Simulation – Principles, Progress and Possibilities

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No Conflict of Interest

Cell phone tower Knysnaa, SA

Objectives

- To demystify Simulation
- Introduce the basis for Simulation Education
- Highlight the nSMARTT interprofessional team initiative
- Simulation in clinical practice, education and research in Neonatology

The need for a new approach

Capetown,
VA Waterfront
cafe

The Need for Simulation

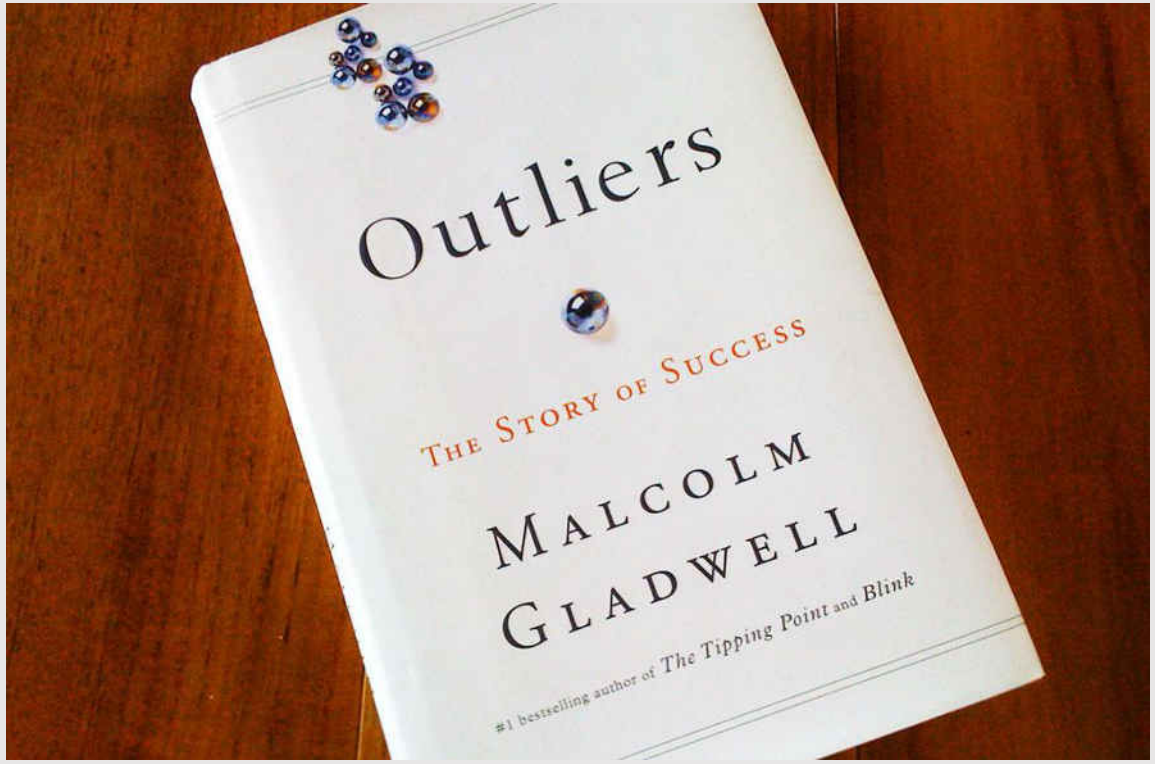
- The traditional “See one, Do one, teach one and hope not to harm one “apprentice model of graduated responsibility in the care of real patients and for acquisition of clinical, procedural and leadership skills has been termed “education by random opportunity”

The Need for Simulation

- The rationalization of work hours during residency
- The increasing breadth of technical skills required
- Limited opportunity to acquire competence in the context of safety and time
- Public outcry for accountability

Both a Challenge and an opportunity to embrace innovative learning strategies

The 10,000 hours - Novice to Expert



Harvard Business Review

www.hbrreprints.org

New research shows that outstanding performance is the product of years of deliberate practice and coaching, not of any innate talent or skill.

The Making of an Expert

by K. Anders Ericsson, Michael J. Prietula, and Edward T. Cokely

Psychological Review
1993, Vol. 100, No. 3, 363–406

0033-295X/93/$3.00

The Role of Deliberate Practice in the Acquisition of Expert Performance

K. Anders Ericsson, Ralf Th. Krampe, and Clemens Tesch-Römer

The theoretical framework presented in this article explains expert performance as the end result of individuals' prolonged efforts to improve performance while negotiating motivational and external constraints. In most domains of expertise, individuals begin in their childhood a regimen of effortful activities (deliberate practice) designed to optimize improvement. Individual differences, even among elite performers, are closely related to assessed amounts of deliberate practice. Many characteristics once believed to reflect innate talent are actually the result of intense practice extended for a minimum of 10 years. Analysis of expert performance provides unique evidence on the potential and limits of extreme environmental adaptation and learning.

Insanity: doing the same thing over and over again and expecting different results.

