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**Simulation Training in Gastrointestinal Endoscopy: Does the Timing of Feedback (concurrent versus terminal) Matter? (Paper)**

Catharine Walsh, Simon Ling, Hospital for Sick Children and University of Toronto, and Heather Carnahan, University of Toronto

**Background:** The purpose of this study was to determine the optimal timing of feedback (concurrent versus terminal) in promoting skill acquisition and retention in novices learning to perform colonoscopy in a simulated setting. **Methods:** Thirty novice endoscopists were pre-tested on a bench model colonoscopy simulator task, which involved navigating a real colonoscope through a series of marked targets as quickly and accurately as possible. Participants were then randomly assigned to receive feedback either during (concurrent) or after (terminal) each of their 12 trials. The effectiveness of training was assessed using an immediate post-test and one week later using both a retention and transfer test. Performance measures included insertion time and blinded expert assessment of performance (checklist and global rating scores). In addition, novices were asked to rate the quality of feedback received. **Results:** There was no difference in performance between the terminal and concurrent feedback groups during the pre-test; both groups improved significantly after practice (p<0.05). Time to complete the practice session was shorter (33.3 min vs. 39.24 min) for the concurrent feedback group; however, the terminal feedback group performed significantly better on the transfer test (p<0.05). Students in both groups rated the feedback as equally useful, clear, and timely. **Conclusions:** Both terminal and concurrent feedback promote endoscopy skill acquisition in novices in a simulated setting. However, the practice session was longer for the terminal feedback group, and the extra time invested resulted in better learning.
Background: The aim of this study was to evaluate the structure and content of nursing students’ knowledge related to empowering patient-education when using a virtual patient simulation and to describe factors related to the students’ knowledge. Methods: The sample consisted of graduating nursing students (n = 69) at six polytechnics in Finland. Data was collected in two phases: before and after using a computer-based virtual patient simulation. Only 46% of the students who experienced the simulation participated. Student learning was measured with concept maps about empowering patient-education; learning strategies were measured with the Finnish version of the Inventory of Learning Styles, and learning orientations with one subscale of the Inventory of General Study Orientations. The concept maps were analysed using Bigg’s SOLO taxonomy (scale of SOLO categories from 1 to 5) and content analysis. Data from the questionnaires were statistically analyzed. Results: Nursing students’ knowledge structure related to empowering patient-education was mainly multi-structural (SOLO category 3, pre-test: 54%, n = 37; post-test: 67%, n = 31). Only two students' knowledge structure was categorized in SOLO category 5 (extended abstract) in the post-test. Content analysis and statistical analysis are ongoing. Conclusions: Based on preliminary results this study will provide new and useful information on learning empowering patient-education, using virtual patient simulation.
In Order to Learn:
Does the Sequence of Simulation-Based Training Affect Self-Guided Learning of IV Catheter Insertion Skills by Nursing Students? (Paper)

Ryan Brydges, Wilson Centre

Background: Psychological research suggests that the sequencing of topics affects learning. In addition, research has shown that when the learning setting is well-structured, students can benefit from a self-guided learning approach. Our purpose was to investigate the effectiveness of different practice sequences as well as the mechanisms of self-guided learning in these contexts.

Methods: Nursing students (n=45) practiced intravenous catheter insertion for two hours. Three simulators were used by three groups: progressive, self-guided, and control. Progressive learners moved from low-fidelity to high-fidelity simulators—the number of trials completed on each simulator was self-selected. Self-guided learners moved freely between the simulators in an independent manner. Control learners followed an experimenter-defined practice schedule. Students returned one week later to complete a standardized patient (SP) scenario. Experts evaluated video-taped performances from the SP scenario and the final trial on each simulator.

Results: Most self-guided learners (66%) independently chose the progressive learning practice schedule. The low-fidelity simulator was rarely used by self-guided learners; post-practice surveys suggested that it was regarded as an impediment to learning. Expert evaluations indicated similar performances between the progressive and self-guided groups; both outperformed the control group (p<.05).

