

# Role of Laparoscopic Simulation in Surgical Skills Acquisition: A Feasibility Study



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CLINICAL SKILLS  
Managed Educational Network  
Excellent skills for excellent care



# Background

- ❖ Minimally invasive surgery now gold standard
- ❖ Learning curve is steep for surgical trainees
  - psychomotor skills (3D/2D), instruments, depth perception, instruction
- ❖ External pressures
  - EWTD, cost, public demand, patient safety
- ❖ Simulation-based medical education is an ethical imperative

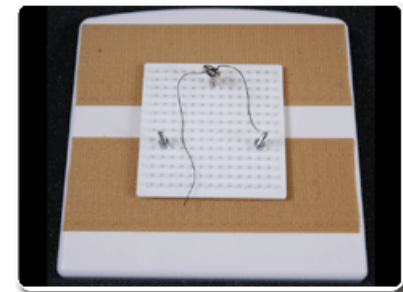
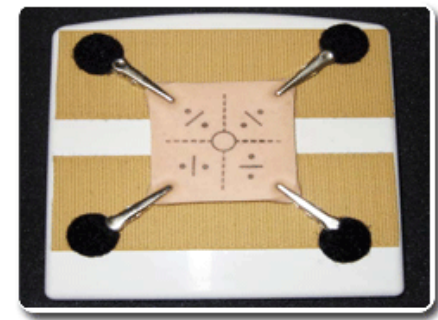
# Background

- ❖ Simulation core part of high risk professions training
  - Maximise safety and minimize risk
- ❖ Focus on training in skills centres and transfer to operating room
- ❖ VR simulation – *MISTVR<sup>TM</sup>*, *LapSim<sup>TM</sup>*, *LapMentor<sup>TM</sup>*
  - Different simulators have varied training strengths
- ❖ Careful evaluation and validation is essential
  - Training and assessment purposes

# Limited research on portable lap simulators

iSIM

£3700



No existing validated portable simulators

# AIMS

1. Identify core laparoscopic skills
2. Model skills into validated training exercises
3. Assess role of a portable simulator in laparoscopic surgical skills education

