

ORIGINAL ARTICLE

Leadership and teamwork in medical emergencies: performance of nursing students and registered nurses in simulated patient scenarios

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Aims and objectives. To examine nursing students' and registered nurses' teamwork skills whilst managing simulated deteriorating patients.

Background. Studies continue to show the lack of timely recognition of patient deterioration. Management of deteriorating patients can be influenced by education and experience.

Design. Mixed methods study conducted in two universities and a rural hospital in Victoria, and one university in Queensland, Australia.

Methods. Three simulation scenarios (chest pain, hypovolaemic shock and respiratory distress) were completed in teams of three by 97 nursing students and 44 registered nurses, equating to a total of 32 student and 15 registered nurse teams. Data were obtained from (1) Objective Structured Clinical Examination rating to assess performance; (2) Team Emergency Assessment Measure scores to assess teamwork; (3) simulation video footage; (4) reflective interview during participants' review of video footage. Qualitative thematic analysis of video and interview data was undertaken.

Results. Objective structured clinical examination performance was similar across registered nurses and students (mean 54% and 49%); however, Team Emergency Assessment Measure scores differed significantly between the two groups (57% vs 38%, $t = 6.841$, $p < 0.01$). In both groups, there was a correlation between technical (Objective Structured Clinical Examination) and nontechnical (Team Emergency Assessment Measure) scores for the respiratory distress scenario (student teams: $r = 0.530$, $p = 0.004$, registered nurse teams $r = 0.903$, $p < 0.01$) and hypovolaemia scenario (student teams: $r = 0.534$, $p = 0.02$, registered nurse teams: $r = 0.535$, $p = 0.049$). Themes generated from the analysis of the combined quantitative and qualitative data were as follows: (1) leadership and followership behaviours; (2) help-seeking behaviours; (3) reliance on previous experience; (4) fixation on a single detail; and (5) team support.

What does this paper contribute to the wider global clinical community?

- This study revealed differences in the teamwork behaviours (non-technical skills) of the nursing students and Registered Nurses during the management of simulated deteriorating patients but the level of technical skills was similar.
- The best-performing team members readily accepted followership roles, regardless of their seniority, whilst, in the poorer performing teams, the team leader tended to fixate on one task and did not lead the team.
- Study findings emphasise the need to focus on how skills are performed, rather than simply what needs to be done. The difference in performance between students and RNs emphasises the need to provide opportunities to develop teamwork skills in undergraduate programmes.

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Conclusions. There is scope to improve leadership, team work and task management skills for registered nurses and nursing students. Simulation appears to be beneficial in enabling less experienced staff to assess their teamwork skills.

Relevance to clinical practice. There is a need to encourage less experienced staff to become leaders and for all staff to develop improved teamwork skills for medical emergencies.

Key words: education, emergencies, patient safety, simulation

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Introduction

While patients have a fundamental right to safe and quality health care [Australian Commission on Quality and Safety in Healthcare (ACQSH) (2008)], previous authors have confirmed that adverse events in hospitalised patients are often predictable and sometimes not recognised (ACQSH 2010). The ways in which deteriorating patients are managed can be influenced by education and past experience (Gazarian *et al.* 2010, Kelly *et al.* 2013); knowledge, skills and attitudes improved when medical and nursing students were taught teamwork and leadership (Hobgood *et al.* 2010, Robertson *et al.* 2010), with studies showing improvement in teamwork and communication for managing postoperative (Paull *et al.* 2013) and trauma patients (Steinemann *et al.* 2011). Contemporary healthcare education promotes the benefits of simulated environments (Flin & Maran 2004, McCallum 2007), with high technological, environmental and psychological fidelity (Fritz & Flanagan 2008, Bucknall 2010). Learning through simulation is rarely a solitary encounter, and hence, the social practice involved in the simulation encounter as important as fidelity (Dieckmann *et al.* 2007). Major benefits of simulation include improved knowledge and clinical skills (Buykx *et al.* 2012), the opportunity to reduce medical error by skill rehearsal (Bucknall 2010) and improved situation awareness (Flin & Maran 2004).

