Poster #:
Abstract - Games Arcade

ECMOjo: Computer Simulator for Extracorporeal Membrane Oxygenation (ECMO) (782)

Presentation Category: Technology

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Introduction: Simulation-based training (SBT) is valuable for acquiring clinical and behavioral skills in a safe environment (1). One example is computer simulators; where immersion is traded for low-cost and the ubiquity of training using a screen-based environment (2). This is especially pertinent in extracorporeal membrane oxygenation (ECMO); a modified cardiopulmonary bypass technique employed to support patient's vital functions during recovery from cardiac and/or respiratory failure (3). The technique gained popularity following the H1N1 outbreak in 2009 and the publication of the CESAR study (4). Despite its life-saving potential, a multitude of circuit-side complications can occur and demand swift intervention from a multi-disciplinary team. There are few computer ECMO simulators available, mostly with varying feature-sets and high licensing costs. This work introduces an open-source ECMO computer simulator designed to replace conventional didactic classroom instruction.

Methods: This work presents ECMOjo; a cost-effective ECMO computer simulator focused on pediatric patients with anatomic, physiologic, and pharmacologic realism (5). It is built on a sophisticated, empirical model of ECMO phenomena; which gives it the ability to simulate both the ECMO circuit and the pediatric patient. The virtual circuit simulates real-time circuit data (e.g. flows, SvO2, and membrane pressures), and ECMO circuit components such as an oxygenator, a pump, and a gas blender (see Figure 1). The virtual patient is modeled to realistically react to circuit adjustments and emerging issues. Utilizing both building blocks, ECMOjo can simulate a multitude of ECMO scenarios such as pump failure and accidental arterial decannulation. Cost-wise, ECMOjo is freely available online, cross-platform, and open for customization and extension. To assess the educational potency of ECMOjo, a skills acquisition study was carried out to answer the question: can ECMOjo replace didactic instruction?

Results: A skills acquisition study was conducted to compare the educational effectiveness between ECMOjo and didactic classroom instruction. A total of 51 medical professionals including perfusionists and physicians were enrolled, and were randomized into two groups. One group carrying out didactic classroom instruction and another training on ECMOjo over the same period. Both groups were assessed using three hands-on sessions. Analysis of the assessment between the two training modalities shows a chi-square probability higher than 0.05; proving the null hypothesis that no difference in training between ECMOjo and didactic instruction applies. Though the solution beholds several limitations, including the lack of support of adult virtual patient, and outdated virtual circuit due to accelerated progress of ECMO technology. The simulator also lacks physical realism and hands-on experience enabled by full-scale simulators. Thus, ECMOjo is considered complementary to hands-on training sessions.

Conclusion: In the grand scheme, unlike full-scale simulators, ECMOjo is a proven low-cost computer ECMO simulator that complements hands-on ECMO training. Following the study's verdict that ECMOjo is equivalent

to didactic instruction due to its interactive, engaging nature and its underlying physiological model, the simulator is especially educationally-valuable at medical training centers where hands-on experience is sparse. The roadmap of the simulator includes updating to cutting edge ECMO equipment, supporting other ECMO machines, and fully enabling adult virtual patient simulation for the purpose of becoming a comprehensive computer ECMO simulator.

Reference available upon request

Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:
Abstract - Games Arcade

Virtual Simulation Games from Existing Scenarios for Nursing Education (426)

Presentation Category: Technology

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Introduction: Technology-enhanced simulation training in health education is associated with better knowledge, skills and behaviors outcomes (1). A critical yet innovative aspect of simulation learning is pre-simulation preparation (2). Pre-simulation preparation consists of the application of materials required by learner in advance of the scenario, and are meant to optimize learning during the simulation scenario. Pre-simulation activities include reading, lectures, quizzes, and self-assessments, where the learner identifies knowledge and skill gaps, and to address those gaps prior to the simulation scenario. Preliminary results from a systematic review of pre-simulation preparation point to the need for innovative approaches to pre-simulation preparation. Research question: What is the impact of two instructional design approaches to pre-simulation preparation (i.e. traditional and blended delivery) on nursing students' ability to achieve learning outcomes?

Methods: This study involved educators from four BScN nursing programs. Each site developed a virtual game used for presimulation preparation. Each virtual game involved complex, deteriorating patient care, including: 1) an elderly patient with urosepsis; 2) de-escalation of the angry patient; 3) diabetic ketoacidosis; and 4) DVT to PE respiratory distress, previously developed and peer-reviewed through a multisite collaboration (3). Using innovative gaming technology (Articulate) and Go-Pro audio/video technology, these games utilized standardized patients and/or high fidelity simulators where students complete the simulation preparation as a virtual game. Games have five built-in decision points with three potential nursing responses. Each response then plays out the positive or negative expected consequences of this clinical decision. Students can replay the scenarios as many times as they wish, and select different actions each time and observe the associated outcomes.

Results: The results of this study will be the development of four virtual games (available in English and French) used for the presimulation preparation of validated simulation scenarios across four BScN nursing sites. The virtual pre-simulation materials require students to view a nursing situation, filmed from the perspective of the nurse. Challenges encountered and successful solutions will be used to support and enhance the development of future virtual games in nursing education.

Conclusion: Three key innovations and contributions of this project include: (1) the design and implementation of a virtual pre-simulation preparation; (2) the expanded use of learning outcomes and clinical knowledge assessments for student and faculty evaluation; and, (3) the integration of these outcome metrics to develop cost utility models. Over the longer-term, the systems and processes we have put in place through these innovations will enhance our ability to continue to develop high quality, clinical simulations that can be integrated into all health professional educational programs, as well as post-licensure training and continuing education. The development of new clinical simulation scenarios is very resource intensive for nursing faculty, and by sharing newly developed virtual pre-simulation materials via our existing virtual simulation repository, this project responds to calls to improve productivity in nursing education.

Reference available upon request

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Poster #:

Abstract - Games Arcade

SIMULATIONiQ™ SimPHARM™: an Innovative Virtual Pharmacological Platform (518)

Presentation Category: Technology

Dushy Edrisinghe[1]

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Introduction: Innovation project: SIMULATIONiQ™ SimPHARM™ is an innovative virtual pharmacological platform that replicates the professional practices of actual pharmacists working in hospitals with a view to reducing medical errors. SimPHARM provides a web-based simulated environment that is consequence-free, safe, and relevant for students to learn about how drugs work (their actions; interactions) and decision making (the motivations, processes, and consequences of making decisions).

Methods: Project Design: SIMULATIONiQ SimPHARM provides a time-sensitive, persistent world where students take on the role of hospital clinical pharmacists and are tasked to provide pharmaceutical care to their patients. It allows learners to ask specific questions of their patients, order laboratory tests, recommend new medicines or prescribe different doses, and live through the consequences of their actions as pharmacists.

Results: Innovation project evaluation: Students experience inconsistencies between the theoretical content they have learned and what is expected from them in practice. This restricts their learning process and can lead to poor decision making and serious consequences for patients in the real world. On March 29, 2017, the WHO launched a global initiative to reduce medication-associated harm by 50% over the next 5 years. Medication errors cause at least one death every day and harm approximately 1.3 million people annually in the U. S. alone. Reference: http://www.who.int/mediacentre/news/releases/2017/medication-related-errors/en/ Simulation is a well-established tool for training. SIMULATIONiQ SimPHARM replicates real-world cases that can help pharmacy students to reduce medication-related errors. With SimPHARM, every action taken by the student is recorded and evaluated, and real-time feedback is provided in the form of selections made, error alerts, and alternative options.

Conclusion: Virtual computer-based simulation offer the clear advantage of providing more flexibility and anywhere, anytime accessibility on a mobile device. SIMULATIONiQ SimPHARM provides a level of authenticity that has the potential to enable students to meet the needs of the 21st century healthcare system. It provides a real-time simulation for a virtual patient with all drugs and conditions interacting appropriately in order to give realistic, time-sensitive feedback on how the patient is doing. The cases are long (2-5 days), and as such, provide students with an opportunity to study and learn between brief 30 min. interactions with the patient, as a practitioner would do in real life. It illustrates the consequences of students' actions. And it contains events that change over time, and hence, no two instances of caring for a patient are the same. SIMULATIONiQ SimPHARM is an innovative virtual technology that revolutionizes pharmacy education to improve patient care and outcomes.

Reference available upon request

Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:
Abstract - Games Arcade

Pre-Simulation Preparation for Undergraduate Nursing Students (544)

Presentation Category: Technology

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Introduction: High-fidelity manikin-based simulation learning is a major component of current undergraduate nursing education, however, the dose of simulation available to each student may be limited by the constraints of time, space and expense. During this precious simulation time, learning itself may be limited if students are overwhelmed by the cognitive demands required to function in a high-fidelity simulation environment (1). Preparation before simulation can improve student learning outcomes during manikin-based simulation (2). Pre-simulation preparation at our college has traditionally taken the form of text-based expository writing assignments. Emerging evidence of the effectiveness and efficiency of multimedia learning supported our decision to create and pilot 2 pre-simulation online modules for first-semester undergraduate nursing students participating in a nursing fundamentals course with a simulation component (3).

Methods: Our online module development team included experts in content and technology. Content was based on current evidence and guidelines in nursing science. We used an iterative design method with repeated cycles of prototype creation, user testing and improvement based on user feedback in order to ensure usability of the online modules (4). Instructional design is consistent with principles of multimedia learning and promotes learning from both text and images in user-paced segments with expert modeling video and game-based learning components (5). Multimedia learning software and learning management software were used to create, disseminate and track use of online modules. During the pilot phase, students completed 2 online modules and 3 text-based assignments to prepare for 5 simulation sessions. Online module topics included wound care, urinary catheterization and nutrition. We invited student feedback and shared IT support contact information with each online module.

Results: Students at our college are required to own a laptop computer and have internet access, therefore, all had access to the technology needed to complete the online modules. During the pilot, students used feedback mechanisms to describe technological malfunctions which were potential barriers to learning. Malfunctions not identified during initial rounds of user testing were discovered after integration of multimedia learning software with the course learning management system and affected scoring and navigation of the online module. Open channels of communication and enhanced IT staff support improved access and usability of the online modules. Feedback will guide ongoing improvement of pre-simulation assignments.