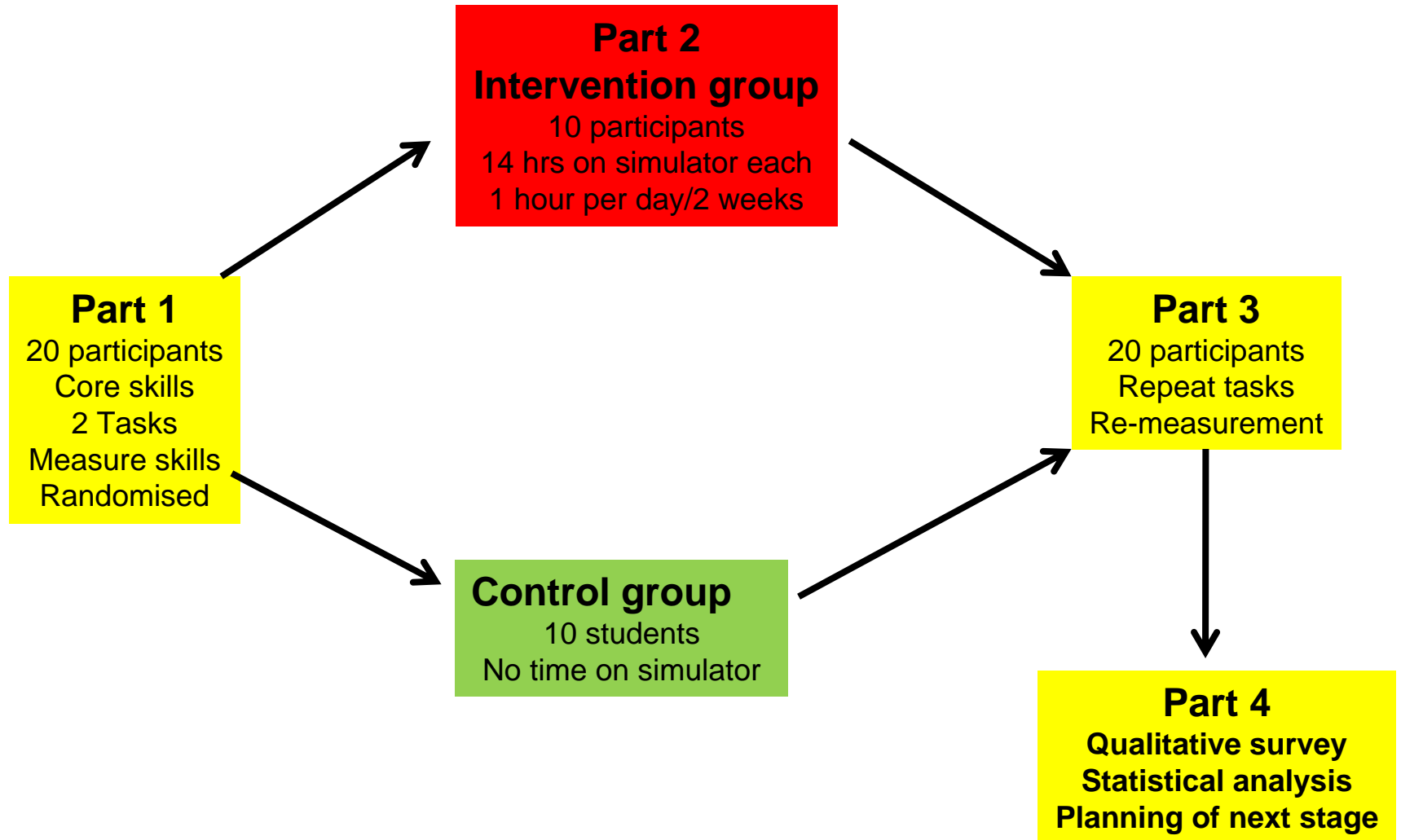
Integrated laparoscopic simulator

iSIM

[http://www.youtube.com/watch?v=vUQ\\_BOZ  
ChtU&feature=player\\_detailpage](http://www.youtube.com/watch?v=vUQ_BOZChtU&feature=player_detailpage)

<http://www.isurgicals.com/video.htm>

# Structure of the trial



# Part 1

# Recruitment of participants

- ❖ Email sent to all 3<sup>rd</sup> and 4<sup>th</sup> year DUMS students
- ❖ First come basis
- ❖ All interested in a surgical career
- ❖ Anyone with previous lap experience **excluded**
- ❖ 20 medical students
  - Age range 20-30
  - 6 Female 14 Male
- ❖ All received introductory emails and presentation
- ❖ Informed consent

# Identification of core skills

## Consensus between five experts

1. Retraction of tissues
2. Trajectory of instruments  
(Time and motion)
3. Instruments handling
4. Preciseness in tissue handling
5. Cutting
6. Dissection of tissue planes
7. Flow of procedure and forward planning
8. Clipping
9. Use of non-dominant hand
10. Unnecessary movements

## Validated Tasks

1. Scissor dissection
2. Clipping

# TASK 1

5 minutes

## Scissor Dissection

- Carefully dissect the latex between the black lines and separate the triangular shape from its surroundings
- Take care not to cut across the lines
- Aim to cause minimal damage to the underlying layer of latex



Pre-recorded DVD of task



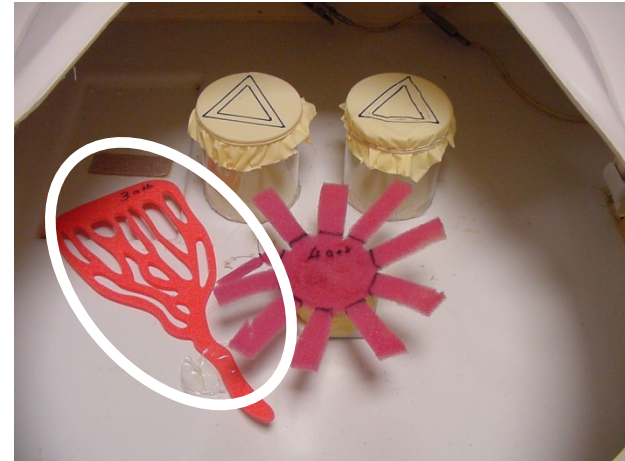
**DVD made of each participant's attempt at each task**

