10L1 (312) Ward round simulation in final year medical students: Does it promote students’ learning?

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Background: Ward round skills are essential for doctors in a hospital setting. Literature reveals deficiencies in those skills among medical students and junior doctors. Simulation is increasingly emerging as a modality to train ward round based skills. However, exposing learners to ward round simulation at a too early stage may be associated with a high cognitive load and limited learning. This study aims to determine to what extent students experience a cognitive load and its interplay with performance and to explore factors that may promote and impair learning.

Method: Fifty-six final year medical students participated in a simulated ward round training exercise with three standardized patient scenarios. Both students’ performance and cognitive load were measured to determine if there was any correlation. Interviews were carried out in order to provide a deeper understanding of factors that may support and impair learning.

Results: Performance scores revealed deficiencies in ward round skills. Students experienced some intrinsic but very low extraneous cognitive load, and both cognitive loads weakly correlated with performance. Qualitative findings provide important insights into simulated ward-based learning. On the one hand, well-designed clinical scenarios, prioritization tasks, teamwork and feedback may support students’ learning process. On the other hand, distractions can impair their learning.

Conclusion: WRS seems to be a good teaching method to improve clinical skills at this stage of training, as the cognitive load associated to the exercises is not too high to impair learning. Moreover, the inclusion of relevant tasks in the simulation design can enhance the learning process.

Take-home message: WRS can offer meaningful learning opportunities for final year medical to improve not only technical and non technical skills but also clinical decision making skills that are more contextual particularly in emergency situations.
10L3 (1477)
The power of simulation: a narrative analysis of learners’ experiences

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Background: Simulation-based education (SBE) is now a ubiquitous part of health professional education. The current literature in SBE is extensive but does not explicitly investigate why SBE can be such a powerful learning experience. The National Health Education and Training in Simulation program (NHET-Sim) offers the opportunity to investigate this question. NHET-Sim has been providing Australia-based health professionals with the introductory skills and concepts necessary to facilitate SBE since 2011.

Method: This study investigates learners’ narratives of powerful experiences in SBE. It seeks to identify the ways in which health professionals recount their learning through SBE, and through this to understand how SBE shapes learners’ future practice. Drawing from the NHET-Sim learning management system, 2624 reflective responses were extracted (with consent) to the prompt “describe the most powerful learning experience you have had using simulation”. 328 of these were deemed to be in narrative form and these were categorised into narrative types. Thematic analysis indicated features that spanned narrative types and factors that influenced learning.

Results: There were four categories: progression narratives, which describe development of skills (257/328 = 71%); practice narratives, which are reflections of clinical practice (36/328 = 11%); transformational narratives, which tell significant moments of professional development (29/328 = 9%); and humiliation narratives, which describe distressing and harmful experiences (8/328 = 2%). Recurrent features across all categories were: formative early experiences; dramatic scenarios; an appreciation of simulation as a methodology; scenarios that ‘go wrong’; emotional responses, most commonly negative in valence; and reflective practices. Factors that promoted learning were: verisimilitude (realism); feedback, debriefing and facilitation; observation of others: repetition of scenarios; and ‘being the patient’.

Discussion & Conclusion: Analysing SBE narratives provides an understanding of how simulation induces powerful learning. The narrative data suggests that error and associated negative emotional valence prompted learning. In some instances, narratives were transformational, that is, they led to a profound and permanent shift in professional practice. On regular but infrequent occasions, learners described highly unpleasant experiences with no learning reward.

Take-home message: Making mistakes is a key feature of learning through simulation.

10L4 (329)
A Randomised Control Trial of simulation-based education for mechanical cardiopulmonary resuscitation training

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Background: Mechanical cardiopulmonary resuscitation (M-CPR) is increasingly used in the management of cardiac arrest. There are no reported randomised studies investigating M-CPR training to date. This study of newly trained M-CPR providers hypothesised that a brief standardised simulation-based intervention at 4-months would improve performance at a 6-month assessment.

• Newly acquired resuscitation skills decline significantly from 3 months.
• The use of M-CPR is associated with interruptions to chest compressions, highlighting the importance of an evidence-based approach to teaching and consideration of the issue of attrition resuscitation skills and knowledge that are only used occasionally.

Method: This study utilised a simulated Emergency Department (ED) ‘in-situ’ cardiac arrest model. The M-CPR device used was a proprietary LUCAS-3 machine (Physio Control, Redmond, WA, USA). Participants were trained and assessed in pairs. Standardised baseline training was provided to all participants. A baseline assessment was completed for time to M-CPR initiation (primary outcome) and the number of critical errors made. Participants were randomised to an intervention group (additional simulation at 4-months) or control group (no specific additional training). After 6-months the performance outcome measures were reassessed. Comparative statistical tests were performed using an intention to treat analysis.

Results: 112 providers were enrolled. The intervention group (n=60) and control group (n=52) had similar baseline demographic characteristics. At a 6-month assessment of performance, median time to M-CPR initiation was 27.1 seconds (IQR 22.0-31.0) in the intervention group and 31.0 seconds (IQR 25.6-46.0) in the control group (p=0.003). The intervention group demonstrated a significant reduction in errors compared to controls at 6-months (p=0.001)

What this study adds:
10l5 (2005)
The influences of fidelity toward students’ perception on simulation and the effectiveness of simulation education

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Background: Medical simulation incorporating with team skill training has long been recognized essential in medicine. The simulation “fidelity” had been previously considered parallel to the effectiveness of simulation training, while increasing cost and consumption of manpower. However, recent reports indicated the degree of fidelity is not necessarily related to training effectiveness. It is important to identify target functions of “fidelity”, such as physiological signals, those may be related with the effectiveness of simulation education. This study is to explore students’ perception on the focus of simulation fidelity shifting from mannequin to “physiological signals”.

