Patient-Centered Anesthesia and Learner-Centered Training

Samsun (Sem) Lampotang, PhD
Professor of Anesthesiology
Director, CSSALT
Director, CTSI Simulation Core
Innovations Director, UF Health Shands Experiential Learning Center

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Disclosures

• As co-inventor of the Human Patient Simulator mannequin, the Temperature Management Systems (TMS) cooling football pads and the Hamilton Max transport ventilator, I receive(d) a fraction of the royalties that the University of Florida collects(ed) from the licensees

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DoD Disclaimer

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Outline

• Patient-Centered Anesthesia
  – Precision medicine/anesthesia/sedation
  – Race-specific loading doses for propofol sedation

• Learner-Centered Training
  – Self-instruction on procedural simulators
  – Self-debriefing on procedural simulators
  – Competency-based training

White House Precision Medicine Initiative

Doctors have always recognized that every patient is unique, and doctors have always tried to tailor their treatments as best they can to individuals. You can match a blood transfusion to a blood type — that was an important discovery. What if matching a cancer cure to our genetic code was just as easy, just as standard? What if figuring out the right dose of medicine was as simple as taking our temperature?” - President Obama, January 30, 2015

https://www.whitehouse.gov/precision-medicine
Personalized vs. Precision Medicine

• Personalized medicine can be misconstrued as designing a unique treatment for every single individual patient, an impractical proposition
• Therefore, the term “Precision Medicine” is recommended over “Personalized Medicine”*


Ethnicity ≠ Race

• “Ethnicity” misused as politically correct synonym for “Race” in the US
• Ethnicity is based on language, culture, cuisine, NOT genes
  – Caucasians can be of Hispanic, English, French, German, etc. ethnicity
• Race is based on genes
• Race-specific dosing is based on race, not ethnicity

Effect site concentration compartment
Interpatient Variability within Caucasians – Propofol

- Propofol simulation demo

Race-Specific PD Model of Propofol-Induced LOC


North America India
Pragmatic precision medicine

- Estimating initial propofol doses based on patient race without need for individual DNA analysis
- Point of care precision sedation tool

Patient Safety Significance

Propofol sedation gone wrong

- “.. a case in Florida in 2004 when a patient stopped breathing during breast augmentation surgery and died as a result... the surgeon personally administered anesthetic drugs, including propofol, and overmedicated the patient.”

Propofol sedation gone wrong

Ongoing clinical study in GI suite
LEARNER-CENTERED TRAINING

- Self-instruction
  - Basic skills exercises
  - Constructivist exercises
- Self-debriefing
  - Automated scoring algorithm
  - Detailed breakdown of score
- Competency-based training, instead of time-based training

RECOMMENDED APPROACH TO ANESTHESIA FOR GI ENDOSCOPY

SELECTING AN INTRAVENOUS ANESTHETIC AGENT:
- EF > 40%: Propofol infusion (loading dose rate \( \Delta 300 \text{ mcg/kg/min} \) and attentively titrate down to maintenance rate before scope attempt) (right-sided lesions)

- EF < 40%: Propofol infusion (loading dose rate \( \Delta 300 \text{ mcg/kg/min} \) and attentively titrate down to maintenance rate before scope attempt) (left-sided lesions)

ESOMEPA (load with 0.1-0.15 mg/kg, start infusion \( \Delta 30-40 \text{ mcg/kg/min} \))
- Or: Ketamine (load with 0.25-0.5 mg/kg, followed by propofol infusion (suggested infusion rate \( \Delta 75-150 \text{ mcg/kg/min} \) as tolerated)

INDICATIONS TO INTUBATE:
- Severe hiatal hernia, Mallampati Class IV
- Hiatal hernia, RAP > 0.4
- High BMI, +/- difficult airway anatomy (e.g. Mallampati class IV, prior neck surgery +/- XRT)
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Techniques in Gastrointestinal Endoscopy 2016 18, 34-37 DOI: (10.1016/j.tgie.2016.02.006)
Motivation

• Clinical instructors busy with patient care
• Limited time/availability to teach results in time-based learning but not all learners learn at the same rate
• Clinical instructors are expensive (RoI)
• Limited and expensive time of clinical instructors best used for material that cannot be self-taught and self-debriefed

ROI

• ROI = Cost of complications directly avoided due to simulation training/Cost of training
• Lack of instructors; keeping training costs low; increasing accessibility for learners
• “Half a loaf is better than no bread”
• Integrated tutor (not intelligent tutor)
• Ongoing study to evaluate if an integrated tutor for self-study/debriefing is non-inferior to a human instructor
Learner-Centered Training

- Self-instruction
  - Deconstruct a procedure into its basic skills components
  - Basic skills exercises
  - Constructivist exercises (active learning; learners construct knowledge for themselves; e.g., they go through an exercise to experientially learn about needle anisotropy)

- Self-debriefing
  - Detailed breakdown of score

Questions/Contact info

Sem Lampotang
Email: slampotang@anest.ufl.edu
Web:
http://vam.anest.ufl.edu/wip.html
http://simulation.health.ufl.edu