SIMULATION INDUSTRY ASSOCIATION OF AUSTRALIA

SimTecT 2007 Healthcare Simulation Conference

BRISBANE QUEENSLAND

3-6 SEPTEMBER 2007

Simulation - Attaining and Maintaining Standards in Healthcare

CONFERENCE HANDBOOK WITH PROGRAM AND ABSTRACTS

ROYAL BRISBANE AND WOMEN'S HOSPITAL EDUCATION CENTRE/
QUEENSLAND HEALTH SKILLS DEVELOPMENT CENTRE

BRISBANE AUSTRALIA

www.simtecthealth.com

PRINCIPAL SPONSORS

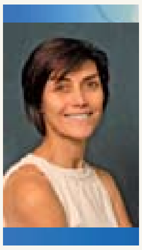
Laerdal helping save lives

SES Supplying Medical Educational Equipment for the Future

METI

HANDBOOK CONTENTS

WELCOME



The Organising Committee extends you the warmest invitation to attend SimTecT 2007 – Healthcare Simulation Conference. SimTecT Healthcare is the key forum for healthcare simulation in Australia; bringing together experts in patient safety, healthcare education, human factors, systems design, technology, and quality improvement. The key theme of SimTecT 2007 is the role to be played by simulation in attaining and maintaining standards in healthcare. We are increasingly required to demonstrate "outcomes" in health delivery and to direct and evaluate our work in terms of performance indicators, benchmarks and impact. Simulation has a role – what is it and how can we use it to improve our work in healthcare?

We look forward to seeing you at SimTecT 2007.

Leonie Watterson
Conference Convener

CONFERENCE SECRETARIAT

consec

Consec – Conference Management
PO Box 3127
BMDC ACT 2617 Australia
Telephone: +61 2 6251 0675
Facsimile: +61 2 6251 0672
Email: simtecthealth@consec.com.au

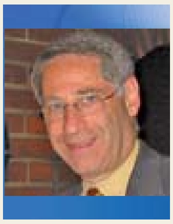
Conference Manager: Savita Khiani
Conference Coordinator: Mimi Mekdarasouk

CONFERENCE ORGANISING COMMITTEE

Graham Beaumont	Clinical Excellence Commission (CEC), NSW
Claire Chinnery	Clinical Training & Education Centre, WA
Peter Cosman	Liverpool Hospital, NSW
Pat Cregan	Nepean Hospital, NSW
Denise Dignam	University of Technology, Sydney, NSW
David Edwards	Clinical Training & Education Centre, WA
Brendan Flanagan	Southern Health (Vic) Simulation & Skills Training Centre, VIC
Val Follows	Flinders University Clinical Simulation Unit, SA
Kathleen Hickey	Royal Australian College of Surgeons
Peter Hill	Simulation Industry Association of Australia, NSW
Brian Jolly	Monash University, Centre for Medical & Health Science, VIC
Michelle Kelly	University of Technology Sydney, NSW
Joel Madden	ACT Health
Nick Masotti	Defence Health Services
Geoff McDonnell	University of New South Wales
Alan Morrison	Ambulance Service NSW
Barry Neame	Consec (SIAA's Conference Organiser)
Harry Owen	Flinder's University, SA
Debbie Paltridge	Health Education Innovative Solutions, QLD
Jennifer Tichon	University of Queensland
Katie Walker	Queensland Health Skills Development Centre
Leonie Watterson	Sydney Medical Simulation Centre

KEYNOTE SPEAKERS

Gerald M. Fried, M.D.



Professor of Surgery, McGill University, Montreal, Canada

Gerald M. Fried, MD is Professor of Surgery and Adair Chair of Surgical Education at McGill University and Steinberg-Bernstein Chair of Minimally Invasive Surgery and Innovation and the McGill University Health Centre Hospitals in Montreal, Canada.

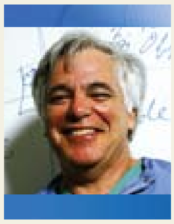
After graduation from McGill University in Medicine in 1975, he trained in general and gastrointestinal surgery at McGill, the Ohio State University, and The University of Texas Medical Branch, Galveston.

At McGill University he has served as Program Director for General Surgery and currently oversees all educational activities within the department including undergraduate and residency programs, as well as continuing medical education and faculty development. He directs a research program in surgical education focusing on the use of simulation to teach and evaluate technical skills, and validation of evaluative methods. His work has led to the development and validation of the manual skills component of the Fundamentals of Laparoscopic Surgery (FLS) program of the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) and The American College of Surgeons. He is currently co-chair of the FLS committee.

Dr. Fried is Past-President of the Canadian Association of General Surgeons, member of the Board of Governors, Advisory Council for General Surgery, and the Committee on Emerging Surgical Technologies and Education of The American College of Surgeons, member of the Board of Governors, Educational Resources Committee, and co-chair of the Fundamentals of Laparoscopic Surgery Committee of SAGES.

His research interests are in measuring technical performance in surgery, the development and validation in surgery, the development and validation of simulation technology, and measurement of outcomes after minimally invasive surgery. His clinical interest is in gastrointestinal surgery, and the multidisciplinary application of endoscopic, imaging, and minimally invasive technologies in the care of patients with digestive diseases.

Dr Dan Raemer



Associate Professor of Anaesthesia, Harvard Medical School, Bioengineer, Department of Anaesthesia and Critical Care, Massachusetts General Hospital, Boston, Massachusetts, USA

Dan Raemer has developed a special expertise in teamwork and crisis management over the past twelve years at the Center for Medical Simulation in Boston. He recently received a unique award from the Harvard Department of Anaesthesia for "excellence in teaching". He has worked nationally to establish the International Meeting on Medical Simulation and is the founding President of the Society for Medical Simulation.

He is also a Past-President of the Society for Technology in Anaesthesia. Dan's graduate degrees are in Bioengineering and he worked as a researcher for many years at Brigham and Women's Hospital and Massachusetts General Hospital in the Anaesthesia and Critical Care Departments. In addition to his publications related to simulation, he has written extensively on monitoring devices and has a number of patents for clinically useful devices and technologies.

INVITED SPEAKERS AND WORKSHOP PRESENTERS

Stewart Barnett – Manager, Educational Development, CIPHER, Faculty of Medicine, University of Sydney

Tracey Beacroft – Representative, Laerdal

Pat Cregan – Director, Surgical Services, Wentworth Area Health Service, NSW

Stephen Duckett – Executive Director, Reform & Development Division, Queensland Health

Brendan Flanagan – Director, Southern Health Simulation Centre

Valerie Follows – Coordinator, Flinders University Clinical Simulation Unit, SA

Gerry Fried – Professor of Surgery and Adair Chair of Surgical Education, McGill University, Steinberg-Bernstein Chair of Minimally Invasive Surgery & Innovation, McGill University Health Centre, McGill University, Montreal

Tim Gray – Chair, Simulation Training Subcommittee Committee, Australasian College for Emergency Medicine

Trevor Hine – Senior Lecturer, Faculty of Education, University of Technology

Elyssebeth Leigh – Senior Lecturer, Faculty of Education, University of Technology, Sydney

Cate McIntosh – Simulation Program Director, Hunter New England Skills & Simulation Centre

Cari Miller – Simulation Coordinator, Sydney Medical Simulation Centre

Alan Morrison – Manager, Clinical Education, NSW Ambulance Services

Elizabeth O'Driscoll – General Practitioner, SA

Stephanie O'Regan – Simulation Coordinator, Sydney Medical Simulation Centre

Debbie Paltridge – Consultant, Health Education Innovative Solutions, QLD

Dan Raemer – Assistant Professor, Anaesthesia, Harvard Medical School

Adam Rehak – Simulation Instructor, Sydney Medical Simulation Centre

Jonny Taitz – Assistant Director, Clinical Services, Sydney Children's Hospital

Jennifer Tichon – Senior Research Fellow, School of Human Movement Studies, University of Queensland

John Vassiliadis – Senior Instructor, Sydney Medical Simulation Centre

Leonie Watterson – Director, Sydney Medical Simulation Centre

Mark Wiggins – Head of School, School of Psychology, University of Western Sydney (Bankstown)

Michal Wozniak – Associate Lecturer, Clinical Simulation, Flinders University, SA

Sue Wulf – Technical Operations Manager, Sydney Medical Simulation Centre

Andrea Wyatt – Head, Graduate Coursework Programs, Monash University Centre for Ambulance and Paramedic Studies

PRINCIPAL SPONSORS

Laerdal has been offering learning products responding to evolving needs in emergency medicine ever since the introduction of Resusci Anne in 1960.

Today our range of life saving, cost-efficient learning products are expanding to cover all aspects of a complete Circle of Learning. Our range includes graphic source materials, innovative skills trainers, interactive computer simulators like MicroSim and Virtual IV and advanced patient simulators like SimMan and SimBaby. These products are designed to equip you with the tools to meet your learning objectives.

This reflects our belief that helping build competence is a critical part of our mission of helping save lives.

Our name says a lot about what we do. We are Medical Education Techologies, Inc – a company committed to developing learning tools that impact the education of our future doctors, nurses, first responders and military medics. Our goal is to improve patient safety and ultimately save more lives. We are an education company first, and our commitment to providing technologically advanced learning tools – including our complete line of human patient simulators, surgical simulators, exam trainers and the integration platforms educators need to fully alter the learning process – meet the highest standards, which sets us apart and distinguishes us as an industry leader.

METI simulators save lives by providing a learning platform that allows students and practitioners to practice without harming real patients. By offering a variety of simulators that meet the exacting needs of our users, we are able to provide a higher level of measurable skill acquisition for the healthcare industry.

Scientific Educational Supplied Pty Ltd is a Queensland based company which commenced trading in 1965 with a select range of high quality anatomical chart and models. With a commitment to provide high quality products for Medical, Paramedical and Training Professionals, our range has expanded to cover skill-based products for virtually every medical procedure, through to advanced patient simulators that are on the cutting edge of technical development and realism.

The company has also expanded its operation geographically, with the addition of a New Zealand subsidiary in April 1999, and continues to maintain a significant presence in the Asia Pacific area.

PRE-CONFERENCE WORKSHOPS

Assessing Competence: Current Perspectives

Date: Monday 3 September 2007

Time: 9.00am–5.00pm

Facilitators: Gerry Fried, Mark Wiggins, Dan Raemer, Leonie Watterson and Stephanie O'Regan

Venue: Queensland Health Skills Development Centre

Summary: Demand for valid and reliable assessment methodologies gathers momentum. Meanwhile, educators seem to generate more questions than solutions. Should we be more, or less reliant on objective measures? What competencies should we measure? Can we predict performance from measures of competency? This workshop will begin with an overview of competency and performance assessment in synthetic learning environments, including the limitations of current assessment methodologies and recent advances in this field. Thereafter, it will be presented in four interactive modules; each of which will demonstrate recently developed, or refined methodologies by presenters working in this field.

Setting Up a Simulation/Skills Centre

Date: Monday 3 September 2007

Time: 9.00am–5.00pm

Facilitators: Denise Dignam, Michelle Kelly, Cate McIntosh and Katie Walker

Venue: Queensland Health Skills Development Centre

Summary: This workshop will guide participants through varied aspects related to setting up a simulation or clinical skills centre. Participants will be able to interact and workshop with guest presenters/experts who have had first hand experience with these issues.

CONFERENCE INCLUSIVE WORKSHOPS

Workshop 1

Practical Moulage

Date: Tuesday 4 September 2007

Time: 11.00am–12.30pm, repeated after lunch from 1.30pm–3.00pm (1.5 hour workshop, held twice)

Facilitator: Tracey Beacroft

Summary: Demonstrates trauma moulage methods to enhance scenario realism. Participants practice hands-on using the provided gelatin products, trauma make-up and Practoplast wounds.

Maximum numbers: Numbers are strictly limited to thirty (30) people.

Workshop 2

Designing and Evaluating Simulation Scenarios

Date: Tuesday 4 September 2007

Time: 11.00am–12.30pm

Facilitator: Elyssebeth Leigh

Summary: Scenario design is critical to effective learning and valid, reliable assessment. This workshop draws on experience within healthcare and non-healthcare sectors to explore good practice in scenario design and methods of evaluating the effectiveness of scenarios. Broadly relevant to designers in all simulation modalities.

Workshop 3

Ask the Experts–Research or Training I am Trying to do

Date: Tuesday 4 September 2007

Time: 11.00am–12.30pm

Expert Panel: Mark Wiggins, Marcus Watson, Gerry Fried

Summary: In this session three delegates will present work in progress. Our expert panellists will facilitate a discussion aimed at guiding the development of the projects.

Workshop 4

Preparing Learners for Simulation Exercises

Date: Tuesday 4 September 2007

Time: 1.30pm–3.00pm

Facilitator: Dan Raemer

Summary: Uses role play and simulation to explore how preparing participants for scenario-based learning influences the effectiveness of their learning. Suitable for any trainers who use scenario-based learning, with manikins or standardised patients, who wish to ensure their learners are oriented and psychologically prepared to be immersed.

Workshop 5

Developing Operational Standards for Facilities

Date: Tuesday 4 September 2007

Time: 1.30pm–3.00pm

Facilitator: Stephanie O'Regan, Cari Miller and Sue Wulf

Summary: Time to reflect on our own practice? Simulation units are assumed to meet broad institutional standards. But do they and are they always appropriate? This workshop is aimed at simulation providers and will involve hypothetical cases and discussion. Discussion points will be incorporated into a draft standards document, proposed as an initiative of the Australian Society for Healthcare Simulation for 2007–08.

Workshop 6

Getting the Best from Standardised Patients

Date: Wednesday 5 September 2007

Time: 11.00am–12.30pm

Facilitator: Elizabeth O'Driscoll

Summary: This workshop will address key issues relevant to simulation using standardised patients and actors for training assessment. It is particularly aimed at instructors who work with this simulation modality.

Workshop 7

Critical Analysis of Performance: Does Your Debriefing Reflect Patient Care Outcomes?

Date: Wednesday 5 September 2007

Time: 11.00am–12.30pm

Facilitators: Valerie Follows and Michal Wozniak

Summary: The simulation scenario is over. The participants are returning to the debrief room. You are rewinding the video tape and collecting your notes for the debriefing. Where do you start to decipher what has gone on? This workshop will use scenarios to develop a structure for analysing scenarios and debriefing themes.

Workshop 8

Teaching Clinical Procedures to Learners at Different Levels of Experience

Date: Wednesday 5 September 2007

Time: 11.00am–12.30pm

Facilitators: John Vassiliadis and Leonie Watterson

Summary: How do we ensure we deliver the right pitch as teachers and supervisors? This workshop takes a practical and fun look at Benner's "Novice to Expert" and Blanchard's "Supervisory leadership" models to address this important question.

Workshop 9

Using Key Event Software

Date: Wednesday 5 September 2007

Time: 1.30pm–3.00pm

Facilitator: Adam Rehak, Sue Wulf and Chris Carpenter

Summary: Computer software that enables marking of key events for later discussion or analysis is growing in popularity. Effective use of this technology requires forward planning and practice and possibly changes in your debriefing approach. In this workshop you will use a variety of sample performance markers and video to explore the issues

Workshop 10

Designing Clinical Skills and Simulation Courses–Where do you Start?

Date: Wednesday 5 September 2007

Time: 1.30pm–3.00pm

Facilitator: Debbie Paltridge

Summary: Have a good idea for a simulation scenario? Not sure how to put it together into a course? This workshop targets instructors and providers of simulation and/or clinical skills courses. Topics will include setting objectives, choosing teaching formats to match objectives and resources, familiarising learners with the synthetic environment, timing sessions and other practical issues relevant to small group learning in synthetic environments. By the end of the workshop participants will have written an outline for their own program.

Workshop 11

Ask the Experts–Training I am Trying to do

Date: Wednesday 5 September 2007

Time: 1.30pm–3.00pm

Expert Panel: Brendan Flanagan and Cate McIntosh

Summary: In this session three delegates will present work in progress for training and education initiatives. Our expert panellists will facilitate a discussion aimed at guiding the development of the projects.

Workshop 12

Constructively Aligning Multi Modality Simulation Within a Pre-Registration Nursing Curriculum

Date: Wednesday 5 September 2007

Time: 1.30pm–3.00pm

Facilitators: Matthew Aldridge and Nigel Wynne

Summary: This workshop aims to demonstrate the development of multimodal simulation (MMS) model and its integration within curricula. Participants will gain first-hand experience of the functionality of MMS through engaging with a computer platform and high fidelity patient simulation activities.

TRADE EXHIBITION

The Exhibition will be held in the Gallery areas of the Royal Brisbane & Women's Hospital Education Centre, Education Centre – approximately two minutes walk from the skills centre.

Trade Exhibition Opening Hours

Tuesday 4 September 2007	8.00am–5.00pm
Wednesday 5 September 2007	8.00am–5.00pm
Thursday 6 September 2007	8.30am–4.00pm

TRADE EXHIBITORS

Booths 1 and 2

SES/METI
Shane de Vries
Brisbane, QLD
www.ses.com.au

Booth 3

Studiocode Business Group
Adrian Borcheds
NSW
www.studiocodegroup.com

Booth 4

Limbs and Things
Debbie McKinstry
Melbourne, VIC
www.limbsandthings.com

Booth 5

ASSH/SIAA
Renee Corney
Herston, QLD

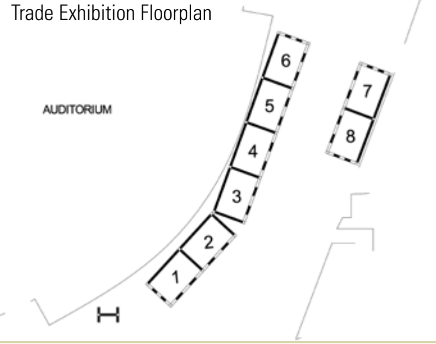
Booth 6

Medic Vision Ltd
Zorana Mayooran
Malvern, VIC
www.medicvision.com.au

Booths 7 and 8

Laerdal
Tom Guthormsen
Nationwide
www.laerdal.com.au

Trade Exhibition Floorplan



SOCIAL PROGRAM

Welcome Networking Drinks

Date: Tuesday 4 September 2007
Time: 5.15pm–7.00pm
Venue: Queensland Health Skills Development Centre, Royal Brisbane and Women's Hospital Education Centre
Cost: $35.00pp (or included in Full Registration Fee)
Dress: Smart Casual

OPTIONAL Conference Dinner

Date: Wednesday 5 September 2007
Time: 7.00pm–11.00pm
Venue: Customs House, 399 Queen Street, Brisbane
Cost: $115.00pp (not included in Registration Fee/s)
If you would like to purchase a ticket, please see the staff from Consec – Conference Management at the registration desk
Dress: Smart Casual

GENERAL INFORMATION

Welcome to Brisbane

Brisbane is Australia's sunniest capital city, with a population of 1.6 million people; it is Australia's third largest city after Sydney and Melbourne. Brisbane is a place of character, style, excitement and entertainment for visitors and locals to enjoy. Built around the beautiful Brisbane River, the city offers parks, walks, restaurants and even a city beach. Close to hills and the coast, Brisbane also gives easy access to a number of attractions including the Gold Coast and the Sunshine Coast.

ATM

The closest ATM is located in the Dr James Mayne Building. Please see the attached map.

Banking

Banks are generally open from 9.30am–4.00pm Monday to Thursday, and 9.30am–5.00pm Friday, however some banks offer extended hours and some are open on Saturday mornings. Travellers cheques are widely accepted, as are major credit cards VISA, MasterCard and (to a lesser extent) AMEX and Diners Card. Most banks will engage in foreign currency exchange.

Car Parking

Pay car parking is available at the venue off Herston Road and off Butterfield Street. The car parks are indicated on the map attached. A discount rate of $7.50 per day is available for Conference delegates, who have their car parking ticket stamped at the Conference venue and depart while car-parking attendants are working (during office hours).

Conference Program and Changes

The chair of each session will notify delegates of any changes made to the program. Changes to the Program will also be placed on the notice board next to the Conference Registration Desk.

Conference Secretariat

consec

Consec – Conference Management
PO Box 3127
BMDC ACT 2617
Email: simtecthealth@consec.com.au
Conference Manager: Savita Khiani
Conference Coordinator: Mimi Mekdarasouk

Conference Venue

The Royal Brisbane and Women's Hospital Education Centre is located 200 metres from the state-of-the-art Queensland Health Skills Development Centre. Practical sessions, and tours of the Skills Development Centre will allow delegates to experience and interact with this major Simulation facility in Australia. The Conference venue is a 15 minute drive from the airport and the approximate cost is $25.00 in a taxi fare.

Disclaimer

The Conference handbook and program is correct at the time of printing. However, the organisers reserve the right to change the information where necessary without notice.