Albert Einstein

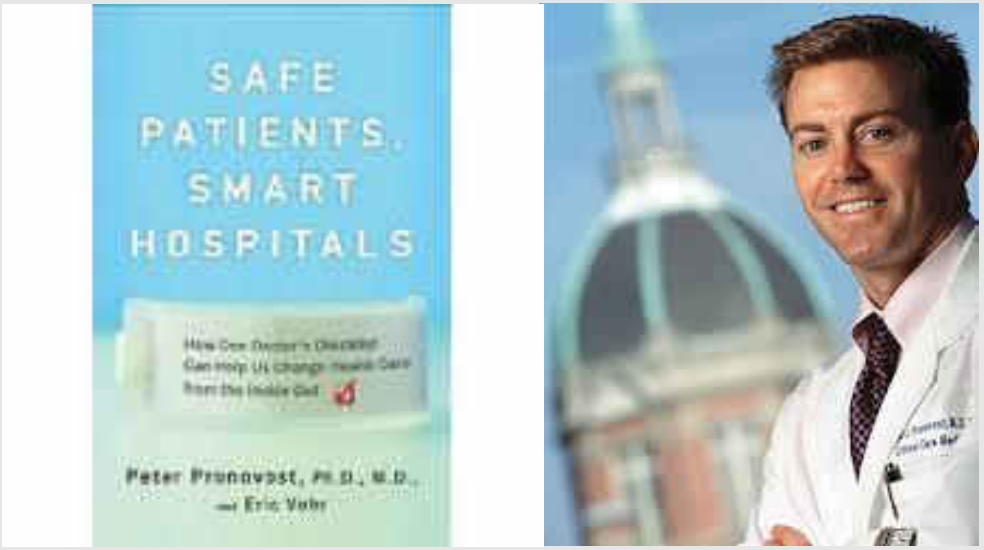
Checklists and Coaching for Mastery

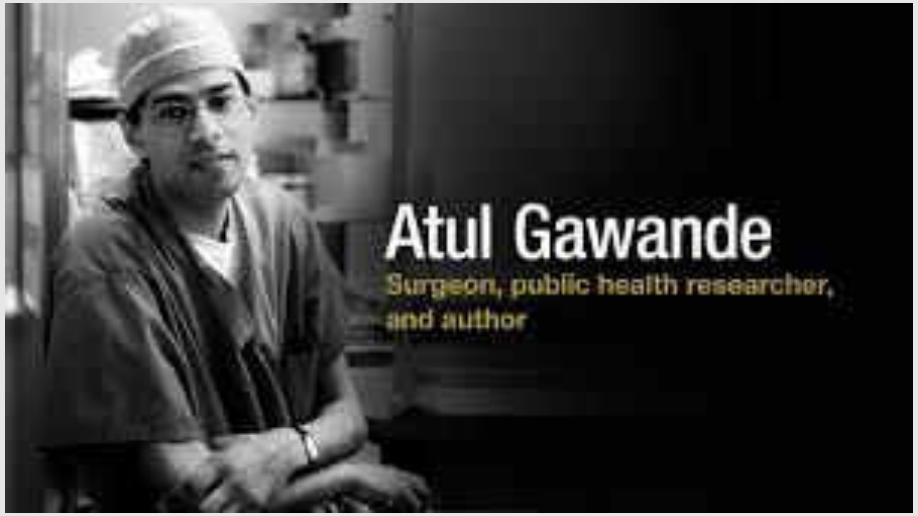
Annals Of Medicine- New Yorker

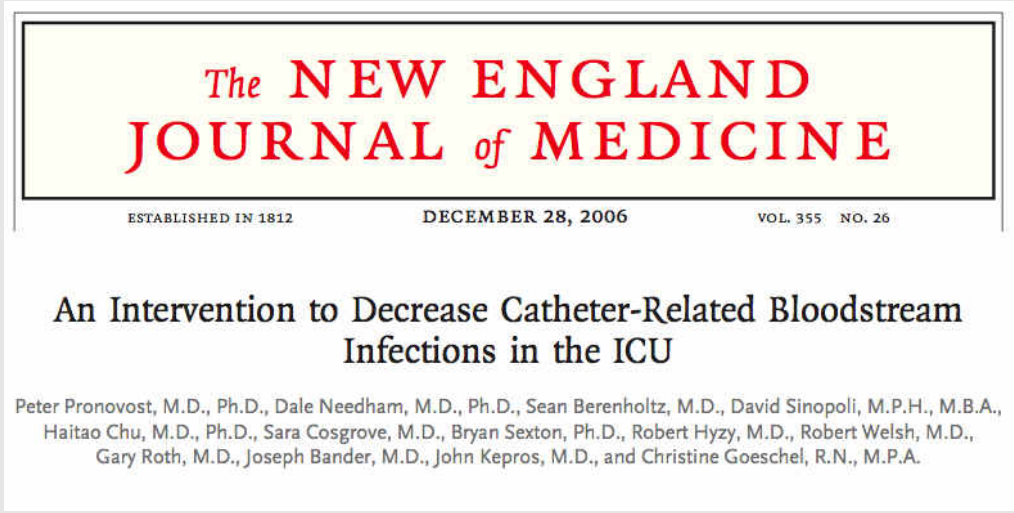
Personal Best

Top athletes and singers have coaches. Should you?

by Atul Gawande October 3, 2011







Avoiding the “July” effect and more

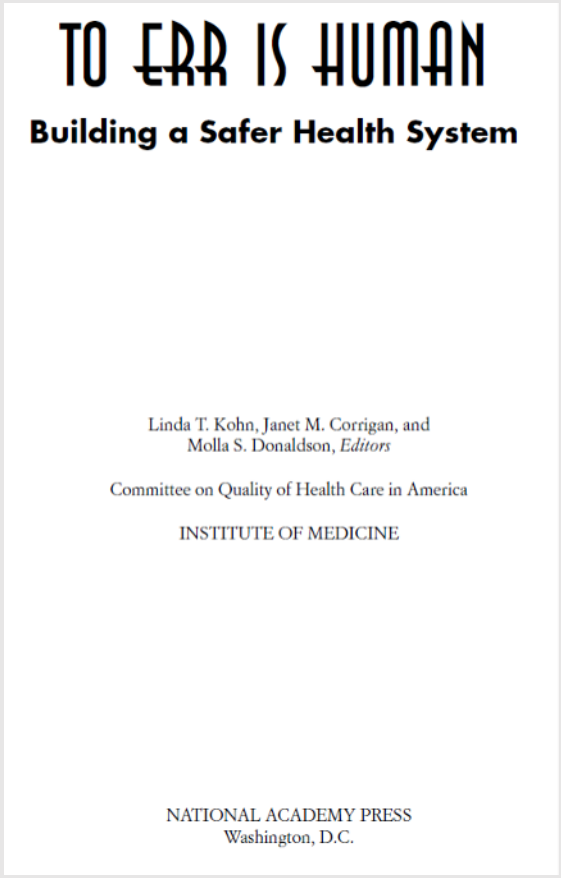
A July Spike in Fatal Medication Errors: A Possible Effect of New Medical Residents

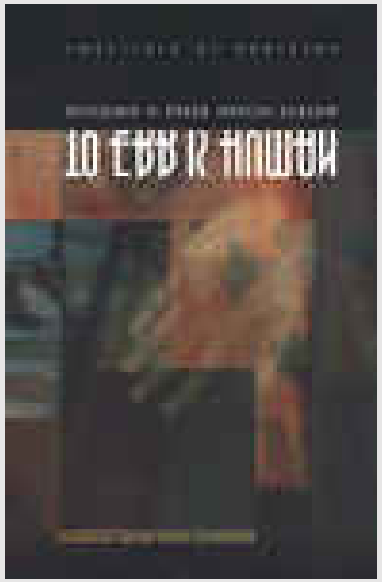
David P. Phillips, PhD[1] and Gwendolyn E. C. Barker, BA[2]

[1]Department of Sociology, University of California at San Diego, La Jolla, CA, USA; [2]School of Public Health, University of California at Los Angeles, Los Angeles, CA, USA.

Avoid the Hospital in July
Why? New doctors and nurses report to work for the first time
by Sid Kirchheimer, AARP, Updated June 2013

Institute of Medicine report 1999





Principle 5 –Create a learning environment

- Use Simulations Whenever Possible
- Health care organizations and teaching institutions should participate in the development and use of simulation for training novice practitioners, problem solving, and crisis management, especially when new and potentially hazardous procedures and equipment are introduced.

Cognitive, Technical and Behavioural and Communication skills

- In the following video you will see a novice German coast guard officer on his first day on the Job!

