E-learning vs. Standard Teaching Methods in Medical Clerkship, Is There a Difference?

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Disclaimers

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Conflict of Interest:
None
Background - Curriculum reform

• “Molecules to Military Medicine” (2011)
• Clerkship year starts 6 months earlier
• Basic science integration in clinical rotations
• USMLE Step One after the clerkship
The Problem

• Student & Faculty across entire USA!
• Med Clerkship now 2 weeks shorter (16%)
• 25% increase in lecture content
• Now sharing block of time with psychiatry...
<table>
<thead>
<tr>
<th>Outpatient MEDICINE</th>
<th>Psychiatry</th>
<th>MEDICINE wards</th>
<th>Exams Week</th>
</tr>
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15 weeks
“IGS”

• Group Sessions that are...
  • ”Interactive” = NOT lectures
  • “Integrative” = Basic Science correlates
  • “INTERPRETER” (RIME)

• 90-minutes, weekly
• CDIM Core Curriculum

**BUT** what about students who are not there?
What about E-learning?

• Similar or better outcomes to lectures
  • Surgical clerks using MEDU WISE*
  • ECG reading web-based vs classroom†
  • Family Medicine - Low Back Pain Module**
  • Exam of Diabetes treatment knowledge††

†Journal of electrocardiology. 2016;49(2):112-116
† † BMC medical education. 2016;16:158
E-learning Solution

- MEDU SIMPLE (Now Aquifer) virtual patients
- Core Clerkship Curriculum Guide V 3.0
IGS Topics

- Chest pain
- Fever/antibiotics
- Diabetes
- Acid-Base
- Dementia/delirium

- CHF
- Obesity
- Anemia
- Hypertension/lipids
- Fluids/osmolarity

- Renal failure
- Liver/ascites
- HIV
- Dyspnea
- Syncope

When students are away on psychiatry they cover the 5 topics they miss using e-learning
With one-third of core topics for any individual student now being delivered via e-learning, are educational outcomes impacted?

- This project was reviewed by the USU IRB and determined to be exempt under 32 CFR 219.101 (b)(1)
Methods

• First 15 weeks, Class of 2018 (N=57 Students)
• Assessment outcomes:
  • Clinical points/overall clerkship grade
  • Examinations: NBME, MSX, OSCE
  • Analyzed by rotation sequence
• Script concordance test (SCT)
  • % correct e-learning vs. lecture
  • Linear regression mode vs. topic
**Script concordance Test (SCT)**

**Based on illness script theory**

You are evaluating a 60 year old male with dyspnea

<table>
<thead>
<tr>
<th>If you are considering</th>
<th>And you find</th>
<th>Your hypothesis becomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ACS</td>
<td>Normal EKG</td>
<td>-1 0 +1</td>
</tr>
<tr>
<td>2. PE</td>
<td>Hypoxemia</td>
<td>-1 0 +1</td>
</tr>
</tbody>
</table>

-1 = much less likely
0 = Neither much more nor much less likely
+1 = Much more likely

Results

• 100% IGS session attendance on Medicine
• 57/57 (100%) attempted the SIMPLE cases while away on Psychiatry
• 52/57 (91%) completed all FIVE modules
• Mean completed was 6 (SD 2.5; range 3-15)
• No relationship between #modules and SCT
### Results – Script Concordance

<table>
<thead>
<tr>
<th>SIMPLE</th>
<th>IGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Correct</td>
<td>% Correct</td>
</tr>
<tr>
<td>64%</td>
<td>65%</td>
</tr>
</tbody>
</table>

- Paired T test of mode of learning vs result no significant differences (p=.63)
- SIMPLE module (mean=64%, SD=0.19)
- IGS modules (mean=65%, SD=0.10)
## Results – Script Concordance

### Linear Regression Analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unstandardized coefficient</th>
<th>Standardized coefficient</th>
<th>t</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td>.12</td>
<td>.07</td>
<td>1.64</td>
<td>.10</td>
</tr>
<tr>
<td>Topic</td>
<td>.01</td>
<td>.01</td>
<td>.83</td>
<td>.41</td>
</tr>
<tr>
<td>Interaction</td>
<td>-.03</td>
<td>.02</td>
<td>-2.06</td>
<td>.04</td>
</tr>
</tbody>
</table>

- Outcome= SCT Performance
- R2 of the model was very small ($R^2 = .01$)
  - Interaction was negligible.
# Results by rotation sequence

<table>
<thead>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N</strong></td>
<td>N=9</td>
<td>N=11</td>
<td>N=10</td>
<td>N=9</td>
<td>N=9</td>
<td>N=10</td>
<td>N=58</td>
</tr>
<tr>
<td><strong>NBME (100)</strong></td>
<td>64.3</td>
<td>72.9</td>
<td>67.2</td>
<td>69.1</td>
<td>64.9</td>
<td>71.5</td>
<td>ns</td>
</tr>
<tr>
<td><strong>MSX (%)</strong></td>
<td>24.4</td>
<td>25.2</td>
<td>24.0</td>
<td>25.1</td>
<td>22.4</td>
<td>23.7</td>
<td>ns</td>
</tr>
<tr>
<td><strong>Int Med OSCE (%)</strong></td>
<td>62.6</td>
<td>67.2</td>
<td>63.6</td>
<td>67.7</td>
<td>63.6</td>
<td>62.9</td>
<td>ns</td>
</tr>
<tr>
<td><strong>SCT</strong></td>
<td>59.4</td>
<td>61.8</td>
<td>69.0</td>
<td>64.4</td>
<td>66.1</td>
<td>67.0</td>
<td>ns</td>
</tr>
<tr>
<td><strong>Clin pts (66)</strong></td>
<td>33.4</td>
<td>40.2</td>
<td>28.5</td>
<td>34.8</td>
<td>37.9</td>
<td>33.7</td>
<td>ns</td>
</tr>
<tr>
<td><strong>Total Points (100)</strong></td>
<td>48.6</td>
<td>61.3</td>
<td>44.8</td>
<td>52.5</td>
<td>50.1</td>
<td>53.8</td>
<td>ns</td>
</tr>
</tbody>
</table>
Discussion

• We demonstrated non-inferiority of e-learning compared with traditional teaching

• Multiple educational outcomes
  • Script Concordance Test
  • NBME shelf
  • OSCE
  • Overall clerkship grade
Limitations

• 1 Block Pilot, early in academic year
  • Underpowered n=57
• Single institution
• Script Concordance Test only 20 items
• Other Possible Influences
  • Bedside clinical teaching
  • Additional self-study resources
Summary

• Replacing Five core lectures with E-learning...
  • Increased feasibility & consistency of our program
  • No adverse impact on learner outcomes
  • No difference in clinical reasoning assessment (SCT)

• E-learning may benefit Sites with:
  • Multisite clerkships
  • Provider RVU pressure
  • Barriers to classroom learning
Thanks to

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