



CSMEN – Simulation Publications Update

September 2020

Bulletin on

Paediatrics in Simulation Based Education

Welcome

Welcome to the Simulation Publications Update a service brought to you by CSMEN in partnership with NES Knowledge Services.

The focus for this Simulation bulletin is on **Paediatrics and use of Simulation based education**. The articles may be of interest or relevance to your current role in NHS Scotland. The articles may also be of use in your research. The articles are from those journals we currently subscribe to. If there are any journals that you would like us to add/consider please let us know.

Until now we have tried to provide approximately 30 links to articles on all aspects of simulation. We are now moving to shorter more frequent Bulletins with a clear focus on an aspect of simulation. Paediatrician educators have increasingly been using simulation to support learners across the spectrum from novices to experts to facilitate transfer to their workplace practice.

If you would like to suggest a focus topic or become a reviewer, please also let me know.

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The plan is to widen this service to focus on topic areas and to monitor its use and effectiveness so feedback would be much appreciated.

This bulletin has been developed by Jean Ker clinical lead CSMEN in partnership with Alan Gillies from NES Knowledge Services.

Access to Journals

Different journals have different processes for login so please follow the instructions for accessing the full text of the articles through the links provided.

On your behalf NES Knowledge Services subscribes to some journals direct and others via aggregators (i.e. journal collections or full text databases). We use something called a 'link resolver' to link you via the best route using your NHS Scotland OpenAthens password.

Some journals can detect that you're logging in from NHS premises, so won't ask for the OpenAthens password, but if you're accessing from home you may have to login.

None of the links should require you to set up a separate login – where there are login boxes for personal accounts, look for an OpenAthens or 'institutional login' option as well, which will accept your OpenAthens password.



Focus: Paediatrics in Simulation based Education

[A simulation based difficult conversations intervention for neonatal intensive care unit nurse practitioners: A randomized controlled trial.](#) Bowen R., et al, PLOS One, Vol 15, 3 Article Number: e0229895. 2020.

This paper from the USA used a randomized control trial method to explore an educational intervention. The context focuses on neonatal nurses having difficult conversations with new parents. There are few studies published related to this area of practice for this cadre of professionals.

This study involved NICU nurses in a regional care facility attending a difficult communications workshop of 4-6 participants who were randomized to participate using a web-based randomization tool. The workshop consisted of a lecture, a teaching scenario and a facilitated debrief for each participant. The intervention group took part in the workshop prior to a standardized test scenario while the control group only participated in the standardized test scenario. Both the control and intervention group completed pre and post surveys. In addition, performance of both the control and intervention group were evaluated blindly by two experts using a checklist tool and a one dimension global empathy score.

13 of a possible 31 nurses participated. Pre- defined communication behaviours was higher in the intervention group as was the mean empathy score. There was 74% agreement between the two observers.

The conclusions drawn on this small cohort are over exaggerated. The discussion about the categorization of empathy appears rather late in the paper. There is also a naivety about the structure of the study design as it assumes all the nurses had the same experience and expertise in relation to breaking bad news. They do however mention the lack of a pre and post intervention test scenario as a limitation. It also assumes that empathy and communication skills are independent variables. The two independent assessors were described but their profiles in relation to their level of communication expertise can only be assumed and is not transferable. The numbers participating are really too small to draw any conclusions. This is at best a pilot! The best learning point is the use of a randomization tool, *Randomiser.org* but I am still not convinced of the use of RCTs in educational studies but again it depends on the question(s) being asked, doesn't it?

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Using simulation in training pediatric residents on neonatal abstinence syndrome scoring: An experimental study. Agana M., et al, *Advances in Neonatal Care*, 2020.

The purpose of this study was to develop a simulation model of a standard video training of the Finnegan Neonatal Abstinence Scoring System (FNAS) and investigate the perceptions of comfort and competency of pediatric residents undergoing video or simulation training. Thirty-one pediatric and medicine-pediatric residents participated in the single-blinded randomized intervention study. The experimental group completed demonstrated simulation while the control group received the traditional video instruction. Both experimental and control groups scored the FNAS scenario similarly and were also similar to expert raters. Both groups also reported comparable levels of comfort and competency after the training, though first-year residents reported greater improvement than upper-level residents.