Dress

Recommended dress for the Conference is smart casual.

Liability Waiver

In the event of industrial disruptions, the Conference and the organisers accept no responsibility.

Messages

Messages can be collected and left at the Registration Desk. All messages will be posted on the message board adjacent to the desk. Please check the board on passing.

Mobile Telephone Policy

Mobile phones are not to be used while sessions are in progress. Please ensure they are turned off during these times.

Name Badges

Your name badge is your entry to the Conference sessions (excluding exhibitors who are not fully registered), morning/afternoon teas and lunches. Please ensure that you wear your name badge at all times and if misplaced, please see the staff at the registration desk as soon as possible for a replacement.

No Smoking Policy

All the rooms at the venue are NON-SMOKING.

Personal Insurance

Delegates shall be regarded in every aspect as carrying their own risk for loss or injury to person or property, including baggage during the Conference. We strongly recommend that at the time of booking your travel and tours you take out a travel insurance policy of your choice. The policy taken should include the loss of deposit through cancellation, medical insurance, loss or damage to personal property, financial loss incurred through disruptions to accommodation or travel arrangements due to strikes or other industrial action. The organisers are in no way responsible for any claims concerning insurance.

Personal Mail

All personal mail should be sent to your accommodation address.

Privacy Clause

In registering for this Conference, relevant details incorporated into a delegate list for the benefit of all delegates (name, organisation and state only), and may be made available to parties directly related to the Conference including the Simulation Industry Association of Australia (SIAA), Consec – Conference Management, the Conference Organising Committee, venues and accommodation providers (for rhe purposes of room bookings and Conference options), key sponsors (subject to strict conditions) and parties associated with related Conferences. Postal and email details will be added to the SIAA's mailing list to keep you appraised of news items.

Registration Desk

The Registration Desk will be situated in the foyer of the Royal Brisbane and Women's Hospital Education Centre and will be staffed as follows:

Monday 3 September 2007	8.30am–5.00pm
Tuesday 4 September 2007	8.00am–7.00pm
Wednesday 5 September 2007	8.00am–5.00pm
Thursday 6 September 2007	8.00am–3.00pm

Rest Rooms

There are a number of rest rooms located within the Royal Brisbane and Women's Hospital Education Centre.

Special Needs

We endeavour to ensure delegates with special needs are catered for. Should you require particular assistance, please see the staff at the registration desk.

Useful Telephone Numbers

Pacific International Apartments	07 3234 8888
Novotel Brisbane	07 3309 3387
Metro Hotel Tower Mill	07 3832 1421
Hotel Grand Chancellor Brisbane	07 3831 4055
Qantas	13 13 13
Virgin	13 67 89

Website

The SimTecT 2007 Healthcare Simulation Conference website is: www.simtecthealth.com

Monday 3 September 2007

Pre-conference Workshops

9.00am–5.00pm Room: Ray Page Room, Qld Health Skills Development Centre (QHSDC)

Assessing Competence: Current Perspectives

Gerry Fried, Mark Wiggins, Dan Raemer, Leonie Watterson, Stephanie O'Regan

9.00am–5.00pm Room: David Gaba Room, Qld Health Skills Development Centre (QHSDC)

Setting Up a Simulation / Skills Centre

Denise Dignam, Michelle Kelly, Cate McIntosh, Katie Walker

Tuesday 4 September 2007

8.30am–8.45am Room: Auditorium

Official Opening and Acknowledgement of Traditional Owners

Leonie Watterson

8.45am–10.30am Room: Auditorium

Chair: Brendan Flanagan

Plenary Session 1

STRIVING TO MEET EXPECTATIONS

Stephen Duckett – What is a competent health care workforce?
Gerry Fried – Measuring procedural competency
Dan Raemer – Here comes assessment. . .buckle your seat belts!

Question Panel

10.30am–11.00am *Morning Tea*

11.00am–12.30pm **Concurrent Sessions**

Room: Auditorium

Chair: Pat Cregan

Free Papers Session 1

Simulation Research

A content analysis of communication in a simulated obstetric emergency
Maureen Harris

The validity and learning effectiveness of an integrated simulator of laparoscopic appendectomy: a randomized controlled trial
Benjamin PT Loveday, John A Windsor, George Oosthuiqen, Scott Diener

Patient monitoring with a head-mounted display: a full-scale simulator study
David Liu, Simon Jenkins, Penelope Sanderson, Marcus Watson, John Russell, Terry Leane, Phil Cole, Norris Green, Tania Xiao

Development of a valid evaluation process in a simulated educational environment
Patricia Rego, Marcus Watson, Katie Walker

Virtual reality applied to overcome heights fear
Carlos Coelho

Accuracy of self-assessment of non-technical skills in cardiac arrests
Claire Chinnery, Elaine Chapman

Room: Seminar Room 1, RBWH Education Centre

Chair: Val Follows

Free Papers Session 2

Policy and Resource Issues

The establishment of easily accessible simulation facilities with trained test supervisors across Australia and New Zealand
Roslyn Williams, Alison Cole, Katie Walker, Lisa Jukelevics, Kathleen Hickey

Simulation with computerized mannequins for undergraduate health professional education – a systematic review of outcomes
Felicity Blackstock, Karen Dodd

Developing standardized tools and procedures for curriculum development
Nicola Ferguson, Ray Peterson

Faculty review, what makes instructors stay?
Kate Quigley, Katie Walker

The development of an interprofessional facility for clinical skills and simulation training in a regional area
Maree Gleeson

Defence health simulation roadmap and concept of operations
Brendan Byrne, David Thomas

Room: CPR & Airways Lab, QHSDC

Facilitator: Tracey Beacroft

Workshop 1

Laerdal Practical Moulage

(numbers limited)

Room: Ray Page Room, QHSDC

Facilitator: Elyssebeth Leigh

Workshop 2

Designing and evaluating simulation scenarios

Room: Seminar Room 2, RBWH Education Centre

Expert Panel: Mark Wiggans, Marcus Watson, Gerry Fried

Workshop 3

Ask the experts – research I am trying to do

Development of a new Colonoscopy Skills Trainer using Virtual Reality and Haptic Feedback
David Hellier, Joshua Passenger, Mark Appleyard and Sébastien Ourselin

Learning about interprofessional clinical practice in a simulated ward environment
Debra Kiegaldie, Peteris Darzins, Barbara Workman Workman, Katrina Recoche, Susan Lee, Jill French, Geoff White, Brendan Flanagan

12.30pm–1.30pm	*Lunch*
1.30pm–3.00pm	**Concurrent Sessions**

Room: Auditorium

Chair: Harry Owen

Free Papers Session 3

Innovations and New Technologies

Moulage in high-fidelity simulation – a chest wall burn escharotomy model for visual realism and as an educational tool
Carole Foot, Daniel Host, Dylan Campher, Lucas Tomczak, Jeremy Cohen, Leo Nunnink, Marc Ziegenfuss

Learning cardiopulmonary resuscitation using an integrated clinical simulator
Keith Pine, Richard Bloxham, George Oosthuizen, John A Windsor

Multi-desciplinary hybrid crisis trainer
Daniel Host, Dylan Campher, Lucas Tomczak, Kersi Taraporewalla, Anusch Yazdani, Marcus Watson

Designing a portable audio visual system integrated with simulated patient vital signs
Marcus Watson, Daniel Host, Dylan Campher, Lucas Tomczak

The use of multi-modal technology to reduce anxiety and pain in children undergoing burn injury treatment
Kate Miller, Sam Bucolo, Julie Mill, Melanie Hilder, Roy Kimble

Software simulation of capnography monitoring on the METI ECS
David Liu, Simon Jenkins

Room: Seminar Room 1, RBWH Education Centre

Chair: Brendan Flanagan

Poster Presentations 1

Policy and Resource Issues

Rethinking the difficult airway trolley: using simulation to standardize difficult airway trolleys across an area health service
Delyth Jones, Cate McIntosh

Elements of fidelity in medical simulation – what is real and is it really important?
Sarah Constantine, Kylie Willet, Colin White, Victoria Brazil

Regular ward-based simulation exercises improve staff skills for dealing with paediatric emergencies
Louise Dodson, Tanya Mountford, Jason Acworth, Elayne Ellis-Cohen, Samantha Keogh

Standardised testing of artificial blood (STAB) trial
Carole Foot, Daniel Host, Dylan Campher, Lucas Tomczak, Stephen Fahy, Kim Vidhani, Maria Higgs, Adrian Barnett

Mobile simulation versus on site simulation: a cost comparison
Cate McIntosh, Simon Ford

Integrating finite element method into a virtual reality simulator for laparoscopic training
Amer Alsaraira, Ian Brown, Ryan McCoil, Fabian Lim

The use of knowledge and skills review program prior to immersion in simulation based learning activities
Pauline Lyon, Patricia Rego

How good do I have to be? A simulator gold standard
James Wood, Andrew Holland, Erik La Hei, Albert Shun, Ralph Cohen

Virtual reality laparoscopic surgical training in Australia
James Wood, Andrew Holland, Erik La Hei, Albert Shun, Ralph Cohen

Room: CPR & Airways Lab, QHSDC

Facilitator: Tracey Beacroft

Workshop 1

Laerdal Practical Moulage

Morning session repeated

Room: Ray Page Room, QHSDC

Facilitator: Dan Raemer

Workshop 4

Preparing learners for simulation exercises

Room: Seminar Room 2, RBWH Education Centre

Facilitators: Stephanie O'Regan, Cari Miller, Sue Wulf

Workshop 5

Developing operational standards for facilities

3.00pm–3.30pm	*Afternoon Tea*

3.30pm–5.00pm Room: Auditorium

Chair: Katie Walker

Plenary Session 2

ACHIEVING MAXIMUM IMPACT

Pat Cregan – Technical skills training – how important is it?
Jonny Taitz – Making an impact on the organisation – How to win support from hospital management?
Mark Wiggins – Its Why, Not What!: Assessing cognitive competency

5.15pm–7.00pm *Welcome Networking Drinks*

Wednesday 5 September 2007

9.00am–10.30am Room: Auditorium

Chair: Graham Beaumont

Plenary Session 3

EDUCATIONAL STANDARDS

Stewart Barnett – Redesigning the standard model – new approaches to professional development education
Elyssebeth Leigh – Identifying and assessing learning outcomes
Alan Morrison – Achieving high standards in manikin-based training

10.30am–11.00am *Morning Tea*

11.00am–12.30pm

Room: Auditorium

Chair: Debbie Paltridge

Free Papers Session 4

Training Programs

Training rural clinician educators for scenario based learning
Victoria Brazil, Sarah Constantine, Katie Mills

Trauma team training: non technical skills training for multi-professional teams
Stephanie O'Regan, Leonie Watterson, Sharon Lown

Integration of simulation into an undergraduate nursing curriculum. One institutions experience
Monica Peddle

Evaluation of a formal undergraduate curriculum in patient safety
Brendan Flanagan, Julia Harrison, Stuart Marshall, Jennifer Hogan, Nicholas Chrimes

Time to prepare for simulation: a practical approach to e-learning
Nially Higgins

Is there still a place for human patients in scenario based training? The PHTLS experience
Barry McCarthy

Room: Seminar Room 1, RBWH Education Centre

Chair: Jennifer Tichon

Poster Presentations 2

Education and Training Methods

NEO: using simulation to orient and assess new anaesthesia trainees
Lee-ann Kitto, Cate McIntosh, Allyson Armstrong-Brow, Wei-Ping Chan

"This is where I fit into the picture" – Simulation: A framework for teambuilding in a rural setting
Leanne Rogers, Debbie Stone, Lyn Gum

Evaluation of simulated skills cluster testing related to student competence and self efficacy in an accelerated online bachelors degree to BSN
Stephanie Stewart, Jennifer Thyes

NAPS: Simulation enhanced curriculum redesign for non anaesthetist administration of paediatric sedation
Susie Lord, Cate McIntosh, Kathryn Davies

Using simulation to uncover knowledge and skill gaps… what does a decrease in confidence mean?
Cate McIntosh, Lee-ann Kitto, Simon Ford, Narrell O'Dea

continued next page

Room: David Gaba Room, QHSDC

Facilitator: Elizabeth O'Driscoll

Workshop 6

Getting the best from standardized patients

Room: Seminar Room 2, RBWH Education Centre

Facilitators: Valerie Follows and Michal Wozniak

Workshop 7

Critical analysis of performance: Does your debriefing reflect patient care outcomes

Room: Ray Page Room, QHSDC

Facilitators: John Vassiliadis and Leonie Watterson

Workshop 8

Teaching clinical procedures to learners at different levels of experience

11.00am–12.30pm continued		***Poster Presentations 2 cont.*** Mock code blue: do you know what to do? *Janet Willhaus, Rebecca Sander, Anissa Sonntag* Improving nursing student assessment skills for mother and newborn care *Janet Willhaus, Kim Riffel, Kathleen Ward* Didactic strategies for the development of medical skills through the clinical simulation in Colombia and its influence in Latin America *Adalberto Amaya* The embedding of simulation in paramedic courses *Melinda Service, Tony Hucker*			
12.30pm–1.30pm	*Lunch*				
1.30pm–3.00pm	**Concurrent Sessions**				
	Room: Auditorium *Chair: Alan Morrison* **Free Papers Session 5** **Education and Training Methods** Scripting, acting, performing = learning. Developing a toolbox for facilitators to use actors in mental health scenario based learning *Christopher Churchouse, Cobie Rudd, Evan Rawstron, Alix Brown* Writing physiotherapy simulation scenarios *Anne Jones, Lorraine Sheppard* Using an introductory video as orientation to high fidelity simulation *Carole Foot, Lucas Tomczak, Dylan Campher, Daniel Host, Jeremy Cohen, Leo Nunnink, Sarah Webb* Feedback and simulation – does a spoonful of sugar help? *Moira Kelton* The teaching of a structured tool improves the clarity and content of inter-professional clinical communication *Stuart Marshall, Julia Harrison, Brendan Flanagan*	Room: Seminar Room 1, RBWH Education Centre *Facilitators: Adam Rehak, Sue Wulf, Chris Carpenter* **Workshop 9** **Using key event video editing software**	Room: Seminar Room 2, RBWH Education Centre *Facilitator: Debbie Paltridge* **Workshop 10** **Designing clinical skills and simulation courses – where do you start?**	Room: Ray Page Room, QHSDC *Expert Panel: Brendan Flanagan, Cate McIntosh* **Workshop 11** **Ask the experts – training I am trying to do** Assisting medical students acquire airway management skills through practical classes using mannequins: Experience of International Islamic University Malaysia *Ariff Osman* Simulation-based team training in the Emergency Department: Are there real results in teamwork and job satisfaction? *Katie Mills* Attaining National Standards Using a Multi Modality Model of Simulation Education in Pre Registration Nursing Curriculum *Gerri Nevin, Tracey Starkey-Moore, Lindsay Yardley*	Room: David Gaba Room, QHSDC *Facilitators: Matthew Aldridge and Nigel Wynne* **Workshop 12** **Constructively aligning multi-modality simulation within a pre-registration nursing curriculum**
3.00pm–3.30pm	*Afternoon Tea*				

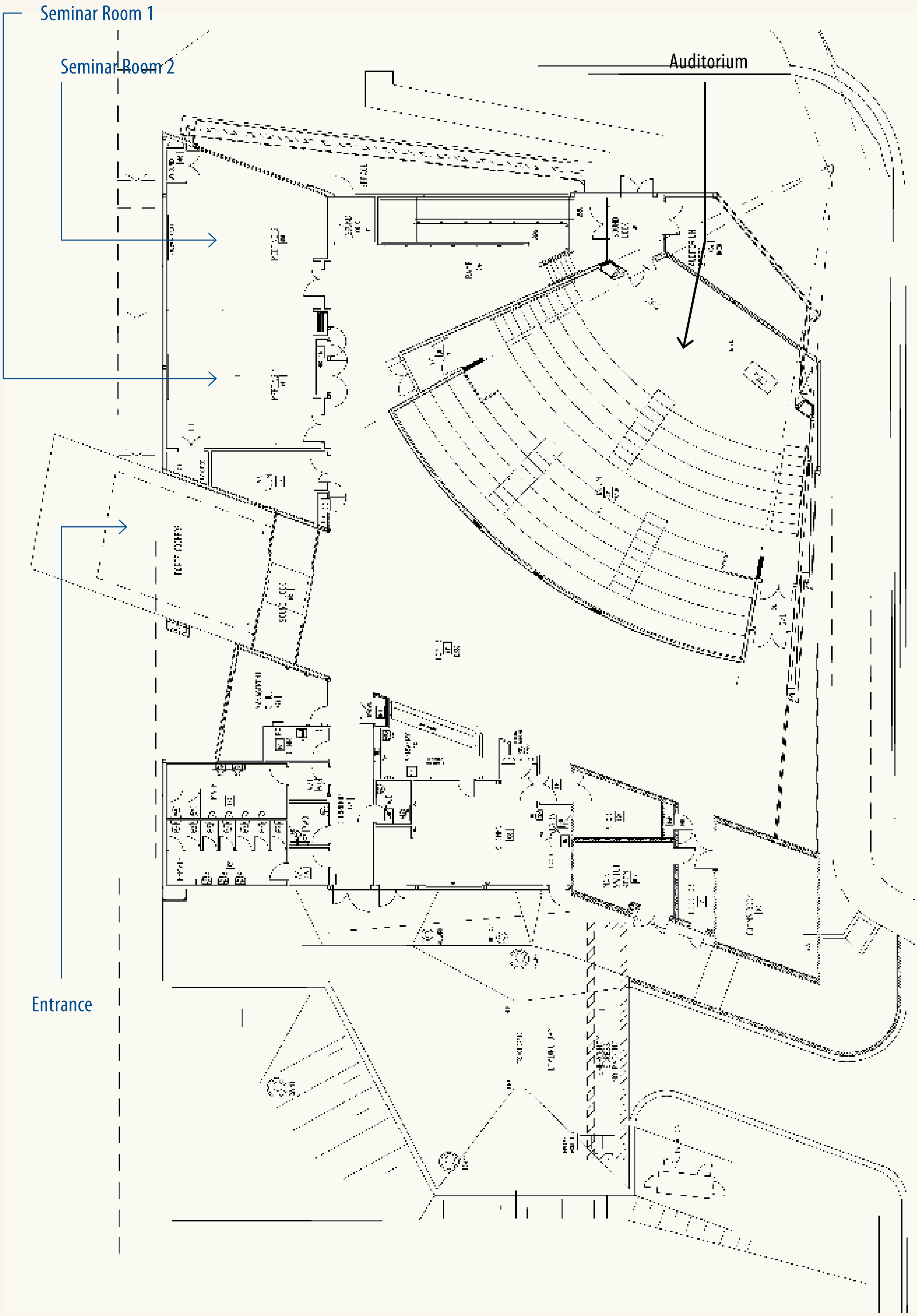
3.30pm–4.30pm	Room: Auditorium *Chair: Claire Chinnery* **Plenary Session 4** **SIMULATION TRAINING – RECENT DEVELOPMENTS** *Tim Gray – Continuing professional development in emergency medicine* *Andrea Wyatt – Training and assessing decision making in critical care*
4.30pm–5.00pm	Room: Auditorium *Chair: Leonie Watterson* **Meeting of the Australian Healthcare Simulation Society**
7.00pm–11.00pm	*Conference Dinner, Customs House*

Thursday 6 September 2007

9.00am–10.30am	Room: Auditorium *Chair: Leonie Watterson* **Plenary Session 5** **WHAT NEXT?** *Debbie Paltridge – A new national curriculum framework for junior doctors* *Jennifer Tichon – The psychological experience of simulation: use in treatment and training* *Trevor Hine – Simulation in therapy for anxiety disorders – what's the best way?*
10.30am–11.00am	*Morning Tea*
11.00am–12.30pm	Room: Auditorium *Chair: Kathleen Hickey* **Plenary Session 6** **QUALITY ASSURANCE IN SIMULATION** *Gerry Fried – How do we assess the effectiveness of simulation programs for teaching and evaluation?* *Leonie Watterson – Effectiveness, access or efficiency? Experiences with training for paediatric emergency teams* *Marcus Watson – Meeting new standards in research*
12.30pm–1.30pm	*Conference Closes with Lunch*