Conclusion: Pre-simulation online modules grounded in multimedia learning theory help students optimize learning during high-fidelity manikin-based simulation. Although multimedia learning theory indicates online modules are a good fit for pre-simulation assignments, trade-offs exist. For instance, with transition to online modules, our students no longer practice expository writing during pre-simulation. Specifying learning objectives for the online module prior to development will ensure the final product meets the needs of the curriculum. Initial efficiency can be compromised by technological challenges. Planning for enhanced resources and communication during transition to online module use can improve usability and minimize barriers to

learning. The use of an iterative design method allows for constant improvement based on user experience and feedback. More research is indicated to evaluate and compare the effectiveness of simulation preparation modalities.

Reference available upon request

Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:
Abstract - Games Arcade

PREality: Preparing for Reality using Immersive Virtual Reality (1133)

Presentation Category: Technology

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Introduction: This innovation project introduces PREality: fully immersive virtual reality experiences of actual patient care created from 360-degree digital video and audio captured from the point of view of the healthcare practitioner and/or the patient. While the strength of traditional simulation lays in providing opportunities for repetitive technical skill practice, simulation can only mimic reality by using problems derived from real-life. The need to suspend reality during simulation limits the capacity to address non-technical skills known to be essential to successful patient outcomes including situation awareness, receptive communication, emotional acclimation, and critical thinking. Fully immersive PREality experiences of actual patient care created with 360 video/audio provide a novel, innovative and relatively low-cost/rapid implementation strategy to train non-technical skills vital for optimal patient outcomes in challenging, critical-care healthcare settings.

Methods: The purpose of this first study is to evaluate the efficacy of PREality experiences to facilitate site-specific preparation in order to accelerate the acclimation of doctoral physical therapy (DPT) students to the ICU. Clinicians from Northern Arizona Healthcare (NAH) and physical therapy educators from Northern Arizona University (NAU) will capture patient care provided by physical therapists in the intensive care unit (ICU) using 360 video/audio in order to create up to 5 immersive PREality experiences for use with DPT students prior to completing clinical rotations with NAH. Members of the NAH Communication Department will obtain written consent from both patients and providers. All video images will be stored on and viewed from a secured hard-drive independent from the internet. All DPT students in one cohort will participate in training using the PREality experiences which will be added to their integrated clinical/didactic education program.

Results: Acceleration of student acclimation to the clinic site will be evaluated by comparing DPT student performance on the CAPTE Clinical Performance Instrument between the experimental cohort and prior DPT cohorts who have not participated in PREality. Efficacy of PREality to facilitate site-specific performance of DPT students will be compared between students who complete internships with NAH vs. those who complete internships at other sites. Utility of PREality to train non-technical skills will be evaluated in the didactic curriculum by faculty and by clinical physical therapist instructors at NAH in the following manner: measures of site-specific situation awareness (e.g. correct recognition of local equipment, alarms, lines), receptive communication (e.g. listening skills, observation skills), acclimation efficacy (e.g. reports of stress, anxiety, confidence), and critical thinking (e.g. planning for patient examination/intervention).

Conclusion: This project introduces PREality, a relatively low-cost/rapid implemenation immersive reality strategy that is very different from computer generated virtual reality associated with high costs and prolonged development time. Although simulation, video, and virtual reality are in active use in medical education, the use of 360 video/audio of actual patient care viewed in an Immersive VR format is a novel and innovative strategy that has yet to be evaluated in medical education. PREality experiences will not replace traditional simulation

but instead serve to bridge a gap between classroom preparation and the actual clinic environment through site-specific, role-specific immersive experiences. PREality has the potential to make a significant and transformative contribution to the future of medical education.

Reference available upon request

Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:
Abstract - Games Arcade

Cost Effectiveness: Video Games vs. Live Simulation for Disaster Training (751)

Presentation Category: Technology

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Yale University School of Medicine[1] Yale New Haven Children's Hospital[2] Yale University[3] Nemours/Alfred I. duPont Hospital for Children[4]

Introduction: Pediatric disaster triage (PDT) is an infrequent, high-stakes challenge. In particular, EMS personnel should be prepared to perform PDT. PDT practitioners are faced with performing rapid assessments, providing immediate stabilization techniques, and assigning triage levels to multiple children in a time constrained, hectic environment. PDT training for EMS has several barriers that prevent large-scale training for EMS personnel. Video game-based education allows for standardized, asynchronous learning. Educational video games, sometimes called serious video games, are being established as a means for healthcare education. Little is known, however, about the cost-effectiveness of the educational video game setting vs. live simulations. We hypothesized that a video game-based disaster triage program would be more cost-effective than a live simulation and feedback-based disaster triage program for EMS providers.

Methods: This was a nested study within a randomized controlled trial (RCT). The RCT compared triage accuracy in a simulation of a school-shooting scenario between paramedics and EMTs exposed to 60 Seconds to Survival (60S), a disaster triage video game, versus feedback after a live simulation. Baseline scores were established for each participant via completion of the first live simulation, a school shooting involving 10 victims portrayed by manikins and actors. The participants then were randomized to receive a debrief following the live disaster simulation or played 60S over a 13-week period. Participants were required to play the game at least once per month during the 13 weeks, and there was no limit to how often the game could be played. Video game accuracy was defined as in-game triage accuracy. At the end of the study, participants completed the same live simulation scenario a second time. Cost effective analyses were conducted in R (v. 3.2.2) using the package BCEA (v. 2.2.4).

Results: For the live simulation + feedback group, there was a one-time cost of $82,595 plus a recurring cost of $252 per 20 participants per simulation. For the videogame-based training program, there was a cost of $67,822. The Incremental Cost-Effectiveness Ratio was -3824.55 for videogame-based simulation versus live simulation + feedback, with a higher effectiveness differential and lower cost differential vs. live simulation + feedback.

Conclusion: A videogame-based disaster triage training program could be a simple, scalable, and sustainable solution to training EMS providers. Future studies are needed to better measure the effectiveness of this type of program.

Reference available upon request
Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:

Abstract - Games Arcade

NICU TeamSTEPPS: Teamwork Training for NICU professionals (760)

Presentation Category: Interprofessional_Education

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Introduction: Interprofessional teamwork is essential for neonatal care as typical neonatal intensive care unit (NICU) teams feature multiple health professionals partnering with families in delivering care in critical situations. Teamwork training has known impact on patient safety and many programs use TeamSTEPPS, an evidence-based teamwork training program developed by the Agency for Healthcare Research and Quality. However, initial TeamSTEPPS training is time intensive and is traditionally delivered through lectures. There are no options for practice or refresher training other than for staff to go through the same process again and it is not known how frequently this should occur. Most TeamSTEPPS training scenarios are not of typical NICU situations. Virtual reality (VR) teamwork training that targets neonatal care providers can be more accessible and engaging than traditional, didactic alternatives and may allow neonatal care providers to practice teamwork skills for critical care situations.

Methods: The objectives were (a) To develop neonatal critical care scenarios in a typical NICU setting (b) To increase access to TeamSTEPPS refresher training for neonatal health professionals The University of Washington (UW) NICU TeamSTEPPS program is designed for unit-wide teamwork training based on the TeamSTEPPS framework. It consists of four typical newborn care scenarios for individual practice that can be deployed in a virtual environment or learning management system. A virtual hospital hospital environment contains NICU, Labor & Delivery, office, conference, and waiting rooms. Interaction in this multi-user environment may occur between users who are logged in simultaneously or with virtual parents in hospital rooms. These parent characters have artificial intelligence chatbot features that enable learners to engage with them using free text chat. VR scenario development involved the UW NICU leadership, TeamSTEPPS master trainers, and an interprofessional group of NICU team members.

Results: The multi-player UW NICU TeamSTEPPS environment and newborn care scenarios may accompany initial in-person TeamSTEPPS training for neonatal care professionals, residents or health professional students; or can be used for refresher training for these groups. The individual scenarios are readily customizable and available to any institution using a SCORM-compatible institutional learning management system (LMS). Teams using the multi-player virtual environment may practice using existing scenarios or their own scenarios. Health care professionals and learners can develop skills in parent communication around difficult NICU conversations through free-text chat interaction with the virtual patients.

Conclusion: The UW NICU TeamSTEPPS environment enables virtual teamwork training for neonatal care settings. Individual and team-based teamwork training is feasible for neonatal care professionals utilizing virtual newborn care scenarios.

Reference available upon request

Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:
Abstract - Games Arcade

Diagnosis of Thoracic Injuries (1238)

Presentation Category: Technology

Edward Sims[1]

Vcom3D, Inc.[1]

Introduction: Studies have revealed that that emergency responders frequently fail to recognize visual and aural cues that indicate presence of pneumothorax, hemothorax, flail chest, and other results of trauma to the chest. Military medics, in particular, failed to properly diagnose and treat female casualties. Even when conditions were accurately diagnosed, they had difficulties in identifying appropriate landmarks for performing interventions such as needle decompression. Our hypothesis is that current simulations of the perceptual cues associated with chest motion, whether manikin- or screen-based fail to properly show both normal and pathological chest motions, as well as appropriate landmarks for interventions, thereby detracting from training. The research question is whether emerging methods in physiological modeling, virtual patient articulations, and manikin mechanics can be applied to accurately simulate cues associated with thoracic injury.

Methods: For this project, the researchers created both a highly articulated, 3D female virtual human and a life-sized, 3D-printed rib cage, in which each rib rotated about hinge points on the sternum and spine. The 3D rib cage was furthermore fitted with a casting representing female skin and breast tissue. A real-time physiological simulation was developed using the BioGears open source physiology engine. This simulation computed chest motions and lung and pleural volumes that responded to pneumothorax and hemothorax, and to needle decompression and chest tube interventions. The computed chest motions, in turn drove the motions of the simulated ribs in both the physical and virtual patient models.

Results: Using the BioGears-based physiology simulation, we were able to simulate lung and pleural space dynamic volumes, and to produce rib motions that are representative of the various chest injuries and their treatments, and that correlate between the virtual (3D graphic) and physical (manikin) simulations. The breathing pathologies in turn led to expected differences in vital signs.

