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2018 SELECTED MANUSCRIPTS
FUTURE INNOVATIONS IN RESEARCH, EDUCATION AND SIMULATION (FIRES)

#33990

ADDRESSING DUAL PATIENT AND STAFF SAFETY THROUGH A TEAM-BASED STANDARDIZED PATIENT SIMULATION FOR AGITATED PATIENT CARE IN THE EMERGENCY DEPARTMENT
Ambrose H Wong, MD, MSEd,1 Halley Ruppel, MS, RN, CCRN,2 Lauren Crispino,1 Alana P Rosenberg, MPH,2 Joanne D Iennaco, PhD, PMHNP-BC, APRN,2 Federico E Vaca, MD, MPH1
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#34006

PRETEST SCORES UNIQUELY PREDICT ONE-YEAR DELAYED PERFORMANCE IN A SIMULATION-BASED MASTERY COURSE FOR CENTRAL LINE INSERTION
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#34136

A COMPARISON OF NOVEL MODIFIED POLYVINYL CHLORIDE MIXTURE AGAINST TRADITIONAL SIMULATION MATERIALS FOR ULTRASOUND PHANTOMS
David Frederick Pepley, B.S., Mechanical Engineering,1 Rohan Sunil Prabhu, B.Tech. Mechanical Engineering,1 Mary Yovanoff,3 David Han, MD,2 Scarlett Rae Miller, PhD,1 Jason Zachary Moore, PhD1
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2018 AWARD-WINNING ABSTRACTS

1st Place Award Winner
Poster #201 - IMPROVING TRANSPORT MANAGEMENT OF ABDOMINAL AORTIC Aneurysm PATIENTS WITH SIM (#301)
Presentation Category: Patient Safety & Quality
Jannie White, BSN, RN,1 Marcie Lambrix, ABD, MA1
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2nd Place Award Winner
Poster #125 - QUALITATIVE STUDY OF GAPS BETWEEN NEONATAL INTUBATION SIMULATION AND PRACTICE (805)
Presentation Category: Education
Lamia Soghier, MD, CHSE, FAAP,1 Karen Fratantoni, MD, MPH,1 Ellen Goldman, EdD, MBA2
1CHILDREN'S NATIONAL MEDICAL CENTER, WASHINGTON, DC, UNITED STATES; 2GEORGE WASHINGTON UNIVERSITY, WASHINGTON, DC, UNITED STATES

3rd Place Award Winner
Poster #190 - IMPROVED SAFETY FROM REDUCTION IN CAST SAW BURNS AFTER SIMULATION EDUCATION FOR ORTHO RESIDENTS (#1025)
Presentation Category: Patient Safety & Quality
Hayley Lynch, BA,1 Winnie Yu, MBA,2 Christopher Roussin, PhD,1 Katherine Jamieson,1 Donald Bae, MD1
1BOSTON CHILDREN'S HOSPITAL, BOSTON, MA, UNITED STATES; 2CONTROLLED RISK INSURANCE COMPANY (CRICO), BOSTON, MA, UNITED STATES

4th Place Award Winner
Poster #101 - BASIC LIFE SUPPORT INSTRUCTORS’ ASSESSMENT OF CARDIOPULMONARY RESUSCITATION (#1084)
Presentation Category: Assessment Approaches
Camilla Hansen, MD,1 Camilla Bang, Mathilde Staerk,2 Mette Nebsbjerg, MD,1 Stinne Rasmussen, MD, 1 Bo Loefgren, MD, PhD,1 Kristian Krogh, MD, PhD1
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5th Place Award Winner
Poster #138 - IMPROVING THE PATIENT EXPERIENCE ONE DEPARTMENT AT A TIME: AN EVS SIMULATION (#818)
Presentation Category: Education
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Poster #101 - 4th Place Award Winner

BASIC LIFE SUPPORT INSTRUCTORS' ASSESSMENT OF CARDIOPULMONARY RESUSCITATION (#1084)
Presentation Category: Assessment Approaches

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Introduction: High quality cardiopulmonary resuscitation (CPR) is associated with improved survival from cardiac arrest. Dissemination of high-quality CPR skills is therefore crucial. During basic life support (BLS) training, instructors assess learners’ CPR skills and correct performance errors to ensure that each learner performs CPR correctly. BLS instructors’ assessments may therefore directly affect participants’ learning outcome. It has been shown that emergency department staff and senior residents assess chest compression quality poorly. However, we have limited knowledge on certified BLS instructors’ assessment skills. The aim of this study was to investigate certified BLS instructors’ assessment skills in terms of identifying adequate and inadequate performances of chest compressions and rescue breathing.

Methods: Data were collected at BLS courses for medical students at Aarhus University, Denmark. In pairs, BLS instructors, certified by the European Resuscitation Council, evaluated each learner in an end-of-course test. Learners were asked to demonstrate CPR and operate a training AED (Lifepak® CR-1 Plus, Physiocontrol, with an audio track duration of 67 sec from start to time of shock) on a resuscitation torso manikin without arms (AMBU® Man, AMBU) for 3.5 minutes. Instructors’ assessments were compared with CPR quality data collected from the resuscitation manikin. The test was video recorded and data from the first three cycles of CPR were analyzed. Correct chest compressions were defined as ≥2 out of 3 CPR cycles with 30:2 chest compressions at a depth of 50–60 mm and rate of 100–120 min-1. Correct rescue breathing was defined as 75% efficient breaths in 3 CPR cycles with visible, but not excessive, manikin’s chest raise (instructor assessment) or a volume of 500–600 mL (manikin data).

Results: We included data from 90 end-of-course assessments undertaken by 16 instructor pairs. Instructors passed 81 (90%) learners based on chest compressions and rescue breaths; although manikin data revealed that the overall BLS quality was poor. Only 2 (2%) learners performed adequate resuscitation in all BLS categories. Instructors identified correct chest compressions with a sensitivity of 0.96 (95% confidence interval (CI95%) 0.79-1.00) and a specificity of 0.05 (CI95% 0.00-0.14), and correct rescue breaths with a sensitivity of 1 (CI95% 0.95-1.00) and a specificity of 0.07 (CI95% 0.03-0.15). Instructors mistakenly failed one learner due to inadequate compression depth, while passing 53 (59%) learners with inadequate compression depth according to manikin data. Instructors correctly failed 6 (7%) learners due to inadequate rescue breaths. However, 80 (89%) inadequate rescue breath performances were not identified.

Conclusion: Certified BLS instructors assess CPR performance with poor specificity, particularly for chest compression depth and rescue breathing. This raises the following concerns: 1) Using only the instructor assessment may not be a sufficiently accurate method to determine rescuers’ BLS skills in simulation-based resuscitation research. Thus, manikin data should always be included when possible. 2) Instructors may often award learners a BLS certificate despite performing BLS with inadequate quality. In turn, this may lead to suboptimal BLS performances in real-life settings and potentially affect the chances of survival negatively. Actions should be taken to improve the accuracy of instructor assessments. The use of feedback devices to support instructors’ assessment may be beneficial to ensure high-quality CPR.

References available upon request

Full disclosures for all authors and coauthors available upon request

Poster #102

VIDEO SELF-ASSESSMENT VS. STANDARD DEBRIEFING OF SIMULATED PROCEDURAL SEDATION (#689)
Presentation Category: Assessment Approaches

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Introduction: Medical training via simulation often requires standard debriefing with dedicated physicians which can be limited by time, training, and financial resources. Boet et. al (2011) attested that self-assessment was as beneficial as instructor debriefing and key non-technical skills were similar. Self-assessment encourages learners to recognize errors with the use of video replay of their scenario. This skill is important to learning but few studies have utilized video self-assessment for education. Our goal was to determine if video-assisted self-debriefing via a checklist would be non-inferior to standard faculty debriefing in the setting of simulated procedural sedation. This cohort study will compare video-assisted self-assessment versus standard debriefing for simulated procedural sedation. We hypothesized that improvement in performance after the self-assessment would be comparable to standard debriefing practice.

Methods: This is a randomized cohort study of PGY 1–3 EM residents comparing video-assisted self-assessment utilizing an observer checklist versus standard debriefing (GAP model) of simulated procedural sedation. Residents were randomized to either self-assessment or standard debriefing. All residents had undergone formalized procedural sedation training prior to the study. The observer checklist assessed clinical, pharmacologic, and communication areas with a total of 49 checklist items. The checklist also included recognition and correction of errors. Subjects in the intervention group completed the observer checklist using video self-assessment while the control group underwent standard debriefing (faculty used their completed observer checklist as a debriefing guide). All participants ran a second simulated procedural sedation which was scored by faculty using the same checklist. Change in scores between the two simulations for each group was calculated and compared using t-test.

Results: Resident self-evaluation assigned higher scores compared to faculty evaluations via paired samples T test; t(22)=3.20, p<0.05, vs t(22)=2.21 p<0.05. There was a large and significant positive correlation between faculty and resident evaluations r =0.72, p<0.05 12 and FET found no difference in the frequency of assigned ratings between resident self-evaluation and faculty evaluations. Only 2/21 checklist items were statistically different ‘jaw thrust performed’ (74% residents considered it performed, 42% of faculty considered it performed, t(21,λ=47)=5.00, p<0.05) and global ratings of quality of patient care (FET, p<0.05). The lack of a significant difference between randomizations on the 1st scenario indicates that they started at the same baseline. Both groups demonstrated increased checklist scores on the second scenario. t-test found no significant difference, t(47)=1.32, p=0.19, indicating no difference between scores between groups.

Conclusion: We found that residents rated themselves higher than faculty on a global scale but that only two checklist items showed a statistically significant discrepancy. Our goal was to see if there was a difference between checklist item completion and error recognition using video self-assessment versus standard debriefing. This would help us determine if performance improved to the same degree between groups. In the context of a procedural or task-oriented simulation, our data supports the hypothesis that video self-assessment is equivalent to faculty debriefing. The implications for the healthcare simulation community are that video self-assessment may provide a viable method for medical education training, which could have significant ramifications for resource constrained simulation environments.

References available upon request
Full disclosures for all authors and coauthors available upon request
LESSONS LEARNED FROM DEBRIEF EVALUATION AT SCALE IN A RESOURCE LIMITED SETTING (#1176)
Presentation Category: Assessment Approaches

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Introduction: Debriefing, a critical component of simulation-based learning, is a difficult skill to learn and master. The Debrief Assessment for Evaluation in Healthcare? (DASH) and the Center for Advanced Pediatric and Perinatal Education (CAPE) Debriefing Evaluation Tool? have been created and validated to measure the effectiveness of debriefing in high-resource settings. However, little is known about debrief assessment in low resource settings where time is limited, debrief evaluators and facilitators are inexperienced, and provider education and literacy levels are low. In Bihar, India, where simulation and debriefing is becoming an important tool in teaching basic emergency maternal and neonatal care, assessment and feedback of debriefing skill appears to be essential.

Methods: The aims of this analysis were to compare the ability of the DASH and CAPE evaluation tools to reliably assess debrief skill and to assess if debriefing skills were maintained over time among midwife nurse mentors who worked for a simulation training program embedded in a large-scale mentoring program for public sector nurses named “AMANAT” by CARE in Bihar, India. Trained raters evaluated randomly selected videos of simulation debriefs using the modified CAPE and DASH debrief evaluation tools. Reliability was determined for each quality indicator, and those with high reliability were assessed for changes overtime.

Results: A total of 73 debrief videos were double coded and analyzed. Fourteen of 18 CAPE indicators and two of six DASH indicators were reliably coded (ICC > 0.6). Majority of reliable indicators increased or were maintained over the 8-month intervention. The number of times ‘instructors asked questions’, the amount of ‘trainee responses’, and the ‘organization of the debrief’ improved significantly with practice (p < 0.01, p = 0.04). In contrast, the percent of ‘time spent playing the video’ and ‘time spent in the application phase’ fell by 6.2% (p = 0.01) and 3.4% (p = 0.04), respectively. The ratio of ‘trainee responses: instructor questions plus statements’ approached, but did not equal 1:1, the score of a novice debriefer.

Conclusion: In the Bihar context, we found more success assessing debriefs with the CAPE tool, as compared to the DASH tool. In addition, nurse mentors largely maintained their debriefing skills overtime, and several improved with increased practice. However, the low reliability on several indicators and the References available upon request

Full disclosures for all authors and coauthors available upon request

REFERENCES AVAILABLE UPON REQUEST
Introduction: The Association for American Medical College (AAMC) includes "case presentations" as one of 13 Core Entrustable Professional Activities (EPAs) for entry into residency [1]. However, two assessment challenges related to quantifying "case presentation" EPA 6 exist: 1) the lack of explicit expectations for case presentations [2, 3], and 2) factors that can bias trust judgments [3, 4, 5]. We aimed to address this by developing a structured objective case presentation activity in order to examine the relationship between entrustment and competence ratings of near-graduate medical trainees from the perspective of multiple standardized rater–who were either blinded or not to the actual simulated clinical encounter/trainee.

Methods: A total of 73 near graduate medical trainees (39 females, M = 26.5 years and SD = 2.6) participated in a 4-hour simulated “Night on Call” (NOC) experience that was developed to assess the 13 core EPAs and measure the construct of entrustment. Embedded within this immersive simulation experience was a structured objective case presentation activity to create a structured and objective case presentation activity, we a) used the guiding principles outlined by the AAMC to develop the assessment, and b) chose a telephone-based format to de-identify trainees and reduce bias. The trainee first evaluated and clinically managed the patient’s presentation, and then, in 45-minute rounds, described the clinical encounter to the attending, who was blinded to the actual clinical encounter/trainee. The attending provided feedback and guidance. The trainee also submitted a narrative summary of their experience for each scenario.

Results: Each of the three raters (SP, SN, SA) provided an assessment of the trainee’s performance and an entrustment score. Our data show that the SP and SN (r = .527, p < .001), SP and SA (r = .253, p < .05), and SN and SA (r = .287, p < .05) entrustment ratings were significantly correlated. Our data also reveal significant positive correlations (moderate to high) between each rater’s entrustment score and their respective checklist score for the clinical coverage case (i.e., behavior-specific clinical skills). Our findings offer preliminary evidence for rater agreement (blinded or not) related to the entrustment ratings. More specifically, the structured objective telephone case presentation entrustment ratings (i.e., the attending who was blinded to the actual clinical encounter/trainee) aligned with the entrustment scores of the raters that experienced the clinical encounter together (i.e., SP and SN).

Conclusion: These findings are important to consider within the context of both simulation and the EPA framework, as they suggest that using a telephone-based case presentation method following a simulated clinical coverage case can be an effective approach for minimizing potential bias without sacrificing assessment accuracy related to entrustment judgments. It also offers flexibility by allowing raters to assess learners remotely. As we enter a new era of measuring competence in medical trainees transitioning to residency, the case presentation becomes an important assessment tool for the judgments about a trainee’s readiness for autonomy in the workplace. The development of the structured objective case presentation is a promising effort to address the current need for both activity-specific entrustment decisions [1] and explicit expectations of oral presentations [2]. Explicitly measuring rater bias related to entrustment will be an important next step to further developing this assessment.

Full disclosures for all authors and coauthors available upon request
**Poster #107**

**PREDICTORS OF COMMUNITY CPR TRAINING AND PERFORMANCE IN GRENADA. (#1231)**

**Presentation Category: Assessment Approaches**

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**Introduction:** The American Heart Association (AHA) cardiopulmonary resuscitation (CPR) training for community providers uses repetitive practice with low-fidelity manikins and trainers to simulate CPR in real situations. Despite the known benefit of using video-based simulation with hands-on practice for teaching CPR, in Grenada many persons have not taken a CPR course. This research project seeks to teach AHA CPR and identify correlates of low participation in bystander CPR training engagement such as barriers of cost and access, concerns about performing CPR, and knowledge about the potential lifesaving benefits of CPR. These correlates will provide actionable information for training improvements at St. George’s University, one of the nation’s few CPR instruction facilities. Results will inform tailored training efforts aimed at Grenada’s sectors of greatest need, as most working adults (including many in healthcare) lack current CPR training.

**Methods:** This cross-sectional study is currently being conducted in St. George’s University (SGU) Multi-Fidelity Simulation Lab. Approval for the University’s Institutional Review Board was obtained. A brief written survey was given after each AHA Heartsaver CPR training session completion along with the AHA course evaluation. To date, a total of 94 participants from the community with ages ranging from minors (with parental consent) to adults over 60 years of age, comprising various occupations. The survey aims to identify participant gender, age range, occupation, prior training, predictors of training involvement, barriers to CPR performance, and confidence level with CPR skills. Data analysis will seek to identify associations between demographics, prior training, and CPR performance. Analysis is also expected to reveal barriers to CPR training engagement.

**Results:** The research project is approximately 60% completed to date so far. Participants reported satisfaction with video-based simulation involving hands-on practice for learning the basics of CPR. Trends so far suggest an association between prior CPR training and an increased willingness to perform pre-hospital CPR. A marked predominance of infection concerns were noted as the main deterrent to attempting CPR in the community setting.

**Conclusion:** Preliminary results suggest associations between prior CPR training with increased willingness to provide bystander CPR. These results also identify several predominant deterrents which could be dispelled with augmented training on infection control and the risks associated with CPR provision. This study supports AHA training for community providers using simulation and suggests that provision of affordable CPR training will improve access and demand for AHA CPR certification using deliberate practice. This study, undertaken by an active CPR training location, will use the results to further community CPR quality. The results, to be made available via publication, may benefit public health at large.

References available upon request

Full disclosures for all authors and coauthors available upon request

Poster #108

**CHOOSING A SIMULATION ASSESSMENT TOOL – A COMPARATIVE ANALYSIS IN BIHAR, INDIA (#630)**

**Presentation Category: Assessment Approaches**

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**Introduction:** To explore whether clinical, teamwork, and interpersonal skills of auxiliary nurse midwives (ANMs) and general nurse midwives (GNMs) could be monitored inexpensively at scale, we compared two independent simulation measurement tools used at Primary Health Centers (PHCs) in Bihar, India. Our aim was to determine if the less expensive, less resource intensive, paper-based “real-time assessment tool” (RTAT) could be used in place of the more expensive, more resource-intensive video-coding tool to accurately evaluate simulation performance.

**Methods:** Embedded in a large-scale ongoing nurse mentoring program “AMANAT” by CARE India, we conducted a cross-sectional study comparing the RTAT to assess clinical performance in normal and emergency obstetrical and neonatal simulations with a video-coding tool completed retrospectively by independent raters. The RTAT consisted of a series of seven global questions related to clinical identification, management, use of evidence-based practices (EBP), communication and teamwork as observed during the simulated scenarios. Responses were recorded on a 5-point Likert scale ranging from ‘Strongly Agree’ to ‘Strongly Disagree’. The simulation scenarios were also analyzed using the RTAT created in Studiocode software. The RTAT included 80 clinical EBP, teamwork and communication indicators. The means and standard errors were calculated for each indicator using both the measurement tools. We calculated the Cohen’s Kappa coefficient to determine the level of agreement between indicators across the two tools.

**Results:** We paired data from both tools for all 222 simulations available and analyzed indicators for three types of simulations; normal spontaneous vaginal delivery (NSV), neonatal resuscitation (NR) and post partum hemorrhage (PPH). One hundred sixty-one (36%) of the simulations were NSVD scenarios, 147 (33%) were NR scenarios and 126 (31%) were PPH scenarios. In general, the mean scores on the RTAT were higher than those on the video-coding tool. The RTAT’s kappa coefficients for all indicators suggested no agreement between the two tools. Of the three indicators investigated by simulation scenario type, the RTAT’s kappa coefficient ranged from 0.05 to 0.07.

**Conclusion:** Our analysis suggested that the RTAT performed poorly against our chosen gold standard video-coding tool for reliably measuring ANM/GNM clinical skills in simulated normal and complicated births at PHCs in Bihar. We recommend future programs assessing provider behavior use video coded data for regular monitoring whenever possible. Alternatively, we suggest that measurement tools used to monitor simulations through direct observation should consider: (1) the use of instruments with objective indicators; (2) training data collectors in person and (3) employing external evaluators for data collection. While video coded data provides an objective standard for assessing clinical behavior in simulations, we realize it is expensive on a large scale, and, therefore, its use will likely remain limited. We encourage other groups to explore less expensive, lower resource ways to reliably measure clinical behavior in simulations.

References available upon request

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POSTER #109
EVALUATING NP COMPETENCIES THROUGH SIMULATION: AN ENTRUSTABLE PROFESSIONAL ACTIVITIES TOOL (#375)
Presentation Category: Assessment Approaches

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Introduction: Direct observation of nurse practitioner (NP) students in the clinical setting has traditionally been used to assess clinical competence (Gibbons et al, 2009). Simulation education in the form of standardized patient case encounters provides observable clinical experiences, which identify NP students’ competence. NP simulation education has generated a need for reliable and valid clinical evaluation tools, which measure progressive stages of clinical competence over the course of a program (Competency Framework, 2012). The Entrustable Professional Activities (EPA) instrument identifies and measures levels of performance for clinical competence at five degrees of supervision in six areas of performance. The purpose of this research was to determine the relationship of an EPA instrument to present NP clinical-competence-grading rubrics reflective of student clinical learning outcomes and to examine the inter-rater reliability of this EPA instrument.

Methods: This EPA instrument was piloted in the University of San Diego’s (USD) Dickinson Nursing Simulation Center using NP summative Clinical Competency Examinations (CCEs) in four sequential nursing practicum theory courses. IRB approval was received from USD. Simulation Faculty Facilitators (SFF) completed both a traditional grading rubric and the EPA instrument for each of their students throughout semester summative CCE testing. Scores from the Rubric and EPA instrument were correlated in four areas to assess reliability and validity. In addition, six SFFs before each summative CCE event viewed a course related CCE case video and using the EPA instrument assessed student performance. Inter-rater reliability (IRR) analyses were then performed on each course video CCE using the EPA instrument to assess degree of scoring agreement amongst SFFs. Fleiss’s kappa (Davies & Fleiss, 1982) was computed to secure a single kappa like statistic summarizing IRR across all coders for each course.

Results: The mean and median for the EPA Instrument was for all courses lower than the mean and the median for the Rubric Instrument while the range was greater. A Wilcoxon Signed Rank Test was performed on all clinical practicum courses and revealed statistically significant Z scores for all areas of the Rubric and EPA instruments with medium to large effect size, suggesting the instruments were significantly different. Spearman rho correlations performed between all areas of the Rubric and EPA scores were significantly correlated except for two areas in second-year advanced courses. Cronbach alpha coefficients for each of the four course cases was computed to provide an indication of correlation among the EPA instrument items and were: 0.866, 0.917, 0.779 and 1.0. Kappa (κ) statistics were computed to ascertain each course’s EPA instrument Facilitator IRR and revealed slight to almost perfect agreement: 0.58, 0.27, 0.50, and 1.0.

Conclusion: The conclusions of this research study are that the EPA instrument is a reliable and valid instrument with inter-rater agreement which can measure NP clinical competence over the course of a program. A clear relationship existed between the standard Rubric and EPA instruments in assessing clinical competency in all areas throughout the NP program’s clinical courses. The EPA instrument was found to be a valid instrument to assess all clinical areas and was particularly strong in evaluating more complicated second-year course cases and determining competency of advanced students. The Cronbach alpha coefficients for each course suggested strong internal consistency/reliability and content validity. IRR amongst simulation faculty had agreement for each course case. The resulting implications of this research for simulation education is that the EPA instrument can be used to accurately assess NP clinical competence using simulation events over the duration of a NP program.

References available upon request
Full disclosures for all authors and coauthors available upon request

POSTER #110
BLOOD, SWEAT AND TEARS: DEVELOPMENT OF THE FACET ASSESSMENT TOOL FOR ORIENTATION (#661)
Presentation Category: Assessment Approaches

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Introduction: There are a number of simulation evaluation tools available that are valid and reliable. However, it is important to consider whether a particular tool is appropriate for the simulation and population being evaluated. Furthermore, that tool would need to be tested for validity and reliability for any new population that would be measured. Several hospital based simulation programs use simulation as a means of assessing readiness to practice. We developed nine simulation scenarios that are presented over a period of orientation weeks to assess new nurse performance. The purpose of this research was to develop a Formative Assessment Clinical Education Tool (FACET) for newly graduated nurses and to test the validity and reliability of the FACET.

Methods: In order to ensure that the goals for these simulations met the learning objectives we started with a development of a GN Simulation Competency Framework guided by Tanner’s Clinical Judgment Model. Tool structure was determined based on the framework. Components and items were created and weighted for each domain. Content validity was tested by an expert panel comprising 7 clinical experts from 4 acute care hospitals with 10 to 25 years of clinical and/or education experience. More than half achieved specialty certification, CCRN and/or CPAN. Face validity was ensured by focus group with multiple meetings including 7 CESD educators who would be the end users of the FACET. Intra-class reliability was examined by having raters watch video-taped simulations and grade each scenario individually. Intra-class correlation coefficients (ICC) were calculated by SPSS 23 using model 3. A prospective repeated measures design was used to further test the discriminant validity of the FACET.

Results: Content validity indices (CVI) were calculated using a Likert scale (1. Not relevant, 2=slight relevant, 3=moderately relevant, and 4=relevant) for each simulation scenario. Item-level content validity indices (1-CVI) defined as the proportion of content experts giving item a relevance rating of 3 or 4 were calculated with all items having indices of 0.97 to 1.00. Revisions were made for each scenario according to the feedback from the focus groups. The intra-class correlation coefficient (ICC) was calculated using the model that “each subject is assessed by each rater, but the raters are the only raters of interest.” The “reliability calculated from a single measurement” (XU, 2011) was calculated for each scenario. All ICC were greater than 0.90, indicating an excellent intra-class reliability and consistency among the raters. Repeated measures have not completed yet with data collection halfway through, but will be completed by August and result will be reported by Sep. 1 2017

Conclusion: The simulation assessment tool demonstrated validity and reliability. The tool will be used to assess newly graduated nurse’s performance in simulations as part of the orientation process. Use of this tool will provide evidence of learner gains in competencies over the orientation period. The tool will provide data on learner performance and with repeated measures a check for discriminate validity.

References available upon request
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Poster #111

NURSING SIMULATION USE IN LARGE-SCALE NURSING GAMES (946)

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Introduction: What is the feedback of students participating in simulation challenges during a large-scale event such as Nursing Games? In March, 2017, 240 nursing students from 8 Schools of Nursing in Ontario, Canada, participated in the “Nursing Games.” Several nursing-related activities were held in a gaming format around the host university. Simulation activities of maternal-child, medical-surgical, and an “Amazing Race” design were used as gaming activities, and selected students from each team participated in one activity. Undergraduate students practiced nursing responsibilities while gaining knowledge in a fun, friendly competitive atmosphere (Bradbury-Golas & Carson, 1994). Soft skills such as leadership in addition to practical skills obtained in nursing programs were used, resulting in learning from and with one another (Stanley & Latimer, 2010). Gaming increases retention of knowledge, and fosters problem-based learning (Royse & Newton, 2007).

Methods: A mixed methods survey design was used to collect feedback of nursing students participating in the Nursing Games simulation activities of a maternal-child, medical-surgical, and an ‘Amazing Race’ scenario-type. Purposive sampling recruited participants to the study after the activity ended. The inclusion criteria was being a registered participant on one of the 8 teams of nursing students from a Canadian nursing school. Ethical approval was obtained. Because there was a relationship between the faculty researcher and students participating in the Games, a survey ensured anonymity and protected the student confidentiality. Participants in the nursing games were free to participate or decline participation; it did not affect their level of competition in the games. Recruitment occurred via a poster and social media link after the games were completed. The participants were invited to complete an electronic survey by accessing the link and accessing it on their own time and space.

Results: Results are anticipated by September 1, 2017. Analysis is in progress and will be submitted when complete.

Conclusion: Preliminary analysis of qualitative data indicates positive themed experiences to the use of simulation as a gaming activity in large-event nursing activities. There is little evidence in the literature to describe simulation use in large-scale events such as nursing games and even less to describe the student experience in participating in this event. Results from the study can inform the public on such events and can create sustainability in such events that previously have been periodically offered to nursing students.

References available upon request

Full disclosures for all authors and coauthors available upon request

Poster #112

COMPARISON OF SHORT AND LONG EVALUATION CHECKLISTS FOR INFANT LUMBAR PUNCTURE (#470)

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Introduction: Altering the length of a simulated skill assessment tool without changing the content can affect the accuracy of the assessment. Does altering the length of a validated infant lumbar puncture (LP) checklist improve the accuracy of the assessment in simulated infant lumbar puncture? Simulation-based summative assessment is increasingly utilized at multiple learner levels across the spectrum of healthcare professions. Assessment tools used during SBE in summative assessment especially for high stakes evaluation require careful development and analysis. The Patient Outcomes in Simulation Education Network has developed and validated an infant LP competency checklist that has been widely used. Our proposed research seeks to compare the operational characteristics of this infant LP evaluation checklists by comparing the accuracy of assessment by varying number of checklist items for use by novice observers during a simulated video skill demonstration.

Methods: We modified the previously published infant LP checklist to make a 10 item checklist titled short checklist and created a 20 item checklist by separating the content items from the original checklist into single line item's titled long checklist. Raters could score 3 options - done correctly, not done/done incorrectly, unable to assess/not observed. Two scripted videos were created, 1 demonstrating perfect performance of infant LP on a partial task trainer and the other demonstrating 4 planned errors. Third and 4th year medical students were enrolled and randomized into either the long or short group. Participants observed an introductory video on infant LP technique, then were trained in the use of the assigned checklist, and viewed the 2 scripted videos, in randomized order. Checklist scoring was done immediately after each video. Hands-on infant LP procedure training was provided by pediatric faculty after the research was completed.

Results: Twenty eight participants were randomized to the long checklist and 25 to the short. When observing the perfectly performed infant LP simulation, there was a significant difference in the percentage of correctly assessed items with the long checklist average of 94.6% and the short average of 89.6% (p = .009). When observing the infant LP simulation with 4 planned errors, there was no significant difference in the number of correctly assessed items between the long (79.6%) and short (77.6%) (p = .47). There was no significant difference in the percentage of checklist items marked unable to assess/not observed between the long and short checklist (p=0.34) and short (4%) (p=0.54). Chi-square analysis was performed for categorical data. The mean number errors found by the raters while observing the simulation with 4 planned errors was 2.6 errors for those using the long and 2.4 errors for those using the short. A Kruskal-Wallis test will be applied to this data to determine significance.

Conclusion: Medical student raters could more easily identify errors during the infant LP simulation using a shorter checklist while the longer checklist had a higher accuracy rate in assessing the perfectly performed procedure. Shorter checklists may be more accurate when errors are anticipated for an assessment, such as with a difficult procedure or novice learner. Further research into whether this apply to more experienced raters would reveal whether this was a rater characteristic effect or assessment tool characteristic effect. Surprisingly, the length of the tool did not seem to affect the percentage of items marked ‘unable to assess/not observed’ as we expected the longer checklist would lead to more missed observation points. Given that the increased length of the checklist does not lead to more subjectively missed observations, when creating checklists, length would not necessarily mean that it would feel more difficult for raters to make observations.

References available upon request

Full disclosures for all authors and coauthors available upon request
MEASURING USE OF TEAMWORK AND COMMUNICATION SKILLS IN SIMULATION; BIHAR, INDIA (#1125)

Presentation Category: Assessment Approaches

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Introduction: Cohesive teamwork and clear communication are important components of effective management of neonatal and obstetric emergencies. We integrated 30 teamwork and communication activities and into a nurse mentoring simulation program in Bihar, India. Bihar is a very resource poor state with high maternal and neonatal morbidity and mortality. These activities promote techniques such as leadership, listening, communication, mutual support, and problem solving. To understand if auxiliary nurse midwives (ANMs) in Bihar, India applied the teamwork and communication techniques in clinical simulation we coded simulation videos for use communication skills: 1) 'call for help', 2) 'check back', 3) 'SBAR' and 4) 'transparent thinking'; and two teamwork techniques: 1) 'provider delegates task' and 2) 'provider offers to do task'.

Methods: We conducted a mid-post study comparing the use of teamwork and communication techniques in simulated clinical scenarios in a population of ANM mentees at 320 Primary Health Centers (PHCs) enrolled in four different phases of a nurse mentoring program. During the nurse mentoring program, nurse mentors ran mid- and post-assessment simulations in which the ANMs were told that their performance was being assessed. Mentors ran 3 scenarios: normal spontaneous vaginal delivery (NSVD), postpartum hemorrhage (PPH), and neonatal resuscitation (NR) for performance was being assessed. The raters will independently view all the simulation videos and has been validated in reports of adult trauma team training, but has not yet been validated for pediatric trauma team assessment.

Results: We collected data from 350 mid-assessment and 350 post-assessment videos in 2 phases of a nurse mentoring program. We found that ANM use of 'SBAR', 'transparent thinking', and 'provider offers to do task' increased significantly from mid- to post-assessment in all simulated clinical scenarios (p

Conclusion: PRONTO International's integration of team training and communication in partnership with simulation training program led to ANMs using 'SBAR' and 'think out loud' and 'provider offers to do task' increased significantly from mid-to post-assessment in all simulated clinical scenarios (p

References available upon request

Full disclosures for all authors and coauthors available upon request

Poster #114

NOVEL USE OF TNOTECHS TO ASSESS IN SITU PEDIATRIC TRAUMA TEAM TRAINING (#508)

Presentation Category: Technology

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Introduction: Hypothesis: Interprofessional, in-situ trauma team training in a newly designated pediatric trauma center improves non-technical skills as assessed by T-NOTECHS. Research question: Do T-NOTECHS scores improve for new pediatric trauma teams during interprofessional, in-situ team training? Background: Trauma is a leading cause of death and disability for children. Preventable trauma deaths occur even in mature trauma systems; 1/3 of errors occur during the initial resuscitation. Lapses in teamwork are postulated to be a major source of error. Practice and training is essential to optimize excellent teamwork. Central to this training is the ability to accurately assess and provide feedback about teamwork. Trauma Team Non-technical Skills (T-NOTECHS) was designed to evaluate teamwork and provide formative feedback to adult trauma teams and has been validated in reports of adult trauma team training, but has not yet been validated for pediatric trauma team assessment.

Methods: Emergency physicians, pediatric surgeons, critical care and emergency nurses, respiratory therapists, and clinical assistants affiliated with the trauma team at an urban, newly designated pediatric trauma center participated in the program. The curriculum consisted of a brief didactic reviewing key concepts of team performance and trauma protocols followed by in-situ team performance during three clinical simulation scenarios. The scenarios focused on aspects of clinical teamwork using a programmable human patient simulator, video recording, and facilitator moderated debriefings following each scenario. The scenario sequence order was randomized. The 6 training sessions were completed and simulation videos were archived at the simulation center. We plan to train teamwork experts not involved in the trauma training on the use of T-NOTECHS. The raters will independently view all the simulation videos in a randomized order and assign T-NOTECHS scores.

Results: Anticipated: T-NOTECHS is composed of five behavioral domains: leadership, cooperation/resource management, communication/interaction, assessment/decision making, and situation awareness/coping with stress; each rated on a scale of 1 (no teamwork) to 5 (flawless). An analytical evaluation of the reliability of the T-NOTECHS assessment tool for pediatrics will be conducted during the video review. For each T-NOTECHS subscale, interrater reliability will be analyzed using intraclass correlation coefficients (ICC) and/or the weighted kappa statistic. Given 18 videos (6 sessions x 3 scenarios) to be evaluated, these 4 raters will achieve at least 80% power to detect an intraclass correlation of 0.85 with a significance level of 0.05. To evaluate improvement in teamwork performance over subsequent training scenarios, repeated measures analysis of variance will be used on each subscale of T-NOTECHS. We expect improved T-NOTECHS scores over the 3 scenarios and high reliability between raters.

Conclusion: Conclusions anticipated by August 2017: We expect that T-NOTECHS is applicable for use in the assessment of pediatric trauma teams as it is for adult trauma teams. Interprofessional, in-situ trauma team training for a newly designated pediatric trauma center using human patient simulators leads to improvements in demonstrated teamwork.

References available upon request

Full disclosures for all authors and coauthors available upon request
Development of a Trauma Team Performance Score: The Simushock-Score Study (#1363)

**Presentation Category:** Assessment Approaches

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**Introduction:** Polytrauma, despite important improvement in outcomes along the past two decades, is the first cause of death and lifelong disability among the youngest patients. Unstable polytrauma patient at arrival presents a mortality rate of 85%, instead of 25% for the patient which are stabilized by pre-hospital care. Five to 15% of deaths are evitable in this population, and 30% of those deaths are allegedly due to communication issues within the team. So how can we improve the rate of evitable deaths in this population? The safety issue is linked to the performance issue, as frequently stated by patient safety foundations. Before testing innovations or strategies to improve safety, we should be able to measure the team performance to have a tool to effectively measure the effect of new strategies. Performance is often poorly defined, but we could state that it’s the efficiency of a bunch of competencies at the contact of a specific situation.

**Methods:** The objective of this study was to develop a trauma team performance score, integrating Technical and Non-Technical skills of every member in a timeframe for the unstable polytrauma patient at arrival. We first created a scoring system based on a comprehensive review of the existing guidelines in the field. We also use the existing guidelines and recommendations regarding effective communication, and CRM to better define the principal non-tech skills needed. Timeframe was separated in 3 periods: preparation, primary and secondary surveys. We considered a team of 5 people (1 trauma leader, 1 resident, 2 nurses (1 dedicated to transfusion) and 1 caregiver). We then submitted this draft to an expert panel (9 MD, + 1 trauma bay nurse) for 2 dephlith with (1 trauma leader, 1 resident, 2 nurses (1 dedicated to transfusion) and 1 caregiver). We then submitted this draft to an expert panel (9 MD, + 1 trauma bay nurse) for 2 dephlith rounds, rating each item on a 9-point Likert Scale (futile item to indispensable). They were encouraged to comment the items.

**Results:** A strong agreement was obtained for 92% of the items at round 1, >99% at round 2. Only one item didn’t reach strong agreement at round 2 because it was redundant with another item attributed to the trauma leader. This item was suppressed. And strong agreement along the entire scoring system was accepted. Mean CVR (Content Validity Ratio) was significantly higher at round 2, and above the critical levels as calculated by Wilson et al. The final score contained 69 items, with a distribution between tech and no tech skills and between professions similar to the first draft. We received 137 and 68 commentaries in round 1 and 2, respectively. We then conducted a qualitative analysis of those commentaries. Role distribution and medical/technical controversies were the predominant sources of commentaries, representing approximately 40% of the total at each round. Reasonable number of items compared to other comprehensive scoring systems, regarding other critical care scales.

**Conclusion:** We describe the first trauma team performance score integrating Tech, No-Tech Skills of every team member and Time in the care of the unstable polytrauma patient based on trauma guidelines and performance assessment best practices.

References available upon request

Full disclosures for all authors and coauthors available upon request

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Psychometric Evaluation of the SET-M in Medical Education (#385)

**Presentation Category:** Assessment Approaches

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**Introduction:** Kardong-Edgren et al. (2010) suggest researchers refine instruments, using larger and more diverse populations, rather than creating additional tools lacking reliability and validity (1). Created in 2005, the Simulation Effectiveness Tool (SET-M) provided understanding of how undergraduate nursing students believed learning needs were met (2). Subsequent understanding of simulation best practices, terminology, and accreditation standards changed simulation delivery leading to modification of concepts and language resulting in the SET-M. The SET-M underwent psychometric evaluation with nursing students and demonstrated acceptable reliability and validity with a coefficient alpha of .936 (3). This study sought to establish reliability and validity of the modified Simulation Effectiveness Tool (SET-M) with medical students using three types of simulation-based learning activities: Harvey simulator, high-fidelity mannequin, and standardized patients (SP).

**Methods:** Following IRB approval, third and fourth semester medical students were recruited from a large off-shore US medical school. Using a cross-sectional survey design, we sampled 10-20 participants per survey item for three simulation typologies: Harvey simulator, high-fidelity mannequin, and SP. Participants engaged in the usual simulation-based curriculum. After each simulation-based learning experience, participants completed the SET-M, through CAE’s LearningSpaceTM (Sarasota, FL). Linear regression was used to evaluate differences in the simulation effectiveness scores among participants according to characteristics of level of student and work experience. Likelihood ratio testing was used to assess contributions to the model using ?=.15. (4) Data were analyzed using R (Vienna, AT). Descriptive statistics were calculated for demographic characteristics. Confirmatory factor analysis was used to evaluate how well current model explained the observed data.

**Results:** Internal consistency reliability was excellent (70.96) for all simulation modalities. Varimax rotation resulted in one factor models explaining 77% of the variance for Harvey simulation and standardized patient simulation with all items strongly loaded on the one factor (>7 and >06, respectively). A one factor model explained 57% of the variance for high-fidelity simulation with all items strongly loaded on one factor (>0.6). Results were triangulated using the acceleration factor, parallel analysis, and Kaiser’s rule, nongraphical solutions to Cattell’s scree test. Due to logical construction of the instrument, a three-factor model was investigated for high-fidelity simulation. A three-factor model increased variance accounted for by 12%. A three-factor solution was consistent with previous work in that two prebriefing items loaded on one factor, five debriefing items loaded on one factor, and the remaining 12 items loaded on one factor.

**Conclusion:** The SET-M was found to be a reliable tool when used to evaluate medical students’ perceptions of how well their learning needs were met when participating in three different types of simulation-based education: High-fidelity, Harvey (mid-fidelity), and SPs. It is imperative that healthcare disciplines look outside their own literature when considering how to evaluate various aspects of simulation education and consider use of tools that have demonstrated reliability and validity in other professions. It is equally important that evaluation tools regularly undergo examination to determine if they require updates due to the rapid changes in this teaching methodology.

References available upon request

Full disclosures for all authors and coauthors available upon request
INTRODUCING A MOMENT OF SILENCE USING SIMULATION TO COPE WITH DEATH IN THE ED (#515)
Presentation Category: Education

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Introduction: Emergency medicine (EM) physicians are frequently faced with the challenge of witnessing patient death. Chronic exposure to patient death in the emergency department can lead to burnout resulting in depersonalization, low morale, and poor patient care. A moment of silence after patient death in the emergency department (ED) can be utilized as a possible coping mechanism for EM physicians. The primary purpose of this study is to evaluate the effectiveness of using simulation-based training for introducing a moment of silence to EM residents as a novel technique for coping with patient death in the ED, as well as introducing the concept of a moment of silence. We believe that introducing a moment of silence during a simulated patient scenario will translate into implementation in the ED in real-time, foster a better interprofessional team dynamic, help residents cope with patient death, and help residents more seamlessly return to patient care following a death.