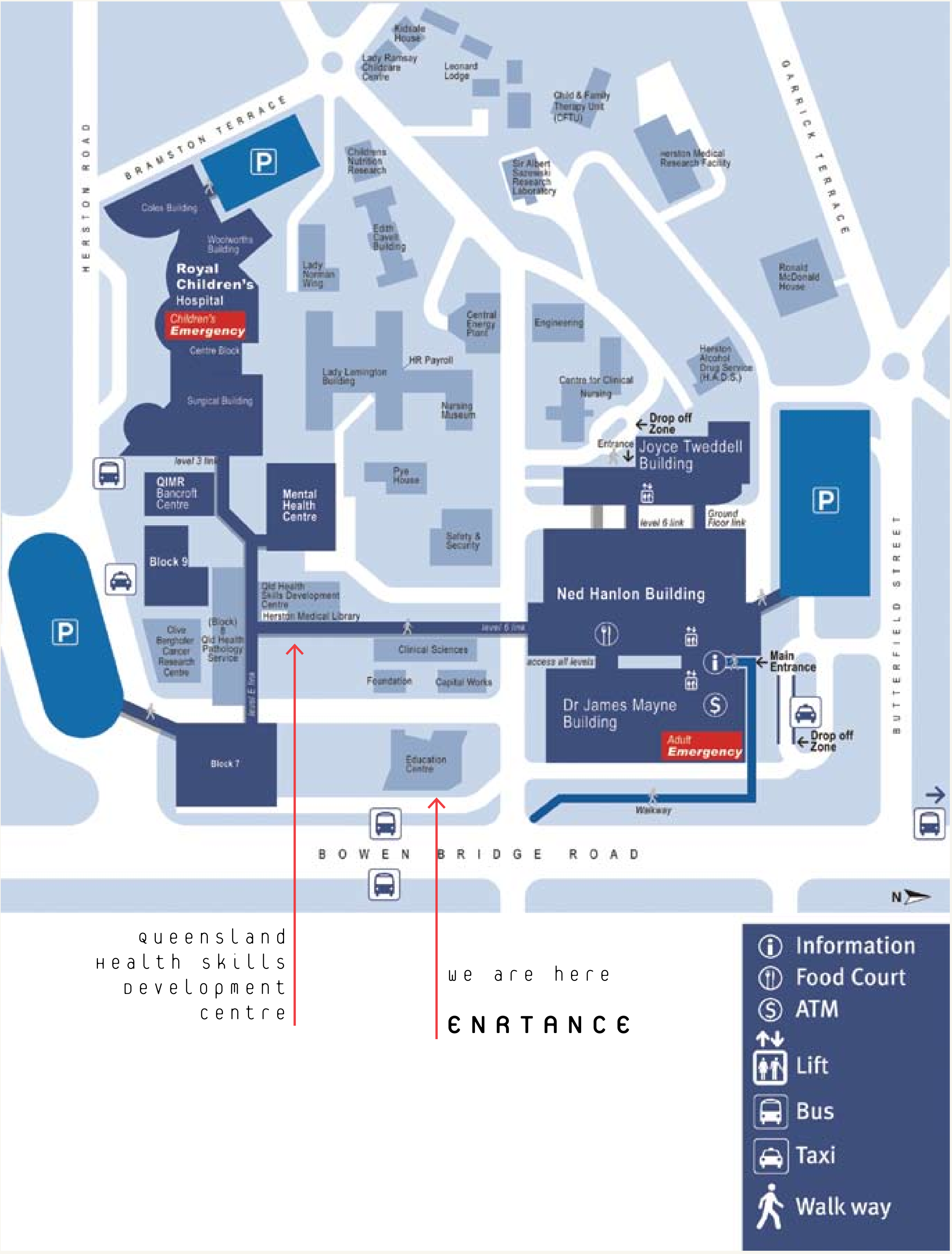
VENUE FLOORPLAN

Royal Brisbane and Women's Hospital Education Centre



ROYAL BRISBANE AND WOMEN'S HOSPITAL HEALTH SERVICE DISTRICT

Directions for Queensland Health Skills Development Centre



SIMTECT 2007 HEALTHCARE SIMULATION CONFERENCE ABSTRACTS

Free Papers 1

Tuesday 11.00am–12.30pm

Stream 1 – Simulation Research

Stream 2 – Policy and Resource Issues

Free Papers 2

Tuesday 1.30pm–3.00pm

Stream 1 – Innovations and New Technologies

Free Papers 3

Wednesday 11.00am–12.30pm

Stream 1 – Training Programs

Free Papers 4

Wednesday 1.30pm–3.00pm

Stream 1 – Education and Training Methods

Poster Session 1

Tuesday 1.30pm–3.00pm

Policy and Research Issues

Poster Session 2

Wednesday 11.00am–12.30pm

Education and Training Methods

Peer Reviewed Full Papers

Free Papers 1

Tuesday 11.00am–12.30pm

Stream 1 – Simulation Research

A Content Analysis of Communication in a Simulated Obstetric Emergency

Maureen Harris

Aims

To analyse communication patterns in a simulated obstetric emergency.

Background

Studies of cockpit communication in routine flights and in high fidelity simulators have informed the development of training programmes to improve aviation safety. Few such studies exist in healthcare, yet communication problems are thought to cause twice as many preventable disabilities or deaths as inadequate skills.

Methods

A random sample of four teams of doctors and midwives participated in a simulated postpartum haemorrhage scenario, before and after additional obstetric emergencies training. The simulations were conducted in a delivery room on the labour ward and were captured to audio-video recording. The data were transcribed to text files and coded using a content analysis framework to quantify the frequency of commands, enquiries, responses and observations.

Results

Communication patterns varied widely. The senior doctors' main communication categories were commands and enquiries. The primary midwives' main communication categories were responses and observations. Communication styles appeared to influence information flow. Commands directed to specific individuals, by use of name, face-to-face attention, or gestures were associated with acknowledgement of tasks (49 / 75 directed commands). Conversely, acknowledgements of tasks were observed for only 9 / 43 undirected commands (commands called out 'into the air').

Conclusions

Analysis of communication poses a number of methodological and practical challenges. Video-based analysis enabled structured observation, and linkage to source data allowed detailed review of communication styles and consequences. Further work is required to inform the design of effective communication processes, training interventions and practical assessment tools.

The Validity and Learning Effectiveness of an Integrated Simulator for Laparoscopic Appendectomy: A Randomised Controlled Trial

Benjamin PT Loveday, John A Windsor, George Oosthuizen, Scott Diener

Aims and Background

Attaining procedural competence requires a combination of cognitive and psychomotor skills. The Multimedia Clinical Skills Trainer (MCST) is computer program that integrates text, anatomy, video and simulation for training procedures. The purpose of this study was to determine the face, content and concurrent validity and instructional effectiveness of the MCST laparoscopic appendectomy module.

Methods

Basic surgical trainees (BSTs) in NZ were randomized into a control group and an intervention group. The latter received MCST for use on their personal computers. Participants received three assessments: a prestudy questionnaire (demographics and operative experience), 20 multiple choice questions (MCQs) at 2 weeks (knowledge recall and problem solving), and a questionnaire at four months (operative confidence and validity of MCST scored using 7-point Likert scales).

Results

Fifty-eight BSTs were randomized. The two groups were shown to be comparable from the prestudy questionnaire. Interface and functionality of MCST (face validity) received median scores of 6/7 and 5/7 respectively. Usefulness and chance of use (content validity) received median scores of 6/7. Operative confidence (concurrent validity) was similar for both groups. MCQ score (instructional effectiveness) was higher for the intervention group than the control group (15.0 vs 13.5, $p=0.10$). This difference was more apparent in first year BSTs (14.9 vs 12.1, $p=0.04$).

Conclusions

MCST has highly rated interface and functionality. It is perceived as useful and is highly likely to be utilized by surgical trainees. It is shown to improve knowledge recall and problem solving skills for first year trainees.

Patient Monitoring with a Head-Mounted Display: A Full-Scale Simulator Study

David Liu, Simon Jenkins, Penelope Sanderson, Marcus Watson, W. John Russell, Terry Leane, Phil Cole, Norris Green, Tania Xiao

Aims

We evaluated the effect of head mounted displays (HMDs) on anaesthetist detection of moderately unexpected intraoperative events (UEs). We tested whether UEs are detected later or are more likely to be missed (1) with HMD plus visual monitor (Vm) vs. with Vm alone and (2) with specific combinations of HMD depth of focus, ongoing task location, and UE location.

Background

Anaesthesia simulation studies suggest that HMDs speed detection of dramatic incidents,1,4-6,3 but aviation studies suggest HMDs reduce UE detection.2,7

Methods

Twelve anaesthetists conducted normal anaesthesia using a METI™ ECS. In each of three scenarios, participants experienced a different display: Vm only, HMD with near focus, and HMD with far focus. UEs occurred either in HMD, on Vm, at patient, or elsewhere in OR. Eight events per scenario were constructed from combining distance of anaesthetist's ongoing task (close, distant) with UE location (HMD, Vm, patient, OR).

Results

Preliminary results indicate that neither HMD nor depth of focus affects UE detection or speed. However, nearer UEs (HMD, Vm) are detected more often and faster than farther UEs (patient, OR).

Conclusions

We did not replicate advantages of HMDs seen in studies with dramatic UEs or disadvantages seen in aviation studies. However, post-hoc reclassification of scenario events shows that detection was fastest for UEs signaled acoustically (eg equipment noise), slower for UEs signaled by direct visual cue (eg patient's arm falling), and slowest for UEs inappropriate in context (eg blood type not checked). We discuss the impact of monitoring strategies on UE detection.

References:

1 Block, F. E., Yablock, D. O. &McDonald, J. S. (1995) "Clinical evaluation of the head-up display of anesthesia data. Preliminary communication." International Journal of Clinical Monitoring and Computing, vol. 12, pp. 21-24.

2 Crawford, J. &Neal, A. (2006) "A review of the perceptual and cognitive issues associated with the use of head-up displays in commercial aviation." International Journal of Aviation Psychology, vol. 16, pp. 113-133.

3 Ormerod, D. F., Ross, B. &Naluai-Cecchini, A. (2003) "Use of an augmented reality display of patient monitoring data to enhance anesthesiologists' response to abnormal clinical events." Studies in Health Technology and Informatics, vol. 94, pp. 248-250.

4 Platt, M. J. (2004) "Correspondence: Heads up display." British Journal of Anaesthesia, vol. 92, pp. 602-603.

5 Via, D. K., Kyle, R. R., Geiger, P. G. &Mongan, P. D. (2002) "A head-mounted display of anesthesia monitoring data is of value and would be used by a majority of anesthesia providers." Anesthesia and Analgesia, vol. 95, pp. S132.

6 Via, D. K., Kyle, R. R., Kaye, R. D., Shields, C. H., Dymond, M. J., Damiano, L. A. &Mongan, P. D. (2003) "A head mounted display of anesthesia monitoring data improves time to recognition of crisis events in simulated crisis scenarios." (Abstract). In Proceedings of Society for Technology in Anesthesia (STA2003).

7 Wickens, C. D. &Long, J. (1995) "Object versus space-based models of visual-attention - implications for the design of head-up displays." Journal of Experimental Psychology-Applied, vol. 1, pp. 179-193.

The Development of a Valid Evaluation Process in a Simulated Educational Environment

Patricia Rêgo, Marcus Watson, Katie Walker

Aims

To describe the development of a valid evaluation process in a simulated educational environment.

Background

The safety of medical practice has improved over time. However human error and systems failure are still important factors in adverse patient outcomes (Blum, et al., 2004; Leonard et al., 2004), and it is well known that 40% of adverse events in hospitals are the result of non-technical errors (e.g. communication failure, lack of leadership or lack of situational awareness) (Yule, et al., 2006).

Employing didactic methods to teaching many of the non-technical skills required by healthcare teams in a crisis is inappropriate because there is no single correct way of applying them (Barr et al., 1999). As a consequence, many simulation centres have developed courses based on Crisis Resource/Event Management principles, and use a combination of didactic and experiential learning. How to evaluate these programs properly poses a challenging question.

Methods

The Queensland Health Skills Development Centre is developing a systematic approach to the evaluation of all of its courses. This has taken a number of forms, but is based principally on a modified Kirkpatrick model (Barr et al., 1999) which covers participants' immediate reactions to the program, the acquisition of knowledge and skills, changes in participants' behaviour, and ultimately changes in organisational practice and patient safety indices.

Results

Much valuable information has been gleaned, particularly in relation to participants' insights and self-reported behavioural changes following the programs. However, as far as the ultimate validity of the process goes, the low numbers of participants per program means this will take some time to determine.

Conclusions

The evaluation process appears to have enormous potential to provide the information needed to validate and standardise simulation-based training in healthcare. If successful, other simulation centres will be invited to use the evaluation instruments and strategy.

References

Blum, RH, Raemer, DB, Carroll, JS, Sunder, N, Felstein, DM, Cooper, JB. (2004). "Crisis resource management training for an anaesthesia faculty: a new approach to continuing education", Medical Education. Vol. 38, pp. 45-55.

Leonard, M, Graham, S & Bonacum, D. (2004). "The human factor: the critical importance of effective teamwork and communication in providing safe care", Quality and Safety in Health Care. Vol. 13, pp. 85-90.

Yule, S., Flin, R., Paterson-Brown, S. & Maran, N. (2006). "Non-technical skills for surgeons in the operating room: a review of the literature", Surgery. Vol. 139, No. 2, pp. 140-149.

Barr, H, Hammick, M, Koppel, I, Reeves, S. (1999). "Evaluating interprofessional education: two systematic reviews for health and social care", British Educational Research Journal. Vol. 25, No. 4, pp. 533-544.

Virtual Reality Applied to Overcome Heights Fear

Carlos Coelho

Aims

Virtual Reality systems (VR) are being increasingly applied in the field of psychology. In the current project we contribute to the study and understanding of the therapeutic potential of VR through investigation of its use in the treatment of acrophobia.

Method

During treatment the VR system was used to mediate the patient's (n=10) exposure to feared stimuli, compared to patients exposed to a real height environment (n=6). The VR environment was a replica of the real one.

Results

Results revealed that participants in the VR group were able to climb more steps with less anxiety after the treatment, with a one-year follow-up maintenance. There were also positive and statistically significant results for the participants in the real environment group, demonstrating the value of exposure therapy for fear of heights overall. The two test groups did not show significant differences when treatment efficacy was compared. Within the VR group we observed the behaviors usually associated with fear in the real environment.

Discussion

Treating acrophobia via VR has substantial, long-term advantages, not only in terms of efficacy, but also facilitating therapeutic confidentiality. VR intervention makes it easier for the therapist and the client to commence, interrupt or complete the exposure therapy, assisting the patient to feel more in control of the process. VR facilitates the balance between the ecological and the experimental observation. VR holds great promise for improving interventions for specific phobias. Specifically in this study it was demonstrated that its application in therapy for individuals afraid of heights was effective.

Accuracy of Self-Assessment of Non-Technical Skills in Cardiac Arrests

Claire Chinnery, Elaine Chapman

Aims

The aims of this research were to identify:

The association between technical and non-technical skills in multidisciplinary Medical Emergency Teams during simulated cardiac arrests

The extent to which teams could accurately assess performance of non-technical skills.

The demographic factors which influence accuracy in assessment of non-technical skills

Methods

Multidisciplinary teams participated in simulated cardiac arrests at the Clinical Training and Education Centre, University of Western Ausstralia (CTEC). A standardised ventricular fibrillation arrest scenario was used for all teams. Teams were expected to manage the arrest using the current Australian Resuscitation Council Advanced Life Support (ALS) guidelines. Two raters measured technical skills using a checklist designed to assess adherance to the ALS guidelines, task completion and timeliness. Non-technical skills were assessed using a global rating scale on a number of subcategories designed to capture the elements of non-technical performance most relevant to multidisciplinary Medical Emergency Teams. Team members also assessed these elements of non-technical skills by completing a questionnaire immediately after the scenario.

Results

Data were obtained for 17 teams (106 individuals). Objective assessment of non-technical skills correlated with objective assessment of technical performance. The elements of non-technical skills most strongly correlated with technical performance were leadership and decision-making.

Overall, participant self-assessment of non-technical skills did not correlate with objective assessment of non-technical skills, although there was a low correlation in subscales relating to decision-making, cohesion and conflict. No correlation was found between objective and self-assessed scores on subscales relating to leadership, communication, coordination or role division.

Two factors were linked to greater accuracy in self-assessment of non-technical skills. These were:

- Tertiary education in Australia, NZ, Western Europe or the U.S.
- Recent completion of an ALS course.

Gender, profession (medical or nursing), team role (leader or non-leader) and level of experience had no effect on the accuracy of self-assessment of non-technical skills.

Conclusions

As with previously published studies which considered the relationship between technical and non-technical skills, the current study demonstrated a positive correlation between the two. I.e. teams with high scores for non-technical performance also scored highly for technical performance and vice-versa. Non-technical skills relating to leadership and decision-making were the strongest predictors of technical performance, suggesting that there needs to be an increased focus on these areas in training programs.

In general, participants were unable to accurately assess team performance in relation to non-technical skills following simulated cardiac arrests, giving themselves high ratings for all elements. The association between accuracy in assessment of non-technical skills and place of education or completion of an ALS course must therefore be interpreted with caution, as it may be coincidental. However, the findings of this research may go some way to explaining why participants have difficulty with reflection and critical analysis during debriefs in crisis management training. It may be necessary to provide participants with a clearer framework to enable them to assess the performance of their team in relation to non-technical skills, in order to maximise the benefits of such training.

Free Papers 1

Tuesday 11.00am–12.30pm

Stream 2 – Policy and Resource Issues

The Establishment of Easily Accessible Simulation Facilities with Trained Test Supervisors across Australia and New Zealand

Roslyn Williams, Alison Cole, Katie Walker, Lisa Jukelevics, Kathleen Hickey

Aims

In relation to the Fundamentals of Laparoscopic Surgery (FLS) program, to describe the practical problems/issues relating to the national/international implementation of the official standardised training program for test administrators in situ.

Background

FLS is one of only 2 validated medical simulation courses in the world. The Skills Development Centre is purchasing the licence to deliver FLS in Australia and New Zealand, and the Royal Australasian College of Surgeons (RACS) supported this decision by indicating they would like FLS to be mandatory for surgical trainees in the future.

To ensure the integrity of the program, mandatory guidelines require frequent high-level administrative support from the licence-holder, the use of specific instruments and consumables, and intensive training for test supervisors.

Methods

Training of test administrators was delivered in various test centres around Australasia in situ. It was assumed the medical simulation industry would supply instruments and consumables as a way of gaining product exposure, and that surgeons would be interested in a RACS-approved program.

Results

Support from industry and surgeons generally has been difficult to secure because of the cost involved in implementing a program which is not yet mandatory for all surgical trainees. This has meant the costly and circular problem of not being able to provide the necessary equipment in situ, a consequent reluctance on the part of trainees to enroll, and thus the delay in the FLS program's being made mandatory.

Conclusions

Despite the popularity of the FLS program in the USA, it will take a considerable amount of time to achieve the same reputation in Australia and New Zealand. The implications of people's reluctance to accept this change in surgical skills training are that new generations of surgeons may not receive optimal training which could lead to adverse patient outcomes.

Simulation with Computerized Mannequins for Undergraduate Health Professional Education – A Systematic Review of Outcomes

Felicity Blackstock, Karen Dodd

Aims

The Aims of this systematic review were to investigate the efficacy of using computerized mannequins to educate undergraduate health professional students.

Background

In recent years simulation technology has provided an opportunity for health professional educators to recreate clinical experience in a simulated environment, and thereby potentially maximize the learning experience of undergraduate health profession students. This systematic review reports on the efficacy of computerized mannequins as an educational tool in this format.

Methods

Medline, CINAHL, Embase, and Cochrane were searched in Dec 2006 for papers examining computerized mannequin simulation for undergraduate health professional education. Reference lists of full text papers were also examined. Two independent reviewers determined included papers and analysed the data.

Results

Twenty-nine papers were included in the review. 76% of papers involved the education of medical students. Eighteen studies examined the quality of the simulation experience and all reported positive responses from the majority of students. Seven of the 11 studies examining clinical skills acquisition illustrated significantly better performance. Seven of the 12 studies examining knowledge acquisition illustrated significantly increased knowledge. Three of the 4 studies examining student confidence in practice found significant increases following the simulation training.

Conclusions

The literature to date has demonstrated that health professional students' experience using computerized mannequins for education is overwhelmingly positive. Computer mannequin simulation appears to be an effective learning environment for clinical skill/knowledge acquisition, and improving confidence; however analysis of study methodology shows that many of these studies are pre/post design and a lack of blinding has possibly led to biased Results. Further randomized trials with blinding, validated outcome measures, comparable educational time periods, and analysis of cost versus benefit are still needed before confident recommendations can be made about the use of computerized mannequins for undergraduate health professional's education.

Developing Standardised Tools and Procedures for Curriculum Development

Nicola Ferguson and Ray Peterson

Aims

To discuss the benefits of standardised processes and tools for curriculum development in scenario-based learning in a simulated environment.

