Basic Science of Chemotherapy E-Modules: Does Spaced Access Improve Outcomes?

Author: Ghazaleh Kazemi MD, MSc, FRCP(C)
Date: September 27, 2019
I had an affiliation (financial or otherwise) with a pharmaceutical organization.
However no disclosures that would pertain to this presentation.

- Advisory board member – Purdue, Pfizer, Eisai
- Speaker - Novartis
BACKGROUND
Basic Science of Chemotherapy

• Required training experience for all medical oncology residents
• Traditional academic half day lectures
• Important knowledge for practice and for licensing examinations

• What is the optimal way to teach this to our residents?
Phase 1: Module development

- Draft power point slides
- Articulate software to transform into e-modules
- Use of Mayer’s Multimedia principles
- Use of major pedagogical principles to aid in knowledge retention
  - Test enhanced learning
  - Case enhanced learning
  - Spaced learning: 8 e-modules, each <20 min
- Pilot tested with medical oncology fellows and refined
Phase 2: Randomized study

- How do we effectively deliver online teaching so that the “spacing effect” is maximized? Do we need to space access to individual modules to take advantage of this effect or will students naturally space their own learning when content is separated into discrete modules?
- Study Question: Does spaced access to modular components of an online course on basic science of chemotherapy versus simultaneous access over the same time period significantly improve knowledge retention?

METHODS
METHODS

- Randomized 1:1 allocation to spaced vs simultaneous access
- 2017: 49 medical oncology residents
- 2018: 33 medical oncology residents
RESULTS

Baseline Characteristics

<table>
<thead>
<tr>
<th>Home Institution</th>
<th>Simultaneous (n = 48)</th>
<th>Spaced (n = 49)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dalhousie</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Laval</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>McGill</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>McMaster</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Memorial</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Queens</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Alberta</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>British Columbia</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Calgary</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Manitoba</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Ottawa</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Sherbrooke</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Toronto</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Western</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Unknown</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

PGY Level | Simultaneous (n = 48) | Spaced (n = 49) |
---------|----------------------|----------------|
4        | 29                   | 28             |
5/6      | 19                   | 21             |
RESULTS

End of course evaluation

- Likert scale: 1 – not at all, 4 neutral, 7 – very much
- N= 39 responses

Bar chart showing:
- Content over smaller modules vs long module
- Prefer online vs didactic
- Preparation for clinical scenario?
- Effective Teaching?
- Overall Satisfaction
## Summary of Knowledge Test Scores

<table>
<thead>
<tr>
<th>Time</th>
<th>Simultaneous (n = 48)</th>
<th>Spaced (n = 49)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>T0 (Baseline)</td>
<td>40</td>
<td>13.8 (3.3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>55%</td>
</tr>
<tr>
<td>T1 (Post course)</td>
<td>21</td>
<td>19.6 (3.6)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>78%</td>
</tr>
<tr>
<td>T2 (3 months)</td>
<td>7</td>
<td>18.6 (4.3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>74%</td>
</tr>
<tr>
<td>T3 (6 months)</td>
<td>0</td>
<td>-</td>
</tr>
</tbody>
</table>
RESULTS

Effect on short-term knowledge retention

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimate (95% CI), p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group: Simultaneous vs. Spaced</td>
<td>1.9 (-0.6, 4.4), p = 0.13</td>
</tr>
<tr>
<td>T0 Result</td>
<td>0.3 (-0.1, 0.7), p = 0.20</td>
</tr>
</tbody>
</table>

No effect on short term knowledge retention

Above analysis is the mean difference at T1 between groups, adjusted for T0 using ANCOVA
CONCLUSION

• E-modules can be readily integrated into current residency curriculum
• Residents prefer the online format for delivery of this content
• Spacing e-modules does not impact short term knowledge retention
• Due to small sample size unable to comment on effect on long-term knowledge retention
Acknowledgements

- Co-investigators:
  - Som Mukherjee
  - Ilana Bayer
  - Sameer Parpia
  - Gillian Lampert

- Ontario Clinical Oncology Group (OCOG)
- MacPherson Institute at McMaster University
- Department of Oncology, McMaster University
- PGY4/5 medical oncology residents
Help us improve. Your input matters.

• Download the ICRE App, or

• Go to: www.royalcollege.ca/icre-evaluations to complete the session evaluation.

Aidez-nous à nous améliorer. Votre opinion compte!

• Téléchargez l’application de la CIFR

• Visitez le www.collegeroyal.ca/evaluationscifr afin de remplir une évaluation de la séance.

You could be entered to win one complimentary registration for ICRE 2020 in Vancouver. Vous pourriez participer au tirage d’une inscription gratuite à la CIFR 2020 à Vancouver.