Methods: The project used a convenience sample of EM residents. 21 residents participated in a 30 minute voluntary simulation-based training session. A total of 4 sessions were conducted. The simulation scenario involved a patient presenting in asystole. The team is expected to call time of death. Immediately after, a confidante acting as a nurse, requests for a moment of silence. Anonymous pre-and post-simulation surveys based on a Likert scale were distributed about the challenges of witnessing death in the ED, coping skills, their views about using a moment of silence in daily practice and whether it can be used as a coping technique. A month after the course, an anonymous follow-up survey was sent electronically to the participants to determine perceived usefulness of a moment of silence as a coping technique and whether a moment of silence is being used in their clinical practice. A two-round modified Delphi technique was used in constructing all three survey questionnaires.

Results: The pre-simulation survey revealed that majority of residents agreed (mode of 4) that witnessing patient death in the ED is emotionally challenging and contributes to burnout, yet feel comfortable coping with the emotions related to witnessing patient death in the ED. After the completion of the simulation course, the post-simulation survey revealed that majority of residents agreed (mode of 4) that a moment of silence is a useful tool to help cope with death encountered in the ED. The majority of residents strongly agreed (mode of 5) that they would like to implement a moment of silence into their clinical practice. The data from the follow up survey one month after the course is still being analyzed.

Conclusion: Based on the immediate post-simulation surveys response, the majority of residents agreed that a moment of silence would be a useful coping tool when witnessing patient death in the ED and plan to initiate one. The follow-up survey, which has been distributed but not yet analyzed, will help determine whether residents are implementing a moment of silence into their clinical practice and if they view it as a useful coping mechanism after encountering patient death in the ED. Interestingly, 2 residents felt that acknowledging patient death by a moment of silence made it more difficult to return to work. Interesting questions and discussions have arisen regarding the moment of silence, such as, “for whom are we doing the moment of silence?” In the post-simulation debrief, some residents expressed that they do it for themselves, others’ expressed as a tribute to the patient’s life, others as a coping mechanism for the entire ED team, and others feel it is to honor the family.

References available upon request
Full disclosures for all authors and coauthors available upon request
LESSONS LEARNED FROM DEBRIEF EVALUATION AT SCALE IN A RESOURCE LIMITED SETTING (#628)
Presentation Category: Education

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Introduction: Debriefing, a critical component of simulation learning, is a difficult skill to learn and perfect. The Debrief Assessment for Evaluation in Healthcare (DASH) and the Center for Advanced Pediatric and Perinatal Education (CAPE) Debriefing Evaluation Tool have been created and validated to measure debrief effectiveness in high-resource settings (1–3). However, little is known about debrief assessment in low resource settings where time is limited, debrief evaluators and facilitators are inexperienced, and provider education and literacy levels are low. In Bihar, India, where simulation and debriefing is becoming an important tool in teaching basic emergency maternal and neonatal care, assessment and feedback of debriefing skill is essential.

Methods: The aims of this analysis were to compare the ability of the DASH and CAPE evaluation tools to reliably assess debrief skill and to assess if debriefing skills were maintained over time by midwife nurse mentors who worked for a simulation training program in Bihar India (4). Trained raters evaluated randomly selected videos of simulation debriefs using the modified CAPE and DASH debrief evaluation tools. Reliability was determined for each quality indicator, and those with high reliability were assessed for changes overtime.

Results: A total of 73 debrief videos were double coded and analyzed. Fourteen of 18 CAPE indicators and two of six DASH indicators were reliably coded (ICC > 0.6). The majority of reliable indicators increased or were maintained over the 8-month intervention. The number of times ‘instructors asked questions’, the amount of ‘trainee responses’, and the ‘organization of the debrief’ improved significantly with practice (p < 0.01, p = 0.04). In contrast, the percent of ‘time spent playing the video’ and ‘time spent in the application phase’ fell by 6.2% (p = 0.01) and 3.4% (p = 0.04), respectively. The ratio of ‘trainee responses: instructor questions plus statements’ approached, but did not equal 1:1, the score of a novice debriefer.

Conclusion: In the Bihar context, we found more success assessing debriefs with the CAPE tool, as compared to the DASH tool. In addition, nurse mentors largely maintained their debriefing skills overtime, and several improved with increased practice. However, the low reliability on several indicators and the references available upon request Full disclosures for all authors and coauthors available upon request

EXPLORING DEBRIEFING METHODS IN VIRTUAL GAMING SIMULATION (#205)
Presentation Category: Education

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Introduction: Debriefing is a vital component of simulation that fortifies the student’s learning experience (Dreifuerst, 2009). This component involves facilitating students’ reflections upon the simulation events and their emotions as well as analyzing their clinical decisions (Zigmond et al, 2011). As such, debriefing is pivotal to the simulation experiential learning process. Debriefing methods specifically related to virtual simulation have not been critically examined. Considering this gap in the literature, along with the shift to online learning and technology-enabled learning, our research examines various debriefing formats in the context of virtual these in the context of virtual-based simulations. The study purpose is to compare the effectiveness of technology-enabled debriefing methods to traditional, in-person debriefing after a virtual gaming simulation, on nursing student outcomes (self-efficacy, knowledge, and debriefing experience).

Methods: In this pilot study, we used a quasi-experimental survey design to test the differences between three debriefing methods and the mean scores for learning outcomes related to knowledge, self-efficacy, and the debriefing experience. The Control Group consisted of a traditional, in-person debrief, Intervention Group 1 consisted of a self-debrief and Intervention Group 2 consisted of a synchronous online debrief. The data were analyzed through descriptive and inferential statistics using IBM SPSS version 24.0. Descriptive statistics were used to calculate results for the demographic and self-efficacy surveys, the debriefing experience scale and the multiple choice tests. Dependent t tests were used to measure change within groups for the pre- and post-self-efficacy surveys and multiple choice test scores. The ANOVA and post hoc tests were used to determine the impact of debriefing method on knowledge, self-efficacy and debriefing experience between groups.

Results: Thirty-six students completed the pre and post surveys. Fifteen students participated in the self-debrief group, thirteen in the in-person group and eight in the virtual group. There were no statistically significant differences in the self-efficacy post-test scores, with the greatest gains in the in-person group. The total mean score for all groups on the pre-knowledge test was high at 7.6/10 and the post-knowledge test mean was 8.4/10. There was no statistically significant difference on the pre/post-knowledge mean scores between the groups. The mean score for all groups on the debriefing experience scale was 60.2/70. The in-person group reported the highest score, followed by the virtual group.

Conclusion: This pilot study involved a small sample with unequal group sizes. The results have informed plans for a larger study for the fall of 2017. The intervention study will recruit a larger sample size so that more reliable inferences can be made from the results. The self-efficacy tool and the debriefing experience scale validated well for all groups, thus both will be used in the intervention study without changes. The knowledge test was too easy as a pretest; changes have been made to the ineffective distractors to increase test difficulty. In the pilot, students selected the form of debriefing they would participate in based on their schedules. To increase the randomization of participants in the larger study, students will be assigned to a debriefing type rather than self-selecting. Preliminary results from the larger study will also be shared in this session. The results of these studies may indicate which type of debriefing heightens students’ learning through virtual simulations.

References available upon request
Full disclosures for all authors and coauthors available upon request
AN EXPLORATION OF PHYSICAL THERAPY FACULTY DEVELOPMENT WITH SIMULATION (#390)

Introduction: Simulation education is used in physical therapist education as an active teaching method to facilitate critical thinking and reflection to prepare students for clinical practice (1). The adoption of simulation as a teaching method in their practice requires time and training (2). However, how this teaching practice impacts a faculty member is not well understood. The purpose of this study was to explore individual physical therapist faculty members’ experiences with simulation and understand how using simulation may have transformed their teaching practice. The research question was: How do physical therapist faculty develop using simulation and are their commonalities between educators?

Methods: An interpretive phenomenological analysis (IPA) approach was used. Following IPA, a small sample size of subjects participated in three individual semi-structured interviews (3). Transformative learning theory, previously used to understand simulation and teaching practice was used as a theoretical framework (4,5). Semi-structured interview questions were created through the lens of transformative learning theory to allow for faculty transformations to be uncovered. Interview transcripts were read multiple times for a general understanding of the individual participant’s story. Then, IPAs two step iterative and inductive coding was completed. Credibility and trustworthiness were achieved through member checking where participants were provided access to their transcripts from the first two interviews for comments or corrections. Validity was established through using transcript excerpts to support identified themes analytic memos to record researchers field notes.

Results: Eight physical therapist faculty members (25% male) with a range of 3 to 16 years of using simulations shared their individual experiences. A total of 1336 transcript segments were coded and 149 analytic memos were recorded. Each participant was found to have a unique introduction to simulation and varied in their training and use of simulation. Four common themes related to faculty development were identified across participants. Themes identified faculty: rely on their previous clinical and educational experiences; are impacted by how they were introduced and trained with simulation; interconnect simulation teaching with their belief in inter-professional education; transformed their professional or personal lives through teaching with simulation.

Conclusion: While everyone had unique experiences and varying simulation training, commonalities related to professional development and transformation were found. Several shared experiences influenced the faculty development and created change within their personal and professional lives. Further research into faculty development with simulation education is needed. This study provides useful information for faculty seeking to adopt or further understand the teaching practice of simulation in physical therapist education and provides insight into expectations when adopting simulation. Results add to the collective body of knowledge on simulations influence and importance in education.

References available upon request

Poster #123

BASIC LIFE SUPPORT INSTRUCTORS – A PERFORMANCE REVIEW (#924)

Introduction: High-quality cardiopulmonary resuscitation (CPR) and the use of an automated external defibrillator (AED) improve survival from out-of-hospital cardiac arrest. AEDs are thought to be easy to use however variations in AED electrode placement may affect the success of defibrillation success. During basic life support (BLS) courses, instructors are responsible for dissemination of resuscitation skills, e.g. through demonstration of both CPR and the use of an AED. The quality of BLS instructors’ CPR skills and ability to use an AED correctly, and their ability to demonstrate and describe these abilities may affect participants’ potential learning outcome. To best support and focus the continued faculty development of certified BLS/AED instructors an investigation of their performance was warranted. The aim of this study was to evaluate CPR skills of certified BLS/AED instructors and to determine their competencies in using an AED.

Methods: BLS/AED instructors certified by the European Resuscitation Council (ERC) and/or the Danish First Aid Council were asked to demonstrate CPR and operate a training AED (Lifepak ® CR-T Plus, PhysioControl, with a default audio track duration of 67 sec from start to time of first shock) on a resuscitation torso manikin with arms (AMBU ® Man, AMBU), equivalent to a teaching setting, but without explanation or pauses. The test was video recorded. Data from the first three cycles of CPR were analyzed. Correct CPR was defined according to the ERC 2015 Guidelines: chest compression depth of 5–6 cm, chest compression rate of 100–120 min-1, and tidal volume between 500–600 mL. After the test, a measure tape forming a X-Y coordinate system was placed on the manikin to measure the distance from the center of the AED electrode to the position recommended by the ERC. Following the test, participants were asked to complete a questionnaire testing their knowledge of current resuscitation guidelines.

Results: In total, 45 instructors participated (1 instructor withdrew). Data from 44 instructors were analyzed (66 % male, median age: 30 years (Q1-Q3: 26–56), median time as an active instructor: 4 years (Q1-Q3: 2–10)). Median chest compression depth was 6.5 cm (Q1-Q3: 6.0–7.1), and 23% of chest compressions were performed within recommended guidelines. Chest compressions were delivered with a mean rate of 115 min-1 (SD ± 12). Median volume of the successful rescue breaths was 410 mL (Q1-Q3: 240–640). Only 9 % of all rescue breaths were between 500–600 mL. Median deviation from recommended position for the left and right AED electrode was 5.2 cm (Q1-Q3: 2.9–10.4) and 1.5 cm (Q1-Q3: 0.9–3.4). Overall, 47% placed the left AED electrode within 5 cm of the recommended position and 84% placed the right AED electrode within 5 cm of the recommended position. When asked, 59% and 66% of instructors could describe (in writing) the recommended position of the left and right AED electrode, respectively.

Conclusion: Certified BLS/AED instructors performed CPR with an excessive chest compression depth while maintaining a sufficient chest compression rate. Only a fraction of rescue breaths were sufficient to meet the recommended guidelines. When demonstrating the use of an AED, BLS/AED instructors often misplaced the left AED electrode, and less than 2/3 of instructors could sufficiently describe the recommended position of the left AED electrode. Overall, this study found an urgent need to intensify faculty development for BLS/AED instructors with an increased focus on compression depth, rescue breaths and AED electrode placement to ensure optimal training conditions for participants attending BLS courses.

References available upon request

Poster #122

AN EXPLORATION OF PHYSICAL THERAPY FACULTY DEVELOPMENT WITH SIMULATION (#390)

Presentation Category: Education

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Introduction: Simulation education is used in physical therapist education as an active teaching method to facilitate critical thinking and reflection to prepare students for clinical practice (1). The adoption of simulation as a teaching method in their practice requires time and training (2). However, how this teaching practice impacts a faculty member is not well understood. The purpose of this study was to explore individual physical therapist faculty members’ experiences with simulation and understand how using simulation may have transformed their teaching practice. The research question was: How do physical therapist faculty develop using simulation and are their commonalities between educators?

Methods: An interpretive phenomenological analysis (IPA) approach was used. Following IPA, a small sample size of subjects participated in three individual semi-structured interviews (3). Transformative learning theory, previously used to understand simulation and teaching practice was used as a theoretical framework (4,5). Semi-structured interview questions were created through the lens of transformative learning theory to allow for faculty transformations to be uncovered. Interview transcripts were read multiple times for a general understanding of the individual participant’s story. Then, IPAs two step iterative and inductive coding was completed. Credibility and trustworthiness were achieved through member checking where participants were provided access to their transcripts from the first two interviews for comments or corrections. Validity was established through using transcript excerpts to support identified themes analytic memos to record researchers field notes.

Results: Eight physical therapist faculty members (25% male) with a range of 3 to 16 years of using simulations shared their individual experiences. A total of 1336 transcript segments were coded and 149 analytic memos were recorded. Each participant was found to have a unique introduction to simulation and varied in their training and use of simulation. Four common themes related to faculty development were identified across participants. Themes identified faculty: rely on their previous clinical and educational experiences; are impacted by how they were introduced and trained with simulation; interconnect simulation teaching with their belief in inter-professional education; transformed their professional or personal lives through teaching with simulation.

Conclusion: While everyone had unique experiences and varying simulation training, commonalities related to professional development and transformation were found. Several shared experiences influenced the faculty development and created change within their personal and professional lives. Further research into faculty development with simulation education is needed. This study provides useful information for faculty seeking to adopt or further understand the teaching practice of simulation in physical therapist education and provides insight into expectations when adopting simulation. Results add to the collective body of knowledge on simulations influence and importance in education.

References available upon request

Full disclosures for all authors and coauthors available upon request
**Poster #124**

**SOCIAL NETWORK ANALYSIS OF A HEALTHCARE SIMULATION COMMUNITY (#367)**

**Presentation Category:** Education

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**Introduction:** Graphical analysis of networking maps can be used to measure the health and vulnerabilities of a professional community. We aimed to capture and map the connections and relationships between individuals and organisations in the healthcare simulation community of the state of Western Australia.

**Methods:** In association with baseline list of established simulation practitioners, an online survey instrument and propriety mapping software was used to establish links and interactions between individuals and their own and external organisations.

**Results:** There were 78 respondents with 500 pairs of relationships generated for 203 nominated personnel. Collaborative patterns were presented in matrices and social network maps. These data identified leaders, important networks and weaknesses in this community of practice. During the survey period, two leaders left the state for opportunities elsewhere in Australia, highlighting the vulnerability of the simulation community in a geographically isolated region.

**Conclusion:** The study confirmed that there were a handful of simulation educators with many linkages both within and external to their own organisations. Also, isolated groups with poor cross-organisational associations were identified. This information can be used by the participating individuals and their organisations to review their linkages to the wider simulation community and consider appropriate improvements as required.

References available upon request

Full disclosures for all authors and coauthors available upon request

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**Poster #125 - 2nd Place Award Winner**

**QUALITATIVE STUDY OF GAPS BETWEEN NEONATAL INTUBATION SIMULATION AND PRACTICE (#805)**

**Presentation Category:** Education

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**Introduction:** Simulation-based methodologies are the primary approach for neonatal endotracheal intubation training. Although this method allows for repetitive practice with feedback, pediatric resident intubation success rates on actual neonatal patients is approximately 25% (1). This lack of skill transfer to the clinical environment is attributed in part to the airway simulators’ lack of anatomic and functional fidelity (2). Therefore, educators and simulator manufacturers need a better understanding of simulation training deficits to advance simulator and session design. To determine the differences between simulation-based practice and intubation on actual neonatal patients, to inform simulator design and development, and guide instructional design.

**Methods:** In-depth 60 minute semi-structured in-person or phone interviews were conducted with 12 attending neonatologists, 10 second year and 10 third year neonatology fellows; a total of 32 participants from 14 different neonatal-perinatal training programs. Questions explored the perceptions of differences between simulation-based practice and intubation on actual neonatal patients related to the environment, equipment and context. A constant comparative method of data analysis was used to identify themes. Purposeful sampling, member checks, triangulation of data analysis, and thick rich description was performed to ensure transferability.

**Results:** Four themes emerged: 1) Simulation-based sessions constrain trainee advancement i.e. “there is only so much that can be done on simulators”. Clear white demarcation of manikin vocal cords hampered trainees’ ability to identify correct anatomy on patients. Single manikin anatomy and mid-line configuration did not allow trainees to practice patient positioning. Manikin stiffness translated into excessive use of force clinically with potential for trauma. 2) Simulators foster the development of poor habits e.g. lack of secretions in a manikin caused trainees to forget suctioning secretions clinically. 3) Session design was driven by instructors and did not account for learner needs e.g. lack of sedation training for advanced trainees. 4) The unpredictability and pressure of real world intubations makes replication in a simulation challenging. Trainees had a diminished sense of urgency and risk during simulated intubations leading to inability to adjust to new situations in real life.

**Conclusion:** Multiple limitations of simulation-based training were noted by the neonatology attendings and senior fellows. All participants noted that transfer of skill from simulation-based training to clinical encounters did not occur readily. Suggestions for improvement include: 1) vocal cord design that make markings less obvious, 2) adding more degrees of freedom to neck movement to aid in practice positioning, 3) use of softer material and more flexible joints, 4) training for difficulty by adding simulated head and tongue motion, 5) designing manikins with simulated secretions and amniotic fluid coating, 6) training sessions should address local learner needs, and 7) performing simulations in-situ with time pressure in multi-disciplinary teams to heighten risk and urgency.

References available upon request

Full disclosures for all authors and coauthors available upon request
POSTER #126

SIMULATION FACULTY IS MORE IMPORTANT THAN SIMULATOR: EM MULTI-CENTER SURVEY (#730)

Presentation Category: Education

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Introduction: Although implementation of simulation based education (SBE) is essential for emergency medicine residency programs (EMRPs), little is known about what are the factors associated with degree of implementation of SBE in EMRPs. Therefore, we conducted a multi-center cross sectional survey on SBE implementation among EMRPs in the Kanto region, Japan. In addition, we investigated factors associated with degree of SBE implementation among EMRPs. Upon investigation, we hypothesized that the number of simulation-faculty was associated with the degree of SBE implementation.

Methods: We conducted a multi-center cross sectional survey on SBE implementation for EM resident education, against accredited EMRPs of the Japanese Association for the Acute Medicine in the Kanto region, Japan, from April 2016 to August 2016. Survey question themes included characteristics of institutions, status of simulation education (possession of simulator, annual simulation time, simulation curriculum, number of simulation-faculty etc.). In analysis of factors associated with degree of SBE implementation, we defined EMRPs with robust SBE implementation as annual simulation time more than 10 hours. To investigate the association between number of simulation-faculty and robust SBE implementation, we conducted unadjusted and adjusted logistic regression models. In the adjusted logistic regression model, we adjusted for possession of simulator in emergency department (ED), presence of simulation curriculum, and presence of simulation based formative or comprehensive assessment.

Results: Response rate of the survey was 73% (106/145). Rate of simulator possession in ED was 42%. 99% EMRPs had simulator within their institutions. 53% had a simulation curriculum, 15% used simulation for formative or comprehensive resident assessment, and 32% EMRPs reported their annual SBE time was more than 10 hours. In the univariate analysis, although possession of simulator in ED was not significantly associated with robust SBE implementation, number of simulation-faculty, presence of a SBE curriculum and presence of simulation based assessment were significantly associated. In the multivariate analysis, possession of simulator in ED (OR 0.44; 95% CI, 0.14-1.26), presence of simulation based assessment (OR 2.88; 95% CI, 0.77-11.73) were not significantly associated robust SBE implementation, while we observed association of robust SBE implementation with number of simulation-faculty (unit OR 1.32; 95% CI, 1.11-1.61) and presence of curriculum (OR 4.4; 95% CI 1.58-13.74).

Conclusion: To the best of our knowledge, our study is the first survey on SBE implementation for emergency medicine resident education in Japan. Although 99% of EMRPs had simulator within their institutions, only 32% of EMRPs reported that their annual SBE time was more than 10 hours. In the multivariate logistic regression analysis, the number of simulation education faculty was independently associated with robust SBE implementation. Therefore, in addition to expensive simulators or state of art simulation environment, faculty development program for SBE is essential for the Japanese emergency medicine residents’ education.

References available upon request

Full disclosures for all authors and coauthors available upon request

POSTER #127

DETERMINING SIMULATION INSTRUCTOR QUALIFICATIONS (#1020)

Presentation Category: Education

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Introduction: The instructor is critical to the success of simulation. A well planned simulation with well-defined objectives is more likely to be successful. The simulation instructor must be adaptable and prepared with all the necessary tools. The Veterans Health Administration (VHA) encompasses an array of simulation facilities, educators and programs. Facilities range from accredited centers to lone mannequins run in situ. Instructors in the VHA system encompass SimChampions with certifications and degrees in Simulation representing geographical regions to local clinicians, pharmacists, social workers, chaplains, etc. with basic hands-on experience. Programs in the VHA Simulation Learning, Education, and Research Network (SimLEARN) range from nationally developed curricula such as Code Team Training to classes designed to meet individualized needs. SimLEARN sought to craft a consensus set of competencies to guide simulation educators throughout our national network of 150+ medical facilities.

Methods: A Modified Delphi process will be used to determine competencies for simulation instructors. Round 1 combed existing competencies such as the INACSL standards as well as searched literature via Medline, CINAHL and PubMed. We also reviewed 40+ existing fellowship and instructor programs for published objectives. These data were thematically organized into the 7-domain framework used by SimLEARN’s Simulation Fellowships. Sixty unique elements were identified. Round 2 will poll 20+ individuals representing professions, simulation backgrounds and facility types in the VHA network. An a priori cut off of 70% consensus of Likert responses 6 or 7 out of 7 will be used to determine consensus. Responses will be analyzed using standard descriptive statistics. Round 3 will present elements meeting criteria with corresponding analysis and comments to the group for a final “include” or “not include”. Those elements generating greater than 70% “include” responses will determine competencies.

Results: in-progress – available by September 1, 2017

Conclusion: in-progress – available by September 1, 2017

References available upon request

Full disclosures for all authors and coauthors available upon request
PEDIATRIC TRAUMA BOOT CAMP:
A SIMULATION-BASED CURRICULUM (#733)
Presentation Category: Education

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Introduction: Trauma is a leading cause of morbidity and mortality in infants and children worldwide. Pediatric trauma management is complex, time critical, and requires the coordinated efforts of a multidisciplinary health care team. Pediatric patients have several unique anatomical and physiologic differences from adult patients. Trauma education is one of the most commonly reported deficiencies in pediatric emergency training. In the advanced trauma life support (ATLS) course there is little to no guidance on effective leadership, teamwork, or effective communication as a trauma team leader. Additionally, there is very limited discussion about pediatric trauma in this course. The primary goal of this study was to create a pediatric trauma curriculum for pediatric emergency medicine (PEM) fellows and medical emergency resident (EM).

Methods: A two-day boot camp curriculum was designed for the management of pediatric patients with a variety of trauma related pathology. The curriculum consisted of a two-day, 10-hour total experience. Thirty hours of preparation and execution of the curriculum was required which included pediatric trauma patient simulations, content expert lectures, and group discussion by expert adult and pediatric emergency physicians, trauma surgeons and simulation faculty. Baseline and acquired knowledge, confidence, and performance metrics were assessed through the use of confidence surveys, cognitive questionnaires, and a validated evaluation tool of teamwork and performance in the management of pediatric trauma cases.

Results: Thirteen (n=13) trainees participated (7PEM/6EM resident) with a significant improvement of pediatric trauma knowledge where the mean (SD) pre-test score was 52.3% (10), compared to 66.2% (8.7) post with (p-value < 0.01), and the mean paired difference (95% CI) being 13.8% (9.2 – 18.5). Wilcoxon Signed Rank Test to compare the (pre-post) change in confidence scores demonstrated significant statistical improvement in the overall self-confidence of the trainee in leadership, role delegation, effective closed loop communication, CRM principles, performing primary and secondary surveys and effective difficult airway management of pediatric trauma patients (p-value < 0.01 for all). No significant changes were seen in utilization of the Glasgow Coma Scale, orthopedic splinting/reduction skills and performance of pediatric FAST exams. The NOTECHS data demonstrated improvement in all 5 behavioral domains and teamwork performance during simulations.

Conclusion: At the conclusion of this intensive simulation-based trauma boot camp participants demonstrated significant improvement of the basic knowledge, confidence and performance in the management of pediatric trauma cases.

References available upon request
Full disclosures for all authors and coauthors available upon request

ANESTHESIA SIMULATION BOOT CAMP INCREASES CONFIDENCE IN RESIDENCY ORIENTATION (#682)
Presentation Category: Education

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Introduction: Multiple studies demonstrate the use of simulation as part of medical education to improve technical proficiency, efficiency (1), teamwork, and communication (2), especially in high-stress, emergency situations. Case-reports credit prior simulation training with subsequent competence in rarely encountered emergencies (3). Anesthesia-specific crisis management during orientation has been associated with perceived increase in confidence post facto (4), but no direct comparison of before and after confidence scores exists. We hypothesized that an intensive one-week simulation Boot Camp in essential anesthesia skills would increase confidence in participants in performing these skills compared to their baseline scores. We also hypothesized that participants that regularly play video games may have greater benefit that their peers that do not, as they are more likely to accept simulated realities as an educational technique.

Methods: We created a high-fidelity simulation program, "Boot Camp", for anesthesia residents as part of orientation. This one week curriculum in the 3rd week of residency was designed to reinforce basic anesthesia skills, independence, and communication. Each day, every resident participated in two short individual scenarios, including debriefing on their particular performance as well as scripted learning points with an attending anesthesiologist. Scenarios focused on airway management and complications, or common hemodynamic perturbations. Before the course, participants were given a questionnaire including questions about prior simulation and gaming experience and a questionnaire rating their confidence level from 1 to 10 on various basic anesthesia skills. At the course conclusion, residents repeated the confidence questionnaire and evaluated the contents and structure of the course on a Likert scale from 1 to 5. Aggregate pre and post confidence scores were generated.

Results: Data were collected on 267 residents over 10 years. Confidence improved in every skill category. Mean confidence represented as an aggregate score increased by 37.99 (95% CI 34.58 – 41.41) from 131.51 (95% CI 126.97 to 136.05) pre Boot Camp. Men had greater confidence (140.82) than women (121.32) before Boot Camp (p = 0.000). Men also had greater confidence (175.67) than women (162.82) after Boot Camp, but a trend toward significance showed that women had a greater net increase in confidence (p = 0.055). Participants who played video games had higher initial confidence scores (p = 0.000). Course evaluations internally validated that those who responded that they felt increased confidence or felt self-conscious on the Likert scale, also had higher or lower confidence scores respectively.

Conclusion: High fidelity simulation during orientation increases confidence in essential anesthesia skills in first year residents. Female residents have a lower starting confidence level, but data suggests that this type of training program may be effective in closing this gap. Residents who routinely play video games had higher starting confidence, but their peers who do not play video games had a greater increase in confidence after completing the course.

References available upon request
Full disclosures for all authors and coauthors available upon request
THE EFFECT OF GROUPS DYNAMICS IN SURGICAL SKILL TRAINING (#380)
Presentation Category: Education
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Introduction: Open surgical skills are a core competency for surgeons. However, duty-hours have decreased and combined with the introduction of minimally invasive methods, surgical trainees receive less training in open surgery (1,2). Self-directed simulation training at home can improve access to training, nonetheless, when training on your own the motivation to train is difficult to maintain. The social component as a motivational factor during training is lost. Furthermore, there are also limited opportunities for feedback when training unsupervised. Both external motivation and feedback are important factors in motor skill learning (4,5). Dyad training could keep trainees motivated and improve their performance through observation and feedback, but we lack knowledge on how the effects of dyad training can be transferred to training at home.

Methods: The study is a prospective, rater-blinded, randomized controlled trial. We examined the effect of off-site self-directed training in groups versus individual training in open surgical skills. Ninetyseven medical doctors were randomized to train individually or in pairs during a six-week course. The course consisted of didactic instructions in combination with self-directed training at home. The participants received written material and a transportable knot tying and suturing station (Ethicon). Trainees were tested before and after the course in five different suturing techniques using the transportable suturing station. Tests were video recorded and rated by two experts, using the Objective Structured Assessment of Technical Skills (OSATS) Global Rating Scale (GSR). Trainees kept a training log on all off-site training activities including numbers of training sessions, time spent on training and what tasks they do.

Results: Results are anticipated, since the study is in-progress. Of the 97 doctors included in the study 40 were interns, 32 were residents while 25 were currently unemployed, on maternity leave or PhD-students. Preliminary data analysis shows that participants training in pairs are more likely to pass the course, make fewer errors, spend less time training and perform more consistently as a group compared to participants training individually.

Conclusion: Conclusion is anticipated, since the study is in-progress. Preliminary data indicate that dyad practice can improve training in open surgical skills. Dyad practice can help motivate participants to train. Also, dyad training could benefit learners in difficulty. Participants training in pairs spend less time on training, but still perform as well as participants training individually. In our study, a higher number of dyad trainers, compared to participants training individually, achieved the required surgical skills to pass the course in basic open surgical skills, making the course more cost-effective.

References available upon request
Full disclosures for all authors and coauthors available upon request

RELATIONSHIP OF FIDELITY & EXPERIENCE ON NURSE PERFORMANCE DURING SIMULATION (#1204)
Presentation Category: Education
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Introduction: The purpose of this quantitative study is to examine the relationship of simulation fidelity on performance of registered nurses in simulation. Simulation fidelity encompasses mannequins, equipment, environment, and psychological aspects under two conditions: low fidelity and high fidelity. It is hypothesized that different levels fidelity may result in variations in performance as measured by the CSET score. It is also hypothesized that variations nurses’ performance may be explained by interactions between level of fidelity and nurse experience. This study answers the following research questions: 1. What is the relationship between nurses’ years of experience and simulation performance? 2. What is the relationship between fidelity levels and simulation performance? 3. To what extent does the amount of nursing experience provide a moderating effect on the relationship between fidelity and performance? 4. What is the relationship between perception of fidelity and experienced fidelity?

Methods: The NLN-Jeffries Simulation Framework was used for this quantitative study. A convenience sample of 68 RNs were randomly assigned to either a high or low fidelity simulation. The 15 min scenario was the same for both groups; fidelity differences were in terms of mannequin, equipment/environment and psychological factors. Nurse performance was measured by observation and researcher assessment of performance using the Clinical Simulation Evaluation Tool (CSET). Construct validity was established comparing the CSET to the CCEI. Participants will also complete the Fidelity component of the Simulation Design Survey (SDS). Independent variables are nurse experience and simulation fidelity. Dependent variable is performance (CSET score).

Results: Clinical Simulation Evaluation Tool (CSET) scores will be analyzed using multiple linear regression to examine the relationship between fidelity and performance during simulation. Perceived fidelity (SDS) scores will be compared to actual fidelity.

Conclusion: Results of this study have implications for undergraduate, graduate, and continuing nursing education. Simulation is used frequently in nursing education and can be resource intensive. This study may provide information that will allow educators to choose the best level of fidelity for participants. Results will also contribute to the body of knowledge regarding the NLN-Jeffries Simulation Framework.

References available upon request
Full disclosures for all authors and coauthors available upon request
**THE NURSE FACULTY IN INTERPROFESSIONAL EDUCATION: A DESCRIPTIVE STUDY (#844)**

**Presentation Category:** Education

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**Introduction:** The study aims to provide fundamental understanding on how IPE faculty team members synergize to collaborate the planning, activity structuring, co-facilitation and debriefing the learners. The main focus is on the nursing faculty’s perception & reflection on her role as a faculty in IPE. IPE refers to the multi-cultural healthcare setting in Singapore whereby IPE sessions are attended by medical and nursing staff. The IPE sessions are conducted in the hospital training facility. Research Questions: a) What do Singaporean health care faculty understood by the term inter-professional health care education? b) What is the role of nurse educators in inter-professional education within the Singaporean context? c) What is the role of other professional health care education? d) What is the nature of the role relationships between the different professional groups involved in inter-professional education?

**Methods:** This is a multiple case study with three identified cases who are nurse educators from three healthcare institutions. Data collection is through direct IPE activity observation and structured interviews. The nurse faculty will be observed for opportunities to engage IPE learners. Objectives for direct observation: 1. Observe for coordination in facilitation work among faculty in an IPE session involving 2 or more professions. 2. Observe for engagement of participants for facilitated discussion during the SBE-debriefing! 3. Observe faculty role relationship, role conflict/s and the nature of such conflicts. The observation is followed by structured interviews with the involved nurse faculty, 1 IPE faculty and 2 learners. Interview transcriptions are analyzed for thematic identification with review done to determine regrouping of themes into more appropriate categories to facilitate discussion and for cross case synthesis.

**Results:** 3 most common themes (interim) emerged: 1. Hierarchy 2. Readiness to lead 3. Critical need for IPE IPE is a relatively new healthcare education concept for educators in Singapore though IPE programs have been introduced since 2005. The preparation of the nurse faculty towards IPE facilitation relies on the frequency of exposure opportunities to IPE. Issues surfaced include the value of the nurse faculty to debrief and address IPE learners as a whole. Disparity in perceptions on input from nurse faculty. The nurse faculty often feel unsure of her input to learners; learners expressed that they have gained much from the nurse faculty. The medical faculty are consistently leading the scenario initiation and debriefing. Nursing faculty felt that "things are taken cared of". The mere exposure to IPE is sufficient to build experience to facilitate. All participants felt that IPE has an important role in shaping their career in healthcare.

**Conclusion:** This study has discovered multiple perspectives from the nurse and medical faculty, and learners. The perspectives contributed insights that help to identify components that are useful in IPE facilitation development, contributing to IPE trainer curricula evolution that is suitable for use in Singapore or the Asia region.

References available upon request

Full disclosures for all authors and coauthors available upon request

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**APPLYING THE SELF-REGULATED PREDICTED RESPONSE FRAMEWORK TO CLINICAL SIMULATION (#448)**

**Presentation Category:** Education

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**Introduction:** It has become increasingly important for health professional students to engage in self-assessment and self-regulated learning (SRL). Their ability to recognize their own strengths and weaknesses, and regulate practice will ultimately contribute to patient safety. The Self-Regulated Predicted Response (SRPR) framework (1) is built upon four key SRL elements: accurate self-assessment, goal setting, attribution, and actionable feedback. The SRPR framework was designed to improve health care practitioners’ SRL and may be applied to three stages of clinical simulation: preparation, performance, and debriefing. We operationalized the SRPR simulation approach in a BNSc program by creating scenario-specific learning outcome assessment rubrics. Space is provided in SRPR rubrics for score rationalization for each assessment, and scaled descriptors are related to outcomes, not behaviours. Our objective is to describe application of the SRPR framework to clinical simulation in a BNSc program.

**Methods:** We conducted mixed method evaluations of clinical simulations implemented using the new SRPR approach. Two deteriorating patient scenarios were pretested with a voluntary group of 29 nursing students. Intraclass correlation coefficients (ICC) were calculated to measure inter-rater reliability of the assessment rubrics. The two scenarios were implemented in two 4th year nursing courses and learners completed the SRPR rubric pre and post simulation (3). Abbreviated versions of four unresponsive patient scenarios were implemented in a 2nd year nursing course using a brief unresponsive patient rubric administered pre-lecture, and pre and post simulation. Learner self-assessment data were collected using the rubrics. Learner and instructor satisfaction with the rubrics was assessed with a researcher-developed satisfaction scale with good internal consistency (Cronbach’s alpha = .83), and participants and instructors also provided qualitative feedback on the approach.

**Results:** Inter-rater reliability for SRPR rubrics was modest (ICC = .641 to .748; p Conclusion:** The SRPR framework provides a feasible approach to implementing clinical simulations in undergraduate nursing education. Both instructors and learners report advantages to using SRPR rubrics to strengthen the pre-simulation preparation phase and to guide debriefing. The SRPR framework allows for identification of over and under confidence by comparing the learner’s pre-simulation predicted and post-simulation self-assessment, with the instructor’s expert assessment of their performance. Moreover, by comparing rating rationales between learners and experts, the origins of inaccuracy can be identified and corrected. To fully appreciate and benefit from the SRPR framework, more scenarios with assessment rubrics will need to be incorporated into the BNSc program using the SRPR approach. Providing multiple SRPR cycles of learning should promote self-assessment accuracy and enhance learning. Further research is needed to identify the optimal number of SRPR cycles.

References available upon request

Full disclosures for all authors and coauthors available upon request
A VOICE-HEARING SIMULATION TO ENHANCE EMPATHY AND SELF-EFFICACY TO COMMUNICATE (#276)

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Introduction: The research question for this study was whether an experiential Voice Hearing Simulation (VHS) increases final year nursing students' empathy for and self-efficacy to communicate with people who hear voices and whether this is sustained six months after the VHS experience. There is evidence that nurses do not routinely discuss voice-hearing experiences with mental health care consumers (1,2). One way to address this shortcoming is the use of a VHS (3–5). Whilst there is some evidence that nursing students report empathy for voice-hearing after participating in a VHS (4,5), it is not known whether this is maintained over time, nor is there any evidence that participation in a VHS results in confidence to talk with consumers about their voice-hearing experiences. The study is important in ascertaining the utility of an experiential VHS to increase and sustain empathy and self-efficacy in nursing students.

Methods: This is a sequential mixed methods study of 376 final year nursing students who participated in an experiential Voice Hearing Simulation (VHS). The VHS comprised pre-simulation preparation, a 45-minute simulation of voices recorded on mp3 players whilst completing scheduled activities, followed by a 45-minute guided reflection of the experience. Data were collected pre and post the VHS and at six-month follow-up, using a survey comprising demographic questions, an empathy scale, a self-efficacy to communicate scale, and open-ended questions. Further qualitative data were collected via focus group interviews. SPSS was used to analyse the data. Descriptive statistics were calculated for the dependent variables, empathy and self-efficacy to communicate, ANOVA with repeated measures over the three collection periods, and post hoc comparisons of different groups using Tukey’s HSD Test, were undertaken. Qualitative data were thematically analysed.

Results: Analysis of the quantitative data revealed that nursing students' confidence to talk about voice-hearing experiences increased significantly post VHS and was maintained at six-month's follow-up. Empathy significantly increased at six-month's follow-up for females, those in whom English was an additional language, those who had no prior nursing or other tertiary education qualification, and those whose family members did not have a mental illness. Analysis of the qualitative data revealed that prior to the VHS the participants were concerned about interacting with consumers who hear voices. After the VHS they reported increased awareness of the effects of voice-hearing, reduced concerns about consumers who hear voices, and increased feelings of empathy, related to the realism of the simulation experience. Further, the VHS experience afforded them the confidence to talk with consumers about voice-hearing experiences during their mental health clinical placements.

Conclusion: The use of experiential learning principles contributed to the development of the participants’ understanding of voice-hearing and its effects on consumers. The level of realism of the simulation experience aroused emotions in the participants and contributed to their development of empathy and confidence when interacting with consumers who hear voices. This study also identified the need for the further development of specific communication skills, to address conversations about consumers' voice-hearing experiences. The findings of the study supported the research questions, highlighting the utility of VHS to increase and sustain nursing students' empathy for, and confidence to communicate with, consumers who hear voices. The VHS workshop reported in this study is recommended for the educational preparation of all nursing and other health professions students.

References available upon request

Full disclosures for all authors and coauthors available upon request

NURSING STUDENT PERCEPTIONS OF INTRADISCIPLINARY HIGH-FIDELITY RRT SIMULATIONS (#238)

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Introduction: Pre-licensure registered nurse (RN) students are required to complete clinical rotations in hospital settings during their educational training. However, RN students rarely participate in the management of acutely decompen-sating patients in collaboration with other healthcare providers. This gap in knowledge, preparation, and experience contributes to impaired utilization of available resources, such as the organizational rapid response team (RRT), and leads to adverse patient outcomes and increased healthcare costs. The objective of this project was to provide RN students in the last semester of their educational program with high-fidelity simulation experiences, requiring them to manage an acutely decompensating patient, identify clinical indications for RRT activation, practice communication skills in high-intensity environments, and work collaboratively on an intradisciplinary team.

Methods: RN students participated in a pre-briefing session that included information on RRT activation. Groups consisting of three RN students participated in a twenty-minute, high-fidelity simulation where the simulated patient experienced an acute event triggering RRT activation. Two intensivist-trained Adult Gerontology Acute Care Nurse Practitioner (NP) students presented to the bedside as members of the RRT when called by the RN students. RN and NP students then worked collaboratively to stabilize the patient. During the simulation experience, RN students also observed two additional scenarios. In one, they served as an "on call" resource. In the second, they discussed management strategies with course faculty while observing the scenario. Each scenario concluded with debriefing. After all three simulations, RN and NP students participated in a large group debriefing. RN students were then provided with an optional pen and paper survey that measured their perceptions of the experience.

Results: A five-point Likert scale was used to evaluate RN student perceptions of the simulation experience. All participants (100%, n=130) agreed or strongly agreed that the experience allowed them to practice managing an acute patient scenario, and 99.2% (n=129) agreed or strongly agreed that the experience helped them identify clinical criteria for RRT activation. The majority (97.6%, n=127) agreed or strongly agreed the experience gave them the opportunity to practice their communication skills with interdisciplinary healthcare team members. All participants (100%, n=130) agreed or strongly agreed the experience assisted them in identifying ways to improve communication with patients and healthcare team members. Additionally, 98.4% (n=128) of respondents agreed or strongly agreed the experience allowed them to work collaboratively as a team member, and 99.2% (n=129) agreed or strongly agreed that the experience helped them recognize the importance of a cohesive healthcare team.