Background

Curriculum development does not occur in a vacuum. Curricula have to meet the needs of a number of different stakeholders and should be developed by a broad cross-section of appropriate individuals (e.g. various clinical specialists, educationists) (1). To ensure the most important elements of curricula ("Aims and objectives, learning opportunities, subject matter and assessment") are addressed, it is essential that a systematic process be used in the development phase (2). Due to the rapid uptake of simulation-based training for all levels of hospital staff, and the tension between having to develop new curricula whilst delivering existing programs, the emphasis has been on the development of courses to meet demand rather than developing standardised protocols for curriculum development. This presentation will discuss the development of a tool to guide the curriculum development process for scenario-based learning in a simulated environment.

Methods

All curricula are assessed using a decision-making flow chart. This both guides curriculum developers and assists decision-makers to assess the proposed curriculum against organisational strategic direction, need, resources, cost, etc.

Results

The tool has been useful in helping faculty to conceptualise the curriculum development process and has standardised decision-making and administration processes.

Conclusions

Using this tool, simulation centres will be able to assess all applications for proposed new curricula methodically to ensure course quality and the equitable use of resources by existing and potential members of faculty.

References

1 Fish, D & Coles, C. 2005. Medical Education: Developing a Curriculum for Practice. Open University Press, Maidenhead, UK.

2 Nicholson, S, Osonnaya, C, Carter, YH, Savage, W, Hennessy, E & Collinson, S. 2001. Designing a community-based fourth-year obstetrics and gynaecology module: an example of innovative curriculum development. Medical Education. Vol. 35: 398:403.

Faculty Review, What Makes Instructors Stay?

Kate Quigley, Katie Walker

Aims

Two years ago the Queensland Health Skills Development Centre (SDC) discussed the vexed question of simulation centres' ability to recruit and retain members of faculty. This is a follow-up presentation which will discuss the results of a major survey designed to determine faculty's motivation for involvement and their needs as trainers.

Background

Simulation centre faculty are predominately busy practicing clinicians with limited free time. It has been assumed that faculty are generally motivated by factors such as recognition, remuneration and achievement (1). However, for simulation centres to be able to recruit and retain Faculty, these assumptions need to be tested.

Methods

Over 100 members of SDC Faculty were invited to complete an 84-item web-based survey. In order to determine ways of attracting new Faculty, existing Faculty were asked to nominate their reasons for initially becoming involved as instructors (e.g. financial, travel, altruism etc.), and for remaining as instructors (e.g. making a difference to patient safety, collegiality, job satisfaction etc.). Importantly, Faculty were also asked to describe the barriers to their participation so that the SDC may attempt to meet their needs better. The survey produced both quantitative and qualitative data, and non-parametric measures were used to analyze the data.

Results

In contrast to the assumptions mentioned above, faculty became and remained involved for mainly altruistic reasons (e.g. improving the skills-base of their colleagues and/or other healthcare professionals, and making a difference to patient safety) (2). Major barriers to participation as instructors were work and family commitments. Suggestions to recruit and retain Faculty included: train the trainer sessions; opportunities for social/professional networking; and professional development. Improvements to administrative processes (e.g. the development of lead faculty packs) have been well received and other changes are underway.

Conclusions

The survey gave insight into the needs of faculty and pointers to the means by which they may be met. The Results of the survey have implications for all simulation centres, and as heralded at previous SimTect conferences, the instrument will be made available to any centre that requests it.

References

1 Hagedorn, LS. 2000. Conceptualizing faculty job satisfaction: components, theories, and outcomes. New Directions For Institutional Research, Vol. 105, Spring: 5-20.

2 Régo, P. 2007. Report on the Skills Development Centre's Survey of Faculty, November 2006. School of Medicine, The University of Queensland.

The Development of an Interprofessional Facility for Clinical Skills and Simulation Training in a Regional Area

Maree Gleeson

Aims

To develop a Clinical Skills and Simulation Centre in a regional area with an interprofessional focus that meets the simulation learning needs of health professionals across the north west coast of Tasmania. To report on the outcomes of the development to date and flag the future opportunities/ challenges that the Centre presents.

Background

The University of Tasmania Rural Clinical School (RCS) Administration, Teaching and Research facility is co-located on the same campus as the North West Regional Hospital and North West Private Hospital in Tasmania. There are up to 1,000 health professionals and undergraduates in the region at any one time. requiring clinical skills training.

Methods

In 2006 a project was undertaken to develop a Clinical Skills and Simulation Centre that would meet the needs of health professionals working and studying in the region. A comprehensive consultation was undertaken to determine:

- the range of clinical skills teaching equipment in the hospital and community environment
- the training/learning needs of key stake holders in the region
- the training experience and expertise available for simulated training in the region.

Results

The RCS Clinical Skills and Simulation Centre was developed to reflect the finding of the consultative process. The Skills Centre is utilized for the training of a range of health professionals (including, nursing, medicine, the ambulance and allied health) from the community and hospital settings. A management structure and special interest group has been developed to direct the activities of the Centre.

Conclusions

Developing a skills centre with an interprofessional focus requires time, patience and extensive consultation.

Defence Health Simulation Roadmap and Concept of Operations

Brendan Byrne and Denis French – presented by David Thomas

Aims

To establish a medium-term sustainable plan for the expansion of simulation support to Defence health capability, including a strategy to remediate present shortfalls in support of simulation training.

Background

Defence purchased 14 SimMan in order to facilitate advanced training of medical teams as a part of Joint Project 2060 Deployed Health Capability in 2005. Defence now owns in excess of 20 SimMan across Australia; many are used extensively for the training of Medical Assistants and Nursing Officers at the three Service's health training schools. Others are located at short notice-to-move health units around the country, but are often underutilized due to a lack of train-the-trainer, infrastructure, and curriculum support.

Methods

Extensive consultation has occurred with health simulation operators both within and external to Defence, as well as with units that are utilizing SimMan with varying degrees of success, and uniformed experts in health simulation training from the reserves. Policy guidance has been sought from the Australian Defence Simulation Office that directs the development of simulation capabilities across the whole of Defence.

Results

The Defence Health Simulation Roadmap has been developed along the six themes of the wider Defence Simulation Roadmap 2006 of:

- Manages simulations effectively.
- Promotes increased use and re-use of simulation in Defence processes.
- Combines simulations for greater benefit.
- Ensures there are adequate trained and skilled personnel across Defence, industry and academia.
- Ensures simulation systems are supported through their life cycles.
- Secures access to quality data to support simulations.

The three identified priorities of the Roadmap are:

- Maximize effectiveness of SimMan.
- Implement complementary health simulation methodologies.
- Expand application of simulation beyond clinical training.

In support of the Roadmap the Defence Clinical Simulation Concept of Operations (CONOPS) describes how we want to employ simulation in support of health training, and what we need to do in the immediate future. The established recommendations from the CONOPS are:

- The establishment of APS Clinical Simulation Operator positions at each of the three Service's health training schools.
- Outsource development of a Clinical Simulation Operator/Debriefer Course.
- Outsource development of SimMan software scenarios to appropriate Aims, objectives and outcomes.

- Establish a standing offer panel of clinical simulation course providers
- Investigate sources of funding for clinical simulation training and support that can be attached to acceptance of regional training liability by units.
- Outsource the development of a Military Crisis Resource Management Course.

Conclusions

After extensive consultation within Defence and the health simulation industry the Defence Health Service has an identified plan to enable the sustainability and enhancement of clinical simulation training in order to facilitate the expansion of simulation support to health capability.

Success of the plan rests on actively engaging external civilian organisations to provide services ranging from course development to train-the-trainer programs, to delivery of simulation training, and will present many opportunities for the civilian health simulation industry.

References

1 Australian Defence Simulation Office [ADSO] (2006) *Defence Simulation Roadmap 2006*. Department of Defence: Canberra.

2 Defence Health Services Division [DHSD] (2007) *Defence Health Simulation Roadmap*. Department of Defence: Canberra.

3 Defence Health Services Division [DHSD] (2007) *Clinical Simulation Concept of Operations*. Department of Defence: Canberra.

Free Papers 2

Tuesday 1.30pm–3.00pm

Stream 1 – Innovations and New Technologies

Moulage in High-Fidelity Simulation – A Chest Wall Burn Escharotomy Model for Visual Realism and as an Educational Tool

Carole Foot, Daniel G Host, Dylan Campher, Lucas Tomczak, Jeremy Cohen, Leo Nunnink, Marc Ziegenfuss

Aims

As part of an Intensive Care Crisis Event Management Course, simulation of an extensive chest burn was desired. The aim of the moulage was to enhance the realism of the scenario but additionally to enable a chest wall escharotomy to be performed.

Background

There is a paucity of literature pertaining to the role and techniques of moulage for creating high-fidelity medical simulations. One of the scenarios during this day-long course has involved a patient with severe burns and difficulties with ventilation. In addition to presenting a life-like "patient" requiring assessment and management, the aim of the scenario is to demonstrate the method of performing a chest escharotomy for patients with circumferential restrictive chest burns. The challenge was to prepare a moulage that could be attached to a manikin that would enable these goals to be achieved. It was also essential to ensure that the manikin was not injured during the demonstration of this procedure.

Methods

A simple step-wise technique for preparing a chest wall burn moulage that may be fitted to manikins of all sizes and shapes is described.

Results

Utilisation of the chest wall moulage as part of an overall strategy to prepare manikins' for a severe burns scenario will be detailed.

Conclusions

In the case of the chest wall burn model, moulage was used as more than a visual realism enhancing strategy – it served as an educational tool in its own right, permitting demonstration of a procedure performed infrequently outside the walls of major burns centres. Further publications describing techniques such as this should be shared within the medical simulation community.

Learning Cardiopulmonary Resuscitation Using an Integrated Clinical Simulator

Keith Pine, Richard Bloxham, George Oosthuizen, John Windsor

Aims

To demonstrate the functionality of the ICS and the benefits if offers for learning CPR

Background

Current Methods for CPR instruction typically involve formal lectures and practice sessions on mannequins. The Integrated Clinical Simulator (ICS, GoVirtual Medical Ltd) is a learning management system that combines hyperlinked text, interactive anatomy, video demonstration and a cognitive VR simulation, and it provides self-testing and feedback. It can be used before and after a course to ensure effective, efficient and durable learning. In addition it will reduce the time required for didactic teaching and provide learning targets for the practical sessions.

Methods and Results

The ICS was originally developed as the multimedia clinical skills trainer and the pilot module for learning laparoscopic appendectomy was presented at SimTect 2006. The advantages include the intuitive interface, the ability to test knowledge and performance, portability and the low unit cost. The CPR module was developed from the content of courses designed by the American Heart Association and the New Zealand Resuscitation Council in order to provide regionally appropriate educational content. It was completed in April 2007. The key elements of the ICS will be demonstrated to highlight the functionality of the learning management system, the way in which it caters for different learning styles, the Methods used for testing knowledge and skill to provide formative and summative feedback, and an audit trail for training supervisors. The different ways that the CPR module can be accessed will be discussed. The formal evaluation of the validity and reliability of this module by a randomized controlled trial of junior doctors and nurses is underway.

Conclusions

This innovative approach to learning CPR should add value to existing courses, by reducing costs and by improving learning efficiency and effectiveness.

Multi-Disciplinary Hybrid Crisis Trainer

Daniel G Host, Dylan Campher, Lucas Tomczak, Kersi Taraporewalla, Anusch Yazdani, Marcus Watson

Aims

To develop a simulation environment that supports patient resuscitation scenarios during gynecological laparoscopic training.

Background

There is evidence that simulator based training improves operating room performance (1); however, many surgical tasks are not included in current simulation training. A course to teach laparoscopic techniques to trainee gynecologists required multi-task trainers and virtual reality simulators to improve technical skills. The lack of a complex simulator capable of providing a laparoscopic environment and patient physiological vital signs has led us to create a hybrid simulator for combined anaesthesia and laparoscopic crisis management.

Methods

A simple step-wise technique was used to prepare a hybrid laparoscopic surgical simulator that allows for laparoscopic insufflation and medical resuscitation. A box trainer simulation of an abdomen that allowed for insufflation and a laparoscopic procedure was integrated with a Laerdal, Mega Code Kelly™ with the ability to be resuscitated.

Results

The system developed allowed for laparoscopic insufflation and procedures to be performed as well as resuscitation including management of the surgical stack, defibrillation, administering intravenous medication and ventilation. The combinations of the box trainer and the Laerdal, Mega Code Kelly™ meet most of the training requirements; however, both the box trainer design and the lack of physiological integration between the box trainer and the Laerdal, Mega Code Kelly™ limits the types and fidelity of gynecological laparoscopic based training.

Conclusions

The hybrid trainer demonstrated the possibility for gynecological laparoscopic scenario based training; however, further development of hybrid trainers is required.

Reference

1 Seymour NE, Gallagher AG, Roman SA, et al. Virtual reality training improves operating room performance: Results of a randomized, double-blinded study. Ann Surg. 2003;236:458-464

Designing a Portable Audio Visual System Integrated with Simulated Patient Vital Signs

Marcus Watson, Daniel G Host, Dylan Campher

Aims

To create an affordable portable audio-visual (AV) system that records, backs up and provides a live feed of multiple camera views and simulated vital signs for scenario-based learning in rural and remote locations.

Background

There are hundreds of clinical simulation centres around the world using complex AV systems. Many of these centres have excellent facilities for scenario-based learning; however, despite hundreds of centres existing, very few clinicians actually receive the benefits of scenario-based learning. The cost of AV equipment required for scenario-based learning contributes to scarcity of new simulation centres being developed. It is unlikely that sufficient simulation centres will be built in the next decade to meet the growing need for simulation-based training in healthcare and even less likely that simulation centres will be built in rural areas with small clinical populations. One option is to build portable simulators for training in rural and remote areas.

Methods

An iterative design process was used to develop a portable AV system for scenario-based learning.

Results

A portable AV system was produced that supports scenario-based learning. In an effort to reduce the cost while preserving the essential components of video capture, dispensable components such as touch screens were removed from the design. The cost of the AV system was reduced to less than $10,000.

Conclusions

Portable AV systems that record, back up and provide a live feed to a debriefing room will allow scenario-based learning with video debriefing to occur in remote and rural clinical settings.

The use of Multi-Modal Technology to Reduce Anxiety and Pain in Children Undergoing Burn Injury Treatment

Kate Miller, Sam Bucolo, Julie Mill, Melanie Hilder and Roy Kimble

Background

With the recent focus on adjunct pain protocols to control anxiety in the paediatric population, distraction has continued to progress from basic interventions to advanced technology systems that offer engaging diversion in a way that meets the acute clinical needs of the patient and team.

In continuation from previous Multimodal Virtual Reality studies, a new prototype has been developed with a focus on meeting clinical demands and developmental appropriateness. This fourth generation prototype is a portable device which Aims to immerse a child into unique 3-Dimensional virtual content using the interaction paradigm of direct manipulation.

Aims

The prototype is being clinically trialled in 2007 to evaluate the effectiveness of Multimodal Technology in children who attend burn clinics. It also seeks to understand the change in pain levels between multi modal distracters (e.g. stories, games or movies) and to trial the use of technology assisted Procedural Preparation in reducing anxiety.

Method

In this experimental study, patients aged between 3 and 10 years will be randomised to a Control Group (standard distraction), an Electronic Games Group or one of four Multimodal Distraction Groups: 1.Stories, 2.Movies, 3.Procedural Preparation and 4. Games. All groups receive standard doses of pain medications. Behavioural and self reported pain levels will be measured, as well as pulse and respiratory rate.

Results/Conclusions

A previous study has shown encouraging Results of the impact Multimodal Technology has on anxiety and procedural pain. It is hypothesised that this prototype will have a continued positive effect on pain during burn procedures, that usability will improve and that technology assisted Procedural Preparation will be a positive adjunct in an outpatient setting. Results will be available in September 2007.

Software Simulation of Capnography Monitoring on the METI ECS

David Liu, Simon Jenkins

Aims

We faced two major challenges when using the METI ECS™ patient simulator to run an interactive patient monitoring study (1): 1) the lack of capnography support on the ECS™, and 2) the difficulty of staging equipment "failures" or "malfunctions" during scenarios. Here we describe a software tool that was developed to help overcome these challenges.

Background

We have observed limitations of simulators when used for patient monitor evaluations (2). Neither the METI ECS™ nor the HPS™ simulators display capnography on their Waveform Display monitor. Although they both produce CO2 gas that can be monitored with standard capnography equipment, the output is inflexible for staged events and the ECS™'s waveform is unrealistic.

Methods

"Standard" capnographic waveforms and recognised anomalies were adapted from a medical text (3) in consultation with anaesthetists. A Java application that monitors the breathing of the METI mannequin was developed that produces the appropriate capnographic waveform in "real time". The mannequin's breathing characteristics (VT, RR and I:E ratio; Figure 1) and instructor-supplied parameters (waveform shape, end-tidal CO2 concentration, inspired CO2 concentration) are used to generate capnography waveforms (Figure 2). The waveform and EtCO2 are then displayed, superimposed over a blank space on the Waveform Display™ window to depict a capnograph on a dedicated VGA display (Figure 3) incorporated into an anaesthetic machine.

Results

We used our simulation software during an ARC-funded (DP0559504) study of Head-Mounted Display-based patient monitoring with 12 anaesthetists (registrars and consultants) at the Royal Adelaide Hospital1. The software generated capnographic waveforms representing spontaneous ventilation, mechanical ventilation, bronchospasm and circuit disconnection. Using the simulated capnographs, the participants could confirm correct ETT placement after intubation, diagnose a bronchospasm event, and detect disconnection of the circuit. The tool also provided scenario flexibility in that actors could surreptitiously disconnect the CO2 trace line without immediately affecting the patient monitor. Although not used for the aforementioned study, the software also generates capnographic waveforms representing CO2 re-breathing and oesophageal intubation.

Conclusions

Our software extensions allowed us to expand the capabilities of the METI ECS™ simulator and increase the fidelity and flexibility of our scenarios for patient monitoring display evaluations.

References

1 Liu, D., Jenkins, S., Sanderson, P., Watson, M., Russell, W. J., Cole, P., Leane, T., Green, N., & Xiao, T. (2007) "Patient monitoring with a head-mounted display: A full-scale simulator study," SimTecT 2007 Healthcare Simulation Conference, Brisbane: 3-6 Sep, 2007.

2 Liu, D., Jenkins, S., Watson, M., Sanderson, P., & Russell, W. J. (2007) "Extending simulators to improve support for patient monitoring display research," Society for Technology in Anesthesia Annual Meeting, Orlando, FL: 17-20 Jan, 2007.

3 Miller, R. (2005). "Chapter 36 – Respiratory Monitoring: Capnographic Waveform". Miller's Anesthesia, 6th ed., Churchill Livingstone: Available at http://www.mdconsult.com/das/book/0/view/1255/1023.html. Accessed 18th June 2007.

Free Papers 3

Wednesday 11.00am–12.30pm

Stream 1 – Training Programs

Training Rural Clinician Educators for Scenario Based Learning

Brazil, V., Constantine, S., Mills, K.

Aims

The program objective was to develop individual skills and institutional capacity for utilising scenario-based learning (SBL) in education for acute care medicine.

Methods

A workshop curriculum was developed through consultation with medical educators and acute care clinicians, and from needs analysis data provided by a rural workforce agency. The instructional design was experiential in content and process. These workshops were delivered in three rural locations.

Participants initially took part in an experiential activity as learners. This was followed by sessions on project planning, scenario design, reflective practice and debriefing, technologic adjuncts and managing organisational change. On the final day participants led a workshop as facilitators.

The workshops were supported by online activities and resources.

Evaluation consisted of pre and post-workshop evaluation forms completed by all participants, as well as direct observation by a dedicated evaluator.

Results

All participants agreed or strongly agreed that the workshop contributed to achievement of their SBL learning objectives, as well as confidence in employing scenario-based learning within their own teaching environments. They identified features of scenario design, and approaches to debriefing as most valuable parts of the workshop, as well as the ability to practise workshop delivery.

Participants identified barriers to implementing a SBL approach within their hospital environments that were most often cultural and organizational, rather than equipment based.

Conclusions

Individual skills and institutional capacity for employing scenario based learning can be enhanced through short workshops, supported by online resources. Successful SBL training requires a focus on educational principles, and on addressing organisational barriers to change in educational practice.

Trauma Team Training: Non Technical Skills Training For Multi-professional Teams

Stephanie O'Regan, Leonie Watterson, Sharon Lown

Aims

This presentation reports on a training course targeting teamwork skills for multi-professional trauma resuscitation teams in NSW, a collaborative project between ITIM and the SMSC conducted in 2006.

Background

The activation of a trauma team significantly improves outcomes in severely injured patients (1) however little published work is available on trauma teamwork training.