First2Act, an intervention developed through a series of studies specifically focused on management of the deteriorating patient, includes knowledge tests, immersive simulation scenarios, reflection and feedback. These studies showed that nursing students, registered nurses (RNs) and registered midwives alike had satisfactory theoretical knowledge but failed to respond appropriately to patient deterioration (Cooper *et al.* 2010a, Endacott *et al.* 2010, Scholes *et al.* 2012). For example, as patients deteriorated and participant anxiety levels increased, performance and

awareness of the situation significantly reduced. Significant impact on reported learning of study participants was also identified. In a follow-up study focused on a cohort of RNs working in one rural hospital, review of patient notes and a time series analysis identified significant improvement in appropriate frequency of vital signs recording, delivery of oxygen and pain assessment (Kinsman *et al.* 2012).

The purpose of this study was to examine the teamwork skills used by nursing students and RNs to manage deteriorating patients during simulation exercises with patient actors.

Background

Studies have confirmed that adverse events in hospitalised patients are often predictable and are sometimes not recognised (Harrison *et al.* 2005, ACQSH 2010) with preceding changes in vital signs, an enduring finding from studies across more than two decades (Schein *et al.* 1990, Buist *et al.* 1999, Hodgetts *et al.* 2002, Nurmi *et al.* 2005, Bell *et al.* 2006). Evidence from previous studies shows that deficient nontechnical skills, such as leadership, teamwork and decision-making, are related to a considerable proportion of adverse events (Hobgood *et al.* 2010). Nontechnical skills, including communication between team members, leadership, teamwork, thinking skills, ability to understand situations and make clinical decisions, are complementary to technical skills, all of which are necessary for safe practice (Todd *et al.* 2008, Cooper *et al.* 2010b).

Poor management of deteriorating patients leads to expensive and often unsuccessful resuscitation procedures (Harrison *et al.* 2005). In addition, it is acknowledged that nonmetropolitan settings in Australia have fewer resources for managing deteriorating patients (Hore *et al.* 2003, Peake & Judd 2007), and communication and referral processes are less well established (Hore *et al.* 2003, Endacott & Westley 2006) with demands on enrolled and

registered nurses to take leadership roles. The extent to which this applies in other countries is not known, but early recognition and effective management can prevent the incidence of serious adverse events. Although it is not fully understood how inexperienced clinicians make decisions about patient management, it is known that overall situation awareness plays an important role in managing the deteriorating patient (Brady & Goldenhar 2014). Further, simulation training has been shown to improve the knowledge and clinical skills of nursing students (Buykx *et al.* 2012) and assists in the development of effective and valuable leadership and team skills such as crisis management, negotiation, communication and organisational understanding (Radovich *et al.* 2011).

Methods

Aims and research questions

The aim of the study was to examine the teamwork skills used by nursing students and RNs to manage deteriorating patients during simulation exercises with patient actors.

The following research questions were addressed:

- 1 How do RNs and students manage deteriorating patients in a simulation context?
- 2 Do RNs and students exhibit different team behaviour when managing simulated patients who are deteriorating?
- 3 Is there a relationship between technical and nontechnical (TEAM) scores in either group?

Design

An embedded mixed methods design was used, with a mix of quantitative and qualitative data collected in a sequential manner. In this design, the qualitative data collection aids interpretation of quantitative data (Cresswell & Plano Clark 2007), for example interview and video data were reviewed in detail for teams scoring highest and lowest for technical and nontechnical skills.

Setting and participants

Two categories of participant were recruited to the study: (1) final year nursing students ($n = 97$) from two universities in Victoria and one university in Queensland, Australia and (2) registered nurses ($n = 44$) from two mixed medical-surgical wards in one rural Australian hospital in Victoria. The setting for the scenarios was as close to a normal place of work as possible; RN simulations were conducted in a

side room at their hospital. For the students, simulations were conducted in the university clinical skills laboratory.