Discussion: Our findings demonstrate that nursing students prefer the progressive learning practice schedule, which has implications for the order that educators introduce simulation resources. Student perceptions indicated that the low-fidelity simulator was not considered a valuable learning aid. Continual study of the self-guided learning approach will allow us to enhance the cost- and time-efficiency of early trainee education and could potentially foster effective life-long learners.
Addressing the Severe Shortage of Healthcare Providers in Ethiopia:
Bench Model Teaching of Technical Skills (Paper)

Miliard Derbew, Addis Ababa University

Background: There is a severe healthcare worker shortage in Ethiopia that must be responded to by efficient means of training mass cohorts of students. The objective of this study was to demonstrate that bench model training is a feasible approach to teach surgical skills in Ethiopia. Method: A pre-test, training intervention and post-test design was used with no control group. Two Objective Structured Assessments of Technical Skills (OSATS) tests and a bench top simulation training session were administered at the Black Lion Hospital in Ethiopia. Nineteen surgical residents volunteered to participate as learners. Five surgical faculty members and one senior resident from the Black Lion Hospital, as well as two faculty from the University of Toronto participated as trainers and evaluators. The OSATS tests consisted of four stations: knot-tying, closure of skin laceration, elliptical excision, and bowel anastomosis. These tests were separated by a two-hour practice session. The primary outcome measures included previously validated instruments: Global rating scales (GRS) and skill specific checklists (SCL). Results: The measures showed no improvement on knot-tying (GRS: p=.14; SCL: p=.7), marginal improvement on closure of laceration (GRS: p=.48; SCL: p=.003), and improvements on excision and bowel anastomosis (GRS: p=.012; SCL: p=.003, and GRS: p<.001; SCL: p<.001). Conclusions: The bench models and scoring schemes developed in Toronto, Canada were directly applicable in Addis Ababa, Ethiopia. This approach may, thus, prove a feasible, safe, and cost-effective method for training a multitude of physicians, nurses, and midwives in technical skills and may address the human resources gap in sub-Saharan Africa.
Learning to Make Orthoses with Simulation (Paper)

Eric Hagemann, Pat McKee, and Heather Carnahan, University of Toronto

Background: Occupational therapy students learn to make orthoses in a laboratory setting, using each other to practice on. One problem with this approach is that they are learning to make orthoses on healthy, normal-functioning hands, whereas the hands they will encounter as clinicians have a different architecture. Learning clinical skills on a simulated hand with pathology is one method for trainees to gain experience. The purpose of this study is to test the efficacy of an artificial hand as a teaching tool for orthosis-making. Methods: Thirty-three novice occupational therapy students were randomized into three groups. The first group made five orthoses on a healthy human hand, the second made five orthoses on a healthy-looking artificial hand, and the third made one orthosis on a healthy human hand. All participants returned for a one-week retention test, where they made one orthosis on a healthy human hand. An expert occupational therapist evaluated the orthoses using a previously validated Check List (CL) and Global Rating Score (GRS). Results: On the retention test, there were no differences between the three groups for the GRS. The artificial hand group did better on the CL-product measure and had a larger movement time than the other two groups. Discussion: Practicing on artificial hands is a useful way of learning to make orthoses; occupational therapy programs can benefit from incorporating this tool into their teaching. Additionally, higher practice volume does not lead to better performance. Future work will evaluate learning after practice on an artificial hand with arthritis.
A Clinical Communication Curriculum for Peri-Operative Specialist Practitioners (Paper)

Debra Nestel, Monash University
Alison Barnet, and Roger Kneebone, Imperial College London, UK

