Simulation-based Education & High-Stakes Assessment as a Cultural Change Vehicle in Healthcare Quality & Safety Education

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CHOP, Philadelphia
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Disclosure

- Consultant to Simbionix Inc.
- Consultant to Michener Institute for Applied Health Sciences, Toronto, Ontario (non profit institute)
Agenda

Background
– Simulation-based education – the safety opportunity
– Assessment in Medicine - Paradigm Change!!

MSR, the Israel Center for Medical Simulation
– Simulation-based (Training) & High-Stakes*
Assessment as a cultural change vehicle on a National / Healthcare System level

Lessons learned
– Challenges / Barriers / Insights

*High Stakes: with regulatory implications
Aviation and Medicine

**Similarities**
- High-risk and high-tech industries
- Low tolerance to errors
- Intolerance to not learning from errors
- Diverse skills / personality characteristics required

**Differences**
- Admission and screening culture
- Training and certification culture
- Reporting and debriefing culture

**Assessment & Safety Culture**
Personal Simulation Story

- Israeli Air Force > 20 years
  - Simulation-based training / Instructor (of instructors…)

- Hadassah / Jerusalem — Med. School & Pediatric Residency
  - CHOP / Philadelphia — Adolescent Medicine / Med Education

- Simulated Patients (SPs) — Consultant, ECFMG’s CSA Programs (USMLE CS) - SP-based Test Center, Philadelphia

- Medical Director - MedSim
  - MedSim – TJU Medical Simulation Center

- Sheba Medical Center, Deputy Director
  - Director, Risk Management, QA, Medical Education – Patient Safety
  - Founder & Director, MSR, Israel Center for Medical Simulation

- Professor and Chairman of Medical Education TAU Medical School
The Chaim Sheba Medical Center
The Chaim Sheba Medical Center

- Largest in Israel
- Affiliated to Tel-Aviv University
- Almost 2000 beds (1000 Acute + 900 Chronic)
  - Disaster capacity – 3000 beds
- 120 Departments and clinics (3 hospices, 4 hotels)
- >7,000 Employees
- 85000, Admissions
- 750,000 OP visits
- 150,000 ER visits
- 35000, Operations
- 10,000 Deliveries
- 850 MDs / 2000 RNs
- $350M Budget
The General Hospital
The Rehabilitation Hospital
The Chaim Sheba Medical Center

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The Premise

Current Patient Safety & Quality Care Reality is Suboptimal

The Underlying Assumption/Hypothesis is:
- Medical Education and Medical Assessment has a share in this reality
- A change in Medical Education and in its Assessment Paradigm could improve this reality

Simulation-based Education has the power to a cultural change vehicle leading towards:
- More Effective / Safe / Patient Centered Medical Practices
- Improved Readiness / Preparedness of Health Professionals
- Improved Accountability of the Health Profession at large
The (system) Swiss Cheese Model

Triggers

- Deficient CRM, Com & Handover skills
- Inadequate Training & Assessment
- Lack of Cultural Competence
- Sub-optimal Patient Centered Care
- Need for Patient Empowerment

Defences

- Institution
- Organization
- Profession
- Team
- Individual
- Technical

Modified from Reason, 1991 © James Reason
It’s about our systems...
The (educational) Swiss Cheese Model

Inadequate Screening & Selection Process

Sub-optimal Training & Formative Assessment

Competency Assessment & Licensing Paradigm

Recertification / Maintenance of Competency (MOC & MOL)

Continuum of Education & Practice

Modified from Reason, 1991 © James Reason
The Flexner Report (1910)

“Birth of Modern Medical Education”
Set Standards – admission, curriculum, duration...

Unchanged Educational Paradigm - 100 Years

Pre-Clinical Phase
Basic Scientific Knowledge
Traditional Educational Tools (lectures)

Clinical Phase
Basic Clinical Skills
Apprentice-based Learning (bed-side)

Missing Components:
Standards for Proficiency Assessment
Education as reflection of Practice
TAU's 4 Year Program - a Pilot Site

Released - 4/2009
Why Simulation?

- Safe environment - mistake forgiving
  - Error driven education

- Proactive and controlled training
  - Nightmare driven education / Receptiveness
  - Just in Time / Transitions = Increased Motivation

- Trainee/ Team / System Centered Education
  - Experiential / Emotional learning - IPE

- Feedback and debriefing-based education
  - Reflective/Narrative learners / Process-based education
  - The message: Apply in & as Life Long Learners

- Reproducible, standardized, objective (CSA)
  - Assessment driven education
The (Traditional) Assessment Focus

Emphasis on the “easy to measure” instead of on what is “important to measure”

We start out with the aim of making the important measurable and end up making only the measurable important.
Professionalism - Hierarchy

Professional Behaviour

Non-technical skills
Safety Skills

Technical skills

Competent knowledge base
Higher Order Competencies / Skills

**Safety Skills** *(Error = Unasked Question)*
- Handover, Adherence to Guidelines, *Error Recovery*, Calling for Help, Documentation, EMR: **Doc/Pat/Comp** Skills