The impact of simulation-based medical education on resident management of emergencies in pediatric anesthesiology. Ambardekar A.P., et al, *Paediatric Anaesthesia*, Vol 29, 7, 753-759. 2019.

In this prospective, observational trial 30 residents were randomized to receive simulation-based education on four perioperative crises (Laryngospasm, Bronchospasm, Supraventricular Tachycardia (SVT), and Bradycardia) during the first week (Group A) or fifth week (Group B) of an eight-week rotation. Assessment sessions that included two scenarios (Laryngospasm, SVT) were performed in the first week, fifth week, and the eighth week of their rotation for all residents. The residents were assessed in real time and by video review using a 7-point checklist generated by a modified Delphi technique of senior pediatric anesthesiology faculty. The authors concluded that the simulation-based curriculum enhanced the learner's management of laryngospasm and SVT management and is a reasonable addition to didactic and clinical curricula for anesthesiology residents.

A randomized control trial of cardiopulmonary feedback devices and their impact on infant chest compression quality: A simulation study. Austin A.L., et al, *Pediatric Emergency Care*, Vol 36, 2, e79-e84. 2020.

This study evaluated the quality of chest compressions with standard team-leader coaching, a metronome (MetroTimer by ONYX Apps), and visual feedback (SkillGuide Cardiopulmonary Feedback Device) during simulated infant cardiopulmonary resuscitation. Seventy voluntary health care providers who had recently completed Pediatric Advanced Life Support or Basic Life Support courses were randomized to perform simulated infant cardiopulmonary resuscitation into 1 of 3 groups: team-leader coaching alone (control), coaching plus metronome, or coaching plus SkillGuide for 2 minutes continuously. The study did not demonstrate a clinically significant improvement in chest compressions with the addition of a metronome or visual feedback device, no clinically significant difference in Pediatric Advanced Life Support-approved compression technique, and no difference between compression quality between genders.

Randomised simulation trial found an association between rescuers' height and weight and chest compression quality during paediatric resuscitation. Bibl K., et al, *Acta Paediatrica, International Journal of Paediatrics*, 2020.

This study examined the relationship between rescuers' anthropometric data and chest compression quality during paediatric resuscitation training. 224 medical students (53% women) performed 2 minutes of paediatric resuscitation at the Medical University of Vienna: 116 on a baby manikin and 108 on an adolescent manikin. Participants with a lower BMI achieved higher total chest compression scores on both the baby and adolescent manikins than participants with a higher BMI. The latter were more likely to exceed the correct compression depth and not achieve complete chest recoil in the adolescent manikin. When it came to the baby manikin, the female participants achieved better chest recoil and the males achieved a



higher number of compressions at the correct rate. Males also achieved better chest recoil with the adolescent manikins. Being tall only correlated with incomplete recoil in the adolescent manikin. The results indicate that anthropometric variables were associated with chest compression quality in paediatric patients and should be considered by future education programmes.

[A simulation based difficult conversations intervention for neonatal intensive care unit nurse practitioners: A randomized controlled trial.](#) Bowen R., et al, PLOS One, Vol 15, 3 Article Number: e0229895. 2020.

This study sought to evaluate whether a simulation based Difficult Conversations Workshop for neonatal nurse practitioners leads to improved skills in conducting difficult conversations. It was a randomized controlled study of a simulation based Difficult Conversations Workshop for neonatal nurse practitioners (n = 13) in a regional level IV neonatal intensive care unit. Participation in the simulation based Difficult Conversations Workshop increased participants' empathy score and the use of communication skills in a simulated clinical encounter. The authors conclude that the study demonstrates that a lecture and simulation based Difficult Conversations Workshop for neonatal nurse practitioners improves objective communication skills and empathy in conducting difficult conversations.

[Learning to beat the shock clock: A low-fidelity simulation board game for pediatric and emergency medicine residents.](#) Bridges E.P., et al, MedEdPORTAL : The Journal of Teaching and Learning Resources, Vol 15, 10804. 2019.

Resident physicians may have difficulty with identifying and managing pediatric septic shock due to limited patient encounters. The researchers developed a low-fidelity tabletop simulation game to teach pediatric septic shock and compared residents' knowledge of and comfort with recognition and management of septic shock. Because it was presented as a board game rather than high-fidelity simulation, learners focused on decision making rather than the mechanics of procedures. Correct responses for the preintervention test were 71%, compared with 83% postintervention. Residents rated this modality as being more useful than lectures or reading and as equivalent to bedside teaching and high-fidelity simulation.