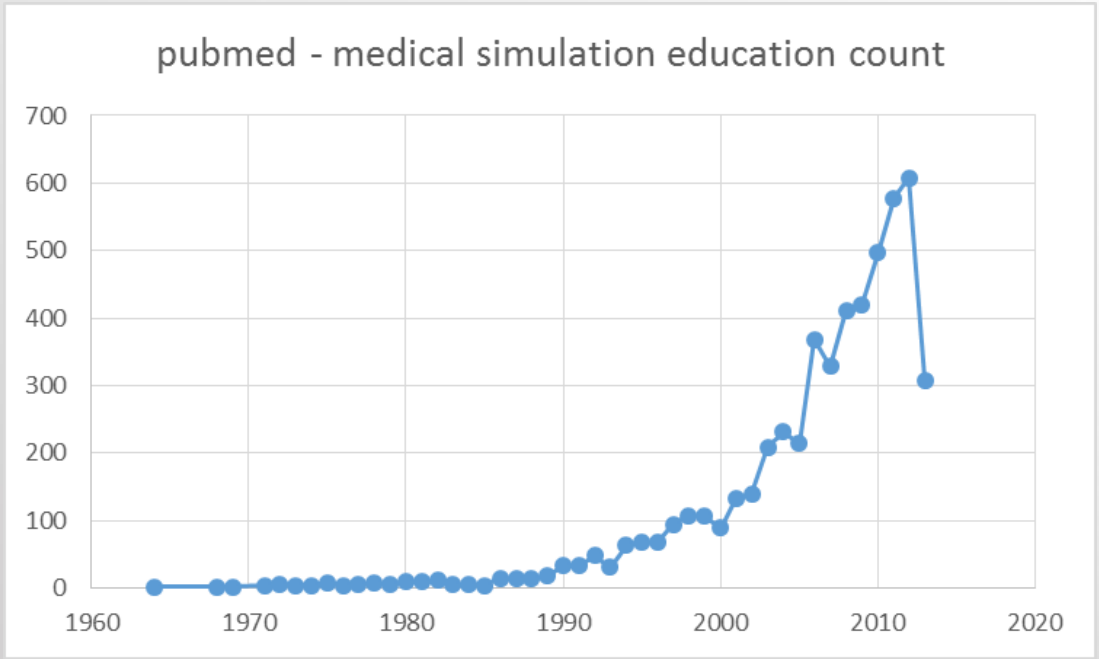
Definition of Simulation

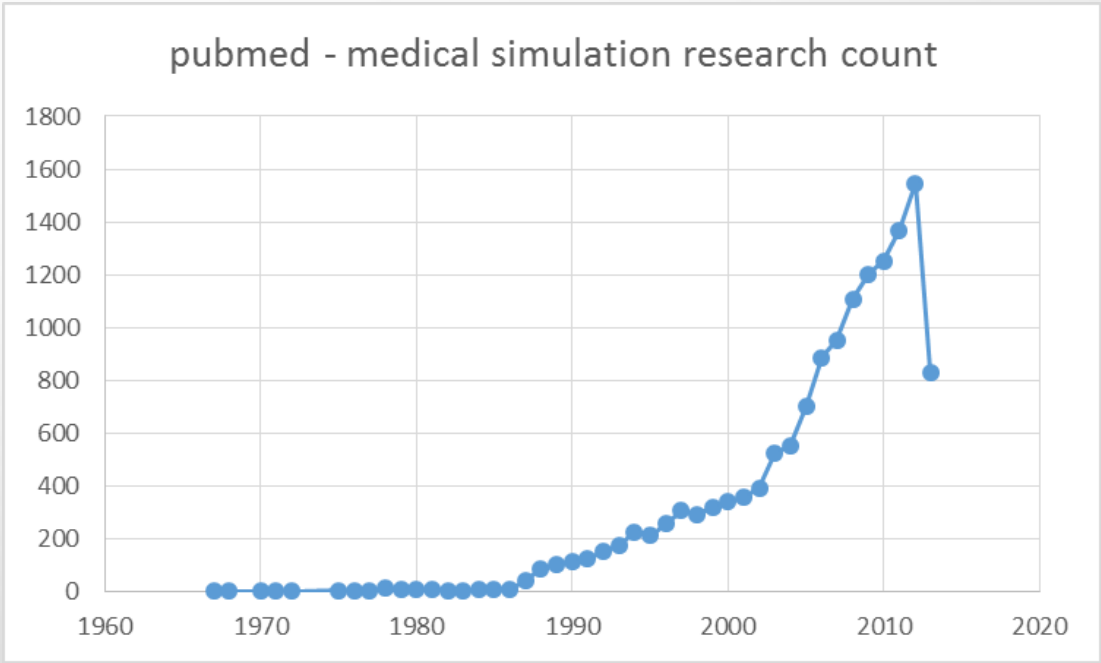
- Modern day simulation is an immersive instructional strategy, used to replace or amplify real experiences with guided experiences that evoke or replicate substantial aspects of the real world in a fully interactive manner.

Simulation and Patient Learner Safety

- Simulation enables repeated procedural exposure in a safe environment without compromising patient safety.
- Simulation protects the learner and prepares the individual for the real deal

Growth in Academic Interest in Simulation





CONTEMPORARY ISSUE

Simulation and its role in medical education

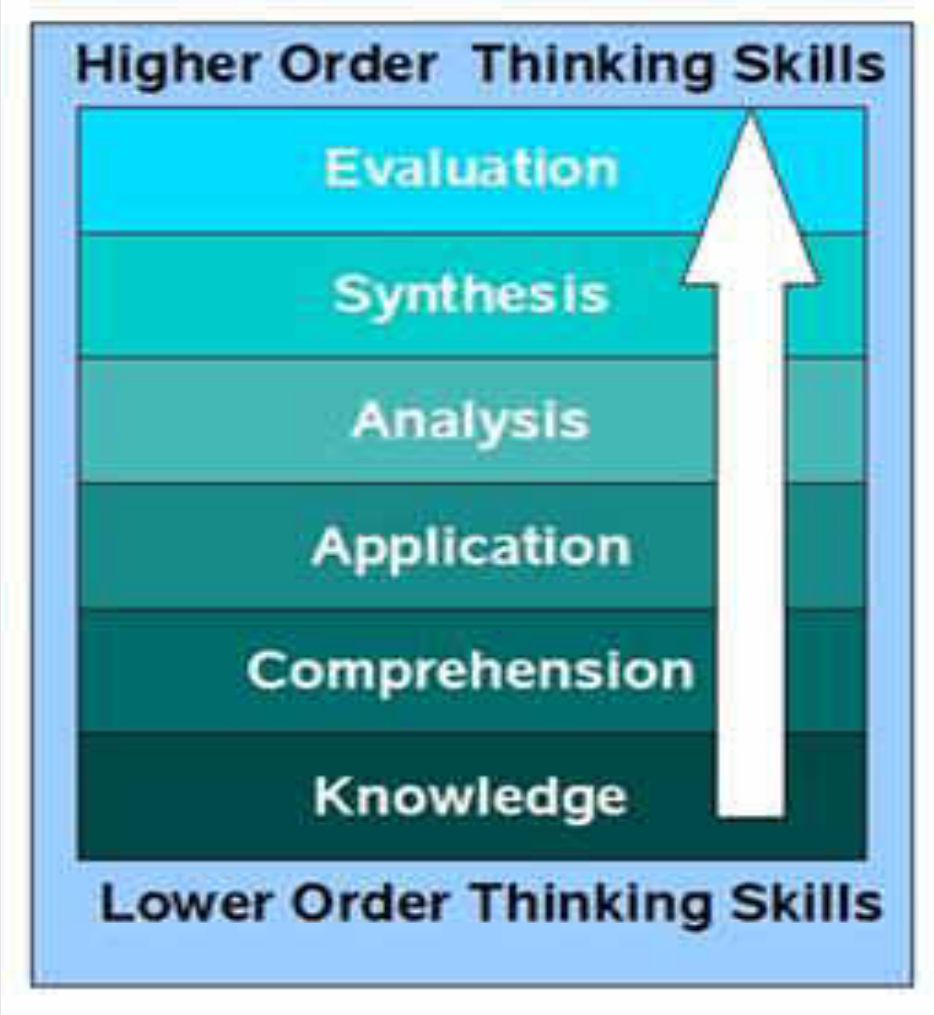
Col Rashmi Datta*, Brig KK Upadhyay, VSM†, Surg Cdr CN Jaideep‡