**Team Work Skills**
- CRM, Leadership, Followership, IPE: Inter-professional Skills

**Multi-Cultural and Communication Skills**
- Cultural Humility, **Patient Centered skills**, Use of Interpreter Skills, **Geriatric Care**, Counseling skills …

**Reflective Skills**
- Debriefing, Self assessment, Feedback Provision Skills

**Personal Traits**
- Integrity, Motivation, Capacity, Humility, Risk Taking Traits
The Good News - Driving Forces of Simulation and patient centered Education

- Patient safety (and simulation…) movement
  - Growing public demand for safer health care

- Accountability of Medical Education (BMJ 2009)
  - Readiness Concept / Competency-based education
  - Reduced work hours / increased training duration

- Ethics - Patient (& animal) Rights movements
  - “First Do No Harm” = Patient Centered Concept

- Accreditation bodies / professional boards
  - Performance Assessment & Growing collaboration between the
    Low-Tech (High Touch) - OSCE and High-Tech simulation

- Global migration of health professionals
  - Proficiency Gate-keeping needs

- Liability and Mal-Practice (teaching Vs. practice)

- Simulation industry – more mature / secure
Simulation Modalities
Patient Centered – Customized Simulation
Radiotherapy / Dentistry / Stenting

Patient Diagnosed
Imaging Center
3D Reconstruction

Patient Treated
Simulation Mission Rehearsal
Surgical Modeling and Planning

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Simulation in Pediatrics

Pioneers in the use of Simulated Patients (SP Mothers)

- Limitations: Use of young children as SPs


Basic Sim-Models - “Recusse Anne”
- A derivative of a baby doll (laerdal - Norway) – Mid 50th…

Advanced Sim-Models – High Fidelity
- Neo-sim, Sim-baby, Baby-Sim, NewB, Ped-Sim, Noelle, etc…

Applications
- Structured / regulated: PALS / APLS / NRP etc.
- Local Initiatives – departmental / Institutional level…
- Increased reports – mostly from Intensive care / Neonatal / ER fields
In-Situ CRM: Simulation at the Point of Care

The Center for Advanced Pediatric and Perinatal Education (CAPE)

Louis Halamek, MD
Founder and Director, CAPE
The Children's Hospital of Philadelphia

Center for Simulation, Advanced Education, and Innovation

- ED Trauma Transport
- CICU PICU NICU
- 8 Main Simulation Development & Training
- International programs
- General Peds & Sedation
- Community & Families
- Ambulatory Peds
- Peri-Op & Operating Room
- PEDESTAL
- External programs
- Medical School
- Nursing School
- National and Int’l Consortia
- Regional Consortia
- External programs
IMSH Participants’ Growth

Year:
- 2004
- 2005
- 2006
- 2007
- 2008
- 2011

Participation Count:
- 2004: 0
- 2005: 500
- 2006: 1000
- 2007: 1500
- 2008: 2000
- 2011: 3000

Note: Participation count for 2011 is projected.
Additional SBME Trends

Growing Interest by **Risk management**
- **Premium reduction** for SBME (Harvard)
- Mandatory OB-GYN, RM Officers Training (Israel)

Serious gaming industry & **2nd Life**

Growing Federal Funding opportunities
- AHRQ (>5 $ Annually), CPSI, **US Simulation Bill - Cong.**
- Australia Federal Funds > 95 M$ over 5 years

Associate Deans for Simulation - e.g. **Stanford** **London**

**Multiple Sim-centers** worldwide – multiple models
- Single Profession / Modality / **Networks of Silos (Sim1)**
- Institutional **(Mayo Clinic)**
- National Model **(MSR)**
SBME - Applications

- “Hands-On” Skills Training (Basic & Advanced)
- Simulation-Based CME - PD
- Enhancement of Cognitive Learning
- Teamwork / IPE & “Human Factor” Training
- Performance Assessment of Individuals / systems
  - Readiness for Practice / setting new standards
- Patient Safety / Risk Management / QA
- Structured Exposure to & Testing of New Medical Technologies
- Screening, Licensure, Certification
MSR – The Israeli Vision

National resource for comprehensive interdisciplinary, multimodality medical simulation center dedicated to:

- Patient safety and quality care
- Hands-on training
- Readiness to clinical practice
- Performance assessment

Cultural Change Vehicle
Broad-spectrum simulation modalities
- Simulated patients / **Hybrids**
- High-tech simulators
- Task trainers / Skills lab

Clinical environments
- Home, Field, ER, OR, clinic
- **Customized - EMR**

Debriefing capabilities
- One-way mirrors
- Digital A-V equipment
- Debriefing software

**Multidisciplinary staff**
Guidelines and Principles

National exposure / collaboration
- Identify national needs – high impact factor
- Involve **Regulators** (IMA, MOH, IDF, HMO) – **Certification**