# TASK 2

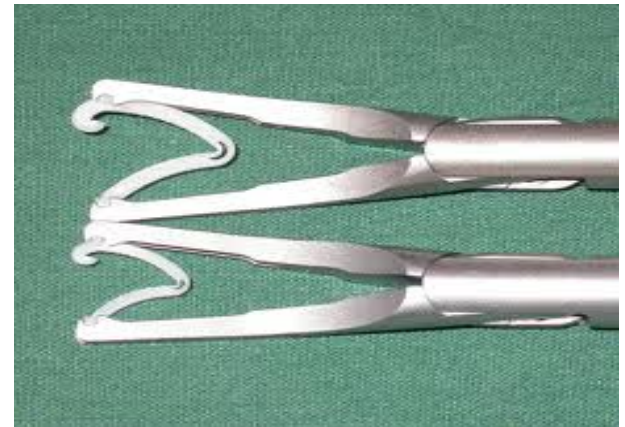
5 minutes

## Clip Applying

- Select one of the “vessels” on the vascular tree
- Apply two clips leaving a safe distance between them
- Do **not** divide the structure



**Pre-recorded DVD of task**



**DVD made of each participant's attempt at each task**

# Fixed simulator in CSC



Baseline measurement of skills on 15<sup>th</sup> & 16<sup>th</sup> Dec 2010

# OSATS Global Rating Tool

General Skill	1	2	3	4	5
Respect For Tissue	Frequently used unnecessary force on tissue or caused damage by inappropriate use of instruments		Careful handling of tissue but occasionally caused inadvertent damage		Consistently handled tissues appropriately with minimal damage
Time & Motion	Many unnecessary moves		Efficient time/motion but some unnecessary moves		Economy of movement and maximum efficiency
Instrument Handling	Repeatedly makes tentative or awkward moves with instruments		Competent use of instruments although occasionally appeared stiff or awkward		Fluid moves with instruments and no awkwardness
Use of non-dominant Hand	Consistent poor or failed use of left hand		Good use of left hand most of the time		Strategically used left hand to the best advantage at all times
Flow of Operation & Forward Planning	Frequently stopped operating or needed to discuss next move		Demonstrated ability for forward planning with steady progression of operative procedure		Obviously planned course of operation with effortless flow from one move to the next

**Assessors blinded to pre and post intervention DVDs of task performance**

# Insight into initial measurement

- ❖ Only 50% finished in allocated time
- ❖ Participants found tasks very challenging
  - posture, handling of instruments, depth perception
- ❖ High error rate
- ❖ Randomisation
  - validated random computer number generator

# Part 2

## **Intervention group**

10 participants

14 hrs on simulator each

1 hour per day/2 weeks

# Problems and Solutions

- ❖ Individual circumstances
  - adaptable process needs adaptable training system
- ❖ Finding appropriate room to practice
  - Out of hours access, flexible, security
- ❖ Managing participants
  - Intro to iSIM, timing/reflective sheet, prepare tasks, self led
- ❖ Additional task
  - Laparoscopic suturing
- ❖ Maintaining commitment
  - Certificate + option to practice on iSIM