Methods

This one-day course targets familiar teams from trauma centres of different levels across rural and metropolitan NSW. Learning objectives emphasise team skills using a training doctrine developed specifically for this purpose. Activities are built around realistic cases, the clinical management of which are supported by best practice guidelines. Course activities include group discussions, games, paced workshops and fully immersive simulations. Course evaluation is by written participant appraisals. Items are scored as mean (Standard deviation) agreement with statements on 5 point Likert scales where 1= strongly disagree and 5= strongly agree.

Results

Four courses (48 participants) have been conducted to date. Individual sessions were highly valued: teamwork session 4.32 (SD 0.56), airway workshop 4.45 (SD 0.75), immersive scenarios 4.64 (SD 0.6). Mean scores ranged from 4.23 to 4.62 regarding improved understanding of ten key non-technical and teamwork related skills and from 4.04 – 4.10 regarding improved ability to manage the four targeted emergencies. Mixed team training was felt to be useful, 4.79 (SD 0.55) Written comments support these scores.

Conclusions

This doctrine and model appears to be effective. Insights were gained regarding mixing participants of differing experience and from workplaces with differing exposure to trauma, balancing the pitch of instruction, and the limits of scenario-based learning in short courses.

Reference

1 Petrie, D., Lane; P. and Stewart, T.C. (1996) "An evaluation of patient outcomes comparing trauma team activated versus trauma team not activated using TRISS analysis," The Journal of Trauma, vol. 41, no.5, Nov, pp. 870 - 875.

Integration of Simulation into an Undergraduate Nursing Curriculum. One Institutions Experience

Monica Peddle

Aims

This purpose of this presentation is to describe the framework, models and educational theories used to integrate simulation education in the nursing curriculum at La Trobe University, Division of Nursing and Midwifery, Albury-Wodonga Campus.

Background

The ability of nursing students to provide competent, safe care for patients is reliant upon their ability to acquire knowledge, incorporate clinical reasoning, integrate psychomotor skills, develop self confidence, develop communication and team work skills, and transfer this learning to the clinical setting (1). Simulation is touted as one method to ensure that health professionals, from beginning students to experienced clinicians are well prepared for the reality of the practice environment.

Method

Simulation was introduced into the undergraduate nursing curriculum at La Trobe, University, Albury Wodonga campus in 2005.

Integration into the curriculum involved an action learning model. The integration process involved identification and implementation of appropriate actions and simulations, monitoring Results, reflection upon the action and refining the next action and/or simulation.

A constructivist learning paradigm informed by situated learning theory and principles of adult learning was used to guide the integration of simulation within a unit of the curriculum.

Results

The action learning model used required commitment to the process by staff and contributed to increased understanding of the method through learning 'first hand' with real projects. It increased self awareness and motivation to bring about change in a group environment.

Feedback sought from stakeholders and learners included that simulation sessions promote the integration of knowledge and competencies into the current nursing practice of the undergraduate student. Students reported that they felt well prepared for clinical and that the simulations had provided a solid base of knowledge and skills for students to build on.

Conclusion

The integration of simulation into the unit at La Trobe University, Albury Wodonga Campus assists students achieve a satisfactory level of competence and safety in a realistic clinical environment before working with patients and is beneficial to the development of entry level competence in the new graduate.

Reference

1 Childs, Janis C. and Sepples, Susan.(2006) Clinical teaching by simulation lessons learned from a complex patient care scenario. Nursing Education Perspectives , v27 i3, p154(5)

Evaluation of a Formal Undergraduate Curriculum in Patient Safety

Brendan Flanagan, Julia Harrison, Stuart Marshall, Jennifer Hogan, Nicholas Chrimes

Aims

To evaluate a formal curriculum on Patient Safety for final year medical students.

Background

This presentation describes the evaluation of the first 12 months of a course integrating patient safety themes into the final year of an undergraduate medical curriculum.

Methods

A multimodal approach was adopted. Evaluation forms completed by the students on each of the days and at the end of the subject were designed to assess the course's effect on change in practice as well as the perceived strengths and weaknesses of each of the modules and their delivery. Attitudes to safety were evaluated using a patient safety attitude survey (PSAS). OSCEs were used to assess the knowledge and skills of the students on the final contact day.

Results

All 175 students completed the course requirements and assessment components. Thematic analysis data will be presented. Questionnaire data showed that the majority of students (74%) placed greater value on learning non-technical skills required as a junior doctor such as teamwork and error management over the technical skills learnt. The majority of the students (59%) gave examples of ways that the course had helped them think of, and react to the workplace differently.

Conclusions

A five-day course in patient safety achieved its Aims of improving awareness of patient safety issues. Consistent data from the different sources demonstrates a deeper appreciation of the students for Patient Safety, both in general and in specific areas. The positive multimodal evaluation of this course is being followed up by targeted examination of specific areas of course content.

References

1 Halbach, J. L., & Sullivan, L. L. (2005). Teaching Medical Students About Medical Errors and Patient Safety: Evaluation of a Required Curriculum. Academic Medicine, 80 (6), 600-606.

2 Flanagan, B., Nestel, D., & Joseph, M. (2004). Making patient safety the focus: Crisis resource management in the undergraduate curriculum. Med. Educ., 38, 56-66.

Time to Prepare for Simulation: A Practical Approach to E-Learning

Niall Higgins

Aim

Clinicians have reported little time for learning whilst at work as well as poor access to computers for online learning (1). This paper examines the usage of four online modules in an attempt to understand if clinicians are conducting most of their learning out of work hours. The aim was to find out who is using this system, how they access the content, and the potential for this style of work place learning.

Method

Instructors have created e-learning materials to be incorporated into simulation courses. A learning management system (LMS) provides clinicians with a password to access the system. Content was constructed within Internet pages and multimedia elements added the opportunity for interaction. Feedback and demographic data from the LMS was examined for user traits and professional background.

Results

18% of 278 course registrations took place on a weekend. Of these, 28% were nurses and 38% were physiotherapists. Only 26% of physiotherapists and 42% of nurses registered with an internal network email address.

Conclusion: It is reasonable to suggest that clinicians conduct professional e-learning in their own private time. Health organizations need to recognize this and allow clinicians lieu time for e-learning if it is to support their preparation for face-to-face simulation courses. A process to check that e-learning materials have been accessed would confirm participant preparation.

Reference

1 Yu, S., Chen, I. J., Yang, K. F., Wang, T. F. and Yen, L. L., (2006) 'A feasibility study on the adoption of e-learning for public health nurse continuing education in Taiwan', Nurse Educ Today. Available online at http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=17175074

Is There Still a Place for Human Patients in Scenario Based Training? The PHTLS Experience

Barry McCarthy

Aims

PHTLS plays an important role in the delivery of trauma education to a wide variety of health care providers from a Mine Rescue Medic to an Emergency Department Nurse, from Ambulance Officers to training registrars in Emergency Medicine.

Background

The PHTLS program uses a combination of human patients and simulation aids. The tools used in practical and assessment scenarios are a combination of paper based and instructor driven. This is essential due to the wide range of geographical, cost and time challenges, as well as the multi disciplinary nature of the course.

Results

Participation rates and feedback have been outstanding for the 10 years that the course has been running in Australia, especially from the rural and remote areas. With the most common positive responses being increased confidence, team leading and team dynamics.

Conclusions

It has been identified by instructors and students of the benefits of using both human and simulated manikins. The use of both media can be seen as being complementary for an holistic approach to the PHTLS process.

Free Papers 4

Wednesday 1.30pm–3.00pm

Stream 1 – Education and Training Methods

Scripting, Acting, Performing = Learning. Developing a Toolbox for Facilitators to use Actors in Mental Health Scenario Based Learning

Cobie Rudd, Christopher Churchouse

Aims

How then do we bridge the "theory- practice gap" in health care education without scaring off students or harming the most vulnerable of patients? This paper will discuss the development of a toolbox to assist facilitators in preparing actors for healthcare simulation with a specific focus on mental health.

Background

This collaborative program between Edith Cowan University School of Nursing, Midwifery and Postgraduate Medicine and the West Australian Academy of Performing Arts encompassed a multifaceted approach to simulation development by incorporating education theories, simulation learning principles and performance. This project aimed to:

- Develop a partnership tool-box for the progression of scenario based improvisation scripts to guide actors in the simulation environment.
- Provide education and support to facilitators in developing and maintaining the role of performance facilitator.
- Provide direction to facilitators on interpretation and analysis of clinical scenarios to discover the meaning and structure.
- Outline techniques for facilitators to work with the actors to define the parameters and action of the scene to be improvised.
- Provide facilitators with technical skills to undertake pre and post production management processes.
- Provide direction on design and production requirements to ensure the illusion of reality is maintained.
- Develop a bank of moulage for prosthetics, wounds, and costume and make-up techniques to support the development of realistic simulation in co-morbidity situations.

Conclusions

This paper will outline the development of the toolbox to support the use of actors in a variety of scenarios exploring co-moridities with a focus on mental health. It will also discuss how the training emphasised psychological fidelity, with the aim of providing a training workforce with all the usual benefits of simulated patients but with the flexibility of a valid performance that mimics the real mental health environment.

Curriculum Driven Demand – The Hospital Skills Program

Brown, A., Rawstron, E.

Aims

To develop a robust framework that supports training for non-specialist medical staff in key clinical areas. The presentation will focus on the impact of this and other curriculum frameworks on medical simulation centres.

Background

The Hospital Skills Program Emergency Department Module was developed in 2006/07 by the NSW Institute of Medical Education and Training. Additional modules are planned in the areas of mental health and aged care. The Program is aimed at recognising and further developing the skills of existing non-specialist medical staff, as well as providing a clear career path toward advanced non-specialist practice in relevant clinical areas.

Recognising that one issue affecting the sustainability of simulation centres in Australia has been ongoing demand for the training they offer, the development of the Hospital Skills Program and other curriculum frameworks provide useful opportunities for identified areas of mandatory or elective training and education, to be undertaken by simulations centres; i.e. curriculum driven demand.

While the development of simulation facilities has often occurred with little central coordination, the emergence of HSP and other curricula such as the National Curriculum Framework for Junior Doctors, along with factors such as the increasing number of medical graduates, is likely to see an increasing focus by jurisdictions and health services on the important role that simulation can play in the delivery of safe and efficient service-based health professional training.

Methods

Development of the HSP Curriculum Framework involved extensive consultation with a range of clinical groups and review of other curricula and existing relevant educational opportunities.

Results

A curriculum framework has been developed and implementation is in process.

Conclusions

Simulation centres have a key role to play in the evolving Australian medical education and training sector and NSW IMET's Hospital Skills Program. The development of clear curriculum frameworks for various groups within the system is likely to have a positive effect on the demand for services offered by simulation centres.

References

1 NSW IMET. (March 2007) "*Draft Hospital Skills Program Curriculum Framework – Emergency Department (HSP-ED)*". Available online at www.imet.health.nsw.gov.au

Writing Physiotherapy Simulation Scenarios

Anne Jones, Lorraine Sheppard

Aims

The aim of this paper is to identify and outline a method for writing health care simulation scenarios.

Background

Simulation has been used in health professional education for nearly 50 years. It has been used in both undergraduate and post graduate training as a teaching method to enable skill-development, improve communication, facilitate team work and develop professional competencies. In the last few of years physiotherapy has used simulation as a method of train cardiorespiratory skills at both an undergraduate and post graduate level. As physiotherapy increasingly implements this technology for learning, there is a need to document the processes involved when developing a simulation curriculum. Scenario writing is one process which needs to be documented.

Methods

A literature review was undertaken to identify articles specifically on simulation scenario writing, which would inform the process of simulation scenario development.

Results

Three articles were identified of which only one pertained to healthcare simulation. From the identified articles, a process was outlined which will assist people to write scenarios for simulation.

Conclusions

Even though simulation has been used for over fifty years there is minimal literature available to aid people in writing scenarios for health care simulation. This paper outlines a process which will aid people to write simulation scenarios for health care training. Further publication and discussion on current Methods for writing simulation scenarios needs to occur to further develop simulation as an educational method.

Using an Introductory Video as Orientation to High Fidelity Simulation

Carole Foot, Daniel G Host, Dylan Campher, Lucas Tomczak, Jeremy Cohen, Leo Nunnink, Sarah Webb

Aims

To produce an orientation video capable of familiarising participants to Laerdal Simman and the environment that they would be working in.

Background

Problems that we have encountered in familiarising participants to the simulation environment are: the length of time it takes; keeping participants interested; making sure that it is standardised for every course; and the fact that once they have been familiarised in the actual scenario room, they find it more difficult to immerse themselves in the simulation scenarios.

Methods

To this effect, we decided to create a short engaging video showing the features and shortcomings of the manikin, the learning environment and what is expected of participants during scenarios.

Results

The video developed was able to demonstrate to participants exactly what they can and can't do, and what behaviour is expected of them during our courses. The film was scripted to be a 'spoof' of the successful medical drama 'House' and utilised short sequences of musical themes to other well known television programs such as 'ER'. As part of the production of this multimedia project, the team became well versed in the appropriate legislation pertaining to the use of commercial sound, screen and concept material for educational projects.

Conclusions

The video was well received, enjoyable and informative. Further investigation is needed to elucidate the optimal method of orientating learners to high-fidelity simulation environments.

Feedback and Simulation – Does a Spoonful of Sugar Help?

Moira F Kelton

Aims

To determine whether feedback strategies used by the Clinical Coach in the simulated Coaching laboratory develop students' clinical nursing practice.

Background

The Clinical Coach uses strategies associated with giving specific feedback containing precise information about what students should do in order to solve or correct a problem. Feedback is considered an effective strategy for practice development. The effectiveness of that feedback, however, is dependent on its delivery, and the use of feedback that promotes self reflection and helps to develop the student's clinical practice.

Methods

A questionnaire survey designed using the Likert scale and open ended questions is distributed during the evaluation session of each coaching unit. A coaching unit comprises an initial interview and preliminary test session; individualized skills sessions x 2 and an evaluation session.

Results

Initial Results from 19 students rated the feedback they had received from the clinical coach with a mean average of no less than 6. 6 / 7 for all Likert scale questions and open ended questions have been summarized under themes.

Conclusions

Comments reflected that some students had received very little useful feedback in the clinical venue and that feedback was often given using the positive – negative – positive method. When positive comments were given as a spoonful of sugar to sweeten negative feedback, the students did not find the criticisms any easier to accept. Students indicated that they were able to accept feedback that could even be deemed as criticism when it was followed up immediately with corrective strategies and practice opportunities. Students identified that the feedback they received from the coach focused them on ways in which to develop their clinical nursing practice.

The Teaching of a Structured Tool Improves the Clarity and Content of Inter-Professional Clinical Communication

Stuart Marshall, Julia Harrison, Brendan Flanagan

Introduction

Suboptimal communication between health professionals has been recognised as a significant causative factor in patient safety incidents. The use of a structured method of communication has been suggested to improve the quality of information exchange. The aim of this study was to determine if the teaching of such a tool would improve the content and clarity of a telephone referral in a simulated clinical environment.

Method

A randomised, controlled trial of final year medical students with or without prior exposure to a teaching session using the ISBAR communication tool. Audio and video data were recorded of a simulated clinical scenario in which a standardised telephone referral was required. Communication was scored on both content and clarity.

Results

Data were obtained from 17 simulated scenarios. Inter-coder reliability of the observations of both the content and clarity was excellent (mean Kappa=0.87, and Kappa 1.0 respectively). Content of the communication improved from a mean score of 10.2 to 17.4 items ($p<0.001$). Clarity of the delivery of information on a 5-point scale improved from a mean of 2.75 to 4.44 ($p<0.001$).

Conclusions

The teaching of a structured method of communication improves the clarity and content of communication of telephone referrals in a simulated clinical setting.

Poster Session 1

Tuesday 1.30pm–3.00pm

Policy and Research Issues

Rethinking the Difficult Airway Trolley: Using Simulation to Standardise Difficult Airway Trolleys Across an Area Health Service

Delyth Jones, Cate McIntosh

Aims

- Using simulation for pre-procurement assessment of difficult airway equipment in order to standardise difficult airway trolleys across an area health service.
- Developing a local Emergency Department specific difficult airway algorithm.

Background

To provide an area wide service, ED physicians are now required to work in several different hospitals. Each hospital has different equipment which is currently purchased on an ad hoc basis, according to local pReferences. Variation in equipment is costly and may decrease patient safety. Evidence suggests that a high level of experience with a few devices is sufficient to resolve most situations (1) and is more appropriate than limited experience with many devices.

Methods

A course was developed in consultation with ED physicians and comprised an introductory lecture, 5 skill stations and 2 difficult airway scenarios using SimMan©. Equipment for the course was selected on the basis of a literature review focusing on their utility in the emergency setting. Each scenario was followed by a traditional debriefing, in addition to a facilitated discussion led by domain experts to ascertain which equipment the physicians felt would be most useful to them. Cost was also considered.

Results

Senior ED physicians created a local algorithm with assistance from faculty. In accordance with the algorithm, 4 devices were considered essential and placed in the trolley in the order that they would be required.

1 Easy Cap II® CO2 detector
2 Intubating LMAs
3 QuicktrachTM cricothyroidotomy kit
4 Surgical airway equipment

Conclusion

The proposed algorithm and recommended equipment list has been presented to the Emergency Department Area Executive Committee. Future courses will enable ED physicians to familiarise themselves with this small number of devices in a simulated clinical setting.

Reference

1 Combes, X; Le Roux, B; Suen, P; et al. (2004) "Unanticipated difficult airway in anesthetizes patients," Anesth, 100, 5, May, 1146-50.

Elements of Fidelity in Medical Simulation – What is Real and is it Really Important?

Constantine, S, Willet, K, White, C, Brazil, V

Aims

The objective of this study was to determine which components of medical simulation participants considered realistic, and whether the extent of this realism was considered an important factor in their learning experience.

Background

The use of simulation has been established as a useful adjunct in the education and training of health professionals. Medical simulation for education relies upon recreating elements of a patient care episode for participants. Unlike part-trainers, patient simulation relies on more than the mannequin. Other elements include equipment, environment, scenario structure and flow, and the context given by facilitators. There has existed an assumption that increased fidelity necessarily equates with a better learning experience, but little evidence exists in support of this contention.

Methods

Rural General Practitioners that participated in 12 simulator based training courses from February 2005 to March 2007 were surveyed. They rated each of 18 'elements of fidelity' on two criteria. These criteria were 1) realism, and 2) importance to the learning experience. A 4 point scale was used for each rating.

Results

176 participants were surveyed. The elements considered most realistic were breathing, pulses and cardiac monitoring, as well as scenario content. These elements also received high ratings for importance to learning, together with procedures performed, clinical props and debriefing. The greatest discrepancy between realism and learning significance was facial expression. Participants also felt that clothing, skin colour and temperature were not particularly realistic but that this impacted minimally on learning. Team composition, training environment and presence of confederates were of medium realism and significance to learning.

Conclusions

Study of the realism and importance of various elements of fidelity has the potential to direct efforts at improving medical simulation to those areas that impact on learning, rather than merely the improvement of technology for its own sake.

Regular Ward-Based Simulation Exercises Improve Staff Skills For Dealing With Paediatric Emergencies

Louise Dodson, Tanya Mountford, Jason Acworth, Elayne Ellis-Cohen, Samantha Keogh

Aims

This study examined the effect of a regular fortnightly scenario-based educational intervention on the knowledge, practical skills and attitudes of ward-based paediatric nurses when dealing with severe respiratory, cardiovascular or neurological compromise in paediatric patients.

Background

The infrequent nature of paediatric medical emergencies in a ward setting may limit individual expertise and increase anxiety for ward staff dealing with these situations. Simulated paediatric emergency exercises offer a method of teaching that can be tailored to address important knowledge and skills that may be used only infrequently.

Methods

A pre-test/post-test intervention design was used to assess the impact of mock emergency exercises upon identified deficits in paediatric assessment and life support management. Nurses from four clinical areas participated in an initial attitudes/knowledge questionnaire and standardised pre- and post-intervention testing scenarios. Scenario performance was scored using a previously validated evaluation tool. Two clinical areas were exposed to fortnightly teaching scenarios for 4 months, the other 2 areas acted as controls.

Results

Eighty-seven nurses completed the attitudes/knowledge questionnaire. Mean years nursing experience was 3.63 years with 28 respondents (32.2%) reporting ≥10 years nursing experience. Most nurses (86.2%) reported lacking confidence in managing paediatric emergency situations. Knowledge was less than optimal, with only 8 respondents (9%) achieving scores of ≥80%. Testing scenario scores improved significantly in the areas receiving regular mock exercises (70% pretest versus 89% posttest) compared to control areas (76% pretest versus 66% posttest).

Conclusions

Regular ward-based simulation exercises can improve clinical skills in dealing with paediatric emergency situations.

