IMPACT OF PROGRAM SPECIFIC E-LEARNING MODULES ON SURGICAL SKILL ACQUISITION AND KNOWLEDGE RETENTION IN THE SETTING OF A JUNIOR ARTHROPLASTY ROTATION

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SURGICAL RESIDENCY IS CHALLENGING

- Shift to competency based assessment
- Rise in documentation
- Shifting practice patterns and increased complexity
- Restriction in work hours


https://www.uottawaortho.ca/
LEARNING MODALITIES

Aural: 45.5%

Visual

Kinesthetic: 33.1%

Read

Write

LITERATURE REVIEW

After learning activities people generally retain:

- 10% of what we read (Reading)
- 20% of what we hear (Hearing words)
- 30% of what we see (Looking at pictures)
- 50% of what we see & hear (Watching a demonstration)
- 70% of what we say (Participating in a discussion)
- 90% of what we say & do (Doing a dramatic presentation)

Nature of involvement:

- Verbal: Passive
- Visual: Receiving
- Active: Participating, Doing


https://www.uottawaortho.ca/
- However
  - Overwhelming amounts of information
  - Surgical videos do not mirror exact steps/techniques of staff surgeons

Rapp A et al. 2016 Journal of Surgical Education. 73(6) Dec
STUDY QUESTIONS

- Do rotation specific E-Learning Modules enable **quicker skill acquisition** in arthroplasty surgery compared to those using personal study techniques alone?

- Do rotation specific E-Learning Modules **improve knowledge retention** compared to those using personal study techniques alone?
**Methods**

- Ethics approval granted by OHREB
- **Needs assessment survey completed**
  - 10 question survey
  - Completed by 30 residents in the division of orthopedics
  - Distributed through survey monkey
METHODS

- **Needs assessment results**
  - 90% already used online surgical videos for preparation
  - 97% agreed E-Learning Modules would be beneficial to their learning

### Survey Results

**Questions:**
- Do you or have you used online surgical videos to learn or review surgical approaches?
- Do you believe rotation specific E-Learning modules (staff specific - written and video based surgical technique) would improve your skills and knowledge acquisition?

**Chart 1:**
- **Yes** 89.29% (25 responses)
- **No** 10.71% (3 responses)

**Chart 2:**
- **Yes** 96.43% (27 responses)
- **No** 3.57% (1 response)
METHODS

- **E-Learning Modules created**
  - Narrated surgical video
  - Summary manual (step by step guidelines) + more
  - Module accessible through any computer/mobile device
METHODS

- To validate our Modules, we recruited 10 jr. residents
- Knowledge and skill acquisition tested at multiple points of rotation
  - OSCORE
  - 30 MCQ exam (OITE type questions)

## RESULTS

- **Table 1.** Skill Assessment in ten residents undergoing their three month arthroplasty rotation using the validated **OSCORE** tool during the acquisition period

<table>
<thead>
<tr>
<th></th>
<th>Mean (SD; Range)</th>
<th>E-Learning Module</th>
<th>No E-Learning Module</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First OSCORE</strong></td>
<td>17.2 (4.3, 9-24)</td>
<td>19.4 (4.2, 13-24)</td>
<td>15.0 (3.5, 9-18)</td>
<td>0.095</td>
</tr>
<tr>
<td><strong>Second OSCORE</strong></td>
<td>20.7 (4.2, 14-28)</td>
<td>19.8 (5.5, 14-28)</td>
<td>21.6 (2.8, 18-25)</td>
<td>0.548</td>
</tr>
<tr>
<td><strong>Last OSCORE</strong></td>
<td>26.3 (6.3, 18-39)</td>
<td>26.0 (4.5, 21-32)</td>
<td>26.6 (8.3, 18-39)</td>
<td>0.841</td>
</tr>
<tr>
<td><strong>Absolute Change Score (Last-First)</strong></td>
<td>9.1 (8.6, -1-30)</td>
<td>6.6 (5.0, 13-14)</td>
<td>11.6 (11.1, 1-30)**</td>
<td>0.690</td>
</tr>
<tr>
<td><strong>P-Value (Last - First)</strong></td>
<td>0.008*</td>
<td>0.08</td>
<td>0.042*</td>
<td></td>
</tr>
</tbody>
</table>

*significance p<0.05
## RESULTS

- **Table 2.** Knowledge acquisition during 3 month arthroplasty rotation and 3 month retention in ten residents using a multiple choice questionnaire

<table>
<thead>
<tr>
<th></th>
<th>Cohort Mean (SD; Range)</th>
<th>E-Learning Module Mean (SD; Range)</th>
<th>No E-Learning Module Mean (SD; Range)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baseline</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14.2 (3.6, 7-18)</td>
<td>14.4 (2.9, 10-17)</td>
<td>14.0 (4.5, 7-18)</td>
<td>0.841</td>
</tr>
<tr>
<td><strong>End of Rotation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>19.2 (3.9, 16-26)</td>
<td>17.6 (1.9, 15-20)</td>
<td>20.8 (2.3, 17-23)</td>
<td>0.056</td>
</tr>
<tr>
<td><strong>3 Month Retention</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>20.7 (3.9, 16-26)</td>
<td>22.3 (3.8, 17-26)</td>
<td>17.5 (2.1, 16-19)</td>
<td>0.151</td>
</tr>
<tr>
<td><strong>Absolute Change Score</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acquisition (End-Baseline)</td>
<td>5.0 (4.4, -1-14)</td>
<td>3.2 (4.3, -1-10)</td>
<td>6.8 (4.2, 4-14)</td>
<td>0.267</td>
</tr>
<tr>
<td>Absolute Change Score 3 Month Retention (3 Month - End of rotation)</td>
<td>2.3 (5.6, -5-9)</td>
<td>5.3 (4.1, 0-9)</td>
<td>-3.5 (2.1, -2-3)</td>
<td>0.133</td>
</tr>
<tr>
<td><strong>P-Value Acquisition (End - Baseline)</strong></td>
<td>0.011*</td>
<td>0.144</td>
<td>0.042*</td>
<td></td>
</tr>
<tr>
<td><strong>P-Value Retention (3 Month - End)</strong></td>
<td>0.345</td>
<td>0.106</td>
<td>0.180</td>
<td></td>
</tr>
</tbody>
</table>

*significance p<0.05
LIMITATIONS

- Number of junior residents completing arthroplasty block (n=10)
  - Underpowered; however, that is the absolute number of junior residents available in a year
- No ability to control how much individuals in intervention groups are actually using resource to prepare
- May be variability in staff OSCORES
DISCUSSION

- E-Learning is not a substitute but a supplement
- E-learning can be a cost-effective resource
- E-Learning may offer early procedural learning benefits/decrease junior residents anxiety
- Continuous rigorous evaluation and improvement of its effectiveness is ongoing
- User impression survey data must be collected and analyzed
CONCLUSION

- Surgical education needs to evolve to meet the needs of the new generation of learners
- Needs assessments have established the need for these learning tools
- We are looking to reinforce our E-Learning Modules further through what we have learned
- Further analysis of survey data will explore the role of E-Learning Modules in decreasing resident anxiety and increasing procedural confidence
MERCI / THANK YOU
The presenter would like to thank Dr. Andrew Adamczyk, from whom this slide show is adapted.