[Rapid cycle deliberate practice versus reflective debriefing for pediatric septic shock training.](#) Cory, M.J., et al, Pediatric Critical Care Medicine, Vol 20, 5, 481-489. 2019.

Rapid cycle deliberate practice is a simulation training method that cycles between deliberate practice and directed feedback to create perfect practice; in contrast to reflective debriefing where learners are asked to reflect on their performance to create change. The aim of this study was to compare the impact of rapid cycle deliberate practice versus reflective debriefing training on resident application and retention of the pediatric sepsis algorithm. Post-intervention, the rapid cycle deliberate practice group had higher checklist scores. Both groups had improved quiz scores. At follow-up, both groups continued to have higher scores compared with the pre-intervention evaluation. Both groups reported improved confidence in diagnosing and managing septic shock. The authors conclude that both rapid cycle deliberate practice and reflective debriefing are effective in training pediatric residents to apply the sepsis algorithm and in improving their confidence. The rapid cycle deliberate practice method was superior immediately post-training; however, it is unclear if this advantage is maintained over time.

[Early recognition of pediatric sepsis simulation checklist - an exploratory study,](#) Diaz, D.A., et al, Journal of Pediatric Nursing, Vol 50, 25-30. 2020.

This article describes the modification and exploration of a 21-item Early Detection of Pediatric Sepsis Assessment Checklist aimed at improving nursing students' recognition of key factors that contribute to early detection of sepsis in pediatric patients through clinical simulation. 131



nursing students were evaluated using the adapted Checklist in simulation using high-fidelity manikins. The authors conclude that the checklist forms a valuable tool to assess the knowledge of pre-licensure students and may possibly be extended as a tool to assess the clinical readiness and performance of new graduates through the safety and supervision allotted by simulation.

[Impact of simulation-based closed-loop communication training on medical errors in a pediatric emergency department.](#)

Diaz, M.C.G. & Dawson, K., American Journal of Medical Quality, 2020. *Closed-loop communication (CLC) promotes a shared understanding of information. Participants experienced 2 hands-on CLC simulations one month apart. A retrospective chart review of Emergency Severity Index (ESI) 1 patients was conducted 4 months pre and post CLC simulation-based training. The training improved staff perceptions of their CLC ability and was associated with a significant decrease in the number of medical errors in ESI 1 patients.*

[Simulation in neonatal resuscitation.](#) Garvey A.A. & Dempsey, E.M., Frontiers in Pediatrics, Vol 8, Article Number: 59. 2020.

This review summarises the current evidence on the use of simulation based education and training in neonatal resuscitation, with particular emphasis on the evidence supporting its effectiveness. It also highlights recent advances in the development of simulation based medical education in the context of newborn resuscitation to ensure we "train to win".

[Simulation-based summative assessment of neonatal resuscitation providers using the RETAIN serious board game-A pilot study.](#) Ghoman S.K., et al, Frontiers in Pediatrics, Vol 8, Article Number: 14. 2020.

This study aimed to examine if the RETAIN simulation-based boardgame can be used to assess HCPs' neonatal resuscitation knowledge. In the RETAIN board game (<https://playretain.com>, RETAIN Labs Medical Inc, Edmonton, Canada), players perform simulated neonatal resuscitation scenarios based on real-life cases, using action cards, and equipment pieces. Participants consisted of the following HCPs: 8 nurses, 4 respiratory therapists, 4 nurse practitioners, and 4 neonatal fellows. Overall mean Open-answer test and Game Performance was 8.6 out of 16 (53%) and 29 out of 40 (74%), respectively. Out of the 10 actions shared between the open-answer test and game scenario, performance on the open-answer test was mean 7.2 (72%) and game performance was mean 8.8 (88%). The authors conclude that RETAIN may provide an enjoyable and standardized alternative toward summative assessment of neonatal resuscitation providers. RETAIN may be used to improve more frequent and ubiquitous uptake of simulation-based competence assessment in healthcare settings.

[Pediatric critical care medicine fellowship simulation use survey.](#) Henricksen, J.W., et al, Pediatric Critical Care Medicine, 2020.

