Integration of PBL cases into gross anatomy laboratory experiences followed by a modified TBL formative assessment:
Pedagogy using the best of both worlds

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Curriculum at a Glance

Cardiovascular, Renal and Respiratory Medicine I

Gastrointestinal, Endocrine and Reproductive Medicine I
Motivation

• How can we accomplish a pragmatic continuity of PBL, small group learning, didactics and laboratory activities?
• Can we improve learning of a subject through integration?
Problem Based Learning (PBL)

1. Begin with a problem or complex scenario
2. ‘Brainstorm’ to understand the nature of the problem
3. Assign each another responsibilities for resolving specific questions before the next class
4. Teach each other the findings from specific questions
5. Integrate new knowledge and skills in the context of the problem

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Gross Anatomy Collections

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Cardiovascular and Respiratory Modules
- Heart and Mediastinum Prep Lecture Lab Quiz
- Upper Airway Prep Lecture Lab Quiz
- Lower Airway and Chest Wall Prep Lecture Lab Quiz

Gastrointestinal System Modules
- Upper GI Prep Lecture Lab Quiz
- Lower GI Prep Lecture Lab Quiz
- Abdominal Walls Prep Lab Quiz
- GI Integration Prep Lab Quiz

Genitourinary System Modules
- Male Pelvis and Perineum Prep Lecture Lab Quiz
- Female Pelvis and Perineum Prep Lecture Lab Quiz

(To return to this menu from any Module, click on your browser's back button.)
Methods (2010-2011)

• Student anatomy teams were asked to answer PBL integration questions at the end of 5 (of 8) lab sessions covering topics in head and neck, thorax, abdomen and pelvis.

• Tutors were given a tutor note addendum with the background anatomy for the PBL Integration questions, and were encouraged to discuss the questions with the students.
Methods (2010-2011)

• Cardiovascular, Renal & Respiratory Medicine I (Block 2, 8 weeks)
  – Heart/Mediastinum (week 1)
    • PBL Theme: The cardiac pump and regulation of its rate
    • PBL Case: Bradycardia (Mobitz I or Wenckebach)
  – Upper Airway (week 5)
    • PBL Theme: Fluid, Electrolyte and Acid-Base Balance
    • PBL Case: Acute metabolic ketoacidosis
  – Lower Airway (week 6)
    • PBL Theme: Dyspnea and Exchange of Gases Between Atmosphere & Blood
    • PBL Case: Chronic Obstructive Pulmonary Disease (COPD)
Methods (2010-2011)

- Gastrointestinal, Endocrine and Reproductive Medicine I (Block 3, 8 weeks)
  - Abdominal Wall (week 3)
    - PBL Theme: Metabolism – Storage, Retrieval, and Synthesis of Fats and Carbohydrates
    - PBL Case: Diabetic Ketoacidosis
  - Male Pelvis and Perineum (week 6)
    - PBL Theme: Male Anatomy and Physiology
    - PBL Case: Cushing’s syndrome (hyperadrenocorticism)
In your PBL case this week, Mr. John Smith presented to the clinic multiple times with hemorrhoids. He has a long history of alcoholism and gastrointestinal bleeding. Currently he presents with hemorrhoids, but no hematemesis. Explain the anatomy of portocaval anastomosis relative to these two clinical signs.

In addition, Mr. Smith had a history of acute pancreatitis. It's thought the inflammatory response can close off the pancreatic duct and prevent extrusion of the pancreatic juices into the duodenum. Describe the pathway of pancreatic enzymes from the head, body or tail of the pancreas into the duodenum. What is the functional and anatomical relationships of the stomach, liver, gallbladder, duodenum and pancreas? Be sure to discuss important ducts and enzymes.
Methods (2010-2011)

• Eleven 1st year student volunteers participated in a 1-hr semi-structured focus group to assess the experience. Proceedings were recorded (students’ identification was anonymous) and transcribed (IRB exempt).