Link with RM and Patient Safety database / “real world”
- Stress error reduction / adherence to guidelines / **communication** skills
- Teamwork – “**Organic Teams**” / IPE – IPL

Non for profit - fee for service – **operationally balanced**
- Financial stability (autonomy) – Business Model
- Long term contracts – ongoing budget items

Focus on debriefing / assessment /
- “**Train the Trainer / Rater**” – instructors / raters’ courses
- Bottom-up & top-down approach

Assessment - Expertise in testing and evaluation
- Strategic partnership with NITE (“Israel’s ETS”)
MSR > 9 Years of Activity

- > 120,000 Trainees / Examinees (>40% as teams)
  - Medicine (38%), nursing (33%) Para-medicine (30%)
- Multimodality courses (> 50%)
  - in collaboration with prof. assoc., HMOs, IDF, RM, MOH…
  - > 100 national programs
  - >150 SPs -16-80 y.o. / > 100 simulators / models
- Dedicated Multidisciplinary staff (>50 = >30 FTEs)
  - > 1500 trained Trainers
  - > 2500 trained Raters
- Mandatory TTT / TTR Policy
- National Change Agents

Research – publications
- 7 PhDs (e.g. – Handoffs Skills, “Rejected Patient” skills…)

> 50 Basic science fellowships (6 months each…)
### SBME as Translational Science

**T1 science — laboratory discovery ➔ clinical research**

**T2 science (clinical effectiveness) — comparative impact translated into practice guidelines**

<table>
<thead>
<tr>
<th>Contributions of medical education interventions to T1, T2 and T3 outcomes</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Increased or improved</strong></td>
<td>Knowledge, skill, attitudes, and professionalism</td>
<td>Patient care practices</td>
<td>Patient outcomes</td>
</tr>
<tr>
<td><strong>Target</strong></td>
<td>Individuals and teams</td>
<td>Individuals and teams</td>
<td>Individuals and public health</td>
</tr>
<tr>
<td><strong>Setting</strong></td>
<td>Simulation lab</td>
<td>Clinic and bedside</td>
<td>Clinic and community</td>
</tr>
</tbody>
</table>

McGaghie: Science Translational Medicine 17 February 2010 Vol 2 Issue 19

**T3 science — health care delivery systems ➔ measureable impact in health of individuals and society**

Simulation-Based Objective Assessment Discerns Clinical Proficiency in Central Line Placement

A Construct Validation

Yue Dong, MD; Harpreet S. Suri, MBBS; David A. Cook, MD, MHPE; Kianoush B. Kashani, MD; John J. Mullan, MD; Felicity T. Enders, PhD; Ort Rubin, PhD; Amitai Ziv, MD; and William F. Dunn, MD, FCCP

Background: Central venous catheterization (CVC) is associated with patient risks known to be inversely related to clinician experience. We developed and evaluated a performance assessment tool for use in a simulation-based central line workshop. We hypothesized that instrument scores would discriminate between less experienced and more experienced clinicians.

Methods: Participants included trainees enrolled in an institutionally mandated CVC workshop and a convenience sample of faculty attending physicians. The workshop integrated several experiential learning techniques, including practice on cadavers and part-task trainers. A group of clinical and education experts developed a 15-point CVC Proficiency Scale using national and institutional guidelines. After the workshop, participants completed a certification exercise in which they independently performed a CVC in a part-task trainer. Two authors reviewed videotapes of the certification exercise to rate performance using the CVC Proficiency Scale. Participants were grouped by self-reported CVC experience.

Results: One hundred and five participants (92 trainees and 13 attending physicians) participated. Interrater reliability on a subset of 40 videos was 0.71, and Cronbach’s α was 0.81. The CVC Proficiency Scale Composite score varied significantly by experience: mean of 88%, median of 87% (range 47%-100%) for low experience (0-1 CVCs in the last 2 years, n = 27); mean of 88%, median of 87% (range 60%-100%) for moderate experience (2-49 CVCs, n = 62); and mean of 94%, median of 93% (range 73%-100%) for high experience (> 49 CVCs, n = 16) (P = .02, comparing low and high experience).

Conclusions: Evidence from multiple sources, including appropriate content, high interrater and internal consistency reliability, and confirmation of hypothesized relations to other variables, supports the validity of using scores from this 15-item scale for assessing trainee proficiency following a central line workshop.