Conclusion: The ability to represent accurate visual and physiological cues associated with various chest injuries and their treatment has been demonstrated. It is believed that these simulations may serve as a basis for improving patient outcomes in the treatment of chest injuries. Based on these initial results, we are now developing a more robust prototype, which we will use to evaluate improvements in student performance.

Reference available upon request
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Poster #:
Abstract - Games Arcade

Virtual Reality Clinical Procedure Room using Oculus Rift (1279)

Presentation Category: Technology

Eric Bauman, PhD, EMT-P/NRP, Fellow of SSH, FSSH[1]; Jon Brouchoud[2]; Brian Pelletier

Institute for Research and Clinical Strategy[1] Arch Virtual[2]

Introduction: Students learning about healthcare careers are transported to a virtual reality (VR) clinical procedure room using Oculus Rift virtual reality headsets and controllers to perform a clinical procedure on a patient in an immersive multi-task clinical experience. Learners are paired in the same VR environment in order to engage in a multiplayer or clinician experience in much the same way that actual clinical practice takes place. The multiplayer experience provides an authentic situated teaching and learning clinical encounter that promotes teamwork and authentically represents healthcare professions.

Methods: Best practices in simulation-based teaching and learning exemplify and orient learners throughout game play. This allows learners to leverage the level of environmental fidelity and interactivity provided in this VR environment. As clinicians, they each perform a series of tasks as instructed by a non-player character that serves as a guide to provide them with just-in-time instructions and cues move them through each step of the procedure. Instructions are also provided using a variety of in-scene graphical icons and images to highlight actions required to complete the procedure that the players are learning about.

Results: N/A

Conclusion: Working with a healthcare subject matter expert, multiple task oriented procedure scenarios were proposed. For the working prototype and first episode of this project, a wound closure and care procedure was selected. The design process began with the development of a game design document and storyboard to illustrate the scope and flow of the selected procedure. Further development of the prototype was based on an in-world walk-through of the learner experiences to determine player pacing, fidelity and mechanics. Based on feedback from user interface testing and play testers experiences, the project shifted to full production. The end result is a situated multiplayer VR clinical experience for learners that leverage high quality assets, systems, and functionality needed to introduce and inspire high school students about careers in healthcare.

Reference available upon request
Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:
Abstract - Games Arcade

APEX: Anatomical Physiological Exploration (1292)

Presentation Category: Technology

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Adtalem Global Education[1] Learning Games Network[2] Institute for Research and Clinical Strategy[3]

Introduction: Objectives: • Immerse clinical sciences students in human anatomy & physiology lessons. • Leverage VR presence and features to create laboratory experiences that rival their physical counterparts. • Create VR learning experiences that increase the persistence of learning. Introduction: Using the Anatomical Physiological Exploration (APEX) in Oculus Touch, clinical sciences students manipulate and examine human & anatomy systems with their hands in an experience that rivals the presence of examining physical specimens.

Methods: A significant challenge in anatomy & physiology education is the persistence of learning. The most effective method for students to learn and retain knowledge about anatomy & physiology is to physically manipulate and examine those systems with their hands. Learning activities that incorporate direct manipulation and the resulting spatial understanding is more persistent than similar experiences situated in print, images, videos, or 3D simulations. Recent advances in affordable desktop VR systems such as Oculus Touch and HTC Vive enable the production of laboratory simulations approaching a life-like fidelity and accuracy. As a result, it is feasible to provide students with anytime-anywhere, reusable, self-directed, noninvasive, safe laboratory experiences that rival their physical counterparts.

Results: Initial research to begin during the Fall of 2017, with a pilot study that obtains design and user feedback regarding the comparison of the iPad based APEX with the APEX delivered in VR.

Conclusion: Previous research conducted by the Institute for Research and Clinical Strategy, Adtalem Global Education with the Anatomical Physiological Exploration (APEX) anatomy table demonstrated its effectiveness as a solution for anatomy & physiology instruction. APEX Immersive builds upon this success. In moving the APEX to VR, the learning experience is transformed from looking through the 2D plane of the display to actually being placed within the world-space of the simulation. When the learner then reaches out to hold the models in their hands, that transformation is complete. In the transformation from looking at the simulation to being in the simulation, engagement, immersion, and spatial understanding are intensified. As a result, persistence of learning (memory) is enhanced. Working with the APEXHuman development team at GEAR, University of Wisconsin, the Institute for Research and Clinical Strategy developed a working prototype of APEX Immersive using Oculus Touch.

Reference available upon request
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Poster #:
Abstract - Games Arcade

CPR Training and Competency (607)

Presentation Category: Technology

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Introduction: Cardiopulmonary Resuscitation (CPR) is a lifesaving skill and the foundation of basic life support (BLS), (Madden, 2005). The skill must be mastered by a broad range of healthcare providers and first responders including police, firefighters, lifeguards, coaches, emergency medical technicians, nurses and physicians. Among the skills tested during CPR/BLS training, effective chest compressions are considered one of the most important factors in achieving the return of spontaneous circulation. However, learners often achieve low scores in BLS chest compression skill demonstration (Ewy, 2007; Kellum, Kennedy, and Ewy, 2006). Although CPR/BLS recognition is a mandatory job requirement for many of these professions, regular deliberate practice is rarely performed, and CPR competency is poorly retained (Handley and Handley, 2003).

Methods: Alternative strategies including digital and game-based instruction have become a more prevalent, novel and accessible ways to promote initial training and skill retention. Digital and game-based learning tools create a learner-oriented approach while promoting curriculum outcomes. In addition, game-based learning may be ideal for continuing health professions education because it can provide a convenient and cost-effective tool that promotes learning anytime and anywhere (Bauman, 2016; Ricciardi & Paolis, 2014).

Results: A review of the available digital mobile applications and games yielded a paucity of computer based games available to support for BLS education that are consistent with current American Heart Association (AHA) guidelines for proper rate of chest compression, depth of compression and allow for full chest recoil.

Conclusion: SavingLives! is a tablet-based application that provides learners with just-in-time feedback in an authentic situated game where the patient status changes based on player performance associated with best practices in CPR. This application provides on demand practice, allowing learners to practice BLS/CPR skills more frequently than through the use of traditional manikin-based education. This sort of access to formative and summative feedback through game-based learning may improve key competencies related to best practices in BLS/CPR.

Reference available upon request
Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:
Abstract - Games Arcade

Cloud Based Combination of Gaming for Basic Life Support (646)

Presentation Category: Technology

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Acibadem University[1] Acibadem University CASE[2]

Introduction: An in house developed serious game module for BLS (Basic Life Support) trainings is being used at our medical simulation centre for more than a year. Aware of the positive effect of the serious game module on the learning outcomes of trainees, we decided to integrate serious gaming with hands on trainings by collecting users' data on a common LMS (Learning Management System). We also decided to add a VR module with the same content to our project and this module uses the same LMS. VR (Virtual Reality) hardware and dedicated software is nowadays widely used for different types of trainings to increase the immersion of serious gaming. The validation of VR applications for medical simulation purposes has been validated in recent studies.

Methods: A bluetooth transmitter was installed into the manikin to send data acquired from the existing sensors. These data are compression depth&frequency, ventilation volume&frequency and hand position. The instructors' interface combines visual check scores of the instructor and sensor data imported from the manikin and sends these data to the trainees' LMS accounts. For the VR module, a virtual lobby was created in order to choose the game settings. Gaze control and leap motion enables the trainees to choose correct type and sequence of actions required for BLS. The real physical manikin is represented by a virtual manikin in the VR scenario. The training takes part in a virtual world without any distractions. Different scenarios are displayed different surroundings in VR world. Therefore the effects of external distractions on trainee performance can be measured.

Results: By using the LMS module, we are collecting trainees' data by using the tablet PC based serious game module, hands on training module and the VR module.

Conclusion: We think that collecting trainees' data on the same LMS at individual level, will reveal impacts on the learning outcome of the serious game module, simulation based hands on training and VR module. Future VR and AR Applications in medicine will be numerous and promising. The aim of our AR project is replacing the combination of manikin based hands on trainings and VR module.

Reference available upon request
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Poster #:
Abstract - Games Arcade

Virtual Gaming: Shock for Undergraduate Nurses (660)

Presentation Category: Course_Exemplars

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Durham College-UOIT[1] University of Ontario Institute of Technology[2] Durham College/University of Ontario Institute of Technology[3] UOIT[4]

Introduction: The use of simulation has become an integral part of many nursing programs with varying degrees of curricular integration. With a critical shortage of clinical placements, and significant constraints on physical resources, nursing educators are facing a critical educational juncture in terms of meeting learning needs tied to patient safety. Without question, the next phase of simulation-based development in nursing education must include virtual learning opportunities, where learners develop mastery learning through cognitive rehearsal, as the student repeats the activity as necessary. The goal of this project is to develop and evaluate a web-based learning module for nursing students focusing on shock using, a software program that creates accessible web-based learning tools. Learning from this pilot will enable further development, with the ultimate goal being a suite of storyline modules that can be embedded in a variety of courses.

Methods: This was a pilot, feasibility study which incorporated the concept of cognitive rehearsal – a technique whereby a student 'mentally rehearses' ways of dealing with a particular situation such that the student is better equipped to respond should that situation arise. The first phase of this project was to first develop the on-line module using a web platform that is accessible to students using various mobile devices. Basic usability testing was conducted to gain insight into the user experiences with the technical aspects of the module produced on the software platform. Focus groups were also conducted with learners following integration of the module into one second year mandatory nursing course.

Results: Overall, the students enjoyed the interactive experience and accessible learning of a complex concept. Engaging in this virtual simulation may improve the student's confidence in clinical practicum and overall exam scores. The first phase of this educational innovation has been beta tested for feasibility and usability in undergraduate nursing students. Pending REB approval, the next phase of this serious game is to launch in relevant courses during the 2017-2018 academic year. Outcomes of interest include knowledge retention, self-efficacy, and critical thinking.

Conclusion: Students were very receptive to this serious gaming experience, where complex concepts of shock were taught. Through the opportunity to repeat the experience for mastery learning, students are familiar with the signs and symptoms, risk factors, and nursing interventions for shock conditions. Through the think-a-aloud process, the final gaming experience incorporates enhanced realism and fidelity leading to a quality experience.

