Successes and Pitfalls of Teaching Medical Gross Anatomy Via Only Team-Based Learning and Lab

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Why did MCW change?

• New Dean pushed curriculum change
• LCME was pushing active learning, less passive lecturing, more integration
• Data showed MCW students don’t do as well on USMLE as MCAT data would predict
• Large grant received to fund the endeavor
Curriculum Timeline

- **2008**: MCW hires new Dean with ambitious curriculum plans
- **2009**: Planning starts for Pilot Integrated Curriculum
- **2010**: Interactive learning hallmark of the new curriculum
- **2011**: Basic science Chairs write letter to Dean about problems with PIC and all sign
- **2012**: Discovery curriculum launched

- **2008**: Curriculum retreat held to consider change – mandated 20% reduction in course time
- **2009**: Decision made to use 100% TBL & Labs with no Lectures
- **2010**: PIC goes live with 28 students out of a class of 204. 176 still in classical curriculum
- **2011**: Planning for new curriculum begins
- **2012**: M1 Discipline-based and M2 Systems-based (Hybrid PIC & Classical)
- **2013**: USMLE scores for PIC and Classical curriculum received

- **Discovery Curriculum**
- **Classical Curriculum**
- **Pilot Integrated Curriculum (PIC; M1 & 2)**
- **Discovery**

- Analysis and debriefing of Fall semester

Flow back to M3 & M4
Curriculum Timeline

2009
2010
2011
2012
2013
2014
2015

Classical

PIC (n=28)

Classical (n=176)

Discovery
Design Principles

• Adhere to LCME standards and (existing or revised) MCW curricular global objectives.

• The guiding principles that were developed over the course of several faculty retreats include:
  – Early clinical patient contact
  – Integration of basic and clinical sciences
  – Building on strengths of the current MCW program
  – Competency-based curriculum
Pilot Integrated Curriculum (PIC; 2010)

- 28 out of 204 students participated
- Completely integrated
- Systems-based
- No lectures, all Team-based learning (M-F, 1-5)
- Modules co-directed by basic scientist and MD
- The PIC and Traditional curriculum were being run concurrently so double-teaching
Successes and Pitfalls of TBL in Anatomy

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<thead>
<tr>
<th>August</th>
<th>September</th>
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<tbody>
<tr>
<td>General Principles</td>
<td>Musculoskeletal &amp; Skin Module</td>
<td>Cardiovascular, Respiratory and Renal Module</td>
<td>GI, Nutrition and Metabolism Module</td>
<td>Reproductive Medicine Module</td>
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<td><strong>NBME Exams</strong></td>
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*Kidney dissection before peritoneal cavity*

*No oral cavity yet*

Longitudinal Patient Panel

Pathway Activities

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<tr>
<td>Endocrine Module</td>
<td>Brain, Mind &amp; Behavior</td>
<td>Hematology, Lymphatic System and Neoplasia</td>
<td>Infections and Inflammation Module</td>
<td>Symptoms-Based Presentations</td>
<td>USMLE Board Prep</td>
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Longitudinal Patient Panel

Pathway Activities
Successes and Pitfalls of TBL in Anatomy

Methodology...

• Preclass assignment (textbook reading, faculty lecture notes, ppt slides, podcasts, etc.)
  - Learning objectives key!
• IRAT/GRAT – good way for students to determine their level of preparedness
  - Enormous effort to create all assessments
• Application exercises
  • 2-4 Clinical vignettes followed by 3-5 MCQs
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Grading – class determines percentages

- **Individual Component** – 50%
  - IRAT 25%
  - Written Exam 30%
  - OSCE 20%
  - Lab Practical 15%
  - Peer 10%

- **Group Component** – 50%
  - GRAT 60%
  - Application Exercise 40%
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Outcomes – Grade inflation

- **Individual Component** – 50%
  - IRAT 25% ... 50%
  - Written Exam 30% ... 50%
  - OSCE 20% ... 75%
  - Lab Practical 15% ... 60%
  - Peer 10% ... 100%

- **Group Component** – 50%
  - GRAT 60% ... 100%
  - Application Exercise 40% ... 100%

= 80.8%, High Pass
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Outcomes – Practical Exam comparison

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<tr>
<th>Topic</th>
<th>Classical</th>
<th>PIC</th>
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<tbody>
<tr>
<td>Musculoskeletal Skin (n=17)</td>
<td>87.8%</td>
<td>84.3%*</td>
</tr>
<tr>
<td>CV / Resp. / Renal (n=13)</td>
<td>86.9%</td>
<td>85.4%</td>
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<tr>
<td>Gastrointestinal / Nutrition (n=18)</td>
<td>88.1%</td>
<td>83.7%*</td>
</tr>
<tr>
<td>Reproductive (n=14)</td>
<td>86.2%</td>
<td>81.5%*</td>
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* Statistically significant
Outcomes – Written Exam comparison

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<tr>
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<th>PIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Musculoskeletal Skin (n=11)</td>
<td>84.3%</td>
<td>84.7%</td>
</tr>
<tr>
<td>CV / Resp. / Renal (n=15)</td>
<td>83.8%</td>
<td>84.4%</td>
</tr>
<tr>
<td>Gastrointestinal / Nutrition (n=9)</td>
<td>85.2%</td>
<td>83.9%</td>
</tr>
<tr>
<td>Reproductive (n=7)</td>
<td>82.2%</td>
<td>82.9%</td>
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No significant differences
Successes and Pitfalls of TBL in Anatomy

Outcomes...

• Grade inflation (helped weaker students – GRATs significantly increased percentages)

• PIC students on average did not perform as well as the Classical curriculum students on practical exams

• PIC students did as well as Classical curriculum on written exam questions

• USMLE: what would you predict?
PIC – Pitfalls...

• Significant increase in upfront work (Learning assignments, Learning objectives, RATs, Application exercises)
• Coordinating activities of numerous basic scientists and clinicians from many different departments was challenging
• Covering the breadth of the discipline using only TBL
• Grading
• Faculty morale is low
PIC – Pitfalls...

• Only team-based learning very limiting

• Not efficient for students
  – Lots of prep work for students and difficult for them to separate the wheat from the chaff
  – Then all the in class time

• Not efficient for faculty
  – TBL was four hour blocks
  – Instead of giving a 1 or 2 hour lecture
  – Significant coordination of activities (administrators, clinicians, basic scientists)
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PIC – Pitfalls...

• Students not as invested in the anatomy lab dissections considering they were spread out over 14 months and it did not count much toward unit grade.

• Difficult for basic scientist to feel comfortable with leading discussions with lots of integrated content (multiple disciplines)
Successes and Pitfalls of TBL in Anatomy

Successes...

• Potent faculty development
• Superb early student mentorship
• Improved student problem solving skills
• More active/interactive/proactive student learning
• Increased collaboration (MD & PhD)
• Improved curriculum integration
Successes and Pitfalls of TBL in Anatomy

Successes cont.

- Integration, acquisition and application of knowledge
- When students prepare thoroughly it made higher level interactions fun for faculty
- Assessments better match our learning outcomes and expectations
- Increased focus on medical education scholarship
Take Home Message...

• TBL is a powerful pedagogical tool
• *TBL only* leaves too many gaps – not all topics can be explored thoroughly
• Good TBL leads to great learning
• Mediocre/poor TBL is equally ineffective as mediocre/poor lectures
• Significant faculty development is necessary to do it well
Successes and Pitfalls of TBL in Anatomy

Thank you for your attention!

What questions do you have for me?

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