Med J Armed Forces India. 2012 Apr; 68(2): 167–172.

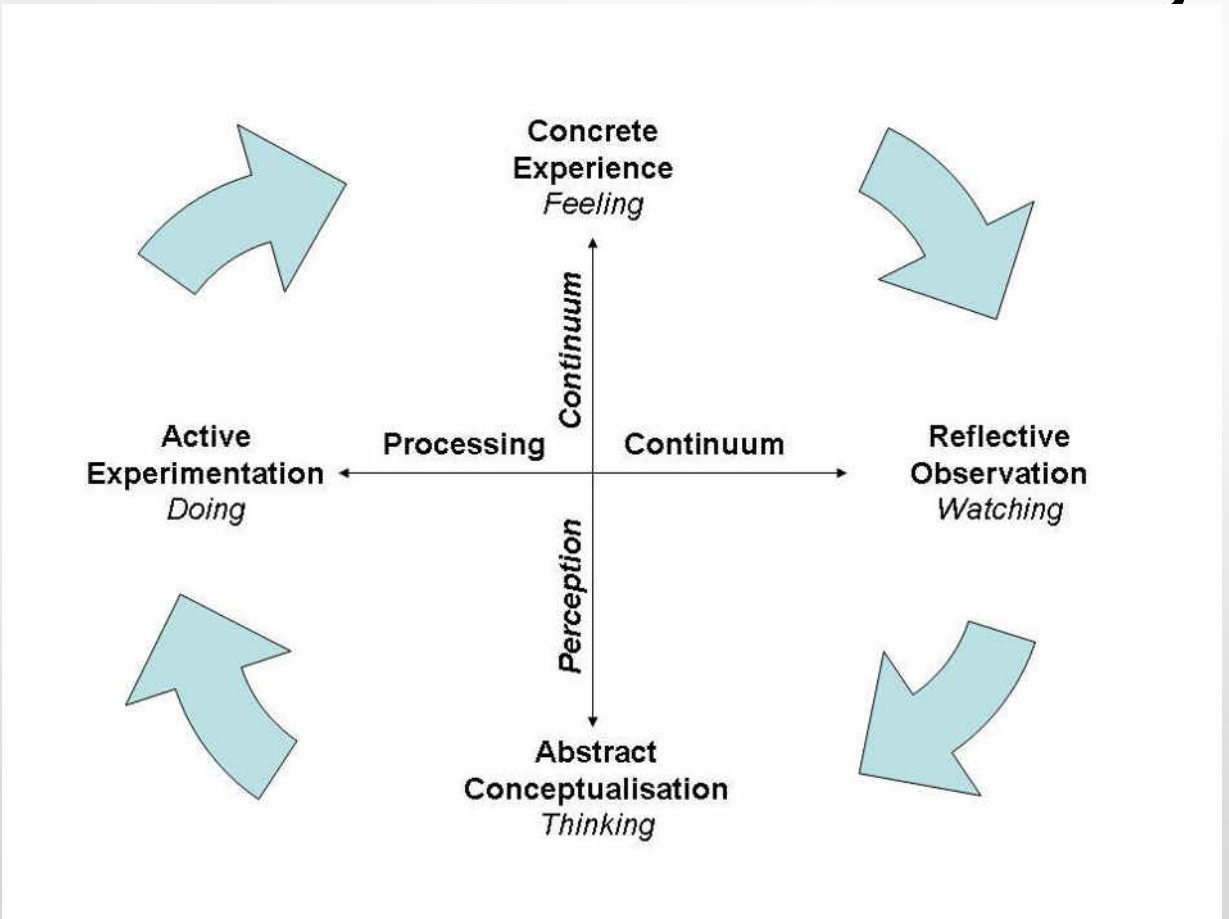
The Education Theory - Principles

- Blooms Taxonomy
- Kolb's Cycle of Experiential learning
- Circumflex model of affect