Conclusion: The survey data supports that the learning objectives for the interdisciplinary, high-fidelity simulation experience were met. Based on the survey data, the experience introduced RN students to acute clinical situations that might be encountered in their future clinical practice, assisted them in identifying criteria for RRT activation, and provided them with a safe environment for both didactic and experiential learning. Furthermore, the data reflects that RN students found the simulation experience allowed them to practice communication skills with interdisciplinary healthcare team members and helped them recognize areas for ongoing improvement in communication. Additionally, RN students found that the simulation experience allowed them to practice collaboratively as a member of the healthcare team while solidifying the importance of a collaborative healthcare team.

References available upon request

Full disclosures for all authors and coauthors available upon request
**Poster #136**

**COGNITIVE WORKLOAD DIFFERENCES BETWEEN NOVICE AND EXPERT NURSES IN A SIMULATION: A PILOT STUDY (389)**

**Presentation Category: Education**

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**Introduction:** Simulation is used to train competent, safe nurses despite this methodology being associated with learner stress and increased cognitive workload. Several studies have used pupillometry and pupil dilation as a measure of task-evoked cognitive load. However, there are no studies identifying specific tasks in a simulation which increase cognitive workload or if there are any differences in cognitive load based on experience level.

**Methods:** Therefore, we did a prospective, two-group pilot study of Novice Nurses (senior prelicensure students; n = 13) and Expert Nurses (ICU nurses of at least 5 years; n = 15) participating in a single high fidelity heart failure simulation using eye tracking pupillometry to measure cognitive load and determine its relationship to common nursing tasks as well as determine differences between the two groups.

**Results:** Nine tasks were measured in the simulation. Of the 15 expert nurses, 9 of them completed all of the tasks but of the 13 novices, only 5 completed all 9 tasks. Using pair samples t-tests, we found a statistically significant difference in pupil size change from baseline between the Novices and Experts in all of the tasks despite no statistical difference in simulation experience between the groups (p = 0.52). Across 5 of the tasks, the Novices had significantly larger mean pupil dilation compared to their baseline (Look at Patient [p = 0.014]; Elevate Head of the Bed [p < 0.01]; Look at the Monitor [p < 0.01]; Apply Oxygen to Patient [p = 0.012]; Connect oxygen device to the wall [p < 0.01]). Experts had significantly larger mean pupil dilation only during the task, Elevate the Head of the Bed (p = 0.024).

**Conclusion:** This pilot study was able to demonstrate significant cognitive load differences between Novices and Experts in a simulation related to task performance. The Novices had greater cognitive workload on 5 of the 9 tasks as evidenced by pupil size from baseline. Simulation is known to cause stress which can affect pupil dilation but there was no difference in simulation experience between groups. Therefore, basic nursing tasks increase cognitive workload in senior nursing students (Novices) despite skills lab sessions, simulation and up to or greater than 300 hours in the clinical setting. Nurse training should concentrate on increasing repeated practice of common skills in order to prevent skill decay and reduce cognitive load. By doing so, cognitive effort can be focused on the patient problem and not common tasks.

References available upon request

Full disclosures for all authors and coauthors available upon request

**Poster #137**

**EFFECT OF ROLEPLAY SIMULATION TRAINING FOR ADVANCED PRACTICE NURSES (832)**

**Presentation Category: Education**

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**Introduction:** Roleplay simulation is an experiential learning method that is widely acknowledged as a powerful technique across multiple avenues of training and education. In Japan, to further promote home health care, by the year 2025, it is necessary to train nurses to provide specific medical assistance (e.g., drip feeding for dehydrated patients (assessment of the level of dehydration and correction by transfusion)). Therefore, nurses acquire not only practical comprehensibility, the ability to think and judge, as well as advanced and specialized knowledge and skills, but also need to understand doctors' responsibility in carrying out medical procedures. We hypothesized that roleplay simulation helped enhance the process of decision making with regard to clinical diagnosis and the mutual understanding between nurses and doctors.

**Methods:** Eighty-three nurses aged between 27 and 56, (50 females and 23 males), all of whom were working full time as resisted nurses participated in this study. Participants joined a lab training course whose learning objectives were "Perform a sensitive and accurate physical examination, diagnose common diseases and conditions" and "Collaborate effectively with health care team for problem-solving." Participants implemented the simulation training with roleplay wherein they played the roles of doctor and nurse to understand the process of decision making involved in clinical diagnosis for outpatients and doctors’ responsibility in carrying out medical procedures. Following the completion of the training, participants recorded portfolios about the summary of the training, introspection, and future plan. In total, 83 portfolios’ data were analyzed and coded using descriptive exploratory qualitative analysis. Common or recurrent codes across participants’ portfolios were identified.

**Results:** Our analysis revealed 5 major codes and 18 subcodes from portfolio data. The major codes were as follows: (1) "Awareness of the role of Advance Practice Nurses in medical assistance" included subcodes such as "Importance of nurses' best practice" and "Seeking support from other healthcare providers"; (2) "Importance of medical interview and physical assessment" included "Lack of knowledge to perform a diagnosis" and "Importance of the process to settle the diagnosis"; (3) "Need to train using several learning methods" included "Need to continue training" and "Difficulty of conducting medical examination in a short time"; (4) "Practice for interprofessional collaboration" included "Reinforcement of mutual understanding" and "Ability to communicate information correctly"; (5) "Reflective learning" included "Awareness from mutual assessment". Participants achieved learning objectives and they described their problems and tasks in their portfolios.

**Conclusion:** Our findings indicated that participants achieved the two learning objectives of the course using roleplay simulation. However, participants needed to learn more about medical interviews and physical assessments to diagnose patients accurately and quickly. Therefore, participants hoped to continue training. It was suggested that roleplay simulation motivated participants to engage in self-directed learning. Additionally, participants perceived the importance of patient safety via communication with other healthcare providers and the characteristics of nurses’ roles. With regard to this, participants understood the difficulty of the expanding nurses’ roles, and they also understood how to solve this problem using interprofessional collaboration without attempting to solve it themselves. In this study, using portfolios to assess participants’ learning outcomes was effective. In the future, we plan to develop more reliable and valid methods to evaluate portfolios.

References available upon request

Full disclosures for all authors and coauthors available upon request
Poster #138 - 5th Place Award Winner

IMPROVING THE PATIENT EXPERIENCE ONE DEPARTMENT AT A TIME: AN EVS SIMULATION (#818)
Presentation Category: Education

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Introduction: Problem: The environmental services department (EVS) at a 400 bed, level 1 trauma center continued to see a decline in patient satisfaction (Press Ganey) of room cleanliness and courtesy of persons cleaning the rooms. In December of 2016 the current data showed: ‘Room cleanliness’ 36% with target of 75% and ‘Courtesy of person cleaning room’ 46% with target of 75%. At the time of consult, training for new associates included four hours of hospital introduction followed by a period of shadowing on the job. Leadership “spot checks” occurred weekly with real-time feedback was the only on-going evaluation. The leadership had tried to hold education offerings in the past, but with high patient census and low resources they weren’t sustainable. With very minimal literature on the use of simulation in non-clinical departments in acute hospital settings, they came to us with an ask, and instead, it became a mission.

Methods: A quasi-experimental approach was taken to address the cause and effect of simulation education on patient survey outcomes in an EVS department in an acute healthcare setting. December 2016 surveys (results stated above) will be compared to May 2017 survey results. A two tiered approach was taken for the two distinct problems identified: cleanliness (task of cleaning the room) and courtesy (communication tools).
4 associates, 2 hour sessions, 2 room simulation center: The sessions included “build the perfect EVS cart” in which each team built a simulated cart following safety standards/guidelines. Next was a tag team approach to performing the 5 systematic steps of the room clean in our simulated patient rooms. Finally, individuals performed all cleaning steps while conversing with a simulated patient throwing communication “curveballs” at them. After each session, a facilitator lead debrief provided the team with feedback related to the simulation sessions.

Results: After 5 months of training, 25 sessions and approximately 110 EVS associates completing the simulation sessions, there was a positive shift in patient surveys. The survey being addressed ranks and benchmarks hospitals of similar size in several different categories. Specifically looking at room cleanliness, in December 2016, 163 patients returned surveys ranking the hospital at a 36%. In May of 2017 with 181 patient surveys returned, the hospital ranked in the 82nd percentile. This is an increase of 46%. Related to courtesy of person cleaning the room, in December of 2016, 156 patients reported the hospital at 46%. In May of 2017, 179 surveys were returned placing the hospital in the 67th percentile; a 21% increase. In addition to clear survey improvement, the staff participants, overall, responded positively to simulation training with clear, positive confidence shifts per associate evaluations following training.

Conclusion: Surveys and benchmarks have been used to compare hospital services and quality for years, but what happens when you’re the one at the bottom and it’s viewable to the public? Not only do clinical staff play an important role in these outcomes, but addressing the non-clinical staff and their impact can make a difference. Simulation has proven to be an effective education modality to address non-clinical outcomes, but addressing the non-clinical staff and their impact can make a difference. The leadership had tried to hold education offerings in the past, but with high patient census and low resources they weren’t sustainable. With very minimal literature on the use of simulation in non-clinical departments in acute hospital settings, they came to us with an ask, and instead, it became a mission.

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Conclusion: Surveys and benchmarks have been used to compare hospital services and quality for years, but what happens when you’re the one at the bottom and it’s viewable to the public? Not only do clinical staff play an important role in these outcomes, but addressing the non-clinical staff and their impact can make a difference. Simulation has proven to be an effective education modality to address non-clinical area concerns. Drastic positive shifts in surveys can be achieved through simulation of job tasks and communication expectations of ancillary staff, particularly environmental service associates.

References available upon request
Full disclosures for all authors and coauthors available upon request

Poster #139

MOTIVATIONAL VIDEOS CAN CHANGE SIMULATED TASK PERFORMANCE: A RANDOMIZED STUDY (#1205)
Presentation Category: Education

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Introduction: Our understanding of how to optimize simulation-based training, and in particular how to enhance motivation to learn, remains incomplete. Achievement goal theory suggests that mastery goal orientations (growth mindsets) lead to deeper and more sustained learning than performance orientations (entity mindsets).(1–4) We hypothesized that a brief motivational video intended to induce a mastery orientation would be associated with improved performance (shorter time and better quality) and increased motivation on a simulated surgery procedural task, compared with a video intended to induce a performance orientation.

Methods: As part of a half-day medical simulation activity, secondary school science students completed a laparoscopic cutting task(5) as many times as they desired during 18 minutes. Students were randomly assigned to watch one of two one-minute motivational videos before starting the station. The “mastery” video emphasized the brain’s capacity to learn and encouraged students that “the more you practice, the better you’ll get”. The “performance” video emphasized the difficulty of the task and encouraged students to “do your best”. Primary outcomes were product quality and task completion time. Secondary outcomes were the number of task repetitions, and self-report measures of motivation, mental effort, mindset, and aptitude for surgery. We compared groups using mixed effects analysis of variance accounting for repeated measures on students.

Results: 190 students completed the station (80 mastery, 110 performance video). Those who viewed the performance video performed the task faster [180 vs 286 seconds difference [95% CI], −106 [−144, −68]; P

Conclusion: Contrary to our hypothesis, the video intended to induce a performance goal mindset was associated with a statistically significant improvement in simulated laparoscopic cutting (faster task completion, and better-quality products) compared with the video intended to induce a mastery goal mindset. We found a small but statistically significant increase in reported motivation to perform another repetition for the mastery video, but actual repetitions (i.e., task persistence) were higher for the performance video. Assuming the videos correctly captured the intended motivational constructs, these findings suggest that performance goals lead to improved immediate performance outcomes in simulated procedural tasks. It is also possible that the videos did not correctly induce the intended motivations, that these results are specific to this study population or task, or that intended effects would only become apparent using delayed (retention) outcomes.

References available upon request
Full disclosures for all authors and coauthors available upon request
A RCT OF STANDARDIZED PATIENTS VS RESIDENTS TO TEACH COMMUNICATION SKILLS (#1305)
Presentation Category: Education

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Introduction: Communication skills are often insufficiently taught in graduate medical education. Standardized Patients (SP’s) have been viewed as highly effective teachers in the simulated environment. However, significant resources are needed to employ SP’s in simulation. We hypothesized that trained resident physicians may be equally effective in teaching communication skills to junior level medicine residents in the simulated environment. We are also testing the hypothesis that training in communication skills will improve the ability of medicine interns to communicate in the simulated environment.

Methods: We have focused this study on the teaching of facilitating code status discussion as a communication skill. Interns at Massachusetts General Hospital will be randomized to receive no training, didactic training in communication skills and training with a SP, or didactic training plus training with an upper level resident physician playing the role of the patient. All groups will then be subsequently evaluated in their ability to facilitate a code status discussion in a follow-up case.

Results: Results of any training versus no training and training using SP’s versus resident physicians playing the role of the patient will be compared. Data is currently being collected.

Conclusion: Conclusions are currently pending collection of results.

References available upon request
Full disclosures for all authors and coauthors available upon request

IMPROVING CODE STATUS DISCUSSIONS THROUGH COMMUNICATION SKILLS TRAINING (#728)
Presentation Category: Education

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Introduction: The ability to hold an effective code status discussion is a key skill for physicians. Resident physicians are often expected to facilitate code status discussions, despite a lack of formal teaching on the subject beforehand. The introduction of a novel “Communication Curriculum,” focusing first on code status discussions (CSD), highlights an exciting new focus for the Internal Medicine Resident Simulation Program at Massachusetts General Hospital. Design/implementation of this new curriculum raise discussion regarding its impact on resident communication skills, as well as the comparative efficacy of standardized patients versus junior/senior Internal Medicine residents in the role of the patient. Hypotheses to be tested: 1) Dedicated teaching improves residents’ ability to hold an effective code status discussion. 2) Junior/senior Internal Medicine resident volunteers are non-inferior to standardized patients in the role of the simulated patient.

Methods: MGH Internal Medicine PGY-1 residents will be randomly assigned to one of three groups: control, intervention – Standardized Patient, and intervention – JAR/SAR resident volunteer. Study design consists of three total sessions, the order of which varies by randomly assigned group. The intervention group will undergo baseline pre-intervention Sim case, followed by didactic teaching session (with one of two patient populations within the Simulation case) and subsequent evaluation Simulation case to assess interval improvement. The control group will undergo baseline pre-intervention Sim case, followed by repeat Simulation case (at which time they will be evaluated again), and subsequent didactic session to ensure that all residents receive the teaching session, in keeping with Simulation program beliefs that all residents should receive equal teaching if believed to be helpful.

Results: Results are anticipated. Data gathering is complete; statistical analysis is underway.

Conclusion: Results are pending, as described above.

References available upon request
Full disclosures for all authors and coauthors available upon request
Simulation Adds Value to TeamSTEPPS® Education (#1097)

Poster Category: Education

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Introduction: Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS) is an evidence-based program aimed at optimizing performance among teams of health care professionals. The TeamSTEPPS® Essentials course employs instructional strategies including didactic PowerPoints, brief video vignettes, and discussion which take about 3 hours. Programs are incorporating more interactive instructional strategies such as role-playing, games, and simulation. Andragogical research has demonstrated that experiential learning such as simulation leads to improved retention. Healthcare organizations struggle with the cost of lost productivity due to failed educational time for workers; hence time allotted for education needs to be value-based. The purpose of this study was to analyze the effectiveness of a simulation-based TeamSTEPPS® curriculum of 90 minutes compared to the standard 3 hours essential course through learner knowledge, safety culture attitudes, and teamwork performance.

Methods: A prospective quasi-experimental research study with pre/post-testing of two cohorts was designed. Two TeamSTEPPS® Essentials courses were implemented within the same healthcare organization: group one received the standard 3-hour didactic/video/discussion program and group 2 received a 90-minute didactic and simulation-enhanced program. Both courses delivered the same curricular content. Participants completed pre/post knowledge tests, safety culture surveys, and performance assessments of TeamSTEPPS® training on hospital safety events were compared.

Results: Data was examined over a 6 month period comparing curricula of 3 hour essentials and 90 minute simulation-enhanced programs. Pre/post knowledge tests showed significant improvement in both groups, with higher scores in the simulation-based 90 minute course (+22.6% group 1 versus +46.7% group 2, p < 0.05). Secondary analysis will be conducted assessing for statistical significant difference in posttest scores from low budget model are non-inferior to the cadaver model in training providers for the lateral canthotomy procedure. The questions will be presented on a 1–5 scale score, which will allow scores from the questions to be summed into a single pretest score. Following the simulation, the same pretest will be administered as a posttest. Data collection will take place in one day. Data analysis will be performed to determine if the posttest scores from low budget model are non-inferior to that of the cadaver model. A non-inferiority margin will be set at 20%. Secondary analysis will be conducted assessing for statistical significant difference in pretest and posttest scores in each simulation group.

Conclusion: Anticipated

Full disclosures for all authors and coauthors available upon request

References available upon request

A Low Cost and Effective Simulation Model for Lateral Canthotomy (#908)

Poster Category: Education

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Introduction: The objective of this study is to design a low cost and effective lateral canthotomy model that will closely imitate a cadaver model. Our hypothesis is that the low cost model will non-inferior to the cadaver model in training providers for the lateral canthotomy procedure. Training for lateral canthotomy has been traditionally done on human or animal cadavers. Although human cadavers are considered the gold standard simulation given their authentic anatomy and tissue characteristic, they are not easily accessible for medical simulation. We hypothesize that a well-designed model will be non-inferior to a cadaver simulation. Although there exists commercial, high-fidelity models for lateral canthotomy, one such model costs over 700 dollars. Part of our goal is to design a model that will only require household materials, which will not exceed the cost of twenty five dollars.

Methods: We aim to recruit 30 residents and attendings in a noninferiority randomized control trial: half of the group to perform the procedure on a cadaver and half to perform the procedure on the simulation model. Prior to the simulation, participants will take a baseline pre-test survey consisting of several questions aimed at assessing their pre-procedure comfort with the lateral canthotomy. The questions will be presented on a 1–5 scale score, which will allow scores from the questions to be summed into a single pretest score. Following the simulation, the same pretest will be administered as a posttest. Data collection will take place in one day. Data analysis will be performed to determine if the posttest scores from low budget model are non-inferior to that of the cadaver model. A non-inferiority margin will be set at 20%. Secondary analysis will be conducted assessing for statistical significant difference in pretest and posttest scores in each simulation group.

Results: Anticipated

Conclusion: Anticipated

References available upon request

Full disclosures for all authors and coauthors available upon request

References available upon request
EARLY EVALUATION OF THE MICHIGAN HIP,
A DEVELOPMENTAL HIP DYSPLASIA SIMULATOR (#538)
Presentation Category: Education

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Introduction: Proper examination and diagnosis of developmental hip dysplasia (DDH) are required skills for all trainees who provide neonatal care. The currently commercially-available simulator does not accurately replicate the features required for robust training of DDH examination and diagnosis. The goals of this work were to (1) create a new, more realistic neonate DDH model with high anatomic fidelity, and (2) evaluate preliminary validity evidence of this novel simulator for the use of training and testing learner DDH examination and diagnostic skills.

Methods: Using a CT scan and CAD software we created skeleton, ligaments, and body tissue to align with DDH presentation. Magnets and elastic bands replicated the distinct “jump” present during positive Ortolani, and posterior dislocation/relocation Barlow tests, while a silicone model replicated a neonate body to provide realistic training experience. Nineteen experts (15 peds/4 peds-orthopedic faculty) trialed and rated the simulator using a 26-item survey. Twenty items measured fidelity across 5 domains—Physical attributes, Realism of experience (Barlow/Ortolani), Value, Relevance, and a Global rating, all scored on 4-point rating scales (4 highest). Participants supplied demographics, diagnosis/associated confidence, and a yes/no rating for “Improvement over current model” for each aspect. Validity evidence relevant to test content and internal structure was evaluated by review of mean ratings, with rating differences compared across specialty using Mann-Whitney U test.

Results: Pediatric and orthopedics participants self-reported means of 190.0 (SD=133.6) and 183.3 (SD=147.4) DDH examinations, and 24.5 (SD=12.6) and 1.0 (SD=1.6) positive DDH exam over the last 12 months, respectively; Thirty out of 17 participants (76.5%) correctly diagnosed the abnormal hip on the model. Of these, 12 (92.3%) self-reported “very confident,” while 2 (7.7%) were “somewhat” confident in their diagnosis. There were no differences in ratings across specialties (p=0.48,1.00) so responses were combined. Lowest combined rating (M=3.50; SD=0.52) was associated with Skin realism-visualization, but this rating still aligned with “Highly realistic, no changes needed.” Global rating was high (M=3.86, SD=0.33), which aligned with “This simulator can be considered for use in in developmental hip dysplasia training with no improvements made.” For all 20 items, participant majority reported the Michigan Hip was an improvement over the currently available Laerdal model (%=52.9,81.3).

Conclusion: Using 3D printing technology, we successfully created the Michigan hip, a novel simulator for training the DDH examination and diagnosis by replicating both the Ortolani and Barlow tests. Early evidence from targeted experts suggests the novel model has adequate fidelity, and is valuable as a training tool. Future work includes evaluating the model’s value when embedded in a training program.

References available upon request
Full disclosures for all authors and coauthors available upon request

Poster #145
EPISTAXIS TASK TRAINER INCREASES EMERGENCY MEDICINE RESIDENT CONFIDENCE (#439)
Presentation Category: Education

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Introduction: Epistaxis is a common ENT emergency, accounting for 1 in 200 ED visits in the United States. Most episodes of epistaxis can often be managed conservatively with direct pressure, vasoconstrictive agents, or cautery. However, when conservative methods fail anterior and/or posterior nasal packing may be required to tamponade the bleeding. While literature regarding the procedural experience of emergency medicine residents is limited, one Canadian study showed that packing for posterior epistaxis is on a short list of procedures which program directors deem important but have rarely been performed by senior emergency medicine residents. Simulation based education allows residents to gain experience with procedures rarely encountered during clinical training without placing patients at risk. Our objective was to develop a simple task trainer that would be effective in teaching emergency medicine residents the algorithms and procedures necessary for managing epistaxis.

Methods: Our epistaxis task trainer was built using supplies already present in our simulation center. We utilized an airway task trainer (IntBuying Teaching Study Model Airway Management Trainer Intubation Manikin 20V), suction tubing, IV tubing, and a bag of normal saline dyed with red food coloring. The blood flow was controlled by a roller clamp so that the instructor was able to stop the bleeding once appropriate steps had been completed. During their weekly didactic conference, emergency medicine residents participated in various simulations stations, including this epistaxis station. They were given a simulated scenario, and then the opportunity to manage the epistaxis with various types of packing utilizing the task trainer. Prior to the case, a survey utilizing a 5 point Likert scale regarding their confidence in managing such a patient was administered. The same survey was administered after completion of the case and debriefing. Pre- and post-scenario means were compared.

Results: Means for confidence ratings on all questions showed a statistically significant increase. Questions regarding management of posterior epistaxis appear to show a greater increase in confidence when compared to questions regarding management of anterior epistaxis. Specifically, residents felt more confident in their ability to perform all of the steps in an epistaxis management algorithm (M=3.0 vs 4.32, p

Conclusion: Epistaxis is a common ENT emergency, and while cases of epistaxis requiring packing are less common than those which are controlled by conservative management, it remains of vital importance that emergency medicine residents gain experience with performing these procedures. As ample opportunity may not present itself during clinical training, simulation based education and task trainers provide a means for gaining hands-on practice without endangering the patient. Our simple task trainer was effective in providing an opportunity for such practice, and its use resulted in a significant increase in resident confidence in regards to treating both anterior and posterior epistaxis. We recognize the previous development of various epistaxis task trainers, and do not claim that we have shown our task trainer to be superior in any way. Instead, we aim to contribute to the growing body of literature which shows that simulation is an effective education modality for resident training.

References available upon request
Full disclosures for all authors and coauthors available upon request

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A MIXED METHODS STUDY OF PARTICIPANT AND OBSERVER ROLES IN SIMULATION EDUCATION (#865)

Presentation Category: Education

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Introduction: Traditional simulation-based training prioritizes participation in simulated scenarios. Participation in scenarios should not be critical to learning, however, study investigators have anecdotaly perceived benefit to learners in the simulation observer role. To date, there is limited data to conclude that participation within simulation scenarios is necessary for maximum learning or improved performance. The educational benefit of simulation observation is still an area being investigated.[1,2]

Notably, it is plausible that the cognitive experience of considering clinical decisions during a simulated scenario could benefit both participants and observers, particularly if followed by debriefing. Because simulation education is labor- and resource-intensive, and is affected by resource limitations, understanding the educational value of the learner role, and other factors such as debriefing may be an important opportunity to optimize resource allocation in simulation-based education.

Methods: This convergent, parallel, mixed-methods study assessed simulation-based learning for participants and observers. Quantitative component: 15 interns from 6 different medical specialties were assessed by the number and frequency of completed critical action (CA), time to CA, and performance assessment. Index participants and observers to the scenario underwent a shared debriefing. Three months later, a follow-up assessment evaluated index participants and 15 observers within the same scenario as active participants. Analyses compared participants and observers using Wilcoxon signed rank and Wilcoxon rank sum tests. Rater assessments of participants' performance were evaluated for agreement and reliability. Qualitative component: Case study methodology explored the nature of learning for participants and observers. Data were triangulated using direct observations, focus group, and reflective notes that were transcribed for analysis and coded. Results were member checked.

Results: Quantitative data analysis demonstrated few statistically significant learning differences between participant and observer roles. The intraclass correlation of the raters' average of the eight domain assessments was 0.92. Analyses comparing follow-up participants to follow-up observers for time to CA completion demonstrated a statistically significant difference between groups for calcium administration (199.07 and 404.87 seconds; p = 0.0003), ephinephrine administration (493.87 and 434.93 seconds; p < 0.0001), and time to ventilation (304.87 and 179.13 seconds; p = 0.0030). Qualitatively, multiple themes were uncovered: scenario participation facilitated an activated learning environment, which increased learning; observation engaged learners and also facilitated an activated environment; debriefing was necessary for participation and observation to be maximally beneficial, and elevated the learning benefits of observation closer to that of participation.

Conclusion: Triangulating data from this convergent, parallel, mixed methods study provided a comprehensive evaluation and comparison of participants and observers, who debrief together following a simulation-based learning experience. There was no demonstrable advantage of one learner role (participant vs. observer) in simulation-based education in an isolated scenario of cardiac arrest due to hyperkalemia. Observation should not be underestimated as an important opportunity to enhance simulation-based education. When paired with debriefing, both scenario participants and observers reap similar educational benefits.

References available upon request

Full disclosures for all authors and coauthors available upon request

PERFORMANCE AFTER SIMULATED CRISIS: DOES MORTALITY OR INDEPENDENCE MATTER MORE? (#386)

Presentation Category: Education

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Introduction: Simulation has been shown to be an effective educational adjunct to traditional training. A previous study showed independent practice and ability to fail during simulation improved performance in simulated emergencies (1). Experts have debated the utility of simulated mortality in the simulation lab without clear evidence (2,3). In this study, we will determine how simulated mortality and independent practice individually affect performance. We hypothesize that subjects working independently and with simulated mortality possible will perform better when re-exposed to a similar scenario in comparison to groups who only have one or neither of those possibilities.

Methods: Using a randomized, controlled design 48 first year residents will complete a hyperkalemia scenario with or without supervision and with or without mortality. Residents will be randomized into four groups: independent practice/mortality not possible (A1,n=12), independent practice/mortality possible (A2, n=12), supervised practice/mortality not possible (B1, n=12), and supervised practice/mortality possible (B2, n=12). Six months later, residents will complete a similar hyperkalemia scenario with independent practice and possible mortality. Participants’ time to treatment, number of proper treatments, and mortality will be measured.

Results: At this time, 24 residents have completed this study (n=6 in each group). Time to treatment was fastest in A2 (independent practice/mortality possible, 343.8 sec) when compared to A1 (387.8 sec), B1 (416.5 sec), and B2 (556.2 sec). The total number of correct treatments was also highest in A2 (3.83) when compared to B1 (2.83), A1 (2.16), and B2 (2.16). The mortality rate for A2 and B1 were the lowest at 16.6%, while the mortality rate for A1 was 33.3% and B2 was 83.3%.

Conclusion: Thus far, the preliminary results of this project support our hypothesis. Allowing residents to fail and experience mortality independently in the simulation laboratory may be an important combination for training for future emergencies. Further investigation to evaluate a larger sample size is required to determine statistical significance.

References available upon request

Full disclosures for all authors and coauthors available upon request
AN EXPLORATION OF THE SCOPE OF SIMULATION USE IN ACUTE CARE HOSPITALS IN THE US (#568)

Presentation Category: Education

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Introduction: The use of simulation to provide education in acute care facilities has been reported in single site publications; the training of cardiothoracic nurses (1); pediatric emergency management (2); reduction of catheter related blood stream infections (3). In addition to addressing learning needs, recommendations have been made to expand simulation beyond training to human factors, system testing and interprofessional training (4). Startup and maintenance of simulation centers within acute care hospitals has been described in the literature (5). However, there is a paucity of evidence on the broad use of healthcare simulation in acute care hospitals. Therefore, three professional organizations collaborated to conduct a national study to explore the scope of simulation use in acute care hospitals in the United States and in military hospitals abroad. The sample was limited to facilities conducting simulation教育培训 in acute care environments, to date there has not been a national survey completed to identify barriers and challenges faced, and highlights areas for future research. The kind of study increases the understanding of simulation use in acute care hospitals, acute care facilities should concentrate on funding. The findings from this first of its kind study increases the understanding of simulation use in acute care hospitals, identifies barriers and challenges faced, and highlights areas for future research. Conclusion: Although large scale surveys of simulation use have been conducted in academic environments, to date there has not been a national survey completed to better understand the scope of simulation use in acute care hospitals in the US. To address this gap in the literature a survey addressing simulation modality, scope, management, including staffing and funding, and barriers was distributed to members of four professional organizations. One noteworthy finding was that 59% of responses cited cost as an extreme or moderate barrier to initiating and maintaining their simulation program. Recommendations therefore include efforts to facilitate simulation use in acute care facilities should concentrate on funding. The findings from this first of its kind study increases the understanding of simulation use in acute care hospitals, identifies barriers and challenges faced, and highlights areas for future research.

Results: Five hundred eighty-six responses were received. Ten percent (n=60) of the sample was excluded because they did not want or consent to participate, and/or did not work in a hospital setting, leaving 526 respondents. Almost 40% of respondents indicated membership in AONE, 64% in the ANPD, 21% in INACSL, and 7% in AONE. All (99%) but three facilities used simulation for education, about one-third of respondents indicated their facilities used simulation for summative assessment, almost 70% used simulation for health system integration including systems testing, only 30% of the facilities used simulation to investigate errors, while 45% of the responses indicated their facilities used simulation for research. Over 88% of the facilities used high-fidelity simulators, medium to low fidelity simulation, and task trainers. Cost was cited as an extreme and moderate barrier 30% and 29% of the time, respectively. Lack of space was cited as an extreme barrier almost one-fourth of the time. Conclusion: Although large scale surveys of simulation use have been conducted in academic environments, to date there has not been a national survey completed to better understand the scope of simulation use in acute care hospitals in the US. To address this gap in the literature a survey addressing simulation modality, scope, management, including staffing and funding, and barriers was distributed to members of four professional organizations. One noteworthy finding was that 59% of responses cited cost as an extreme or moderate barrier to initiating and maintaining their simulation program. Recommendations therefore include efforts to facilitate simulation use in acute care facilities should concentrate on funding. The findings from this first of its kind study increases the understanding of simulation use in acute care hospitals, identifies barriers and challenges faced, and highlights areas for future research.

References available upon request

Full disclosures for all authors and coauthors available upon request

UNDERSTANDING THE FACULTY FRAMEWORK FOR SIMULATION IN PHYSICAL THERAPY (#434)

Poster #149

Introduction: Best practice guidelines define the use of simulation education within health professions. (1,2) Although physical therapist (PT) faculty members have adopted simulation education into their teaching practice (3,4,5), PT faculty rely on other professions guidelines and practices to inform their teaching and research. The purpose of this study was to investigate current PT faculty simulation teaching practice to begin to define PT simulation practice. The research question was: How do PT faculty define PT simulation education and how does it align with best practice in other professions? Methods: A qualitative interpretive phenomenological analysis was done to interview individual PT faculty members and identify common themes across participants. Over a series of three individual interviews, participants described their teaching process and observations. A two-step thematic coding process was done to identify commonalities across participants to begin to define the simulation teaching process in physical therapist education. Credibility and trustworthiness were achieved through participant member checking with participant transcript review. A three-member review team conducted an expert review and thematic findings were validated with transcript excerpts and research field notes. Results: Eight physical therapist faculty members with a range of 3 to 16 years of using simulations described their teaching. All participants contributed data to define three themes surrounding current practice in PT simulation. Theme 1) a standardized process exists which is centered on learning objectives and debriefing that mirrors best practice defined in nursing and physician literature. Theme 2) there is a reliance by PT faculty for interprofessional education to create fidelity for PT simulations. Theme 3) The lack of consensus documents in PT education is challenged by lack of PT simulation outcomes and inconsistent support from the PT education community. Conclusion: PT simulation faculty follow a consistent process centered on interprofessional education and in need of outcome assessment, that can inform the development of a best practice in physical therapist education framework. It is essential the profession of physical therapy formulate and disseminate a best practice document for educational acceptance.}

References available upon request

Full disclosures for all authors and coauthors available upon request
Simulation-Based Interactive Problem Solving: An Innovative Method to Overcome HFS Shortcomings (#210)

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Abstract: During the last decade, high fidelity simulation (HFS) has become an indispensable tool for healthcare education. Among the other educational benefits, simulation has several distinctive features that include: interactivity, different patient outcomes based on the trainees' actions, engagement, and suspended disbelief and immersion. When used with the discovery teaching method, several assumptions are made: (1) learning how to apply existing knowledge will take place during training session, (2) participants have had a didactic teaching prior to simulation, (3) participants' group is reasonably small (3-4 people). This limits the use of HFS when the topic of training is complex and not mastered by the participants as well as when a large group of trainees needs to be educated. To overcome limitations and expand the HFS teaching potential, we have developed an innovative teaching method called Simulation-Based Interactive Problem Solving (SBIPS).

Methods: In SBIPS, participants and instructor are present in the same simulation room. The instructor assigns one participant from the group to work the case. During simulated patient management, the instructor can stop the session and facilitate a discussion to ensure that an appropriate clinical reasoning takes place. Periodically, the instructor assigns a new participant to lead the case. Thus, in SBIPS debriefing occurs during the HFS session rather than after the session. Using SBIPS, the instructor can stop the scenario at the decision-making point and, through the facilitated discussion, assist participants in the patient management. Combining HFS-based interactivity and facilitated discussion ensures acquiring new knowledge as well as practicing its application at the same time. Also, facilitated discussion allows instructors to engage a larger group of participants than in inquiry-based teaching.

Results: We have successfully used SBIPS to educate 24 Internal Medicine and 32 Family Medicine resident-physicians to seven clinical scenarios. The participants were exposed to the clinically challenging situations that they have had only partial knowledge of how to manage. Simultaneous use of HFS and facilitated discussion allowed for improving their critical thinking and avoiding developing faulty cause-effect conclusions as it might happen during the teaching through the inquiry. As per participants' anecdotal reports, having peer and instructor support during the session reduced the training-associated anxiety. During each SBIPS-based training, there were six times more participants educated than during an equivalent time in the inquiry-based training.

Conclusion: Teaching via inquiry and SBIPS are useful simulation-based teaching methods. They both have their own advantages and disadvantages. SBIPS is a method of choice when a large group of participants needs to be educated and the participants lack a significant portion of the knowledge pertinent to the case. In such a case, SBIPS allows for knowledge and skills gain, higher participant satisfaction, and lower anxiety levels associated with training.

Disclosure: Reference available upon request

Simulation in Healthcare

Poster #150

Poster #151

Clinical Simulation in the Diagnosis of Rheumatoid Arthritis (#1357)

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Introduction: Five years ago we have noticed that the diagnostic focus of non-rheumatologist physicians with patients with joint pain and RA is inaccurate in a high percentage of cases, as shown in a study by our research group (Fernández Ávila DG, Mora S, Vargas L, Díaz M, Gutiérrez J. Initial diagnostic and therapeutic approach by non-rheumatologist physicians in a group of Colombian patients with joint pain. J Clin Rheumatol. 2012;18(9):322). Therefore, it is necessary to have an educational intervention that improves the proportion of correct diagnoses and leads to early referrals for rheumatology consultations. The teaching of clinical approaches to patients with arthralgia and SpA requires both a practical and a theoretical component, and there are difficulties in having real patients for teaching general physicians in the context of continuing medical education for degree-holding doctors. Thus, the idea emerged to apply clinical simulation in teaching rheumatology in the field of RA.

Methods: To quantify the rate of improvement in the diagnosis of Rheumatoid Arthritis (RA) among a group of Latin American non-Rheumatologists (general practitioners, internists, physiatrists, orthopedists, neurosurgeons, dermatologists) who received an educational intervention based on clinical simulation. 286 Latin American non-rheumatologist physicians received an educational intervention based on clinical simulation. The topic of this educational intervention was based on Rheumatoid Arthritis. They received a workshop that includes clinical simulation models of 5 hands and each hand had various semiological findings of RA. The workshop was divided into two parts: the first was about the clinical approach of joint pain and relevant aspects of RA. The second part focused on clinical cases applied to clinical simulation models. Participants made a several stations where they could appreciate for periods of 20 minutes each simulator. The participants filled out a pre and post test.

Results: The participants filled out a pre and post test, which included 6 (six) clinical cases with simulators and photographs of hands of patients with suspected RA. 286 non-rheumatologists (general practitioners, internists, physiatrists, orthopedists, neurosurgeons, dermatologists) from 3 Latin American countries (Colombia, Costa Rica and Dominican Republic) participated in the study, 71% women, average age 40.3 years (SD 7.5 years). Non-rheumatologist physicians obtained an improvement in the correct diagnosis of RA of 45.6% (the correct diagnosis increased from 44.5% to 90.1%). The total number of exams requested in the cases presented decreased significantly, from an average of 7 to 3 exams requested by each clinical case presented. 95% of participants would recommend to other colleagues to make this workshop. 97% believe that this educational intervention will improve the diagnostic approach to patients with suspected RA.

Conclusion: The present research is a pioneer and innovator in the rheumatology education. We have shown the usefulness of clinical simulation given by an improvement in the diagnostic sensitivity towards the diagnosis of RA, highlighting the semiotics as a key element at the time of making the diagnosis. A significant decrease in the total number of exams requested for each of the clinical cases analyzed was documented, which can have a positive effect on costs for the national health systems in each country of the participating non-rheumatologists physicians.

Disclosure: Reference available upon request

Full disclosures for all authors and coauthors available upon request

Poster #150

Simulation in Healthcare

Poster #151
IDENTIFYING PROCEDURES FOR SIMULATION TRAINING: A NATIONAL NEEDS ASSESSMENT (#580)

Introduction: Education and training in radiology must evolve to meet the increasing demands that new specialists in radiology are facing. New training modalities such as simulation are now slowly being integrated; however choosing the right curriculum content is a challenge. Most often, the development of training programs are unstructured and are based on convenience and available resources (1, 2). Establishing formal training requirements should follow a systematic approach (3). The aim of the study was to perform a needs assessment following a structured approach to identify and prioritize the technical procedures that should be included in a simulation-based curriculum in radiology.

Methods: A national needs assessment using the Delphi method was performed involving 91 key leaders in radiology. Round 1 was a brainstorming phase to identify technical procedures that new radiologists should learn. Qualitative analysis was performed to summarize all responses. In round 2, the need for simulation was explored using a needs assessment formula consisting of frequency of procedures, number of doctors performing each procedure, risk and/or discomfort when performed by inexperienced doctor, and feasibility for simulation-based training. Mean scores per question were calculated and rescaled to a scale from 0–100 by performing data linear normalization. Round 3 involved the elimination and prioritization of procedures. To explore the changes in the ranking order of procedures in rounds 2 and 3, spearman’s rho correlation coefficient was calculated.

Results: The response rates in the three rounds were 67%, 76%, and 66%, respectively. In round 1, there were eighty-one procedures that were suggested which were reduced in round 2 to eighteen procedures. In round 3, the procedures were prioritized in order to eliminate the duplication of procedures. After qualitative analysis, the technical procedures that were included were: gynecology and obstetrics, general procedures (n = 9/10). These procedures will be sent to the third round for discussion and implementation phase.

Conclusion: A nationwide needs assessment was performed using the Delphi method to identify and prioritize 13 technical procedures that should be included in a simulation-based curriculum. The prioritized list of procedures may be used as a resource for leaders and medical educators to develop and implement simulation-based training programs in radiology.

References available upon request

Full disclosures for all authors and coauthors available upon request

 IDENTIFYING NEEDS FOR SIMULATION-BASED TRAINING IN GYNECOLOGY AND OBSTETRICS (#1137)

Introduction: Simulation has been adapted within the field of obstetrics and gynecology for many years, following the advent of different learning modalities such as part-task trainers and virtual reality simulators[1]. It provides a safe environment especially with contemporary challenges that limited training opportunities such as reduced working hours, focus on patient safety and rare events especially in obstetrics [2]. Unfortunately, the development of simulation-based programs are mostly unstructured, driven by coincidence or by available simulators [3]. Kern et al. outlined a six-step approach to curriculum development starting with problem identification and general needs assessment. [4]. A needs assessment should be performed prior to developing simulation courses to ensure that training needs are addressed. The objective of the study was to perform a needs assessment to identify technical procedures in gynecology and obstetrics that should be included in a simulation-based curriculum.

Methods: We performed a needs assessment using the Delphi process to obtain consensus on procedures for simulation training. A total of 165 key leaders were identified to participate and a steering group was formed to govern all processes. In round 1, the participants were asked to identify technical procedures that a new specialist should learn. Answers were analyzed and summarized qualitatively. Round 2 was a survey using a needs assessment formula to determine need for simulation training by exploring 1. frequency of procedures, 2. number of physicians that should be able to perform procedure, 3. risk and/or discomfort when performed by inexperienced physician and 4) feasibility for simulation training. The survey was divided into three parts: gynecology, obstetrics, and general procedures. A ‘2/3 qualified majority’ is used as a priori to eliminate procedures. Mean scores will be calculated and ranked. The pre-prioritized list will be sent back in round 3 for elimination and prioritization.

