Clinical Learning & Assessment in Simulated & Virtual Worlds

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DISCLOSURE

We do not have a financial interest, arrangement or affiliation with a commercial organization that may have a direct or indirect interest in the subject matter of our presentation.
Learning Objectives

• To provide an overview of current simulation modalities available

• To provide an understanding of the underpinning educational theory for learning & assessment in simulated & VR environments

• To outline current research into learning & assessment through simulation
History and context of medical education

The Anatomy Act did clearly establish to whom a dead body belongs. Until relatively recently, the principle that the 'only lawful possessor of the dead body is the earth' prevailed in the UK.
Background to clinical education for Allied Health Professionals (AHPs)

- Apprenticeship
- Socialisation
Apprenticeship

- Historical model of education
- Alder Hey / Bristol enquiry highlighted problems
- Teaching belies absolute patient care
- Disparity between what the mentor “wants” to teach and what the student “needs” to learn
Socialisation of students: Situated learning *(One theoretical perspective)*

- Shared repertoire / joint enterprise (policy)
- Community of practice
- Mutual engagement (care of patient)
- The stronger students are usually accepted into the community either through excellent knowledge and skill demonstration or pure belligerence
Learning in placements?

Social learning - sometimes poor teaching

Unstructured learning unsupervised performance – learning by osmosis

Self-directed practice – reinforcing poor techniques if unsupervised
What is simulation?

• Simulation is defined as a:

“real world event that that represents a referent which then draws its essential meaning from that referent”

• Unlike a simulator:

“a simulator is comparable to a genetic code, and a simulation to the realization of that code into the living organism”

Crookhall, Oxford and Saunders (1987)
History of simulation

• Jousting, chess, war-gaming, military exercise, Aviation
• 1832 – Anatomy Act
• 1960’s – SimONE
• 1980’s – GAS
• 1990’s – Surgical haptic simulators
• 2000’s – HPS/ECS
• 2010 – 3G/iStan
Defining simulation types

- Wargaming
- Aviation
- Nuclear industry
- Space programme
- Tribal dancing
- Military training
- Jousting
- Chess
- Emergency services
- Forensics
Simulation as a concept

There are many terms that are afforded the term simulation, including:

- Low fidelity manikin
- Hi Fidelity manikin
- Part task trainers
- Games (driving rehearsal)
- Haptic systems
- VR
- Simulated patients
- Multimedia
Hi fidelity simulation advantages

- Draws referent from clinical practice (context)
- Aims to facilitate suspension of disbelief
- Allows for 4D teaching (time)
- Allows for repetition and rehearsal
- Stress inoculation (covert sensitisation)
Benefits of simulation

- Patients are not exposed to complete novices
- Safe environment where mistakes become learning opportunities
- Complexity can be altered according to the needs of the student
- Self efficacy can be built before contact with real patients
Benefits of simulation

Students can:

- repeat the skill as often as necessary to develop confidence
- learn at their own pace
- experience being ‘on the receiving end’
- express their fears and ask ‘difficult’ questions
- make mistakes and appreciate the consequences without harm to the patient
Hierarchy of skills learning

10. Supervised clinical practice with feedback
9. Learning in simulation with feedback
8. Unsupervised clinical practice
7. Demonstrations & DVDs
6. Manuals and books

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Hi fidelity simulation disadvantages

- Adrenaline gap
- Uncanny valley
- Fear / upset
- Manpower hours
Practise makes perfect
Practise makes makes permanent!

Only well supervised practise with constructive feedback makes perfect
Theory – practice dichotomy

• If used correctly simulation will facilitate classical conditioning (2nd nature)

• Objective outcome measurement (Anne vs iStan)

• Development of communication and psychomotor domains
SUMMATIVE CLINICAL ASSESSMENT
IN
RADIATION THERAPY EDUCATION
@ UoP
Clinical Assessment Structure

• 2 part process –

  Practical element = procedural skill (Clinical Team)

  Clinical discussion = declarative knowledge (Academic Team)

• Millers pyramid of competence
Pause For Thought

- We do it like this because we always have
- No longer acceptable
- Radiation Therapy is evidence driven
- So is learning & assessment different?
Profile

• **Year 1**
  Linear Accelerator daily QA checks
  Parallel opposed pair / simple multi-field (pelvis)

• **Year 2**
  Head & Neck
  Breast
  Complex multi-field

• **Year 3**
  Risk assessment (any procedure)
  CT localisation
  Lin Acc based pre treatment verification
Profile

- **Year 1**
  
  *Linear Accelerator daily QA checks*
  Parallel opposed pair / simple multi-field (pelvis)

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  Head & Neck
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- **Year 3**
  
  Risk assessment (any procedure)
  CT localisation
  Lin Acc based pre-treatment verification
Virtual versus Real World Assessment

- Must resemble the real life situation (face validity)
- Must be reliable (producing similar results over different time points)
What is VERT™?

Real Linear Accelerator

Virtual Reality Linear Accelerator

www.varian.com

www.vertual.eu
Millers Pyramid of Competence

- Knows
- Knows How
- Shows How
- Does

Procedural Knowledge

Declarative Knowledge
Millers Pyramid of Competence

- MCQ’s & written exams
- Problem based written assignments
- Simulation OSCE
- Work place assessment
**Millers Pyramid of Competence**

- **Fact gathering**
- **Interpretation of facts**
- **Application of learning**
- **Integration into practice**

**Behaviour & Skills**

**Knowledge**
**Millers Pyramid of Competence**

- **Fact gathering**
- **Interpretation of facts**
- **Application of learning**
- **Integration into practice**

*Levels:*
- **Novice**
- **Professional**
- **Expert**

*Conditions:*
- **Behaviour & Skills**
- **Knowledge**

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## Results

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<th>VERT 1</th>
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# Results

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The Future

• To 3-D or not 3-D?

• Redesign assessment to incorporate the functionality of VERT™ Physics module

• Continue to develop global rating charts
VERT™ QA checks

UoP VERT v2.8 Physics module screen shots May 2012
Acknowledgements

- ISRRT & CAMRT planning committee
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