The role of simulation in postgraduate clinical training

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Outline

- What is simulation-based learning (SBL)
- Applications in postgraduate education (PGE)
- Challenges
- Way forward
Definition

Simulation is an educational technique that uses surrogate model and environment to imitate real clinical event, process or system for the purpose of training, assessment and research.
What's new in medical school simulation?
Simulation techniques 1

Role play

Standardized patients

Part-task trainers
Simulation techniques 2

Surgical simulators  
Virtual reality  
Patient simulators
360 degrees panoramic projection
Reasons for increasing use of simulation …

- Need for safe learning environment
- Growing focus on outcomes in education
- Advances in quality simulation technologies
  - computer sensors, immersive VR displays, haptic devices
  - more affordable and accessible
  - greater realism and reliability
Advantages of simulation-based learning (SBL)

- Can simulate any clinical event, any time
- Wide variety of skills
- Errors without harm to patients
- Ability to vary difficulty & complexity
- Repeatedly practice to reach proficiency
- Save time
- Fun & effective
The Learning Pyramid

- Lecture: 5%
- Reading: 10%
- Audio Visual: 20%
- Demonstration: 30%
- Discussion Group: 50%
- Practice by Doing: 75%
- Teach Others: 90%

Average Retention Rates after 24 hours

Source: National Training Laboratories, Bethel Maine
Kolb’s Experiential Learning Cycle

Cycle of Learning

Concrete Experience
Experiencing

Active Experimentation
Applying

Reflective Observation
Processing

Abstract Conceptualization
Generalizing
Common applications in PGE

Training

Technical skills
- Clinical procedures
- Equipment

Non-technical
- Communication skills
- Teamwork Leadership
- Professionalism

Assessment
- Formative
- Summative
- MOC, CPD, Credentialing, Licensure
High stake assessment

- USMLE Step 2 and Step 3 assessments
- ECFMG’s SP-based clinical skills assessment
- ABS - Fundamental of Laparoscopic surgery
- Israeli National Board Examination in Anaesthesiology
- Nursing licensure exam in Canada, Israel
- RCPSC – Internal medicine certification exam
- HKCA Simulation-based OSCE station in Final exam
- MOC Part-4 ABA, ABIM, ABFM
- ANZCA, RCA, HKCA CPD required for recertification
- FDA credentialing of carotid stenting procedure

Correlation with written exam results was very low for simulation format assessments ($r=0.08$) but moderate for oral viva format assessment ($r=0.58$). Participants who passed a written exam based on management of a blocked tracheostomy scenario performed a number of dangerous errors when managing a simulated patient in that scenario.

The lack of correlation between exam formats supports multi-modal assessment, limited correlation between simulation and written exams may support the use of both formats as part of an integrated assessment strategy.
...use of high fidelity simulator incorporating situations with multiple events, immediate feedback,............ complement the results of traditional written examination of medical knowledge to provide a more comprehensive assessment of physician ability in interventional radiology.
Competency

- Defined as knowledge, attributes, skills, behaviour and attitudes that enable an individual to perform specific set of tasks or objective to a given standard
- Paradigm shift to outcome-based education with requirement for assessment and demonstration of competence

Damassa DA 2010, Scalese RJ 2008
Simulation-based learning

• Traditional training and assessment focus on isolated skill
• May be good at technical skill but unable to apply effectively
  • ineffective communication skills
  • poor teamwork, leadership, decision making
  • attitude, professionalism
• Passing marks usually arbitrary – does not reflect competence
• Simulation allows repeated practice and evaluation until set proficiency level (experts’ benchmark score) achieved
Curriculum

• SBL is all about the curriculum, not the simulators
• Defined learning objectives
• Essential to deconstruct the task/event into individual steps/parts to be learned
• Scenario needs to bring out learning objectives
• For training – immediate feedback & debriefing
• For assessment – methodology & outcome measures must be defined and developed
Simulation most suited for competency-based education
HKAM survey Jan-Feb 2016

- Use of medical simulation in local specialist training programmes
- Questionnaire sent to all 15 Colleges
- Results
  - Response rate 100%
  - Five Colleges not using medical simulation
  - Nine have mandatory sim courses for trainees
  - Six have non-mandatory courses
  - Five using simulation for Assessment
## Results 1: College NOT using SBL

<table>
<thead>
<tr>
<th>Colleges</th>
<th>Reasons</th>
<th>Future plan to use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hong Kong College of Community Medicine</td>
<td>No facility suitable for training programmes</td>
<td>No</td>
</tr>
<tr>
<td>Hong Kong College of Pathologists</td>
<td>Not relevant</td>
<td>No</td>
</tr>
<tr>
<td>College of Ophthalmologists of Hong Kong</td>
<td>Cost implication</td>
<td>Yes</td>
</tr>
<tr>
<td>Hong Kong College of Psychiatrists</td>
<td>No reason given</td>
<td>Yes Already conducted pilot course (Apr)</td>
</tr>
<tr>
<td>Hong Kong College of Radiologists</td>
<td>No reason given</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Results 2: College using Sim Assessment

<table>
<thead>
<tr>
<th>Colleges</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hong Kong College of Anaesthesiologists</td>
<td>Final OSCE</td>
</tr>
<tr>
<td>College of Dental Surgeons of Hong Kong</td>
<td>In-training</td>
</tr>
<tr>
<td>Hong Kong College of Family Physicians</td>
<td>In-training</td>
</tr>
<tr>
<td>Hong Kong College of Obstetrics &amp; Gynaecologists</td>
<td>Both</td>
</tr>
<tr>
<td>Hong Kong College of Otorhinolaryngologists</td>
<td>Both</td>
</tr>
</tbody>
</table>

- Although most HKAM Colleges have adopted SBL, many are not using simulation for assessment.
Challenges

- Inadequate expertise & resource
  - Faculty
  - Facility & equipment support
  - Scenario development & assessment tool
- Simulation technology not yet developed to standards to allow
  - consistency & reliability
  - easy integration
- Unclear predictive validity
Way Forward

- Greater understanding of SBL utility
- Faculty development & credentialing
- Standardize simulation equipment & facility
- Curriculum design
- Appropriate assessment methodology
- Research
Simulation is practical and useful in many aspects of postgraduate training & assessment.
Should be integrated into preexisting postgraduate curriculum.
Technological advances have facilitated realism, capability, access & validity.
Need to overcome challenges to enable greater acceptance.
Thank you!