Data collection

All participants completed a formative knowledge assessment, including demographic data items, and three team-based video-recorded scenarios (chest pain, respiratory distress and hypovolaemic shock). Trained patient actors simulated deteriorating patients, and each scenario lasted eight minutes, with a five-minute break between scenarios. Participants were orientated towards the environment and given a briefing prior to each scenario, including instructions on how to summon help from the doctor or the medical emergency team. The same team member gave the briefing for each team. Registered nurses and students completed the scenarios in separate groups, and participants worked in teams of three, with each participant leading one simulation scenario. Participants were randomly allocated to teams. The simulation exercises were followed by an audio-recorded reflective interview with the team, whilst reviewing video footage, and completed a structured debrief with a trained facilitator.

Instruments

Objective structured clinical examination

Skill performance (technical skill) was assessed using Objective Structured Clinical Examination (OSCE) methods. The simulation scenarios and associated OSCE instruments were based on frequently occurring acute conditions and were developed by a panel of six expert clinicians and academics with further testing for face validity by five clinicians and teachers. The objective was to produce a feasible nominal (yes/no) checklist of key actions, which was completed by two experienced raters. Outcomes were then discussed and verified at the end of each examination to ensure inter-rater reliability. The OSCE instruments contained 28 items (chest pain scenario), 24 items (respiratory distress scenario) and 26 items (hypovolaemic shock scenario).

Team Emergency Assessment Measure

Team performance (nontechnical skill) was rated using the Team Emergency Assessment Measure (TEAM) (Cooper *et al.* 2010b). TEAM is a valid and reliable tool that has been designed for trained observers to rate nontechnical skills during emergency events including resuscitation (Cooper *et al.* 2010b) and patient deterioration settings (Cooper *et al.* 2013). This assessment tool consists of 11

items (0–4 rating) used to rate team performance in the three domains of leadership (2 items), teamwork (7 items) and task management (2 items), and one global rating (1–10 rating). Total TEAM score is calculated by adding scores from the 3 domains (Cooper *et al.* 2010b). Clinical observers were trained to use TEAM by watching, critiquing, discussing and rating previously recorded simulated and real emergency events. The same team assessed OSCE and TEAM performance across both groups. Reliability for the TEAM tool was high for both study groups (Cronbach's α 0.923 and 0.912).

As the focus was on teamwork behaviour, all teams were presented with the scenarios in the same order, thus enabling examination of team behaviour and whether it changed as the teams progressed through the three scenarios.

Ethics

Approval was granted by the human research ethics committee at all participating universities and at the hospital; participants self-selected into the study and the right to withdraw was explained verbally and in writing (Ethics committee names removed during review process only to preserve blinding).

Data analysis

Analysis was undertaken in three steps: (1) statistical analysis of TEAM and OSCE scores; (2) development of initial questions based on these data; (3) review of video and audio data to explore the questions. Based on Kolmogorov–Smirnov test for goodness of fit, OSCE and TEAM scores were normally distributed, and hence, Pearson product–moment correlation coefficients were applied and independent samples t-tests were used for differences between related variables. All tests were two-tailed with a p value of 0.05 considered significant.

Audio data were transcribed verbatim, and detailed field notes were taken from the video data. Video and audio data were analysed using thematic analysis, with the five-step process of familiarisation with data, generating initial codes, searching for themes among codes, reviewing themes, defining and naming themes to produce the final analysis (Braun & Clarke 2006). This approach allowed rich description of the video and interview data. All video and audio data were initially analysed by the lead author and checked by other members of the research team, with full team discussion when reviewing, defining and naming the themes.

Results

Participants

Eighty-nine (92%) of student participants were enrolled in the final year of a Bachelor of Nursing (BN) degree, with others in a BN double degree and one participant enrolled in a graduate entry degree. Registered nurse (RN) participants were degree-qualified nurses working on combined medical and surgical wards. All RNs had completed basic or advanced life-support training in the past two years and had managed an acutely ill patient on an average of three occasions in the previous year. The majority of students (93%) and RNs (98%) were female.

