Training and simulation Centres: requirements

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Surgical train

Was acquired in the operating room by
1- first observing,
2- then assisting mentors,
3- to operate under supervision.

By this method unskilled trainees:
learn on patients (morbidity increased risk)

Kauvar, 2016; Wilkiemeyer, 2005
operating room is not the ideal learning environment because of:

- increases operating time (today increasingly limited);
- raises costs (longer surgeries);
- stress/pressure: to op. > number patients;
- ethical/legal problems
simulation-based training (SIM)

- Can provide an alternative to standard surgical training
- Several studies have shown the SIM feasibility and value, being transferable to real patients

(Hull L, 2015)
SIM- advantages

- relaxed and inexpensive environment
- allows to make mistakes and repeat procedures without consequences
- saves time in the op. room
- Accelerates the learning curve
- avoids ethical/legal problems
- allows to train new operations
- can transfer learning to the surgical setting

Fried G, 2004; Sages, 2009; Vanessa N, 2010
They have been organized postgraduate hands-on courses

- Annual meeting of surgical society
- Some organized by Hospitals and Universities
- Industry-sponsored courses
- Etc.

They remain inadequate:

- sporadic and occur irregularly
- with limited inscriptions
- not for all national residents
- they are not structured: most surgeons practice on a self created program
SIM CENTRE

Must be developed a SIM CENTRE, as an “educational home” to train and retrain with a structured and robust form.

SIM CENTRE must have ideally a full complement of:
- educators
- clinicians (some in part-time),
- administrative and support personnel
The physical structure must:

- be large to service a significant number of surgeons and specialties (surgery, neurosurgery, vascular, cardiology, gynecology, orthopedics, etc.)

- include 3 types of environments to support:
  - cognitive,
  - procedural and
  - team training

Dunkin BJ, 2015
1- Cognitive learning environment:

to observe live operations with two way interaction
2- Procedural learning environments:

Rooms to accommodate all types of SIM.: models, computers, live animals, corpses.
3- team training environments

Recreating / simulated operating and recovery room, intensive care unit, etc., With Full Body Simulator
SIM CENTRE – requirements:

Types of surgical simulators

- Synthetic (inanimate) models and box trainers (“endotrainers”):
  - manual
  - hybrid simulators
  - virtual reality (computer-based)

- Live animal (ex. pig)

- Human corpse

- Anatomic sections or organs from autopsies frozen ready for use later
SIM CENTRE – requirements:
Manual synthetic models in plastic, rubber and latex to do basic exercises

Proving the Value of Simulation in Laparoscopic Surgery
Manual synthetic simulators

More primitive and cheap
ideal to start acquiring basic skills

several types
Manual simulators
Manual simulators

Practice laparoscopic procedures on models placed inside the trainer
POP trainer: pulsatile organ perfusion with coloured water
Manual simulators

S. MISTELS (McGill System for Training and Evaluation of Laparoscopic Skills)

With 5 exercises
Structured for learning and evaluation

Part of the basic training program of

SAGES
Society of American Gastrointestinal and Endoscopic Surgeons
Hybrid simulators

Combination of **MANUAL + VIRTUAL R sim.**:
Frequently a mannequin being linked to a computer.
Computer can simulate patient responses to a procedure.
Virtual simulators

They reproduce with fidelity the operations and their complications
Virtual simulators
- provide objective and repeated measurements to improve:
  . time taken to complete a task,
  . errors
  . movements efficiency
Types of surgical simulators

- Synthetic (inanimate) models and box trainers ("endotrainers"):
  - manual
  - hybrid simulators
  - virtual reality (computer-based)

- Live animal (ex. rat, pig)

- human corpse

- anatomic sections or organs frozen
SIM CENTRE – requirements:
- Live animal - pig

Provide a high fidelity without patient environment to:

- get psychomotor and cognitive skills
- learn working as team
- realistic feedback of operat. (morbidity)
SIM CENTRE – requirements:

- **Live animal - rat**

  Bioterium rat
Types of surgical simulators

- Synthetic (inanimate) models and box trainers ("endotainers"):  
  . manual  
  . hybrid simulators  
  . virtual reality (computer-based)

- Live animal (ex. pig)

- human corpse

- anatomic sections or organs frozen
Very usefull for both open and
laparoscopic surgical training.
pneumoperitoneum: easy and reproducible

Tissues with color and consistency suitable for practice

gallbladder
Cystic artery
spleen
caecum

Vermiform appendix
Types of surgical simulators

- Synthetic (inanimate) models and box trainers ("endotrainers"):
  - Manual
  - Hybrid simulators
  - Virtual reality (computer-based)

- Live animal (ex. pig)

- Human corpse

- Organs or sections removed during autopsies that are frozen for later use
Cervical organs to train thyroidectomy
Abdominal organs to train dissection and intestinal anastomoses
train hepatectomy
Amputed legs to train flaps for limb reconstruction
CONCLUSIONS - 1

-Learning training must be sequential and structured

-Ideally it must be developed in a SIM CENTRE, as an “educational home” to train and retrain with a structured form

-SIM CENTRE must have a full complement of:
  - educators,
  - clinicians (some in part-time)
  - administrative and support personnel
CONCLUSIONS - 2

SIM CENTRE – requirements:

- meeting rooms to observe live operations
- manikin based simulation operating room
- rooms to accommodate all types of SIM
- laparoscopy
- but must have Robotic Surgery ??
CONCLUSIONS - 3

SIM CENTRE – requirements:

- Synthetic (inanimate) models and box trainers ("endotrainers"):  
  - manual
  - hybrid simulators
  - virtual reality (computer-based)

- Live animal (ex. pig)
- human corpse
- anatomic sections or organs from autopsies, frozen for use later