Conducting Simulation in Low-Resource Settings

- **What**
- Where
- Why
- How
- Discussion

- **5 simulation sessions**, two hours each
- 14 anesthesia residents, 6 volunteers
- **2 scenarios per day** designed based on a needs assessment from the previous year
  - Available medications and treatment options shaped scenario creation
- **2 debriefings per day**
- **No budget**

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Port Au Prince, Haiti

Bernard Mevs Hospital

Haiti Health Statistics

- January 12th 2010 earthquake destroyed health infrastructure of Port-au-Prince
- Gross National Income per person 2014= $1710 USD (~$150/month) [1]
- Average anesthesia resident salary ~$100 USD per month
- United Nations Development program: 2014 national poverty rate is 58.6%, abject poverty at 24.7% [2]
- Per capita in 2014, Haiti spent about US$131 annually on health care [1]
- Deaths due to TB in HIV negative population in 2013: 26 per 100k (~2800 people per year)

(1) WHO Statistical Profile: Haiti   (2) "Haiti boosts health and education in the past decade, says new UNDP report". *UNDP*. 25 June 2014. Retrieved 30 May 2017.

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- In complex dynamic environments, static decision → "naturalistic decision making"
  - Problems ill structured, environment is dynamic and uncertain, time pressure, high stakes, often multiple players[1]
  - This type of decision making requires experience and practice [1]
- Airline industry requires simulation training and airlines must therefore provide funding despite many other financial demands
- However, high fidelity simulation comes at a large cost:

Image from Sully, 2016 motion picture

In one 2006 study, high fidelity simulator annual cost was US$876,485.
Fixed costs per year totaled $361,425. Variable costs totaled $311 per course hour.[2]

The cost per hour of high-fidelity simulation is
more than the average monthly income in Haiti.

So, what about low fidelity simulation?

(1) Gaba, D. Simulation-Based Training in Anesthesia Crisis Resource Management (ACRM); Simulation & Gaming 32(2):175-193 · June 2001 DOI: 10.1177/104687810103200206

(2) McIntosh, Cate; Macario, Alex; Flanagan, Brendan; Gaba, David M. Simulation: What does it really cost? *Abstract #1473*. Simulation in Healthcare: The Journal of the Society for Simulation in Healthcare: Summer 2006 - Volume 1 - Issue 2 - p 109

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- Equipment included an already available intubating head, a tablet with the mobile application SimMon (on iTunes for ~$30USD), surgical equipment, intubating supplies, syringes and IV supplies were used (expired equipment from the operating room).
- SimMon displays a patient monitor, emits pulse oximetry tones and can be controlled remotely from a second device via BlueTooth.
- The ability of the scenario to impart believability became apparent through the residents' facial expressions, sweating, trembling hands, and the debriefing discussions.

Consent given for use of all photos.

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Surgical clamps are used to mimic bronchospasm in an intubating head.

- The literature weakly supports high-fidelity simulation over low-fidelity simulation in medical training, although further studies are required.[1-2]
- We argue based on our experience that low-cost, low-fidelity simulation is a plausible exercise in low-resource settings as long as scenarios are appropriately adapted to reflect the setting of practice for the trainees.

(1) Crofts, Joanna F. BMBS, **Training for Shoulder Dystocia: A Trial of Simulation Using Low-Fidelity and High-Fidelity Mannequins.** Obstetrics & Gynecology: December 2006 - Volume 108 - Issue 6 - pp 1477-1485. doi: 10.1097/01.AOG.0000246801.45977.c8
(2) Hoadley, Theresa A**. Learning Advanced Cardiac Life Support: A Comparison Study of the Effects of Low and High Fidelity Simulation.** Nursing Education Perspectives: March/April 2009 - Volume 30 - Issue 2 - p 91–95