Results: The response rate for round 1 and round 2 were 61% and 50%, respectively. After qualitative analysis, the technical procedures that were included were: gynecology (n = 51), obstetrics (n = 40) and general procedures (n = 10). In round 2, the procedures that were included after elimination are: gynecology (n = 36/51), obstetrics (n = 36/40) and general procedures (n = 9/10). These procedures will be sent to the third round which is expected to finish in September 2017. In the third and final round, the anticipated result in the final round is a prioritized list of technical procedures that are suitable for simulation-based training.

Conclusion: A national general assessment ensures the development of simulation-based training programs that are relevant to today’s training needs. We have performed a Delphi process which will identify a prioritized list of technical procedures that are highly suitable for simulation. Educators and leaders of simulation centers will be able to use the prioritized list of procedures as a guide in planning and developing simulation-based training programs for residents in gynecology and obstetrics. The Delphi process contributes to a transparent process, which will be helpful in the discussion and implementation phase.

References available upon request

Full disclosures for all authors and coauthors available upon request
EFFECT OF SIMULATION TRAINING ON STUDENTS’ KNOWLEDGE ACQUISITION AND RETENTION (#962)

Poster #155

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Introduction: The traditional teaching of medical skills during their clinical training is a very complex challenge that obviously involves restrictions. With the advance of technology, the way medical skills are taught has been changing in the past years. Now, health professionals may practice their skills, clinical reasoning and behaviour aspects on simulators, without any harm to the patient in a safer environment. In Brazil, the emergency room is full of trauma and patient with critical conditions, which requires much training and experienced medical doctors. It does not allow however for students to practice their skills when the case may lead to the death of the patient. Thus, including trauma during students’ undergraduate training becomes necessary to not only practice their skills but acquire the necessary knowledge as well. In this study, we investigated the insertion of simulated training on the short- and long-term knowledge retention.

Methods: Medical students from the Universidade Cidade de São Paulo about to enter their clinical rotations participated in this study. The first cohort had concluded the tutorial classes. After the tutorial session, the second cohort received a simulation training that aimed to get students familiarise with an emergency room and material. They were taught how to use the material and practising basic medical skills like orotracheal intubation and intraosseous puncture in a high-fidelity scenario. Both groups answered a knowledge, containing 31 questions divided into three main topics: cardiovascular emergencies, polytraumatised patients and Obstetric Emergencies. The first group answered the knowledge test after their tutorial lessons. The second group answered the knowledge test after the training. After six months, both groups answered the same knowledge test. We conducted a t-test to compare the difference between both groups on the scores.

Results: The participants were 101 medical students, in which 55 students were from cohort 1 and 46 students from Cohort 2. The t-test analysis demonstrated that the cohort 2, which has taken the simulation training, scored significantly higher than students in the cohort 1, except in the Trauma topic in the first measurement point.

Conclusion: In this study, we sought to investigate the impact of inserting a simulation training before students started their clinical rotation. Our results demonstrated that students who have taken the simulation training scored significantly higher than students who did not take the simulation training. With the simulation training, students were able to acquire as well as retaining more knowledge regarding trauma. Because of the naturalistic design of this study, many variables were not controlled, such as baseline knowledge. However, the students followed the curriculum containing the same learning material, number of hours, and requirements to pass. Additionally, some students in cohort 2 only observed the training and received debrief. Students that participated in a debrief session acquire the same knowledge than those who participate in the training. Inserting a simulation training before the clinical rotation may improve students’ knowledge acquisition and retention.

References available upon request
Full disclosures for all authors and coauthors available upon request

AN UNDIFFERENTIATED INTERN READINESS COURSE TO PREPARE GRADUATES FOR INTERNSHIP (#1246)

Poster #156

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Introduction: The purpose of this study is to establish an undifferentiated readiness course for senior medical students transitioning into intern year and to provide a detailed description of the course as a model for undergraduate medical education programs.

Methods: We conducted a cross-sectional IRB-approved study, IRB-16-MED-38, of fourth year medical students who participated in a 4-week undifferentiated Intern Readiness Course (IRC) over a two-year interval. An interdisciplinary panel, including medical school faculty and students, Graduate Medical Education (GME) program directors, and hospital staff, designed the IRC to prepare senior medical students for intern year, regardless of specialty. Students completed course evaluations and open-ended course reflections about the structure and efficacy of the IRC. Analyses included t-tests which measured satisfaction with the course structure, objectives, sessions, and faculty. Grounded theory was used to identify themes in the course reflection responses.

Results: Course evaluations and reflections were completed by 204 students (n=204, 100%). Students reported satisfaction with the course (n=202, 4.79 / 5). Themes identified in the course evaluation responses indicated appreciation for technical skills (20.6%), interpretation skills (13.0%), and overall structure of the course (15.3%). Responses showed areas for improvement to include didactic components of the course (18.5%) and increased exposure to more specialty-specific skills (17.4%).

Conclusion: Student participants of the IRC reported satisfaction and desired continuation for future classes. Implementing a course that provides an opportunity to increase knowledge, behaviors, and skills required of interns, regardless of specialty, could serve to lessen the gap between expected and actual intern preparedness.

References available upon request
Full disclosures for all authors and coauthors available upon request
**MEDICAL STUDENTS’ KNOWLEDGE RETENTION OVER TIME (#1236)**

**Presentation Category: Education**

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**Introduction:**
Emergency medical education includes problem management, which involves some risk components, including very mindful thinking, early planning, immediate action, and assessment of each step. The challenge for educators lies in implementing an adequate teaching methodology, with the aim of actuating long-term memory. The research question was: How long do students retain knowledge after a simulation-based training course? The purpose of the study was to assess the medical students’ learning retention with the passage of time. This was a dual descriptive and quantitative study. The study was carried out by the medical staff of the Simulation Center of the University of Rio de Janeiro. The subject selected for the study was Basic Life Support 2015 (BLS 2015). In the second semester of medical curriculum, students receive theoretical information on the subject and engage in hands-on practice with mannequins under instructors’ supervision.

**Methods:**
Study instructors were medical students who received two hours of training in the use of the equipment and the study protocol. Data was collected after time intervals of 30 days, 6, 12 and 18 months. Ninety-nine subjects took part in the study: students from the 2nd, 3rd, 4th and 5th semesters of the medical course, known as M2, M3, M4 and M5, respectively. Prior to assessments, participants were asked about their extracurricular activities related to BLS, since this could have refreshed memories of the subject matter. For theoretical assessment, a test containing 10 questions was used, and for practical skills assessment participants were asked to provide medical assistance in a simulation scenario, having at their disposal the mannequin and the Automatic External Defibrillator (AED trainer). For data analysis, the cutoff point was considered up to 50% of the hit rate.

**Results:**
The highest knowledge retention rate occurred 30 days after the teaching of BLS 2015 (M2): 72.2% in theoretical assessment and 68.3% in practical assessment. After 6 months of the training (M3), a decrease of 3.2% in theoretical knowledge and a decrease of 15.8% in practical skills was observed. After 12 months of the training (M4), the data showed a decrease of 18.5% in theoretical knowledge and a 26.3% decrease in practical skills. After 18 months (M5), theoretical knowledge retention showed a decrease of 14.7% and practical knowledge retention showed a decrease of 34.3% (p <0.05).

**Conclusion:**
Within six months after teaching, satisfactory knowledge retention was observed (above 50% in theoretical and practical skills). After six months without training, knowledge retention started showing a progressive decrease. However, students who performed extra- or intracurricular training on BLS after 18 months of the first teaching demonstrated a higher knowledge retention rate in both theoretical and practical skills (M5). The study suggests that all practitioners of the BLS protocol receive a refresher course with theoretical and practical activities after periods no longer than 1 year.

References available upon request

Full disclosures for all authors and coauthors available upon request

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**EFFECTS OF HYPER-REALISTIC TRAUMA IMMERSION ON MEDICAL STUDENT MOTIVATION (#372)**

**Presentation Category: Education**

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**Introduction:** Intensive Surgical Skills Course is a 5-day course in San Diego at Strategic Operations training facility. Thirty incoming third year medical students attended the course annually. Students learn skills including learning to perform surgery, needle decompression, cricothyroidotomy, and tube thoracotomy. Trauma management scenarios are carried out by simulated patient actors wearing the Human Worn Partial Task Surgical Simulator, a forty pound suit which simulates the appearance, anatomy, and texture of human organs. The hypothesis was, “A 5-day hyper-realistic trauma simulation course will alter incoming third year medical students' source of motivation in medicine”. This hyper-realist trauma simulation course was designed to help second year medical students transition into their third-year clinical rotations, exposing them to the stress of training to become a physician. The source of their motivation was analyzed to determine if the course had an effect on their motivation and how it changed.

**Methods:** This prospective survey evaluated 30 medical students undergoing a hyper-realistic trauma immersion training utilizing mass casualty scenarios and the Human Worn Partial Task Surgical Simulator. Participants served as lead surgeon, first assistant surgeon, scrub nurse, emergency department (ED) attending physician, ED resident, and ED triage physician. The independent variable was the immersion course. The dependent variable was student motivation. Students were surveyed their first day on what motivates them in medical school. Students were asked the same question on the final day to determine how immersion training altered their mentality and motivation. A one-sided t-test was used to determine if the increase in students motivated by patient care was statistically significant.

**Results:** Prior to the initiation of the simulation course, 33% of the students were motivated by fear or success. When the course concluded, 53% were motivated by patient oriented care, 23% by family, and 10% by fear or success. There was a 33% increase in the number of students who were motivated by patient care while the number of students motivated by fear changed slightly. A t-test was performed on the student survey data and yielded a p-value of .0146. A p-value less than .05 was deemed statistically significant prior to data collection. For context, this was compared to attending physicians with more than 5 years of experience. 60% of experienced physicians were motivated by patient care and 0% by fear or success.

**Conclusion:** This qualitative study found completion of a 5-day hyper-realistic trauma simulation course was associated with alteration of incoming third year medical student motivation and drive. This course is one of the students’ first exposure to patient care in medical school. It is also their first opportunity to learn how to intervene in trauma scenarios with life-saving techniques. This experience helps students transition from textbook learning to real-life application of medicine and emphasize the importance of patient care over classroom knowledge or test scores. As demonstrated by the statistical analysis, this course produced statistically significant changes in students’ source of motivation in medical school.

References available upon request

Full disclosures for all authors and coauthors available upon request
EMOTIONAL RECOGNITION AND EMPATHIC COMMUNICATION WITH A VR ANTENNAL PATIENT (#856)
Presentation Category: Interprofessional_Education

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Introduction: Prenatal counseling at the limits of viability involves sensitive interactions between neonatal providers and families. Empathetic discussions are currently learned through practice in times of high stress. Decision aids may help improve provider communication but have not been universally adopted. Virtual standardized patients are increasingly recognized as a modality for education, but prenatal counseling simulations have not been described. To be valuable as a tool, a virtual patient would need to accurately portray emotions and elicit a realistic response from the provider. Our objective is to determine if neonatal providers can accurately identify a standardized virtual prenatal patient’s emotional states, and examine the frequency of empathetic responses to statements made by the patient.

Methods: A panel of Neonatologists, Simulation specialists, and Ethicists developed a dialogue and identified empathetic responses. V ANESSA, a screen-based simulation of a woman at 23 weeks gestation, was capable of displaying anger, fear, sadness, and happiness through animations. 24 neonatal providers, including a subgroup with an ethics-interest, were asked to identify V ANESSA’s emotions 28 times, respond to statements, and answer open ended questions. The emotions were displayed: without dialogue, with text dialogue, and with audio dialogue. Participants completed a post-encounter survey describing demographics and experience. Data was reported using descriptive statistics. Qualitative data from open ended questions e.g. “What would you do?” was examined using thematic analysis.

Results: Half of our participants had over 10 years of clinical experience (Table 1). Most participants reported using medical research (n=18, 78.3%) and mortality calculators (n=17, 73.9%). Only the ethics interested subgroup (n=10, 41.6%), listed counseling literature (n=7, 70.0%). Of 672 attempts, participants accurately identified V ANESSA’s emotions (n=523, 77.8%) of the time, and most (n=14, 61.11%) reported that they were confident in identifying these emotions (Fig 1). The ethics interest group were more likely to choose empathetic responses (p= 0.002) (Fig 2). Participants rated V ANESSA as easy to use (n=22, 91.20%), and reported that she had realistic dialogue (n=15, 65.22%).

Conclusion: This pilot study shows that a prenatal counseling simulation is feasible and can yield useful data on prenatal counseling communication. Our participants showed a high rate of emotion recognition and empathy in their responses. References available upon request

Full disclosures for all authors and coauthors available upon request

Tables and figures are available from the author upon request.

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Tables and figures are available from the author upon request.
**Poster #161**

**DEVELOPMENT & EFFECT OF A MULTI-MODALITY SIMULATION DISASTER TRAINING PROGRAM (#766)**

**Presentation Category:** Interprofessional Education

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**Introduction:**

The objective of this project was to develop a multi-modality simulation disaster training program for emergency nurses and to investigate the effect of the program. Despite the importance and perception of emergency nurses in disaster crisis, a standardized program to develop competencies are still lacking in Korea. Many good programs exist dealing with disaster preparedness, but most contents are focused on the system management and on-site response. None exist that focus on emergency nurses that are left in the hospital to care for victims transported from the scene. Since disaster response requires multiple aspects of competencies, it is important to develop a multi-modality training program that is best suitable for the content to be trained.

**Methods:**

The curriculum was developed using Kern’s 6-step approach. Downing’s construct validation was used to validate the program. All assessment checklists were validated using content validity index. The education was a 3-day workshop for selected 30 emergency nurses. The course consisted of lecture, technical skills training, triage exercises, crisis management, and problem-solving. Triage exercises were done using virtual and table-top simulation. Crisis management, focusing on incident command set up and managing surge capacity were trained with table-top simulation. And problem-solving training was done with scenario-based mannequin simulation. Disaster Preparedness Questionnaire for Emergency Nurses (DPQ-EN), which was derived from the International Council of Nurses Framework of Disaster Nursing Competencies, was used to assess the perception changes of the participants. All pre-to-post differences within subjects were analyzed with paired t tests.

**Results:**

The educational intervention developed is called the TIPSS Course: Triage, Incident Command, Procedures (Life-Saving), Surge Capacity, and Special Hazards. Content validity index were 0.92. All the categories of the DPQ-EN survey, consisting of basic concepts, planning, patient care, psychological issues, special hazards, epidemiology, communication, personal preparedness, and ethics improved post-training. Patient care and special hazards improved the most. The participants were assessed on disaster nursing technical skills (airway management, needle decompression, intraosseous infusion, contaminated wound care, splinting techniques), accuracy of triaging, and crisis and problem-solving competencies (radiation exposed scenario from a major earthquake event) using validated performance checklists. The differences were all statistically significant (p<0.05).

**Conclusion:**

A multi-modality simulation disaster training program for emergency nurses positively affected perception and performances of the participants. Disaster has become a worldwide community issue, and to keep the community safe from extreme crisis, healthcare providers and hospitals need to take responsibility in taking care of victims of disaster. Since disaster is not something we experience in everyday life, we need to train and develop competent healthcare providers to respond to disaster crisis, through realistic simulation scenario, and rigorous method and assessment. By developing this structured and evidence-based training curriculum, we are able to expand the program to emergency residents, medical students, paramedics, school nurses, and pharmacists, as well as retired public service workers.

References available upon request
Full disclosures for all authors and coauthors available upon request

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**Poster #162**

**EFFECTS OF VIRTUAL REALITY SIMULATION ON WORKER EMERGENT EVACUATION OF NEONATES (#901)**

**Presentation Category:** Interprofessional Education

Sharon Forra, PhD, CHSE, CNE, RN,1 Elaine Miller, BSN, MSN, PhD, FAAN, FAHA, RN-BC,2 Eric Hodgson, PhD,3 Ashley Simon, MSN, RN,4 Matt Gneuhs, BA4
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**Introduction:**

Emergency preparedness is critical in healthcare facilities; the need to train hospital workers in evacuation has been repeatedly demonstrated in actual events. OSHA uses virtual reality simulation (VRS) to train miners in evacuation, VRS is also used to train for fire evacuation. A review of the evacuation literature found a paucity of empirical studies indicating a gap in the literature and a need for further investigations. The purpose of this project was to develop and study the effectiveness of a program of VRS to foster healthcare workers’ emergency preparedness to evacuate neonates from intensive care units. The study compared traditional training methods and VRS as a method of healthcare evacuation training. Outcomes were measured in all 3 domains of learning. The ability of learning, acquired through VRS, to be translated into practice was assessed. It was hypothesized that VRS training would be effective as traditional methods in training workers for NICU evacuations.

**Methods:**

Quantitative dominant, the study employed a longitudinal quasi-experimental design with 2 groups & repeated measures. Following IRB review, interprofessional NICU workers (MD, NP, RN, Unlicensed) (N=92) were randomized to 2 groups (stratified). Participants completed web-based modules related to NICU evacuation and then completed either a series of clinical updates (control) or virtual reality simulations (VRS)(intervention) (training type=Ind. Var.). Assessments of learning outcomes (Dep. Var.) were completed pre/post, 8 & 12 months including cognitive test, modified Emergency Preparedness Information Questionnaire, and NICU Evacuation Rubric (assessment of performance during a live exercise evacuation using human patient simulators). VRS experiences were explored using focus groups. Analysis of research questions includes using general linear model (GLM) analysis of variance techniques & generalized estimating equation (GEE) techniques within a generalized linear model.5

**Results:**

At this time, the results are reported as “In progress”. Data collection is complete and we are working with the statistician to analyze results. We will have the analysis complete by September 1, 2017 and submit as required.

**Conclusion:**

Currently, very preliminary findings demonstrate that VRS is effective in teaching NICU evacuation with live exercise performance significantly better in the VRS group. This difference is both statistically and clinically significant. We will further discuss conclusion when our results are finalized. This study was funded by an AHRQ Simulation in Healthcare Grant. References available upon request
Full disclosures for all authors and coauthors available upon request

References available upon request
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Anticipated.

Conclusion: Anticipated.

reliability will be measured using intra-class correlation coefficients (ICC). will be used to analyze confidence and speaking-up performance scores. Inter-rater design ANOVAs with time as within-subjects, and grouping as between-subjects factors scoring system (1, 2). One simulated case will be used at each assessment point.

during simulated cases will be measured (pre/post) by a modified advocacy-inquiry confidence in speaking up in the OR will be measured by a questionnaire (pre/post) will receive a brief instruction supplemented by a scripted checklist. CA-1 residents' information for expressing patient concerns in the OR, those in the treatment group

Methods: This is a double-blind randomized control study including CA-1 residents at a single institution. While residents in the control group will be provided a standard information for expressing patient concerns in the OR, those in the treatment group will receive a brief instruction supplemented by a scripted checklist. CA-1 residents' confidence in speaking up in the OR will be measured by a questionnaire (pre/post) with 5-point Likert scale and their performance in expressing patient care concerns during simulated cases will be measured (pre/post) by a modified advocacy-inquiry scoring system (1, 2). One simulated case will be used at each assessment point. Two blinded, trained research assistants will rate the videotaped performances. Mixed-design ANOVAs with time as within-subjects, and grouping as between-subjects factors will be used to analyze confidence and speaking-up performance scores. Inter-rater reliability will be measured using intra-class correlation coefficients (ICC).

Results: Anticipated.

Conclusion: Anticipated.

References available upon request

Full disclosures for all authors and coauthors available upon request

Conclusion: Our findings indicate that medical residents rate the performance of male team leaders higher than female code team leaders despite standardization of leadership behaviors. This indicates an implicit bias against female physicians in leadership roles. These findings challenge us to rethink how we are currently assessing crisis resource management skills, as differences in ratings on standard measurement tools may not reflect any difference in objective performance. It also puts into question results from previous studies that have found differences between genders in leadership behaviors. The data also highlight the persistence of gender bias in medicine. Recognizing bias and understanding the underlying mechanisms is the first step to eliminating it. Our ongoing studies will attempt to further elucidate the factors that contribute to this bias through evaluations of different health professional groups (nurses, nurse practitioners) as well as through qualitative methods.

References available upon request

Full disclosures for all authors and coauthors available upon request
**Poster #165**

**SIMULATION-BASED TRAINING IN A PUBLICLY FUNDED HOME BIRTH PROGRAM IN AUSTRALIA (#936)**

**Presentation Category: Interprofessional Education**

Arunaz Kumar1

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**Introduction:** Birth at home is a safe choice for women with a low risk pregnancy. However, there is a small risk of a birth emergency requiring immediate, skilled management to optimise maternal and/or neonatal outcomes. High quality simulated emergency training has been shown to reduce the rate of adverse events and improve outcomes in a hospital environment (1–2). These simulations afford personnel an opportunity to update their knowledge, to practice skills and to improve communication and teamwork. Indeed, the success of such training is thought to depend on the opportunity to update their knowledge, to practice skills and to improve communication and teamwork. Indeed, the success of such training is thought to depend on the opportunity to update their knowledge, to practice skills and to improve communication. The success of such training is thought to depend on the opportunity to update their knowledge, to practice skills and to improve communication.

**Methods:** Home birth midwives and paramedical staff were asked to participate in a home-based workshop conducted in a community home, where they were required to identify and manage the simulated emergency with stabilisation of the mother or baby in real time, using the equipment provided in the home birth kit. Most scenarios culminated with the transfer of the mother and/or baby to the hospital in the ambulance. Each scenario was followed by a debriefing session, in which they were encouraged to reflect on their performance and how the simulation experience would influence their clinical practice. Following the activity, the participants completed a pre-test and post-test evaluation form (using a quasi-experimental research design), exploring the content and utility of the workshops and also participants' attitudes and behaviors towards relevant clinical practices. Content analysis was performed on qualitative data regarding the most important learning acquired from the simulation activity.

**Results:** A total of 73 participants attended the workshop (midwifery = 46, and paramedical=27). There were 110 comments, made by 49 participants (42 midwifery and seven paramedics). The most frequently identified key learning elements were related to communication (n=42, among midwives, paramedical and hospital staff and also with the woman's partner), followed by recognising the role of other health care professionals (n=11), developing an understanding of the process (n=11) and the importance of planning ahead (n=11). Respondents identified safety as underpinning much of the learning, with explicit statements on using all available resources, including asking for the partner to help (n=9). Finally, the role of realism in the simulation was cited in relation to the presence of real colleagues, that the simulation took place in a real home, that activities were undertaken in real time, that the scenario challenges were realistic and the psychosocial fidelity believable (n=6).

**Conclusion:** The home birth simulation workshop was found to be a useful tool by the staff who provide care to women who are having a planned home birth. Developing clear communication and teamwork were found to be the key learning principles guiding their practice. “In-situ simulation”, which is described as a team-based simulation strategy that occurs on the actual patient care units involving actual healthcare team members within their own working environment was noted to contribute to the psychological fidelity of the simulation.

References available upon request

Full disclosures for all authors and coauthors available upon request

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**Poster #166**

**INTERPROFESSIONAL EDUCATION IMPROVES COMMUNICATION, DECISION-MAKING, AND ROLES (#1191)**

**Presentation Category: Interprofessional Education**

Kathy Trotter, DNP,1 Virginia (Chris) Muckler, AA, AAS, AS, BSN, DNP, MSN, APRN, CHSE, CRNA, RN, 1 Michelle Kuszajewski, BSN, DNP, MSN, CHSE, RN, 2 Remi Hueckel, DNP, APRN, CHSE, PNP2

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**Introduction:** Following Institutional Review Board approval, this study examined a maternal-fetal simulation opportunity for team building among students from nursing, physical therapy, neonatal nurse practitioner, women’s health nurse practitioners, and nurse anesthesia programs. In accordance with the Core Competencies for Interprofessional Collaborative Practice, the aim was to improve 1) understanding of roles, responsibilities and scopes of practice of other professions; 2) team decision-making; 3) interprofessional communication, including giving and receiving feedback, addressing conflict or difference of opinions, and self-reflecting; and 4) contributions to interprofessional ethical reasoning and decision-making. Interprofessional Education Collaborative. (2016). Core competencies for interprofessional collaborative practice: 2016 update. Washington, DC: Interprofessional Education Collaborative.

**Methods:** Following Institutional Review Board approval, graduate and pre-licensure students enrolled in nursing, physical therapy, neonatal nurse practitioner (NP), Women’s health NP, and nurse anesthesia programs participated in a simulated learning opportunity at Duke University School of Nursing. Students were assigned roles commensurate with their educational training. The simulation scenario involves a patient in labor who delivers twins that require neonatal resuscitation. Prior to and immediately following the simulation scenario, the Interprofessional Collaborative Competency Attainment Survey tool was completed by student participants, faculty, and staff using. The tool is valid, reliable, and assesses participant competency and attitudes following interprofessional learning opportunities.

**Results:** Descriptive statistics were used to describe the pre and post samples including program of study and year of program. Non-parametric Wilcoxon tests were used to compare the pre versus post subscale scores and scores for individual items. A significant increase in post event scores is anticipated, particularly in the collaboration and role identity variables. A better understanding of the roles of other team players including their knowledge and skill level led to enhanced patient care as perceived by the participants. The communication and shared values scores did improve, but not with statistical significance. Data analysis is ongoing and further results are pending. Even with preliminary results, the overwhelming themes are that student learners valued collaborative efforts and an opportunity for deliberate practice with communication skills.

**Conclusion:** This simulation scenario incorporated a variety of nursing disciplines. It provided an opportunity for students to practice and improve communication skills and improve understanding of various roles and responsibilities of all team members. The simulation event offered students a time to practice clinical skills but more importantly, to improve communication skills and function in the role within the larger team dynamic. Even with preliminary results, the overwhelming themes are that student learners valued collaborative efforts and an opportunity for deliberate practice of communication skills in a collaborative practice environment. This project aligns with the Interprofessional Education Collaborative core competencies for interprofessional collaborative practice and demonstrates that learners highly value interprofessional learning opportunities.

References available upon request

Full disclosures for all authors and coauthors available upon request
DECODING CODES: AN INTERDISCIPLINARY APPROACH TO IMPROVING PATIENT OUTCOMES (#622)

Gabriela Bambrick-Santoyo, MD, 1 Barbara Karagiannis, BS, EMT, 1 Manideep Duttuluri, MD, 1 Michael Doctor, MD, 1 Susannah Kurtz, MD, CHSE, 1 Keith Rose, MD 1

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Introduction: The ability of code-teams to respond effectively to medical codes can significantly affect clinical outcomes for patients. Studies have shown that the quality of patient care is impacted by the different perceptions between the health care team members to effectively collaborate. Aviation research has also shown that effective teamwork is essential to flight safety. At many institutions, including our hospital, medical code training occurs separately for each profession, leading to variable quality of teamwork and reduced effectiveness of codes. This project builds on the above research to implement inter-professional code training at Mount Sinai West Hospital in NYC. A group of nurses, attending physicians, medical residents and respiratory therapists were trained jointly in an effort to improve the quality of medical code. Our hypothesis was that inter-professional code training will improve the quality of medical codes by reducing the time to compressions and correct defibrillator pad placement.

Methods: The study had three phases: initial assessment, which included an 8-item survey to assess baseline skills, unannounced in-situ mock codes on the medical floors and team-training in the simulation lab, and a post-training assessment which included unannounced mock codes on the medical floors. A post-intervention survey will be administered during the third week of June 2017. Two medical units were chosen for this project. 95% of the nursing staff chose to participate in the training sessions. All medical code team leaders on staff at the time of the study voluntarily participated in the training. Two respiratory therapists assigned to these units were present during the sessions. A total of 43 nurses and 3 nursing assistants participated in one of the two 9-hour sessions. Time to compressions, time to correct pad placement and defibrillation were measured from the time the patient was deemed to be pulseless. Quality of compressions were sensor-measured using a SIM MAN 3GM (Laerdal).

Results: We surveyed a total of 45 staff members and learned that 80% of nurses do not start CPR or place the pads even if they are the first ones to arrive. Similarly, resident physicians answered that about 80% of the time the nurses do not start CPR. 62% of physicians and 65% of nurses felt that they often participate in organized, well-run codes. Significant in-training improvement was observed in the following areas: time to correct placement of pads (mean 22.7 sec front pad and 27.4 sec back pad), time to first defibrillations (mean 90 sec faster). An average of 1 cm depth improvement in compressions was observed. No in-training improvement was observed in initiation of CPR. Analysis of data from pre-training codes vs post-training codes showed a substantial improvement in the time to bring the code cart (mean 131 sec), placement of pads (front mean 71 sec faster, back mean 114 faster) and time to first defibrillation (138.5 secs faster).

Conclusion: Both nurses and physicians agreed that in our hospital, nurses in general did not start CPR or place the pads even if they were the first ones to arrive. Similarly, resident physicians answered that about 80% of the time the nurses do not start CPR. 62% of physicians and 65% of nurses felt that they often participate in organized, well-run codes. Significant in-training improvement was observed in the following areas: time to correct placement of pads (mean 22.7 sec front pad and 27.4 sec back pad), time to first defibrillations (mean 90 sec faster). An average of 1 cm depth improvement in compressions was observed. No in-training improvement was observed in initiation of CPR. Analysis of data from pre-training codes vs post-training codes showed a substantial improvement in the time to bring the code cart (mean 131 sec), placement of pads (front mean 71 sec faster, back mean 114 faster) and time to first defibrillation (138.5 secs faster).

Using AIDET Education Simulations To Improve Patient Experience Scores (#357)

Erin Blanchard, MSN, CPAN, RN, 1 Andres Viles, MSN, CNS, RN, 1 Stephanie Moore, MSN, CCRN, RN, 1 April Bello, MSN, CHS, RN, 1 Shilpa Register, MS, PhD, 1 Marjorie White, MAED, MD, CHSE

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Introduction: The acronym AIDET, stands for Acknowledge, Introduce, Duration, Explanation, and Thank You. Created by the Studer Group as a communication framework for healthcare professionals, its aims at enhancing communication with patients, thereby decreasing patient anxiety, increasing compliance, and improving clinical outcomes (1). Its use has also been shown to improve patients’ satisfaction and perceptions of care (2). Staff at UAB have been trained on the use of AIDET. However, patient engagement scores in the Heart and Vascular Center (HVC) remained low, with Communication and Facility/Personal Treatment Domains ranging from 2-30%ile and 2-75%ile ranks respectively in the 3 months prior to our simulation. Simulation based re-education is an effective strategy regarding retention of skills (3). Thus, we developed and implemented a series of in situ AIDET simulations in HVC in 2016, hypothesizing that training of HVC staff using AIDET could positively impact patient engagement scores.

Methods: Simulations took place in HVC from June-August of 2016, utilizing 77 staff consisting of nurses, patient care technicians, electrophysiology and radiology technicians, and secretaries. For each simulation, staff were prebriefed, paired off, and asked to interact with a standardized patient in pre-op, utilizing AIDET as they normally would. Objectives included: (1) demonstrate effective communication using AIDET and (2) describe strategies for applying AIDET with each patient encounter. Learners were given a patient chart and case stem. A debriefing was performed afterwards in which a point of discussion was how AIDET can be applied to different situations in patient care. Learners completed surveys to finish the simulation. Patient satisfaction survey data was collected and analyzed from February 2016 to April 2017 which spans a period before, during, and after the AIDET simulation. Data was summarized per month and averaged for analysis.

Results: Patient experience surveys were returned by the following number of patients: 144 in the four months before the simulations, 119 during the three months of the simulations, and 158 in the four months after the simulations. Preliminary statistical analysis of average patient satisfaction related to the communication domain demonstrates an upward trend in patient satisfaction during the simulation and 4 months post simulation compared to the 4 months pre simulation. Interestingly, the upward trend continued for the next 3 months demonstrating some level of sustainability of AIDET training. For the facility/personal treatment domain, there was no specific pattern to the patient satisfaction survey data which may mean that other training may provide a greater impact within this domain.

Conclusion: The in situ simulations provided an effective learning opportunity for HVC staff to practice their AIDET communication skills in a familiar environment and receive real time feedback. Patient experience scores in the communication domain improved during the simulations and remained enhanced months after the training, suggesting retention of practiced skills. This is important with much of reimbursement being tied to patient experience and engagement. One possible explanation for the lack of positive trend in the facility/personal treatment domain is that all staff in HVC were unable to participate in the simulation, and there is no way to account for which staff members were encountered by patients who filled out surveys. Another possible explanation is that questions in that category referred to physicians and nurses, and no physicians took part in the simulations.

References available upon request
Full disclosures for all authors and coauthors available upon request
Poster #169

USE OF SIMULATION TO PROMOTE DELIVERY ROOM EUTHERMIA IN PRETERM INFANTS (#665)
Presentation Category: Interprofessional Education

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Introduction: Preterm infants are at increased risk of hypothermia due to thin skin, decreased brown fat, large body surface area to mass, and poor metabolic compensation. Hypothermia in preterm infants increases morbidity and mortality. Delivery at community hospitals in this population is also associated with increased morbidity and mortality. When anticipated, preterm delivery is planned at tertiary care centers, however preterm infants sometimes deliver urgently in the community. The Indiana University Neonatal Outreach Simulation Team identified that many community providers were unaware of or incompletely implementing the Neonatal Resuscitation Program’s thermoregulation recommendations. In this study, we hypothesize that using simulation education will improve neonatal morbidities and mortality by promoting delivery room euthermia in preterm infants born at Indiana community hospitals.

Methods: This study consists of three phases. In phase one, participants completed a pretest to assess cognitive knowledge on preterm infant thermoregulation. A simulation scenario assessing interventions to reduce hypothermia in preterm infants was then performed with a preterm infant mannequin. The scenarios were scored and videotaped to ensure accurate scoring. A standard debriefing was conducted focusing on thermoregulation and ventilation. The scenario was repeated and scored again, followed by a post-test of cognitive knowledge. A “Preterm Delivery Checklist” was provided after participation. In phase two, 6–12 months after initial participation, repeat cognitive exams and simulation scenarios were performed to evaluate knowledge and skill retention. Finally, chart reviews are being performed at each site to evaluate preterm infant admission temperatures prior to and after simulation education.

Results: 25 community hospital sites with 471 multidisciplinary providers participated in the first phase of the study. Average pre- and post-test cognitive scores were 49% and 94% respectively (p-value

Conclusion: A structured simulation education intervention on preterm infant thermoregulation improves community provider’s immediate knowledge and skills as well as performance 6–12 months after the education. In addition, providers utilized the thermoregulation measures more efficiently after simulation. The noted decrease in time to initiation of thermoregulatory measures is especially important for preterm infants as temperature loss begins immediately after birth, and any delay in addressing thermoregulation can adversely affect outcomes. Ultimately, chart reviews to evaluate post-resuscitation outcomes for preterm infants before and after simulation education will demonstrate the true clinical impact of this education.

References available upon request

Full disclosures for all authors and coauthors available upon request

Poster #170

INTERPROFESSIONAL LEARNING IN A SIMULATED ENVIRONMENT WITHIN A RADIOLOGY DEPARTMENT (#484)
Presentation Category: Interprofessional Education

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Introduction: The division between doctors, nurses and other allied health professionals is no secret within the National Health Service. Each of these groups are educated and trained separately, perhaps contributing to a lack of understanding of each other’s roles. Simulation based learning provides the opportunity for health professionals to train together, thereby developing not only their technical skills but also communication, team working and leadership skills. Approximately 70 - 80% of medical errors are attributed to a breakdown in these non-technical skills. Simulation can lead to improved interdisciplinary team dynamics and can be an arena for clinicians to formulate strategies to enhance patient safety by reducing errors that occur in clinical practice. Objective: To emphasise patient safety in the management of anaphylaxis. Evaluate attitudes towards interprofessional learning. To encourage participants to understand the roles of different health care professionals.

Methods: Three simulation sessions, each lasting 2 hours, were carried out at University College Hospital over a 1 year period. Each session consisted of a simulated scenario in which participants had to manage an anaphylactic reaction in fluoroscopy using SIM Man and authentic equipment. This was followed by a structured debrief. There were 13 participants in total (2 radiology registrars, 9 radiographers and 2 health care assistants.) Participants completed post scenario surveys to measure attitudes toward interprofessional learning, leadership, communication skills and technical skills.

Results: Over 70% of participants felt the simulation scenario would have a positive impact on their team working skills. Over 50% of participants were aware of their roles within the team at all times. Only 23% of participants felt that team members consistently used closed loop communication at all times, however, over 60% felt their communication skills had improved by the end of the simulation. During the debrief it was apparent that some participants lacked knowledge of their own scope of practice and that of their colleagues during a clinical emergency. Interprofessional team simulations are an effective way to increase interactions between different health professionals and to improve the understanding of clinical roles and responsibilities in medical emergencies.

Conclusion: It is important for participants to maintain their understanding of interprofessional learning. Kolb described an experiential learning cycle where learning occurs in 4 stages: concrete experience, reflective observation, abstract conceptualisation and active experimentation. We therefore recommend that participants repeat simulation sessions in order to put into practice what they have learnt previously thereby completing the experiential learning cycle. As a result, they will be able to deliver an effective service for improved care and maintain a positive staff experience by enhancing collaboration amongst different disciplines.

References available upon request

Full disclosures for all authors and coauthors available upon request
**Poster #171**

**USING INTERPROFESSIONAL SIMULATION FOR DEVELOPING A NEW PEDIATRIC ECLS CENTER (#847)**

**Presentation Category:** Interprofessional Education

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**Introduction:** The purpose of this study is to determine whether the utilization of Interprofessional Simulation focused on team training for Extracorporeal Life Support (ECLS) has the ability to improve technical and non-technical skills, identify latent safety threats and enhance the knowledge and performance of the entire team while establishing a new pediatric ECLS program. The development of a new ECLS program has no defined process or set guidelines to follow to ensure safe patient care while training an entirely novice team. It was theorized that using multidisciplinary, simulation-based ECLS training would improve comfort and confidence levels among a novice team. In addition, the coordination of the interprofessional team, communication issues and hospital wide system would benefit from ECLS simulation not only to identify safety threats but provide a mechanism for improvement. To safely deploy this complex technology, simulation offers a mechanism for evaluating and training a new team.

**Methods:** Over a 9-month period, simulation was used for Interprofessional team training. A comprehensive ECLS curriculum incorporating wet labs, didactics and simulated ECLS scenarios was implemented. At the end of 9 months, an 8-hour immersive ECLS simulation was held with the entire health care team and hospital wide system. The scenarios for system wide simulation consisted of ECLS activation, cannulation, circuit/patient emergencies, intrafacility transport and decannulation. Two Post participation questionnaires were used with a Likert scale, the Perception of Skills Gained and Post Simulation Effectiveness evaluation. ECLS specialists had a pre and post-test with 10 multiple-choice questions. The simulated experience was in an actual PICU room and the Laerdal, USA monitor was used. A surgeon facilitated the simulation cannulation with a patch from 3-d MED (Ohio, USA). Over 3 days, 70 staff from the ECLS team, PICU/OR, cardiology, blood bank and access call center participated.

**Results:** Interprofessional training identified areas of improvement in communication through the access center and paging system. A formatted script was refined to capture pertinent patient information in the initial activation call to disseminate for safe patient care. Process improvement in intrafacility transport was identified and a checklist for moving ECLS patients out of the PICU was developed. Ancillary staff in other departments were recognized as needing additional training to safely interface with ECLS patients. Improvements were made in equipment availability specific to cannulation and ECLS bedside carts. ECLS checklists for cannulation, emergencies and decannulation were perfected. Novice ECLS specialist (n = 28), test scores increased significantly with the participation in the simulation with average quiz score increasing from 75% to 91% (p = 0.003). The Perception of Skills Gained post survey averaged 3.71 out of 4 and the Simulation Effectiveness tool averaged 3.78 out of 4.

**Conclusion:** ECLS is a technologically complex endeavor with a high-risk low volume profile and no established guideline or standardized process for educating an interprofessional team. In addition, pioneering the frontier of building a new ECLS program requires additional innovation to develop a competent team and mitigate safety threats. A curriculum using ECLS simulation facilitated a safe environment to improve the delivery of ECLS care and enhanced communication for the entire team. With simulation, more time was spent in the active learning phase allowing for improved retention of knowledge, clinical skills and behavior skills. The ECLS specialists developed confidence in technical skills and the hospital developed procedures and checklists focused on safety directly from the simulations. The entire interprofessional team, each through a different lens used simulation to identify areas of improvement in the ECLS program imperative to the initiation and development of a successful program.

References available upon request
Full disclosures for all authors and coauthors available upon request

**Poster #172**

**SIMULATION-BASED SPIRITUAL CARE WORKSHOPS FOR INTERPROFESSIONAL PRACTITIONERS (#1015)**

**Presentation Category:** Interprofessional Education

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**Introduction:** For most patients, illness has spiritual as well physical impact: “Why me? How will I get through this? Why is this happening to me?” Patients report they want practitioners to inquire about their spiritual and religious beliefs and such beliefs have been found to influence healthcare decision-making and quality of care. It is not uncommon for practitioners to be confronted with patients’ spiritual needs and distress. Yet, little training is available for practitioners to learn how to assess spiritual needs, intervene effectively, work collaboratively with chaplains, and recognize spiritual distress and make chaplaincy referrals. This study aimed to address this knowledge and educational gap through one-day simulation-based workshops. Specifically, the study examined the research question of what interprofessional practitioners learn, retain and implement from one-day Program to Enhance Relational and Communication Skills (PERCS)-Spiritual Generalist simulation-based workshops.

**Methods:** The PERCS-Spiritual Generalist workshops featured professional actors depicting a range of spiritual/religious backgrounds and healthcare dilemmas. The workshops incorporated didactic and experiential exercises focused on the role of spirituality in healthcare decision-making, spiritual screening, generalist level spiritual care skills, recognizing spiritual distress, and timely chaplaincy referrals. Learners completed demographic pre-questionnaires, post-questionnaires (specifically, “Name three take home points from today’s session”), and 3-9 month follow-up email surveys that asked whether and how participants had incorporated the skills learned at the workshop into their clinical work. Demographic characteristics were summarized with descriptive statistics and the open-ended qualitative responses were coded through a process of iterative thematic content analysis. The study was approved by the hospital Institutional Review Board, and each learner completed a written consent form.

**Results:** From 2011-2016, 202 of 232 interprofessional participants (87%) from twelve one-day PERCS-Spiritual Generalist workshops completed the pre-post questionnaires including: 21 (10%) physicians, 62 (31%) nurses, 46 (23%) social workers, 9 (4%) psychologists, 21 (10%) chaplains, 11 (5%) medical interpreters, 28 (14%) other disciplines, and 4 (2%) unknown. Learners reported six primary themes including: Defining Spirituality, Spiritual Influences on Illness and Healthcare, Core Values, Spiritual Generalist Skills, Roles and Resources of Chaplains, and Interprofessional Teamwork. Within a representative subsample, 22/35 (63%) learners completed 3-9 month follow-up surveys via email. Of those learners, 22/22 (100%) reported drawing on what they had learned in the PERCS-Spiritual Generalist workshops and 21/22 (95%) reported making changes in their everyday clinical practice as a result of attending the workshops.

