch, Xie, and Ronis (2013) who found significant differences in SMM between nursing roles. Shared mental models describe a team's ability to mutually understand how the team functions and have clear expectations of each team member's role (Gillespie, Chaboyer, Longbottom, & Wallis, 2010; Westli, Johnsen, Eid, Rasten, & Brattebo, 2010). The wellbeing of team members is dependent upon on the shared understanding and trust that safety is 'assured and not assumed' (Miller, Riley, & Davis, 2009). The concept of shared mental models (SMM) was first described fifteen years ago in demanding and critical environments such as military training (Banks & Millward, 2000) and flight simulation (Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000) to maximises both team process and performance (Mathieu et al., 2000). Studies suggest that shared mental models facilitate teamwork skills (Westli et al., 2010) teamwork performance (Gillespie et al., 2010) and team member anticipation of other staff needs (Kalisch & Hee Lee, 2013). More recently SMM has been described as a significant factor associated with effective team work in areas of critical care and emergency health care settings (Custer et al., 2012; Miller et al., 2009; Westli et al., 2010).

Our study found that designation had no impact on teamwork reflecting an integration of team members' knowledge, skills, years of experience and attitudes. New graduate SMM mean scores were significantly different in comparison to experienced nurses. However, the difference between the two groups may reflect a shorter duration of time in a particular specialty area or ward rather than their inexperience. The effect of nursing designation has on team work is conflicting (Kalisch & Lee, 2009; McGillis Hall, 2003; Thomas, Sexton, & Helmreich, 2003). Kalisch et al. (2013) found nursing team leaders rated higher scores compared to registered nurses in sub scales of back up, team leadership and shared mental model. Although team leaders perception maybe higher than registered nurses effective leadership connects team members sharing common goal (Leonard & Frankel, 2011; Leonard et al., 2004). Studies have reported that a generational difference (Nelsey & Brownie, 2012) or a variation in nurse designation may create conflict within teams (Valentine et al., 2011), however these findings may reflect an absence of effective team leadership and poor communication.

The relationship between team work and team leadership and communication were significant. Our findings are consistent with the literature (Kalisch & Lee, 2009; Leonard & Frankel, 2011; Xyrichis & Ream, 2008) and supports Salas conceptual framework of teamwork where communication circumnavigates the five essential elements of teamwork (Salas, Sims, & Shawn Burke, 2005) and leadership is a core component of the five elements. The authors suggest effective leadership is facilitated by a combination of individual contributions by team members and by insuring individuals on the team understand the relationship between team nursing and the benefits of working together. Clinical leaders play a crucial role in enhancing work quality for staff (Duffield et al., 2009, 2011; MacPhee et al., 2012) reduces the potential for conflict, and effectively manages the barriers created by generational gaps between staff (Nelsey & Brownie, 2012). Closed loop communication as described by Salas et al. ensures that all team members are actively exchanging information and involves several stages including delivery, receiving, interpreting and acknowledgement that the communication has been received (Salas, Sims, & Burke, 2005). Communication is essential to teamwork and safe delivery of care (Jain, Miller, Belt, King, & Berwick, 2006; Leonard & Frankel, 2011; Leonard et al., 2004; Chiarella & Lau, 2006; O'Connell et al., 2006; Walker et al., 2007).

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Knowledge, clinical expertise, knowledge of patient care and workload of the team is shared within the team built on the foundation of communication (Miller et al., 2009; O'Connell et al., 2006). Whilst our study did not investigate the form or process of communication in use, the relationship between team work and total communication were a constant finding for overall teamwork.

Historically, nursing team work, team leadership and communication skills were assumed. This assumption is now acknowledged to be false and formal educational programmes have been implemented to instil the necessary skill set to participate as an effective team member and deliver leadership (Baker, Day, & Salas, 2006; Leggat, 2007; Leonard et al., 2004). Kalisch et al. highlights the unreasonable expectations placed on staff to work as a team without training (Kalisch & Begeny, 2005). More recently Kalisch et al. investigated the affect of implementing a train the trainer intervention on teamwork effectiveness and efficiency (Kalisch et al., 2013). The intervention group reported an increase in mean teamwork scores, a significant decrease in missed care, an increase in teamwork satisfaction and a higher level of teamwork knowledge in comparison to the control group who had no training. Despite the acknowledged benefits of the intervention, the author cautions that it is unlikely the intervention will suit all settings and further studies are warranted (Kalisch et al., 2013) Strategies such as team building interventions, team training (Kalisch et al., 2013), development of leadership skills (Dignam et al., 2012; MacPhee et al., 2012), the use of simulation models to optimise communication, and leadership during stressful situations have been recommended (Miller, Crandall, Washington, & McLaughlin, 2012). These findings are of particular relevance providing solutions that may be used to improve team work at a local level.

Interpretation of study findings is limited and may not represent that of the general nursing and/or midwifery population considering the small sample size, low response rate, single organisation, and underrepresentation of more senior nursing staff. In addition, our study did not measure the type of leadership style or methods of communication that were implemented and perceived to facilitate team work. However, we used a rigorous approach using validated instruments to strengthen the conduct of this study

6. Conclusion

Whilst we acknowledge teamwork encompasses an inter play of numerous factors our study demonstrated communication and leadership are significant predictors of nursing teamwork in a large acute care hospital setting. Consistently high mean SMM scores were reported which may inadvertently promote effective teamwork. These findings are of particular relevance in providing solutions such as future identifying areas of nurse education and workforce planning to improve nursing team work. Communication and leadership skills training programmes are recommended for all levels of nursing and midwifery staff to sustain high levels of effective teamwork within health care organisations.

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Conflict of interest

Authors have no conflict of interest to report.

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