Assessing First-Year (M1) Medical Students’ Understanding of Blood Glucose Control Using a “Backward Design” Asynchronous Physiology Lecture

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Introduction
• Backward design, an instructional model outlined by Wiggins and McTighe, emphasizes identifying key learning objectives (LOs) that students must be able to perform after learning about a topic\textsuperscript{1}
• Requires educators to first develop assessments aligned with the key LOs, which form the basis of course content and activities\textsuperscript{1}
• The majority of medical students across the United States encounter lecture-based learning in their first two years of basic sciences curriculum with little opportunity for clinical application\textsuperscript{2}
• Compared to traditional lecturing, a backward-designed session with planned activities may better develop medical students’ critical thinking and problem-solving skills

Aims and Objectives
• To redesign a traditional first-year medical school lecture using the backward design model
• To compare students’ performance on assessments and understanding of key concepts
• To compare students’ perceptions on the lecture formats

Methods
• Using the backward design framework, we redesigned a traditional lecture on “Hormonal Control of Blood Glucose” from Fall 2022, and delivered it in Fall 2023
• We re-evaluated our LOs, and ensured that they aligned with our four assessment questions
• The updated LOs were also used to create session content and interactive activities
  • drag-and-drop activity (see below)
  • clinical case branching scenario
• In both years, the lecture, four assessment questions, and survey were delivered asynchronously to 125 M1 students in their Biomedical Foundations of Clinical Practice 2 (BFCP 2) course

Results
• The 4 assessment questions were completed by 50 students in 2022, and 60 students in 2023
• Average score in 2022: 65% (2.6/4)
• Average score in 2023: 70% (2.8/4)
• 5 students in 2022 and 26 students in 2023 completed the survey
• In response to, “The session content prepared me to answer the concept check questions,” 84% of 2023 students answered “strongly agree” vs 60% of 2022 students

Discussion
• Although not statistically significant, our results demonstrate an upward movement of the average score among students from Fall 2023 who received a backward-designed lecture, compared to students who received the traditional lecture
• Furthermore, a higher percentage of 2023 students answered assessment question #3 (related to GLUT receptors) correctly, after the drag-and-drop activity was added to the lesson

Conclusion
• Main limitation was small sample size and low number of survey responses
• However, our results demonstrate how backward design and the addition of interactive activities into lectures can benefit medical student learning
• Future directions include correlating the percent of lesson completion with average scores

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