**Background:** The Perioperative Specialist Practitioner (PSP) is a new professional role within surgery in the United Kingdom. At Imperial College we have designed and implemented a training course for this role, piloting its first iteration in 2003. Effective communication with patients, their relatives, and members of the surgical team is a key component of the course. This paper describes an innovative simulation-based Clinical Communication Curriculum (CCC) that runs through the nine modules of the course. **Methods:** The CCC has strong theoretical underpinnings and uses simulation to enable learners to rehearse communication challenges. The CCC has two threads: 1.) Patient interactions, such as communicating during patient assessment while conducting a clinical examination, explaining a procedure, giving risk information during a procedure, and giving bad news; 2.) Interprofessional interactions, such as giving feedback, making case presentations, handover skills, communicating during emergencies, writing referrals, and using patient care leaflets. Evaluation methods include observations, questionnaires, written reflections, and interviews. **Results:** Thirty-eight PSPs have completed training. Responses have been very positive, highlighting the opportunity to review familiar skills and acquire new ones. Participants were not always “comfortable” with the educational methods (role-play and videotaping), although they acknowledged them as powerful learning tools. **Discussion:** Evaluation of this training demonstrates the effectiveness of a layered CCC, progressively building on learner expertise. Simulation offers a valuable medium in which communication can be targeted. This approach offers a useful blueprint for training for other patient-centred roles, especially in the context of a healthcare system where patient safety and effective communication must lie at the heart of each clinical interaction.
Evaluating Cognitive and Psychomotor Skills in Undergraduate Nursing Simulation Scenarios (Paper)

Betty Cragg, University of Ottawa,
Kathryn A. Smith Higuchi, University of Ottawa
Carmen Hust, Algonquin College
Tammy Miller, Algonquin College

Background: Research was conducted to evaluate the cognitive and psychomotor skills demonstrated by second and third year baccalaureate nursing students in clinical scenarios using high fidelity simulators. Methods: Year two student clinical scenarios involved assessment of newborns and older adults. Year three student scenarios involved assessment and management of adult respiratory and post-operative situations. All sessions were video recorded. To conduct our data analysis we reviewed the video-tapes and then selected key exemplars for further analysis. The key exemplars were those segments that included interactions with patients, and provided clear audio recordings. The exemplar segments (n=18, M=66.8 sec), were then transcribed and subjected to two types of analysis by two independent researchers. We first analyzed each segment to determine the thinking processes demonstrated by the students, based on Donald’s Model of Thinking Processes (Donald, 1992; 2002). We also analyzed each segment for expected versus actual behaviours, or whether the students performed the expected psychomotor and communication skills related to the specific scenario. Results: Students demonstrated a range of thinking skills, including high level cognitive processes such as selection, inference, synthesis, and verification. When compared with expert skill performance, students most frequently missed or partially completed key elements. Incorrect performance of expected skills was infrequent. Discussion: Video recordings of scenarios can provide a rich source of data on cognitive processes of students. The findings indicate that clinical simulation scenarios can be used to assess and enhance thinking skills, in addition to the more traditional role of assessing psychomotor and communication skills.
Using Technology to Support Learning in Nursing Orientation (Paper)

Carolyn McPhee, Margaret Duff, and Claire Mallette, University Health Network

Background: Up until two years ago, monthly nursing orientation primarily consisted of lectures conducted by nurse educators who repeated the same content for each group of orientees. Delivery was inconsistent; learning styles and learners’ previous knowledge and experience were seldom acknowledged; and, orientees experienced information overload. Nurse educators, recognizing the need for a more effective model of teaching-learning, proposed a blended approach that incorporates technology to support learning.

Method: With the implementation of this innovative approach, much of the didactic classroom content is now captured in interactive e-Learning modules containing factual information, links to hospital policies and other resources, as well as problem-solving scenarios that engage the learner. Completion of these e-Learning modules prepares the orientees for participation in a one-day simulation laboratory where they engage in hands-on practice with computerized mannequins in a controlled environment. Orientees rotate through a series of skill stations designed to build on knowledge acquired through the online courses. Nurse educators are located at each skill station to provide support, demonstrate techniques, and answer questions. Results: Orientees and educators alike have expressed satisfaction with this technologically-supported approach. The decreased demand for teaching of repetitive, generic content has allowed the educators more time for individual coaching at the bedside; orientees have found that e-Learning, in combination with the simulation lab, provides a more powerful, meaningful learning experience that prepares them for real-life clinical situations. Factors for success as well as challenges associated with this approach will be described.
Creation of an On-line Interprofessional Critical Care Film Scenario (Paper)

Brendan Greaney, Coventry University

**Background:** The critical care film scenario discussed in this paper is a short film detailing a victim that has been knocked over by a car. The scenario details the care that the victim receives from an air ambulance, ambulance crew, a doctor and a witness. The victim’s story continues as he is admitted into hospital and assessed by a nurse and a physiotherapist. The aim of the film is to illustrate in a more innovative and visual way how inter-professional practice can be demonstrated, or not as the case may be.