Technical and nontechnical skills

Technical (OSCE) performance positively correlated with nontechnical (TEAM) skills for both groups. For students, this occurred in all three scenarios [chest pain $r = 0.525$ ($p = 0.001$); respiratory distress $r = 0.530$ ($p = 0.004$); hypovolaemic shock $r = 0.534$ ($p = 0.002$)], and for the RNs, this was evident in the respiratory distress and hypovolaemic shock scenarios [$r = 0.903$ ($p = 0.000$); $r = 0.535$ ($p = 0.049$)]. This indicates overall strong positive relationship between teamwork and clinical performance for both participant groups. There were differences between various aspects of performance across the two groups (see Table 1). Review of the whole data set revealed that technical and nontechnical performance did not improve as the teams worked through the scenarios.

T-tests revealed a significantly higher score for RNs compared with student teams for all three subscales of the TEAM scale (see Table 2). The magnitude between the differences in the means was moderate based on Cohen's d : Leadership 0.44; Teamwork 0.49; Task Management 0.49.

All video footage was reviewed initially and then comparison made across all teams to identify commonalities and idiosyncratic performance using an outcome matrix, prior to the analysis of the OSCE and TEAM scores. The qualitative and quantitative data were then combined, and the research team identified a number of initial research questions to explore the characteristics and conditions for team performance (see Table 3). The video and audio data were sampled to explore these questions, for example, characteristics of the highest and lowest scoring teams, 'mixed' teams (with good scores in some scenarios and poor scores in others), 'HiLo' teams (with high OSCE and low TEAM performance and vice versa).

Table 1 Teamwork (TEAM) and clinical (OSCE) performance in response to deteriorating patient scenarios by registered nurses and nursing students

	TEAM			OSCE
	Mean (SD)	Low score <20 n (%)	High score >30 n (%)	Mean (SD)
RN (<i>n</i> = 44)	24.90 (6.59)	9 (20)	9 (20)	54 (10.04)
Students (<i>n</i> = 97)	16.65 (6.60)	25 (26)	3 (3)	49 (12.97)

Thematic analysis

Themes generated from analysis of the combined quantitative and qualitative data were as follows: (1) leadership and followership behaviours; (2) help-seeking behaviours; (3) reliance on previous experience; (4) fixation on a single detail; and (5) team support. In the extracts that follow, the notation indicates type of participant/site/team number, for example RN/Site 1/Team 6. Where conversation between the team leader and team members is reported, these roles are denoted by TL and TM.

Leadership and followership

This theme included a range of behaviours/perspectives that were categorised as 'leadership' or followership'; both leader and follower denoted some form of team identification.

As indicated by the lower TEAM scores, the students were less comfortable in the team leader role:

I think I did a lot better when I wasn't in charge – I don't know whether that's because I went first but when it wasn't me [leading the team] I could think more clearly. (Student/Site 3/Team 12)

There was also a sense with some of the student teams that they were sharing the decision-making process, working collaboratively to manage the patient:

I kept asking them [team members] 'shall I put his legs up?' and we all said 'I don't know.' (Student/Site 1/Team 11)

By contrast, there was fluidity in the movement between team leader and team members in the RN teams, as illustrated in the following excerpt:

[Lots of discussion between Team Members during the interview – good sense of team]

TM1: We didn't really delegate jobs too well...

TM2: ...We all tended to step in and say 'oh I'll do this, I'll do that' so the TL...

TL: ...I thought in my head 'oh I need these guys to do this and that' but looking at the video I didn't actually ask them. (RN/Team 2)

The willingness of team members to challenge the team leader was not explicitly captured in the TEAM score but was explored in the interviews. Review of the video data indicated that some team members in both groups held back from questioning their colleagues' decisions but interview data suggested that this was a reflection of feeling overwhelmed by the situation, rather than reluctance to challenge. There was also a sense of respecting the designated leader for the scenario, with the remaining team members stepping back. However, even in the teams where all participants achieved a low TEAM score, there was a clear sense that challenging the team leader was acceptable:

R: Was there anything you wanted to do but didn't do because you weren't the team leader?