Standardised Testing of Artificial Blood (STAB) Trial

Carole Foot, Daniel G Host, Dylan Campher, Lucas Tomczak, Stephen Fahy, Kim Vidhani, Maria Higgs, Marc Ziegenfuss, Adrian Barnett

Aims

The objective of our study was to compare the characteristics of a number of products that could be utilized as artificial blood for high-fidelity simulation. In the current climate of an ever-increasing demand for and emphasis on simulation as both a teaching and training tool, various artificial blood products were assessed in a double-blinded study with regard to their realism and practicality.

Background

In the current climate of an ever-increasing demand for and emphasis on simulation as both a teaching and training tool, various artificial blood products were assessed in a double-blinded study with regard to their realism and practicality.

Methods

A literature and internet search was performed and 15 artificial blood products were identified from a variety of sources. One product was excluded due to its potential toxicity risks. Five observers, who were blinded to the products, performed two observational analyses on each product using a set of pre-defined ratings on such qualities as colour, consistency, clotting, as well as staining potential to manikin skin and clothing. The products were left for 24 hours, both refrigerated and at room temperature, and then re-assessed. Statistical analysis was performed on the data to identify the most suitable products, and both inter- and intra-relater variability was examined.

Results

Three products scored consistently well with all five observers, with one of these in particular scoring well in almost every category. This highest-rated product had a mean rating of 3.6 (95% Posterior Interval (P.I.) of 3.4-3.7). There was generally only minor inter-relater variability with average ratings varying from 3.0 to 3.4 between the highest and lowest scorer. Intra-relater variability was negligible with substantial agreement between first and second rating as per weighted kappa scores.

Conclusions

The most realistic and practical form of artificial blood identified was a commercial product called Barnes blood product. It was found to be not only realistic in appearance but practical in terms of storage and stain removal.

Mobile Simulation Versus On Site Simulation: A Cost Comparison

Cate McIntosh, Simon Ford

Aims

The goal of this project was to compare the cost of mobile simulation courses to the (known) cost of delivering courses on site at a central location in our model centre.

Background

Recent changes to composition of NSW Area Health Services led to the creation of Hunter New England Health, a unique health service serving rural, remote and metropolitan needs across a vast area. Addressing the needs of such a diverse organisation creates many challenges for education and training. CRM style team training is labour intensive. We sought to determine the economics of providing this training on a mobile basis.

Methods

Spreadsheet modeling based on a micro-costing technique had previously quantified the start up and hourly cost of running a model simulation centre (Ref 1). This program can be used to quantify costs of any centre by altering variables.

We sought to calculate only the difference in cost between the two courses and ignored common underlying costs (e.g. backfilling of staff attending courses).

Assumptions for the purposes of this model were 1) that the curriculum delivered is the same, 2) participant mix included 6 doctors and 4 nurses, 3) 3 sets of 3 courses are provided offsite per year and 4) 2 courses per week are delivered onsite.

We calculated fixed and variable costs including travel and subsistence costs incurred by participants traveling to a central location and by instructors traveling to a remote location.

Depreciation was accelerated for mobile courses due to increased risk of loss and damage.

Results

Costs were sensitive to hours attributable to course provision.

	Central on site	Mobile off-site
Course delivery costs	4626	8438
Subsistence costs	2700	2000
Transport	750	375
COST PER COURSE	$8076	$10813

Conclusion

The incremental cost per course to provide mobile CRM style training is $2737. However, economic feasibility should consider intangible benefits such as not needing to travel away from home overnight, or the critical mass effect of concentrating research knowledge and expertise. These costs are significant but difficult to estimate since individuals place varying significance on this.

Understanding differences in cost structure should guide rational development of centres in Australia.

Reference

1 McIntosh C, Macario A, Flanagan B, Gaba D. Simulation: What does it really cost? Simulation in Healthcare 2006; 1:109 (Abstract) #1473

Integrating Finite Element Method into a Virtual Reality Simulator for Laparoscopic Training

Amer Alsaraira, Ian Brown, Ryan McColl, Fabian Lim

Aims

Instruments/anatomy interactions are one of the main features of the laparoscopic surgery simulators. The aim of this work is to look at the feasibility of incorporating the finite element (FE) models within a visual graphic model to achieve high realism of instrument-tissue segment interaction.

Background

The virtual gynecological environment includes both rigid and soft anatomical objects, these objects have to respond to contact with rigid instruments and each other. Many Methods have been developed to model the soft objects (Ref 1); FE method is one of them. The FE method is a very popular and accurate method for modeling physical objects. In the FE model the object is represented as a continuous distribution of mass and energy. It is divided into finite elements depending on the object's shape and size and has discrete nodes which are joined together

Methods

Using commercial FE software a segment of uterine tube was modeled as a deformable meshed cylinder and was assumed to be linear elastic and isotropic object. A simple mesh was created using different types of elements between two tips of the grasper to analyze the grasping of the tissue segment. The tips were modeled as an analytical rigid body.

Results

Figure 1 shows the deformation of the segment under the compression of the tips.

Deformation of the tissue segment

Conclusions

A number of different instrument/tissue segment interactions have been investigated.

Reference

1 Liu, A., et al., A survey of surgical simulation: applications, technology, and education. Presence, 2003. 12(6): p. 599-614.

MaCRM, Maternity Crisis Resource Management – Using Knowledge Review and Crisis Resource Management Principles to Bridge the Midwifery /Medical Cultural Divide

Pauline Lyon, Patricia Régo

Background

Whilst seeking recognition and autonomy in their practice (1), midwives acknowledge that optimal care for women during emergencies requires team work and collaboration with their medical colleagues (2). Hirst's 2005 review noted that the two professional groups appear unable to find "common ground for care provision" (2), a counter productive state in managing emergencies. RCOG's (3) Why Mothers Die report indicates that substandard care was a factor in nearly 70% of maternal deaths from direct causes, sighting failure of communication between the professions as a significant factor.

Aim

The two-day MaCRM program attempts to bridge the midwifery / medical cultural divide, through providing an environment where knowledge review/update and training in crisis resource management principles encourages and role models multidisciplinary collaboration. This presentation will describe the program and Results of participant's evaluation.

Methods

Participants, in a supportive learning environment refresh their knowledge and skills regarding management of specific maternity emergencies. The following day working in teams, participants manage five simulated maternity emergencies. Scenario-based training encourages higher order thinking (4) whilst CRM training enables individuals to work as co-ordinated teams through emphasis on: communication; leadership; situational awareness; accessing assistance and effective resource use. Post scenario debriefings reinforce learning and evaluation of case management focuses on processes not personnel, role modelling a just culture.

Results

Midwives and doctors report greater cohesion and a successful application of CRM principles in the clinical environment.

Conclusion

MaCRM has enormous potential to consolidate positive relationships between midwives and doctors, contributing to saving the lives of mothers and babies.

References

1 Matthews, A & Scott, A et al 2006. An exploratory study of conditions important in facilitating the empowerment of midwives. Midwifery (2006) 22, 181-191

2 Hirst,C. 2005. Re-Birthing: Report of the review of Maternity Services in Queensland. Queensland Health, Brisbane

3 Drife, J. 2005. Why mothers die. Journal of the Royal College of Physicians Edinburgh, Vol. 35 : 332- 336.

4 Williams,VS, Williams, BO. 2000. Facilitating higher order thinking: new teacher's dilemma. Annual Proceedings of Selected Research & Development Papers presented at the national Convention of the Association for Educational Communications & Technology. Denver, Colorado, 25-28 October.

How Good Do I Have to Be? A Simulator Gold Standard

James Wood, Andrew J.A. Holland, Erik La Hei, Albert Shun, Ralph Cohen

Simulated virtual reality skills training appears to offer several advantages if it can be used in conjunction with the established Halsteadian apprenticeship undertaken by surgical trainees. Incorporation of simulation training into the often overcrowded curricula of surgical training though can be daunting. If an opportunity can be found for simulated training the question of how much training is enough is often arises.

Current simulators have sophisticated software which records an often confusing array of metrics from each training episode. These databases are cumbersome and time consuming to navigate which means it can be difficult to get a clear idea of progress. Of equal importance there is currently no accepted reference point with regards to expected competency. Training sessions are necessarily based on duration rather than competency. We attempted to identify standards for the each skill at which our experts operate.

8 specialist minimally invasive surgeons undertook 3 training programs on the LapSim Surgical Skills simulator of increasing difficulty. Their performance was used to create a standardised score for each skill assessed. A group of 12 final year medical students undertook the same training programs and their performance relative to the specialist standard was calculated. Using feedback these from these standardised scores it was possible for all trainees to achieve a level competency in simulated skills comparable to our experts.

We will discuss the use of these standardised scores in the implementation of simulated training curricula.

Virtual Reality Laparoscopic Training in Australia

James Wood, Andrew J.A. Holland, Erik La Hei, Albert Shun, Ralph Cohen

Opinions on the role of virtual reality simulation in surgical training are diverse and usually not evidence-based. Several adequately powered, randomised and blinded studies have demonstrated an improvement in the operative performance of those who have undergone virtual reality training. Nonetheless there remains reluctance by the medical profession to incorporate simulation into training.

This seems to be based on three misconceptions:

- Simulators are expensive
- It is difficult to incorporate them into an already overcrowded curriculum
- The transfer of skill to the real world has not been demonstrated to reduce risk or improve patient outcomes.

We report on our attempts to assess the feasibility of establishing virtual training for local trainees and to assess its outcome on operative performance.

16 Basic surgical trainees were randomised into control and training groups. All underwent baseline testing of their psychomotor ability before the training group were allowed 24 hour access to a LapSim virtual reality simulator. It was not possible to complete this study and we will discuss the reasons for this which we believe has important implications for the future use of simulation in surgical training.

16 final year medical students were also recruited, and similarly randomised and assessed before being allowed access to the simulator. After four weeks of training, we were able to demonstrate a significant improvement in their simulated laparoscopic surgical skills when compared with the skills of local specialists. Using an animal model, we were able to demonstrate the effect of this on their operative performance.

Poster Session 2

Wednesday 11.00am–12.30pm

Education and Training Methods

NEO: Using Simulation to Orient and Assess New Anaesthesia Trainees

Lee-ann Kitto, Cate McIntosh, Allysan Armstrong-Brown, Wei-Ping Chan

Aims

The goals of this project were to:

1. Utilize the benefits of simulation to efficiently provide a structured orientation to anaesthesia
2. Utilize the benefits of simulation to help trainees develop individual learning plans during the early phase of their training
3. Provide a structured assessment of novice trainees prior to them being able to practice without direct supervision

Background

The Australian and New Zealand College of Anaesthetists requires structured assessment of trainees before they are permitted to practice without direct supervision. Observation of trainee ability to manage multiple crises is difficult to achieve reliably and efficiently without the use of simulation.

Methods

The 3 part program was designed by simulation faculty in collaboration with the Supervisors of Training:

- 2 days of lectures, problem-based learning sessions, skills and 1 day of simulation (All incoming trainees, n = 21)
- A 3 month structured assessment process comprising direct observation in the workplace, completion of trainee log books, structured viva sessions and a simulation session at the end of 3 months (All novice trainees, n = 5)
- A pre-existing one day simulation based intensive care orientation program (All trainees commencing intensive care rotation, n = 9)

Evaluation feedback was collected at the end of the course and at 3 months.

Trainees were assessed using a combination of weighted checklists and a modified mini-CEX.

Outcomes

Evaluation feedback at the end of the course indicated that trainees rated the course highly; in particular the simulation component was rated as extremely useful. 90% of trainees stated that the program overall was useful in developing an individual learning plan.

Four out of five registrars were assessed as able to work without direct supervision; specific problems with communication and clinical judgement were identified with the fifth registrar.

Conclusion

Simulation provides an efficient means of introducing trainees to a new environment and assessing large numbers of skills and behaviours in novice trainees prior to unsupervised practice. In addition, it can highlight skill and knowledge gaps in order to tailor teaching programs.

Rural Maternity Teams Who Work Together Train Together

L Rogers, D Stone, L Gum

Aim

CSiM is a research project that intends to generate new theoretical approaches for clinical practice and education, exploring how participation in clinical simulation learning can enhance maternity rural practice.

This research has the potential to generate new understandings about the way clinicians translate knowledge into clinical practice using state-of-the-art teaching and learning through simulation.

Background

Clinical Simulation in Maternity (CSiM) is a research and multi-disciplinary education initiative by the Flinders University Rural Clinical School in collaboration with the Queensland Health Skills Development Centre. This innovative program enables multi-disciplinary teams of rural clinicians to maintain and expand their clinical skills and knowledge in managing normal deliveries and obstetric emergencies.

Methodology

The workshop involves 8 participants who participate within their own working teams. The workshop consists of education sessions, skills stations, simulated emergency scenarios, and debriefing.

In-depth interviews were conducted with all workshop participants and facilitators immediately post workshop and at 3 months. The interviews were video recorded and then transcribed verbatim. The data is currently being analysed using Strauss and Corbin's three step method.

Results

CSiM is proving to be a stimulating and effective method for the multi-disciplinary maternity teams to maintain and improve their skills through a hands-on-approach, whilst enhancing rapport building and confidence both individually and collaboratively.

Conclusion

Early Results show that clinical simulation in maternity emergencies increases confidence, teamwork and reflective practice. Participants found the experience positive and useful for rural practice.

Evaluation of Simulated Skills Cluster Testing Related to Student Competence and Self Efficacy in an Accelerated Online Bachelors Degree to BSN

Stephanie Stewart, Jennifer Thyes

Aims

The purpose of this study is determine self efficacy and perceived competence of accelerated nursing students after participating in three human patient simulator scenarios: 1) basic nursing skills assessment; 2) complete adult health history; and 3) adult medical surgical forced assessment during a two week combined residency lab and clinical "bootcamp" in an online accelerated bachelor's degree to BSN.

Background

Our nursing program allows qualified students who already have a bachelor's degree to earn a Bachelor's degree in nursing (BSN) within a 12 month time period online. Students must meet admission qualifications and have completed all academic prerequisites before the beginning of the program. This program which began in May 2003, is the USA's first all online precepted bachelors degree to BSN. We are now in the process of admitting the ninth cohort of 25 students. Our students have been very successful with a 90% state board pass rate and are highly valued by employers.

The program currently has two cohorts. One runs from May-May; the other from October-October. Students take one course at a time (although some clinical courses run concurrently with a corresponding theory course) and progress through the program as a cohort. Theory courses are offered online at a rate of one credit per week. The rapid pace demands a full-time commitment to academics. Therefore, students are required to sign an agreement stating they will not hold employment during the program. There are two weeks of campus residency (termed bootcamp") approximately three months into the program student come to campus for intensive skills and health assessment labs and the first clinical rotation. Students then complete the rest of their clinical hours in their home cities or nearby locations under the direct guidance of a qualified registered nurse preceptor and are supervised by UW Oshkosh clinical faculty. For the first time we are integrating simulated skills cluster testing into the two week "boot camp"

Methods

The design is pretest posttest. Students will be pre tested using a self efficacy tool and a skills competency tool (clinical simulation evaluation) (1) prior to simulation in their intensive "bootcamp," then they will be post tested after experiencing the simulation using the same tools. They will be further "posttest" tested using the same tools after their hospital clinical experience.

Results

This study will take place summer 2007

Conclusions

The Results will be reported in the poster.

Reference

1 Radhakrishnan, K., Roche, P., Cunningham, H. (2007) "Measuring Clinical; Practice Parameters with Human Patient Simulation: A Pilot Study.," International Journal of Nursing Scholarship. vol. 4, issue1, pp. 1–11

NAPS: Simulation Enhanced Curriculum Redesign for Non-Anaesthetist Administration of Paediatric Sedation

Susie Lord, Cate McIntosh, Kathryn Davies

Aims

To utilise the benefits of simulation to redesign a training program for non-anaesthetist administration of paediatric sedation. The goal is to improve the quality and safety of the sedation service.

Background

A clinician is not safe to administer sedation unless they are also competent in the management of the potential adverse events. Complications are rarely encountered during supervised training and, when they do occur, the supervisor frequently steps in and takes over management of the child.

In addition, current training requires one on one supervision for each trainee for each clinical exposure. This level of resource intensity is unsustainable and has led to insufficient numbers of trained staff and poor access for children to sedation services. During 2006, only two staff completed sedation training at our hospital.

Simulation can reliably and efficiently provide exposure to multiple adverse events ensuring uniform training experiences for larger numbers of clinicians.

Methods

A review of training practices revealed deficiencies: written materials required evidence based revision, inadequate equipment education, inadequate access to lectures, inadequate access to suitably skilled clinical supervisors, and a lack of educational opportunities to manage sedation-related adverse events.

The new simulation based course was designed in collaboration with stakeholders who provided funding for a sedation simulation coordinator. Prerequisites for course participation are completion of revised online package and attendance at a lecture covering conceptual material. The one day course incorporates skills sessions (airway and equipment), group discussions and participation in team simulation scenarios. The assessment process, conducted on a separate occasion, will incorporate a weighted checklist, developed by a panel of experts via a modified Delphi process, and an assessment of non-technical skills.

Anticipated outcomes

During the next 12 months, 40–50 doctors and nurses will be trained in the delivery of paediatric sedation.

Conclusion

As a result of this course, children who undergo painful procedures during the course of their treatment will have improved access to a quality analgesia and sedation.

Using Simulation to Uncover Knowledge and Skill Gaps...What does a Decrease in Confidence Mean?

Cate McIntosh, Lee-ann Kitto, Simon Ford, Narrell O'Dea

Aims

To compare PGY1 change in confidence with performance and perceptions of utility of simulation based cardiac arrest training.

Background

Evidence suggests that doctors are inaccurate at assessing their skills; in particular confidence does not correlate with performance(1,2). However, participants' self-stated goals prior to attending the simulation centre are frequently to increase confidence. We had noticed little change, or even a decline, in confidence levels as a result of courses and sought to compare this with perceived usefulness of the course and with performance. Self-assessment alone is likely insufficient to identify one's own knowledge and skill gaps and perhaps a decrease or little change in confidence reflects appropriate recalibration on reflection post course performance.

Methods

All PGY1s (n= 65) have been enrolled in the program (45 participants to date, 5 per half-day) which provides a structured approach to ACLS training incorporating team performance issues; participation is compulsory.

Feedback was collected at the end of the course and will be collected again after 6 months. Confidence levels were measured pre and post course using a 10 point scale.

Participants were assessed using a combination of weighted checklist and a modified mini-CEX.

Results

Evaluation feedback at the end of the course indicated that trainees rated the course extremely highly (4.9 out of 5.0). 79% of participants stated that their confidence level increased (average increase 27%) as a result of doing the course. 21% stated their confidence levels did not change or declined. There was no relationship between confidence and performance, nor between change in confidence and previous clinical experience with cardiac arrest, nor between change in confidence and perceived utility of the course.

Conclusion

The lack of change and/or decrease in confidence in 21% of our participants was a surprising finding and the significance of this is unclear. This may have been due to the brevity of the course, some other problem with our course design, or due to participant discovery of a perceived knowledge and skill gap. Are we scaring them witless or are we progressing them from unconsciously incompetent to consciously incompetent?

References

1 Wayne DB, Butter J, Siddall, VJ et al. Graduating internal medicine residents' self-assessment and performance of advanced cardiac life support skills Medical Teacher 2006; 28:365-369

2 Barnsley L, Lyon PM, Ralston SJ, Hibbert EJ, Cunningham I, Gordon FC, Field MJ. Clinical skills in junior medical officers: a comparison of self-reported confidence and observed competence Medical Education 2004;38:358-367

Mock Code Blue for Nursing Students

Janet Willhaus, Rebecca Sander, Anissa Sonntag

Aims

This project was aimed at improving student comfort levels with responding to a code blue emergency.

Background

Fort Hays State University nursing students nearing graduation have traditionally been familiarized to "code blue" emergencies in a final lab experience. During the Fall 2006 and Spring 2007 semesters a simulation utilizing the Laerdal Sim Man was added to familiarization.

Methods

Instruction included a short video emphasizing nursing responsibilities. Orientation to the crash cart and discussion about psychosocial reactions to a resuscitation event were covered by the instructors. Students observed a simulation where the Laerdal Sim Man progresses from chest pain with pre-ventricular contractions to ventricular tachycardia to ventricular fibrillation to no electrical heart activity. The students then drew lots for various roles and the code program was initiated. After each session the students were debriefed with a digital recording of the events.

Results

In all cases the students were able to initiate oxygen and call for a crash cart within one minute. All groups successfully initiated CPR and bag/mask ventilation when indicated. Initiating intravenous access time varied between 4 and 8 minutes. All student groups required some prompting to recognize a rhythm requiring a specific drug. Students completed a short quiz following the simulation. with scores of 90% or better. Anecdotally, students enjoyed the familiarization. Some requested to repeat the simulation to attempt to improve their performance.