• Questions focused on four themes:
  – Role of PBL in the medical curriculum
  – Awareness of the integration
  – Experience with the integration
  – Satisfaction with the integration
Results (2010-2011)

• Role of PBL in the medical curriculum
  – Helpful for “learning lecture material in greater depth,” and “essential for achieving active and critical learning,” “teamwork,” and “literature search skills”

• Awareness of the integration
  – Integration is an important feature of the overall curriculum, “but even with integration questions, it was difficult to put PBL into the activities” and “tough to answer questions at the end of anatomy”
  – “The whole process of learning should be integrated whether it is explicit or not”
Results (2010-2011)

• Experience with the integration
  – Better to “mention the integration at the beginning of lab” because “I’m not thinking of the PBL cases during the lab”
  – Students wanted a didactic approach to integration questions throughout lab exercises with a “discussion of the answers at the end of lab”
  – “It would be nice if lecturers knew what the PBL cases were”

• Satisfaction with the integration
  – “Having case concepts in anatomy is helpful to solidify PBL concepts”
  – I would like to see “more integration with histology”
Conclusions (2010-2011)

• Students recognized the need and importance for PBL integration in the curricular activities, and in particular the efforts in anatomy lab, but didn’t like the way it was done

• Integration questions should be at the beginning or throughout the lab

• Students want answers
Methods (2011-2012)

• PBL Integration
  – Make the questions more overt by placing them at the **beginning** of lab
  – Provide summative assessments (in addition to final practical)
Methods (2011-2012)

- Gastrointestinal, Endocrine and Reproductive Medicine I (Block 3, 8 weeks)
  - Lower GI (week 2)
    • PBL Theme: Function of the Liver – Detoxification and Synthesis
    • PBL Case: Celiac disease
  - Abdominal Wall (week 3)
    • PBL Theme: Metabolism – Storage, Retrieval, and Synthesis of Fats and Carbohydrates
    • PBL Case: Diabetic Ketoacidosis
  - Male Pelvis and Perineum (week 6)
    • PBL Theme: Male Anatomy and Physiology
    • PBL Case: Cushing’s syndrome (hyperadrenocorticism)
  - Female Pelvis and Perineum (week 7)
    • PBL Theme: Female Anatomy and Physiology
    • PBL Case: Adnexal mass
Team Based Learning (TBL)

iRAT and tRAT quizzes emphasized integration of material. Scores counted toward students’ final course grade.

From: Sibley J and Spiridonoff S. www.teambasedlearning.org
Results (2011-2012)

• Role of PBL in the medical curriculum
  - PBL “introduces the topic, helps us do our own research and discuss with a group of people”
  - PBL “motivates me to learn more if it’s relevant” but “so much depends on the quality of the tutor”

• Awareness of the integration
  - “More integration into the curriculum” is needed
  - “PBL questions were in the beginning of the labs which made them interesting” but “as the weeks went on I stopped looking at the integration with the cases”
  - Knowing anatomy “helped with PBL and other parts of the week”
Results (2011-2012)

• Experience with the integration
  – “There’s so much to know anyway, it’s tough to go over the integration too”
  – “I didn’t look at the questions, but I do want more integration”
  – “I don’t feel that there’s enough clinical integration into the anatomy lab” but others felt that “the questions did integrate and were clinical”

• Satisfaction with the integration
  – Integration was really “helpful with doctoring”
  – “It would be more frustrating for us if the material wasn’t integrated”
Results (2011-2012)

• Modified TBL in the anatomy lab
  – “Provided immediate feedback on individual preparedness on anatomy (and histopathology) labs”
  – “Individual quizzes were abstract because I hadn’t seen the material yet”
  – “My team was so focused on discovering the answers of the quiz to help prepare for the group quiz that we didn’t get much done in the lab”
  – “Since the individual and group quizzes were the same, the team component became irrelevant. You need a different group quiz”
Conclusion (2011-2012)

• PBL integration
  – More students were discussing the cases
  – Some students felt it improved experience with other areas of the curriculum (i.e. doctoring)
  – But still not clear if the students were learning any better

• Modified TBL component
  – Increased the level of preparedness
  – But became a distraction toward learning since students were now hyper-focused on the quiz
  – Students did not recognize how TBL was helping them with PBL integration because they viewed it more as an assessment tool than as a learning tool
Discussion

• How can we accomplish a pragmatic continuity of PBL, small group learning, didactics and laboratory activities?
  – Integration of PBL and anatomy is a step in the right direction, but it’s not clear whether it improves continuity since there is no assessment of the continuity

• Can we improve learning of a subject through integration?
  – Depends entirely on the means of assessment
Discussion

• Students and faculty learn and teach, respectively, in an educational environment of tension between learning and assessment
• Would learning and teaching improve if the assessment were a better reflection of what we wanted our students to learn?
  – Students knew that in the in the end, the assessment was the practical exam, so why spend time on the integration?
• What do we want our students to learn?
  – How to integrate anatomical knowledge with hypothetical cases?
  – Voluminous anatomical material?
  – Team skills?
  – Hierarchical thinking?
Acknowledgements

Anita Wong – transcribing data