Reference available upon request
Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:
Abstract - Games Arcade

Measuring the Learning Outcome (535)

Presentation Category: Assessment of Learners_Evaluation of Programs

Mehmet Emin Aksoy[1]; Dilek Kitapcioglu, MD, CHSE[2]; Mehmet Erhan Sayali, MD, CHSE[2]

Acibadem University[1] Acibadem University CASE[2]

Introduction: With collaboration of content experts and serious game developers, a serious game for BLS trainings was developed and planned for integration into existing simulation based adult basic life support courses at our university. As there was also a need to evaluate performances of the participants, a scoring system was required.

Methods: A SCORM (Shareable Content Object Reference Model) / Tin Can compliant Learning Management System was integrated into the project. In contrast to classical "read and learn" or "watch and learn" methods, the application aimed to teach users the BLS algorithm by actively involving them into the scenario of our serious game. Trainees were guided through the scenario with the help of the training mode. Trainees were first instructed how to take correct actions, before they were expected to interact with the 3D software and "play" the rescuer role in the test mode. The goal of this study was to identify technical problems or issues associated with the new game. 61 students participated in the pilot study. After familiarisation to the game based module lasting about 20 minutes, the participants logged into the system to use the serious game consisting of training and self-test mode. The students were allowed to call for support while using the game-based system.

Results: The most frequently encountered technical issues were log-in problems. 58/61 Trainees had log- in problems in their first attempt. The second most encountered problems were software bugs. A new study with first–year medical students who were randomly assigned to a control group and an intervention group was started. The intervention group completed the Serious Game Module, while the control group received a theoretical lecture on the same content. On the next day both groups received simulation-based hands-on training. All students were assessed with an OSCE a week later on. There was no difference in OSCE scores between both groups. Serious game scores and OSCE scores were then statistically evaluated by using Pearson Correlation. Statistical analysis revealed strong correlation between the participants serious game and OSCE scores while r-value was calculated as 0,8412 and P value was calculated as p=0,00001 at the significance level 0,01.

Conclusion: These results imply that there is a strong correlation between serious game test results and OSCE results.In conclusion, serious game modules can be used as a complimentary tool for simulation based trainings and as a supporting tool for instructors to evaluate trainees' performances prior to hands on trainings.

Reference available upon request
Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:
Abstract - Games Arcade

Using Mathematical Physiology Modeling to Improve Simulation (371)

Presentation Category: Technology

Danielle Parker, MD[1]; John Clemmer, PhD[1]; Robert Hester[2]; Rob Rockhold[1]; Jeffrey Orledge[3]; W Bosseau Murray[4]; Anna Lerant, CHSE[1]

University of Mississippi Medical Center[1] University Mississippi Med Ctr[2] University of Mississippi[3] Pennsylvania State University College of Medicine[4]

Introduction: Simulation scenarios are frequently created for participants to experience crisis events. The participants' actions may be delayed, resulting in physiologically extreme conditions. Because clinicians work diligently to minimize the time patients spend at the extremes of physiological compensation, their "clinical experience" of these extremes may be limited. Due to the speed that therapy is instituted in real life, extensive physiological measurements are seldom obtained in a systematic fashion. Often, simulation professionals with limited physiology background or clinical experience have to make vital sign changes in reaction to participant actions. Using physiology simulators as experiential learning tools, the operations professional can build up a "feel" for changes in vital signs. We are using mathematically modeled physiology programs (e.g., HumMod) to enhance simulation accuracy by providing expanded, scientifically based sets of vital signs.

Methods: We incorporated physiological models at multiple points in the design and implementation of simulation scenarios. Our experienced clinicians benefited from advanced physiological programs such as HumMod to obtain scientifically based vital signs for authoring scenarios. Specifically, the compensation of healthy human beings for abnormalities such as blood loss was built into a trauma scenario. A major effect of prior disease, e.g., peripheral neuropathy was explored with the mathematical models and contrasted with the healthy subject. Our non-clinical simulation professionals used the program JustPhysiology.com to gain experience with multiple variations of blood loss, such as volume and rate of blood loss, etc. to develop a "feel" for the magnitude of changes in physiological parameters, e.g., systolic, mean, diastolic blood pressure (BP), heart rate, respiratory rate, oxygen saturation (SPO2), urine output, blood gases, and skin perfusion as a measure of "cold, clammy", etc.

Results: The results of using a mathematically modeled simulation based program include improved scenario authoring and implementation experiences. We used a mathematically modeled physiology program (HumMod) to demonstrate the futility of hyperventilation on the rate of increase in SPO2 in hypoxic patients after a prolonged intubation attempt. We also demonstrated changes in critical parameters that are not typically measured, for instance that hyperventilation leads to a low PaCO2 concentration which in turn results in decreased cerebral blood flow. After completing the "hemorrhage" and "hemorrhage compensation" modules in JustPhysiology, our novice, non-clinical simulation professionals were able to engage in the scenario design and implementation process in a more pro-active way, anticipated changes based on the timing of therapeutic interventions and supported the scenario more effectively.

Conclusion: 1. Based on our experience of using mathematically modeled physiological programs, our clinicians improved their scenarios by exploring vital signs at the extremes of physiological compensation. 2. Our non-clinical simulation professionals benefited greatly from using mathematically modeled physiological programs for experiential learning to fill a clinical experience gap. 3. In addition, mathematical models "made visible" parameters that are not typically measured during crisis events such as cerebral blood flow. 4. Both the

novice and the expert simulation professionals may benefit from perusing the mathematically modeled physiological simulators and programs to improve simulation scenarios.

Reference available upon request

Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:
Abstract - Games Arcade

Full Code: An Emergency Room Game in Your Hand (376)

Presentation Category: Technology

James Takayesu[1]; Michael McLinn, Bachelor of Science[2]

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Introduction: Simulation training is an integral part of medical education at the undergraduate and graduate levels as well as ongoing continuing medical education. The cognitive benefits of simulation training can be achieved using software applications in a gaming environment. This environment can provide a low-cost, high-impact method of simulation training to a wide audience, providing valuable training and performance feedback.

Methods: Our software simulates clinical scenarios on a phone or laptop. We recreate the complex decision tree involved in treating a patient and bring the situation to life with a 3D scene. Our scenarios are created by experienced physicians in a separate web-app. We are starting with emergency medicine and will extend into a variety of specialties and roles. Scenarios are sold via in-app-purchase and we will be offering a subscription model for institutions which adds student performance tracking.

Results: We anticipate a market audience of medical students, residents, nurse practitioners, physician assistants, as well a interested lay people. By September, we will have initial product use feedback from customers and subscription data.

Conclusion: We hope to add to the simulation training landscape by bringing the benefits of cognitive deliberate practice to individuals in a low-cost application that allows for convenient just-in-time learning.

Reference available upon request
Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:
Abstract - Games Arcade

Experiencing a Prenatal Assessment (428)

Presentation Category: Technology

Margaret Verkuyl, NP[1]; Oona St-Amant, PhD, RN[2]; Jennifer Lapum, PhD, RN[2]

Centennial College[1] Ryerson University[2]

Introduction: We designed and created a set of open access, online modules incorporating virtual gaming simulation for prenatal care in nursing practice. The modules and virtual gaming simulation are tailored to the undergraduate level nursing student. Our aim is to enhance uptake of the modules into a myriad of institutions; the modules are granular in nature, making it possible for them to be reused, adapted, and remixed in various ways based on the needs of specific nursing programs. The granular nature of each of the modules (and sub-modules) facilitates flexible uptake because they can be fully implemented or the module/sub-module sections can be remixed into varying content segments based on the nursing program's curricular needs. The modules and virtual gaming simulations can be accessed by nursing students and graduates as a self-study learning object and/or by faculty as part of curriculum.

Methods: We used an innovative pedagogical approach with digital platform to incorporate virtual gaming simulation. The prenatal module includes textual information, visual images, short audio/video presentations and a related virtual gaming simulation. The virtual gaming simulation involves computerized applications that go beyond mere entertainment and provides opportunities for immersive, interactive, and experiential learning. It prompts learners to critically reflect upon and problem-solve simulated clinical situations in safe learning environments for students and clients. Film clips of interactions between a nurse and a client are used in the virtual gaming simulation. Learners watch the film clips and engage in multiple decision points throughout the game while experiencing the consequences of their decisions. This medium allows for an experiential teaching-learning approach in which learners are actively involved in situations of high intensity and high risk in a safe environment.

Results: The module and game will be completed in fall 2017. We will use analytics to report demographics, location, as well as the devices and operating systems used to access the game. We plan to add a simple method to require visitors to submit an email before entering the application. We will keep it as open access but we also plan to gather the visitor's email address for reporting purposes before letting them access the simulation game. In addition, the module and game will be incorporated into a number of baccalaureate nursing programs in Ontario and evaluated.

Conclusion: The prenatal online modules and virtual gaming simulation will be undergraduate level learning. It was created in a granular fashion so that institutions can have the flexibility to implement them across the years of a nursing program. The implications for the healthcare simulation community is access to prenatal learning modules and a virtual prenatal clinical experience that is available by open access. This technology has the ability to provide education to healthcare providers from a large geographical area in the environment of their choosing. In this presentation, we will provide a demonstration of the learning modules and virtual gaming simulation.

Reference available upon request
Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:
Abstract - Games Arcade

Increase Awareness of the Totality of Tooth Surfaces (467)

Presentation Category: Technology

Dov Jacobson, BA, BS[1]

GamesThatWork[1]

Introduction: Young children are seriously deficient in knowledge about their own dentition. Our previous research demonstrates, for example, nearly universal neglect of all lingual surfaces, Our hypothesis is that a virtual reality, third-person brushing experience can permanently increase awareness of the totality of tooth surfaces and lead to more conscientious brushing.

Methods: We have built a highly engaging Virtual Reality experience that include a timed tooth-brushing challenge. Our research efficacy test calls for a pre-and post self tooth brushing performance assessment test in which the video recordings are made of unguided brushing and scored later by blinded evaluators in order to assign Time On Tooth Surface scores for each of 16 zones. This research has not yet received the funding needed to progress forward.

Results: No data is yet collected, but anecdotal experience is encouraging. The ability of the intervention to engage the enthusiasm of children has been demonstrated.

Conclusion: We have only anecdotal results so far. These are consistent with our hypothetical outcomes.