CHEST 2010; 137(1):1–7

Abbreviations: CVC = central venous catheterization; IJ = internal jugular; SC = subclavian

There are an estimated 5 million central venous catheterizations per year. Simulation-based testing has been found to...
Composite score stratification by experience level

P < 0.01

Unpublished data, Dong & Dunn
Skill Acquisition Curve
Impact of Zero-Risk Training

Clinical competence
Safety standard

Experiential reinforcement

Traditional training
Simulation-based training

Dong et al: Chest 2010
Simulation as process engineering tool improves communications… teamwork… safety… healthcare delivery research opportunity.
Simulation-based mock codes significantly correlate with improved pediatric patient cardiopulmonary arrest survival rates*

Pamela Andreatta, PhD; Ernest Saxton, BSN; Maureen Thompson, MSN; Gail Annich, MD - Pediatr Crit Care Med 2011 Vol. 12, No. 1

Main Finding:
Survival rates increased to approximately 50% ($p .000$), correlating with the increased number of mock codes ($r .87$).
National Programs (Sample)

National medical Preparedness programs
Military/Civilian; Pre-hospital/In-hospital; In-Vitro/Situ

Simulation as a Bridge for Peace
- Trauma & Communication Skills Training for Palestinian Physicians & Paramedics ("Physicians for Human Rights")

National Patient Centered Ethical Programs
- Transparency / Apology (error disclosure, informed consent) / Handling the "Difficult" Patients (for seniors)
- RM / Com skills – Pharmacists / OB-GYN
- Role Modeling - Conveying bad News (PANIC)
- Ailing and Healing – Patient Valued Care
  • Spiritual Support / “End of Life” Skills / Cultural Humility
Multiple Mandatory (Formative) Programs (sample) + Indicators for Improved Safety / Quality

- Interns – transition into hospitals (Driven by Job Analysis)
  - 4 d “nightmare course” > 800 interns annually (> 4000 tot)
  - MOH + MS Deans’ regulation

- Conscious Sedation for Non-Anesthesiologists
  - Pediatrics – Improved adherence to Guidelines

- Institutional Mandatory Certification
  - e.g. – Charge Nurses / RM Officers etc / Ob-Gyn (national…)
  - SB Patient Centered Bed-Side Teaching/Tutorship Skills

- Domestic abuse (multidisciplinary)
  - Old age, women, child – improved health professional skills

- Physician / Patient / Computer Skills
  - For primary care HMO physicians / Customized EMR
Pediatric (National) Programs (sample)

In collaboration with the Israeli Pediatric / Neonatal / Hemato-Oncology / Adolescent Medicine / Intensive Care Societies / Associations

- CRM in Pediatric Fields – PICU / NICU / ED / Trauma
  - Including HMO / Ambulatory teams

- Pediatric Hem-Oncology Com Skills
  - Multidisciplinary teams – including Medical Clowns...

- Adolescent Medicine and Adolescent Gynecology
  - Family Physicians; Pediatricians; OB-Gyns; SW; RNs
  - military recruitment center (MRC) physicians
National Simulation-Based High-Stakes Assessment at MSR – In Collaboration with NITE

Anesthesiology board exams (since 2003)
- > 70 examinees annually
- In collaboration with the Israel Board of Anesthesia

Paramedics certification exams (since 2004)
- >150 examinees annually
- In collaboration with the Israel EMS (Magen David Adom)

MOR - Screening of medical school candidates (since 2005)
- > 900 examinees annually
- In collaboration with Technion, HU, TAU, Zefat Medical/Dental Schools

Advanced nursing licensing exams (since 2008)
- >1000 examinees annually (15 different clinical domains)
- In collaboration with the Israel MOH Nursing Authority
## Desired Personal Attributes

<table>
<thead>
<tr>
<th>Ethical attitude</th>
<th>Honesty</th>
<th>Service awareness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude towards authority</td>
<td>Empathy</td>
<td>Integrity</td>
</tr>
<tr>
<td>Self awareness</td>
<td>Sensitivity</td>
<td>Self confidence</td>
</tr>
<tr>
<td>Maturity</td>
<td>Responsibility</td>
<td>Motivation</td>
</tr>
<tr>
<td>The ability to function under stress</td>
<td>The ability to identify a need for help, search for help and accept help</td>
<td>Inter-personal communication skills</td>
</tr>
<tr>
<td>Self confidence</td>
<td>Openness</td>
<td>……</td>
</tr>
</tbody>
</table>
Structure of Assessment Center (MOR)

Simulations
- 120 minutes
- 9 Behavioral stations
  - Communication skills
  - Handling of stress
  - Initiative & responsibility
  - Consciousness & self-awareness

Biographical Questionnaire
- 90 minutes
- 21 Questions
  - Essay questions related to candidate’s past experiences

Judgment and Decision-Making
- 45 minutes
- 3 Dilemmas
  - Short descriptions of dilemmas that require candidate to make decisions
Consequences

- The make-up of the student body changed by 20% each year (stable)
- Dramatic change in atmosphere at the faculty
- Good reliability and validity data (Peer Assessment)
- Very high national (and international) interest - two other faculties joined the process in 2006/7
  - Publication: A Ziv, O Rubin, et al, Medical Education; 2008
- #s (2004-2011)
  - > 5300 candidates; > 1500 Faculty trained as Raters
  - > 100 SPs trained as Raters – the patients’ perspective
- Moral message to candidates, faculty & public
National Level SBT - Lessons Learned