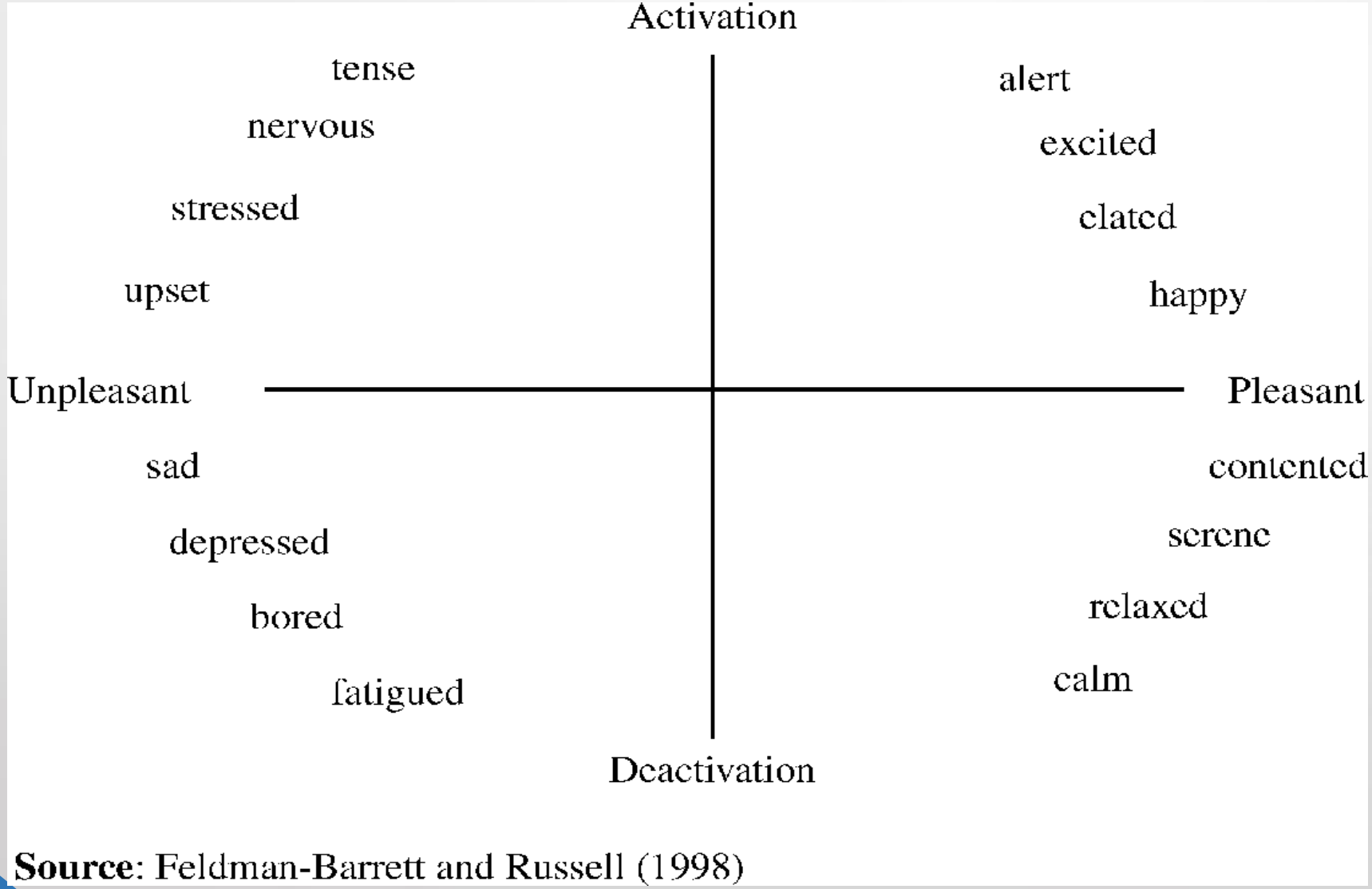
Blooms Taxonomy



Simulation And Kolbs Cycle



Circumflex mode – Getting to learning state



Source: Feldman-Barrett and Russell (1998)

Integrated innovative approaches

The educational strategies best suited to address acquisition of skills include not only didactic sessions and content acquisition but also

- audio visual review
- supervised clinical experiences
- simulated experiences
- addressing knowledge gaps
- developing competence and mastery

What we've done so far…

Picking Pebbles
Cape of Good
Hope, SA

Neonatal Simulation Medicine and Resuscitation Team Training

N Sneath, MScN, NNP*, G Srinivasan, MD, F Postolow, MD, R Heese, RRT, C Porter RN, BN and B Wheeler RN, MN.

University of Manitoba

Winnipeg Regional Health Authority / Office régional de la santé de Winnipeg
Caring for Health / À l'écoute de notre santé

Children's Hospital
Health Sciences Centre Winnipeg
Hôpital pour enfants
Centre des sciences de la santé Winnipeg

Hôpital St-Boniface Hospital

Basic assumption

- We believe that everyone participating in activities at the Clinical Learning and Simulation Facility is intelligent, well-trained, cares about doing their best, and wants to improve.

nSMARTT

Project Goals and Objectives

1. Implementation of the Golden Hour

   - Providing opportunity to practice golden hour skills in real-time in a inter-professional group
   - Improve compliance with checklist completion
   - Pre-ductal saturation monitoring by 2 minutes of age
   - Transitioning on nasal continuous positive airway pressure

2. Neonatal Resuscitation Program renewals and updates (mandatory every 2 years)

nSMARTT

Project Goals and Objectives

3. Introduction to Simulation

- Improve critical thinking and problem solving skills in high-stress resuscitation situations
- Provide a forum for and practice the skill of debriefing “The Good Judgement approach”
- Trainees make sense of, learn from and apply simulation experience to change frames and actions
- Maintain psychological safety and give accurate evaluative feedback

4. Introduction to Fundamentals of Teamwork

- Improve teamwork and communication by practicing and reinforcing the importance of role clarification and identification of an event coordinator

nSMARTT

Debriefing – The Good Judgement approach

- Goals
- Trainees make sense of, learn from and apply simulation experience to change frames and actions
- Maintain psychological safety and give accurate evaluative feedback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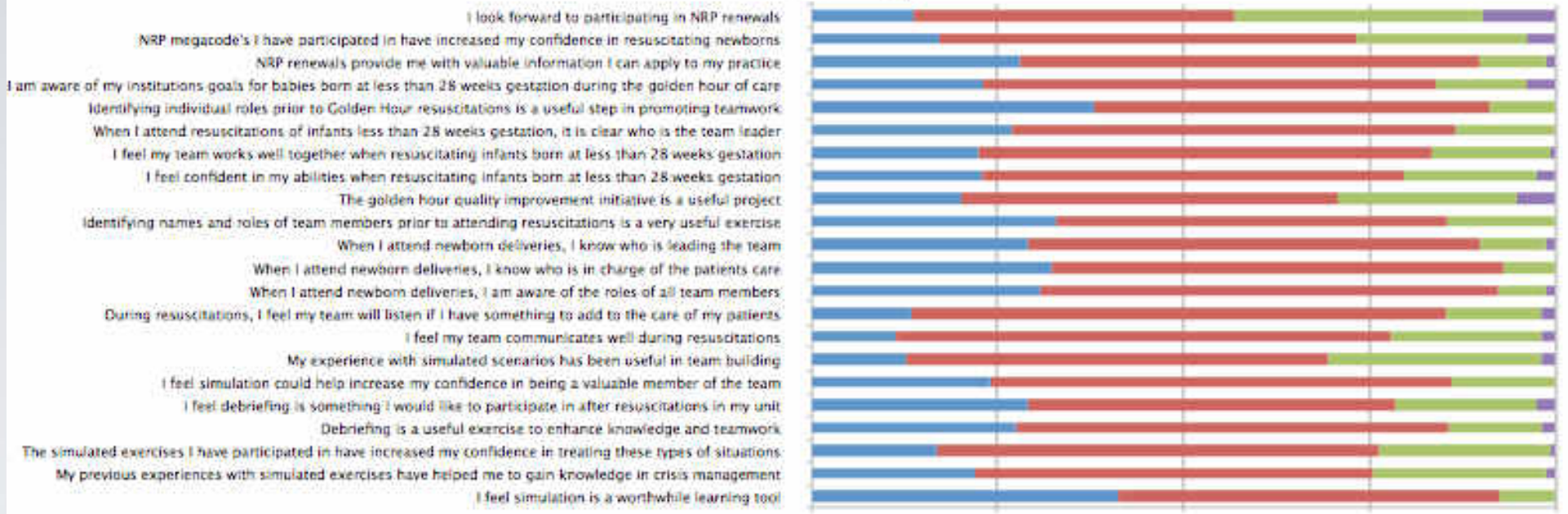
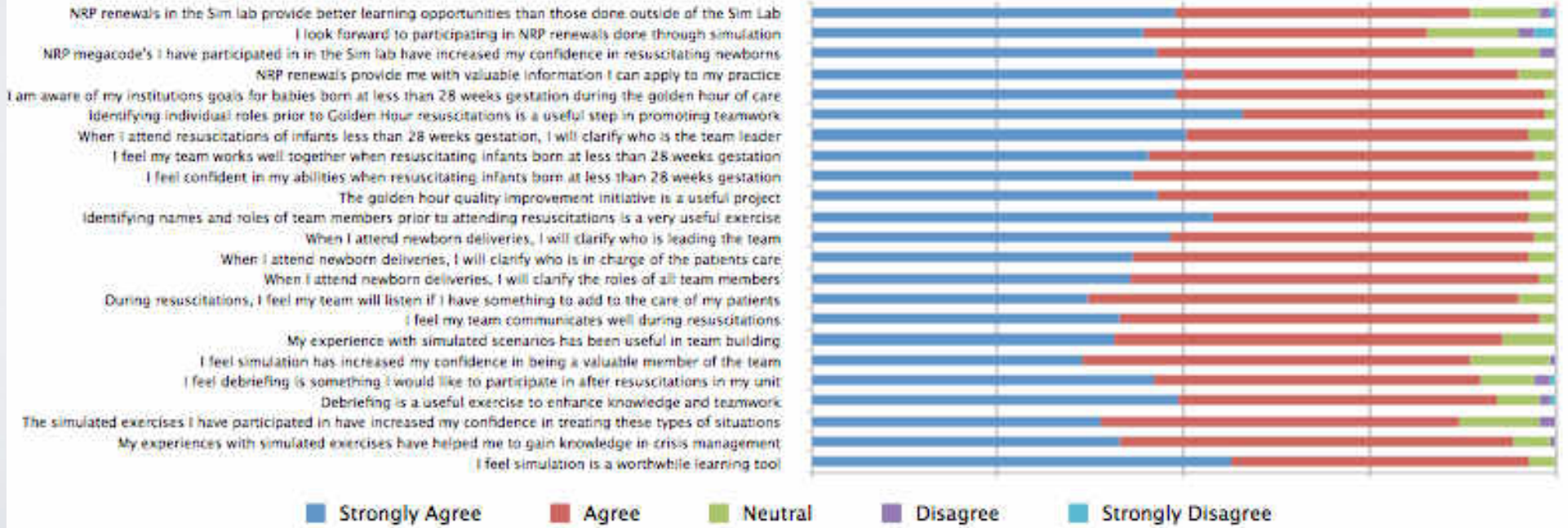
Pre-Evaluation Flag