**Results:** The learning outcomes for the film scenario include: a) Exploring the range of professions involved in different care of treatment settings; b) Describing aspects of one’s own professional role, responsibility, and values to other professions; c) Effectively utilising communication skills and channels to share knowledge and ideas within an inter-professional group; d) Discussing the importance of integrated assessment/care planning; and e) Identifying opportunities for integrated assessment/care planning and critically evaluating their impact on the patient-client. The film scenario has been made available online to a variety of healthcare students, including paramedics, nurses, physiotherapists, and medical students. **Discussion:** The film scenario provides opportunity for reflection and discussion on the events through questions and discussion points, including what could potentially have been done differently.
Peri-operative Patient Simulation: An Online Interactive Simulation of Cardiac Critical Care Patients (Paper)

Gordon Tait, Toronto General Hospital

Background: The successful completion of a cardiovascular surgical repair is followed by close monitoring and stabilization of the patient in the Critical Care Unit. The simulation of patient management in Critical Care allows trainees to gain experience by putting their knowledge into practice without risk to patients. Methods: We have created a new Web-based Peri-Operative Patient Simulator (POPS) that uses a mathematical model of the heart and circulation to simulate the cardiovascular response to post-operative complications and the response to treatment with the drugs, fluids, and interventions typically used in the Critical Care Unit. On completion of the case, POPS provides a score and other feedback to the user. Results: The POPS application has been developed and is being assessed by staff anesthesiologists for face and content validity and by resident physicians for usability. Construct validity will be assessed by determining whether POPS scores discriminate between novices and experts, whether POPS provides cases with a range of difficulty, and whether repeated practice with POPS results in an increase in scores. Discussion: When the evaluation of POPS is completed, it will be made available as a free online resource for teaching and learning around the world. It can be used by instructors as a focus for small group teaching and as a self-study resource for physicians and nurses learning to manage patients in Critical Care.
Evaluating a Virtual Intravenous Pump Educational Module for Undergraduate Nursing Students (Paper)

Marian Luctkar-Flude and Cheryl Pulling, Queens University

**Background:** Programming electronic intravenous (IV) infusion pumps is a technical skill that challenges most nursing students, causes stress to nurses, and may cause harm to patients when improperly used. IV pumps are reported to be involved in as many as 35% of serious medication errors, usually as a result of user error and inadequate device education. The purpose of this study is to evaluate an innovative virtual IV pump educational module developed to increase student knowledge, competence, and confidence in utilizing an IV pump. **Methods:** Third year nursing students were approached to participate. Students in the fall semester (control group) completed the current required readings. Consenting study participants were asked to demonstrate how to program the specified infusions on an IV pump in the laboratory. A research assistant scored participants’ performance. Study participants completed a short survey asking them about their confidence using IV pumps. Students in the winter semester (experimental group) will complete the online virtual IV pump educational module prior to attending the laboratory and will be given additional survey questions related to ease, usefulness, and satisfaction with the virtual IV pump educational module. **Results:** Evaluation of results is ongoing. It is anticipated that participation in the new educational module will enhance nursing students’ knowledge, skill, and confidence in programming IV pump infusions. **Discussion:** Ideally, increasing student competence and confidence with this skill, will transfer to other skills and contribute to patient safety in the clinical area.
Simulation to Reality: Evaluating Transfer of Learning in Basic Procedural Skills (Paper)

Debra Nestel, Brendan Flanagan, Jill French, Julia Harrison, David Campbell, George Somers, Robyn Hill, Brian Chapman, Chris Browne, Monash University, Australia