- Needs to be an **Explicit Goal** of SB educators
  - From Formative Assessment to Summative Testing and back
- Requires **ongoing Courageous (Political) Leadership** on behalf of the professional / regulatory boards
  - Readiness to fight for the cause / defend the move in public
    - *in the profession....Probably unfounded legal concerns...*
- Dive into the water – don’t wait for the “ultimate” exam
  - **Work-in-progress:** Ongoing Improvement Process/Evolution
  - Improve in Small Increments – **Maintain Structure**
- SBT as a Complementary Exam to the traditional ones
  - **Not a Replacement**
Feedback loop back to the training programs on Identified Skills’ Deficiencies
– Revisions in Curriculum towards more competency-based training & more focus on deficient skills

Collaboration between Content Experts / Simulation Experts and Measurement Experts (Psychometricians) - Crucial for Success
– Emphasis on Validity – Content, Construct, etc
– Aim at High Reliability (secondary in priority…)

Convincing Professional Boards / Regulators
– Moving into SBT requires a mental “Leap frog” transformational / strategic / Value decision
National (Cultural) Impact

High penetration rate

- **Vertical** - MDs: Admission / MS / Interns / Residents / Seniors
- **Horizontal** - RNs / OT / SW / Dieticians / Pharmacists / etc.
- **Health care institutions** – HMOs and Hospitals

Multiple sectors experience High-Stakes SBT

- **ALL (Full Cohorts)** interns / graduating paramedics / military docs / advanced nurses / > 80% MS candidates
- Exposure / Involvement of > 50% of registered paramedics / Anesthesiologists / medical schools’ faculty (as Raters!)

Significant increase in SBME implementation

- Multiple peripheral sim-initiatives (in collaboration with MSR)
- Patient Centered driven educational curricula including in SBT (RM & Patient Safety as driving forces)
Simulation-based Safety Training: Patient Centered Paradigm Shift

Traditional approach
- Safety - Personal Value
- Secret / Close Guild
- Inaccessible Information
- Reactive System
- Professional Autonomy
- High Variability
- Assessment of Knowledge
- Duration-based education
- Apprentice-based learning

21st Century Cultural Shift
- Safety - System Value
- Transparency - Debriefing
- Free Flow of Information
- Proactive Approach
- Pt. Autonomy/Empowerment
- Evidence-based Norms
- Performance/Readiness Ass.
- Proficiency-based education
- Simulation-based Training

Education & Practice as one Continuum…
Lessons / Challenges / New Frontiers

Transition from “Wow” to “Mature” Phase

– Link Sim-based training with Risk Management data
– Structured Incorporation into Continuum of Medical Education & Practice – “Sequential Simulation”
  • Bottom-up & Top Down / horizontal & vertical

Educational Challenges - Leadership

– Train the Trainers / Raters / Video-based Debriefing
  • New expertise / Maintenance of Instructors’ Skills
  • Train SPs for effective / structured feedback
  • Apply debriefing / self reflection in real practice

– Develop the pre & post simulation components
– Integration of Sim-based training into curriculum (LMS)
Performance Assessment Measures of Skills
– Apply Preparedness / Readiness Concepts
– Measuring the “un-measurable”/“the important”
– Simulation is only one of many tools….

Regional / National / (& global) collaboration
– Crucial for success - international partnerships
– Sister Center-ship – Mayo Clinic & Case Western (US), A-Einstein (Brazil), McGill, Michener (Canada) and more…
– The third world challenge!!!

Sim-Technology – Need for Improvement
– Curriculum Driven R&D / Metrics / Reliability / Fidelity
Lessons / Challenges / New Frontiers

Delivery Model / Cost Effect. / Funding
– Fee for Service / Financial Stability
– Sustainable Philanthropy
– Alliance with Commercial World
– Centralized sites + Peripheral Satellites + Mobile
– Distant Simulation-based Education

Continuum Medical Education Paradigm

Recognition by Regulators: RM/QA/Boards

Accreditation / Licensure / Certification
The (Patient Centered) Safety Message

Humility

“To Err is Human”
## Results (cont.)

<table>
<thead>
<tr>
<th>Refer to</th>
<th>Before intervention</th>
<th>Following intervention</th>
<th>(1)^2 $\chi$</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart rate during handoff</td>
<td>85/224 (38%)</td>
<td>115/166 (69%)</td>
<td>30.5</td>
<td>p&lt;0.0001</td>
</tr>
<tr>
<td>Blood pressure during handoff</td>
<td>109/224 (49%)</td>
<td>110/166 (66%)</td>
<td>52.7</td>
<td>p&lt;0.0001</td>
</tr>
<tr>
<td>Oxygen saturation during handoff</td>
<td>120/224 (54%)</td>
<td>140/166 (84%)</td>
<td>60.6</td>
<td>p&lt;0.0001</td>
</tr>
<tr>
<td>Fluids balance</td>
<td>146/224 (65%)</td>
<td>151/166 (91%)</td>
<td>34.9</td>
<td>p&lt;0.0001</td>
</tr>
</tbody>
</table>
### Results (cont)