Reference available upon request
Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:
Abstract - Games Arcade

Engaging Young Minds: Getting Adolescents Thinking About Health (490)

Presentation Category: Course_Exemplars

Gregory Podolej, MD[1]; Sabirah Kasule; John Vozenilek[2]; Grace Hsu; Nur-Ain Nadir, MD[3]

UICOMP[1] OSF Healthcare[2] University of Illinois College of Medicine Peoria[3]

Introduction: Adolescents are bombarded with mixed messages from pop-culture and social media that often glorify detrimental lifestyle choices such as smoking and substance abuse. Furthermore, these children are at a very impressionable stage that is prone to peer pressure and adults often find it difficult to communicate and engage with this age group. The Social Determinants of Health have profound and lasting effects on health outcomes of these children and include topics such as education, wealth, access to food, and health habits. Gamification has been used successfully before in this age group with similar topics (Jones, Madden, & Wengreen, 2014) . We posit that providing an interactive, immersive, gamified learning experience to middle school children that would teach them about the social determinants of health will empower them with knowledge to make better lifestyle choices. and pique their interest in the medical field.

Methods: This is a prospective cohort study. Participants will be selected from 7th and 8th grade students from Quest Charter Academy Middle School. Briefly, student participation will include playing the game, taking pre/post surveys, and participating in recorded debriefings. In addition, there will be video recorded portions for future quality improvement of game play and creation of a portable multimedia "teaching package" that can be utilized in any educational environment. Game play will consist of a team based competition that takes place in the fictional future year of 2240. Teams will be faced with challenges in which they have to utilize their available resources. Learners will explore topics such as the effects of disease processes on the body (such as diabetes and hypertension and smoking) as well as food deserts and access to healthcare via the in-game challenges.

Results: To date, there are no evaluative reports available.

Conclusion: Thus far, we do not have data from which to draw conclusions. We hope to begin piloting this project during the new school year. We can say that Medical students have expressed profound interest in volunteering and a strong relationship already exists via a mentoring program. We hope to ultimately make a portable package that would allow any educator to teach adolescents about social determinants of health and pique interest in the medical field using an immersive gaming experience.

Reference available upon request
Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:

Abstract - Games Arcade

Embarking on an RxPedition: A Serious Game for Drug Development (491)

Presentation Category: Assessment of Learners_Evaluation of Programs

Dmitriy Babichenko; Lorin Grieve, RPh, , Degrees: Bpharm, BS, PharmD[1]; Ravi Patel, PharmD[2]

University of Pittsburgh School of Pharmacy[1] University of Pittsburgh[2]

Introduction: Pharmacy education is facing a future in which the profession will demand of students skills required to succeed in the information age. These "21st Century Skills" can be distilled into the areas of Critical Thinking, Creativity, Collaboration, and Communication.1 The greatest difficulty in enhancing these skills in a student is that none of them can be taught didactically.2 While lecture-based education fails to reinforce these skills, there is a medium that excels at constructing experiences that reinforce these skills: games. Gamified experiences can provide the context and situation necessary to allow students to apply knowledge and adapt skills.3 A team was assembled to evaluate and redesign the drug discovery and development course at the University of Pittsburgh School of Pharmacy. The goal was to redesign the course into a game-based experience to reinforce both the 21st Century Skills in an engaging and meaningful way. This game was dubbed: RxPedition.

Methods: The 114 students comprising the Class of 2019 were divided in nineteen 6-person teams. Each team was treated as a "start-up" pharma company. Students self-selected roles within the company and had to create a team name, logo, and history to give their company a sense of identity. In the first phase of the course, student companies were presented with mock rat trial data. Student companies then had to select a lead compound and design a Phase 1 trial. These trials were run in silico using industry software. The students then had to evaluate the data and present their findings to faculty in order to gain funding for Phase 2. Student teams then designed Phase 2 trials and Phase 3 trials, with each being run in silico to provide data. Along the way, each team had to identify market viability, efficacy, safety, and other data related to their drug. The final step was to present to a mock FDA panel to be approved for market. Surveys were used to evaluate 21st century skill confidence.

Results: In order to evaluate the effectiveness of RxPedition, we deployed surveys to the students to provide feedback several times throughout the semester. The surveys were designed to evaluate student confidence in the identified 21st Century Skills as well as acquisition of didactic information and enjoyment. These surveys were deployed via Qualtrics (Qualtrics, Provo, UT) on the first and final days of class. Students were found to significantly improve in confidence in all 4 skill areas. Furthermore, students reported enhanced understanding of the didactic material due to the novel class design. Additionally, students reported very high levels of enjoyment in the experience. An additional note must be made that due to the nature of the gamified approach, many groups came up with plans of action that the instructors had not anticipated. These organic gameplay moments were recorded in all cases and serve as anecdotal evidence of creativity.

Conclusion: Through a gamified structure, students could directly practice the targeted 21st Century Skills. Opportunities to practise all 4 of the identified skills were threaded throughout the course experience. Based on the survey results, this classroom experience had several positive effects on our students. There was a significant increase in student confidence in ability for all four 21st Century Skill. This suggests achievement of our primary objective of preparing our students to be more capable in communication, collaboration, creativity, and critical thinking. Another significant result from the survey is in the student perception of the novel education tactics employed. Students reported that the novel methods enhanced their didactic learning. There is

of course some limitation in assessment methods. While student surveys are widely used and accepted as valid forms of curricular assessment, more objective means of assessing educational effectiveness would be preferred.

Reference available upon request

Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:

Abstract - Games Arcade

Dwell: The Health Implications of Poverty (503)

Presentation Category: Research_Methods

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University of Miami[1] University of Miami School of Nursing and Health Studies[2]

Introduction: Poverty is an issue that allied health and healthcare professionals face when practicing in all healthcare settings. Poverty is a ubiquitous condition that impacts half the world's population indirectly and directly. Despite this, many individuals working with poverty stricken people lack a complete understanding of the global and often life-long impacts that being poor has, particularly on health. Dwell was developed as an engaging tabletop simulation game to teach about poverty's impact on one's choices, health, livelihood, communities, and families. Currently no commercially available poverty education games exist. A large-scale simulation product is available but requires a profound amount of human capital to run it. Given the importance of educating future healthcare providers about poverty's impacts, the Dwell team's goal was to create a game that is educationally impactful and does not require long setup time or large numbers of people to run it.

Methods: An interdisciplinary team of faculty with experience in simulation, game design, poverty, and nursing education collaborated on Dwell's design. The team worked on several iterations of the game narrative and overall game system to ensure accurate reflection of poverty's impact on one's health and alignment with Dwell's education goals. A major design challenge was distilling real-world complexity into an accessible format. This was achieved via iterative design, continued research, and feedback from play tests with nursing faculty and students, resulting in streamlining of game narrative, rule set, and strategic visual design choices of components. Each player receives 1 of 5 different household profiles and take turns navigating the Dwell 'community' to accomplish in-game daily and long-term goals. The game includes periodic Did You Know facts related to poverty as well as built-in discussion phases to fully anchor introduced concepts through dialogue, reflection, and debriefing.

Results: Game design was led by an experienced social impact game designer coordinating with nursing faculty for subject matter expertise and applying tandem transformational game design. Research began in late 2015 followed by creating a preliminary set of character profiles that could provide a diversity of poverty and health scenarios. The goal was for players to roleplay - as a pregnant teen, transgender adolescent, veteran, married couple with children, or widow with special needs child - in order to make decisions from their perspective and ultimately develop empathy for real-world situations previously less familiar to players. The next step was designing a system in which players traverse their community and discover challenges in completing basic tasks. The Dwell game system was developed through rough and rapid prototyping testing a variety of mechanics and keeping those which provided the greatest affordances.

Conclusion: Future plans for this innovation is to pilot test its potential educational impacts. Once initial impacts have been evaluated with undergraduate students, the plan is to further test the game's potential uses across a larger, more diverse population of interest. Poverty is a global pandemic that impacts health, healthcare access, quality of life, and life span. Efforts to improve the understanding of the impacts of poverty by persons who interact with poverty stricken individuals in professional capacities may help to improve dismal statistics related to health, education, and quality of life. We have applied for a small grant to support next steps.

Reference available upon request

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Poster #:
Abstract - Games Arcade

Clinical Readiness & Support for Staged Trauma Beyond Golden Hour (802)

Presentation Category: Patient_Safety

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Virginia Modeling Analysis and Simulation Center/Old Dominion Universtiy, Suffolk VA[1]

Introduction: For catastrophically injured military patients whose initial surgical encounter and care is delayed beyond the "Golden Hour," it is postulated that use of a predictive big data-based clinical decision support system (CDSS) that includes modeling (via computational and interactive war gaming virtual environment play) and (live, virtual, and constructed) simulations could (1) mitigate or eliminate some of the negative effects of the "tyranny of time and distance" on military patient outcomes. (2) the initial CDSS will be a line+medical war game to help resolve threats to pt. survival and mission with both groups working together, (3) the insertion of projected new tech, blood-like products with supply chains & transportation asset availability form the informed analysis of a patients chance to survive all these challenges related to level of injuries, predicted time of survival given the status of pt, reliance on supplies, fluids, drugs and transportation.

Methods: Descriptive study of multiple layers of simulation from virtual testing & training, to computational severity of injury, time of survival left given current condition and degree of dependance on logistic support :& transportation. Data & analysis will go directly to the TTL and populate a near real time Command & Control dashboard to support TTL decision making re: to continue care or limit resource use, etc. Very difficult choices, at best. Using agent based models and big data analysis of JTTR type data, run on high speed computers will produce actionable info to Dr. re: Patient response to treatment as well as information on status of supplies used & remaining on site, and available transport times impacting pt. survival. We postulate this proactive approach will help prevent survivable pt deaths Single and cohort based analysis will help refine the model improving reliability, validity, specificity supporting TTL decision making and care selection.