Background: This study evaluates the impact of learning a procedural skill (peripheral intravenous cannulation) in a Simulation-based Training for Enhanced Procedural Skills (STEPS) module and its transfer to clinical settings. Methods: STEPS was designed to support acquisition of skills for safe and effective performance of clinical procedures. STEPS comprises a DVD (on integrated procedural knowledge and skills), simulation activities (~3 hours), and supervised clinical practice (~1 hour). The program is underpinned by a generic rating form: Direct Observation of Procedural Skills (DOPS). Medical students were recruited to experimental (STEPS: n=15) and control (semi-structured training: n=20) groups. Students completed questionnaires (demographics, response to STEPS, etc.) and procedural assessments. Clinicians rated student performance using DOPS. Descriptive and non-parametric statistics were used to analyze quantitative data (SPSS 15.0). Qualitative data were analyzed thematically. Results: STEPS-trained students outperformed the control group in clinical settings (p<0.05). Students valued the sequential delivery of information in the DVD: the overview, demonstration of technical, communication and patient safety skills, the DOPS form, and patient perspectives. The experiential activities with peer and expert (simulated patient and tutor) feedback on bench-top models and in hybrid simulations were helpful. Finally, the supervised practice in real clinical settings with clinician feedback was reported to facilitate transfer of learning. Discussion: STEPS supported learning in a basic procedural skill. The DOPS framework underpinning STEPS provided structure for students to organize key elements of procedural skills. Raising patient perspectives alongside technical elements of the procedure was innovative and valued.
Stress and Performance of Residents during High Acuity Simulated Trauma Resuscitations (Paper)

Vicki LeBlanc, and Adrian Harvey, University of Toronto
Glen Bandiera, and Avery Nathens, University of Toronto and Saint Michael’s Hospital

Background: The effects of stress on performance in clinical situations are poorly understood. The purpose of this study was to examine the effects of stress on the performance of residents in simulated trauma resuscitations. Methods: Thirteen emergency medicine and general surgery residents were evaluated in High Stress (HS) and Low Stress (LS) trauma resuscitation simulations. Subjective (State Trait Anxiety Inventory [STAI]) and physiological (salivary cortisol) measures of stress were collected at baseline and in response to each scenario. Video-taped performance was assessed with the Anesthesia Non-Technical Skills tool (ANTS), global ratings, and checklist scores of technical performance by two blinded raters. Post scenario recall was assessed by completing a standardized trauma history form. Results: Post scenario STAI scores and cortisol levels were higher in the HS scenario compared to the LS scenario (p<.05). Checklist performance scores and post-scenario recall were significantly higher in the LS compared to the HS group. Subjective and physiological measures of stress were negatively correlated with performance in post-scenario. Conclusion: In trainees, stress has detrimental effects on important aspects of clinical performance and immediate recall in trauma resuscitations. Greater stress responses are associated with greater impairments in performance. As such, training for acutely stressful events should be extended beyond the skills and knowledge required during such events, and should include training in coping with stressors and managing stress responses.
Utility of Crisis Resource Management Simulation—Mitigating Stress, Improving Confidence and Performance (Paper)

Jeffrey Groom, Florida International University

**Background:** In an attempt to mitigate the physical and psychological impact of stress during emergencies and thereby, improve confidence and crisis management performance among health care professionals, we used simulation instruction in combination with stress inoculation training. **Methods:** We assessed psychological and physiological variables of stress, confidence, and performance in a pre/post evaluation design in a crisis resource management intervention for a group of senior nurse anesthetist (SNA) students. Psychological measurements included the State-Trait Anxiety Inventory and Likert-scale responses to perceived stress and self-confidence. Physiological measures included heart rate (HR), blood pressure (BR), and salivary cortisol level. Performance was scored by standardized checklist. Twelve hours of instruction in crisis management and stress inoculation were conducted between pre- and post-evaluations. **Results:** For the SNA students (N=54) comparisons between pre/post evaluation physiologic measures showed a significant decrease in HR, BP and Cortisol (p < 0.001). State anxiety decreased 10.6 points (p < 0.001), while trait anxiety remained unchanged (p = 0.098). Perceived stress going into both evaluations was not significantly different (p = 0.175). However, perceived stress during the post-intervention scenario declined significantly (p = 0.0007). Confidence was significantly higher going into (p < 0.001) as well as during the post- evaluation (p = 0.0023). Performance ratings significantly improved between the pre- and post-intervention measures (p < 0.001). **Discussion:** Our study demonstrated an improvement in crisis management performance among participants in the simulation-based intervention. This study affirms the utility of simulation instruction in mitigating the physical and psychological effects of stress.
**A Mixed-method Approach to Studying Simulation learning with Baccalaureate Nursing Students (Paper)**