**Conclusion:** Interprofessional practitioners’ participation in PERCS-Spiritual Generalist workshops provided valuable, enduring skills that learners reported incorporating into their everyday clinical work. Participants learned and practiced a range of skills as a result of attending the workshops including conducting spiritual screening as part of their assessment, reflective listening and empathic presence, inviting chaplains and holding collaborative team meetings, recognizing spiritual distress, and initiating timely chaplaincy referrals to support patients’ and families’ religious practice and spirituality. Training such as this can help to address the knowledge gap surrounding spirituality/religion in healthcare and deliver more holistic, meaningful healthcare.

References available upon request
Full disclosures for all authors and coauthors available upon request

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Concepts were discussed during the simulations and reinforced with intentional pauses following each scenario. All simulations took place in one of the main operating rooms at our institution. Participants received introductory material about TeamSTEPPS® two weeks prior to the simulations. TeamSTEPPS® concepts were discussed during the debrief following the first simulation and then reinforced with intentional pauses during the second simulation. Participants were surveyed before and after the simulations. All survey questions were rated on a Likert scale of 1-5. Results are listed as average ± standard error of the mean. Average pre and post survey questions were evaluated using a paired t-test.

**Results:** Participants self-reported increased confidence in managing intra-operative myocardial infarction (2.83±0.21 vs 4.04±0.13, p < 0.01) following the simulations. Participants also reported a significant increase in knowledge of TeamSTEPPS® (2.06±0.17 vs 3.88±0.17, p < 0.02).

**Conclusion:** In-situ OR simulations led to increased confidence in participants for managing the emergency situations simulated. Incorporation of the TeamSTEPPS® curriculum into our in-situ simulation program resulted in increased knowledge of TeamSTEPPS® concepts amongst participants and led them to report a willingness to use these concepts during real life emergencies. Future evaluations at both the individual and institutional level must be done to determine the lasting impact of this training.

References available upon request

Full disclosures for all authors and coauthors available upon request
Poster #175

A MULTICENTER QUALITATIVE STUDY OF INTERPROFESSIONAL SIMULATION-BASED EDUCATION (#1156)
Presentation Category: Interprofessional Education

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Introduction: After the release of the Institute of Medicine’s seminal report To Err is Human, there has been a rapid growth in the use of interprofessional simulation-based education (IPSE) across the globe with as goal to improve interprofessional teamwork and thereby quality and patient safety.1 Despite the growing use of IPSE, there is limited evidence to support best practices.2 Current published recommendations for IPSE are based primarily on expert opinion,3 and pull from general interprofessional education (IPE) and simulation-based education (SBE) best practices. It is not known how interprofessional simulation programs utilize these recommendations, and whether these expert opinions meet the needs of the stakeholders across a variety of contexts. As a first step towards creating a stronger evidence-base for IPSE, we aimed to understand to what extent and how current IPSE programs apply IPSE, IPE and SBE recommendations in practice.

Methods: We conducted a qualitative non-participant observational study of IPSE sessions. Prior to observing the programs, we developed a framework of IPSE principles to guide our observations based on published recommendations for IPSE, IPE and SBE. Our sample consisted of 8 IPSE programs across 6 different hospitals affiliated with 2 institutions. We divided observations among 3 investigators, who performed 3 observations per program and documented observation notes on a worksheet based on our framework. We imported all observation notes into qualitative data analysis software (Dedoose) to analyze our data. We used a deductive approach with the Framework Method4, drawn from sociology, to analyze our data. We took an iterative approach to coding, with at least 2 investigators coding the data followed by comparison and reconciliation through discussion.

Results: (Finalized data analysis to be submitted by September 1st) We identified 10 IPSE principles in our framework. Between February 2017 and May 2017 we have completed 11 observations (15 hours of observation) out of a planned 24 observations. Preliminary data suggest considerable variability in the application of 5 of the 10 identified IPSE principles, specifically in equitable distribution, competency based learning, repetitive and distributive practice, hierarchy awareness and facilitator training. The remaining 5 IPSE principles (active learning, psychological safety, sociological fidelity, feedback/debriefing, facilitator training) were more consistently applied across programs.

Conclusion: (Finalized conclusion to be submitted by September 1st) There is significant variability whether programs implement IPSE principles based on expert opinion. Future studies through interviews with various stakeholders of each program are needed to determine whether variation in adherence and application of recommendations among different programs is intentional based on each program’s specific needs, or if the variability is due to unique or common affordances or barriers within each programs environment.

References available upon request

Full disclosures for all authors and coauthors available upon request

Poster #176

IMPACT OF A SIMULATED PATIENT SAFETY PROGRAM ON INTERPROFESSIONAL COMMUNICATION (#454)
Presentation Category: Interprofessional Education

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Introduction: Ineffective healthcare teamwork skills and communication are associated with medical errors and poor outcomes. To improve patient safety, there is an increased emphasis on interprofessional (IP) team training. Investigators used simulation to develop and evaluate a patient safety program to increase IP communication in pre-licensure and post licensure health care professionals.

Methods: A convenience sample of 94 medical/nursing students were randomized into small IP teams. Teams complete a 2.5 hour session of 3 mannequin simulations followed by a facilitator lead debriefing. Instruments were administered pre/post-training to examine patient safety knowledge, attitudes, teamwork/communication skills. To assess attitudes toward team communication, the Team Strategies and Tools to Enhance Performance and Patient Safety Teamwork Attitudes Questionnaire (TAQ) from the Agency for Healthcare Research and Quality was administered. The second instrument was the Attitudes, Motivation, Utility and Self-Efficacy (AMUSE) to assess AMUSE toward IP skills from the University of Washington’s Center for Health Science Interprofessional Education, Research & Practice. Knowledge of patient safety/team communication was measured using pre/posttest developed by an IP team of patient safety experts. Team performance was evaluated using a developed team performance checklist.

Results: Over a period of 7 months, a total of 94 participants have completed the program. Complete data has been collected on 92 participants. Results of the knowledge pre/posttest revealed there was a statistically significant increase in the knowledge of patient safety/team communication from the pretest (M=7.13, SD=1.58) and the posttest (M=8.02, SD=1.52) at p=.000. Greatest improvements in knowledge were noted in understanding team skills and team communication tools such as call outs, huddle, and “CUS”. Significant differences were also noted in the TAQ (p=.000) and AMUSE (p=.000) scores. Review of team performance revealed a statistically significant increase in communication scores between groups.

Conclusion: Increases in attitudes regarding teamwork, knowledge of team process and communication skills were noted. Evidence supports the participants had increases in attitudes, motivation, and utility regarding IP simulation training. Observer review of team performance revealed and increase in the mean team communication scores. Findings suggest a simulated patient safety program can be used to increase knowledge and team skills regarding IP communication.

References available upon request

Full disclosures for all authors and coauthors available upon request
OPTIMIZING SIMULATION-BASED INTERDISCIPLINARY TEAMWORK TRAINING FOR MEDICAL AND NURSING STUDENTS AND EVALUATING ITS LONG-TERM EFFECTS (#393)

Poster #177

Introduction: Does interprofessional education (IPE) at the undergraduate level for nursing and medical students change teamwork skills and does it change teamwork attitudes over time. Also does IPE change teamwork attitudes as compared to students without training. The conceptual framework for this research is the Institute of Medicine’s Interprofessional Learning Continuum Model (IPLC) focusing on the foundation for professional education commencing at the undergraduate level. We wanted to understand the effect of team training on undergraduate medical and nursing students’ knowledge, skills and attitudes to determine the value of adding live IPE teamwork training to the UGME curriculum. We designed the training sessions to assess a learning curve to determine whether skill levels continue to improve across all four sessions. In addition, we assessed for short term and long term change in teamwork attitudes and compared the students to others in their class.

Methods: A total of fifty (50) students (20 last semester senior BSN students and 30 3rd year medical students) participated in a formal IPE teamwork training program which included simulation with feedback. Teamwork attitudes were assessed using the TeamSTEPPS Teamwork Attitudes Questionnaire pre and post training as well as four months following the program which is designed to measure teamwork attitudes and knowledge. Questionnaires were also distributed to classmates who did not undergo training as a control. Videos of each training session were reviewed and scored for teamwork and communication skills by two raters who were trained using the instrument to score recorded teamwork sessions to optimize interrater reliability. Trainees participated in 4 sessions each. Results of survey and performance data were exported to SAS for analysis utilizing Kruskal-Wallis rank based testing.

Results: Comparison of pre and post training survey data revealed a significant improvement in knowledge regarding the patients’ role in the healthcare team and the causes of medical errors as well as pre-training data compared to the four month follow-up point. Video scores improved during all four training sessions but each change did not reach statistical significance.

Conclusion: The findings of this study are supportive of the IPLC starting at the undergraduate level. Although this study did not yield significant results for outcomes of the model relating to collaborative behavior and performance in practice, significant improvement was found in reaction, attitudes, perceptions, knowledge and teamwork skills.

References available upon request

Full disclosures for all authors and coauthors available upon request

HOW ARE YOU FEELING? INTERPROFESSIONAL SIMULATION FOR PSYCHOSOCIAL TEAMS (#350)

Poster #178

Introduction: Interprofessional Education through simulation for healthcare professionals is a growing area of research, but currently little exists for fields that are in the family support roles in our healthcare facilities. The purpose of our study was to explore simulation as a means of changing the perceptions and attitudes of psychosocial professionals.

Methods: This was a single-site study using The Psychosocial Simulation Participant Survey (PSPS) during simulation sessions at Children’s Mercy Hospital Simulation Lab. The PSPS is a 19-item Likert Scale Instrument adapted from the RIPLS and IEPS. Within the PSPS, items were grouped into four subsets: Learning and Performance, Benefits of Training, Communication, and Cooperation. The purpose of our study was to evaluate the effectiveness of simulation in changing the perceptions and attitudes of psychosocial professionals in those four areas. Additionally, the project was designed to compare participants and observer roles. We also made some comparisons based on demographics such as male/female, age, years of experience in their role, and between disciplines.

Results: We found that respondents reported a statistically significant increase in Learning and Performance from before to after their simulation experience. In the Benefits of Training subset, respondents reported a statistically significant change from pre to post simulation. Cooperation was our final subset of questions, where we found another statistically significant change from pre-simulation to post-simulation responses. We compared those who were actively participating in the simulation versus those who only observed simulation and participated in debriefing. We found no statistically significant difference between those two groups. This suggests that observers benefit as much as active participants. We also compared respondents who were male versus female, in age groups, their years of experience and even between the disciplines of Chaplains, Social Workers, and Child Life Specialists. All of these results showed no statistically significant differences.

Conclusion: Simulation can be used as an effective means of changing perceptions and attitudes regarding Interprofessional Education for Chaplains, Social Workers and Child Life Specialists. Learning can be acheived by those actively participating in the simulation scenarios as well as those that are observing the scenarios and participating only in debriefing. We have studied attitudes and perceptions and now it is our goal to look at the change in knowledge that happens within simulation experiences. We are working to establish core competencies for each discipline that we can demonstrate and measure through simulation.

References available upon request

Full disclosures for all authors and coauthors available upon request
Poster #179

**IMPACT OF MEDICAL STUDENTS’ STRESS AND COPING SKILLS ON SIMULATION PERFORMANCE (#180)**

**Presentation Category:** Interprofessional Education

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**Introduction:** Stress is the resulting response of situations when cognitive demands exceed one’s ability to manage them. Medical students are particularly vulnerable to experience stress, as they are routinely confronted with multiple potential stressors. Acute stress has been shown to reduce medical students’ cognitive performance on examinations, and chronic stress can contribute to cognitive disorders over time. A literature review found that stress management interventions are largely successful at reducing trainees’ anxiety, enhancing medical knowledge, and increasing their use of adaptive coping skills. It is possible that stress coping skills and performance enhancing mental skills may help medical students manage stress effectively and better maintain clinical performance. The goal of this pilot study was to assess the relationship between medical students’ stress, workload, use of mental skills and stress coping skills, and performance during an Acute Care Team Simulation (ACTS).

**Methods:** After IRB approval, third-year medical students (MS3) were recruited during their surgery clerkship rotation, where participants engage in an ACTS to assess their ability to care for a surgical patient. Prior to their ACTS test, participants completed self-report measures on their use of mental skills and stress coping skills, the impact of daily hassles and uplifts on their lives, and their state- and trait-level anxiety. During the ACTS, participants wore heart rate monitors to assess their physiological stress by capturing average heart rate (HR) and heart rate variability (HRV). Participants’ perceived stress and workload was assessed via self-report immediately after its completion. ACTS performance was assessed using a standardized checklist, which was completed by an experienced nurse educator who was present during the scenarios. Data analyses included descriptive statistics and linear regression models to compare correlations of all variables.

**Results:** Forty-one MS3 voluntarily participated in the study (average age: 25.98 years ± 2.7; gender: 26 men, 15 women). Participants’ ACTS performance was negatively correlated with perceived stress during the scenario (R = −0.33, p = 0.03) and perceived workload (R = −0.30, p = 0.05). Participants’ use of problem solving as a stress coping skill was positively correlated with ACTS performance (R = 0.38, p = 0.02), and negatively correlated with perceived stress (R = −0.31, p = 0.05). Besides problem solving, there was no relationship between students’ self-reported use of other stress coping skills or performance enhancing mental skills, hassles and uplifts, HRV, pre-ACTS state or trait anxiety and participants ACTS performance.

**Conclusion:** The findings from this pilot study indicate that medical students’ perceived stress and workload negatively impact their performance during a simulated clinical scenario. Adaptive stress coping skills, such as focusing on problem solving, may allow medical students to manage stressful situations and better maintain performance. Aside from problem solving, students reported using mental skills and other stress coping skills, but the use of these other skills was not correlated with ACTS performance. It is possible that due to their lack of clinical experience, students have not developed effective coping skills to manage stressful situations. In an effort to help students develop these skills, we plan to implement a structured mental skills curriculum with MS3 in the next academic year.

References available upon request

Full disclosures for all authors and coauthors available upon request
**Poster #181**

CREATING MEANINGFUL STUDENT-LED INTERPROFESSIONAL EDUCATION EXPERIENCES (#571)

Presentation Category: Interprofessional Education

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Introduction: Creating quality interprofessional education (IPE) experiences is challenging as faculty members must collaborate with other disciplines to address the diverse needs of students who are at varying levels of development in clinical and teamwork skills. While coordinating course schedules, developing resource-heavy learning experiences, applying collaborative IPE skills, and minimizing barriers of time and space is difficult enough, the additional dimension of delegating instruction to a student cohort increases project complexity. In phase one of a three-year IPE project, nursing students were tasked with creating an IPE simulation to teach general survey techniques to physical therapy and radiography students in the simulated hospital environment. This study explored changes in student attitudes toward IPE and collaboration. Can leading/participating in a student-led IPE experience change attitudes towards interprofessional education and collaboration?

Methods: Eight third-semester nursing students conducted a needs assessment for 12 first semester physical therapy and 8 first-semester radiography students to develop the IPE simulation. This needs assessment met a requirement for the nursing course, Population-Centered Care. The physical therapy and radiography students were the nursing students’ assigned “population.” A nursing faculty member and a simulation educator mentored the nursing students to develop the IPE simulation. We used a retrospective pretest posttest design to assess attitudes of students from all three professions using the Interdisciplinary Education Perception Scale (IEPS) and the Jefferson Scale of Attitudes toward Interprofessional Collaboration (JeffSATIC). Both assessments employ a five-point Likert response scale to assess level of student agreement with specific statements. Surveys were electronically administered; data were analyzed using the Wilcoxon Signed Ranks Test for differences between dependent samples.

Results: A preliminary review of the results indicates that students perceived a change in attitudes following the IPE simulation. Students were significantly more positive about their perceptions towards interprofessional education and collaboration as a result of participating in the IPE simulation. The greatest changes were within the “Perceived Need for Cooperation” subscale of the IEPS (4.1 vs. 4.5) and the “Working Relationships” subscale of the JeffSATIC (4.2 vs. 4.5). Narrative comments revealed that students valued the opportunity to interact with other disciplines, recognized the role of improved interprofessional communication in mitigating medical errors, and recognized the need to cooperate with and depend on other professions. Anticipated results indicated that this intervention also significantly improved recognition of the need to share information and resources with other professions on a more frequent basis.

Conclusion: Students are able to take the lead and create meaningful IPE experiences, often facing challenges similar to those of faculty. Team-building skills such as honing clear communication, creation of project outcomes, and confronting logistical barriers are practiced. Faculty must work together in interprofessional peer or faculty-to-faculty teams to plan and overcome barriers. The time the faculty spends problem solving, helps create an efficient framework in which to work. They are able to provide context and guidance to by moving from the role of instructor to that of mentor. Despite the challenges, the faculty believed the experience was a favorable learning experience. Students created an IPE experience that results in improved attitudes about IPE and IPC from all three professions involved in this project. This experience also reinforced students’ belief that academic institutions should enhance collaborative practice by developing interdisciplinary educational programs.

References available upon request

Full disclosures for all authors and coauthors available upon request

**Poster #182**

INTERPROFESSIONAL AND NEAR-PEER EDUCATION OF PELVIC EXAM IN MEDICAL STUDENTS (#734)

Presentation Category: Interprofessional Education

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Introduction: Interprofessional education (IPE) is recognized by several professional organization and accrediting bodies as essential and necessary for patient safety and seen as the standard of care for healthcare education. The female pelvic exam is an intimate exam that most medical students are uncomfortable with and therefore require specific instruction on creating a less intense environment and on how to perform a proper clinical exam. Who better than midwives and midwifery students, who are responsible for the healthcare of women, to help create that safe learning space and provide the expertise needed for medical students learning to perform the pelvic exam for the first time. This IPE activity also creates an opportunity for medical students and senior midwifery students to gain knowledge and respect about each other’s roles within healthcare.

Methods: 192 students were divided into small groups. Students first watched a demonstration and then engaged in experiential learning with the task trainer via deliberate practice. The instructor coached the student through the entire exam allowing them to correct their mistakes and practice the motions of the exam until the student felt comfortable. Some of the rooms also had a senior midwifery student who was available to give additional guidance and support to midwifery students participating in the exam. At the conclusion of the learning activity, we asked the students to complete a survey to share their experience regarding their interprofessional learning experience.

Results: The course was an overall success. 76% rated the course as an excellent experience that visibly decreased their level of anxiety performing the exam. Unfortunately, due to limited faculty, only 69% of the student groups were instructed by midwifery faculty. 77% of the students had an excellent experience with their interprofessional instructor and no one had a fair or poor interprofessional experience. The qualitative analysis of the survey results of those who had an opportunity to work with the midwifery faculty and student clearly demonstrate the appreciation of the midwifery faculty’s expertise, differing perspective and emphasis in ensuring the comfort of the woman during the exam.

Conclusion: Healthcare is a team sport. No profession works in isolation. IPE is therefore an essential and necessary component of medical education. It is clear from our study that students also undoubtedly appreciate and enjoy the experience of interacting with and learning from experts in another field in healthcare.

References available upon request

Full disclosures for all authors and coauthors available upon request
Poster #183
BEST TIME TO INSTITUTE IPE IN A MEDICAL SCHOOL CURRICULUM (#208)
Presentation Category: Interprofessional Education

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Introduction: Healthcare takes place in a dynamic environment. To prepare providers to meet high working demands, practical healthcare and academia establish interprofessional education (IPE) opportunities for healthcare professions. Educational psychologists and philosophers who propose constructivism as a theory of learning argue that "each of us perceives the world through the prism of our own unique experience" that determines how ready we are to accept or reject given concepts or constructs. This makes the appropriate timing to institute IPE in healthcare curricula important. No current literature on IPE collaboration determined an ideal time to introduce IPE into health education. In our project, we have assessed where in the curriculum medical students had the most positive attitude toward IPE and when they were ready to learn from other healthcare professions, and when they were ready to teach the other professions.

Methods: Since none of the existing instruments were suitable to achieve this goal, we developed a 27-item Academic Interprofessional Education Attitude Scale (AiPEAS) survey instrument. This instrument has been piloted and validated at the University of South Dakota Sanford School of Medicine (USD SSOM). At the time of the survey administration, there were 71 first year, 61 second year, 58 third year, and 65 fourth year students enrolled at USD SSOM. To enhance the response rate, the survey was administered in the last two weeks of November and first two weeks of December when students did not have major exams or clinical evaluations. One hundred thirty-five out of two hundred and fifty-four students replied (135/254, 53.14% response rate), and their profiles closely represented the entire medical school student body.

Results: his study found that medical students younger than 25 years, who were females, and were in the first or second year of medical school, had significantly more positive attitudes toward IPE. This discovery supported prior research findings conducted by other investigators (Pollard et al., 2004; Anderson & Thorpe, 2008). Among all medical specialties, primary care and family medicine in particular, along with the group of undecided specialty, demonstrated the highest Mean Attitude toward IPE scores. These findings agree with the previous studies that showed correlation between medical specialties and personality traits (Borges, 2001).

Conclusion: The University of South Dakota Sanford School of Medicine conducted a survey-based study to determine the best timing to institute interprofessional education in medical school curriculum. According to the obtained data, the majority of students responded that the first year of the medical school curriculum was the best time to initiate IPE. While the entire attitude toward IPE was positive, female students were more enthusiastic about it than their male counterparts. Also, students younger that twenty-five years had higher attitudes toward IPE than their older schoolmates. Since many healthcare accreditation agencies require students to be involved in the IPE activities throughout their educational curricula, this survey and its findings could be an indispensable tool in designing such a curricula. References available upon request

Poster #184
INTERPROFESSIONAL SIMULATION EDUCATION FOR MEDICAL AND MIDWIFERY STUDENTS (#771)
Presentation Category: Interprofessional Education

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Introduction: Undergraduate IPE can facilitate the development of unprejudiced impressions of how interprofessional teams can interact effectively with a patient-centered approach. Shifting the focus of IPE towards the common objective of patient care assists in bridging differences and in communicating effectively and working together on the task at hand. Learning clinical skills in a simulated environment can drive engagement of learners by providing clinically relevant or valid tasks. The research questions were: 1. How do medical and midwifery students view each other’s professional relationship three months after participating in the Women’s Health Interprofessional Learning through Simulation (WHIPLS) program? 2. What did the medical and midwifery students consider helpful in regard to their learning three months after the WHIPLS program? 3. To what extent were medical and midwifery students able to apply their learning from the WHIPLS program in clinical practice?

Methods: The study follows a qualitative research design, utilising focus groups as a method of enquiry to encourage participant interaction. The study follows the theoretical framework of experiential learning (1). The intervention is collaboration between medical and midwifery undergraduate schools. This involved introduction of the WHIPLS program, an interprofessional skills training program for medical and midwifery students to teach gynaecological and obstetric intimate examination and management of labour. Briefly, the WHIPLS program consisted of a three-hour clinical skills workshop, supplemented by lectures, pre-reading material and videos provided a week before the workshop. Independent profession specific focus groups were conducted three months after attendance of the WHIPLS program. The focus group discussion were recorded, transcribed and independently thematically analysed (2). A coding framework was created and six final themes were agreed upon.

Results: Eight medical and 18 midwifery students participated in the two (independently run) focus groups. The “role of simulation on clinical learning” was the key learning for the medical students while “power” was the dominant theme for the midwifery students. Common themes related to “roles and relationships”, “team based learning”, “learning methods” and “patient and learner safety”. The commonest theme recognized in the medical student group was the role of simulation with positive impact of “learning by doing” when compared with lectures. The most prominent theme emerging from the midwifery focus group revolved around “power”. References were made to different types and levels of “power” relating to their identity as students versus the practicing health professionals (both medical and midwifery), in the context of their knowledge, experience or their future role when compared to the medical students.

Conclusion: This paper shows how an interprofessional simulation coupled with clinical experience influenced the perspective of the two undergraduate student groups. Three months after participating in the WHIPLS program, medical and midwifery students reported developing positive attitudes towards interprofessional simulation based education, developed prior to and continued after their routine clinical placement. Although, development of interprofessional relationships requires some level of professional maturity to understand the depth of roles and scope of shared practice, the introduction of this teaching can be beneficial at an early career level. The learning acquired by the two groups may be variable. The effect described by the two groups of students may also have a role in development of their own professional identity as future midwives and doctors.

References available upon request

Full disclosures for all authors and coauthors available upon request

Full disclosures for all authors and coauthors available upon request
CAN SIMULATION INFLUENCE WILLINGNESS TO ADOPT TELEHEALTH TECHNOLOGY FOR SEPSIS? (#664)

**Presentation Category:** Patient Safety & Quality

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**METHODS:** We conducted simulations in a 3-Act-3-Debrief 60-minute format that interspersed training in telehealth use, debrief/discussion of barriers and facilitating factors, and review of sepsis care. In year one, rural ED1 did the telehealth rollout support simulations and the technology was made available via standard methods at rural ED2. After one year, ED1 had refresher in situ simulations and ED2 had rollout simulations. Our sample size goal was 80% nurse participation. Readiness to adopt telehealth technology was evaluated at each time point by 6 questions (content areas - improving quality of care, feasibility, role clarity, ease of use, resources, and receptiveness to use) selected from a previously validated survey2 using a 5-point Likert scale (1 = strongly disagree, 5=strongly agree). The K-W rank sum test for unpaired samples was used for the readiness survey. Self-confidence ratings (10 point scale) for rollout simulations only were compared with paired t-tests.

**RESULTS:** Enrollment targets were met for participation at ED1 (20 nurses, 5 providers, 5 others) and ED2 (22 nurses, 4 providers, 4 others). The ED1 pre-post simulation rollout responses shifted positively in 5/6 areas (quality 1.28, roles 1.19, ease of use 0.59, resources 0.72, receptiveness 0.64, all \(P<0.05\)). ED1 pre-refresher again shifted positively in 4/6 areas (quality 1.45, feasibility 1.08, roles 1.28, receptiveness 1.10, all \(P>0.05\)).

**Conclusion:** In situ simulation is a promising method to influence willingness to adopt telehealth technology in the care of septic patients. Reduced willingness found 12 months post simulation intervention may in part be due to changes in staff and simulation participants, and more frequent refreshers may help train new staff and solidify gains. Many other barriers and facilitating factors likely contribute to telehealth engagement and future efforts should qualitatively explore influences of use, and quantitatively assess the impact of this training via tracking telehealth use, care process change markers, and clinical outcomes.

References available upon request

Full disclosures for all authors and coauthors available upon request

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THE EFFECT OF SIMULATION TRAINING ON NOVICES STRESS IN THE CLINICAL SETTING (#944)

**Presentation Category:** Patient Safety & Quality

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**Introduction:** Junior doctors hold uncertainties in performing the Lumbar Puncture (LP) procedure and perform below stakeholders expectations (1). This conflicts with the potential need for immediate performance on critical patients. As novices describe uncertainty and a fear of doing harm, they may be susceptible to experience a stress sensation. Stress during the performance of clinical procedures reduces the working memory (2) and is associated to impaired performance (3). Studies in a simulated context have demonstrated that simulation-based training with mastery learning, decrease stress (4) and improves performance (5), however, the translation of the clinical setting is unknown. This study will investigate the effect, in a clinical setting, of a simulation-based training program with mastery learning on novice performers’ clinical performance and stress levels and their association to the patient outcomes: pain, confidence in operator, and risk of Post Dural Puncture Headache (PDPH).

**Methods:** Multicenter RCT. Participants without LP experience were recruited from four departments of neurology and emergency medicine, and randomized to either the intervention group (IG) or the control group (CG). The intervention was a hybrid simulation-based training course with mastery learning. The control group observed a LP and discussed the procedure with a senior. The LPs were performed as part of ordinary clinical practice. Performance was rated using the established Lumbar Puncture Assessment Tool (LumPAT) by blinded video recordings rated by two content experts. The LumPAT has from 11 to 55 points. The subjective stress response was assessed by Cognitive Appraisal (CA) and STAI-S questionnaire and the physiological stress response by Heart Rate Variability (HRV). Patients rated their pain and confidence in operator on a 10-point Likert-Scale. We telephoned the patients to explore symptoms of PDPH. The study was reported on clinicaltrials.gov (NCT03163927).

**Results:** 37 participants were included, with 18 allocated to the IG and 19 to the CG. There were no differences in the characteristics of neither the participants nor the patients between the groups. There was a significant difference in the participants clinical LumPAT score, with the IG scoring 42.0 and the CG scoring 29.4; \(p<0.05\). There were no differences in the characteristics of neither the participants nor the patients between the groups. There was a significant difference in the participants clinical LumPAT score, with the IG scoring 42.0 and the CG scoring 29.4; \(p<0.05\).

**Conclusion:** We identified that a hybrid simulation-based training program, improves novices’ clinical performance and decrease their stress response before they perform a LP. Although the participants physiological stress response was unaffected, the study indicates that residents could benefit from the intervention, as they would be less stressed when challenged with acute medical conditions requiring performance of a LP. The better performance might explain the near-significant lower incidence of PDPH in the intervention group. The results provide more details on the translational effect of simulation-based training to the clinical context, as the stress reduction prior to performance seems to be a mediator of the better performance. However more studies should investigate the impact of operators stress during performance as this study indicate this might be associated to compromised patient safety.

References available upon request

Full disclosures for all authors and coauthors available upon request

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HARDENED TENDENCIES: PERSISTENCE OF STRESS APPRAISALS AFTER SIMULATION TRAINING (#1022)
Presentation Category: Patient Safety & Quality

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**Introduction:** There is accumulating evidence that clinical performance can be impaired by stress responses during acute events (1). Impairments have been observed in clinical judgment (2), memory (3), and medical skills (4). These impairments are often due to memory problems (5). In many studies where impairments have been observed, baseline levels of performance were acceptable, suggesting that these impairments are not due to a lack of relevant knowledge or skills. The findings of impaired performance when stressed suggests that training for high acuity events needs to go beyond training that is orientated solely towards the acquisition of clinical skills and knowledge (1,5). Training needs to also include interventions aimed at developing the trainees’ ability to cope with stressors and to minimize their own stress responses. The goal of this pilot study was to investigate the effects of two training interventions and demographics (gender, age) on stress responses to simulated trauma scenarios.

**Methods:** Sixteen (16) Emergency Medicine and Surgery residents were randomly assigned to either the Crisis Resource Management (CRM) or Stress Inoculation Training (SIT). The CRM training targeted the non-technical skills required for effective teamwork. The SIT targeted skills related to cognitive reappraisal of situations and relaxation training. Each group received a 3 hour training session consisting of didactic teaching followed by multi-disciplinary simulation scenarios and debriefing with emphasis on either CRM or SIT. All participants served as team leaders in simulated trauma scenarios pre and post intervention. Stress responses were measured with the State Trait Anxiety Inventory (STAI), cognitive appraisal (degree to which a person interprets a situation as a threat rather than a challenge) and salivary cortisol levels.

**Results:** The data were analysed with stepwise regression analyses. The only significant predictor of anxiety and cortisol responses in the post-intervention scenarios were the residents’ appraisal responses to that scenario (degree to which they interpreted it as a threat), explaining 31% of the variance for both anxiety and cortisol. In turn, the residents’ appraisals of the post-intervention scenarios were predicted by their approaches of the pre-intervention scenario and gender, explaining 58% and 15% of the variance respectively. Men were more likely than women to appraise the scenarios as threatening. There were no differences in subjective anxiety, cognitive appraisal or salivary cortisol responses as a result of either intervention.

**Conclusion:** The results of this study show that male residents, as well as those who appraised an initial simulated scenario as more threatening, were more likely to interpret a subsequent scenario as threatening. In turn, they were more likely to have larger subjective (anxiety) and physiological (cortisol) responses to this subsequent scenario. Interventions that have been largely successful in other domains, namely CRM and SIT, were not effective in overcoming initial appraisals of potentially stressful events. This suggests that patterns of stress responses are hardened tendencies in individuals, likely developed over a lifetime. They are thus difficult to modify with brief interventions. Rather, changing the manner in which health professionals approach potential stressors will likely require more comprehensive approaches.

References available upon request

Full disclosures for all authors and coauthors available upon request

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USE OF HYBRID SIMULATION FOR HOSPITAL DISASTER DRILL TRAINING (#773)
Presentation Category: Patient Safety & Quality

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**Introduction:** Every hospital in Korea are required to conduct annual disaster drills. Despite these regular disaster drills, healthcare providers don’t feel they are confident or competent enough to respond to a disaster event. Hospitals that have structured training and drill exercises are known to be better prepared and less morbidity and mortality are known to occur. Live actors as disaster victims have the highest fidelity training and will probably provide the motivation the participants need to be immersed in the exercise. But live actors are limited in their expressions of critically injured or ill victims. The goal of disaster preparedness is to save lives and without assessing the medical care aspect. Therefore, a hybrid of live actor and full-bodied simulator might be more effective in accomplishing the drill exercise objective. In this study, we wanted to find out whether hybrid simulation disaster drill training will be effective in developing competency for healthcare providers.

**Methods:** The simulation exercise was conducted in a teaching hospital located in a major city, as part of the annual hospital drill exercise. Total of 38 hospital employees, 37 live actors, and 5 full-bodied simulators were involved. The scenario consisted of a building collapsing due to a major earthquake, and around 100 people were the victims of this event. The participants task was to get dispatched to the site and perform triage and life-saving procedures to the victims. Four of the live actors were moulaged with severe traumatic wound and they also wore vests that had the capability of performing invasive procedures, such as chest tube drainage and needle decompression. Five full-bodied simulators were set up as critically injured patients. Triage was assessed by 10 separate assessors. Pre- and post-intervention self-assessment of disaster preparedness perception changes were analyzed with paired t tests.

**Results:** Out of 42 disaster victims, correct triage was performed to 39 patients (92.9%). One patient was under triaged, and 2 patients were over triaged. The total duration for completing the 42 victims triage was 14 minutes and 30 seconds. The percentage of proper life-saving procedures performed was 43.4, but no differences were found between the severity of the patients. Pre- and post-intervention changes in perception and competency performed through self-assessment questionnaire improved significantly. The hybrid simulation drill showed significant satisfaction among the participants (9.0;2.3 out of 10 points). The face and content validity showed high scores (out of 10 points). The scores for able to be immersed, acted as if the scenario was real, helped recognize one’s knowledge in disaster response, helped recognize one’s decision-making in disaster response were 8.9, 8.8, 8.5, and 8.6, respectively.

**Conclusion:** Through hybrid disaster simulation drill exercise, we assessed the overall performances of hospital healthcare providers in a disaster response. With the addition of full-bodied simulators and live actors on procedure-capable vests, the morbidity and mortality of patients were assessed as well. Hospital disaster drill exercise should be prepared structurally and as realistic as possible. And there needs to be a rigorous method of assessing the performances in order to save the lives of the victims from disaster events.

References available upon request

Full disclosures for all authors and coauthors available upon request
CRASH TESTING THE ED: IN SITU SIMULATIONS PRIOR TO OPENING EMERGENCY CARE UNITS (#581)
Presentation Category: Patient Safety & Quality

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Introduction: Opening a new facility generates numerous unknowns and providers working on a novel environment might experience difficulty maintaining high level of teamwork. In situ simulations occur in actual care settings using equipment, resources and healthcare providers from units (1). This permits training healthcare teams on technical skills and crisis resource management (CRM) and also assessing system competence and detecting latent safety threats (LST) (2). To prospectively assess training strategy, regarding LST detection, knowledge acquisition, satisfaction with training and teamwork and safety climate. There will be at least one LST detected per simulation scenario conducted. Providers will have an increase in knowledge, high participant satisfaction and improvement of teamwork and safety attitudes perception after training.

Methods: Simulations occurred at new Advanced Units of Emergency Care of Hospital Israelita Albert Einstein, in São Paulo, Brazil. Unit Ibirapuera has services in pediatric emergency medicine and Unit Klabin in pediatric and adult emergency medicine. Simulations occurred in two 4 hour courses per unit, with 6 CRM scenarios each, combining technical and nontechnical issues, like CPR and communication with family per example. Prior to training, knowledge pre-test (0-10 MCQ) and Safety Attitude Questionnaire (SAQ) (4) were filled by participants. Scenarios used simulators, standardized patients or both, occurred at the units’ resuscitation bays cared by interdisciplinary teams for 10 min and were filmed and transmitted to all course participants. Debriefings lasted 20 min and were co-facilitated by a physician and a nurse. Facilitators filled a specific form to register LST detected. A posttest, a satisfaction survey (1-5 Likert) and a post SAQ were filled by participants after each course.

Results: There were 146 participants total (103 Unity Ibirapuera and 43 Unity Klabin). We anticipated at least 1 LST detected per simulation scenario (24 total). We found 27 LSTs at Unity Ibirapuera and 26 at Unit Klabin, average of 2.2 LST per scenario. The knowledge pretest mean score was 7.0 and post 7.7 (paired t-test, p<0.002). The total cost to implement the casting simulation-based workshop was $2,465.31 per 6-month resident rotation. Actual costs attributed to cast saw injuries per resident rotation were $65,83 before simulation, and negligible after simulation. Based on historical data, the potential total payment (claims) related to improper casting technique or cast saw burn that resulted in payment (n=13) ranged from $2,025 and $99,373 per claim. The anticipated savings from averted cast saw injuries and associated medicolegal payments in the 2.5 years post-simulation was $27,131, representing an 11 to 1 ROI. Maximum potential savings were estimated at $104,594 with potential return of 42 to 1.

Conclusion: This study evaluated a strategy to “crash test” the emergency care units, allowing detection of potential unanticipated harms to our patients and accelerating the expertise of our newly formed care teams. We were able to identify LST at a high rate before opening the units, increase individual knowledge and improve or maintain a high level of teamwork and a positive safety perception of healthcare providers after training.

References available upon request
Full disclosures for all authors and coauthors available upon request

IMPROVED SAFETY FROM REDUCTION IN CAST SAW BURNS AFTER SIMULATION EDUCATION FOR ORTHO RESIDENTS (#1025)
Presentation Category: Patient Safety & Quality

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Introduction: Simulation-based training may improve healthcare value by improving outcomes and minimizing complications. However, there is limited information regarding the cost-effectiveness of simulation curricula. The purpose of this study was to estimate the cost effectiveness of simulation training aimed at reducing cast saw injuries by orthopaedic surgery residents. What is the clinical efficacy and return-on-investment (ROI) of simulation-based training aimed at reducing cast saw injuries by orthopaedic surgery residents?

Methods: Third-year orthopaedic residents rotating at a children’s hospital underwent simulation-based instruction on distal radius fracture (DRF) reduction, casting, and cast removal using an oscillating saw. The incidence of cast saw injuries was analyzed before and after implementation of the simulation curriculum. Actual and potential costs associated with cast saw injuries included wound care, extra clinical visits, and medicolegal expenses (indemnity payments and legal expenses). Medicolegal expenses were provided by the Controlled Risk Insurance Company (CRICO), the medical malpractice insurer for the Harvard medical community. Curriculum costs were calculated using time-derived activity-based accounting methodology. The costs of cast saw injury and the simulation curriculum were compared to determine overall savings and return-on-investment (ROI).

Results: In the 2.5 years prior to simulation, cast saw injuries occurred at a rate of approximately 4.3 per 100 casts cut by orthopaedic residents. For the 2.5-year period post-simulation, the cast saw injury rate decreased to approximately 0.7 per 100 casts cut (p=0.002). The total cost to implement the casting simulation-based workshop was $2,465.31 per 6-month resident rotation. Actual costs attributed to cast saw injuries per resident rotation were $65,83 before simulation, and negligible after simulation. Based on historical data, the potential total payment (claims) related to improper casting technique or cast saw burn that resulted in payment (n=13) ranged from $2,025 and $99,373 per claim. The anticipated savings from averted cast saw injuries and associated medicolegal payments in the 2.5 years post-simulation was $27,131, representing an 11 to 1 ROI. Maximum potential savings were estimated at $104,594 with potential return of 42 to 1.

Conclusion: The simulation-based training for orthopaedic surgical residents was effective in reducing cast saw injuries in a pediatric setting and had high theoretical ROI. These results support further investment in simulation-based training as cost-effective means of improving patient safety and clinical outcomes.

References available upon request
Full disclosures for all authors and coauthors available upon request
Poster #191

**PEDIATRIC MED ERRORS: SKILLS, CONFIDENCE AND NEAR MISS RECOVERY BEHAVIORS (#1078)**

**Presentation Category:** Patient Safety & Quality

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**Introduction:** Medications errors continue to be a major problem in the USA. Near misses have not been thoroughly investigated as an event that could have potentially cause harm to the patient, but did not. Due to continued safety concerns in fast-paced clinical acute and critical care settings, and the vulnerability of pediatric patients in experiencing significant medical and medication errors, the purpose of this study was to investigate the effect of a structured safety intervention for BSN students on their performance of error reduction techniques during complex patient scenarios. The research question for this project was, “What is the effect of a safety intervention on reported confidence and the performance of safety sweeps, safety assessments, near miss recovery behaviors, and error identification and reduction during pediatric simulations?”

**Methods:** The study included a pre- and post-test quasi-experimental design to investigate an intervention on environmental safety sweeps, safety assessments, identification of near misses, and clinical error identification and correction. Participants were offered an opportunity to participate in the study which took place in the high-fidelity simulation center. After an initial patient assessment and care during a complex pediatric simulation, the students were given an intervention through a safety course that extended beyond what their pediatric clinical and theory class offered. The intervention included environmental safety sweeps, assessment for common error-prone situations, improvements on medication administration and safety assessments. Participants then had the opportunity to experience the complex, high-acuity environments modified and changes evaluated all within a short period of time.

**Results:** The study, thus far, has demonstrated that this pilot study was successful in increasing the students’ confidence and skills in the area of safety for complex pediatric acute care simulation scenarios. Data collection is to continue until over 60 participants complete the study. Preliminary findings show that the confidence increased, safety sweeps and environmental assessments improved, and the participants were able to identify quickly error-prone situations that were imbedded into the scenario.

**Conclusion:** Although data collection is continuing, preliminary data shows anticipated results that a comprehensive safety intervention for error-prone pediatric acute care clinical scenarios improves the participants’ ability to identify error-prone situations, actual errors and improves the participants ability to communicate the errors to the appropriate health care provider.

