Higher Fidelity: Better for Learning or a Waste of Money?

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Higher Fidelity: Better for Learning or a Waste of Money?

• Is higher fidelity needed for satisfactory, simulation-based learning?
• What do we know about Fidelity?
  – Reproduction of sound
  – Reproduction of an effect
• Have we moved the needle?
Is higher fidelity needed for satisfactory, simulation-based learning?
Pelvic Bleeding Model
RESULTS

- 30 Senior Residents
- 10-50 Prior LVH Repairs
- Advanced Laparoscopic Procedures
- Independent Decision Making
- Procedural Steps
- Artistic License
- Only 3 Residents
Error Management
Operative Planning
Thank You!!
It’s all about the metrics.
Sensor Technology

Biomimetic MEM Sensors
Directional Forces

44 x 44 sensor matrix (1936 sensors)
RESULTS

Average Force Applied By Participants

- **Did Not Find Mass (N=16)**
- **Found Mass (N=16)**

- **Participant Number**
- **Average Force (N)**
Sensor Technology in Assessments of Clinical Skill


It’s all about the metrics.

High Quality Feedback
Thank You!!
It's all about the metrics.
Experienced Intubation

- Upper Teeth
- Lower Teeth
- R-Mandible
- Mid-Mandible
- L-Mandible
- Tongue
- Post-Pharynx
- Vocal Cords
- Upper Trachea
- Lower Trachea
- Thyroid Cartilage

Pressure over time (1/20 sec)
Figure 14: Pressure during normal application of the AAT
Technology & Performance Metrics
Video glasses, Audio, Motion Tracking, Laparoscopic view, External view, Checklist, Self Assessment, FPA
Correlation between LVH Motion Metrics (securing first anchoring suture) and LVH Final Grade

- Less smooth = Lower final product grades
- Longer Path Length = Lower final product grades

$p < 0.05$
Quantify Decision Making

- Idle Time
- Initiation Velocity
- Start-Restart
- Reaction Time


IDLE TIME

![Bar chart showing mean idle time for foam, balloon, and tissue paper. The tissue paper has a significantly higher mean idle time compared to the other two materials.](image)

- Foam
- Balloon
- Tissue paper

*Significant difference (p < 0.01)*
Variable Tissue Simulator

- Participant #1 -> Attending surgeon

Final product for Tissue
Variable Tissue Simulator

- Participant #14 -> Medical Student

Final product for Tissue
IDLE TIME

Measure of Difficulty
Measure of Experience
Athletics vs. Medicine

Metrics for High Stakes

Metrics for Mastery

Ultimate Goal – Excellent MD’s
Working volume
Results

Small working volume

Large working volume
Use of advanced engineering technologies to measure hands-on performance