Post-Evaluation Flag



What else are we using Simulation for ?

- Simulation in Fellowship program
  Resident Academic days simulation sessions
  - Procedural training and practice opportunities
  - Counselling, Breaking bad news,
  - Neonatal Ethics and communication module
- Respiratory therapy education
- Nursing education days
- Neonatal Resuscitation Program (NRP)

Simulation Medicine and Resuscitation Team training

An innovative inter-professional education and training initiative using high-fidelity simulation and checklists

Nicole Sneath[3,5,6], Barbara Wheeler[4,6], Ron Heese[2,3,5,6], Ceceile Porter[4,6], Fabiana Postolow [1,6] and Ganesh Srinivasan[1,6]

[1]Neonatology Division, Department of Pediatrics and Child Health, [2]Department of Respiratory Therapy, University of Manitoba [3]Women's Hos[illegible] [6]Winnipeg Regional Health Author[illegible]

Background and Objectives

Neonatal resuscitation teams require the integrated acquisition of cognitive, technical and behavioral skills training as well as teamwork to support neonates during the critical period surrounding birth, provide optimal resuscitation care and minimize potential long-term morbidities.

We sought to train an inter-Professional group as teams using a focused integrated educational strategy with the following goals:

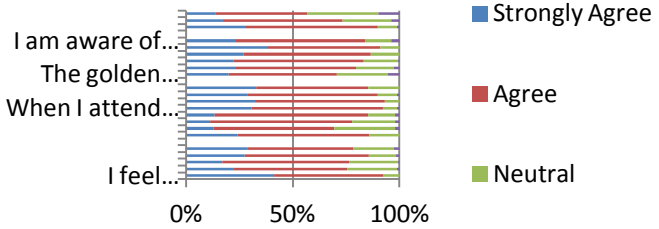
1.Introduction to Simulation based training using high fidelity neonatal simulators and video debriefing. *Goal: Improve critical thinking and problem solving in high-stress resuscitation situations and provide a platform for and practice the skill of debriefing*

2.Introduction to the fundamental concepts in Team training. *Goal: Improve teamwork and communication, role clarification, identification of a team leader and event coordinator*

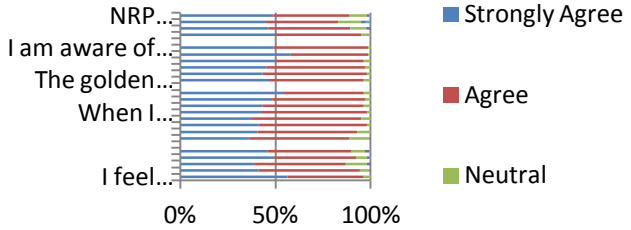
3.Neonatal Resuscitation Program renewals and updates

4."Golden Hour" and the use of Checklists. *Goal: Improving transition for neonates born at less than 33 weeks gestation, significance of checklists and transition checklist completion*

Results: The Pre-evaluation Flag

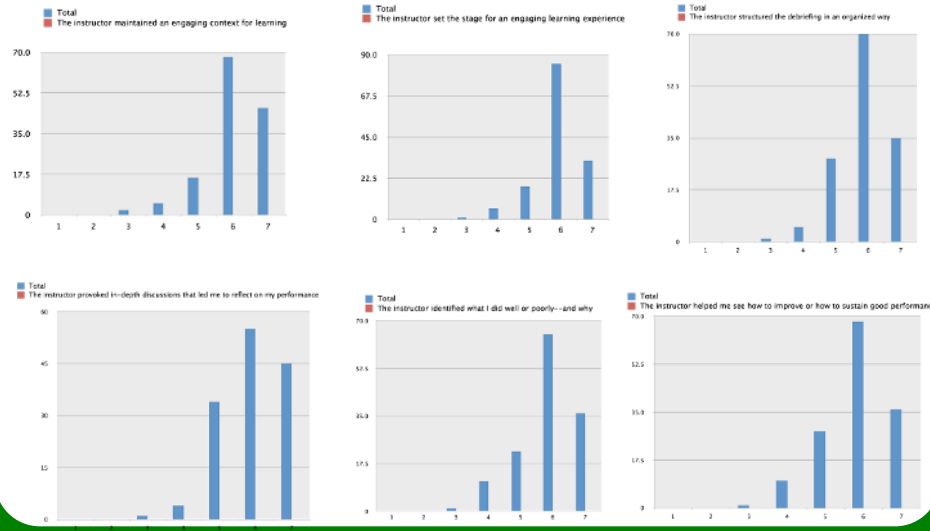


Results: The Post-evaluation Flag



Results DASH-SV©

1	2	3	4	5	6	7
Extremely Ineffective/Detrimental	Consistently Ineffective/Very Poor	Mostly Ineffective/Poor	Somewhat Effective/Average	Mostly Effective/Good	Consistently Effective/Very Good	Extremely Effective/Out-standing