Conclusions

Simulation programming to include additional cardiac rhythms would further test student recognition. Research is needed to support learning clAims.

Reference

Childs, J.C. and Sepples, Susan (2006) Clinical Teaching by Simulation: Lessons Learned From a Complex Patient Care Scenario, Nursing Education Perspectives, 27(3), p. 154-158.

Improving Nursing Student Assessment Skills for Mother and Newborn Care

Janet Willhaus, Kim Riffel, Kathleen Ward

Aims

This project is aimed at improving post-partum and newborn assessment and charting skills for students in the first semester of their senior year of nursing education.

Background

Through special funding the Fort Hays Sate University Department of Nursing acquired two moderate fidelity Laerdal nursing manikins representing a part-partum woman and an infant.

Methods

The instructors prepared a practice assessment simulation designed to provide experience for students prior to their first hospital clinical on the labor/delivery/ postpartum/nursery ward. The postpartum manikin provides students experiences such as uterine height evaluation. Pads and baby diapers prepared with common kitchen ingredients represented varying amounts of lochia discharge, meconium, transition stools and urine offered additional assessment experience. The instructor coached the students in patient teaching for postpartum and newborn topics. Each demonstrated a baby bath, a straight catherization and administration of commonly used injectables. Bedside computers reinforced charting cares and findings. A total of 35 students participated during the Fall 2006 and Spring 2007 semesters.

Results

Because the post-simulation survey was for extra-credit only, not all students responded. Those that did indicated that the assessment had been worthwhile. Anecdotally the clinical instructor indicated more students volunteered for patient teaching activities than in semesters prior to the inclusion of the simulation.

Conclusions

The simulation requires approximately one hour per student to complete and is therefore time-consuming. A pre-test, post-test survey with statistical evaluation would provide more data.

Didactic Strategies for the Development of Medical Skills through the Clinical Simulation in Colombia and its Influence in Latin America

Adalberto Amaya

Aims

Poster summarizes different applied didactic strategies in the clinical simulation for the development from medical skills on the part of the Medicine students in Colombia which generated an impulse for the clinical simulation in the rest of Latin America. It describes the type of medical skills obtained through those didactic strategies and their generalization in 35 centers of simulation on which Colombia counts at the moment.

Background

To show different didactic strategies that they are used at the moment in the practices of clinical simulation in Colombia with the purpose of implementing the world-wide tendency to make the medical skills in different levels and contexts from competition evident. Simultaneously, to show the present state of the clinical simulation led by Colombia in the Latin American context.

Methods

Observation and enumeration of different elements that favor the development of medical skills and type of didactic strategy used to obtain this objective.

Results

It enumerates the changes that have taken place to the interior of the different curricula in the Medicine faculties with the purpose of actually obtaining better Results on the part of their students.

Conclusions

They become evident: the importance of the clinical simulation in the medical education by skills, the importance of applying to different didactic strategies according to the level from awaited medical skills and the repercussion on one better professional practice on the part of the Medicine students.

The Embedding of Simulation in Paramedic Courses

Melinda Service, Tony Hucker

While all paramedic practice involves working with people, it would be unconscionable to consider that paramedic students would begin to learn the basic clinical skills on “real” patients. Simulations have been valued in the teaching of paramedic clinical skills since education programs began. The fact that paramedics are required to form independent clinical judgements while working in an unpredictable, often time critical, and with sometimes uncontrollable environmental factors, area of emergency medical practice makes the use of simulation even more important. This presentation will describe how simulation has a long history in paramedic education and is embedded in the curriculum of paramedic courses at the Queensland University of Technology from the first year of the undergraduate paramedic degree through to the final units in the postgraduate intensive care program. The simulations range from the use of low fidelity manikins to learn basic clinical skills such as CPR through to high fidelity simulators used to learn higher acuity clinical management. The courses also use scenarios involving multi-casualties and interdisciplinary emergency (fire, police, SES) personnel during both day and night to reflect normal paramedic practice. Actors and/or students play the patient roles and while the scenarios are not using high fidelity simulators they simulate an incident requiring very high levels of clinical judgement and patient care management. Groups of students are exposed to about 60 simulations in a week with debriefing and reflective exercises being integral to the learning. At the end of each semester simulation is used in OSCE’s as an examination technique for the assessment of students’ clinical skills and judgements at all levels of each course.

Peer Reviewed Full Papers

3D Haptic Needle Insertion Simulator Utilising An Agent Based Spherical Voxel Model

James Mullins, Hieu Trinh, Saeid Nahavandi

Abstract

This paper describes a technique for the real-time modeling of deformable tissue. Specifically geared towards needle insertion simulation, the low computational requirements of the model enable highly accurate haptic feedback to a user without introducing noticeable time delay or buzzing generally associated with haptic surgery simulation. Using a spherical voxel array combined with aspects of computational geometry and agent communication and interaction principals, the model is capable of providing haptic update rates of over 1000Hz with real-time visual feedback. Iterating through over 1000 voxels per millisecond to determine collision and haptic response while making use of Vieta's Theorem for extraneous force culling.

1. Introduction

As the performance of haptic force reflecting hardware increases and the cost of ownership decreases, the medical field is turning towards haptic technology as a surgical simulation and training aid. Concurrently, internal organ and tissue models are becoming increasingly complex. This places unprecedented strain on computational algorithms and the hardware on which they run. As no two individuals have identical internal organs and tissue, some ambiguity can be designed into the models and as a result, some model accuracy can be traded for haptic smoothness and computational speed. We are looking at the presentation of haptic data sets recorded from a robotic needle insertion operation to validate our model. Utilising the basic fundamentals of haptic research combined with several aspects of computational geometry and agent based research has enabled us to increase the resolution and effectiveness of our haptic needle insertion process and has ultimate benefits for a variety of haptic applications.

It should be noted that using computational geometry derivatives for developing models of haptic scene graphs of needle insertion is not new. Kataoka[1] and DiMaio[2] both describe the use of custom haptic hardware for plotting and resolving force vectors in needle-tissue interaction. These methods while effective, rely on custom hardware that is only suited for a small degree-of-freedom needle simulation. Gerovich[3] makes use of a 6 axis Phantom haptic device from SensAble Technologies. This device can be used for multiple applications in the medical simulation field and is better value for money as a research and training aid. Gerovich's simulations however are limited to algorithms developed using a trial and error approach. Force vectors are set by an anesthesiologist or doctor and compared against real procedures. The model is fine-tuned over time and as a result is a slow and potentially inaccurate way of development.

There have been several studies on the collection of forces for developing models from needle insertions, Simone[4]. These studies, while thorough in their approach, are limited to data collection and analysis. Building upon this research, we have developed a model generation algorithm for creating models of soft tissue and internal organs in real time utilising a spherical voxel model based upon an agent based design philosophy. Utilising agents in soft tissue modeling is new to the literature and is our ultimate contribution to tissue simulation knowledge. To provide accurate force feedback once the needle has penetrated the surface of the tissue, we are using a spherical voxel collision detection algorithm. This system reduces the complexity of finite element analysis to a more computationally efficient level suitable for real time haptic feedback.

Development of an accurate three-dimensional model of a piece of human anatomy for needle insertion requires five steps:

1. Collection of generic force data from the area of interest.
2. Development of a 3D physical model to be imported into the haptic scene.
3. Effective detection of collisions between the model and the haptic probe.
4. Determination of correct response to forces applied once collision detection occurs.
5. Rendering of the haptic scene to screen for visual perception.

A human can feel kinesthetic changes below 1000Hz, it is important that a computational model run at least that rate[10]. Visually updating the world can occur at much slower rates of around 20Hz – 40Hz[11].

We are utilising two machines, a Dual 2.0GHz PowerMac G5 (64Bit) as a graphical processor and a dual processor 1.66GHz Core Duo as a link to the Phantom haptic device. These machines talk to one another by User Datagram Protocol (UDP) sockets, as data transfer at such high data rates with Transmission Control Protocol (TCP) is inadequate. It was found that UDP maintains an adequate level of data integrity.

2. Haptic Recording

Haptic recording is the process by which force and torque data is recorded against a set of known events. It is important to know the physical properties of the tissue in which a model will be constructed. Viscosity, hydration and elasticity all play a part in the kinesthetic representation of haptic surgical simulation.

Forces required to perform a necessary interaction be it cutting, suturing or injecting are discovered and recorded across a broad area of a particular organ. In a structured environment, a robot can be used for precise measurement and positioning of the surgical instrument for force measurement. In the case of in-vivo measurements, surgical robots are still in their infancy. As a result in-vivo haptic surgical instruments are being produced. These instruments are fitted with a magnetic Polaris based tracking system to enable similar resolutions and ranges as those based on robotics arms and are much easier for a surgeon to adapt to in the short term.

For our simulation the process of haptic data is achieved using an Epson Pro-6 industrial robot coupled with an ATI 6-axis force torque sensor and a custom needle syringe end effector. This hardware enables the precise positioning of the needle to the desired test medium with high repeatability.

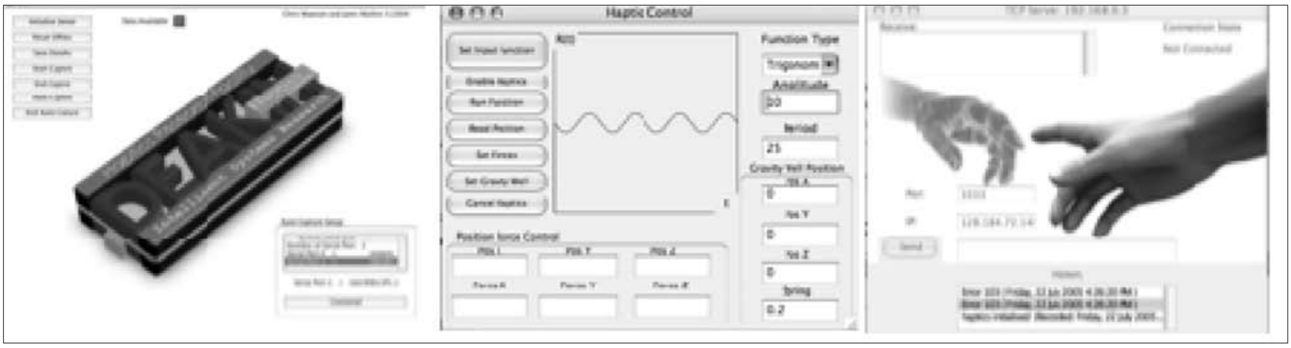


Figure 1: (A,B,C). Developed software for capturing haptic forces at high speed (~ 1200 hertz). This software also enables us to test haptic device latency and differing control schemes with instant graphical output of their effectiveness.

While we are using a robot to capture force reading via force sensor attached to the wrist of the robot, it should be noted that the technique could easily be applied to a hand controlled in-vivo surgical instrument. Because the tissue interactions are limited, algorithms have to be run to extrapolate these measurements to encompass the whole organ or tissue area of interest. Generally a surgeon would not have the capability to set up a structured grid of coordinates on an internal organ in order to gain haptic measurements in a precise well-defined manner. As a result, a form of interpolation is generally required.

Figure 2: Using an industrial robot attached to a six-axis force sensor to measure the haptic properties of neoprene. Neoprene was chosen for initial testing as it was found to have similar haptic properties to bovine liver. Differing gauges of needle were tested with a diverse array of tip geometries. These results have been stored in a material library for future reference and input into our needle model.

2. Agent Based Spherical Voxel Model

As a novel way of dealing with the problem of real-time computational efficiency, our spherical voxel model utilises over one thousand spherical nodes or voxels linked via a mass/spring damper system. These spherical voxels or nodes contain their own intelligence based on an intelligent agent schema.

The particles are constrained locally and can interact using a collision detection algorithm. This collision detection and resultant force reflection within the tissue allows the whole three-dimensional model to apply force back to a haptic user.

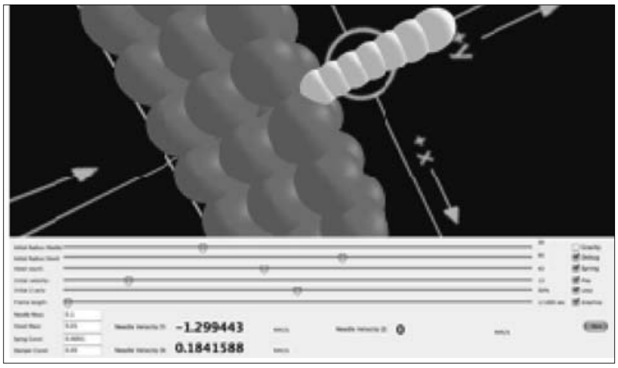


Figure 3. Spherical Voxel model as needle (yellow) penetrates modeled tissue surface.

Each element (voxel) within the modeled system has a mass, initial velocity, current velocity, elasticity (percentage deformation), radius, initial position, current position and human readable identification. This information is used to determine resultant force and voxel position once utilised by our model. External forces added to the voxels are gravity, spring and damper as well as the component forces of the haptic needle interacting with the tissue model. The spherical voxel model differs from other point force models in that it relies on the spherical surface of the voxels for force reflection.

3 Know Your Neighbour

Developed for this application, the Know Your Neigbour (KYN) algorithm is implemented by each voxel as part of the intelligent agent schema. Each voxel within the simulation keeps track of its surrounding voxels within its own memory map. The KYN thread can keep track of static and dynamic voxel movement.

Collision detection at its simplest level consists of an iterative loop of equation 1 comparing each voxel against its closest neighbours KYN. Where p1 and p2 are Voxel midpoints and r1 and r2 are voxel radii. This loop runs at approximately 2000Hz with 1000 voxels in a self contained thread.

$$|p_2 - p_1| = r_1 + r_2 \qquad (1)$$

Now that we can determine if a collision has occurred, the information is handed to the haptic frame buffer. The haptic frame buffer, which is locked at 1000Hz, derives each voxels relative position and velocity with respect to time using equation 2.

$$\left|p_2(x) - p_1(x) + (v_2 - v_1)t\right| = r_1 + r_2 \qquad (2)$$

The next important step is to determine exactly when a collision between voxels will occur. A standard quadratic module handles this function. Where a = V2, b = 2(pv) and c = (p2-r2).

$$t = \frac{-2(pv) \pm \sqrt{2(pv)^2 - 4(v^2)(p^2 - r^2)}}{2v^2}$$

This calculation is simplified even further by using Vieta's Theorem, which tells us that positive roots of equation 3 (we are only interested in positive roots as negative roots would have occurred in past timeframes) can be tested for by equation 4.

$$t_1 + t_2 = -2pv/v^2$$
$$t_1 \times t_2 = \frac{(p^2 - r^2)}{v^2} \qquad (4)$$

Where t1 and t2 are both roots of equation 3. If t1 = t2 then the voxels involved have had very minimal contact and this can be negated. If t1 x t2 is positive but t1 + t2 is negative, then both roots must be negative and there won't be a collision in this haptic frame. If t1 x t2 is negative, then either t1 or t2 is negative. Since we know that t1 <= t2, t1 must be negative; again, no collision in this frame. The remaining case is that both t1 x t2 and t1 + t2 are positive. If both conditions are true a collision will occur within the haptic frame. Performing this simple test allows us to determine whether or not further expensive computation is required.

Now that we have determined a collision will occur, its response is relatively simple. Velocities for both interacting voxels v1 and v2 are calculated based on voxel mass and position as shown in equation 5.

As mentioned previously, all of these calculations are occurring at 1000Hz. Now that collision detection and resultant forces have been determined, it is time to add the mass spring/damper system to the model.

$$v_{1\,final} = v_{1\,initial} - k \times m_2 \times N$$
$$v_{2\,final} = v_{2\,initial} + k \times m_1 \times N$$
$$where:$$
$$N = normal(p2 - p1)$$
$$k = \frac{c(e+1)}{(m_1 + m_2)}$$
$$c = normal(v_1 \bullet v_2)$$
$$e = \text{elastic coefficient range}: (0\text{-}1)$$

Because the voxels themselves are normally at rest, the mass spring system need only be applied to bodies that have experienced displacement within a preset time frame. The model at this stage utilises a standard parallel spring damper system as show in figure 4.

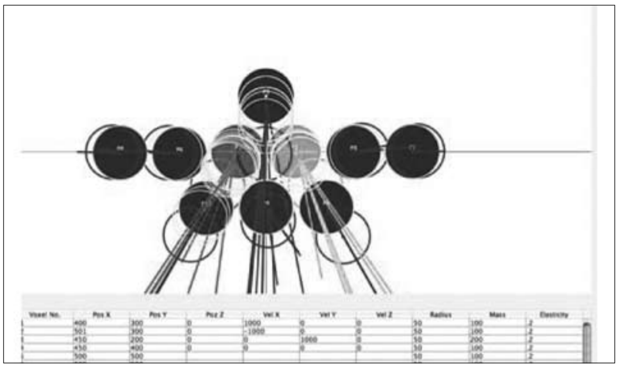
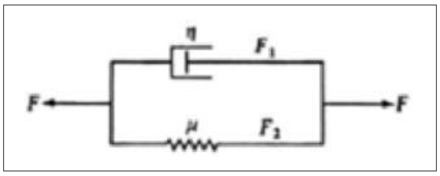


Figure 4a. Early 2D representation of agent based physics engine.



4b. Parallel spring damper system used in spherical voxel model

Standard equations (8,9) are used for spring and damper force calculation respectively.

$$\mathbf{f}_{spring} = -k_s\mathbf{x} \qquad (6)$$
$$\mathbf{f}_{damp} = -k_d\mathbf{v} \qquad (7)$$

As the damper requires instantaneous closing velocity, equation 8 is used. In Equation 6, x is used to denote displacement from the voxels initial resting position pinit.

$$\mathbf{e} = \frac{\mathbf{r}_1 - \mathbf{r}_2}{\left|\mathbf{r}_1 - \mathbf{r}_2\right|}$$
$$v = \mathbf{v}_1 \cdot \mathbf{e} - \mathbf{v}_2 \cdot \mathbf{e} \qquad (8)$$

Values for ks and kd as well as voxel mass and radius are determined experimentally. Needle mass and velocity is a known quantity and is derived from the Phantom haptic device. Due to the nature of the collision detection algorithm, voxel radius has a significant impact on the forces acting against the virtual needle, most notably, the frictional forces acting upon the body of the needle shown in figure 5. Generally the equation for needle insertion can be described as in equation 9 (Simone et al). Cutting force is impacted by voxel mass, friction by radius and stiffness by a combination of the two combined with the voxel elasticity.

$$f_{needle}(x) = f_{stiffness}(x) + f_{friction}(x) + f_{cutting}(x) \qquad (9)$$

It was discovered early on that soft tissue is non-linear in that voids and granularity is represented in all haptic recording data. This accounts for error in the modeled output. It should be noted however, that this granularity can be accounted for in the voxels themselves. Each agent based voxel has a damage property. When a virtual needle interacts with a tissue voxel.

The intelligent agent linked to that voxel determines the amount of contact and the likely damage that will occur. As a result, it our 3D simulations, the voxel radius is reduced to simulate damage to the tissue upon needle contact. This damage is reversible give a change in time (Δt).

3. Haptic Rendering

The last step from a kinesthetic point of view is the physical haptic rendering. Our algorithm interfaces directly with an OCX developed based upon Sensable's latest HDAPI and HLAPI's. Reporting to a standard haptic servo loop of approximately 1000Hz, the algorithm determines the position of the probe at a reduced rate of around 400Hz. Once the probes position is known, it is tested against the closest spherical voxel utilising the above mentioned collision detection techniques. The actual haptic hardware chosen for force reflection is the Phantom Omni from SensAble due to its relatively low cost.

4. Results

It is hard to represent the tactile accuracy of a needle insertion, however, the force model graphs showing the calculated model forces with respect to an actual needle insertion have shown to be extremely similar.

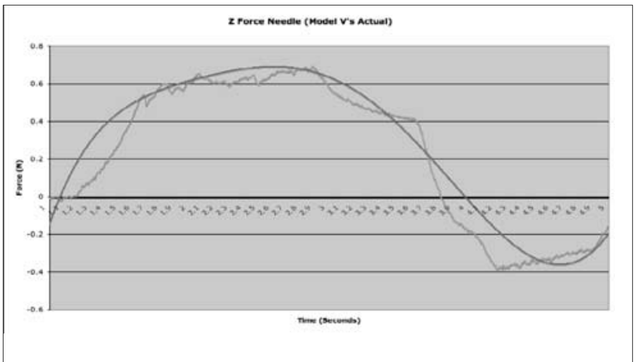


Figure 5. Modeled haptic force plotted against a haptically recorded force from a needle insertion into neoprene rubber.