Michelle Morley, Susan Ogilvie, and Betty Cragg, Algonquin College

**Background:** Health science students face a reduction in acute care clinical placement opportunities, which are essential for developing clinical reasoning and clinical competence. Education methods using high-fidelity human patient simulation may provide a way to ensure students meet these important learning outcomes. A mixed-method study was used to investigate clinical competence and clinical reasoning among third year baccalaureate nursing students. **Methods:** The experimental group (n = 10) received four days of simulation learning as part of their medical-surgical clinical practicum while the control group (n = 9) participated in their regular clinical practicum. Clinical competence was measured using final grades from a medical-surgical theory course and an Objective Structured Clinical Exam. Six participants from the experimental group were interviewed to investigate their perceptions about the simulation experience. **Results/Discussion:** There were no significant differences in clinical competence between the groups, as was evidenced by their final theory grades, t (17) = 1.090, p = .291, and OSCE scores (M = 60 for both groups). A detailed analysis of the transcribed data resulted in the emergence of the central theme of clinical confidence. Four interrelated components, realism, clinical scenarios, facilitation, and debriefing were instrumental in the development of confidence. The results support the use of high-fidelity simulation learning in healthcare education.
Using Crisis Team Training to Determine the Transferability of Simulation-based Learning into Clinical Practice (Paper)

Ruth Tarantine, University of Pittsburgh and St. Margaret Hospital

**Background:** Clinical simulation offers a safe environment for healthcare providers to learn and make mistakes without harming patients. Despite the benefit of enhanced patient safety resulting from simulation education, there is little evidence in literature to support use of simulation in teaching cognitive skills or transferability of skills into clinical practice. The goal of this longitudinal study was to determine whether simulation-based learning successfully transfers into clinical practice. **Methods:** Crisis Team Training (CTT) was utilized to measure transferability of simulation into practice. Interdisciplinary CTT, consisting of nurses, respiratory therapists, and physicians (N=175) were conducted using simulation as a teaching strategy. An 11 question survey was distributed twice, six months apart, to measure multiple beliefs of participants, including technical skills, communication, diagnostics, confidence level, and ability to organize in a crisis. T-tests were used to compare results. **Results:** The initial post-education survey revealed that participants believed simulation was going to have a positive effect on their practice. The six month survey revealed that participant’s integrated simulation learning into practice and perceived positive effects from the CTT class. Based on results from the 11 question survey, there was no statistical difference between the initial survey and six month survey on seven questions. However, four questions indicated a statistical difference between the two surveys. **Discussion:** The evidence points to simulation as an effective teaching strategy in the preparation of healthcare providers. This study supports that simulation learning successfully transfers and sustains in clinical practice.
**Integrating Simulated Teaching/Learning Strategies in Undergraduate Nursing Education (Paper)**

Barbara Sinclair and Karen Ferguson, University of Western Ontario

**Background:** This paper describes the development of an innovative educational method to deliver nursing theory related to the care of clients across the lifespan in an undergraduate nursing program. Five learning activities that have previously been presented in traditional classroom/lecture format were presented using a combined lecture and clinical simulation approach, in the new simulation laboratory facilities in the Faculty of Health Sciences, University of Western Ontario. **Methods:** Year two students enrolled at the collaborative site served as the control group, receiving only classroom instruction. Using a mixed-methods design, students were asked to rate their perceptions of self-efficacy, satisfaction, and effectiveness of this combined teaching and learning strategy. **Results/Discussion:** Based on Bandura’s (1977, 1986) theory of self-efficacy, this study provides data to suggest that students’ self-confidence for nursing practice may be increased through the use of simulation as a method of teaching and learning. Students also reported higher levels of satisfaction, effectiveness, and consistency with their learning style when exposed to the combination of lecture and simulation than the control group, who were exposed to lecture as the only method of teaching and learning. Challenges, resources, and faculty perceptions of the use of simulation in this manner will be discussed.
Evaluating Standardized and Simulated Patients in an Undergraduate Nursing Health Assessment Course (Paper)

Marian Luctkar-Flude, Queens University
Barbara Wilson-Keates, University of Alberta

Background: The undergraduate health assessment course at Queen’s University School of Nursing provides three distinct experiential modalities for students to practice health assessment skills before applying them in a real-world context: Community Volunteers (CV) and, more recently, Human Patient Simulators (HPS), and Standardized Patients (SP). Little research has examined the similarities and differences in students’ learning in the three experiential modalities. The purpose of this study is to evaluate the use of standardized and simulated patients in an undergraduate nursing health assessment course.

