

Preliminary assessment of ABC Kidney PhysioSim, an animated and interactive digital kidney physiology educational tool

Introduction: A 2022 needs assessment performed with University of Colorado (UC) SOM first year medical students (MS1) found that 60% of students described the UCSOM renal physiology course as very or extremely difficult. Focus group themes included requests for more time/practice around physiology and online resources to use as priming material (pre-work). The need for focused pre-work is heightened by the fast pace of the TREK curriculum. ABC Kidney PhysioSim is an interactive digital platform designed to teach kidney physiology. The tool integrates durable learning strategies like 'distributed learning' and 'retrieval practice' through short, animated physiology videos and clinical correlation vignettes followed by interactive simulation-like activities and multiple-choice questions. Module-specific learning objectives and progress tracking facilitate self-directed learning. We aim to introduce it as voluntary prework into the MS1 UCSOM renal course of the TREK curriculum and hypothesize it will improve study time and habits, augment physiology understanding and help identify best practices for digital education tool and curriculum development. To guide tool development and obtain preliminary tool feedback, I assessed opinions on ABC Kidney PhysioSim from medical students (MS).

Methods: To assess MS opinions, we provided ABC Kidney PhysioSim in its current development stage to MS that had completed the renal physiology course, which included 1) the www.ABCKidney.com pilot (view on desktop Chrome), 2) updated videos with new illustrations covering general nephron microanatomy function and salt and water topics and, 3) a preview of the new educational platform. We conducted surveys and focus groups regarding a) content, clarity, and ease of tool, b) tool reliance, c) impact on study time and habits, d) impact on kidney physiology understanding.

Results: Among focus group participants (n = 9), all MS believed they would have used this tool if it had been available during their renal course. The interactive quiz was the highest rated portion of the tool. Additional features positively received included 1) videos providing introductory and 'big picture' concepts, 2) visualization of abstract concepts, 3) clinical correlation section, 4) ability to revisit topics for review and 5) easy navigability for self-directed learning. Tool functionality was critiqued most. Among survey participants (n = 8), 87.5% agreed or strongly agreed that incorporating ABC Kidney PhysioSim would strengthen the MS1 renal course. Additionally, the majority agreed or strongly agreed that 1) using the tool would decrease study time (75%), 2) they would use it to study for the final exam (75%), and 3) ABC Kidney PhysioSim helped them better understand the provided physiology topics (87.5%). Students suggested development of searchable flashcards and robust quizbanks for review, adjunctive, downloadable study material, handheld device compatibility and closed captioning.

Conclusion: ABC Kidney PhysioSim as an online, adjunctive educational tool was well-received by MS. While this is a small sampling of the MS population, the results suggest MS believe it would enhance the renal portion of the TREK curriculum, shorten study time and improve physiology concept understanding. Next steps include integration and assessment of ABC Kidney PhysioSim with MS1 during the renal portion of the TREK curriculum."