<table>
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<tr>
<th>Refer to</th>
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<th>(1)^2 χ</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical ventilation orders</td>
<td>25/88 (28%)</td>
<td>34/38 (89%)</td>
<td>39.8</td>
<td>p&lt;0.0001</td>
</tr>
<tr>
<td>Sedation orders</td>
<td>48/75 (64%)</td>
<td>30/30 (100%)</td>
<td>14.5</td>
<td>P=0.0001</td>
</tr>
<tr>
<td>Orders for medications administered in continuous infusion</td>
<td>71/109 (65%)</td>
<td>31/31 (100%)</td>
<td>14.8</td>
<td>P=0.0001</td>
</tr>
<tr>
<td>Feeding orders</td>
<td>120/224 (54%)</td>
<td>145/166 (87%)</td>
<td>49.9</td>
<td>p&lt;0.0001</td>
</tr>
</tbody>
</table>
Patient Centered Intervention

Proactive Risk-management Process

- Intervention stemmed from a root-cause analysis of a routine near-miss event (Error in insulin administration)
- Documented common deficiencies which led to a more valid intervention (better linked to the actual medical practice).

Handoff as an opportunity to diagnose and correct errors

The intervention included the development & implementation of an Handoff Checklist & Simulation-based Handoff Training

- Decreased incidents of mistakes performed during handoff
- Improved adherence to guidelines – mostly on Verbal Behavioral Front
Overall assessment
percentage ranking 3-4 of all responders

- Total N = 735
- Pre internship N = 55
- Interns N = 290
- Residents N = 380

The workshop is an essential component in a physician's professional training. A mandatory workshop to interns before commencing the internship is essential in a physician's professional training.

Pre internship 3-4:
- 85% of all responders

Interns 3-4:
- 87% of all responders

Residents 3-4:
- 82% of all responders

Israel 3-4:
- 87% of all responders

Overseas 3-4:
- 84% of all responders

Essential component in a physician's professional training:
- 82% of all responders

Mandatory workshop to interns before commencing the internship:
- 91% of all responders

Pre internship:
- 84% of all responders

Internship:
- 83% of all responders

Resident:
- 87% of all responders

Pre internship 3-4:
- 90% of all responders

Internship 3-4:
- 90% of all responders

Resident 3-4:
- 85% of all responders
Acquisition of professional skills
percentage ranking 3-4 of all responders

Total N = 735
Pre internship N = 55
Interns N = 290
Residents N = 380
Safety Questions
percentage ranking 3-4 of all responders

- Total N = 735
- Pre internship N = 55
- Interns N = 290
- Residents N = 380

- Contribute to your awareness to patient safety:
  - Israel 3-4: 59%
  - Overseas 3-4: 52%

- Contribute to the prevention of errors/near-miss events:
  - Israel 3-4: 57%
  - Overseas 3-4: 68%

- Acknowledge your true clinical skills:
  - Israel 3-4: 67%
  - Overseas 3-4: 65%
Notable Quotations

"The workshop is superb, most essential and highly beneficial. On my second day of internship I had to escort a patient (to an exam). Without the workshop, I never would have thought I should make preparations or to check the oxygen balloon (which was, indeed, closed).

"Asking a woman if she feels safe at home, or asking a woman who had recently gave birth how she manages... are things I’ve done during internship, and never would have occurred to me if it wasn’t for the workshop”.

"The workshop is brilliant, one cannot overstate its value. In fact, it is one of the most useful experiences during our studies”

"An outstanding workshop... the clinical skills acquired in emergency care are vital, and cannot be attained in any other manner”

"The workshop was the best thing that happened to me as a student... It is irreplaceable”.
Main insights

- The vast majority of trainees view the workshop as highly essential, and opt to mandate it before internship.
- The evaluation of its significance is maintained even in a 3-4 year perspective.
- The workshop is conceived important to acquiring safety and emergency skills.
- The workshop greatly contributes to both awareness to safety and to student’s acknowledgement of his/her true clinical skills upon embarking to hospitals.
The Learning Pyramid

National Training Laboratories, Bethel, Maine, USA

<table>
<thead>
<tr>
<th>Activity</th>
<th>Average Retention Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>5%</td>
</tr>
<tr>
<td>Reading</td>
<td>10%</td>
</tr>
<tr>
<td>Audiovisual</td>
<td>20%</td>
</tr>
<tr>
<td>Demonstration</td>
<td>30%</td>
</tr>
<tr>
<td>Discussion group</td>
<td>50%</td>
</tr>
<tr>
<td>Practice by doing</td>
<td>75%</td>
</tr>
<tr>
<td>Teach others</td>
<td>80%</td>
</tr>
</tbody>
</table>
6 months Later – Improved Perceived Skills in managing Domestic Abuse