Because the haptic properties of the model rely on fast update rates, it is important to know when the algorithm is saturated. Saturation occurs when the spherical voxel count exceeds the computational capabilities of the host machine. Therefore, a selection of different processors has been tested as a basis for comparison. Note that the spherical voxel model will fail before the graphical representation meaning only the spherical voxel model failure rates will be shown.

Number of Spheres	Haptic Frequency (Hz) A	Haptic Frequency (Hz) B
250	833.3	3050.4
500	714.3	1993.4
750	666.7	1439.8
1000	66.7	1062.4

Table 1: Haptic servo loop speed versus the number of spheres on two different computers. (A) is a 1.4Ghz Pentium 3, (B) contains a dual 1.66Ghz Core Duo.

Table 1 shows the corresponding decrease in the speed of calculation for the haptic servo loop based on the number of calculated voxels. To achieve realistic results from the algorithm, a high speed computer is required (B). It shows that to maintain smooth and buzz free operation of the haptic device, a Core Duo at 1.66Ghz can render approximately 1000 spheres. The slower computer (A) can only successfully render around 150 spheres.

We chose neoprene foam rubber as a surface to inject to test our model because of its apparent similarity to that of human skin. Figure 5 (lighter - blue) shows a typical robotic needle insertion perpendicular to the surface. Figure 5 (darker - red) also shows a typical force plot of a needle insertion into our spherical voxel model. While still undergoing development, the model shows the general profile of a needle insertion operation. Being a 3D capable model, all three axis forces are resolved and presented to a user haptically.

5. Conclusions

This paper presents an overview of the algorithm we are currently testing and enhancing for the measurement and playback of haptic data sets to aid in medical needle insertion simulation and training. Utilising aspects of computational geometry, intelligent agents and haptic force reflection, allows the model to be developed in real time. As a surgeon or surgical robot adds data points, a graphic model continually evolves. Force data captured from the needle probing is iterated through our spherical voxel model to determine a correct force scale. Adding more data points enhances the resolution and accuracy of the model. Haptic scene servo loops are maintained up to around 1000 spheres using currently available high-end consumer workstations. It should be noted that due to the nature of the agent based voxel programming, the simulation supports distributed computing. While a current machine may only be able to model a particular organ, multiple machines collaborating are theoretically able to model entire structures.

The data collection and modeling procedure has been tested on varied rubber composites of differing shapes. This has allowed the testing of a visual model creation algorithm [12], [13] as well as the spherical voxel haptic model generation capability.

By using readily available haptic devices and off the shelf components, we are hoping that this technology will be adopted into the medical community in the near future.

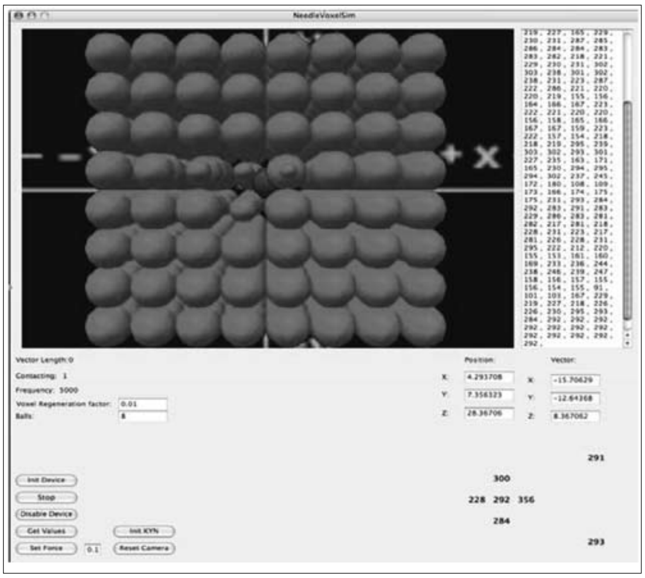


Figure 6. Window showing the NeedleVoxelSim program and a 5 x 5 x 5mm rendered tissue sample.

The needle tip is shown inserted and voxel damage has been depicted by a reduction in the damaged voxel radii.

6. Future Work

As our algorithm continually evolves, we hope to add more features to realistically simulate the physical organ or tissue. Our spherical voxel model will be evolving to take advantage of faster technology. An auto configuration script capable of setting core values such as voxel radius, mass and elasticity will simplify new tissue integration.

Our first step will be to develop a three-dimensional visual engine capable of rendering the organ or tissue under haptic evaluation. Adding a sense of depth perception to the model, which will greatly enhance users' understanding of the scene.

As computational hardware continues to evolve, we plan to combine the visual processing and haptic rendering on the one machine.

7. References

[1] H. Kataoka, T. Washio, K. Chinzei, K. Mizuhara, C. Simone, and A. Okamura, "Measurement of Tip and Friction Force Acting on a Needle During Penetration," Proceedings of the Fifth International Conference on Medical Image Computing and Computer Assisted Intervention -- MICCAI 2002, Lecture Notes in Computer Science (Vol. 2488), T. Dohi and R. Kikinis, Eds., 2002, pp. 216-223.

[2] S. P. DiMaio and S. E. Salcudean, "Needle Insertion Modelling for the Interactive Simulation of Percutaneous Procedures," Proceedings of Medical Image Computing and Computer-Assisted Intervention, Tokyo, September 2002

[3] O. Gerovich, P. Marayong, and A. M. Okamura, "The Effect of Visual and Haptic Feedback on Computer-Assisted Needle Insertion," Computer-Aided Surgery, Vol. 9, No. 3, 2004

[4] C. Simone and A. M. Okamura, "Haptic Modeling of Needle Insertion for Robot-Assisted Percutaneous Therapy," Proceedings of the IEEE International Conference on Robotics and Automation, 2002, pp. 2085-209

[5] Delaunay Refinement Mesh Generation, Ph.D. thesis, Technical Report CMU-CS-97-137, School of Computer Science, Carnegie Mellon University, Pittsburgh, Pennsylvania, 18 May 1997

[6] Delaunay Refinement Algorithms for Triangular Mesh Generation, Computational Geometry: Theory and Applications 22(1-3):21-74, May 2002

[7] Fortune, S., "A Sweepline Algorithm for Voronoi Diagrams," Algorithmica, 2:153-174, 1987.

[8] Guibas, L. and Stolfi, J., "Primitives for the Manipulation of General Subdivisions and the Computation of Voronoi Diagrams," ACT TOG, 4(2), April, 1985.

[9] Malcolm Sambridge, Jean Braun and Herbert McQueen Geophysical Journal International v122, pp837-857, 1995.

[10] GHOST SDK Reference Manual GHOST ® SDK API Reference Version 4.0 SensAble Technologies, Inc. 2003.

[11] Parkhurst, D., Culurciello, E., & Niebur, E. (2000). Evaluating variable resolution displays with visual search: Task performance and eye movements. Proceedings of the ACM Eye Tracking Research and Applications Symposium, 1, 105-109

[12] Mullins, J., Trinh, H. and Nahavandi, S. (2004) A Real Time Haptic Model Generation Technique for Surgical Needle Insertion Simulation, Mechatronics and Robotics '04, pp. 350-354, Institute of Electrical and Electronics Engineers, United States

[13] Mullins, J., Trinh, H. and Nahavandi, S. (2004) Soft Tissue Modelling for Haptic Rendering in Virtual Environments, Mechatronics 2004. Proceedings of the 9th Mechatronics Forum International Conference, pp. 693-698, Atilim University Publications, Turkey

The Integration of Physiology Models with Avatars to Expand the Opportunities for High-Fidelity Medical Training

Laura Kusumoto, David Shorrock, Wm Leroy Heinrichs, Parvati Dev, Patricia Youngblood

Abstract

Game technology incorporated into today's training and educational environments promise positivetraining effectiveness in curricula focusing on situational awareness, decision-making, and team coordination; forexample, in a mass casualty incident. This paper describes a current program to merge medical and gamingtechnologies so that computer generated, but human-controlled avatars will exhibit realistic life signs. The program isidentifying the instructional challenges and system engineering issues associated with the incorporation of multiplephysiological models into the computer generated synthetic representation of patients. The work is a collaborationbetween Forterra Systems and the SUMMIT group of Stanford University Medical School, sponsored by the USArmy (TATRC). Based on this research, a new medium could emerge that offers the instructional system designermore powerful and cost-effective solutions for a future medical training curriculum.

1. INTRODUCTION

Combining medical simulation with game technologyfocused on simulating human interaction createsopportunities for building medical trainingapplications focused on awareness, decision-making,and team coordination [1]. In research sponsored bythe US Army Telemedicine and AdvancedTechnologies Research Center (TATRC) in 2005, Forterra Systems and Stanford University MedicalMedia and Information Technologies (SUMMIT) collaborated to develop a prototype virtualenvironment, based on game technology, in whichteams of first responders could practice theirresponses to mass-casualty incidents. The prototypewas designed to support a specific curriculum, in thiscase, handling triage both on the scene of a masscasualty incident and at the hospital where thecasualties are taken for treatment. In formativeevaluations of this method of learning, a majority ofphysicians and nurses who participated rated it "aseffective or more effective" than the live trainingdrills that are conducted at their hospital for practicingmass casualty responses.

With continued sponsorship from TATRC, in 2006the collaborators began a second phase of thisresearch, to expand the curriculum and encompassmore of the in-hospital response to a disaster, and todelve into some of technology challenges encounteredin the first phase. These challenges include addressingthe tradeoffs between the level of perceived realism ina virtual environment and the cost of realism incomputation and time to develop the environment. Forthe simulation of a mass casualty incident to seemrealistic to medical professionals, it must includemany victims as well as hospital personnel, police,media, the "worried well" and others that would rush to the hospital. The victims must look and act sick or injured, and they must respond to the care given at the hospital, or suffer the consequences of care not received in time.

An effective response to a mass casualty incident requires that the respondents are prepared not only with the clinical skills to deal with patients' injuries, but also:

- Situational awareness leading to appropriate decision making and tradeoffs
- Leadership and coordination between medical team members
- Communications between team members, other hospital departments and community agencies.

Figure 1: Inter-Agency Mass Casualty Practice

Many hospitals are not adequately prepared to deal with mass casualty incidents, in part due to the lack of opportunity to develop and practice these skills [6]. This paper concludes with a comparison of current methods of preparation with the potential benefits of a simulation that combines realistic complexity, team training capability, and high-fidelity medical models.

2. MMOG GAME TECHNOLOGY

The technology used to develop the virtual environment for this research, Forterra Systems' Online Interactive Virtual Environment (OLIVE) platform, was selected for its ability to portray large numbers of people as "avatars" who appear to be together in a simulated environment, even though the participants may be logged in from computers anywhere in the world. OLIVE avatars are computer generated, but human-controlled, characters that move and act in the simulated world in much like people do in the real world. They are controlled by people using their mouse and keyboards, and given voices by people speaking into the microphones on their PC headsets. When participants in OLIVE-based training are logged in as avatars, they can interact with other people in a way that is both immersive and engaging. The natural communications between people that emerge in the OLIVE environment are at the core of this technology's ability to support team training.

When training with OLIVE, as with a live drill, the people who are not being trained would be acted out by role-players. The roles they would fill include victims of the incident arriving by ambulance and on their own, the paramedics who would accompany them, the families and friends of the victims, the "worried well" who feel they may have been hurt, the doctors and nurses from multiple shifts and departments who offer their help, hospital administrative staff and security, and others in the surrounding community such as the police and the media.

Figure 2: Paramedics Coordinate Their Response

OLIVE is a massively multiplayer online game (MMOG) platform that can support thousands of participants logged into an environment simultaneously, so that it can theoretically can be used to portray the large numbers of people who would rush to the emergency department of a hospital in the case of a disaster. In practice, however, there are practical challenges to portraying the "mass" of people in a mass casualty.

3. ENHANCING REALISM

Participants in the first-phase study pointed out technology enhancements that would support more realistic scenarios. Two of the significant challenges they identified also were named by the subject matter experts and instructional designers:

1. Increasing the population of avatars in the scenarios
2. Increasing the medical fidelity of the avatars and interactions with them

3. 1.1 Representing the "Mass" in Mass Casualty

An important aspect of the reality of a mass casualty incident is the sheer numbers of people it could involve. Even with more than 20 avatars in each scenario, some of the participants in the Phase I study commented that the environment seemed too quiet and sparse. For the experience to feel realistic, it needs more people, noise, and activity.

To address the practical problem of hiring roleplayers to fill hundreds or thousands of roles, the computer game notion of non-player characters (NPCs) could be introduced to replace human beings in roles that do not require realistic voice interaction with the trainees. NPCs are automated characters that look like avatars but do not require human operation.

Figure 3: On the Scene with Sixty Avatars

The OLIVE platform currently provides an interface to the US Army's program for controlling NPCs (as well as other types of entities, such as vehicles) in a simulation, namely OneSAF. OneSAF provides a visual user interface for controlling NPCs that can rapidly be adapted, even during the performance of a training scenario. In a research program with the US Army Research, Engineering, and Development Command (RDECOM) [4], Forterra has successfully employed SAF entities to populate Army training scenarios in OLIVE. This is one approach that may be employed to add more realism to the mass casualty scenarios. Another approach would be the use of commercial AI packages that provide crowd behavior modeling.

3.1.2 The Case for Medical Fidelity

The other significant area for improvement identified by participants in the Phase I study was that they wanted the patient avatars look and react as though they are sick or injured. OLIVE's avatars in 2005 could be healthy, injured (with a grimace and a limp), or dead, but there were no intermediate states. Although the prototype software provided a readout of patients' vital signs, some physicians and nurses in the study felt that performing triage on a healthylooking patient who has very poor vital signs simply was beyond belief.

Figure 4: Transporting Patients in a Virtual Hospital

Perhaps more importantly, to extend the training beyond triage and into the treatment phases of a disaster response, it is necessary to provide a way for the trainees to treat the patients. Although the trainees may already know how to treat patients as part of normal emergency department operations, dealing with a mass casualty disaster requires handling more patients simultaneously, placing an emphasis on good teamwork and resource management. If team members do not perform their roles appropriately or communicate well, or if they do not successfully manage critical resources such as drugs and hospital beds, their patients will suffer. Without the ability to represent the consequences of their actions in a realistic fashion, the technology would be limited in its ability to support learning from medical mistakes as well as triumphs.

3.2 AVATAR PHYSIOLOGY

The requirements integration with physiology models are based on what the physicians and nurses need to do in the scenarios, namely diagnose and treat patients.

Diagnosis of the avatar patients will be draw upon the same sort of data that medical professionals would rely upon in real-life. In simulated patients, however, the representation of these cues must be adapted to the technology. The following options are available:

- Visualization on the 3D avatar. Symptoms such as pallor, broken bones, and bleeding can be shown as colors and textures on the avatar and its clothing.
- Textbook-style pictures. For details that are too fine to be represented by the avatar, pictures may be presented (for example, the condition of the throat with the mouth open).
- Text messages may be used in placed of textbook pictures if the latter are difficult to produce or interpret.
- Patient history that can be collected by talking with the patient (who is a human role-player), if conscious, or reading the information collected on triage tags and other documentation at the hospital.
- Human role-players can also express emotions react to pain (crying, screaming) in their interactions with medical staff.

Additionally, the patients can be connected to virtual monitors and physicians may ask for diagnostic tests to run. Monitors will provide waveform readouts for parameters such as heart rate, respiration, and blood pressure. Specific diagnostic instruments will be available in the emergency room, including a portable X-ray machine.

As with the diagnostic tools, the treatments available in the virtual emergency department will be designed to support specific scenarios. In this case, the treatments will include injection of drugs, transfusion of blood, application of bandages, splints and tourniquets.

The role of the physiology models, then, will be to inform the visualization or display of symptoms for diagnosis, and to reflect the consequences of treatment, or lack thereof.

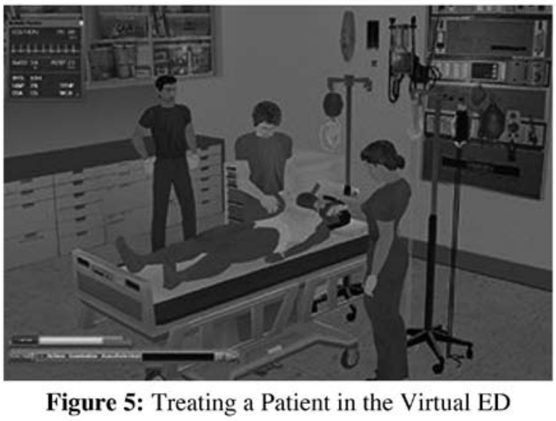


Figure 5: Treating a Patient in the Virtual ED

3.3 IMMERSIVE VIRTUAL ENVIRONMENTS

Medical first responders currently train for mass casualty incidents in a variety of ways, including:

1. Classroom or web-based instruction
2. "Table top" exercises, and other methodologies for practicing communications and coordination, often facilitated by tools such as EMERGOTRAIN.
3. Live practice drills in which the disaster response is simulated at the hospital and victims are portrayed by human role-players.

While each of these methods aids in preparedness, each has its limitations [2]. Classroom or web-based curricula provide didactic instruction about treatment methods and the hospital's disaster plans (if they exist), but they do not foster leadership nor team coordination and communications. Table top and other coordination exercises focus specifically on communications and logistics management, but many do not engage the emergency department physicians and nurses, and their relevance to actual emergency conditions is sometimes questioned [3]. Live practice drills can integrate both the clinical skills and exercise team skills, and they can include the hospital administration and both the clinical and non-clinical staff. However, live drills have the disadvantages that they are expensive to conduct, they portray only one type of incident in each drill, they can disrupt the hospital's normal operations, and they exclude personnel who work in different shifts.

Though the potential for games to facilitate medical training has been anticipated for some time [5], research is still required to gauge their place in the training continuum. Preliminary studies show promise that game-based simulation will provide an economical way to practice, either in preparation for or instead of live practice drills. By the end of 2007, this program will publish the results of a formative evaluation of this technology that we are conducting in two hospital emergency departments, one in a major teaching hospital, and the other in a local hospital that serves as a HAZMAT response center.

Multiplayer simulation solutions, such as those hosted on the Forterra OLIVE platform, are focused on the cognitive skills needed to work effectively in a team through collaboration, exploration and problem solving, and they can provide links to other types of web-based curricula. From an education and training perspective, the medium offers operational features and instructional capabilities including:

- Specific real-world places that can be developed by the end user.
- The ability to run through multiple incidents in a compressed period of time without the material and set-up costs of live practice drills.
- A session record and replay capability allows debrief, and the capability to build specific real-time scenarios for educational or medical procedure rehearsal purposes.
- Integrated with a learning management system, which is the bridge to the curriculum, existing courseware or simulation components such as mannequins or real medical hardware.
- As the system is internet-based, it can include the personnel who work night shifts or otherwise might miss the live practice drills, and can be a solution to the need for collaborative education and training over long distances.

3.4 CONCLUSIONS

This paper has identified the value of immersive simulation environments for team training, using multi-player game technology. The addition of physiology models moves the application to another level of training effectiveness, not just for the mass casualty applications, but it provides a new solution to the growing need for cognitive training in team environments.

REFERENCES

1. Dev, P.; Youngblood, P.; Heinrichs, W.L. & Kusumoto, L. (2007) "Virtual worlds and team training," *Anesthesiology Clinics*, vol. 25, pp. 321- 336.

2. Hsu, E. & Jenckes, M.; Catlett C.; et al. (2004) "Training of Hospital Staff to Respond to a Mass Casualty Incident," Publication No. 04-E015-2, July. Agency for Healthcare Research and Quality (AHRQ).

3. Inglesby, T.; Grossman, R. & O'Toole T. (2001) "A Plague on Your City: Observations from TOPOFF," *Clinical Infectious Diseases*, vol. 32, pp. 436-44.

4. Mayo, M.; Singer, M. & Kusumoto, L. (2005) "Massively Multi-Player (MMP) Environments for Asymmetric Warfare," The Interservice/Industry Training, Simulation & Education Conference (I/ITSEC), vol. 2005.

5. Vozenilek, J.; Huff, J.; Reznek, M. & Gordon, J. (2004) "See One, Do One, Teach One: Advanced Technology in Medical Education," Academic *Emergency Medicine*, November, vol 11, no 11, pp 1149.

6. Wetter, D; Daniell, W. & Treser, C. (2001) "Hospital Preparedness for Victims of Chemical or Biological Terrorism," *American Journal of Public Health*, May, vol. 91, no. 5.

NOTES

NOTES

www.simtecthealth.com

SIMULATION INDUSTRY ASSOCIATION OF AUSTRALIA

SimTecT 2007 Healthcare Simulation Conference

Conference Secretariat:

consec

Consec – Conference Management
Telephone: +61 2 6251 0675
Email: simtecthealth@consec.com.au