Simulation In Urology

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Do We Need Simulation In Urology? Why?
Simulation Is Not New

Already existing in high-tech and high risk industries. (like nuclear, marine, aviation, etc...)

Healthcare learned simulation from aviation with three decades delay
Aviation industry has shown that simulators can reduce the number and type of flight errors by allowing pilots to rehearse different flight scenarios in a controlled environment. (i.e. the flight simulator)
Simulation in Aviation

The Flight Simulator
Prophet & Boyd, two military pilots, presented a number of conditions under which training devices are justified:

- High difficulty levels of skills
- High levels of critical skills and tasks
- Infrequent practice of skills
- Difficulty of teaching in the operational equipment
- Safety factors
- Cost of using equipment for training
To Err is Human, the I. O. M Report has speculated that surgical simulations may afford similar outcomes if implemented in surgical training.
Institute of Medicine Report

- Published in 1999
- Addressed the problem of preventable medical errors
- Charged the healthcare industry to evaluate and change their systems to prevent patient harm
It is clear that the practice of urologic surgery, particularly in laparoscopy and endoscopy meets these criteria for justification of training devices.
Urologic Surgery, as other surgical specialties is facing GREAT CHANGES
1. Beside the fact that a case performed by a trainer lasts longer and is more expensive that a case performed solely by a staff surgeon.
   o -Economical Constrictions
   o -Fear of litigation
   o -Increasingly complex cases

Limit the time in OR and then the opportunities for the trainee to practice and learn.
2. At the same time, operating approaches are changing.
   In urology, open surgery is increasingly replaced by:

   - **Endoscopy**, which is essentially a “one person” procedure teaching an assistant during the procedure, is more difficult than in open surgery.

   - **Laparoscopy** which is difficult to teach and to learn.

Both are time consuming techniques.
Other barriers common to surgical simulation:

- Small market.
- Few simulators validated for teaching.
- High cost of software design.
- High cost of simulations at centers.
Definitions
Simulation:

Technique that creates a situation or environment to allow person to experience a representation of a real event for the purpose of practice, learning, evaluation, testing, or to gain understanding of systems or human actions.

Simulation is not a technology, it is a tool to be added to your educational toolbox.
Simulator:
– Any object or representation used during training or assessment that behaves or operates like a given systems and responds to the user’s action (SSH).
– They are three types:
  • Task Trainer (Part Task Trainer, also called physical model based, or inanimate simulator). A device designed to train in just key elements of the procedure on skill being learned such as Foley Catheterization, insertion of supra pelvic tube, or part of a total system (cystoscopy simulator)
• Computer based simulators. There is a modeling of real life processes with inputs and outputs exclusively combined to a computer, usually associated with a monitor and keyboard.

• Hybrid simulator. Union of 2 or more modalities of simulation with the aim of providing a more realistic experience. In healthcare it is most applied to the situation where a PTT (catheterization model) is realistically affixed to a standardized simulated patient allowing for the teaching and assessment of technical and communication skills in an integrated fashion.
Fidelity:

How realistic is the simulator.
Low & High Fidelity (Higher levels of fidelity are not requested for an simulation be successful).

Haptic Sensation
in HC simulation, refers to devices that providing tactical feedback to the user. It can be used to simulate touching, palpating an organ or body part and the cutting, tearing or traction on a tissue.
Virtual Reality Simulation:

Participant is embedded in his own environment but it is totally virtual. (Flight simulator, Laparoscopic partial nephrectomy)
Types of Surgical Simulators in Urology
P.T.T Male Genital Trainer
P.T.T. URINARY CHATHETERIZATION
Virtual T.U.R Prostate, Bladder, Laser Surgery for BPH
Virtual PCNL: Percutaneous access
Virtual Laparoscopy
Implementing Simulation Curriculum Into Residency Program
Much more than purchasing of VR models, simulation based training involves:

• Robust training curriculum
• Reliable and valid assessment tools
• Expert trained faculty
A lack of understanding of what type of simulation is effective for what type of training, coupled with the idea that it is always expensive resource intensive, and required dedicated centers, may also explain the poor uptake of simulation into urological training.
To incorporate simulation into training curriculum, it must be shown to be efficient in meeting the learning objectives required to be a competent urologist.
Where as technical skills training has made significant progress in the past 10 years, non technical training is still lagging behind
Framework for Simulation Across the Urological Training Program
**Skill/Stage**

**Early**

**Technical**
- **Skills:** Cystourethroscopy, catheterisation, Circumcision, Scrotal surgery.
- **Simulators:** Bench top models, Pelvic Trainer, Animal models
- **Assessment:** Workplace based assessments, Global rating scales e.g. OSATS

**Non-Technical**
- **Skills:** Decision making, Communication, Situational awareness
- **Simulators:** Classroom teaching, Paper scenarios, Role play / Simulated patients
- **Assessment:** Checklists, Multi-source feedback [360 assessment]

**Intermediate**

**Technical**
- **Skills:** Stone surgery, TURP/TURBT, Nephrectomy, Prostatectomy
- **Simulators:** VR Simulators, e.g. TURP simulator
- **Assessment:** Simulator metrics, Faculty assessment, Procedural checklists

**Non-Technical**
- **Skills:** Leadership, Stress management, Interdisciplinary team-work
- **Simulators:** In-situ simulation, Distributed simulation
- **Assessment:** Teamwork assessment e.g. OTAS, Non-technical skills scales e.g. NOTECHS

**Experienced**

**Technical**
- **Skills:** Emergency procedures, Complex procedures, Crisis management e.g. Uncontrolled haemorrhage
- **Simulators:** Simulated Operating Room

**Non-Technical**
- **Assessment:** Video based ratings & feedback, Global Rating Scale, NOTECHS/OTAS

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**Number of learners**

**Cost & complexity**
Conclusion 1
Requirements for successful implementation of simulation in urology
Time and adapted environment.
Commitment from trainers
Appropriate use of technology (not necessary request availability of very expensive technology)
Appreciation of learning tools
Robust research
Conclusion 2

Need of simulators (under use of low cost simulation)
Dedicated time to education
A pinch of good will and a lot of creativity
Thank you

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