<table>
<thead>
<tr>
<th>p</th>
<th>Diff</th>
<th>Ave</th>
<th>N</th>
<th>T</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2.6</td>
<td>73</td>
<td>0</td>
<td>Ability to Diagnose Domestic Abuse</td>
</tr>
<tr>
<td>0.005</td>
<td>0.29</td>
<td>2.9</td>
<td>74</td>
<td>6</td>
<td>Skills to Intervene for the benefit of the Victim</td>
</tr>
<tr>
<td>&gt;0.0001</td>
<td>0.49</td>
<td>2.9</td>
<td>74</td>
<td>6</td>
<td>Communication Skills related to Domestic Abuse</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.7</td>
<td>73</td>
<td>0</td>
<td>Overall Knowledge of Domestic Abuse management</td>
</tr>
<tr>
<td>&gt;0.0001</td>
<td>0.56</td>
<td>3.2</td>
<td>74</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.6</td>
<td>73</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>&gt;0.0001</td>
<td>0.6</td>
<td>3.2</td>
<td>74</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

Likert Scale – 1 (low) to 4 (high)
### Increase in – Suspecting / Inspecting / Reporting of Domestic Abuse

<table>
<thead>
<tr>
<th>Report</th>
<th>Inspect</th>
<th>Suspect</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>74</td>
<td>102</td>
<td>137</td>
<td>74</td>
</tr>
<tr>
<td>(54%)</td>
<td>(74%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>116</td>
<td>155</td>
<td>174</td>
<td>74</td>
</tr>
<tr>
<td>(66%)</td>
<td>(89%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Shefet, Ziv et al, Medical Teacher, 2007**
A National Program for Pediatricians - Forensic Experts in Child Sexual Abuse

Collaborative National Program – MOH Certification for 18 Pediatricians from all Major Israeli Hospitals
– MOH – Haruv Institute - Schusterman Foundation Israel

Driven by Job-Analysis
– Phase 1 – Cognitive Knowledge
– Phase 2 – Apprentice-based learning at Leading Child Protection Centers in NA
– Phase 3 – Comprehensive Simulation-based Skills Training

Domain Specific Medico-legal Skills
– Documentation and reporting skills
– Writing a legally accepted report
– Standing in court

Domain Specific Practical / Manual Skills

Total of 35 different Simulation Stations/Scenarios
– 6 full days of training
– >25 Trained Instructors from all related disciplines
Vaginal Exam – Using a Rape Kit
Diagnosis, Legal Documentation, Forensic Photography
Simulation-based Training of Child Abuse related Communication Skills

Domain Specific Communication skills

- Interviewing parents/siblings of suspected abused child

- Interviewing children / adolescents suspected victims of Abuse/Neglect
  - Listening, questioning, being empathic, being assertive
  - delivering sensitive news…
  - dealing with anger/anxiety/fear….

- Preparing a minor for an intimate physical exam

- Utilizing a translator in a culturally appropriate manner

- Managing a multidisciplinary team
Table. Comparison Between Trained and Not Trained Nonanesthesiologists

<table>
<thead>
<tr>
<th>Variable</th>
<th>Trained Group</th>
<th>Not Trained Group</th>
<th>Adjusted Odds Ratio (95% Confidence Interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presedation evaluation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>History of operations or procedural sedation</td>
<td>14 (88)</td>
<td>2 (12)</td>
<td>49.0 (6.0-398.3)</td>
</tr>
<tr>
<td>Time of last meal</td>
<td>16 (100)</td>
<td>10 (62)</td>
<td>20.4 (1.0-401.7)</td>
</tr>
<tr>
<td>History of known adverse effect to medication</td>
<td>16 (100)</td>
<td>2 (12)</td>
<td>191.4 (8.5-4322.9)</td>
</tr>
<tr>
<td>Measurement of vital signs before drug</td>
<td>12 (75)</td>
<td>4 (25)</td>
<td>9.0 (1.8-44.6)</td>
</tr>
<tr>
<td>Administration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant performance during sedation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintaining eye contact with patient</td>
<td>12 (75)</td>
<td>6 (38)</td>
<td>5.0 (1.0-22.8)</td>
</tr>
<tr>
<td>Titration of medication</td>
<td>14 (88)</td>
<td>6 (38)</td>
<td>11.7 (1.9-70.2)</td>
</tr>
<tr>
<td>Monitoring</td>
<td>16 (100)</td>
<td>12 (75)</td>
<td>11.9 (0.6-241.7)</td>
</tr>
<tr>
<td>Participant performance in recovery time</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitoring</td>
<td>14 (88)</td>
<td>6 (38)</td>
<td>11.7 (1.9-70.2)</td>
</tr>
<tr>
<td>National guideline—recommended discharge</td>
<td>14 (88)</td>
<td>6 (38)</td>
<td>11.7 (1.9-70.2)</td>
</tr>
</tbody>
</table>

*Data are given as number (percentage) of each group. For both groups, there were 16 physicians (6 pediatricians practicing emergency medicine and 10 pediatric gastroenterologists).
Instructor (Practitioner...) Skills