Methods: During week four of the health assessment course, consenting students were assigned to complete a respiratory assessment on either a CV, HPS or SP. Feedback was obtained from peers, faculty, CVs and SPs regarding students’ performance of critical assessment behaviours and interpersonal skills. Participants completed the Health Assessment Educational Modality Evaluation (HAEME) survey assessing their confidence with health assessment skills and satisfaction with the three learning modalities. The HAEME survey was repeated in week 11 of the course, after students had experienced all three learning modalities. Appropriate statistical analyses, such as frequencies, means, standard deviations, and analysis of variance are being conducted.

Results: Preliminary analysis indicates that students are satisfied with all three learning modalities in the health assessment course.

Discussion: Results will determine the similarities and differences among the three learning modalities regarding learners’ health assessment knowledge, attitudes, and behaviors.
Impact of a Structured Training and Assessment Curriculum (STAC) on the Quality of Skill Acquisition in Minimally Invasive Surgery (Paper)

Neil Orzech, University of Toronto

Background: Training for surgical procedures is currently unsystematic and unstructured. The present curriculum aims to provide comprehensive training and assessment of all key elements of surgical competency with Minimally Invasive Surgery. Hypothesis: Residents trained by the Structured Training and Assessment Curriculum will demonstrate shorter learning curves with basic laparoscopic procedures compared to their peers trained conventionally. Methods: Randomized controlled trial. 24 first and second-year General Surgery residents from the University of Toronto were randomized to one of two laparoscopic surgery training modules: (A) STAC (intervention group) or (B) Conventional laparoscopic surgery training (control group). Subject knowledge and technical skill with laparoscopic surgery will be assessed using an MCQ test and two surgical tasks on a VR surgical simulator. The STAC includes eight weeks of training encompassing five major components: (1) Theoretical preparation; (2) Proficiency-based Virtual Reality surgical simulation training with feedback; (3) Operative videos; (4) Observed procedures; and (5) Bench tasks from the Fundamentals of Laparoscopic Surgery Training Program. Competence improvements for all subjects will be assessed using: (1) a different MCQ test; (2) two VR surgical tasks; (3) performance during HPS simulated postoperative complications; and (4) five supervised laparoscopic cholecystectomies in the OR. Operative performance will be video-taped and assessed by independent, blinded experts using previously validated global rating scales.
Intra-Operative Assessment of Technical Skill on Live Patients Using Economy of Hand Motion: Establishing Learning Curves of Surgical Competence (Paper)

Ethan Grober, Mount Sinai Hospital and University of Toronto

Background: Intra-operative assessment of technical skill remains largely unvalidated and subjective. In the surgical training laboratory, measures of the economy of hand-motion (number of hand movements and hand travel distance) have demonstrated promise as reliable, valid, and objective measures of technical competence. The primary objectives of the current study were to: 1.) establish the feasibility of performing live intra-operative hand-motion analysis; 2.) validate live, intra-operative assessments of economy of hand-motion as an objective measure of technical skill; and, 3.) to use hand-motion analysis to establish competency-based surgical learning curves. Methods: Economy of hand-motion was serially evaluated on a standardized, live intra-operative surgical suturing task performed by a novice surgeon and an experienced surgeon on real patients. Hand-motion analyses were correlated with blinded, case-matched assessments of technical skill, using previously validated global rating scales (GRS) and task-specific checklists applied to unedited surgical videos. Serial hand-motion data from the novice and experienced surgeon were used to establish competency-based learning curves. Results: Intra-operative measures of economy of hand-motion significantly correlated with case-matched checklist scores and global ratings of surgical performance (r>0.78, p<0.001). Total number of hand movements, hand travel distance, and operating time significantly improved over time for the novice surgeon, but remained stable for the experienced surgeon. The process of set-up and live data collection added little to the overall operating time (< 3 mins.). Conclusions: Intra-operative assessment of economy of hand-motion represents a feasible, objective, and valid measure of technical skill and can be used to establish competency-based surgical learning curves.
Simulation of the World Health Organization (WHO) as an Intervention/Educational Tool for Health Professions Students (Paper)