# Ninewells Reception Staff



**Participants sign in and out key**

**Reflect and record practice times**

**Self manage**

**Daily monitor of progress**

# Portable simulator in CSC



**First participant started intervention on 25<sup>th</sup> January**

# Progress

**8/10 of intervention gp completed 14 hours of practice**

**Part 2**

**All 8 from intervention gp had skills re-measured 4<sup>th</sup> March**

14 hrs on simulator each  
1 hour per day/2 weeks

**7/10 from control gp have had skills re-measured**

**Part 1**

**Part 3**

**Last 2 from intervention gp started practice on 11<sup>th</sup> March**

2 tasks  
Measure skills

Re-measurement

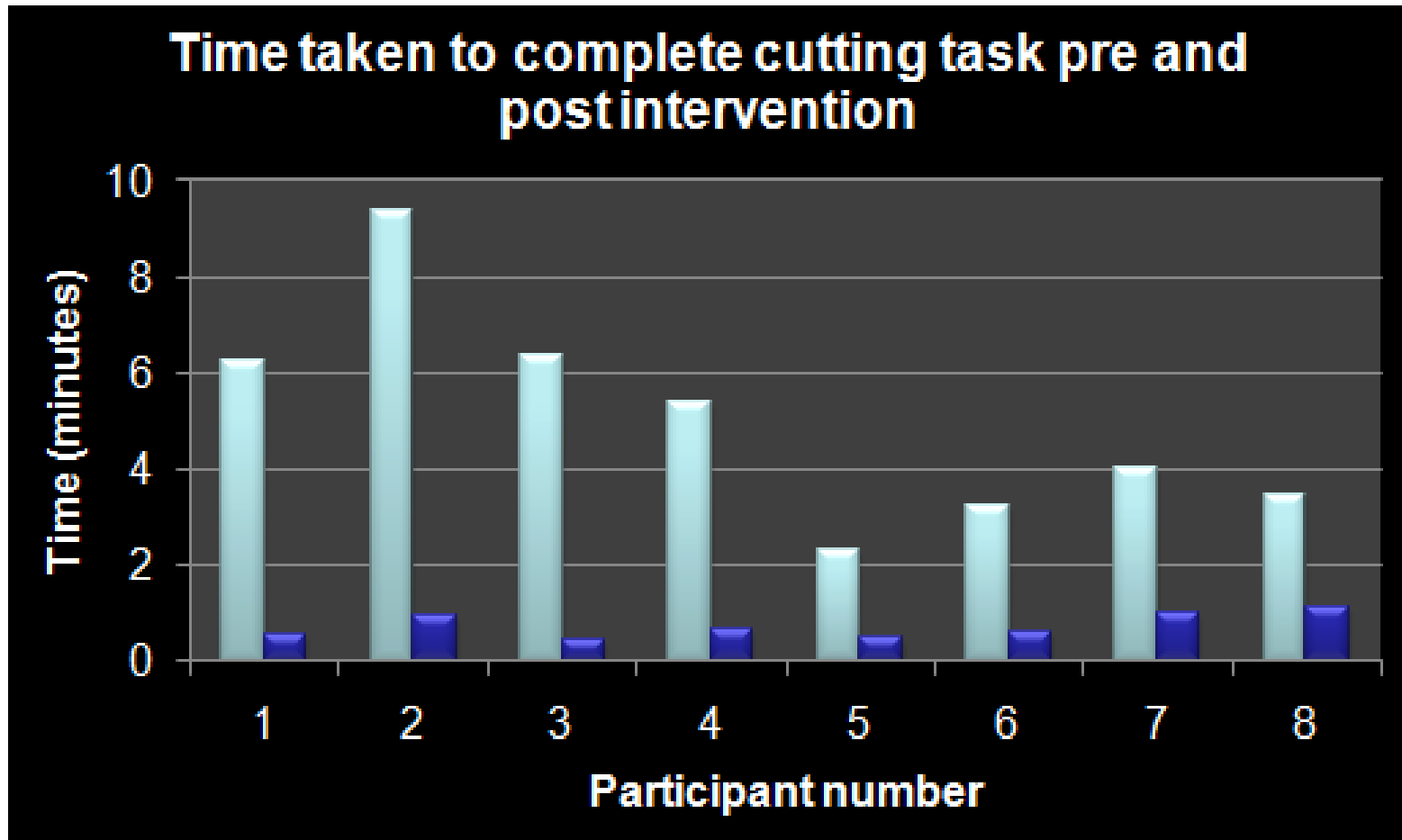
**All participants will have skills re-measured by end of March**