References available upon request

Full disclosures for all authors and coauthors available upon request

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Poster #192

**USING RAPID CYCLE DELIBERATE DESIGN IN OPTIMIZING SAFER WORK SPACE (#582)**

**Presentation Category:** Patient Safety & Quality

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**Introduction:** In situ simulation has been used as a tool for the assessment of clinical spaces. 1, 2 In a pediatric tertiary care center, the use of in situ simulation was central in the design of the emergency tracheostomy care setup in a newly designed complex care ward. A key challenge in this project revolved around how to most efficiently identify patient safety and design issues, incorporate feedback and evaluate resulting changes. The concept of “rapid cycle deliberate practice” (RCDP) has been proposed as an educational framework by Hunt et al 3 wherein masterfully learning is achieved through cycles of deliberate practice and real time directed feedback with an expert. We proposed the use of RCDP as a framework for quality improvement and clinical space evaluation wherein identified issues in patient safety and design could be quickly identified, environments modified and changes evaluated all within a short period of time.

**Methods:** An inter-professional group of key stakeholders met to design the “ideal” first iteration of the patient care room with respect to tracheostomy care. Three common emergency tracheostomy care scenarios (accidental de-cannulation, obstruction and difficult tracheostomy change) were then developed to identify patient safety and design issues and test subsequent changes. 2 consecutive sessions were then organized in situ using the above 3 scenarios during regular working hours. Participants included front line health care staff as well as parents. During each simulation, a team of observers recorded feedback using a tool designed for the exercise. Debriefing of the scenario was done using a “plus/delta” approach and focused specifically on systems issues. The clinical space was then adjusted accordingly and the subsequent scenario run to test the incorporated changes. Validation of the new changes would be measured as decreasing numbers of changes in subsequent simulations.

**Results:** Over 5 simulations, issues were recorded using the observer tool into 4 categories: Structure, Workflow, Patient Safety and Education. Overall, 41 issues were identified throughout the scenarios with 13 classified as impacting patient safety requiring immediate correction. Through the scenarios, 19 changes were made, with each subsequent scenario having a decrease in both the number of issues identified, and number of changes required. Controlling for infrastructure related issues, 6 issues were identified by the 5th simulation. Video analysis revealed a decrease in time (seconds) to first responder, first suction, locating bag mask, locating fitted mask and total time searching for equipment with each implemented change and subsequent simulation session.

**Conclusion:** We have adapted an RCDP framework to efficiently achieve the ideal setup for emergency tracheostomy care in our patient care environment. Using this method, we were able to effectively identify design and patient safety issues and implement changes that solved them in a timely fashion. Traditional quality improvement methods would be more difficult to implement given the high stakes but low frequency of pediatric emergencies. To our knowledge, the use of in situ simulation used in this manner has not been reported before, and could be scaled and adapted to many different clinical environments dealing with the same types of events. We conclude that RCDP simulation can be applied to space design and quality improvement in an efficient and cost effective manner.

References available upon request

Full disclosures for all authors and coauthors available upon request
**Poster #193**

**IMPROVING SYSTEM READINESS, STAFF PREPAREDNESS AND PATIENT SAFETY IN A NEW NICU (758)**

**Presentation Category:** Patient Safety & Quality

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**Introduction:** Transitions to new healthcare environments can negatively impact patient care and threaten patient safety. Immersive in situ simulation conducted in newly constructed single family room (SFR) Neonatal Intensive Care Units (NICUs) prior to occupancy, has been shown to be effective in testing new environments and identifying latent safety threats (LSTs). These simulations overlay human factors to identify LSTs as new and existing process and systems are implemented in the new environment. We aimed to demonstrate that large-scale, immersive, in situ simulation prior to the transition to a new SFR NICU improves: 1) systems readiness, 2) staff preparedness, 3) patient safety, 4) staff comfort with simulation, and 5) staff attitude towards culture change.

**Methods:** Multidisciplinary teams of neonatal healthcare providers (HCP) and parents of former NICU patients participated in large-scale, immersive in-situ simulations conducted in the new NICU prior to occupancy. One eighth of the NICU was outfitted with equipment and mannequins and staff performed in their native roles. Multidisciplinary debriefings, which included parents, were conducted immediately after simulations to identify LSTs. Through an iterative process issues were resolved and additional simulations conducted. Debriefings were documented and debriefing transcripts classified using qualitative methods. To assess systems readiness and staff preparedness for transition into the new NICU, HCPs completed surveys prior to transition, post-simulation and post-transition. Systems readiness and staff preparedness were rated on a 5-point Likert scale. Average survey responses were analyzed using dependent samples t-tests and repeated measures ANOVAs.

**Results:** One hundred eight HCPs and 24 parents participated in six half-day simulation sessions. A total of 75 LSTs were identified and were categorized into eight themes: 1) work organization, 2) orientation and parent wayfinding, 3) communication devices/systems, 4) nursing and resuscitation equipment, 5) ergonomics, 6) parent comfort, 7) work processes, and 8) interdepartmental interactions. Prior to the transition to the new NICU, 76% of the LSTs were resolved. Survey response rate was 31%, 16%, 7% for baseline, post-simulation and post-move surveys, respectively. System readiness at baseline was 1.3/5. Post-simulation systems readiness was 3.5/5 (p = 0.001) and post-transition was 3.9/5 (p = 0.02). Staff preparedness at baseline was 1.4/5. Staff preparedness post-simulation was 3.3/5 (p = 0.066) and post-transition was 3.9/5 (p = 0.03).

**Conclusion:** Large-scale, immersive in situ simulation is a feasible and effective methodology for identifying LSTs, improving systems readiness and staff preparedness in a new SFR NICU prior to occupancy. However, to optimize patient safety, identified LSTs must be mitigated prior to occupancy. Coordinating large-scale simulations is worth the time and cost investment necessary to optimize systems and ensure patient safety prior to transition to a new SFR NICU.

References available upon request

Full disclosures for all authors and coauthors available upon request

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**Poster #194**

**AUTOMATED MEDICATION AND SUPPLIES UNIT-WORKFLOW DESIGN IN PEDIATRIC ANESTHESIA (#1261)**

**Presentation Category:** Patient Safety & Quality

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**Introduction:** The automated medication and supplies cabinet is aimed to improve patient safety by standardizing labelling and accurate transaction data for documentation of anesthetic medications. The introduction of this new technology in the operating room (OR) creates new workflows which can result in unidentified risks and impact on patient care. Despite careful workflow design, different local environments may present unique and unanticipated challenges. Pediatric anesthesia presents additional considerations as the patients may require anesthetics in both the OR and satellite anesthesia locations. Medication preparation is complex due to the need to frequently dilute medications for the broad range of patient sizes. This project aimed to identify workflow processes and safety threats prior to the introduction of the Anesthesia Workstation (AWS) with a Safe Label System (SLS) in the OR for clinical use through simulation activities.

**Methods:** Approval for study was obtained from Quality Management Department. The scenarios were designed with consideration of the usual workflow processes used by pediatric anesthesiologists. They were constructed to incorporate routine and emergency situations including transitions of care, medication dilutions, reconciliation of medications and removal of necessary supplies, and were guided by emerging themes. Simulations were conducted either in the laboratory or in situ, with or without a mannequin and vital signs monitor. Anesthesiologists of different levels and subspecialties were involved after an orientation to AWS. Debriefing was conducted with a standardized debriefing tool. After implementation of the AWS, all anesthesiologists were invited to provide feedback by email or direct communication. Project team was on site to observe processes. Follow-up was conducted using a semi-structured interview from key participants. Notes taken were transcribed for thematic analysis.

**Results:** The simulations identified the optimal process by which supplies and medications including narcotics were dispensed, diluted and labeled. The layout of the medication trays and the supplies were improved. Additional considerations were made to the power-down process. The information gained was utilized to develop an orientation program that incorporated these refinements. After introduction of AWS in the OR only two workflow concerns were raised that related to the location of the sharps container and bar code identification of patients. With respect to the design of the simulation, the use of the mannequin with vital signs were not necessary but improved realism and engagement for some participants. In situ simulation was not essential but highlighted considerations related to local environment.

**Conclusion:** Simulation revealed potential risks associated with the AWS and changes were made to mitigate them prior to use with real patients. Repeat simulations in multiple settings expedited the change processes. Although early simulation may inform development of the implementation of new technology, it is equally important to test the exact end product and avoid the need for extensive alterations after implementation. Considerations on time and resources posed limitations on the extent of simulations. Ongoing monitoring and support on use of the AWS was essential after implementation.

References available upon request

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IN SITU OR SIMULATION AS A TOOL TO DETECT LATENT SAFETY ISSUES (#1206)
Presentation Category: Patient Safety & Quality

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Introduction: In situ operating room-based simulation is typically used to teach surgical teams on team-based principles of crisis management. This involves the use of an experienced observer who identifies latent safety threats and thereby allows the healthcare organization to avert errors instead of implementing and optimizing systems after hazardous events occur. The value of in situ simulation to identify latent threats has been recognized, up to date, a systematic process on how to best implement this has not been performed. The objective of this study was to evaluate the introduction of an independent expert observer (patient safety fellow) embedded in the operating in situ simulation team, the identification of latent safety threats, and thereby leads to the early identification of safety issues which allows the healthcare system to act on these latent threats.

Methods: In a seven-month period, we performed six to eight in situ operating room simulation sessions on either a monthly basis. Each of these simulations included a surgical provider, anesthesia provider, OR nurse, and a surgical tech. Each of these simulations the patient safety fellow was assigned to the team as an independent observer and tasked to identify safety threats. After the simulations, the identified safety threats were presented to the quality committee by the safety fellow and the quality committee identified potential solutions to be implemented. Action plans were addressed and applied within the healthcare system.

Results: During the study, we conducted 50 in situ simulation sessions. Of these, 48 (96%) were assessed by the patient safety fellow. During these simulations, we identified latent threats, such as: 1) poor coordination between SimLEARN and local teams; 2) unfamiliarity with the use of specific needles in emergency situations; 3) time delay of bronchoscopy cart arrival for emergency situations; 4) unfamiliarity with content of lung box by anesthesia residents; 5) cell phone low signal during emergencies; and 6) unfamiliarity with the physical space of bronchoscopy cart arrival for emergency situations.

Conclusion: The initial results indicate that the introduction of a patient safety fellow into in situ operating room simulations allows the identification of latent safety threats and creates immediate communication channels with the quality committee which in turn leads to the deployment of clear safety plans. This interaction facilitates the quick implementation of preventive safety action plans that ultimately will impact patient outcomes and will help to create an institutional safety culture.

References available upon request

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EFFECTIVENESS OF SIMULATION: MANAGEMENT OF DETERIORATING PATIENTS IN ACUTE CARE (#290)
Poster Category: Patient Safety & Quality

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Introduction: Research shows that newly graduated registered nurses (NGRNs) are unprepared for the demands that will be placed upon them to manage patients in the acute care setting (1). Acute care patients treated in private, modern level I trauma centers have a higher acuity resulting in greater potential for deterioration (2). NGRNs must become prepared quickly to safely manage care in this setting. Does the incorporation of adult deteriorating patient simulation scenarios provide a safe and effective teaching modality for NGRNs to acquire essential knowledge and skills? The importance of this project to the simulation and healthcare community is to implement teaching methods for NGRNs that reduce incidents of failure to identify, intervene, and/or rescue in the acute care setting, thus improving patient outcomes.

Methods: Data obtained from the rapid response team was utilized for development of the simulation scenarios; tachycardia, respiratory failure, over-sedation, and hypoglycemia. Authors collaborated with content experts for scenario development. NGRNs practicing in medical-surgical areas and enrolled in the facility’s transition to practice program participated as part of the newly initiated curriculum. Two-hour sessions were provided to 110 NGRNs in groups of 8 or fewer. A structured framework for pre-and post-debriefing sessions prepared NGRNs and facilitated guided reflection. Simulation equipment included SimMan®, patient care monitors, crash carts, IV/PCA pump, medications, and oxygen delivery devices. One participant was assigned the primary nurse role and interacted with the simulator calling upon others when needed. Post-simulation evaluations were electronically sent to participants within two weeks of the training sessions.

Results: Based on survey responses, all participants agreed that the learning environment was safe and comfortable. Over 97% of participants stated that this training was useful to their practice and an effective tool for enhancing skills and job performance. Over 92% felt the scenarios portrayed true to life patient encounters. Select comments regarding the most helpful aspects of the training included: “cases were well designed”, “presenting the most common rapid calls”, “hands on practice”, and “open conversation and learning as a group”. Comments from participants regarding elements of the training that they would like to see improved were: “I would like to see this training happen during hospital orientation before we hit the floors running”, “1 would like to do these sim activities more often”, and “get sim lab more often for new nurses”.

Conclusion: Evaluation results indicated that participants found simulation to be an effective teaching method for management of the deteriorating patient in acute care. Participants also indicated that they want increased and varied simulation opportunities. Although this is preliminary data, it demonstrates the effectiveness of simulation as a learning methodology for NGRNs. Future studies are needed to evaluate the direct impact of simulation for NGRNs on mortality of patients in the acute care setting. School of nursing are increasingly utilizing simulation for knowledge acquisition and skill development. However, within the healthcare community, NGRNs are rarely provided with the same quantity of simulation experiences. There has been identified need for additional learning among NGRNs at the author’s facility and they indicated a desire to increase the utilization of simulation to enhance their knowledge and skills.

References available upon request
Full disclosures for all authors and coauthors available upon request

HELPING NIGHTINGALES TO SING: REDUCING VARIATION AND ENHANCING COMMUNICATION (#1062)
Presentation Category: Patient Safety & Quality

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Introduction: Carter report1 highlights how unwanted variation and lack of consistency across a hospital can lead to decreased productivity and quality of care. Within our own hospitals, we identified variation and challenges to communication in nursing team practices across ward-based areas. Specifically, we identified inconsistent handover formats and duration which led to delays in patient care and staff failing to take breaks or leave shifts on time. These variations also impacted upon transient staff and students’ ability to work effectively across wards. Within a shift we found nursing care was impacted by multiple factors including distractions, lack of situational awareness, poor team working, and lack of timely decision-making in the absence of the nurse in charge. To address these performance gaps, and strengthen team resilience and multi-professional working, we developed a set of ward safety tools, based upon evidence based practices, including SBAR, Safety Briefing & Handoffs.

Methods: A one-day simulation-based education programme was designed for teams of nurses. Over six months, 85 days of training was delivered to 75% of staff (n=1049). Teaching strategies included: introduction of ward safety tools & Circle of Care2 model; self care & non-verbal exercises; deliberate practice with coaching and feedback; immune clinical scenarios and debriefing; flipped classroom with faculty-led role play. The training focused on communication and collaborative working during a shift: the first hour’s safety briefing and bedside handover; the mid-shift huddle and the last hour team working & handover preparation. The overarching focus was on self-care and teamwork, with deliberate practice episodes using these tools. Training was evaluated on three levels: 1) using pre and post training structured surveys assessing participants’ learning of human factors skills for healthcare3 2) qualitative assessment of ward behaviour and 3) assessment of patient and staff outcomes.

Results: Post training staff demonstrated significant improvement in self-efficacy of human factors skills for healthcare (t(897)=24.3, p<0.001). Using a large scale mixed-modality simulation programme to address variation in nursing practice we have enabled staff to develop human factors knowledge and language to help them utilise tools such as SBAR and CUS4 to support patient safety and quality of care in every day practice. This programme has transferred the known benefits of huddles and safety briefings from acute utilisation into routine use in the wider hospital population. It has initiated a cultural change towards self-care and nurse empowerment. The training underpins core values centered around caring for each other, speaking up, and being enabled to address concerns they have, regardless of hierarchy. The use of simulation and deliberate practice exercises were instrumental in creating staff confidence, which led to this cultural shift. In actualising these behavioural changes we have been able to improve staff working patterns which contributes to enhanced patient safety.

References available upon request
Full disclosures for all authors and coauthors available upon request
**Poster #199**

**IMPROVING PEDIATRIC EMERGENCY ROOM QUALITY OF CARE USING OUTREACH SIMULATION (#732)**

**Presentation Category:** Patient Safety & Quality

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**Introduction:** When compared to pediatric Academic Medical Centers (AMC), community Emergency Departments (EDs) have a low volume of pediatric patients and lack easily accessible pediatric resources, guidelines, and protocols; which may affect their readiness to care for ill children. We hypothesize that a mobile in situ simulation-based medical education program will improve the quality of simulated pediatric acute care across community EDs in the state of Indiana.

**Methods:** Standardized, in situ high-fidelity simulations were conducted by an interprofessional team from the AMC to inter-professional health providers at community EDs. The simulation team consisted of pediatric critical care intensivists, nurse (RN) educators and respiratory therapy (RT) educators. Community ED teams consisted of physicians (MDs), RNs, RTs and other providers. Three pediatric scenarios respiratory failure (RF), diabetic ketoacidosis (DKA) and supraventricular tachycardia (SVT) were performed, followed by a constructive debriefing. Each scenario was scored using validated checklists. Similar scenarios were repeated and scored at a minimum of 6 months after the initial visit. For each scenario, a Composite Adherence Score (CAS) was calculated based on the number of items scored correctly on the checklist. The initial CAS was compared to the 6-month follow-up CAS for each case using 2-tailed t-tests.

**Results:** Between May 2016 and August 2017, a total of 36 inter-professional teams participated in initial simulation visits and 42 teams participated in follow-up visits across 9 ED sites. Of 386 participants, 13% were MDs, 61% RNs, 10% RTs and 16% were other providers. The domain CAS improved from 50% to 70% for RF scenario (p<0.08), 52% to 80% for DKA scenario (p=0.01) 58% to 70% for SVT scenario (p=0.29) and 53% to 73% (p=0.07) for the overall CAS. The highest items of improvement were the use of a cuffed endotracheal tube (17% to 70%), p

**Conclusion:** Using standardized in situ simulated scenarios, a statewide pediatric outreach program successfully improved the quality of acute care of simulated pediatric patients across community EDs in the state of Indiana. This model can be used in other states to improve the skills of community ED’s health care providers. Future work will explore whether this simulation-based improvement will translate to actual patient care.

References available upon request

Full disclosures for all authors and coauthors available upon request

**Poster #200**

**SIMULATION TECHNOLOGY TO EXAMINE PRACTICE NEEDS AND EQUIPMENT EFFECTIVENESS (1276)**

**Presentation Category:** Patient Safety & Quality

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**Introduction:** Simulation is showing increasing value as a tool for evaluating healthcare practice priorities and equipment effectiveness. During CODE response, high-quality chest compressions are essential yet shallow chest compressions are common and will negatively affect outcomes. The aim of this IRB approved project was to compare the quality of external chest compressions (rate, depth, recoil, and participant’s perception of compression quality, ease, and fatigue level) by hospital staff with and without the use of an eight inch step stool. The project simulated a cardiac arrest using a high-fidelity manikin placed on a backboard and hospital stretcher. Participants performed uninterrupted chest compressions for two minutes on a high-fidelity manikin without the use of a step stool. A minimum four minute rest period was provided. Participants then performed uninterrupted chest compressions for two minutes with the use of a step stool.

**Methods:** An experimental design, simulated study of chest compressions during cardiac arrest was conducted at a university teaching hospital. Data were recorded using the Laerdal Session Viewer recording system along with including participant perception responses collected by way of a survey. Specifically, data collected to illustrate rate, depth and recoil during chest compressions included mean compression depth, percentage of compressions with correct depth, mean rate of all compressions, percentage of compressions with adequate rate and percent of compressions fully released were each measured with and without the use of a stool. The participant survey was used to compare the participant’s perception using a ten point Likert scale of fatigue severity, quality of compressions, and level of compression ease with and without the use of a stepstool. A convenience sample of 148 volunteer participants from a pool of BLS certified hospital staff or affiliates was used for this project.

**Results:** The study enrolled 146 BLS certified participants. Parametric and non-parametric data were analyzed to assess the effect of performing CPR compressions with and without a step-stool on subjective and objective measures of CPR quality. The project aim to increase mean compression depth (MCD) with step-stool use was statistically significant (M=37.62 ± 8.04, t=-9.39, p < 0.001). Specifically, height was a statistically significant predictor of MCD with step-stool use (r = 0.34, p < 0.001) with regression lines for MCD without and with step-stool intersected at a height of 188.24 centimeters. Participant perceptions were statistically significant with step-stool use in all surveyed areas: Severity of fatigue (Z=-5.181, p < 0.001).

**Conclusion:** Using a stepstool when performing chest compressions increased compression depth along with lessened fatigue severity, enhanced compression ease and improved compressions quality. In the hospital setting it may be unworkable and unsafe for a clinician to kneel in a bed or place a patient on the floor in an effort to provide chest compression with adequate depth. Stepstool utilization may be a cost-effective and efficient way to improve chest compression quality and lessen fatigue among clinicians. Simulation is moving far beyond its original bounds as an educational modality and shows increased value as a tool for evaluating care delivery. True innovation happens when simulationists successfully partner with quality specialists, patient safety champions and administrative leadership. In this session we will share how to execute a simulation-based research program to support new hospital initiatives and evaluate equipment effectiveness in an effort to impact patient safety and outcomes.

References available upon request

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Poster #201 - 1st Place Award Winner

IMPROVING TRANSPORT MANAGEMENT OF ABDOMINAL AORTIC ANEURYSM PATIENTS WITH SIM (#301)
Presentation Category: Patient Safety & Quality

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Introduction: Didactic education modules and formal review of clinical practice guidelines had minimal impact on the UCAN flight team's ability to manage blood pressure for transporting patients with Abdominal Aortic Aneurysms (AAA). Specifically, a post didactic, internal peer review process of all AAA patients identified suboptimal management of blood pressure during transport. Since it is widely known that aggressive management of blood pressure in AAA patients can lead to improved patient outcomes, the UCAN Educator worked with the University of Chicago Simulation (UC Sim) Center to use simulation-based education to reinforce traditional didactic educational methods with complex high fidelity simulated transport scenario training for all flight nurses. After incorporating simulation in the training, AAA patient care outcomes improved considerably.

Methods: Routine internal chart audit/peer review suggested many crew members were not as aggressive with BP management as they could be to initiate strategies to reduce blood pressure of AAA patients. Specifically, formal review of internal quality data looks at a) initiation of treatments within the clinical practice guidelines to achieve goal Mean Arterial Pressure (MAP) of 60–70 and if possible goal Heart Rate 50–70; b) reducing blood pressure by 20% of presenting blood pressure. Since simulation has proved to be an effective tool to reinforce flight team's retention of ACLS and pediatric sepsis management, the UCAN Education Coordinator worked with UC Sim to implement a high fidelity scenario aimed at improving flight team member's ability to manage blood pressure in a simulated AAA patient. Working in pairs, all UCAN flight nurses (n=7) participated in the single sim session. Post sim, everyone took part in a facilitated debriefing session immediately after the scenario.

Results: For the purposes of this project retrospective chart audits of all patients with the primary diagnosis of AAA were evaluated for 12 months prior to the implementation of simulation training (July 2016). A post simulation chart audit was completed from August 2016 to February 2017 to evaluate whether the flight team initiated appropriate treatment to manage the patient's blood pressure in accordance with the clinical practice guidelines. Prior to simulation training, the transport team initiated appropriate treatment to achieve goal MAP 11% of the time. After simulation, this increased to 86% of the time. Moreover, prior to simulation training, the transport team met goal of 20% reduction in BP parameters in 67% of patient transports; after simulation, this increased to 86% of patient transports.

Conclusion: Based on the pre/post chart review data, didactic education sessions alone did not seem to translate into improved management in patient care for AAA. However, when didactic education was paired with simulation training, there was remarkable improvement in both quality care markers and overall management of blood pressure in transport patients with AAA. While the small, non-randomized program does not allow us to make a causal inference that simulation specifically improved the patient outcome measures, we can certainly identify a positive trend in assessment and treatment of patients with AAA since implementing the high fidelity simulation training. In the future we plan to assess the influence of simulation training more rigorously, not only in the care/management of AAA patients, but in all aspects of critical patient care when possible. We feel for our flight team members simulation is a key educational methodology for improving clinical practice and patient safety.

References available upon request

Full disclosures for all authors and coauthors available upon request

Poster #202

PRE-ARRIVAL & PRE-DEPARTURE CHECKLIST IN SIMULATED PAEDIATRIC TRAUMA CARE (#200)
Presentation Category: Patient Safety & Quality

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Introduction: Traumatic injuries are a leading cause of paediatric mortality(1). Variable compliance with primary and secondary trauma surveys occur frequently as a result of patient, injury, and hospital factors(2). Though studies have shown improved primary and secondary survey task completion with the use of a trauma checklist, it is unknown if the use of a trauma checklist will improve the speed of critical clinical interventions, such as intubation or blood product resuscitation(3–4). The purpose of this study is to determine if the introduction of a pre-arrival and pre-departure Trauma Checklist will improve clinical performance in a simulated environment. The Trauma Checklist focuses on pre-arrival preparation and pre-departure review prior to patient transfer to diagnostic imaging or the operating room. We conducted a pilot, randomized control trial assessing the impact of the Trauma Checklist on time to critical interventions on a simulated paediatric patient by multidisciplinary teams.

Methods: Emergency department teams composed of 2 physicians, 2 nurses and 2 confederate actors were enrolled in our study. In the intervention arm, participants watched a 10-minute educational video modelling the use of the trauma checklist and were provided a copy of the checklist. Teams participated in a standardized high-fidelity simulation scenario (Laerdal SimMan 3G) caring for a severely injured adolescent patient with hemorrhagic shock, respiratory failure and increased intracranial pressure. Our primary outcome of interest was time measurement to initiation of key clinical interventions, including intubation, first blood product administration, initiation of hyperosmolar therapy and others. Secondary outcome measures included a Trauma Task Performance score, checklist completion scores, and cognitive workload self-assessment by the NASA-TLX tool. Results were obtained by video review.

Results: We enrolled 14 multidisciplinary teams (n = 56 participants) into our study. There was a statistically significant decrease in median time to initiation of hyperosmolar therapy by teams in the intervention arm compared to the control arm (581 seconds, [509-680] vs. 884 seconds, [588-1144], p=0.03). Time to initiation of other clinical interventions was not statistically significant (including delivery of induction medication, intubation, initiation of blood products, application of pelvic binder and others). There was a trend to higher Trauma Task Performance scores in the intervention group however this did not reach statistical significant (p=0.09). Pre-arrival and pre-departure checklist scores were higher in the intervention group (9.0 [9.0-10.0] vs. 7.0 [6.0-8.0], p=0.17 and 12.0 [11.5-12.0] vs. 7.5 [6.0-8.5], p=0.01). Cognitive workload scores did not show statistical significance across all seven domains of the NASA-TLX tool.

Conclusion: Teams using the Trauma Checklist did not have decreased time to initiation of key clinical interventions except in initiating hyperosmolar therapy. Teams in the intervention arm had statistically significantly higher pre-arrival and pre-departure scores, with a trend to higher Trauma Task Performance scores. Our study was a pilot and recruitment did not achieve the anticipated sample size, thus underpowered. Participant groups in both the intervention and control arm were composed of experienced health care providers. However, use of the Trauma Checklist did not impact cognitive workload scores of team participants. The impact of this checklist should be studied outside tertiary trauma centres, particularly in trainees and community emergency providers, to assess for benefit and further generalizability.

References available upon request

Full disclosures for all authors and coauthors available upon request
IMPROVING QUALITY OF CPR FOR PEDIATRIC HEALTHCARE PROVIDERS WITH DISTRIBUTED PRACTICE AND REAL-TIME FEEDBACK – A RANDOMIZED TRIAL WITH COST-EFFECTIVENESS ANALYSIS (#297)

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Introduction: The quality of CPR directly impacts hemodynamics, survival, and neurologic outcome following cardiac arrest. Each year, health care system spent millions of dollars to offer Basic Life Support training to healthcare providers. However, healthcare providers still struggle to master and retain effective CPR skills after BLS training. Previous studies have shown that distributed CPR practice and use of real-time feedback improved the quality of CPR in both simulated and real events. In this study, we aim to examine both the efficacy and the cost-effectiveness of distributed CPR training method compared with conventional Basic Life Support (BLS) training.

Methods: We conducted a randomized controlled trial by enrolling pediatric emergency physicians and nurses Alberta Children’s Hospital. Participants were randomized into control arm (BLS training) or intervention arm (distributed CPR training). CPR performance and demographic information were collected at baseline. During study period, the intervention arm were asked to practice CPR for 2 minutes on a manikin located in the department with real-time feedback, when assigned to work a resuscitation room shift. The control arm received BLS course only at the beginning of the study and weren’t asked to practice CPR during the study period. All participants had CPR performance assessed at 3, 6, 9 and 12 months. CPR performance was compared between the 2 groups. A cost-effectiveness analysis from a healthcare system perspective was conducted. Costs were identified in 3 components: direct costs of the program, productivity loss and cost for remediation if training is not successful.

Results: A total of 101 healthcare providers participated and were equally allocated in 2 arms. The proportion of excellent CPR (guideline compliance > 90% for compression depth, rate and recoil) were compared between arms. Baseline assessment showed no significant difference in CPR performance. The intervention arm showed significantly improved CPR quality over time (excellent CPR proportion: 4%, 55%, 63%, 60% and 60% at 0, 3, 6, 9 and 12 months respectively) while control arm participants did not (excellent CPR proportion: 10%, 9%, 11%, 14% and 12% at 0, 3, 6, 9 and 12 months, respectively). The difference in quality of CPR between study arms were statistically significant (p < 0.001). Estimated mean costs for each participant were $58.8 for intervention group and $244.4 for control arm. The distributed CPR training program is less costly with better outcomes.

Conclusion: Distributed CPR training with real-time feedback was effective in improving CPR quality of healthcare provider. This training method also resulted in reduced training costs and should be considered adopting.

Full disclosures for all authors and coauthors available upon request.

HIGH-FIDELITY VERSUS VIRTUAL PATIENT SIMULATION CURricula FOR TEACHING THE UNIVERSAL PROTOCOL AND TIME-OUT: A BLINDED, RANDOMIZED CONTROLLED TRIAL (#378)

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Introduction: The Universal Protocol time-out, a Joint Commission requirement, remains an important step in the prevention of incorrect (e.g. wrong-side) procedures (1). Nearly half of incorrect procedures occur outside the operating room and failure to conduct a thorough time-out is a frequent root cause (2-3). High-fidelity simulation (HFS) has been demonstrated to improve self-confidence and performance of time-outs (4), but does not scale well when administering to the many physicians rotating through large healthcare organizations. Furthermore, HFS is expensive, time-consuming, and requires learners and instructors to be simultaneously present. Virtual patient simulation (VPS) represents a cost-effective, alternative learning platform capable of reaching an unlimited number of learners (5). This study poses the following research question: How does HFS versus VPS impact the learning outcomes for curricula that teach time-outs for invasive procedures outside the operating room?

Methods: Medical students and residents completed a baseline questionnaire and test, followed by an introductory PowerPoint presentation. Learners were randomized to control, high-fidelity simulation (HFS), or virtual patient simulation (VPS) groups. Control learners read an article. HFS participants had a thoracentesis time-out simulation including a debriefing. VPS individuals used an iPad to complete an online thoracentesis time-out simulation. One to two weeks later, learners repeated the survey and test and participated in a videotaped, standardized patient paracentesis simulation. Videotapes were reviewed and performance was graded in a blinded fashion using a validated “Ensuring Correct Surgery” (ECS) checklist (4-5). Teamwork skills were measured using the Clinical Teamwork Scale (CTS). The Kruskal-Wallis and Mann-Whitney U tests were utilized to compare results among all three or any two groups, respectively.

Results: Fifty learners were enrolled (control=19, HFS=15, VPS=16). Both HFS (8.6 ± 1.4) and VPS (7.4 ± 1.8) groups demonstrated improved final time-out performance as measured on the ECS checklist compared to control (6.6 ± 1.3, p=0.002). Overall teamwork, as well as five other teamwork skills measured by the CTS, were improved among the HFS (6.7 ± 1.4) and VPS (5.8 ± 1.7) groups compared to controls (5.3 ± 1.0, p=0.36). VPS (+2.1 ± 1.7, p

Conclusion: The study results support the following conclusions: 1) Simulation-based curricula, whether HFS or VPS, improve learner performance for conducting time-outs prior to invasive procedures compared to traditional didactic curricula; and 2) Unexpectedly, VPS was associated with greater improvement in knowledge regarding time-outs than HFS or traditional curricula. These results, especially if substantiated in other studies, are important for the healthcare simulation community as we struggle to effectively teach patient safety behaviors to large numbers of learners and staff.

References available upon request.

Full disclosures for all authors and coauthors available upon request.

Comparison of Intervention and Control Group Costs

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e52 Abstracts Simulation in Healthcare
**Poster #205**

**PROCEDURAL SEDATION SIMULATED COURSE, DOES IT IMPROVE TRAINING AND CLINICAL OUTCOMES (#333)**

**Presentation Category:** Patient Safety & Quality

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**Introduction:** There is no standardized training for procedural sedation (PS) in Emergency Medicine (EM) training programs, despite the availability of guidelines & ACGME EM Residency Milestone #11 which specifically expects competence in PS. Educational content varies across institutions(1). Use of didactics, high fidelity & virtual reality(2) simulation training, on-line modules(3), & supervised clinical encounters have been reported as precursors to independent practice. Kobayashi et al(4) analyzed & identified observable items, discriminated inexperienced vs experienced practitioners. Shavit et al(5) reported significant difference in physician performance & patients' safety, between who completed a simulation based training in PS vs who didn't. We sought to determine whether simulation based PS course that includes pre-sedation evaluation, complications management, & post-sedation observation could impact surrogate markers of safety in ED PS, residents' performance, knowledge & comfort level.

**Methods:** IRB approval was obtained for all aspects of this study, & all subjects (active EM residents) provided informed consent. We developed a PS curriculum based on our hospital's protocol, commonly encountered sedation complications, & discharge standards. The curriculum included pre-reading, 1 hour didactic content, and 5 simulation cases which were administered to groups of 4-5 EM residents over 3 hours by experienced EM faculty. Pre/post multiple choice tests, and pre/post self-assessments were utilized to evaluate learning. Subjects repeated the post-test, and completed a PS simulation station with 16 checklist items 5 months later to evaluate for skills retention. PS cases in the Emergency Department were collected for a period of 3 months before to 3 months after the training session. Data included the indication for sedation, medical history, ASA class, airway assessment, sedation medications, vital signs throughout the procedure, complications, and RASS scale.

**Results:** Residents self-reported improved comfort with PS and medication selection after the sedation course. On a 4-point scale, with 1 identified as strongly disagree and 4 as strongly disagree, residents rated their pre-course comfort with PS at 2.9, compared to 2.3 after the course (p

**Conclusion:** Simulation based training in PS using a curriculum that included a pre-reading handout, didactic session, pre-course self-evaluation and pre-test followed by applying that knowledge to 5 simulated cases in the most common PS complications, had a significant impact on EM residents' knowledge (post-test), clinical performance (delayed PS simulated case) as well as their comfort level (post-course self-evaluation). We are hypothesizing that this would in turn improve patients' safety in the ED who undergo PS, pending data completion.

References available upon request

Full disclosures for all authors and coauthors available upon request

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**Poster #206**

**VIDEO-LARYNGOSCOPE IS NOT ESSENTIAL FOR DIRECT LARYNGOSCOPE SKILL ACQUISITION (#281)**

**Presentation Category:** Patient Safety & Quality

**Nobuyasu Komasawa, MD, PhD1**

1TAKATSUKI, OSAKA, JAPAN

**Introduction:** We have previously showed that direct laryngoscope training contributes to videolaryngoscope skill acquisition of medical students. However, no one has validated how videolaryngoscope training affects the acquisition of direct laryngoscope skills. This study used simulation training to assess the efficacy of videolaryngoscope training for acquiring direct laryngoscope skills among medical students.

**Methods:** This study was approved by the Research Ethics Committee of Osaka Medical College. From October 2016 to May 2017, we conducted simulation training with sixty 5th year medical students with no experience in tracheal intubation as a part of their routine training at Osaka Medical College. Medical students performed tracheal intubation training using the Macintosh laryngoscope (McL) and Pentax- AWS AirwayscopeTM (AWS; HOYA, Japan). We divided 60 medical students into Group 1 (McL 10 minutes, AWS 10 minutes n=20), Group 2 (AWS 10 minutes, McL 10 minutes n=20), and Group 3 (McL 20 minutes n=20). Following simulation training, we assessed tracheal intubation time and success rates using Macintosh laryngoscope in both normal and difficult airways (cervical fixation). Results obtained from each trial were compared using the chi-squared test or one-way repeated measures analysis of variance. Data are presented as mean ± SD. P < 0.05 was considered statistically significant.

**Results:** No medical student failed tracheal intubation in normal airways among the three groups. Four medical students in Group 1, 3 in Group2, 3 in Group3 failed to intubate in difficult airways, which the difference in success rate was not significant. The intubation time did not significantly differ among the three groups.

**Conclusion:** One possible explanation for this may be that the tracheal tube passage through the glottis is the most difficult part of tracheal intubation with McL. Though medical students can get clear image around the glottis with videolaryngoscope, it does not help to facilitate the tracheal intubation with McL. Our findings show that videolaryngoscope training is not essential for medical students in order to obtain direct laryngoscope skills.

References available upon request

Full disclosures for all authors and coauthors available upon request
EVALUATION OF ARTERY AND VEIN DIFFERENTIATION METHODS USING ULTRASOUND IMAGING (#282)

Nobuyasu Komatsawa, MD, PhD¹
Takatsu, Osaka, Japan

Introduction: Ultrasound-guided Central venous catheters (US-CVC) technique has become available, which allows differentiation between veins and arteries and improves CVC safety. We conducted a survey on the subjective difficulty of ultrasound-based methods to distinguish between veins and arteries among medical students.

Methods: We introduced four differentiation methods: arterial pulse (pulse), color Doppler, compression (vein reduction), and Valsalva (vein expansion) methods to 5th year medical student. At the end of training, participants rated the difficulty of the four methods on a VAS, which ranged from 0 mm (extremely easy) to 100 mm (extremely difficult).

Results: There was no significant difference in subjective difficulty between pulse and color Doppler methods (P=0.99). The compression method was easier than color Doppler and pulse methods (P

Conclusion: According to our survey using US-CVC simulation, medical students found arterial pulse and color Doppler methods more difficult than vein reduction or vein expansion. Combination of compression and Valsalva methods may be effective for novice doctors to differentiate between the internal jugular vein and the common carotid artery on ultrasound images.

References available upon request
Full disclosures for all authors and coauthors available upon request

IDENTIFYING EYE MOVEMENTS TO PREVENT NEEDLESTICK INJURIES (#853)

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Introduction: Up to 20% of healthcare students suffer from a needlestick injury during their education (1). Traditionally accepted as a natural consequence of the learning process, the injuries may result in contracting lifelong illnesses such as HIV and Hepatitis, illnesses that can end or limit careers. The chances of a needlestick injury diminish as experience grows (2). Novice surgeons, when operating, concentrated on the tool they used (tool-tracking), while expert surgeons concentrated on the surgical target (target-tracking) (3). It is unknown if this difference may extend to nursing students and the role of this difference in prevention of needlestick injuries among students. Based on the Human Error Model (4), the study identified and compared eye patterns, namely tool-tracking and target-tracking eye behaviors, between novice nursing students and expert clinicians to understand the root cause of needlestick injuries and to develop an education program to prevent these injuries.

Methods: While wearing an eye-tracker to record accuracy and speed of eye movements, nursing students (n = 21) completed three simulated subcutaneous injections into a training pad using a pre-loaded syringe. The same procedure was repeated with physicians and registered nurses (n = 9). Feedback was not given between the injections. The procedure was divided into six subtasks: Scanning, Medication Inspection, Site Disinfection, Pre-injection, Injection, and Needle Disposal. Data analysis was performed on the recorded videos using T test to compare overall procedure time, time for each subtask, injection accuracy, and eye-tracking behaviors between the groups. Accuracy of each injection was assessed by calculating the distance between site of needle entry to the position of the thumb and index finger. Gaze tracking data is being analyzed to identify eye-tracking differences over the areas of interest (AOIs), specifically the injection site, thumb, index finger, and syringe.

Results: Different eye-tracking behaviors have been revealed between novices and experts. Experts’ total task time was significantly less than novices (p < 0.001), as well as reduced subtask times for Scanning (p = 0.010) and Injection (p = 0.001). This trend was also seen, but less significant, in Medication Inspection (p = 0.062), Disinfection (p = 0.22), and Disposal (p = 0.25). On the other hand, Pre-injection subtask was performed faster by novices (p = 0.455). Experts (0.26 ± 0.17) had better injection accuracy than novices (4.6 ± 2.5), p = 0.047. Preliminary results from the gaze tracking data have indicated that novices spent more time looking at the syringe and the needle than experts during the Pre-injection and Injection subtasks. Novices demonstrated more tool-tracking behaviors while experts displayed more target-tracking behaviors.

Conclusion: The results showed different procedural and subtask times and eye-tracking behaviors between the two groups. Novices spent twice as long as experts performing the Scanning and Injection subtasks, resulting in a longer procedural time. Moreover, novices adopted more tool-oriented eye behaviors rather than target-tracking behaviors, resulting in a less accurate injection performance from this group. This finding supports previous research (3). We believe that a less accurate injection performance may increase the risk of a needlestick injury to a novice student. We will continue with a learning study to determine how to best teach target-tracking as a specific skill to increase accuracy and decrease the risk of needlestick injury. This first study has laid the required groundwork for future studies that will help further our understanding of human performance in needle usage and the reduction of needlestick injuries among healthcare students.

References available upon request
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Poster #209

USE OF A SIMULATION-BASED ART CURRICULUM: IMPACT ON CPR QUALITY, PATIENT OUTCOMES (#255)
Presentation Category: Patient Safety & Quality

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Introduction: Survival rates remain low for in-hospital cardiac arrest (IHCA). Studies have shown that improved CPR quality is correlated with improved patient outcomes; however, CPR quality is still often inconsistent or sub-optimal. Simulation has been shown to improve CPR quality and performance during cardiac arrest resuscitation, but rarely has been shown to affect patient outcomes. In 2007, Davis et al. implemented Advanced Resuscitation Training (ART) at the University of California at San Diego. One of the components of this training program is an emphasis on the importance of high-quality compressions during cardiac arrest. Among other modalities, the program utilized high-fidelity simulation for training. Afterwards, Davis et al. found an improvement in overall survival to hospital discharge and survival with good neurological outcome following IHCA. The objective of our study was to determine if ART implementation had a significant impact on CPR quality and patient outcomes.