Jennifer Yoon, Vincent Chapland Lee, Corinne Hart, and Adam Dubrowski, University of Toronto

**Background:** Advocacy and health professional values are often perceived as inseparable. However, this relationship deserves further consideration. Over the course of two years (2008-2009), we designed and implemented a simulation of the World Health Organization (modelWHO) for health professions students in Ontario. Our aim was to engage students in a learning activity that would facilitate their professional knowledge while motivating them to navigate and influence health policy on behalf of the patients in their care. **Methods:** 200 health professions students participated in two modelWHO conferences. The topics for discussion in the 2008 conference were the rehabilitation of child soldiers and bioterrorism. During the 2009 conference, students discussed health professions education and access to healthcare, and participated in a simulated bioterrorist crisis. **Results:** Participants identified learning areas and barriers that prevented them from political engagement. In their evaluation of the modelWHO students reported significant improvement in their public speaking anxiety (p <0.001), improved knowledge of legislation (p<0.001), improved conflict resolution skills (p<0.032), and improved knowledge of public policy/administration (p<0.001).
Does Experiential Learning Improve Knowledge Gains and Retention among Nurses? (Paper)

Mary Agnes Beduz, Micheline Lang, and Irene Wu-Lau, Mount Sinai Hospital

Background: At Mount Sinai Hospital (MSH), e-Learning is used to describe computer-based learning (CBL) that is completed using a learning management system (LMS). Courses offered through the LMS have followed a blended learning design where courses consist of both an e-Learning component followed by an instructor led experiential workshop (ILEW). e-Learning has been shown to be a feasible option in education. However, few studies compare CBL effectiveness with other instructional methods. As such, the following research question was explored: Among newly employed nurses at MSH on an inpatient adult unit, does receiving a blended learning intervention versus an e-Learning intervention result in significant differences in acquired knowledge?

Methods: The pilot study involved newly employed nurses on in-patient adult units who are required to complete a Wound and Skin Care Course in their first year of employment. Nurses were randomized to receive either a blended learning intervention or an e-Learning intervention. Differences in knowledge acquired were measured pre-, post- and 6 weeks following the intervention using a 21-item test. Results: Descriptive statistics were conducted to describe study groups and parametric statistics were used to evaluate group differences. Positive results for the blended learning intervention have been identified through participant test results and feedback. Discussion: This paper will discuss the research study and outcomes and will focus on: 1) nursing education impact, 2) blended learning as a method of knowledge translation, and 3) influence on nursing practice and point of care activities.
Simulation and Medication Administration Safety in Undergraduate Nursing Students (Paper)

Sandra Goldsworthy, Durham College

**Background:** This study examined the benefits of providing a simulation experience to second year nursing students. The study aimed to: 1.) investigate whether a difference existed in the rate of medication errors/near misses and the identification of dangerous assessment findings between students in a standard clinical hospital based practicum and students who underwent a combination of hospital based clinical experience and a simulation-based experience. 2.) describe the effect of participation in case-based scenarios using high fidelity simulators and the influence on self efficacy. **Methods:** Participants were randomized to experimental or control groups. Both groups received pre- and postgeneral self efficacy tests; rates of near miss or actual medication errors were collected in the clinical setting. The experimental group received an intervention that consisted of three eight-hour shifts of a case-based simulated experience that utilized high fidelity simulators. The control group received the usual practicum experience. **Results:** The clinical group that had a simulation experience had a lower medication error rate. There is compelling evidence that the students generated fewer medication errors when the simulation-treatment was administered. Results were highly significant (p < 0.01). Further, the level of self-efficacy significantly increased in the experimental group. Data collected from a follow-up focus group will also be discussed. **Discussion:** Future plans for expanding this research internationally will be discussed as well as the implications of this study for patient-safety.
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