A survey was developed to determine the prevalence, the perceived importance, and barriers associated with simulation-based education in U.S. Pediatric Critical Care Medicine fellowship programs. The researchers defined simulation broadly as "any type of simulation that involved mannequins, task trainers, standardized actors, team training, etc." 67% of programs responded to the survey. 98% use simulation-based education in their Pediatric Critical Care Medicine fellowship curriculum. Most programs (56%) have incorporated simulation training into their Pediatric Critical Care Medicine fellowship curriculum in the last 4-10 years. The most commonly reported barriers were lack of funding (56%) and lack of faculty with simulation experience (56%). The majority of programs (64%) think simulation-based education is absolutely necessary to Pediatric Critical Care Medicine fellowship training.

[Just-in-time training for intraosseous needle placement and defibrillator use in a pediatric emergency department.](#) Itoh, T., et al, Pediatric Emergency Care, 712-715. 2019.



This study evaluated a just-in-time training (JITT) curriculum for the procedures of intraosseous (IO) needle placement and defibrillator use in a pediatric emergency department (ED) by comparing the trainees' comfort level in performing those procedures independently (Kirkpatrick level 2a) and trainees' knowledge of the procedures/equipment (Kirkpatrick level 2b) before and after the JITT. The comfort level to perform procedures independently increased from pre-JITT 0% to post-JITT 48% for IO needle placement and from pre-JITT 3% to post-JITT 32% for defibrillator use. The procedure-related knowledge also increased by $\geq 50\%$ post-JITT.

Relationship between executive functions, mindfulness, stress, and performance in pediatric emergency simulations.

Los K., et al, International Journal of Environmental Research and Public Health, Vol 17, 6, Article Number: 2040. 2020.

The aim of this study was to examine whether executive functions, mindfulness, and stress are related to the technical and non-technical skills of medical students participating in medical simulations in pediatrics. The study included 153 final-year medical students. A total of 306 high-fidelity simulations of life-threatening situations involving children were conducted. Stress and the coping mechanism of the participants were correlated to their skills during pediatric simulations. Some components of mindfulness, such as non-judgment and conscious action, were positively related to the skills of medical team leaders. Executive functions correlated with the non-technical skills and mindfulness of the medical students. Further research in this area may prove whether mindfulness training will improve learning outcomes in pediatric emergency medicine.

Simulation improves medical students' confidence in recognising paediatric safeguarding issues,

McAvoy-Yau, & Kelly, A., BMJ Simulation and Technology Enhanced Learning, Vol 6, 2, 114. 2020.

In the UK, the General Medical Council places a duty on doctors to protect the well-being of children and young people, and all doctors are responsible for recognising signs that a child is suffering abuse or neglect. At South Bristol Academy, child safeguarding awareness training is currently delivered via a half-day core workshop on child protection. The Academy recently introduced a paediatric simulation training day for fourth-year medical students and added a simulated child protection scenario into this training day to assess its use in teaching undergraduates about child safeguarding. A total of 118 fourth-year medical students rotating through paediatrics attended the simulation day in groups of 6–9 over a 9-month period. The safeguarding simulation was found to be effective and well received by medical students.

Simulation-based education for paediatric surgeons: Does it really improve technical skills?

Pacilli M. & Clarke, S.A., Seminars in Pediatric Surgery, 2020.

This article summarises simulation-based research that relates to paediatric surgery. It presents the current evidence behind low-fidelity simulation and computer-based simulation in improving the acquisition of surgical skills. The authors conclude that key-core surgical skills provided by simulation-based training have been shown to have an impact on learning curves.

Eye-tracking during simulation-based neonatal airway management.

Wagner M., et al, Pediatric Research, Vol 87, 3, 518-522. 2020.

The aim of this study was to assess participants' gaze behaviour and usability of eye-tracking glasses during airway management in a simulated neonatal resuscitation. Main outcome measures were airway providers' gaze, dwell time (total amount of time a participant fixates certain areas of interest), and usability of eye-tracking glasses. Data from 13 participants were included. There were significant differences in dwell time during the scenario, with participants spending twice as much time on the newborn and instruments as on the monitor and other staff. Participants spent about 25% more time focusing on another provider while the provider



was inserting the umbilical vein catheter than in all other times of interest (intervals of time with meaningful events). The use of the glasses was perceived easy and not disturbing. The authors conclude that eye-tracking glasses enhance our understanding of providers' gaze and perspective during simulated neonatal airway management.