**Control group**

**Blinded assessors will measure pre and post intervention skills by mid April**

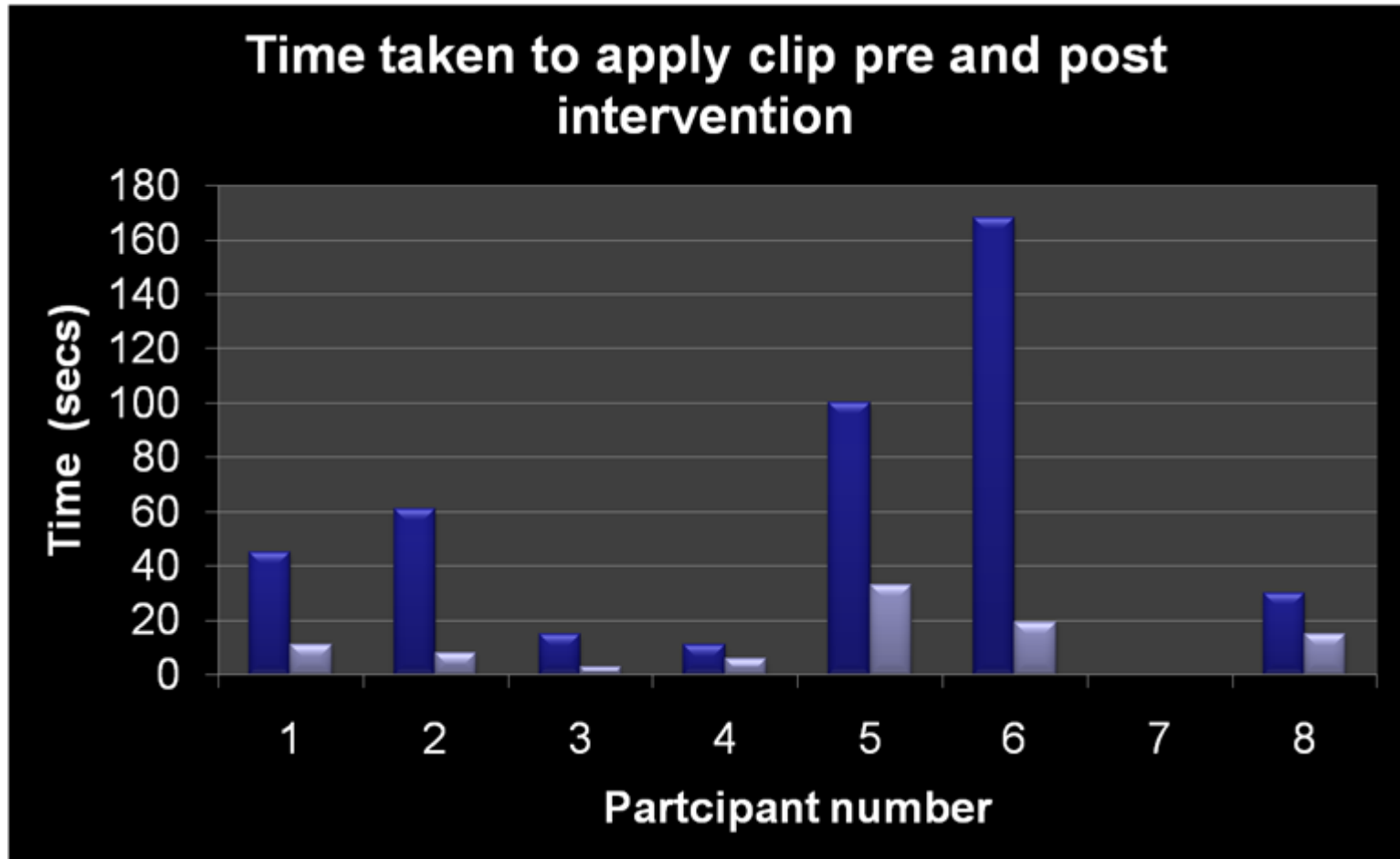
Statistical analysis  
Planning of next stage

# Preliminary results



**On average students practiced cutting task 10-20 times per hour session**

# Preliminary results



**On average students practiced clipping task 6-10 times per hour session**

# Challenges

- ❖ Organising 20 students
  - Most completed tasks within 3/52 instead of 2/52
- ❖ Availability of Clinical and Cuschieri Skills Centres
- ❖ Student commitment variability
- ❖ Lag time for intervention group
  - 2-3/52 lag btw finishing practice to re-measurement of skills
- ❖ Practical differences between portable and fixed simulator may affect results
- ❖ Competence vs capability

# Next steps

- ❖ Analysis and interpretation of data
- ❖ Data will inform design of large RCT to assess role of portable simulators and their transferability to the operating theatre
- ❖ Help establish research programme to create quality assured curriculum for developing surgical laparoscopic skills

# Next steps

- ❖ Can skills acquisition from lap simulators...
  1. Be transferable to the operating room?
  2. Ultimately lead to improved patient outcomes?
  
- ❖ All simulators need to be rigorously evaluated...
  - appropriate use and optimal introduction in surgical training curriculums
  
- ❖ Development of a “pre trained novice”
  - Basic psychomotor and visual-spatial skills become reasonably automatic

# Special thanks to.....

CLINICAL SKILLS  
Managed Educational Network  
Excellent skills for excellent care



Mr Nabi and Mr Tang for mentorship

Mr Tait and Mr Alijani

Ninewells front door staff

Outstanding commitment from medical students

Thank-you

Any questions?