Results: Phase I - Gather data, lessons learned, verify via SMEs and create Trauma War Game to bring together line and medical planning, ID hazards of distance and time to care with potential for failure to sustain care due to lack of blood, supplies, meds, staff or lift of opportunity. Develop new questions and challenges to solve. Phase II train all team member on trauma core content for care and use of new products and technologies. Phase III. Answer question: Does CDSS really support TTLl and Command decision making for best possible care. Also, does this high level of pt care intervention and support analysis, maintain high "save" rates and curtail or eliminate survivable deaths even in austerity, with great distance between POI, Role 2 and Role 3>. Does CDSS improve logistic and transportation coordination to benefit the patient and MTF mission?This is a unique use of M&S, line/medical war gaming vs field exercise; enables personalize trauma care in austerity for pt & mission support.

Conclusion: This study uses all types of M&S from training, researching, analyzing, simulating skills, techniques, procedures, processes, and testing possible alternative products, equipment, and care delivery methods, and measures of effectiveness.

Reference available upon request
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Poster #:
Abstract - Games Arcade

Augmented Reality using ARISE, an OER (814)

Presentation Category: Technology

Kimberly Ernstmeyer, NP, ARNP-BC, CHSE[1]; Theresa Meinen, RRT, CHSE[1]; Charles Leffingwell[1]; Sara Pertz[1]; Margaret Dickens[1]; Shayne V anderbent[1]; Gregory Cedarblade[1]; Ryan LeDuc

Chippewa Valley Technical College[1]

Introduction: Submission for Serious Games Showcase and/or Spectrum of Ideas ARISE helps "make the impossible, possible." By using iPads and QR codes, ARISE scenarios are open education resources that incorporate augmented reality into serious games, low- and high-fidelity simulation. The ARISE project is especially beneficial for transformative learning in low-cost, low-resource environments. Scenarios can be used to stimulate "debriefing across the curriculum" in several health care disciplines such as nursing, respiratory therapy, medical assistant, EMT-paramedic, and pharmacy technician.

Methods: The ARISE project was demonstrated at the 2017 Spectrum of Ideas Showcase and we were encouraged to re-apply for the 2018 Serious Games competition. The ARISE project is an OER funded by a 3 year Department of Labor grant. ARISE scenarios incorporate rich media, using QR codes and iPads, to engage the learner using videos of patients "telling their stories," audios of anatomically-correct lung sounds, images of wounds and videos of handoff reports from other disciplines. Teaching plans are OER and ad provided on the ariseproject.com com website. They incorporate the INACSL Standards of Best Practice for Simulation into ARISE scenarios for multiple disciplines, and can be used to stimulate "debriefing across the curriculum," as advocated by the NLN.

Results: Surveys are embedded into every ARISE scenario. To date, data received from faculty and students has been overwhelmingly positive with 148 faculty responses and 372 students responses. On 4 point Likert scale, faculty and students have expressed satisfaction of 3.5 or higher with the augmented reality, enhanced student engagement and the ARISE curriculum. Consistent with incorporating any type of new technology into existing curriculum, the lowest score received was 3.1 for user friendliness of the curriculum. Website analytics to date show that there have been 73 website sign-ups, 1252 website sessions, and users from 39 countries view the website.

Conclusion: Originally published in the April 2016 issue of Clinical Simulation in Learning, the prototype ARISE scenarios have evolved into unique examples of transformative active learning tools that are easily incorporated into varied learning environments, and are especially useful in low cost/low resource simulation environments.

Reference available upon request
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Poster #:
Abstract - Games Arcade

TeamSTEPPS Online: Teamwork Training for Medical Students (826)

Presentation Category: Interprofessional_Education

Rachel Umoren, MB.BCH, MS, FAAP, FAAP[1]; Rebekah Burns[2]; Andrew Scheets[3]

University of Washington[1] Seattle Children's[2] Seattle Children's Hospital[3]

Introduction: Communication failure in healthcare teams is the root cause of up to 70% of sentinel events, near misses and close calls. The Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS) program is a validated approach to teamwork training. University of Washington medical, nursing, pharmacy, and physician assistant students are offered a half-day training session including lectures, simulations, and debriefs based on the TeamSTEPPS program. The course is highly rated but many medical students are unable to attend due to geographic and scheduling constraints. Software simulations may provide instructors with an opportunity reach more students. There is evidence that computer based training in teamwork skills results in similar knowledge gains as clinical simulation and improved teamwork attitudes. Given the relevance of this training to graduating medical students, we developed an online module consisting of a combination of lecture and software simulation.

Methods: This module consists of a 30 minute recorded lecture on TeamSTEPPS principles and a 10 minute review of the medical care of septic shock followed by a software simulation designed to teach and evaluate specific teamwork skills. Learners progressed through 3 simulations in the role of Team Leader with increasing levels of team communication and medical difficulty. Learners identified and used communication tools with the virtual team and received immediate performance-based feedback. Levels concluded with a pre-scripted debriefing session. The software simulation was developed using Storyline e-learning software (Articulate) using identified learning objectives and an iterative design process applied in previous work.4 All participants took the previously described teamwork attitudes questionnaire and TeamSTEPPS knowledge survey before and after participation. A detailed cost is being performed to compare the cost per student of online and in-person simulations.

Results: The lectures and online simulation were deployed as a module on Canvas, a learning management system (LMS). Usability testing was conducted with 5 graduating medical students. Some technical difficulties included delayed transitions and spontaneous timing out of free text opportunities. These are currently being addressed in an update to the program. Three out of five students reported that the module was useful and practical. Three of the four students who completed the post-course feedback stated that they would use this modality again.

Conclusion: Software simulations may provide an alternative to in-person simulations for teamwork training in health professional students. These online simulations may be of particular relevance when in-person training is not feasible, or when working with a large number of distributed learners.

Reference available upon request
Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:
Abstract - Games Arcade

Body Interact: a Digital Platform for Clinical Education (875)

Presentation Category: Technology

Pedro Pinto, BScEcon by University of Coimbra[1]

Take The Wind, Lda[1]

Introduction: New medical training methods that aim to increase the performance of medical staff are strongly needed to improve the quality and safety of healthcare, where medical errors pose an important threat. The Body Interact is a disruptive digital platform for clinical education. This 3D simulation technology allows doctors, nurses and students to accelerate education and enhance clinical competencies by treating virtual life-like patients. It provides problem-based learning by game-design encouraging experiential rather than passive learning. We would like to show case that this kind of competency-based approach with integrated virtual environments significantly improves critical thinking, decision-making and soft skills and how important inter-professional education is to improving communication skills amongst a team (third leading cause of medical errors in US).

Methods: With a unique built-in physiological model, Body Interact dynamically covers all aspects of patient's interaction in a integrative approach: history taking, physical examination, differential diagnosis, tests, treatments and soft skills development in different simulation environments such as Emergency Room, Office Appointment or Ambulance. Throughout this experiential learning process, the learner is actively engaged by posing questions to the patient, investigating, experimenting, being curious, solving problems, assuming responsibility, being creative, and constructing opinion. The user is challenged to take initiative, make decisions and be accountable for results. Built-in debriefing tools lead to analysis, critical thinking, synthesis of information and to evaluate core skills such as the ability to obtain/interpret data, to problem-solve, communicate and handle unpredictable patient behaviour, which is impossible to train by conventional training products.

Results: An exploratory, descriptive and cross-sectional study was conducted using a quantitative approach. A non-probabilistic sample of 426 pre-graduate students was recruited from a Portuguese Nursing school. The data were collected through a questionnaire (10-point Likert scale) based on the Technology Acceptance Model. The results showed an average of perceived easiness to use the simulator of 8.99 (SD±1; Med=9) and a perceived usefulness and intention of 9.60 (SD±0.55;Med.=9.83) to use the clinical virtual simulator in pre-graduate nursing education. Results also showed an average of 9.55 (SD±0.73; Med.=10) about the relevance and an average of 9.71 points (SD±0.59; Med.=10) as to the facilitator role of clinical virtual simulation in nursing education. The students revealed perceived easiness, usefulness and intention to use the clinical virtual simulation as an important complementary strategy for their nursing education programs. Knowledge acquisition was 27% higher.

Conclusion: Research studies are showing impactful results in several items as easiness, usefulness, intention to use, learning facilitation and knowledge retention. A clearly superior retention of contents and a faster rate of learning critical skills can be found. After being the 6th Annual Serious Games and Virtual Environments Arcade and Showcase/ Small/Emerging Company Division (runner-up), Body Interact as proven to be a worldwide scalable and cost-effective solution. With a brand new set of features and management tools, is being safely adopted by medical and nursing education and enabling a new standard for clinical education and re-certification through simulation-based technology. With Body Interact's game-oriented approach, we aim to

educate the next generation of healthcare providers who will treat the next generation of patients. We are enabling a completely new market for clinical education applications, providing an educational experience just like in the real world.

Reference available upon request

Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:
Abstract - Games Arcade

Virtual Reality for Empathy (876)

Presentation Category: Technology

Siddharth Banerjee[1]; Karishma D'Lima; Parvati Dev[2]

Simtabs, Inc.[1] SimTabs[2]

Introduction: A unique feature of Virtual Reality is the ability to simulate another's perspective. This allows the learner to experience the world through the eyes, ears and other senses of a patient with disabilities or mental disorders. For healthcare learners, this will be an important tool to create empathy for the limitations or differences in perception of a patient. There is a gap in research in demonstrating how and whether VR enables empathy. Our VR application will allow testing of this hypothesis. References: 1. Yellowlees PM, Cook JN. Education About Hallucinations Using an Internet Virtual Reality System: A Qualitative Survey. Academic Psychiatry (2006) 30: 534-7. 2. Guise V, Chambers M, Valimaki M. What can virtual patient simulation offer mental health nursing education? J Psychiatric and Mental Health Nursing,(2012) 19, 410–418. 3. Galletly C. Improving medical student attitudes towards people with schizophrenia. Australian and New Zealand J. Psychiatry , (2011) 45, 473-6.

Methods: We constructed an immersive VR world, experienced through a headset (HTC Vive, Oculus) and headphones and a manual controller. The learner has the role of a character with a mental health issue, in this case, Major Depressive Disorder. The learner's experience of the world is dynamically modified by their depressive state. The simulation mimics the sensory symptoms and cognitive fallacies most prevalent during depressive episodes. The learner is able practice coping strategies within the simulation to take positive actions, that modify and improve the perception of their virtual world. Various interactive objects are present to dynamically allow the learner to adapt. For instance, their choice of diet, a notebook to write their thoughts, or alcohol which can have a negative consequence or simply the ability to take a walk outside in nature. The simulation enables complete control by the learner. If learners take no action, they experience a deterioration of the world around them.