Methods: ART was implemented at Mayo Clinic Florida in January 2016, including the initial high-fidelity simulation component, as well as ongoing monthly in-situ mock codes utilizing high-fidelity simulation. Data collection will continue through May 2017 and pre-ART data will retrospectively be compared to post-ART data. CPR quality and patient outcome data are being collected as part of an ongoing quality improvement initiative. CPR quality data includes compression rate, compression depth, chest compression fraction (CCF), and pre-shock pause and is downloaded from the Zoll™ defibrillators. Patient outcome data include successful return of spontaneous circulation (ROSC), survival to discharge, and neurological outcome at hospital discharge as measured by the cerebral performance score (CPC). These data are collected as part of a monthly code review. Additional data regarding patient age, gender, cause of cardiac arrest, and initial cardiac rhythm are also being collected.

Results: A total of 148 patients who sustained IHCA have so far been included (105 pre-ART and 43 post-ART). Preliminary data analysis shows an increase in ROSC from 58.1 to 86.05% (p

Conclusion: Using medical simulation has been demonstrated to enhance learner retention over other educational modalities such as reading, lectures, and watching videos. It has also been shown to improve CPR quality and provider performance during cardiac arrest resuscitation. At Mayo Clinic Florida, preliminary data analysis indicates that rates of ROSC significantly improved following the implementation of an Advanced Resuscitation Training curriculum which incorporates high-fidelity simulation. Survival to discharge and CPR quality also improved following this simulation-based curriculum. If final data analysis continues to support these findings, the results could support the use of high-fidelity simulation not only as an effective learning modality, but also as a tool to impact patient care and patient outcomes.

References available upon request

Full disclosures for all authors and coauthors available upon request

Poster #210

RAPID CYCLE DELIBERATE PRACTICE VS TRADITIONAL SIMULATION FOR NICU EMERGENCIES (#830)
Presentation Category: Patient Safety & Quality

Jackie LeVan, DO, FAAP, CPhys1 Gillian Gonzaba, BSN, MSN, ARNP-BC, NP,2 Shelley Sanchez, BSN, RN,3 Renee Sitz, BSN, CCRN, RN4
1MEDNAX, SAN ANTONIO, TX, UNITED STATES; 2PEDIATRIX MEDICAL GROUP SAN ANTONIO, HELOTES, TX, UNITED STATES; 3BAPTIST HEALTH SYSTEM, SAN ANTONIO, TX, UNITED STATES

Introduction: Rapid Cycle Deliberate Practice (RCDP) simulation, in contrast to Traditional simulation (TS), provides the medical team a scenario with specific, predetermined hard stops in which immediate debriefing occurs during the simulation. The medical team resumes the scenario from the beginning and continues until all objective expectations are met offering the opportunity for repetitive learning and potential mastering of skills and team communication. In TS the medical team completes a medical simulation and then participates in a debriefing where the scenario is discussed and specific objectives are addressed. In contrast to RCDP, the team does not have the opportunity to repeat the simulation or certain skills. The primary objective was to compare these two types of simulation training for Neonatal Intensive Care Unit (NICU) nurses in relation to a high risk neonatal medical emergency requiring immediate intervention(1-5).

Methods: Nineteen NICU teams comprised of five NICU nurses per team were randomly assigned to RCDP (10) or TS (9). Nurses were assigned to teams based on experience level to assure teams were equal. Simulations occurred in the Baptist Health System High-Fidelity Simulation Lab in San Antonio, Texas. The scenario involved an intubated infant (high fidelity) in the NICU with a tension pneumothorax. The infant requires CPR, emergent medications, and needle thoracocentesis/chest tube. Objectives including initial assessment, team dynamics, DOPE evaluation to determine cause of deterioration (Displacement/Obstruction/Pneumothorax/Equipment Failure), needle thoracocentesis/chest tube set up, and medication administration were obtained. RCDP teams experienced six hard stops 1) Initial Assessment/DOPE/Roles 2) SBAR hand off 3) Diagnosis of tension pneumothorax 4) Preparation for needle/chest tube 5) Coordinated chest compressions 6) Medication calculation/administration/closed loop communication.

Results: Forty-Four NICU nurses completed RCDP and 47 completed TS. RCDP teams completed the drill on average in 11 minutes 25 seconds versus 14 minutes 25 seconds for TS teams. By the final run (average of 3 runs per team), all RCDP teams met predetermined objectives which included a designated team leader, scribe, transilluminator, and needle/chest tube preparation. Comparatively, 77% of TS teams had a team leader, 88% had a scribe, 11% had a transilluminator, only 55% had the needle thoracocentesis prepared and only 44% had chest tube prepared. The average time for chest compressions was 6 minutes 29 seconds (TS) versus 4 minutes 27 seconds (RCDP). The average time for chest tube set up was 8 minutes 17 seconds (TS) versus 4 minutes 42 seconds (RCDP). The average time for epinephrine preparation was 9 minutes 32 seconds (TS) versus 6 minutes 39 seconds (RCDP). Twenty-three percent of TS teams had a medication error versus none of the RCDP teams.

Conclusion: Simulation based medical education offers a way to evaluate team performance, dynamics, communication, and interventions/skills in a medical emergency. RCDP allows teams to proceed through a scenario with direct debriefing, allowing for repetition until there is mastery of skills or certain objectives. Based on our findings, as RCDP teams progressed through the scenario they showed improved proficiency and efficiency in time to interventions including initiating chest compressions, preparing emergent medications, and preparing chest tube equipment. In a medical emergency, the ability of a medical team to prepare medications/equipment for medical interventions in an efficient manner could impact patient outcomes. Further assessments are needed to determine if RCDP allows for improved retention of knowledge and skills compared to TS.

References available upon request

Full disclosures for all authors and coauthors available upon request
**Poster #211**

**IN-SITU SIMULATION FOR RAPID-CYCLE QUALITY IMPROVEMENT IN NEW L-1 TRAUMA CENTER (#1269)**

**Presentation Category:** Patient Safety & Quality

Nicholas Koch, MD, 1 Nubaha Elahi, MD, MPH, 1 Amr Badawy, DO, 1 Ahmed Rashed, MD, 1 Ronald Simon, MD, 2 Amish Aghera, BS, MD, CHSE 1

**MAIMONIDES MEDICAL CENTER, BROOKLYN, NY, UNITED STATES**

**Introduction:** In-situ simulation (ISS) is a mannequin-based scenario that takes place in the actual clinical environment, fully integrated with on-duty providers and clinical operations, technology, and systems. A latent safety threat (LST) is an unrecognized systems factor that has the potential for harm. Newly operating as a level 1 trauma center fosters the likelihood of novel LSTs. ISS is a proposed method to identify and address LSTs.

**Methods:** This was a prospective observational quality improvement (QI) initiative to evaluate the efficacy of ISS to identify and correct LSTs in preparation for a new Level 1 trauma designation in an urban academic medical center. Over an 8-week time period, 17 ISSs of varied trauma cases (adult, pediatric, obstetric) were planned to occur any time from 6 AM to 11PM on weekdays. Immediately prior to each ISS, ED volume was assessed and ED leadership was consulted to ensure safety for existing patients. Each ISS lasted approximately 15 minutes, followed by 15 minutes of debriefing with all interdisciplinary team members. Each debrief was facilitated by an experienced simulation educator using a standardized template to codify identified LSTs and corresponding solutions into predefined healthcare system domains. After each ISS, a summary of LSTs and proposed solutions were sent to ED and trauma operational leadership.

**Results:** 16 of 17 ISSs were completed. One was canceled due to ED volume. 208 total LSTs were identified (mean 13.0 per ISS, SD 4.8). Threats were identified across multiple domains: medications (n=15), environment (n=30), equipment (n=36), staffing (n=21), protocols (n=40), knowledge (n=21), and teamwork (n=45). Examples included unfamiliarity with equipment, confusion about the trauma activation process, lack of role clarity, and difficulty obtaining blood for massive transfusion protocol. During the first 4 weeks 37 LSTs were re-identified in subsequent ISSs, compared to 3 in the last 4 weeks. Overall, >90% of LSTs were addressed via provider education or monitoring performance that would be difficult to obtain in a genuine care-giving environment. AIC enabled examination of characteristics of technology that can influence clinician complacency. Importantly, this study shows that use of a simulated FHR alerting system can decrease monitoring performance, a phenomenon referred to as automation induced complacency (AIC), particularly when operators have multiple tasks competing for their attention. Presently, there is no research on system reliability and monitoring performance with multi-patient Fetal Heart Rate (FHR) displays. Hospitals are beginning to use monitoring systems with automated computer analysis to alert providers about potentially important changes in the FHR. Thus, our goal was to examine how clinicians respond to a simulated high reliability alerting system for maternal FHR tracings. Based on AIC research, we hypothesized that high reliability would result in poorer monitoring performance, particularly for less frequent, incorrect alerts.

**Methods:** Five residents and four nurses from a labor and delivery unit in a local hospital participated in this IRB-exempt study. They monitored simulated FHR tracings of 4 patients displayed in a 2x2 grid. The system detected a deviation in FHR variability from moderate (15 bpm) to minimal (4 bpm) or to marked (28 bpm) variability, or a late deceleration in FHR following a contraction, a text alert appeared on the corresponding tracing for 30s. The scenario included 20 alerts (17 correct/3 incorrect, 85% reliability) which were randomly distributed across the 45-min session and no two alerts occurred simultaneously. Participants pressed a key on a keyboard to indicate whether they agreed or disagree with the alert. Participants were also asked to check a set of EHR records against printed charts and record any discrepancies they detected. They performed the FHR monitoring and EHR error-checking tasks simultaneously, each displayed on a 18.5 x 10.5 in desktop monitor.

**Results:** The proportions of correct and incorrect responses to correct and incorrect alerts are shown in Table 1. The participants’ performance was better when the system alerts were correct, meaning participants agreed that the alert was correct (92% correct). However, when the system presented an incorrect alert, participants were more likely to accept it as correct (67%) instead of disagreeing with the system (30%), the proper response (22(1) = 64.7, p < .01). Regarding the EHR checking task, that was included to create a multi-taking environment and therefore was not analyzed.

**Conclusion:** The results from this preliminary investigation indicate that the reliability of system alerts can impact a clinician’s monitoring performance. When the alerting system was correct, clinicians responded appropriately 92% of the time. However, when the alerts were incorrect, the clinicians were more likely to respond inappropriately, that is, they accepted the system’s incorrect “interpretation” of the characteristics depicted in the tracing 67% of the time. This pattern of results is consistent with predictions of AIC obtained in other high risk domains and suggests the clinicians were less willing to question the incorrect alerts and had become more complacent. Importantly, this study shows that use of a simulated FHR alerting system enabled examination of characteristics of technology that can influence clinician monitoring performance that would be difficult to obtain in a genuine care-giving environment.

**References available upon request**

Full disclosures for all authors and coauthors available upon request

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**Poster #212**

**USING A SIMULATED FHR ALERT SYSTEM TO DETECT AUTOMATION-INDUCED COMPLIANCE (#676)**

**Presentation Category:** Patient Safety & Quality

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**Introduction:** Investigators studying user interaction with automation have shown that highly reliable automated systems can forge high and often inappropriate levels of trust in users. Research with aviation simulators shows that a more reliable system can decrease monitoring performance, a phenomenon referred to as automation induced complacency (AIC), particularly when operators have multiple tasks competing for their attention. Presently, there is no research on system reliability and monitoring performance with multi-patient Fetal Heart Rate (FHR) displays. Hospitals are beginning to use monitoring systems with automated computer analysis to alert providers about potentially important changes in the FHR. Thus, our goal was to examine how clinicians respond to a simulated high reliability alerting system for maternal FHR tracings. Based on AIC research, we hypothesized that high reliability would result in poorer monitoring performance, particularly for less frequent, incorrect alerts.

**Methods:** Five residents and four nurses from a labor and delivery unit in a local hospital participated in this IRB-exempt study. They monitored simulated FHR tracings of 4 patients displayed in a 2x2 grid. The system detected a deviation in FHR variability from moderate (15 bpm) to minimal (4 bpm) or to marked (28 bpm) variability, or a late deceleration in FHR following a contraction, a text alert appeared on the corresponding tracing for 30s. The scenario included 20 alerts (17 correct/3 incorrect, 85% reliability) which were randomly distributed across the 45-min session and no two alerts occurred simultaneously. Participants pressed a key on a keyboard to indicate whether they agreed or disagreed with the alert. Participants were also asked to check a set of EHR records against printed charts and record any discrepancies they detected. They performed the FHR monitoring and EHR error-checking tasks simultaneously, each displayed on a 18.5 x 10.5 in desktop monitor.

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**References available upon request**

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Table available from the author upon request
STRUCTURED DEBRIEF IMPROVES INTERPROFESSIONAL OBSTETRIC CHECKLIST COMPLIANCE (#539)

**Presentation Category:** Patient Safety & Quality

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**Introduction:** Debriefing is an effective method to provide participants a unique learning opportunity to process the simulation experience, analyze thoughts, find meaning in the simulation, and better understand the connections between knowledge gained in the simulation and real-life situations (1). However, limited data exists addressing structured debriefing as a means to increase emergency checklist compliance for interprofessional education (2, 3). The authors developed an in situ interprofessional obstetric team simulation training scenario to assess team performance during a simulated perinatal emergency. Team performance was assessed by checklist compliance. Structured debrief reviewed checklist compliance and team performance using TeamSTEPPS® principles (4). We hypothesized that structured debriefing immediately following in situ simulation obstetric emergency training would improve checklist compliance during a subsequent in situ simulation obstetric emergency scenario 6 months later.

**Methods:** The study consisted of 2 in situ training sessions (July 2016 and January 2017) in which the perinatal emergency response team provided care for a standardized patient with preterm twin gestation. Each simulation training session was 1-hour in duration and included off-ward delivery and resuscitation of the first infant mannequin, transportation to appropriate inpatient units, cesarean delivery using a birthing mannequin and resuscitation of the second infant mannequin. Postpartum hemorrhage ensued, requiring activation of the massive transfusion protocol. During each scenario, team performance was assessed with critical action checklists. Following each training session, a structured debrief was conducted to identify relevant latent safety threats. Action plans were developed from debriefing findings to mitigate future risk. Simulation training was repeated 6 months later to determine the effectiveness of the implemented corrective actions and improvement in checklist compliance.

**Results:** The first training session involved seven teams (75 staff members). Results from this session indicated that 292 out of 391 (75%) critical action checklist items were completed. Additionally, 34 latent safety threats were identified during this first training session. The second training session involved four teams (45 staff members). Results indicated that 94 out of 106 (89%) critical action checklist items were completed, for an overall checklist compliance of 89% for the second training session. Ten of the previously identified latent safety threats from the first training session were mitigated during this second training session. Utilizing a z-ratio, a significant difference was detected between the overall checklist compliance rates between the two training sessions, z = -3.069, p = .002. However, post hoc power analysis indicated the study lacked power.

**Conclusion:** Structured debriefs after interprofessional perinatal team simulation training help to improve checklists compliance during obstetric emergency procedures. The use of structured debriefs may be one mechanism through which patient outcomes are improved. The debrief process establishes an open platform of communication, encouraging the sharing of critical case-related information, promoting team coordination, identifying knowledge gaps, and enhancing team cohesion. The lack of power associated with the results tempers the findings. Future research should aim to further elucidate the relationship between structured debriefs and checklists compliance by incorporating more training teams so that significant differences can be firmly identified and best practice guidelines can be established. Other medical centers may desire to adopt similar practices to improve checklist compliance specific to their units and environment of care.

References available upon request

Full disclosures for all authors and coauthors available upon request

IMPACT OF INTERRUPTIONS ON SIMULATED MEDICATION VALIDATIONS USING EYE-TRACKING (#931)

**Presentation Category:** Patient Safety & Quality

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**Introduction:** Validation of prescription orders is part of the 54 steps of the drug circuit. It is a pivotal step for pharmacists to accomplish as it allows identification of medication errors1,2. Many factors influence rates of medication errors. Interruptions such as phone calls or any distractor may cause the pharmacist to deviate from the usual sequence used during validation3,4. There is a clear link between distractions and the risks of medication error commission5. Oculometry is a biometric measurement of the condition of eye movements which may contribute to monitoring visual search behaviors. There is a gap in knowledge regarding how deviating eye movements correlate with the lack of error detection during the validation process when interruptions occur. We aimed to study the impact of phone interruptions on the relationship between the number of validated prescription lines and the number of errors detected during simulated prescription order validations using eye-tracking.

**Methods:** Prospective observational pilot study done at the simulation center of a mother-child tertiary-care institution in 2017. Participants were pharmacists and pharmacy residents trained to use the institutional prescription validation software. A 15-minute scenario consisted of 2 phone-call interruptions during the validation of 3 medication prescription sheets. Each prescription sheet contained 3, 5 and 4 prescription lines with 4, 9 and 4 errors respectively. Errors were related to incorrect dosing, allergy status and various aspects of drug entry. Of the 17 errors, 4 were considered major. An eye tracking device continuously monitored participant eye movements detecting all information fields in the pharmacy software assessed by the pharmacist while validating prescriptions. Numbers of interrupted medication validations, errors detected associated to these prescriptions, number of validated prescriptions completed as well as the total number of errors per prescription were compiled.

**Results:** Sixteen participants were included (10 pharmacists, 6 pharmacy residents). Due to technical problems, the oculometric reading was available for only 13 of the 16 participants (8 pharmacists, 5 residents). We found significant association between the number of interrupted medication validations and the number of errors detected associated with these prescriptions (p = 0,003). The average number of prescription sheets validated as a whole was 1,75 ± 0,375 in the pharmacist group and 1 ± 0 in the resident group. For the first prescription, the rate of error detection was 18,75 and 95% ± 0,08 (group of pharmacists and residents respectively). All participants detected all major errors. More orders were validated by pharmacists than by residents. However, residents detected more errors, even those related to drug entry. To assess the reliability of oculometric readings, we confirmed that software fields corresponding to errors were indeed all “seen” by the participants.

**Conclusion:** Our pilot study suggests that medication order validations interrupted by phone calls are associated with a decrease in the detection of medication errors during the validation process. An oculometer could be useful during simulated drug order validations by pharmacists as a measuring tool for eye behavior. Further studies are required to explore the potential use of this technology at a larger scale for pharmacist training in drug order validation. Implementing this technology in actual settings may contribute quality assurance and potentially impact patient safety and outcome. More studies are necessary to confirm these findings and to elaborate education strategies to improve performances during the validation process and ultimately patient safety and outcome.

References available upon request

Full disclosures for all authors and coauthors available upon request
Poster #215

ASSESSING PICU MATTRESS COMPRESSIBILITY WITH STANDARD BACKBOARD AND REAL-TIME FEEDBACK: A SIMULATION-BASED STUDY (#404)
Presentation Category: Patient Safety & Quality

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Introduction: The depth of chest compressions (CC) during cardiac arrest is associated with patient survival and neurological outcomes (1). Mattress compression can reduce the proportion of CCs given with adequate depth due to increased vertical hand movement and fatigue (2,3). The use of CPR backboard and mattress firming technology partially attenuate the mattress compressibility (4,5). Real-time feedback using single force and deflection sensor fails to adjust mattress compressibility and may overestimate compression depth when CPR is performed on a mattress (3). In this study, we aim to (i) quantify the amount of depletion when cardiopulmonary resuscitation (CPR) is performed on 2 different PICU mattresses, with or without use of backboard; (ii) explore factors (i.e. mattress type, use of backboard) associated with mattress compression depth; and (iii) explore the effect of feedback sources on effective compression depth by PICU healthcare providers.

Methods: PICU providers were recruited to perform 1 minute of chest compression (CC) on a manikin in each of the following four conditions: (a) typical PICU mattress; (b) typical PICU mattress with CPR backboard; (c) memory foam PICU mattress; (d) memory foam PICU mattress with a CPR backboard using 2 different sources of feedback: (i) an external device and (ii) an internal device. (8 min chest compression in total). CPR quality was concurrently measured by the 2 sources: (i) one external accelerometer sensor to measure the total vertical hand movement and (ii) one internal light sensor to measure the absolute sternum-to-spine movement of the manikin. The difference between 2 measures (i.e. mattress compression depth) were compared using mixed effect linear regression. Effective compression depth with different sources of feedback were compared with mixed effect linear regression model.

Results: Sixteen pediatric healthcare providers participated and a total of 12101 individual compressions were analyzed. When internal device used as the source of feedback, Participants performed high-quality CPR (effective CC depth: 51 – 54 mm). The mean mattress compression depths (percentage of depletion) were: 47.7mm (47.5%) on PICU mattress only, 34.8mm (40.4%) on PICU mattress with backboard, 34.7mm (39.2%) on memory foam mattress only, and 24.6mm (31.2%) on memory foam mattress with backboard. Both memory foam mattress (Mean difference, MD: 11.7mm, 95%CI: 4.8 – 18.5mm) and use of backboard (MD: 11.6mm, 95%CI: 9.0 – 14.3mm) have main effect on minimizing mattress compressibility. Participants failed to perform guideline compliant effective CPR on mattresses when using external device as source of real-time feedback (effective CC depth 38 – 46 mm). Use of internal device as source of feedback improved effective CC depth by 7 – 14 mm compared to external device.

Conclusion: Chest compression depth is significantly depleted when CPR is performed on a PICU mattress. Firming technology should be considered for patients at high risk for cardiac arrest. A CPR backboard should always be used when managing cardiac arrest. When real-time feedback is used, healthcare providers should consider devices that measures sternum-to-spine displacement to improve effective compression depth.

References available upon request
Full disclosures for all authors and coauthors available upon request

Poster #216

NORMALIZINGNALOXONE: A SIMULATION-BASED EDUCATIONAL EXPERIENCE (#450)
Presentation Category: Program Evaluation

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Introduction: Simulation use for direct-patient education is not adequately described in the literature. When utilized for the training of healthcare professionals, simulation-based learning has repeatedly proven to yield increased learner satisfaction and confidence in performing specific tasks compared to didactic lecture alone (McGaghie W.C., et al. 2011). Despite this, there is a paucity of data surrounding simulation-based learning for patient education and evaluation of outcomes in this unique population is scarce. The current simulation-based educational project aims to answer the question: “Does simulation training for direct-patient education improve learner satisfaction and confidence in performing opioid rescue maneuvers and naloxone use compared to didactic lecture alone?” We hypothesize that learners will report increased satisfaction and confidence in performing opioid overdose rescue maneuvers after participating in our simulation-based educational experience.

Methods: This quality improvement pilot project was approved by the IRB. Educational objectives surrounded learner ability to perform opioid rescue maneuvers including naloxone use and post-overdose care. Five, 3.5-hour simulation sessions were held during a 6 month period. Learners included in this study were primarily male Veterans in a transitional housing program. About 7 learners were included per session. Prior to the simulation, learners were required to receive a 1-hour didactic lecture delivered by clinical nurses on the topic of opioid overdose and naloxone use. During the simulation, learners were divided into two groups of 3 – 4 learners. Each group participated in 3 opioid overdose scenarios; 1 with a simulation mannequin and 2 with a standardized patient while the other group actively observed. Scenarios were approximately 2 – 5 minutes in length followed by a 10 minute de-brief. This was a pre/post-survey analysis comparing simulation-based education versus didactic lecture alone.

Results: Descriptive statistics were utilized. Four of the five training sessions are complete (35 learners). Preliminary analysis shows that 83% of learners were “extremely satisfied” with the simulation training (vs. 66% with didactic) and 88% of learners were “extremely confident” that they could administer naloxone after the simulation training (vs. 79% with didactic). In addition, after the simulation training versus didactic training alone; a greater percentage of learners reported that they “strongly agreed” that they could properly identify an overdose (58% vs. 44%), knew what to do during an overdose (85% vs. 55%), and could properly give naloxone to somebody experiencing an overdose (85% vs. 69%). Final analysis will include results based on the training evaluation, assessing confidence and satisfaction, as well as a survey based on the Health Belief Model; a validated tool assessing likelihood that learners will engage in the learned behaviors after participating in the simulation.

Conclusion: Preliminary results based on the training evaluation are promising, as seen above. Final results and conclusions based on the training evaluation and Health Belief Model survey are anticipated pending completion of the final simulation-based education session.

References available upon request
Full disclosures for all authors and coauthors available upon request
POSTER #217

USE OF SIMULATED "SPEED CODES" TO BENCHMARK NON-ATTENDING PREPAREDNESS FOR CRITICAL EVENTS (#481)
Presentation Category: Program Evaluation

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Introduction: The ability to promptly initiate Pediatric Advanced Life Support (PALS) is a necessity in the pediatric critical care environment. According to the American Heart Association (AHA), key components of this response are initiation of chest compressions within 10 seconds and either rapid defibrillation or administration of epinephrine within 2–3 minutes. It is therefore important to train bedside critical care providers to promptly initiate key interventions and to assess their ongoing performance. Simulation is frequently used for both education and assessment. We report on a novel simulation-based "speed code" curriculum as a means of benchmarking PALS readiness among bedside providers.

Methods: "Speed code" simulator programs that contained a number of acute states, including key pulseless arrest situations as defined by the AHA PALS Guidelines, were constructed to support the curriculum. All cases ended in either resolution or death within the first 5–10 minutes. These situations were presented in rapid cycle fashion, with each participant responsible for the identification and management of a single illness state with no assistance. Participants included a mix of critical care nurses, respiratory therapists, and categorical pediatrics resident physicians. Data collected included key metrics such as time to recognition of the pulseless state, time to effective CPR, time to first epinephrine dose, and time to first defibrillation (if applicable). Data were analyzed descriptively and compared to applicable AHA guidelines.

Results: Participants experienced 408 pulseless arrest speed codes over a 3.5 year period in 98 sessions. Average time to recognition of a pulseless state was 14 seconds (SD=32) with an accuracy of 66%. Average time to initiation of CPR in all pulseless states was 34 seconds (SD=56). Average time to epinephrine administration for cases of asystole and pulseless electrical activity was 110 seconds (SD=53). Average time to defibrillation for pulseless dysrhythmias was 146 seconds (SD=73). When compared with applicable AHA guidelines, CPR was initiated within 10 seconds in only 34% of cases. Epinephrine was administered within 3 minutes in 85% of non-shockable rhythms. Defibrillation was performed within 3 minutes in 81% of pulseless dysrhythmias. Defibrillation was inappropriately performed in 6% of non-shockable rhythms.

Conclusion: Simulation can shed light on PALS performance of bedside critical care providers. Despite routine training, critical caregivers do not consistently initiate CPR in pulseless states within the 10 second recommended timeline, however, they do appropriately administer epinephrine or defibrillation within the recommended 3 minutes in the majority of cases. As our institution demonstrates similar mortality and acuity to other PICUs according to the Virtual Pediatric Systems(TM) database, it seems likely that similar patterns occur at other institutions. Speed codes are a reasonable means to train bedside providers and also provide a useful mechanism to benchmark current PALS compliance.

References available upon request

Full disclosures for all authors and coauthors available upon request

POSTER #219

EFFECT OF BLS TRAINING IN HEALTH INFORMATICS STUDENTS BY PRE AND POST SURVEYS (#888)
Presentation Category: Program Evaluation

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Introduction: Basic life support (BLS) is one of the most important skills not only for clinicians but also for non-clinical hospital staff. At our school, we educate information specialists in the healthcare field. We have integrated physiology and anatomy programs that include physical measurement experiments and data analysis. BLS sessions are conducted for the following reasons: first, because the BLS guideline is based on anatomical and physiological mechanisms, it is an appropriate theme for learning and second, over 40% of the graduates work in hospitals where these skills are required for employment. Generally, BLS training is evaluated not only in terms of skill but also in terms of attitude. We already reported the results of cardiopulmonary resuscitation performance after a BLS session using simulator log data. Therefore, in the present study, we report the outcomes of a self-reported survey on the subjective attitude using self-reported pre and post surveys.

Methods: In the program, 34 students attended 15 successive classes once a week. They were freshmen majoring in health informatics. Before a BLS session, students underwent a series of cardiorespiratory experiments and analysis with healthy adults followed by BLS training sessions. The BLS session comprised a short lecture, video learning, task training with a simple simulator and AED trainers, group self-directed learning on BLS, and scenario training using SimMan3G. One week before and after the session, students were queried on BLS using a questionnaire. We used a questionnaire composed of 16 categorical questions regarding the knowledge of and attitude regarding BLS [1]. Fisher’s exact test was used to compare pre and post course results, with the significance level set at 0.05. Thirty students participated in the survey.

Results: During the analysis, significant differences were observed for five questions: willingness in immediately calling the ambulance if a stranger collapses (pre: 77% and post: 84%, p = 0.044), hesitating to attempt BLS because of anxiety for being sued for a bad outcome (pre: 45% and post: 28%, p < 0.001), knowledge of a defibrillator (pre: 29% and post: 42%, p = 0.046), necessity to promote BLS in the general public (pre: 54% and post: 84%, p = 0.008), and confidence of performing BLS in a real life situation (pre: 39% and post: 55%, p = 0.044). On the other hand, no significant changes were observed in the results of willingness for performing BLS for a stranger (pre: 32% and post: 41%, p = 0.192) and for a family member (pre: 65% and post: 78%, p = 0.194).

Conclusion: The results of willingness in calling an ambulance, hesitations because of anxiety for being sued, knowledge of a defibrillator, understanding the need for promotion of BLS, and confidence in performing BLS were thought to be the positive effects of our BLS session. However, significant difference was not observed in the results of willingness for performing BLS. Hamasu reported the willingness in college students for performing BLS improved for a stranger (from 12.8% to 76.8%) and a family (from 58 to 92.7%) after the BLS session. In terms of knowledge and learning the technique, a certain effect was observed after our BLS session. However, some kind of barrier had a negative effect on willingness for performing BLS. It is difficult to determine the reason for inconsistency in our results. Therefore, further consideration is needed.

References available upon request

Full disclosures for all authors and coauthors available upon request
A SIMULATION-BASED CURRICULUM FOR A SYSTEMATIC APPROACH TO CRITICAL PATIENTS (#945)
Presentation Category: Program Evaluation

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Introduction: Internal Medicine (IM) residents are trained to approach a case in a specific way: perform a thorough history and physical, review all pertinent information and formulate a care plan. However, when confronting a critically ill patient, this approach is not always feasible and attempting it may be detrimental to patient care. An algorithmic approach to decompensating patients is preferable under such circumstances. However, IM residents are not usually well versed in or comfortable with this approach. In our hospital, senior residents provide care for critical patients during their Acute Consult (AC) rotation. They evaluate and manage potential ICU admissions as well as lead the rapid response team (RRT) and cardiac arrest team. This can be a challenging rotation for residents, and anecdotally many have expressed hesitancy and discomfort. We designed a novel curriculum to prepare residents for this rotation focusing on how to approach a critically ill patient and TeamSTEPPS concepts.

Methods: A simulation-based curriculum was created for this project. Case-based representations of common acute care situations, such as respiratory distress, hypotension, and altered mental state, formed the base of the curriculum. Residents were briefed about the objectives for the session prior to beginning, and key TeamSTEPPS concepts were reinforced. Data were collected using survey and quiz. Two surveys were conducted: one prior to resident participation and one after the conclusion of the course. The quiz comprised five questions designed to assess the participants’ familiarity with TeamSTEPPS concepts and was also given prior to and after completion of the course. The study was approved by the institutional review board and was carried out in the Center for Advanced Medical Simulation at Mount Sinai West Hospital. All PGY-3 residents in Internal Medicine participated in the study curriculum, while the pre- and post-training surveys and quizzes were completed on a voluntary basis.

Results: 40 residents participated in the course; all completed the pre-course survey and quiz while 38 completed the post-course survey and quiz. The pre-course assessment was obtained immediately prior to course participation, while the post-course assessment was completed on average 41 days after course conclusion (range 27–77 days). Compared to the pre-course assessment, the post-course assessment revealed a significantly increased comfort level in the approach to and management of critically ill patients, as well as increased familiarity with TeamSTEPPS concepts. Specifically, residents reported decreased stress levels associated with being an acute care resident, and a significant majority reported they now felt comfortable being the first on the scene at a rapid response. They also reported increased comfort with making disposition decisions. Their knowledge of vocabulary pertaining to TeamSTEPPS improved significantly, as did their knowledge of group communication paradigms.

Conclusion: A simulation-based curriculum designed to introduce a algorithmic approach to acute care situations and reinforce TeamSTEPPS concepts had a positive influence on learner approach to critically ill patients and situations requiring emergent management decisions. We received overwhelmingly positive feedback from individual learners and survey results. Based on suggestions that it should become a standard course for all residents prior to their senior year, we have now implemented the course at the end of the residents’ PGY-2 year. We believe a standard curriculum integrated into the IM residency curriculum would foster improved teamwork and communication and improve patient care, especially in emergent settings.

References available upon request
Full disclosures for all authors and coauthors available upon request

Poster #221
DO RESIDENTS ADEQUATELY MANAGE PAIN DURING INFORMED CONSENT? A SIMULATION STUDY (#605)
Presentation Category: Program Evaluation

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Introduction: During the preoperative period, anesthesiologists recognize and address patient needs, including pain management, while informing the patient and obtaining their consent. Intense pain, as defined by the patient, may compromise the patient’s ability to understand information given, ask appropriate questions, and make informed decisions. (1) Anesthesiologists ensure the patient is sufficiently comfortable to be able to fully participate in the informed consent process and make educated healthcare decisions. Through simulation with a standardized patient, we studied whether and when residents administered pain medication in response to patient pain cues while obtaining informed consent. We present preliminary findings; analysis continues and findings will be presented for the total sample (N=65). Residents may not provide appropriate and timely treatment of pain due to lack of recognition of pain, concerns including validity and pressure to obtain informed consent.

Methods: Sixty-five first and third year residents participated in an IRB approved study. Forty residents obtained consent from a trained standardized patient, a 52-year-old male in significant pain who needed an emergent repair of a perforated gastric ulcer. Residents were provided case-specific details and instructed to obtain informed consent. The patient and confederate nurse were taught to standardize pain cues. Each scenario was recorded and residents’ actions were coded by 2 trained coders. We documented whether and when residents administered pain medication and when the simulated patient signed the informed consent document. A modified Empathic Communication Coding System (2) was used to document simulated patient and nurse initiated verbal and nonverbal pain cues, residents’ responses, and factors that accelerated or delayed the administration of pain medication and informed consent duration. We also examined the residents’ explanation about general anesthetic risks and procedures.

Results: In 40 pre-surgical informed consent simulations, the average time of the encounter was 9.71 (SD=2.12) minutes. 33/40 (82.5%) residents administered pain medication but 7/40 (17.5%) did not give pain medication during the encounter. An average of 6.52 (SD=4.39) pain cues occurred prior to giving pain medication. The mean number of non-verbal cues was 3.18 (SD=2.95), and verbal pain cues was 2.52 (SD=1.58). Of those administering pain medication, 28 gave medication prior to signing consent with an average time to treatment of 3.60 (SD=2.94) minutes. Five gave medication after signing consent with an average time to treatment of 9.55 (SD=2.16) minutes; these residents explicitly stated that consent was required prior to giving pain medication. 12/40 (30%) did not give pain medication prior to obtaining informed consent or at all during the scenario. Forthcoming results will examine the quality and quantity of residents’ explanations of the risks of general anesthesia and procedures.

Conclusion: 30% of residents withheld pain medicine despite numerous pain cues by the simulated patient and confederate nurse. These residents were either unaware the patient was in pain or thought medications would impair patients’ ability to meet the legal and ethical requirements to give consent. Ongoing data analyses of resident specific responses to pain cues may help distinguish potential etiologies. Concern that pain medication affects patients’ decision-making capacity may represent a fundamental misunderstanding about informed consent and decision-making capacity. Residents may have difficulty focusing on the informed consent discussion; appropriate pain management often improves their ability to participate in the process without diminishing decision-making capacity (1). Results suggest that residents need additional training around the ethics of obtaining informed consent from patients experiencing pain and accurately recognizing and responding to patient pain cues.

References available upon request
Full disclosures for all authors and coauthors available upon request

Poster #220
CONSENT? A SIMULATION STUDY (#605)
Presentation Category: Program Evaluation

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Introduction: During the preoperative period, anesthesiologists recognize and address patient needs, including pain management, while informing the patient and obtaining their consent. Intense pain, as defined by the patient, may compromise the patient’s ability to understand information given, ask appropriate questions, and make informed decisions. (1) Anesthesiologists ensure the patient is sufficiently comfortable to be able to fully participate in the informed consent process and make educated healthcare decisions. Through simulation with a standardized patient, we studied whether and when residents administered pain medication in response to patient pain cues while obtaining informed consent. We present preliminary findings; analysis continues and findings will be presented for the total sample (N=65). Residents may not provide appropriate and timely treatment of pain due to lack of recognition of pain, concerns including validity and pressure to obtain informed consent.

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References available upon request
Full disclosures for all authors and coauthors available upon request
A STUDY OF LOW-FIDELITY ECMO SIMULATION VERSUS ANIMAL MODEL: AN INTERIM REPORT (#1054)

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Introduction: Extra-Corporeal Membrane Oxygenation (ECMO) is a classic low-volume, high-risk procedure that allows for long-term heart-lung bypass. As advanced pulmonary and cardiovascular support measures evolve, fewer patients are requiring ECMO, limiting a provider’s exposure to ECMO initiation and management of life-threatening emergencies. Historically, animal models have been the gold-standard for ECMO training due to their ability to replicate complex physiology and anatomic variation. Recently ECMO simulation models have become more sophisticated and are increasingly incorporated into routine training, however no study has directly compared which modality is best suited for optimal emergency ECMO skills proficiency, safety and teamwork training. We hypothesize that the animal model will be superior for advanced providers in a subset of complex tasks while simulation may be superior for junior providers in mastering basic emergency maneuvers.

Methods: 64 trainees representing 4 clinical disciplines will complete a pre-lab didactic session. The trainees will be randomly assigned to Track A (animal lab 1st; simulation 2nd) or Track B (simulation lab 1st; animal 2nd). Our ECMO simulator is a state-of-the-art cannulation task trainer embedded into a low-fidelity mannequin, which is connected to our standard ECMO circuit. Fogg simulator transducers and Laerdal® display software will be utilized to provide real-time vital sign and pressure measurements. 7 unique ECMO scenarios will be timed for task completion and performance will be objectively evaluated using a standardized assessment tool. The results will be analyzed and stratified by discipline using software designed to compile results and control for inter-rater reliability. Participants will also complete a pre/post lab self-assessment survey and pre-lab cognitive questionnaire regarding ECMO management principles that were covered in the pre-lab didactic.

Results: To date, all performance checklists and training aids have been developed for each of the 7 scenarios. A didactic package incorporating power-point and video files has been developed. Video of each scenario was recorded to establish inter-rater reliability among observers. A realistic SynDaver™ vascular access pad ECMO Cannulation Model has been developed and refined to provide anatomically and functionally accurate cannulation opportunities for the low-fidelity simulation arm. To date, we have enrolled 44 participants in the study with 23 participants completing both the simulation and live-tissue labs.

Conclusion: Data collected is periodically reviewed with the intent of conducting an interim analysis after 50% of participants have been enrolled and completed both study arms. We anticipate this study will help determine if animal or simulation ECMO training is best suited for optimal emergency ECMO skills proficiency, safety and teamwork training. Furthermore, the data may further reduce the need for ECMO animal training by identifying its greatest strengths so that its scope may be narrowed to more targeted provider experience levels and specific physiologically complex scenarios in an evidence-based fashion.

References available upon request

Full disclosures for all authors and coauthors available upon request
IMPACT OF PRONTO HIGH-FIDELITY SIMULATION ON OBSTETRIC SKILLS IN BIHAR, INDIA (#627)

Presentation Category: Program Evaluation

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Introduction: Despite recent improvement, India still accounts for one fifth of the world's maternal deaths: (1). Roughly a quarter of these deaths are caused by postpartum hemorrhage (PPH) a cause of death that can in some cases be prevented by active management of third stage of labor (AMTSL) and use of prompt evidence based practices in the case of PPH: (2). Obstetric and neonatal simulation training programs in high-resource settings have proven effective in increasing the use of clinical skills; however, the impact of large scale simulation-based training in low-resource setting is unknown.

Methods: The aim of this analysis is to assess the impact of PRONTO International and CARE India's high dose in-situ simulation and team-training program on nurses' AMTSL and PPH practices during simulations in Bihar, India (3–4). Between September 2015 to July 2016 video recorded simulations of nurse midwife trainees from 240 health centers across Bihar were evaluated at the midpoint and endpoint of training to assess nurse use of evidence based practices during simulated emergency care using StudiocodeTM software.

Results: A total of 3,453 neonatal and obstetric simulations occurred during the study period. 897 (26%) of these were mid/post simulation assessments. After matching by facility, 253 live birth mid/post simulation assessments and 127 PPH mid/post simulation assessments were evaluated for use of AMTSL and PPH practices, respectively. In AMTSL, uterine assessment increased by 15.8% and time from delivery to oxytocin given decreased by 14 seconds (p = 0.001). In PPH, uterine assessment increased by 16% and time from delivery to oxytocin given decreased by 14 seconds (p = 0.001).

Conclusion: PRONTO International’s training program led to nurses implementing higher numbers of evidence based practices in simulated deliveries. Results also helped identify clinical strengths and programmatic challenges to focus on in future trainings including supply acquisition. Further studies are needed to assess the dose relationship between simulation training and clinical uptake of obstetric skills.

References available upon request
Full disclosures for all authors and coauthors available upon request

IMPACT OF PRONTO HIGH-FIDELITY SIMULATION ON OBSTETRIC SKILLS IN BIHAR, INDIA (#1142)

Presentation Category: Program Evaluation

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Introduction: Despite years of concerted effort, still one fifth of the global maternal deaths are reported from India. Roughly a quarter of these deaths result from postpartum hemorrhage (PPH), a cause that in some cases may well be prevented by active management of the third stage of labor (AMTSL) and use of prompt evidence based management practices. Obstetric and neonatal simulation training programs have been proven effective in improving the obstetric care and complication management practices in high-resource settings; however, the effectiveness of large scale simulation-based training in low-resource setting remains unknown.

Methods: The aim of this analysis is to assess the impact of PRONTO International’s novel, high dose in-situ simulation and team-training program on AMTSL and PPH management practices during simulations among nurses in public sector facilities in Bihar, India where the program is embedded in an ongoing large-scale, comprehensive nurse mentoring program ‘AMANAT’ by CARE India. Between September 2015 to July 2016 video recorded simulations of nurse midwife trainees from 240 health centers across Bihar were evaluated at the midpoint and endpoint of training to assess nurse use of evidence based practices during simulated emergency care using Studiocode software.

Results: A total of 3,453 neonatal and obstetric simulations occurred during the study period. 897 (26%) of these were mid/post simulation assessments. After matching by facility, 253 live birth mid/post simulation assessments and 127 PPH mid/post simulation assessments were evaluated for use of AMTSL and PPH practices, respectively. In AMTSL, uterine assessment increased by 15.8% and time from delivery to oxytocin given decreased by 14 seconds (p = 0.001). In PPH, uterine assessment increased by 16% and time from delivery to oxytocin given decreased by 14 seconds (p = 0.001).