Method: This is a quasi-experimental design that used two kinds of simulators as teaching intervention: a “full-scale high-fidelity model” and a “physiological signal simulator”. The physiological signal simulator, along with a “low-fidelity” mannequin or a standardized patient, can be used either in-situ or in a simulation room. There were 10 simulation trainings for each model, with 1-2 teachers and 5-6 trainees as a group. Questionnaire regarding students’ perception on simulation and the effectiveness of simulation education were distributed at the end of simulations. The learning objectives, simulation design and the tasks for trainees were also studied.

Results: Students perceived there have been no significant difference on the quality of the simulation, in terms of case, equipment and process, between the two simulation models. They recognized the model of “physiological signal” being more friendly and cost-effective when compared with the full-scale simulation. Students appreciated the training conducted in their work place with their regular team members. Both the simulations with “high- or low-fidelity” are generally perceived as helpful on improving their clinical skills.

Conclusion: The degree of simulation fidelity did not parallel with effectiveness of learning. The keys for conducting simulation successfully are to align the simulation focus with the learning objectives, simulation design and the tasks for trainees. With the smart and widespread uses of simulation, patient safety and quality of healthcare can be greatly enhanced.

10l6 (101)
Hardened tendencies: Persistence of initial appraisals following simulation-based stress training

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Background: Stress impairs performance during simulated acute events. This study was conducted to investigate the effects of two training interventions on stress responses to simulated trauma scenarios.

Method: Twenty (20) Emergency Medicine residents were randomly assigned to the Crisis Resource Management (CRM) or Stress Inoculation Training (SIT). The CRM targeted non-technical skills required for effective teamwork. The SIT targeted skills related to cognitive reappraisal and relaxation training. Each group received a 3-hr training session: didactic teaching followed by multi-disciplinary simulation scenarios and debriefing with emphasis on either CRM or SIT. Participants served as team leaders in simulated trauma scenarios pre and post intervention. Stress levels and responses (peak minus baseline) were measured with the State Trait Anxiety Inventory (anxiety), cognitive appraisal (degree to which situation is interpreted as threat vs challenge) and salivary cortisol levels.

Results: Both CRM and SIT resulted in decreased overall cortisol and anxiety scores post interventions (mixed-design ANOVAs, significant = p<.05). However, the magnitude of the cortisol and anxiety responses did not decrease post interventions. Stepwise regression analyses showed that the only predictor of stress responses in the post-intervention scenarios was the residents’ appraisal responses to that scenario (degree to which they interpreted it as a threat), explaining 21% and 28% of the variance in cortisol and anxiety responses respectively. In turn, appraisals of the post-intervention scenarios were predicted by the residents’ appraisals of the pre-intervention scenario and gender, explaining 53% and 15% of the variance respectively. Men were more likely than women to appraise scenarios as threatening.

Conclusion: The stress regulation interventions led to reductions in stress levels, but with limited impact on responses. Those who appraised an initial scenario as more threatening were more likely to interpret a subsequent scenario as threatening. In turn, they were
more likely to have larger stress responses. Interventions that have been largely successful in other domains, namely CRM and SIT, had limited effects in overcoming initial appraisals of potentially stressful events.

**Take-home message:** Approaches to stressful events may represent hardened tendencies; significant training & practice is likely needed to overcome coping approaches developed over a lifetime.

**10L7 (2661)**
Simulation-based mastery learning improves totally implantable venous-access port care skills of interns

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**Background:** Totally implantable venous-access ports (TIVAPs) are valuable device for long-term intravenous treatment of cancer patients but complications can be developed during implantation and care of the device. Inserting and removing the TIVAPs needle are one of the intern jobs in our hospital and were identified as a potential source in catheter-related bloodstream infection.

**Method:** We developed and implemented a simulation-based mastery learning (SBML) course for TIVAPs care to solve the problem. The course was developed according to the 7 principles that characterize SBML programs. One week before internal medicine internship, 12 interns studied pre-course self-learning materials and participated in the 2.5-hour SBML course. The course was comprised of baseline test, deliberate practice with feedback, post-training test, and repeated practice and retest. The assessment tools were developed by subject matter experts and validated by clinician educators. Based on the pilot testing data, the minimum passing standard (MPS) was set using the modified Angoff and Hofstee methods by an expert panel. We also evaluated self-assessed confidence and competence through questionnaires.

**Results:** A checklist with 20 items (2 points per item) for 10-minute skill test was developed and the raters were trained. The intraclass correlation coefficient and Kappa coefficient of the raters were 0.889 and 0.608-1.000, respectively. A total of 8 courses were implemented and 98 interns participated in the courses during 1-year internship. The mean baseline test score of the interns was 32.4±4.7 points and the score in the second half of the internship was significantly improved compared to the first half. Six (8%) interns did not pass the post-training test and were needed repeated practice and retest. Confidence and competence of the interns for the procedures were significantly improved before and after the course and they felt that many aseptic steps were difficult to master the procedures.

**Conclusion:** A SBML course improved interns’ skills of TIVAPs needle insertion and removal in a simulated setting and confidence for the procedures.

**Take-home message:** SBML is an effective way for interns to learn and improve their TIVAPs care skills that is simple but require strict aseptic technique.