Getting Constructive Feedback

Theoretical and practical knowledge

Observing

Group Facilitation Skills

Effective use of the Video

Using Debriefing Model

Process
<table>
<thead>
<tr>
<th>Pre-workshop</th>
<th>Post Workshop</th>
<th>Post Tutorship</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.77</td>
<td>2.68</td>
<td>3.77</td>
</tr>
<tr>
<td>3.55</td>
<td>3.55</td>
<td>3.32</td>
</tr>
<tr>
<td>3.09</td>
<td>3.09</td>
<td>3.23</td>
</tr>
<tr>
<td>2.95</td>
<td>3.23</td>
<td>3.95</td>
</tr>
<tr>
<td>3.41</td>
<td>3.36</td>
<td>3.36</td>
</tr>
<tr>
<td>3.41</td>
<td>3.32</td>
<td>3.32</td>
</tr>
<tr>
<td>2.60</td>
<td>2.70</td>
<td>2.80</td>
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<tr>
<td>2.70</td>
<td>2.80</td>
<td>2.90</td>
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<td>2.80</td>
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<tr>
<td>2.90</td>
<td>3.00</td>
<td>3.10</td>
</tr>
<tr>
<td>3.00</td>
<td>3.10</td>
<td>3.20</td>
</tr>
<tr>
<td>3.10</td>
<td>3.20</td>
<td>3.30</td>
</tr>
<tr>
<td>3.20</td>
<td>3.30</td>
<td>3.40</td>
</tr>
</tbody>
</table>

**Impact of Simulation-based Tutors’ Training on their perceived skills**

- Informed consent
- Bedside teaching
- Facilitation
- Difficult patient
- Ethical Dilemma

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### Students’ Evaluation of Tutors

<table>
<thead>
<tr>
<th>P Value</th>
<th>Delta</th>
<th>Study (N=20)</th>
<th>Control (N=30)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS</td>
<td>0.07</td>
<td>3.67</td>
<td>3.6</td>
<td>Tutor’s overall teaching skills</td>
</tr>
<tr>
<td>NS</td>
<td>0.15</td>
<td>3.66</td>
<td>3.51</td>
<td>Tutor’s bedside teaching skills</td>
</tr>
<tr>
<td>NS</td>
<td>0.14</td>
<td>3.8</td>
<td>3.66</td>
<td>Tutor's overall attitude to students</td>
</tr>
<tr>
<td>NS</td>
<td>0.06</td>
<td>3.64</td>
<td>3.58</td>
<td>Tutor’s ability to engage students in further learning</td>
</tr>
</tbody>
</table>

**Bottom-line re-Tutors’ training**

**mandatory requirement**

by Sheba’s Management
The American Recovery and Reinvestment Act to promote “meaningful use” of electronic health records (EHRs) by all individuals in 2011, and to support the development of mechanisms for information sharing through EHRs in the US. (2009 - $1.2 billion in new federal grants)
Press Release

CAE Healthcare acquires METI and becomes a leader in simulation-based technology for healthcare

Montreal, Canada and Sarasota, USA, August 24, 2011 – CAE Healthcare, a division of CAE, and Medical Education Technologies, Inc. (METI), a worldwide leader in medical simulation technologies and educational software, today announced that CAE Healthcare has acquired METI for US$130 million.
Before training: decrease from viewing scenarios (Baseline) to hands-on scenarios (p<.01)

Advantage to simulator based team training over lecture based team training (p<.05) and over clinical training (p<.001)

Nadler I, Sanderson P, Liley HG. The accuracy of clinical assessment as a measure of teamwork effectiveness. Accepted - Simulation in Health Care, 2011
Percentage of CMS reporting of being asked psychosocial questions

<table>
<thead>
<tr>
<th></th>
<th>Pre-intervention N=697</th>
<th>Post-intervention N=508</th>
</tr>
</thead>
<tbody>
<tr>
<td>School problems*</td>
<td>59.7</td>
<td>68.9</td>
</tr>
<tr>
<td>Mood**</td>
<td>46.9</td>
<td>52.2</td>
</tr>
<tr>
<td>Protected sexual relations*</td>
<td>29.6</td>
<td>36.4</td>
</tr>
<tr>
<td>Smoking</td>
<td>71.5</td>
<td>71.9</td>
</tr>
<tr>
<td>Alcohol use</td>
<td>82.9</td>
<td>83.3</td>
</tr>
</tbody>
</table>

* P=0.01  ** P=0.05
### Percentage of CMS marking best anchor

**Likert scale rating for physicians' conduct**

<table>
<thead>
<tr>
<th></th>
<th>Pre-intervention N=697</th>
<th>Post-intervention N=508</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear questioning</td>
<td>80.8</td>
<td>82.7</td>
</tr>
<tr>
<td>Interest*</td>
<td>68.2</td>
<td>77.5</td>
</tr>
<tr>
<td>Atmosphere</td>
<td>69.7</td>
<td>77.9</td>
</tr>
</tbody>
</table>

Omitting medical information decreased from 6.6% prior to the intervention to 2.4% following the intervention ($p<0.01$)

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Hardoff, Ziv et al. Israel Medical Association Journal 2010;