Results: No studies have been done as yet. This is a prototype that will be evaluated.

Conclusion: We expect that virtual reality tools, such as this one, will become important in the education of all healthcare providers, including primary care physicians, nurses, aides, psychologists, and mental healthcare providers. We will be conducting studies to assess this hypothesis.

Reference available upon request
Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:

Abstract - Games Arcade

Open Medical Gesture Interface for Mixed Reality Simulation (893)

Presentation Category: Technology

Thomas Talbot, MD, FAAP, FAAP[1]

USC Institute for Creative Technologies[1]

Introduction: The lack of an effective and direct user interface for many medical simulation systems is a source of frustration for users and a barrier to adoption for creators. The practice of medicine is a physical, human-contact centered activity that does not lend itself well to cursors and menus for purposes of patient examination or for procedural interventions. This is especially true of virtual reality and mixed reality applications. We have created a gesture set, or language for medical procedures, called MedProc. Additionally, we have constructed an open-source system, called OpenMG, a developer tool that allows medical simulations to easily adopt gestures and voice commands for input without direct knowledge of the input device. We will demonstrate input with various 3D camera systems as well as with sensory gloves. (Accepted in VR Showcase & Arcade for 2017, but could not present d/t engineer medical emergency)

Methods: This is a technology demonstration, not a presentation of a study. For this project we created an interface standard and a universal gesture interpretation system that can incorporate Microsoft Kinect, Intel RealSense, Leap Motion or 3D position gloves for agnostic and easy integration into anyone's medical simulaton project. Activities to be demonstrated include Fundamentals of Laparoscopic Surgery virtual trainer, patient movement interactions, medical tool use and mock physical examination..

Results: We learned the best practices for employing gestures for medical simulations, including the establishment of standardized gestures (MedProc gesture set). We also learned best practicers for VR/mixed-reality interactions w/ body mounted sensors vs. use with traditional computers.

Conclusion: Most medical interactions for simulated medical inspection and procedures can be performed with gestures as the interface method, though this may lack the tactile feedback of true physical interactions. Future plans include usability research studies. This toolkit will be released for free as open source software so that all may benefit from these gesture interface capabilities.

Reference available upon request

Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:
Abstract - Games Arcade

Perceptive Patient: An Emotional Judging Virtual Standardized Patient (897)

Presentation Category: Technology

Thomas Talbot, MD, FAAP, FAAP[1]

USC Institute for Creative Technologies[1]

Introduction: The Perceptive Patient research project seeks to explore the ability for artificial intelligence systems to evaluate nonverbal, empathetic and entrainment oriented communications skills of clinicians in the medical interview. We have combined an advanced virtual standardized patient with a multisensory system that evaluates eye gaze, facial action units, vocal quality and other features to sense these behaviors. The behaviors are evaluated in context of the medical interview and result in changes to a virtual patient emotion model – which ultimately determines the probability truthful disclosure vs denial of sensitive information by the virtual patient. It is hoped that his approach will allow for novel methods to evaluation and improve interviewer soft skills. (Arcade proposal acceted for 2017, but could not attend d/t engineer medical emergency)

Methods: We combined the standard patient (virtual standardized patient) with the MultiSense emotional detection AI system which we have successfully used to detect major depression with high reliability. These are interfaced with an interpreter which aggregates signals according to interview activity (speaking, listening, formulating). A virtual patient emotion model evaluates the human physician according to Authority (perceived competence), Likability (communication skills) and Trustworthiness (compassionate, empathetic) in real time. Inputs to the emotion model include four types of signals: Measures of case performance (1), Linguistic analysis of speech (2), Empathy ratings (3) and visual & facial interpretation (4).

Results: This is cutting edge artificial intelligence research and much was learned. We specifically learned that nonverbal behaviors are highly dependent on the context of the conversation and were also dependent on the interview cycle. For example, eye contact is most important when patients are talking and less so when the interviewer is speaking. We learned which signals are reliably detectable and discovered methods for real-time and after action presentation of these signals to learners. We also discovered how to provide the appropriate context for signals that we evaluated and developed a novel method to simulate a virtual patient's "emotional" response to the interviewer's performance.

Conclusion: We developed and wish to demonstrate a real-time system for the evaluation of physician soft skills and nonverbal performance during a conversational interview with a virtual standardized patient.

Reference available upon request
Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:
Abstract - Games Arcade

Bleeding Control Augmented Reality Interactive Education & Simulation System (1023)

Presentation Category: Technology

Geoffrey Miller, EMT-P/NRP[1]

Sentara Center for Simulation and Immersive Learning[1]

Introduction: This Innovation Project addresses how developing an Augmented Reality (AR) education and simulation system can enhance training and simulation delivery for medical and non-medical personnel. This proposal addresses the need to increase: 1) frequency of training opportunity, 2) locations of training, 3) expert instructional support and feedback, while decreasing: time away from duty for training and associated instructional and simulation costs.

Methods: We have applied a hybrid approach to enhancing simulation realism through the incorporation of virtual visualizations augmented over the natural "real" environment, tied to interactive physical visual injury cues and indicators. We anticipate accomplishing this through the development of a mobile training application (IOS and Android), integrated with a head-mounted augmented reality display system (R7 Smartglass System, Osterhout Design Group, CA). Unique marker-tracker encoded moulage (water-transfer tattoo markers/moulage) and environmental elements will also be integrated to provide robust visualizations of contextually correct physiologic and environmental indicators.

Results: We anticipate that the integration of AR during training, simulation and assessment will allow participants to maintain an enhanced view of skill target area while augmented graphic visualizations supplement their field of vision, allowing superior context of the skill being practiced, performed or assessed. Further we anticipate that the system will provide a highly valuable model and proof of concept for rapidly adapting a wide range of training tasks into a highly efficient, transportable, automated and user-friendly mobile learning, assessment and reference platform.

Conclusion: The system addresses the need for enhanced simulation-based education and assessment, opportunity through the use of mobile media, integrated augmented reality simulation-enhanced training and built-in decision and instructor support. The system demonstrates a novel approach to improving visual cueing and realism through digital augmentation of current simulation platforms and devices, and the use of unique marker-tracker encoded moulage and environmental elements. Finally, the system provides enhanced simulation-based training at the location and time of need, with built-in expert mentorship and procedural guidance and instruction.

Reference available upon request
Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:
Abstract - Games Arcade

Patient Safety, Sterile Catheter Insertion through Virtual Reality Simulation (1042)

Presentation Category: Technology

Karen Breitkreuz, RN, CNE[1]; Suzan Kardong-Edgren, RN, ANEF, CHSE, FAAN, Fellow of SSH, ANEF, FSSH, FAAN[2]; Ann Butt[3]; Anthony Ellertson

Boise State University[1] Robert Morris University[2] University of Utah[3]

Introduction: How do users (students and faculty) rate the experience of using a virtual reality sterile catheter insertion game, in practicing sterile catheter insertion. What is the user experience related to enjoyment, engagement, comfort, likelihood to practice?

Methods: This is a descriptive study that invites nursing and other health science undergraduate students to rate their experience using the virtual reality sterile urinary catheter insertion game. Participants completed surveys rating the usability of the game, and the likeability.

Results: Anticipated results are that users will give feedback on usefulness and likability of this technology as an education strategy.

Conclusion: The findings of this study will give developers insight into future game design and strategy.

Reference available upon request
Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:
Abstract - Games Arcade

Virtual Reality Airway Learning Lab (1043)

Presentation Category: Technology

Eric Bauman, PhD, EMT-P/NRP, Fellow of SSH, FSSH[1]; Brian Pelletier; Jon Brouchoud[2]; Reid Adams, BA, CHSOS, None[3]; David Pederson[4]

Institute for Research and Clinical Strategy[1] Arch Virtual[2] DeVry Institute for Research and Clinical Strategy[3] DeVry Education Group[4]

Introduction: The Virtual Reality Airway Learning Lab is an immersive 3D virtual reality experience that scaffolds existing curriculum by leveraging game mechanics to engage learners in a designed experience. The Virtual Reality Airway Learning Lab provides an important facet the layered learning approach to game and simulation-based learning to prepare students for existing laboratory and clinical experiences (Bauman, Adams, Pederson, Vaughan, Klompmaker, et al 2014).

Methods: Virtual Reality is an extension of the simulation paradigm. Gaba's (2004) the Future vision of simulation in health care discussed future simulation training in the context of the television and movie franchise Star Trek and the Enterprise Holodekk. The fictional Holodeck created an immersive virtual reality experience where complete suspension of disbelief was possible. The Holodeck was often used for training experiences in various episodes. The Virtual Reality Airway Learning Lab was developed to provide knowledge acquisition and orientation for health sciences students by providing immersive situated VR experiences to support various other dynamic laboratory and real-world clinical experiences. The Virtual Reality Airway Learning Lab includes two complimentary VR experiences, an advanced airway tutorial and clinical patient encounter.

Results: Both cases were developed with existing curricula in mind. From this perspective the VR experiences were built from a layered learning perspective to scaffold traditional educational modalities and provide designed experiences (Squire, 2006) to support course and curriculum objectives. Digital media applications that leverage game mechanics address concepts of anytime, anywhere education, while leveraging the types of experiences that contemporary students have come to expect as part of their educational experience (Foronda & Bauman, 2014).

Conclusion: The Virtual Reality Airway Learning Lab includes essential components for clinical decision-making and care delivery. This VR laboratory experience moves beyond the skill and drill, point and click digital experience by including intuitive haptic elements to engage learners in best practices of airway management. Further, VR game-based learning experience merges skill development with cognitive knowledge acquisition and evaluation to better situate and prepare students for future learning and clinical experiences (Bauman, 2016). Future development aims to expand the library of cases. In addition, research is planned to evaluate the effectiveness of this technology in terms of discrete knowledge acquisition and correlation with related course objectives and expected skill development.