TM: No, I think we did it all, we just kind of suggested it [patient intervention] to the team leader. So we did all let the team leader lead but we did suggest things, which is what would happen in the real world because someone else would look at it [the situation] from a different direction. (Student/Site 3/Team 12)

That's what we [nurses] usually do [chip in and help]; we work as a team. (RN/Group6)

In one of the best-performing student teams (Student/Site 2/Team 9), in each scenario, the TL took charge and led the team throughout. During the reflective interview,

Table 2 Comparison of teamwork (TEAM) subscales, total scores and reliability by registered nurses and nursing students for combined scenarios

Measures	Scores	Registered Nurses (<i>n</i> = 44)	Nursing Students (<i>n</i> = 97)	T-tests
Teamwork subscale (possible score = 28)	Mean (SD)	16.30 (4.52)	11.13 (4.42)	−6.292 (<i>p</i> < 0.01)
Leadership subscale (possible score = 8)	Mean (SD)	4.40 (1.69)	2.76 (1.53)	−5.548 (<i>p</i> < 0.01)
Task Management subscale (possible score = 8)	Mean (SD)	4.30 (1.34)	2.71 (1.46)	−6.241 (<i>p</i> < 0.01)
Total TEAM Score (possible score = 44)	Mean (SD)	25.00 (6.55)	16.60 (6.60)	6.841 (<i>p</i> < 0.01)
Overall Scale Reliability (Cronbach's α 11 items)		0.92	0.91	

Table 3 Team behaviour research questions drawn from preliminary data analysis

For the RN teams, does team behaviour change when the team leader is more or less experienced?
What behaviours were evident in the worst- and best-performing teams and how did these differ?
In mixed teams, how did the team behave when the poorer team leader was incharge?
How does the more 'passive' team member perform when they are team leader?
In the 'HiLo' teams, are there any obvious behaviours affecting technical or nontechnical skills function?
Do the teams achieving a lower TEAM score behave any differently during the group interview?

all the teams members contributed to the discussion for each scenario; the team leader answered direct questions but the TMs contributed, usually to support or remind the TL of something that happened during the simulation ('we all should have checked breathing...'). There was also lots of laughter between the team members during the interview. The team members were also anticipating what the TL would want done, for example checking vital signs; however, they also readily acknowledged their limitations:

TL (2): I was too busy wrapped up with his blood pressure...

TM1: I was too busy wrapped up with 'I want to give morphine and Maxolon...

TM3: ... and I was wrapped up with 'where are the doctors; why are they not here?'... (Student/Site 2/Team 9)

This was also evident in the best-performing RN teams.

By contrast, in one of the lower performing student teams, a team member kept interrupting the team leader. When she was team leader, she provided little guidance for the team and sought help from the rest of the team only when she needed physical help to keep the patient in bed.

Help-seeking behaviours

This theme included all the data excerpts that indicated a request for help. The team leader could ask for help from three sources: the rest of the team, a junior doctor and by phoning the medical emergency team (MET). The students tended to ask for help more frequently because they perceived the unfolding scenario to be complex:

R: why did you ask for help at that time?

TL: there was a lot going on; I wanted someone there for him [the patient]. I was becoming a bit disjointed. (Student/Site 2/Team 9)

TL: Because it's chest pain and I know you have to do a lot of things at once so I needed help. (Student/Site 1/Team 7)

The MET calling criteria also figured in their deliberations:

R: any particular trigger that made you do something?

TL: low blood pressure because I know that's a MET call criteria. (Student/Site 1/Team 11)

Review of the video and interview data confirmed that neither the students nor the RNs changed their help-seeking behaviour as they progressed through the three scenarios; they were no more or less likely to ask for help in the final scenario. This was also reflected in the OSCE and TEAM scores, which neither improved nor deteriorated as the scenarios progressed. There was however a greater sense of confidence:

TM2: We were more organised with that one [scenario]. We were more comfortable, less worked up...