Method and Evaluation

The *nSMARTT* concept was designed by an inter-professional core group trained in medical simulation who obtained support from stake holders of the Child Health Program of the WRHA.
Ten one-day simulation workshops were conducted for 163 participants including nurses, respiratory therapists, nurse practitioners and physicians from the two tertiary neonatal care facilities in Winnipeg, Manitoba.
This multilayered format included interactive didactic sessions, simulation and debriefing sessions. These sessions were conducted at the Clinical Learning and Simulation facility, University of Manitoba. Informed consent for audio and video recording was obtained from all participants.

Pre and post evaluations using predesigned questionnaires aligned with the four main objectives were used along with the Student DASH© SV tool developed by the center for Medical simulation, Harvard for rating the debriefing experience.

Conclusions

A significant positive shift in participants perceptions to the four learning objectives was noted.
Ongoing evaluation of completed transition checklists to evaluate the effect of direct patient care is continuing.
The *nSMARTT* model was well received by adult learners despite initial concerns about video debriefing and helped harness the collective experience of neonatal health care professionals working as teams.

Implications for health care policy

The *nSMARTT* inter-professional high fidelity simulation based team training model is an innovative educational strategy which facilitated inter-professional collaboration and practice, while re-energizing and enhancing the culture of safety.

References

Neonatal Resuscitation (NRP) Textbook - 6th Edition (English version) 2010 American Academy of Pediatrics and American Heart Association Guidelines for Neonatal Resuscitation and CPS.
Simon R, Raemer DB, Rudolph JW. Debriefing Assessment for Simulation in Healthcare© – Student Version, Short Form. Cambridge, MA Center for Medical Simulation, 2010.

Laryngeal Mask Airway is Equivalent to Endotracheal Intubation

During Positive Pressure Ventilation and Chest Compressions in Neonatal Resuscitation High Fidelity Simulation Model

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[1] Neonatology Division, Department of Pediatrics and Child Health, [2] Department of Respiratory Therapy, [3] Department of Medical Education
Faculty of Medicine, University of Manitoba, Winnipeg, Canada

BACKGROUND

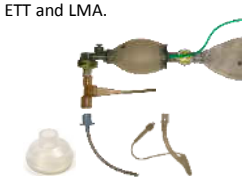
- Positive pressure ventilation (PPV) is the most effective action in resuscitating a compromised newborn.[1]
- Effective ventilation can be achieved using a laryngeal mask airway (LMA), especially if face mask ventilation is unsuccessful.[2-5]
- Chest compressions (CC) may interfere with effective ventilation. It is therefore recommended that an endotracheal tube (ETT) be placed to provide PPV with CC.[1, 5]
- LMA placement requires less training compared to the ETT.[6]
- The use of LMA to provide PPV with CC has not been studied.

HYPOTHESIS

We tested the hypothesis that LMA and ETT are able to provide comparable tidal volume (Vt) during synchronized PPV and CC using a neonatal high fidelity simulation model.

METHODS

- We performed 2 minutes of PPV only and 2 minutes of synchronized PPV with CC (Neonatal Resuscitation Program[1]).
- We used a pediatric self-inflating bag with each of following devices: face-mask (FM), ETT (non-cuffed size 4 mm), and LMA (size 1 ½).
- We measured the expiratory Vt, percentage of Vt leak, and PPV rate using the inline flow sensor of a Drager Babylog® 8000 Plus ventilator.
- The data was recorded using a HD video camera, and extracted in 1-second intervals for 2 minutes.
- We performed ANOVA (level of significance $P < 0.05$) with *a priori* comparison between the ETT and LMA.



RESULTS

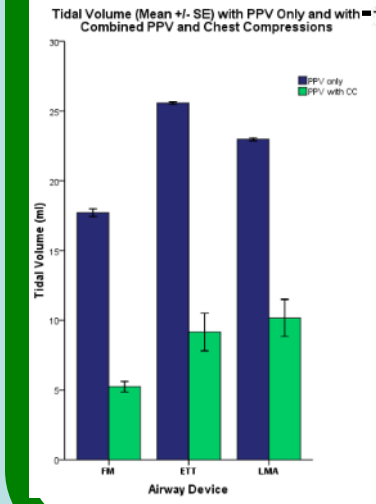
The results are shown in the tables below as mean ± SD and in the graphs as mean ± SE. We observed that the flow sensor recorded chest compressions as breaths with ETT and LMA but not with FM.

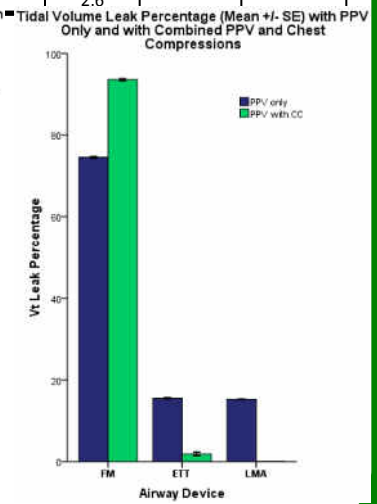
PPV *only*

	FM	ETT	LMA	*P value* (3 groups)	*P value* (ETT *vs.* LMA)
Vt (ml)	17.7 ± 2.6	25.6 ± 0.8	23.0 ± 1.0	< 0.001	< 0.001
Leak %	74.5 ± 1.9	15.5 ± 1.6	15.3 ± 0.7	< 0.001	0.245
PPV rate (bpm)	38.2 ± 2.0	38.3 ± 0.7	38.0 ± 1.8	0.431	0.195

PPV *with* CC

	FM	ETT	LMA	*P value* (3 groups)	*P value* (ETT *vs.* LMA)
Vt (ml)	5.2 ± 3.6	9.2 ± 12.7	10.2 ± 12.7	0.005	0.525
Leak %	93.6 ± 2.6	1.9 ± 4.1	0 ± 0	< 0.001	< 0.001
PPV rate (bpm)	33.5 ± 3.5	96.4 ± 6.5	102.1 ± 2.6	< 0.001	< 0.001





CONCLUSION

- We were able to provide comparable Vt during synchronized PPV and CC using LMA and ETT in a high fidelity infant simulator.
- The leak percentage was not significantly different between ETT and LMA during PPV without CC, but was interestingly less with LMA when PPV was combined with CC.
- Both LMA and ETT were superior to FM.