Reference available upon request
Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:
Abstract - Games Arcade

Evacuation of Vulnerable and Critical Patients (1081)

Presentation Category: Technology

Megan Gray, FAAP, None, FAAP[1]; Anita Thomas[2]; Trond Nilsen; Rachel Umoren, MB.BCH, MS, FAAP, FAAP[1]

University of Washington[1] Seattle Children's Hospital[2]

Introduction: Unexpected catastrophic events such as earthquakes require preparation and planning to prevent interruption of essential care delivery, deficient communication, and uncoordinated attempts at hospital evacuation. Virtual reality (VR) simulations are an excellent medium to train for disasters: teaching the critical disaster management skills of adaptive thinking, leadership, communication, and teamwork skills in an engaging environment. Despite the frequency of natural and man-made disasters across the country, there are no known VR simulation curricula that address safe care and evacuation of critically ill neonatal and pediatric patients from hospitals. We aim to test whether VR simulation training improves the safety and timing of evacuation of critically ill patients compared to traditional didactic training.

Methods: A modified Delphi will be used to create a score for pediatric hospital equipment needed during evacuations. We will enroll 60 pediatric nurses who will be randomized to evacuation training via either didactic training (control group), or a VR simulation (study group). Pre/post training quizzes will be used to gauge knowledge acquisition and learner engagement. All participants will then complete live simulations of an evacuation. Video recordings of these simulations will be scored based on safety and efficiency measures. Communication measures will be reported based on qualitative analysis of communication with confederate coworkers and family members during the live simulations. Critical thinking and communications measures will be scored using the 25 core critical thinking nursing competencies. Demographic data and outcome measures will be collected and compared. Numeric variables will be analyzed with descriptive statistics and assessed for group to group differences.

Results: We anticipate reporting a novel scoring system for equipment necessary for care of critically ill pediatric patients requiring evacuation. We will report results of pre/post training knowledge testing along with the analysis of performance during VR evacuations. The outcomes measures reported for each group's live simulation will be 1) time to completed patient evacuation, 2) utility score of equipment packed for patient care, and 3) scores of critical thinking and communication. Qualitative analysis of communication questions and interactions will be reported.

Conclusion: We aim to determine whether VR simulations are superior to didactic training methods for patient evacuations due to disaster and emergency situations. Our study data will provide evidence of the efficacy of VR disaster training as well as a new information about the pediatric hospital equipment necessary to care for critically ill patients during evacuations.We anticipate presenting the information necessary for programs to weigh the efficacy and cost of VR simulations compared to didactic learning for disaster training.

Reference available upon request
Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:
Abstract - Games Arcade

Orthotopic Liver Transplant (1094)

Presentation Category: Technology

Anjan Shah[1]; Daniel Katz, MD[2]; Ryan Wang[3]

Mount Sinai Hospital[1] Icahn School of Medicine[2] Icahn School of Medicine at Mount Sinai[3]

Introduction: Serious gaming is a novel tool for learning. It has been shown in other areas to improve retention and enhance the learning experience. We therefore set out to develop a serious game to teach residents about liver transplant anesthesiology

Methods: Our game was developed for the iPad platform using GameSalad

Results: Our game was effective and demonstrated superior gains to a traditional simulation based curriculum.

Conclusion: Serious gaming is an effective tool to enhance learning in orthotropic liver transplant.

Reference available upon request
Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:
Abstract - Games Arcade

The Alfred Lab: Embodying a Geriatric Patient (1105)

Presentation Category: Technology

Carrie Shaw[1]

Embodied Labs[1]

Introduction: Embodied Labs has created a platform that contains a library of virtual patient experience labs that allow healthcare trainees to both embody a person with a particular pathology or disease and gain understanding of their perspective, in addition to being able to see that person doing and accomplishing various activities of daily living from the eyes of a care provider or family member. Embodied Labs' first lab is The Alfred Lab, which allows a learner to embody a 74-year old with macular degeneration and high-frequency hearing loss, the two most common conditions for adults 65 and older. Embodied Labs pilot study was designed to test three hypotheses: 1. Embodying an older adult patient will lead to greater empathy for older adults. 2. Embodying an older adult patient will lead to increased knowledge of morbidities, etiologies and pathologies that affect older adults. 3. Embodying an older adult patient will lead to more interest in the geriatrics specialty overall.

Methods: In October of 2016, a group of second-year medical students (M2s) was selected to pilot a seven-minute virtual reality (VR) geriatric immersion prior to the start of the geriatrics coursework. Students individually used an immersive Oculus Rift headset with Leap Motion VR technology to embody Alfred, a 74-year old African-American man with age-related macular degeneration (AMD) and high-frequency hearing loss. The student has control over Alfred's gross head and hand motions. The Alfred Lab starts by the learner embodying Alfred at his birthday party and experiencing challenges interacting with family due to the visual and hearing impairments. The learner, as Alfred, is seen at a doctor's visit, and has difficulty completing a cognitive test due to the AMD. The pilot group was asked to complete a pre- and post- VR experience survey, and invited to volunteer for a focus group to discuss their experience in more detail.

Results: The VR intervention showed several significant data points: 1) ~9% more students choosing "somewhat agree" when asked about their interest in pursuing a gerontology specialty, even though a t-test showed no statistical significance; 2) An extremely statistically significant change in understanding the perspective of an aging adult, with over 50% of students choosing "strongly" or "somewhat agree"; 3) 92% of respondents "strongly agreed" or "somewhat agreed" that embodying their patient would be helpful in learning concepts important to their future career 4) ~63% drop in stereotypical words/phrases used to describe aging adults ("white hair", "nursing home", "sick and slow", "grandparent", etc.), with students instead using words/phrases like "isolated", "misunderstood", or "complex"; 5) A more holistic view of the skills needed to care for aging adults, with students articulating a wider range of words that correspond to physical, social, and emotional needs of aging adults.

Conclusion: This pilot study has many important implications. It shows that medical students are not the only learners who can benefit from embodying their patients. Nurses, CNAs, assisted living staff, family care partners, and more may be able to drastically change their knowledge, beliefs, and attitudes about aging adults by engaging in VR intervention such as The Alfred Lab. These implications merit further investigation by Embodied Labs and other companies who are involved in creating learning tools based in embodied cognition and simulation, particularly given our impending crisis in amount of caregivers and providers available to care for our aging population. In addition, we need a workforce trained to be empathetic, skillful, and knowledgeable

caregivers and healthcare providers, capable of being attentive communicators. Embodied learning through software like The Alfred Lab is a powerful tool to teach those skills.

Reference available upon request

Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:
Abstract - Games Arcade

AVANT: Avatar-Administered Neurological Testing (1107)

Presentation Category: Administration

Alyssa Tanaka[1]; Paul Schermerhorn[2]

Florida Hospital[1] Soar Technology, Inc[2]

Introduction: Computer-based neuropsychological assessments offer multiple advantages over traditional paper-and-pencil testing. Although a number of computer tests can be administered with minimal input from a trained tester, the ability to develop a primarily self-administering core test battery has been limited by requiring patients to read instructions and by the necessity of including tests requiring verbal responses. Current approaches to computerized assessment do not take advantage of technologies that would supplement the clinician with a surrogate. The AVANT project is a platform for administering language-based neurocognitive assessment tasks, including word list learning, confrontation naming, and aural comprehension. A conversational avatar represents a virtual neuropsychologist meant to assist a (real) neuropsychologist in assessing patients. AVANT could serve as a first-pass evaluation, determining, with little or no human intervention, which patients require further assessment.

Methods: One of AVANT's design goals was to make the system easy to port to alternate platforms, including mobile devices. The virtual environment and avatar are implemented in the Unreal engine, which can target multiple platforms. We began with vatar and virtual environment, we bagen with purchased assets, but spent time improving textures and animations. For speech speech recognition, we chose the PocketSphinx recognizer, which is available for many platforms. To improve recognition accuracy, multiple language models were created that can be swapped as needed given the context. We implemented multiple assessments, including list learning, picture naming, and story memory tasks. The system was tested for usability in the lab of our academic partner, Thomas Parsons at the University of North Texas, and we iteratively refined the assessment procedures and instructions. The system is currently undergoing validation testing at UNT; those results will be shared when they are available.

Results: AVANT is composed of two main subsystems: the graphical avatar and environment, which are realized in the Unreal game engine, and a Java-based assessment manager. These two subsystems communicaate via the RabbitMq network protocol. In a typical assessment, a battery of assessments is administered and the results recorded. An assessment is just a set of tasks (e.g., picture-naming or list learning) that can be administered in order or can branch depending on the correctness of patient responses. To present an assessment task to the patient, the assessment manager sends a request to the avatar to speak the instructions and present the stimulus (e.g., a picture on a virtual computer monitor, or an utterance, such as a list of words). The avatar performs the actions and reports back to the assessment manager so that the assessment can proceed.

Conclusion: AVANT is a tool for administering neuropsychological assessment tasks that is intended to help determine whether patients require further assessment by qualified medical professionals.AVANT allows the battery of assessments to be tailored to the individual patient's performance. Unlike many other automated tests, AVANT employs a graphical avatar to administer assessments using a combination of verbal and visual prompts. This makes the AVANT experience closer to a human-administered assessment than many computer-based assessments, and also allows AVANT to be used with patients who might have difficulty with reading instructions often required by automated assessment systems. AVANT can easily be customized, e.g., by providing an alternate avatar or virtual environment.

Reference available upon request

Disclosure available upon request or in the IMSH 2018 mobile app

Poster #:
Abstract - Games Arcade

Post Partum Hemorrhage (1120) 48/48

Presentation Category: Technology

Patricia Rekawek, MD[1]; Katherine Connolly, MD; Daniel Katz, MD[2]; Anjan Shah[3]; Eric Bergh, MD[4]; Catherine Bigelow, MD[4]

Icahn School School of Medicine at Mount Sinai[1] Icahn School of Medicine[2] Mount Sinai Hospital[3] Icahn School of Medicine at Mount Sinai[4]

Introduction: Managing post partum hemorrhage in a low resource setting is difficult. It is further compounded by a lack of training resources available for training. We therefore set out to develop a low cost tool for training physicians in post partum hemorrhage management in a low resource setting.

Methods: We designed our game using a Ricoh Theta 360 Camera and Viar360 software.

Results: None

Conclusion: None yet! This will be for demo at the gaming expo

Reference available upon request
Disclosure available upon request or in the IMSH 2018 mobile app