TM1: I think I would have gone better [sic] in my leader role if I'd gone 2nd or 3rd [rather than first]. (Student/site3/Team 12)

Overall, the RNs were less likely to ask for help. The following viewpoint was only explicitly voiced by one participant but the rest of the team did murmur agreement:

TL: I didn't call for help because I didn't need it... Provided I've got the tools I need (the Registrar) then I don't call for help that I don't need (i.e. the MET). (RN/Team 9)

The respiratory distress scenario was the most challenging for the teams to manage. In the RN teams, this was discriminatory; the highest and lowest OSCE scores were gained in this scenario, with those who gained a low OSCE score also performing poorly as team leader. From the review of the video data, there were no obvious reasons why the RNs should behave any differently in this scenario than the students. Demographic data indicated that there was no difference between the two groups in exposure to team-based simulation scenarios and the RNs who scored poorly in this scenario were not any less experienced than the whole RN group. However, the students were perhaps more likely to have had recent clinical placement experience relevant to the scenario, as identified below.

Previous experience

In this theme, the impact of experience, or lack of experience, was evident. Perhaps not surprisingly, the students often made explicit links to recent placement experience:

R: So why did you call for help at that point?

TL: Because respiratory [problems] might lead to cardiac [problems], and I've just done kids and emergency placements. If a kid has a respiratory arrest you need help...

TM: ...he was a smoker so we realised that may be contributing to his oxygenation problems ...

TM: ...You do bring in things from placement, for example in ED [this student's most recent placement] we seemed to do [blood] cultures often. (Student/Site 3/Team 12)

The more recently qualified RNs also drew on placement exposure:

I was thinking back to when I did a placement in ED so trying to remember what we would have done. (RN/Group2)

The majority of students who performed poorly had previous experience of deteriorating patients but '*never had a patient that sick*'. (Student/Site 2/Team 2)

Distractions

This theme included all the data excerpts, from qualitative and quantitative data, indicating that the participants were distracted. Focusing on one detail in the scenarios was common across the student and RN teams, possibly reflected in the similar average of OSCE scores (54% vs. 49% - see Table 1). For students, the major distraction, or fixation, across teams was medication administration:

TL: The only thing I could think of to was to give the PRN medications for the pain but I didn't know if that was enough. (Student/Site 2/Team 2)

TL: We needed to get the drug re-written because it wasn't written up correctly... She [Dr] just changed it from SL to oral but that wasn't legal so we got her to re-write altogether. (Student/Site 3/Team 12)

TL: I had all the cardiac drugs running through my head but I couldn't think of anything else...

TM: ...I was thinking 'APO' [acute pulmonary oedema] and thinking 'medication' but couldn't think what to give. (Student/Site 1/Team 11)

For the RN teams, the distraction was less specific:

I was terrible because I focused on one thing and not anything else...

... I couldn't think what tests I should do; the simple things just went from my head...

... we needed to focus more on the bigger picture. (RN/Group 6)

Students were also more visibly distracted when unexpected things happened:

TL: When he vomited I panicked and I think I didn't even finish taking the obs...

TM1: ... and I was checking the vomit for blood. (Student/Site 3/Team 12)

In the teams where results were mixed, the poorest performing team leaders were distracted by one task, such as getting a further ECG done (Student/Site1/Team2), or made a premature assumption about the cause of the patient's symptoms (RN/Team 14) and didn't give any direction to the team.

Team support

This theme encapsulates data excerpts indicating how participants did or did not support the rest of their team. Team members voiced support for each other when they perceived that mistakes were made:

TL: I forgot to wear gloves when giving medications ...

TM1: ... it's OK because often on placement nurses don't wear gloves to give medications. (Student/Site 2/Team 2)

TL: I was useless [as a team leader]

TM : No you shouldn't feel like that; you know what you're normally like [how good you are] on the ward (RN/Team 14)

However, team perception of their performance did not always match reality:

TL: We worked pretty well as a team; if someone suggested something then we would say 'yes that's a good idea' ...

TM (1): ... Three brains are better than one...

TM(2): ... Or maybe three brains make up one

TL: Your brain's going so fast and you tend to focus on just one thing; it's good to have someone looking at the whole picture (Student/Site 1/Team 11)

Review of the video footage for this team revealed long spells when the team members were not intervening to help the team leader and were standing doing nothing. This team also had low TEAM and OSCE scores, that is, their perception of their team skills did not match reality. There was a similar lack of insight with other RN and student teams that achieved low scores.