FUTURE PERSPECTIVE

As LMA placement requires significantly less training than ETT, future research should evaluate the role and the impact of using LMA on newborn resuscitation in various healthcare settings, especially, where professionals skilled in intubation are not constantly available.

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the Manitoba Institute of Child Health

Ten Steps to a Successful Simulation

The 10 Steps to a Successful Simulation

1. Identifying and elucidating the specific learning objectives specifically amenable to simulation
2. Pre-practice activities in preparation for simulation
3. Choosing the optimal Simulator
4. A defined simulation environment
5. Pre scenario briefing

The 10 Steps to a Successful Simulation

6. Running the appropriately realistic, challenging and well-designed scenario
7. Recording and identifying the knowledge and performance gaps of the participants during the scenario
8. Post scenario Debriefing
9. Evaluation of the Simulation session
10. Repeat ! Repeat! Repeat!

Blyde Canyon,
Mpumalanga,SA

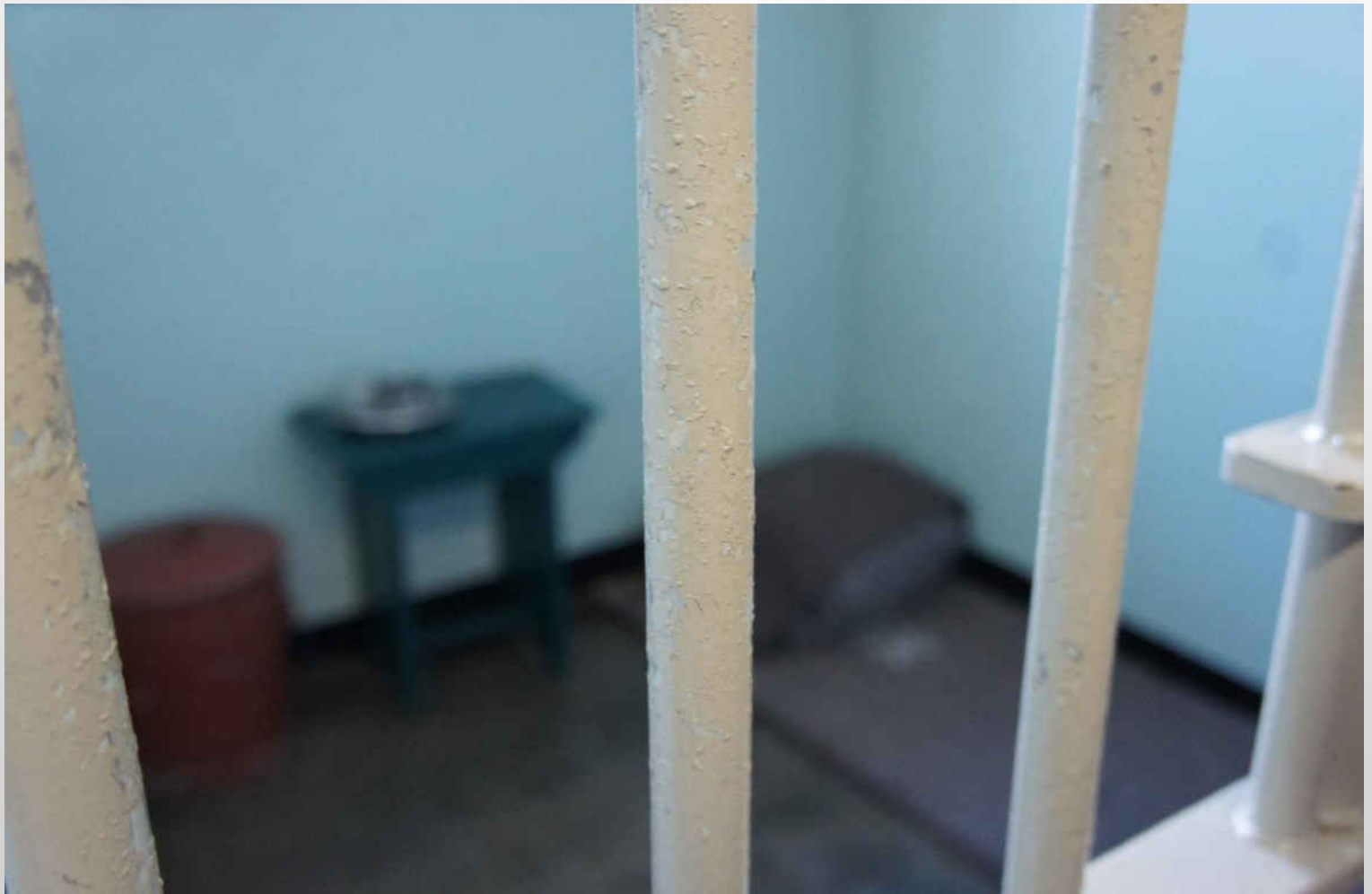
What are you going to Choose?

- The traditional "See one, do one, teach one **and hope not to harm or kill one "**
- See a lot, Simulate a lot, do a lot, teach a lot, learn a lot **and harm none!**

Example of a bad debriefing

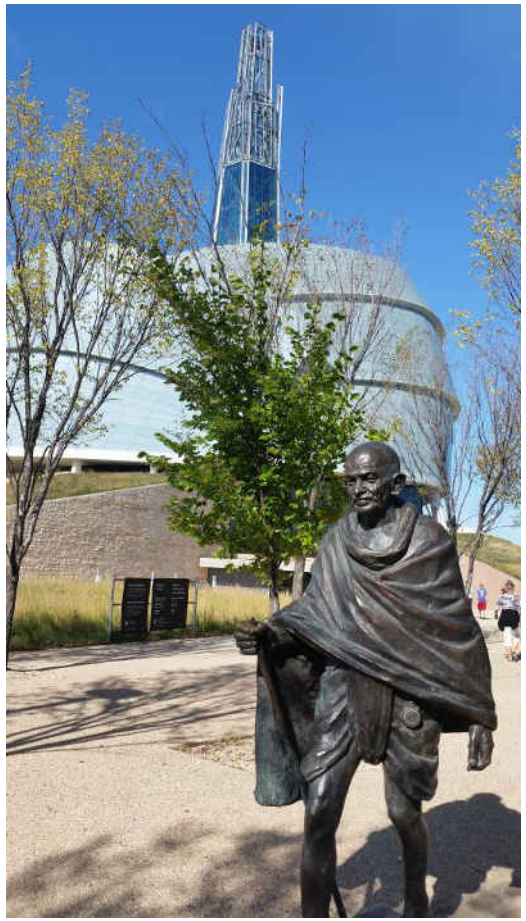
- From the movie Monsters inc
- Monsters use screams collected from children scared by monsters at night to power Monsterland
- If a child were to enter Monsterland it would destroy the evilness of monsters due due to their innocence and friendliness
- Novice monsters train using the simulation to become experts at scaring children and collecting the loudest screams

Questions?



Nelson Mandela's Prison cell

EXPLORER INNOVATOR PIONEER ADVENTURER VISIONARY TRAILBLAZER



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