Conclusion: The use of simulation in the nurse-midwifery training program appeared to increase the numbers of evidence based practices by trained public sector nurses in simulated deliveries. Findings could also help in identifying clinical strengths and programmatic challenges to focus on in future trainings including supply acquisition. Further studies are needed to assess the dose relationship between simulation training and clinical uptake of obstetric skills.

References available upon request
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**A CLINICAL WORKSHOP DEVOTED TO THE NURSING ROLE RELATED TO DOMESTIC VIOLENCE (#277)**

**Presentation Category:** Program Evaluation

**Introduction:** The clinical workshop will improve students’ readiness to manage IPV. RQ: Does a clinical workshop focusing on the nursing role related to domestic violence impact nursing students’ readiness to manage DV as compared to traditional clinical education? “Readiness” is defined as having the knowledge, attitudes, beliefs and behaviors to appropriately care for victims of domestic violence in a culturally sensitive and supportive manner. DV affects a large portion of the population, crossing all demographics, and has serious health consequences. The need for the effective training of nurses in the screening, support, referral and documentation of intimate partner violence has been widely acknowledged. It is difficult to provide clinical opportunities for students due to confidentiality and safety concerns. Best practices are often not demonstrated in the clinical setting. A 6-hour clinical workshop devoted to the nursing role in DV was created and evaluated.

**Methods:** The study was performed using a pretest/posttest quasi-experimental design with non-equivalent groups. The independent variable was the DV workshop and the dependent variable was student “Readiness to manage IPV.” Students completed the Provider Readiness to Manage IPV Survey online. Three subscales are used to measure readiness: Perceived Preparation, Actual Knowledge and Opinions. Three individual ANOVA tests were performed on the three scales of the PREMIS-R between the control group and intervention group. Those same scores were also compared between the pretest and posttest scores. The DV workshop is a 6-hour clinical day held in the simulation lab. Students are exposed to a variety of teaching strategies including video clips of nurses performing assessments using best practices, role-play, games, standardized patients, talking with an advocate, researching resources for referral, documentation using the written word, body maps and photography, as well as others.

**Results:** The results showed that the students who experienced the clinical workshop had significantly improved scores for Perceived Preparation (p < .001) and Opinions (p < .001). Scores on Actual Knowledge were not statistically significant (p < .293). Eta squared for Perceived Preparation was .535 and Opinions was .282, both indicating a large effect size.

**Conclusion:** Students’ scores for perceived preparation and opinions improved significantly after the workshop, indicating the exercises did more than disseminate knowledge, but immersed the student in situations that improved their confidence and changed their opinions about domestic violence. The clinical workshop provides a safe, consistent clinical experience that demonstrates best practices, yet does not compromise patient confidentiality or safety. The workshop is an effective method to teach nursing students the nursing role related to domestic violence.

References available upon request

Full disclosures for all authors and coauthors available upon request

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**NURSING ORIENTATION AND SIMULATION: CREATING AN ENGAGING EXPERIENCE (#986)**

**Presentation Category:** Program Evaluation

**Introduction:** Nursing orientation was historically a 2-day heavily, weighted lectured program covering various topics of patient safety, resources, government regulations, and the patient care experience. The HCAHPS scores for nurse communication and pain management were lower than the projected targets of 80% and 72% respectfully. The purpose of this innovative project is to determine what is the effect of simulation education during the new hire nursing orientation compared to non-simulation based education during the new hire nursing orientation on HCAHPS scores. The use of simulation in nursing orientation is not innovative itself, but the uniqueness of this project is that it is simulation based using improvisational actors as standardized patients to tell a story of a patient through their admission until discharge. Each sequential simulation addresses the nurse sensitive indicators, patient safety, and patient experience concepts that align with HCAHPS patient satisfaction scores.

**Methods:** The project design followed The IOWA EBP Mode for Best Practices. A literary research was done using PUBMED, CINAHL, and GOOGLE SCHOLAR. Critiques and synthesis of the reviewed literature revealed that simulation based education may impact self-efficacy and learning motivation (Oh et Koh, 2015). Use of Improvisational actors improve communication and relationship skills (Bell et al., 2014). Based on these findings, the curriculum was written to follow these sequential patient events over two days: Patient fall on admission, blood reaction post-op pain management, sepsis detection, rapid response initiation, cardiac arrest, and end of life care. An improvisational actor is used for the patient and family member role. The Debriefing focus is on patient safety, communication, teamwork, and the patient experience. An evaluation of the simulation experience is done after each orientation. HCAPHS scores reflecting nurse communication, pain management are monitored on quarterly bases.

**Results:** Since the implementation of this project in September of 2014, the HCAHPS scores for nurse communication have increase from a baseline of 77.2% (2014)on target to 81.7% as of third quarter of 2016. The pain management scores have increased from 71% to 73.10%. These metrics are monitored on a quarterly basis. Following evaluations of the program, 70% feel that simulation was the most meaningful part of orientation, and 85.38 rank the experience as excellent and/or awesome. This data is monitored after each orientation.

**Conclusion:** Implementing a simulation based nursing orientation program may influence HCAHPS scores, patient safety, and the patient experience. Using simulation also creates the atmosphere of patient centered care, which is at the center of many professional nurse practice models. There is a call for additional best practice projects to meet the future potential of these programs and their influence on the outcomes of patient safety, medical errors, communication, and other nurse sensitive indicators.

References available upon request

Full disclosures for all authors and coauthors available upon request
ENHANCING KNOWLEDGE & RETENTION OF INFANT SAFE SLEEP PRACTICES WITH SIMULATION (#374)
Presentation Category: Program Evaluation

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Introduction: The use of simulation will enhance the retention of cognitive, psychomotor & behavioral skills related to infant safe sleep practices. What is the effect of using simulation as the primary teaching modality on the retention of cognitive knowledge, psychomotor & behavioral skills for senior level baccalaureate nursing students? Nursing personnel are critical role models for caregivers. Their attitudes & behaviors toward safe sleep in the hospital influence practices adopted at home. Carrier (2009) purports caregivers are more likely to repeat the behaviors demonstrated by healthcare providers during their hospital stay after discharge. Despite knowledge of safe sleep recommendations published by the AAP, many nurses do not align their behaviors with best practices. Educating nursing students about infant safe sleep practices during their formal education & training may offer an advantage as these students progress to the workplace.

Methods: Mixed-method, intervention pilot study; pre/post-test design with collection of qualitative data. Participants included, n = 51, senior level nursing students. Phase I: a 10-item written pretest was given to establish baseline knowledge of infant safe sleep. Participants were then randomized into 3 groups; 1 group for each simulation-based scenario. Each student participated in 1 & observed 2 scenarios that included various incidences of unsafe sleep (IV); all students participated in debriefing sessions that followed (IV). Performance was evaluated using a validated tool (Todd et al., 2008). Phase II: at 1-month, a 10-item written posttest (DV) was given (questions in different order). Participants were again randomized into 1 of 3 groups to take part in replicated simulation scenarios without debriefing. The same tool was used to evaluate phase II performance (DV). Additionally, participants provided qualitative feedback after the completion of each phase of the study.

Results: The intervention was found to be significant with a large effect size. A paired t-test was conducted to compare the mean differences between pretest (M = 61.17, SD 17.5) & posttest scores (M = 72.05, SD 14.7), t(50) = 6.455, p < .001 2-tailed. A paired t-test also revealed a statistically significant difference between phase I simulation evaluation scores (M = 32.98, SD 13.77) & phase II scores (M = 69.94, SD 14.61), t(50) = 6.935, p < .001 2-tailed. Findings indicate that the use of simulation is an effective modality to acquire the necessary skill set (cognitive, behavioral & psychomotor) to communicate effectively with caregivers & co-workers while demonstrating infant safe sleep practices in the inpatient setting. Rich qualitative data also emerged, themes include: fidelity of simulation experience, simulation as a learning experience, & new information gleaned about SIDS. These qualitative findings support the clinical significance of the study, which is equally important.

Conclusion: As experts continue to search for the best instructional method(s) for the delivery of safe sleep practices, simulation-based learning offers great potential. Reaching nursing students during their formal education and clinical training through this interactive model may better serve to influence & impact knowledge & awareness of safe sleep practices as the progress to licensed registered nurses. The findings of this study can also serve as the foundation to form community partnerships between academia and clinical practice. For example, using simulation as part of annual competency training for nurses and other healthcare providers in the hospital setting may enhance awareness and promote the retention of cognitive, psychomotor, & behavior skills related to infant safe sleep practices. As a result, our scenario-based simulation intervention has the potential to positively impact future outcomes of this vulnerable patient population.

References available upon request

Full disclosures for all authors and coauthors available upon request

INTERPROFESSIONAL SIMULATION ENHANCES NURSING PROGRAM OUTCOMES (#313)
Presentation Category: Program Evaluation

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Introduction: Does the inclusion of physical therapy (PT) in an acute care simulation for nursing students improve nursing school program outcomes? Interprofessional simulation will improve student confidence and outcomes. There is little evidence on assessment of simulation in multidisciplinary teams and using simulation to assess program outcomes (1). An increase in the recognition and adoption of simulation-based education to promote interprofessional education (IPE) is supported in the existing literature (2). There is sufficient evidence that high stakes assessment can be beneficial in health care (3). The purpose of this research study was to 1) Determine clinical competency and readiness to practice in nursing students who experience clinical training through simulation in interprofessional simulation. 2) Investigate nursing program outcome data collected from this simulation experience compared to data from previous years.

Methods: Fourteen Doctor of Physical Therapy (PT) students and 58 Bachelor of Science in Nursing students participated as learners in the simulation investigated in this research study. The simulation experience required active participation from nursing and physical therapy students during three components of the simulation including a didactic instructional pre-brief, care of two patients utilizing a hybrid simulation approach, and debriefing. The teams of nursing students were evaluated by faculty on clinical competencies related to three program outcomes. The independent variable of this study was nursing students and the dependent variable was performance scores. Mean percent averages of performance scores of nursing students ability to to engage in professional nursing practice to assure safe, quality health care were calculated. Z scores were calculated to measure performance scores of competencies related to program outcomes between the 2015 nursing students.

Results: The nursing students (73.5%) met the benchmark for being able to synthesize nursing knowledge and leadership concepts to safely manage patient care. The results of the z scores that analyzed performance scores for the assessment of program outcomes in the nursing program demonstrated no significant difference between 2015 and 2016 nursing students. However, further analysis revealed significant difference in four competencies. Nursing students demonstrated significant improvement in safety with medication distribution. p

Conclusion: The addition of physical therapy students to the simulation investigated in this study provided the nursing students the opportunity to collaborate with other healthcare team members. The results of this study have provided data to the nursing program on how to improve assessment of program outcomes utilizing interprofessional simulation. Both positive and negative trends in performance were found in the three program outcomes evaluated. Possible explanations for the significant improvements in safety and communication noticed were possibly due to the two professions effectively working together as a team because they had multiple perspectives from which to collect information that led to a more comprehensive treatment planning and a greater role clarification (4, 5). This study also identified weaknesses in the evaluation tool. It is believed the decrease in performance in the competency. Measuring clinical reasoning was most likely due to poor design of the evaluation tool.

References available upon request

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SEPSIS AND SIMULATION TRAINING FOR HIGH RISK OBSTETRICS AND NEONATAL PATIENTS (#1278)

Introduction: Sepsis is the body’s life-threatening response to an infection which can lead to tissue damage, organ failure, and death. It kills more than 258,000 Americans each year and leaves thousands of survivors with life-changing after effects. Maternal sepsis is the leading cause of preventable maternal death, accounting for 15% of all maternal deaths worldwide. Likewise, sepsis can be life-threatening for newborns. Sepsis in newborns is not always easy to identify since newborn babies often do not show symptoms of infections in the same way older babies and children may show symptoms. Current management lacks standardization and at times the process can impede the patient receiving care as quickly as indicated. Together failure to recognize sepsis is the leading cause of preventable maternal death, accounting for 15% of all maternal deaths worldwide. Sepsis can be life-threatening for newborns. Sepsis in newborns is not always easy to identify since newborn babies often do not show symptoms of infections in the same way older babies and children may show symptoms. Current management lacks standardization and at times the process can impede the patient receiving care as quickly as indicated. Together failure to recognize sepsis is the leading cause of preventable maternal death, accounting for 15% of all maternal deaths.

Methods: Both neonatal and maternal simulation scenarios were created for 120 maternal-newborn registered nurses. They focused on early recognition and implementation of the sepsis bundle. We utilized lecture to introduce the evidence based practice guidelines and identification of symptoms. Then created a rapid cycle deliberate practice for learning adult code blue skills. The simulation scenario for maternal sepsis included early recognition of symptoms, communication with the physician, escalation of care, implementation of the sepsis bundle and adult code blue skills. The newborn simulation scenario focused on recognition of hemodynamic changes in early neonatal sepsis, appropriate methods to evaluate and assess neonatal patient, ability to escalate care effectively as indicated by patient status, and neonatal code blue skills. Debriefing occurred after each scenario where the team identified gaps in the new evidence based guidelines.

Results: Preliminary results based on pre and post surveys of the RN’s who participated in the simulation program demonstrate a significant improvement in the following areas: 1. 76% improvement in familiarity with the sepsis bundle. 2. 55% improvement in ability to recognize risk factors for sepsis. 3. 49% improvement in identifying symptoms of sepsis in the postpartum mother. 4. 59% improvement in identifying symptoms of sepsis in the neonate. 5. 56% improvement in confidence level to perform sepsis interventions. 6. 99% of the RN’s said objectives of simulation were met well or very well.

Conclusion: Education and a sepsis protocol using a multidisciplinary approach improves compliance with sepsis bundles. Bundles are a group of evidence based interventions that, when used together, are intended to improve health outcomes. Through these simulation scenarios the maternity RN’s have been empowered to implement interventions for both mothers and newborns in the case of early sepsis. They have had the opportunity to practice these evidence based guidelines and communication skills in a multidisciplinary high technology simulation center. The skills they have learned will improve patient safety and avoid preventable harm and or death to our patients.

References available upon request

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Introduction: Preterm birth is a stressful and anxiety-provoking experience. Neonatologists provide prenatal counseling to expectant parents which serves to provide information, alleviate anxiety, and prepare them for the neonatal intensive care (NICU) course. Although such counseling is recommended and widely practiced, it often lacks essential elements such as clear and consistent communication, adequate information sharing, attention to parental emotions, and establishment of a trusting relationship. Simulation has been used to compare different approaches to periviable (22–25 weeks gestation) counseling. We aimed to develop a standardized way of assessing prenatal counseling at gestational ages greater than 25 weeks, which comprise the majority of prenatal consults at our institution. Our hypothesis was that the ideal elements of counseling (1) could be identified and objectively documented by an external observer and (2) would often be missing during simulated encounters.

Methods: Based on a comprehensive literature review we developed a checklist of ideal elements to include in counseling. The checklist consisted of a communication section (derived from validated and reliable tools used to assess good medical communication), and an information session (consisting of a set of essential items to discuss with all parents, such as delivery room resuscitation, length of stay, and specific complications of prematurity). We designed a case scenario that depicted a pregnant woman admitted to the hospital with preterm prolonged rupture of membranes (PPROM) at 28 weeks gestation. Four SPs received training to become familiar with the history, script, medical and social issues. Neonatologists and neonatology fellows were given 20 minutes to complete the simulated counseling encounter. Videotape recordings of the encounters were analyzed for checklist elements and both physicians and SPs were interviewed about their experience.

Results: 26 physicians participated in the simulated encounters. No statistically significant difference was found between communication scores of attending physicians (80%) versus fellows in training (78%). In addition, there was no correlation between years in practice and total communication score. The analysis of the information sharing section revealed a wide variation in the topics discussed. Participants tended to talk more about the general items such as nutrition and length of stay, versus specific complications of prematurity and the long-term outcomes. Participants discussed visitation policies (68%) more than RDS and developmental delay (64%), NEC andROP (40%), and BPD (20%). No correlation was found between years in practice and total number of information items shared. Only 12% of physicians were able to give an accurate survival rate.

Conclusion: Simulation based research is a relatively new innovation in neonatology. This is the first study to report its use in gestational ages beyond 25 weeks gestation. Most participants felt the main objective of the consult was to provide information to the parent. Despite this, participants tended to share very little about complications of prematurity, especially the long-term ones. The current literature supports that families do want to know this information. In addition, SPs reported the variation in the degree of information shared among physicians to be “disturbing”. Ultimately, we need better ways to share information with families. This could include some type of durable material to leave with the family at the end of a consultation. Physicians may also benefit from having a standardized list of items to discuss with accurate statistical data. References available upon request

Full disclosures for all authors and coauthors available upon request
CAN WE TALK? OUTCOMES OF A COLLABORATIVE PRACTICE SIMULATION ASSESSMENT (#1208)
Presentation Category: Interprofessional_Education

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Introduction: Competency-driven, validated assessments exist for interprofessional teamwork, but little research has been done on collaborative practice between healthcare professionals with overlapping scopes of practice. “Can We Talk?” addressed two questions: 1. What are the baseline perceptions of OB-GYN residents and nurse-midwifery students around interprofessional practice? and 2. Can well-designed, targeted interventions address perceived and observed short-comings in the participants’ skills? This simulation-based study used validated tools designed specifically to assess interprofessional practice and education, as well as perceptions of patient engagement in clinical decision-making. Assessment was performed by all participants – expert raters, trainees, and simulated patients and family members. Three cases were developed to represent authentic clinical circumstances for shared decision-making: shoulder dystocia, difficulty breast-feeding, and transfer to hospital from a birth center.

Methods: Researchers used a pre-post design to assess the skills of nurse-midwifery students (N=9) and OB-GYN resident (N=9) teams in interprofessional collaborative practice. Researchers used a pre-post design to assess the skills of nurse-midwifery students (N=9) and OB-GYN resident (N=9) teams in interprofessional collaborative practice. Best practices in performance-based assessment were used throughout. Learners participated in two OSCEs—one in July 2016 to establish a baseline, followed by a second in November 2016 to assess any changes in their collaborative practice and team skills. Based on the results of the first OSCE, a targeted didactic module on collaborative practice was delivered prior to the second assessment. Each OSCE included an interprofessional pre-briefing and debriefing. Based on existing scholarship in IPE assessment and evaluation, investigators used four validated tools: 1. ICCAS: attitudes toward interprofessional practice 2. CSACD: physician-nurse collaboration on care decisions 3. Modified McMaster-Ottawa: individual team skills and team performance 4. SDM-Q:9 patient engagement in shared decision-making

Results: Data analysis offers a multi-dimensional picture of changes in trainee attitudes and skills: 1. Physician and nurse-midwife attitudes toward collaborative practice (ICCAS): Positive changes were statistically significant in three domains: communication, roles and responsibilities, and team functioning. 2. Physician and nurse-midwife perceptions of collaboration in care decisions (CSACD): Means went up across the board on each of nine items, but were statistically significant in seven of the nine domains. 3. Explanations of treatment options and thorough weighing treatment options – comparison of the perceptions of trainees. 4. Performance improved significantly for most trainees, particularly those who most actively incorporated the educational intervention into their practice. 5. Patient assessment of inclusion in decision-making (SDM-Q:9): Patient perceptions of inclusion were significantly lower in two domains – explanation of treatment options and thoroughly weighing treatment options – comparison of the perceptions of trainees.

Conclusion: Using validated tools appropriately can provide a multi-dimensional perspective on trainee performance in collaborative practice simulations. The resulting data can be used to provide detailed individual feedback to learners and to develop targeted interventions to improve performance and patient safety in clinical education. Additional analysis will be performed to provide a more detailed picture of differences in perception between nurse-midwifery students and OB-GYN residents, as well as differences between trainees and standardized patients.

References available upon request

Full disclosures for all authors and coauthors available upon request

Poster #233
LESSONS LEARNED: EVALUATION OF 3 PEDIATRIC SELF-DIRECTED LEARNING MODULES’ DATA (#951)
Presentation Category: Program Evaluation

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Introduction: Recent literature has identified self-directed learning (SDL) as a preferred modality in a variety of settings. Although simulation-based (SB) self-directed learning modules offer trainees opportunities for SDL, there is a paucity of data to guide practice with the added benefit of built-in assessment for meaningful feedback, practical aspects should be considered to ensure that rigor is maintained during assessment of trainees’ skills. We examined the quality of assessment data captured from self-directed learning modules accessed by trainees in two different ways: “free choice” or “required supplemental.” Using our lessons learned, we present findings and highlight practical challenges associated with measuring trainees’ confidence, as well as objective knowledge and technical performance assessments utilizing simulation-based, self-directed learning.

Methods: In this study we implemented three modules: central venous catheterization (CVC) which targeted 1st year pediatric residents (n=10), and Cardiopulmonary Examination (CPE) and Intubation (Int) which targeted 14 Family Medicine trainees (6 1st year residents, 8 M4 students). Modules were embedded in Canvas, a cloud-based learning management system, and introduced to trainees at the beginning of relevant 1-month rotations, along with assessment (timeline and mastery) requirements. The CVC module was introduced as “required supplemental,” material, and integrated into an established SB program, while the CPE and Int modules were introduced as a “free choice” resource for SDL. All trainees were asked to complete the modules, including pre- and post-intervention confidence, knowledge and technical performance tests. We tracked “completeness” of modules’ performance data using percent frequencies, and compared pre-post group confidence and summed knowledge scores using Kruskal-Wallis test.

Results: CVC module was associated with 100% completion rate for pre/post knowledge quiz, and performance test with 70% completion for pre/post confidence survey. Completion rates were lower for CPE and Int modules, with less than 43% completion rates for the pre-post knowledge quiz and confidence survey, with no trainees (0%) completing the pre-post performance assessment. Poor data did not allow adequate comparison of pre/post-intervention improvement at the trainee level, but less robust group comparison indicated statistical improvement in knowledge of CPE [Mpre=8.33(SD=1.62), Mpost=11.80(1.37), p=0.01, r=.76] and CVC [Mpre=8.11(3.53), Mpost=11.47(2.96), p=0.01, r=.49]. Statistically significant improvement was indicated for CVC confidence [Mpre=1.88 (0.39), Mpost=2.56(0.38), p=0.01, r=.66] with no improvement in confidence for CPE or Int. Trainee responses indicated trainee majority (71%) agreed modules helped improved skill, and trainees would suggest the modules to their peers.

Conclusion: Although our findings demonstrated SDL modules can be a powerful tool to support trainees learning, this preliminary work also highlights the importance of thoughtful employment of self-directed learning modules into simulation-based training programs. We must move beyond the thinking that intrinsic motivation is an effective motivator to fully-engage trainees in simulation-based SDL. In our setting, maximum training benefit from simulation-based SDL seem to be associated with the incorporation of SDL materials into established curricula with well-defined time and performance requirements. Considerations associated with computer-based SDL include collaboration with technical design specialist to improve organization of content and assessment data to ensure effective, streamlined assessment processes for better tracking and management of trainees as they engage in simulation-based self-directed learning programs. Other challenges and considerations to be presented.

References available upon request

Full disclosures for all authors and coauthors available upon request
INTEGRATED APPROACH IN STUDYING CARDIOPULMONARY MURMURS (#285)
Presentation Category: Program Evaluation

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Introduction: Simulation is now regarded as a strategy to improve safety of learning and quality in real medical practice. Simulation-based cardiopulmonary auscultation may improve clinical skills and competences of medical students and residents. Harvey the Cardiopulmonary Patient Simulator is a mannequin encompassing more than 50 cardiac diagnoses that was developed at the University of Miami (USA). One of his advantages is the possibility of listening, comparing and discussing “real” cardiopulmonary murmurs. Therefore, simulation-based medical education is a valuable tool for better clinical practice, because it provides safe-controlled environment in which problem-based learning is developed and competences are practiced in high-standard. The aim of this study was to evaluate student’s confidence levels in detection of heart and respiratory murmurs with Harvey the Cardiopulmonary Patient Simulator compared to real patients with cardiopulmonary disorders.

Methods: 380 third-year medical students underwent pre-study multiple-choice question test (MCQ) to assess their ability to perform cardiopulmonary examination and to detect cardiopulmonary murmurs and 311 students successfully passed (more than 51%). They were divided in two groups: G1 (n=155) firstly examine patients with cardiopulmonary disorders (pneumonia with crackles (CR), bronchial asthma with wheezes (WZ), typical mitral stenosis (MS) and aortic stenosis (AS)) and then participate in the Harvey simulation (the same scenarios), G2 (n=156) firstly participate in the Harvey simulation and then examine real patients. At the end, all the students completed the post-study MCQ to assess their confidence in detecting murmurs. Statistical analysis was performed using Statistica 10.0. Data was presented as M±SD. For comparison of frequency we used t2-criterion. Mann–Whitney and multiple logistic regression analysis were performed.

Results: 311 students completed all surveys. There was no difference in mean pre-study score between groups (58% vs 63%, p=0.05). After completing the first activity there were no differences in detecting CR and WZ between groups (74% vs 72%, 80 vs 78%, p=0.05 respectively), but there was significantly higher confidence in detecting MS and AS in G2 (50 vs 72%, 72= 15.1, p=0.05).

Conclusion: Both groups reported confidence in detecting abnormal heart and respiratory sounds after participation in Harvey simulation compared to baseline confidence level. Students who participated firstly in Harvey simulation demonstrated higher confidence level in detection of heart murmurs and higher post-study MCQ score. Our results confirmed that simulation-based training firstly and then implementation in real clinical practice is most effective method under certain educational conditions. References available upon request

Full disclosures for all authors and coauthors available upon request

EVALUATION STUDY OF A SIMULATION-BASED PROGRAM FOR PERINATAL PROVIDERS (#739)
Presentation Category: Program Evaluation

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Introduction: This multi-year study focuses on the quality and effectiveness of a simulation-based training (SBT) (1,2) program designed to prepare Simulation Champions for a system-wide Perinatal Patient Safety Program (PPSP). The SBT component, referred to as the Train the Trainers (TTT) program, was designed to support strategies for building improved practices throughout a large multi-site delivery system (3). The training focused on the TeamSTEPPS™ framework as an approach for enhancing interdisciplinary collaboration (4,5,6). Three evaluation objectives guided the study. First, to determine the overall effectiveness of SBT for TTT applications; second, to assess the quality and effectiveness of Simulation Champions instructional practices at their individual sites; and third to ascertain from participating staff (Learners) perceptions regarding the effectiveness of the PPSP SBT and evidence of changed perinatal clinical practices.

Methods: This was a mixed methods program evaluation study (7). Data sources were physicians, nurses and support staff participating in simulation based learning as either Champions or Learners at sessions held at affiliate sites. Data collection involved surveys, video recordings and focus groups. Simulation based Train the Trainer sessions were held in 2013–14 with survey data and video capture throughout 2014–15. Validated electronic surveys (8,9) were used to measure cognitive knowledge of TeamSTEPPS™ and perceptions of SBL experiences. Focus groups were conducted with both Champions and Learners to discuss the value and impact of SBL and TeamSTEPPS™ on professional practice. Survey data was analyzed using descriptive procedures. Video recordings, focus group data and qualitative comments underwent a rigorous behavior and thematic analysis process. Study conclusions determined following triangulation of all findings.

Results: Over 180 individuals representing disciplines of nursing, medicine and support staff attended one of 18 simulation-based training workshops to prepare as site Champions. Survey data was collected from 55 physicians and 66 participating nurses rating the effectiveness and value of simulation training for enhancing clinical skills and team effectiveness. Champions conducted more than 140 simulation sessions involving approximately 800 individuals (Learners) across 18 sites. Video recordings of 10 sessions are undergoing analysis for specific individual and team behaviors. Electronic survey data was collected from 70 Learners inquiring about their simulation experience and subsequent effects on their clinical practice. Focus groups were conducted at 17 affiliate sites. Thematic analyses of the 23 different focus groups revealed important findings & implications for further simulation based training.

Conclusion: Findings were triangulated to arrive at three overarching conclusions. First, the simulation-based training (SBT) applications were an effective instructional strategy for developing individuals as trainers. The trainers (Champions) were confident and competent in their ability to implement in-situ simulation. Second, the Champions implemented a high quality and effective simulation training for their clinical colleagues. The SBT, in combination with TeamSTEPPS™ principles, proved to be highly successful in improving interprofessional practice. Finally, the perinatal practices were positively impacted through participation in the program. Anecdotal evidence across all affiliates indicates improved team communication, early identification and response to critical events, system improvements, and improved team dynamics. References available upon request

Full disclosures for all authors and coauthors available upon request.
Abstracts

Poster #236

DEVELOPMENT OF A PROCEDURAL WORKSHOP FOR CLINICIANS AND IMPACT ON CONFIDENCE (#706)
Presentation Category: Program Evaluation

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Introduction: Evaluation of procedural skills of practicing Emergency Physicians (EPs) is a Joint Commission requirement known as the Ongoing Professional Practice Evaluation (OPPE). It has been shown that simulation procedures increase resident confidence on procedures (1) but less has been done to investigate practicing attending procedural confidence. It is also known that students and practicing physicians have different perceptions about the need and utility of simulated experiences (2). Difficulties of instituting procedural training programs in attending physicians include scarce protected nonclinical time, clinician reluctance to participate in perceived assessments, and lack of buy-in. This innovation is an example of two years of successful implementation of a simulated procedural skills practice session. The authors sought to determine if the simulation-based OPPE increases confidence, and assess how the simulation format of OPPE is perceived by physicians.

Methods: Study participants were board eligible/board certified practicing EPs from one academic institution. Twenty-five physicians consented to the study; and fifteen physicians to date have completed both the pre and post surveys. The pre-simulation survey measured the number of procedures performed in the past year and confidence in performing five procedures: ultrasound guided central line (CL) catheter placement, cricothyrotomy (Crich), precipitous vaginal delivery (PVD), intraosseous line (IO) placement, and thoracostomy tube (CT) placement. During the OPPE session, participants were guided through simulation-based performance of each procedure. A follow-up survey sent to each physician asked their confidence and their opinion of simulation for refreshing procedural skills, assessment, and likelihood of future participation. We analyzed the difference in procedural confidence between pre and post OPPE session using descriptive analysis and paired sample t-test.

Results: The median number of yearly procedures performed per provider were: CL - 4, Crich - 1, PVD - 0, IO - 2, CT - 1. Pre- and post-simulation confidence is displayed in Figure 1, and showed a statistically significant improvement in procedural confidence in the post session for Crich, PVD, and CT, with an average post-session procedural confidence increase of 0.8, 0.73, and 0.53, respectively. Though there was no statistical difference in the procedural confidence between pre and post session for CL and IO, there was still a slight post-session increase of 0.4 and 0.14. Average agreement on a 5-point scale for acceptance of simulation as a way to refresh procedural skill and assess performance was 4.2 and 4.0 respectively. Average likelihood to participate in future simulation sessions was 4.7.

Conclusion: Offering the ongoing professional practice evaluation in a simulated environment using procedure trainers is one way to increase experience with rare procedures and to improve confidence, while simultaneously demonstrating ongoing proficiency. The use of ultrasound for CL placement and the relative ease of IO line placement may contribute to lack of statistically significant increase in confidence on those procedures. This method was positively received by physicians as a means for refreshing procedural skill and assessing performance. Factors that may have improved the acceptance of the procedural skills training program include offering continuing medical education credits, administrative support and encouragement of participation, and low hourly commitment per attending.

References available upon request

Full disclosures for all authors and coauthors available upon request

Figure available from the author upon request

Poster #237

SIMULATION IMPROVES LUMBAR PUNCTURE BUT NOT PARACENTESIS PERFORMANCE (#466)
Presentation Category: Program Evaluation

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Introduction: Lumbar puncture and paracentesis are core competencies in internal medicine, but residents frequently report discomfort performing these procedures unsupervised. Simulation-based training (SBT) has previously been shown to improve resident performance of lumbar punctures on patients, but outcomes after paracentesis SBT have only been assessed on simulators. We hypothesized that SBT would improve internal medicine interns’ confidence, knowledge and performance of lumbar puncture and paracentesis on patients compared to a control group.

Methods: In the Spring of 2015 and 2016, interns at an urban academic medical center were randomized to SBT or a control group. The SBT cohort received 4 hours of instruction on ultrasound-guided lumbar puncture and paracentesis task trainers. The session followed an evidenced-based pedagogical framework that included simulation-based mastery learning. Three months after the training, learners completed a 5-point Likert scale asking if they were comfortable performing the procedure without supervision and/or teaching the procedure to others. They also completed a 10 question multiple choice knowledge assessment created by the author. Both instruments were reviewed by procedure experts and the UCLA Medical Education Research Department for content and response process validation. Following the training, when the interns performed these procedures on patients, their supervisors used a validated global rating scale to rate their performance as novice, beginner, competent, or proficient.

Results: 88 interns participated in the study, and 39 were randomized to SBT. Baseline demographics were similar between both groups. There was no significant difference in their confidence in performing a lumbar puncture (2.47 vs 2.78, p = 0.21) or a paracentesis (3.4 vs 3.8, p = 0.09) between the control and intervention groups respectively. The intervention group demonstrated an objective improvement in their knowledge of lumbar puncture (1.0 vs 2.3, p < 0.001) and paracentesis (2.5 vs 3.0, p = 0.02). Following the SBT, 48 lumbar punctures and 39 paracenteses were performed. More of the lumbar punctures performed by the SBT group were rated as competent or proficient by their supervisors compared to the control group (89% vs 59%, p = 0.03), but no difference was seen in paracentesis performance (89% vs 100%, p = 0.2). When comparing the control groups, interns were more confident, had better knowledge and were more competent performing paracentesis compared to lumbar puncture (p < 0.001).

Conclusion: Though no subjective change in paracentesis and lumbar puncture confidence was found, an objective improvement in the interns’ performance of lumbar punctures on patients was seen after SBT. SBT likely failed to improve performance of paracentesis because of the already high level of competence, confidence and knowledge of this procedure within the control group. Further study is needed to investigate whether this improved knowledge of paracentesis and lumbar puncture results in reduced procedural complications after SBT.

References available upon request

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Figure available from the author upon request

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TEAMWORK TRAINING IN EMERGENCY MEDICAL SERVICES (EMS): A MIXED-METHODS STUDY (#720)

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Presentation Category: Program Evaluation

Introduction: In the decade following the Institute of Medicine's report, "To Err is Human," adverse outcomes as a result of medical error remain all too common in healthcare. Lapses in communication are among the leading causes of medical error, and is cited as contributing to a substantial proportion of adverse events. Effective communication, a central component of teamwork training, has been linked to reductions in adverse drug events, nosocomial infections, and mortality. Despite the growing evidence in support of team training in healthcare, few studies focus on teamwork in the EMS setting, where effective communication is of critical importance to patient safety. Therefore, as a prelude to a subsequent trial of a teamwork training intervention, the objective of this study was to perform a hypothesis-generating training needs assessment among individuals involved in EMS education to understand the role, importance, as well as the barriers and facilitators of teamwork training in EMS.

Methods: The study was designed as a mixed-methods teamwork training needs assessment of EMS training officers. The sampling frame consisted of members of the National Association of EMS Educators (NAEMSE). Upon IRB approval, members were emailed, and asked to complete a brief web-based survey on teamwork in EMS. The web-survey included questions the importance and extent of teamwork training in EMS. Also, interested respondents were asked to sign up for a semi-structured phone interview which sought to elicit barriers and facilitators to teamwork training in EMS. Phone interviews were recorded and transcribed. Initial structural coding was based on interview questions; open coding supplemented this process. Then, through a deliberative process, codes were combined into candidate themes. Analytic memos during coding and analysis identified potential themes, which were reviewed/refined, and compared against current assumptions. Data analysis was facilitated with Survey Monkey and NVivo v11.

Results: Overall, 306 respondents completed web-surveys, and a point of saturation was achieved after 20 respondents completed phone interviews. Among web-survey respondents, 89% indicated that teamwork in EMS is "extremely important." However, only 27% of respondents' agencies currently conduct teamwork training program as part of routine training. Of those, less than half (42%) utilized simulation to facilitate teamwork training. During phone interviews, respondents frequently noted that team training could reduce medication errors and airway management errors. When asked, "If money was no object", the majority of respondents would establish a consistent agency-wide high-fidelity simulation program. However, the most commonly cited barriers to teamwork training were time and resources.

Conclusion: In this needs assessment of EMS training officers, while the vast majority of respondents noted the importance of teamwork training in their organization, only one-quarter of respondents currently had such a training program in place. Of these, nearly half were simulation-based. If "money was no object", the majority of respondents would implement high-fidelity simulation into existing training plans. However, time and resources to do so were cited as the key barriers to making such change. These preliminary findings may inform decision-makers when implementation of a teamwork training program in the EMS context is considered.

References available upon request
Full disclosures for all authors and coauthors available upon request

TARGETED EDUCATION WITH STRUCTURED DEBRIEF IS SUPERIOR TO EXPERIENCE ALONE FOR KNOWLEDGE ACQUISITION OF A CLINICAL ALGORITHM (#278)

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Presentation Category: Program Evaluation

Introduction: Simulation-based training is used in medical education to foster the development of competency in procedural skills. However, its use to develop non-technical skills such as clinical reasoning and medical decision-making is less well-established [1],[2]. The Pediatric Emergency Care Applied Research Network (PECARN) clinical prediction algorithm is a validated tool that helps identify children at low risk for clinically important traumatic brain injury and the need for neuro-imaging. We hypothesized that interns participating in a targeted simulation-based educational intervention of the PECARN tool would have better knowledge acquisition and ability to correctly utilize this tool when compared to residents with more clinical experience who have not participated in the same targeted training of this tool.

Our primary outcomes were scores on a test of knowledge and correct utilization of the PECARN tool [3].

Methods: A multicenter, prospective randomized-controlled trial was implemented for three years. All interns completed a written pretest and were randomized to participate in either a high-fidelity simulation with structured debrief, or a classroom-based case discussion with structured debrief. During resident ED blocks, all residents completed a validated assessment tool to test their knowledge and application of the PECARN tool when assessing patients with head injury.

Results: Interns were similar in demographics, prior experiences, and general knowledge of TBI. Interns in the high-fidelity simulation group correctly identified a mean of 75% of the PECARN criteria. Interns in the case discussion group correctly identified a mean of 73% of the PECARN criteria (p<0.0001)

Conclusion: Interns participating in either high-fidelity simulation or case-based discussion simulation training demonstrate clinical performance competencies involving the use of the PECARN clinical prediction rule that are measurably better than more clinically experienced senior residents. This study suggests that information delivery and comprehension may be improved through targeted education, and has promising implications for future larger studies.

References available upon request
Full disclosures for all authors and coauthors available upon request
SLICE: A BASIC CLINICAL SKILLS SIMULATION EXPERIENCE FOR MEDICAL STUDENTS (#488)

Presentation Category: Program Evaluation

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Introduction: Simulation has emerged as an essential component of the medical school curriculum by replicating patient encounters utilizing standardized scenarios, allowing students to practice high-risk tasks in low-stakes settings. The University of North Carolina School of Medicine has integrated various forms of simulation into its new curriculum (Translational Education at Carolina (TEC)), but currently lacks a practical procedural skill introduction. Therefore, we founded Simulation Lab Integrated Curriculum Experience (SLICE), a student-led program that combines classroom learning with basic clinical skills education in the UNC Clinical Skills and Patient Simulation Center and piloted it using lumbar puncture task training to supplement the didactic teaching in the Neurology Block. SLICE has two primary goals: 1) augment and contextualize information presented in pre-clinical education 2) develop confidence and competence with clinical skills students may encounter during clinical rotations.

Methods: A signup form was distributed via email to the entire first year class and two ten-slot sessions were filled in less than four minutes. Students were instructed to watch a preparatory New England Journal of Medicine (NEJM) video about the procedure prior to the session. During the event, students were given a fifteen-minute training session from a physician on the technique of performing a lumbar puncture. Students were able to practice on adult and infant trainers with guidance and feedback from multiple physicians. A pre- and post-session survey was distributed to the students. The first four questions used Likert scales from 1 (low) to 5 (high) to assess students’ perceived confidence and competence. Question five was a free response to gauge why students elected to participate and what could be improved in the future. All data were analyzed for significance via Mann-Whitney U tests.

Results: Five question pre- and post-event surveys were distributed to participants (N = 75). There were significant increases from mean pre- to post-event perceived ability to describe lumbar puncture indications and procedures (2.27 vs 4.13; p<0.05).

Conclusion: The pilot SLICE events were student-organized, student-run, and successful, as evidenced by great student enthusiasm and significant increases in student comfort in both performing the procedure and perceived increased comfort teaching the procedure. All participants practiced a basic clinical skill with direct feedback and no risk of adverse patient outcomes. All students reported some increased level of self-confidence and competence with lumbar punctures. Enthusiasm for SLICE among students is high: almost 2/3 of the first-year class enrolled within 24 hours of its creation. Working with faculty, we have developed a unique simulation experience to integrate directly with every organ-system block in UNC’s preclinical curriculum. Future work will include sessions for each organ system block and an assessment of skill retention with comparison of performance in clinical years compared with other cohorts that did not have this experience.

References available upon request
Full disclosures for all authors and coauthors available upon request

POSTER #241

SIMULATION TRAINING OF POSTPARTUM HEMORRHAGE FOR RESIDENTS (#1521)

Presentation Category: Patient Safety & Quality

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Introduction: The objective of the study was to evaluate the effectiveness of post-partum hemorrhage (PPH) simulation teaching compared with standard instructional methods in teaching residents how to deal with the postpartum hemorrhage and the confidence in managing it.

Methods: The participants were residents from 6 different hospitals in Beijing, China and were randomly assigned to 2 groups. The control group (n= 26) received standard instructional methods including textbook, discussion and video viewing. Intervention group (n = 26) acquired postpartum hemorrhage case simulated learning experience. After learning experience, participants were tested for medical knowledge and self-confidence using questionnaires.

Results: Baseline presimulation medical knowledge and confidence levels were similar between the two groups. The post-test questionnaire between the two groups showed that PPH stimulation teaching improved the participants’ medical knowledge than the standard instructional methods. (P<0.05). And the residents teaching by PPH case simulation were significantly more confident in their ability to deal with PPH than the control group (P< 0.01).

Conclusion: Simulation teaching of postpartum hemorrhage has not only improved the residents’ medical knowledge, but also significantly increased residents' confidence in dealing with the PPH compared with the standard instructional methods. It is can be considered that simulation teaching of PPH could be included in the resident training program for helping improve teaching effectiveness.

References available upon request
Full disclosures for all authors and coauthors available upon request