Discussion

Successful teamwork relies on agreed team objectives and defined roles (Flin *et al.* 2008). Whilst difficult to achieve in a simulation environment, the difference between RN and student ability to work as a team was evident in the study

findings. Not surprisingly, the TEAM scores of the experienced nurses were significantly higher. This echoes concerns that the traditional focus with emergency skills training is on 'what' should be performed, such as a specific clinical skill, rather than 'how' it should be performed (Marsch *et al.* 2004, Murray *et al.* 2011).

Gillon *et al.* (2012) suggested that time-pressured events such as that are experienced in medical emergencies can act as a barrier to effective teamwork owing to a lack of shared awareness of the situation and established processes for shared decision-making. This was clearly the case for some teams in this study. However, the more experienced nurses were better at working as a team, indicating the need to provide explicit opportunities to develop teamworking skills in the undergraduate curriculum and during placements. Further, the trend for students and recent graduates to refer back to their placement experience highlighted the tendency for students to model or mimic the behaviour (good and bad) that they had observed during placements. This emphasises the importance of using debriefing to revisit the simulation activities and reinforce the learning. However, it is also important that debrief is suitably facilitated to assist learning (Dieckmann *et al.* 2007); as the data excerpts indicate, the use of the reflective interview with video review in this study provided a useful technique for debriefing.

Previous studies in non-health-related fields demonstrate poor decision-making when team members failed to speak assertively (Blum *et al.* 2005). It was clear from the video analysis in this study that those RN and student teams that performed best had members who were willing to speak out. Team behaviour did not improve as the team progressed through the three scenarios. This supports previous evidence that team communication may be difficult to change (Blum *et al.* 2005); it does take time and repeated exposure and experience to develop. However, it may suggest that additional support is required to develop assertive communication skills both in nursing students and registered nurses.

The difference in performance between students and RNs is supported by Tsang and Vidulich's (2006) assertion that knowledge is organised differently by experts, enabling more speedy retrieval when the situation demands. Experts also respond in different ways to complex situations (Burger *et al.* 2010), can anticipate what is required and draw on tacit knowledge and experiences. However, for the RN group, there was no correlation between technical and nontechnical skills for the first scenario (chest pain). This may have been related to a lack of familiarity with simulated settings and a

degree of initial disorientation, or less frequent exposure to the condition. Both groups were distracted by some element of the simulation but overall continued to manage the situation. The RNs were less likely to become fixated on one procedure, such as medication administration.

Limitations

The study is limited by its small sample size. For a study of this type, the response rates were acceptable, but we do not know how those that opted not to participate may perform in the clinical setting. The RN sample was based in a rural hospital in Australia where there may have been context-specific issues that limit the transferability of the findings. We also do not know the degree to which knowledge, skills, confidence and competence will be retained, requiring further investigation. Whilst we looked at social interaction, specifically how participants worked in teams, we did not specifically explore how the simulation activity itself provided a form of social practice (Dieckmann *et al.* 2007).

Conclusions

Simulation has an important part to play in enabling less experienced staff to develop teamwork skills because of the ability to repeatedly practice without risk to patients. Hence, it should be considered as an integral part of curricula for undergraduate and continuing professional development programmes. There is scope to improve leadership, teamwork and task management for RNs and nursing students. The inclusion of facilitated debriefing should enhance the learning from simulation activities.

Implications for clinical practice

Team performance must be viewed in context, as a 'usual role' for all nurses. There is a need to encourage less experienced staff to become leaders and for all staff to develop improved teamwork skills for medical emergencies.

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Disclosure

The authors have confirmed that all authors meet the ICMJE criteria for authorship credit (www.icmje.org/ethical_1author.html), as follows: (1) substantial contributions to conception and design of, or acquisition of data or analysis and

interpretation of data, (2) drafting the article or revising it critically for important intellectual content and (3) final approval of the version to be published.

Conflict of interest

The authors have no financial interest or potentially conflicting interests that could have had any impact on the conduct or results of the work described.

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