

Distance Learning with Virtual Case-Based Collaborative Learning: Adaptation and Acceptability of Clinical Cases from an American Academic Medical Center for Education at an African Medical School

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Abstract

We aimed to determine whether a Case-Based Collaborative Learning (CBCL) curriculum, developed from the clinical experience of U.S.-based clinicians in collaboration with Rwandan medical faculty, is acceptable, feasible to implement, and effective as a virtual educational tool for medical students in a resource-limited, global health setting. In this CBCL distance learning education, students were actively engaged and understood the case material and asked probing and insightful questions. Course evaluations showed that 106 of the 120 total student responses (88.3%) said that the difficulty level was “about right”, while only 11/120 (9.2%) said it was “too easy” and 3/120 (2.5%) said it was “too hard” providing evidence that even though the cases were largely based on clinical encounters at an American academic medical center, they are understandable, and at the appropriate level of difficulty for Rwanda-based medical students. Qualitative analysis from student comments found the CBCL method most helpful for students to develop diagnostic frameworks, and the practice of clinical reasoning using CBCL was engaging and interactive. This method of a virtual, international CBCL approach, was feasible, effective, and acceptable for students. A large majority of students found the sessions to be of appropriate difficulty and engaging. From the

global health and inter-cultural exchange perspective, this collaboration demonstrates feasibility and acceptability of international partnerships. Using virtual, video conferencing technology, similar future collaborations can improve capacity building in lower-resource settings.

Keywords

Case-Based Collaborative Learning, Problem-Based Learning, Team-Based Learning, Clinical Reasoning, Global Health, Virtual Education, Medical Education, Diagnostic Frameworks

1. Introduction

Case-Based Collaborative Learning (CBCL) is an educational approach closely related to the more common Problem-Based Learning (PBL) that involves teaching students through discussions of scenarios that resemble or are typical of real-life examples. CBCL is a student-centered pedagogical approach that is typically executed in small groups (often 6 - 12 students with a faculty facilitator). This method utilizes the principles of cognitive load theory, which suggests that learning is most effective when individuals are asked to apply knowledge and skills to real-life clinical scenarios and given guidance and feedback by facilitators (van Merriënboer & Sweller, 2005). Within medical education, CBCL allows learners to experience the uncertainty of clinical decision making and complexities of clinical care early in their training (Kassirer, 2010; Geller, Faden, & Levine, 1990). Students experience a team-based approach to care and learn differential diagnosis generation, critical reflection, scientific inquiry, data synthesis and knowledge integration, and patient management skills helping them to prepare for the real-world care of patients in the clinical setting. The COVID-19 pandemic has introduced new challenges into medical education, particularly when lessons require a collaborative approach, such as the small group format of CBCL. It has, however, also normalized the use of digital platforms for education, which encourages pedagogical collaboration crossing geographical boundaries.

A major tenet of both CBCL and medical education more broadly is collaboration and sharing knowledge across disciplines. Pandemic-related travel restrictions have limited *in-person global health and international educational exchanges*. Initially, this created major barriers to global health programs and international educational exchanges, particularly in those settings where knowledge exchange and collaboration have typically been conducted in-person without much online integration. As the world has adopted and adapted to a new workplace norm utilizing virtual platforms for teamwork and collaboration, international collaboration has been enhanced by the increased fluency that we all were forced to develop. New opportunities have emerged for routine educational exchanges between students and faculty in remote corners of the globe. Although a number of papers have described the usefulness of CBCL for American preclini-

cal medical students, we are not aware of any publications describing the appropriateness and feasibility of applying this pedagogical approach using cases based on clinical patient encounters from American academic medical centers in order to provide instruction to medical students in a resource-limited setting (Williams, 2005). We are also unaware of any publications describing the use of remote, virtual medical education exchange between resource-rich medical centers and relatively resource-poor international medical schools.

We aimed to determine whether our CBCL curriculum, developed from the clinical experience of U.S.-based clinicians in collaboration with Rwandan medical faculty, is acceptable, feasible to implement, and effective as a virtual educational tool for medical students in a resource-limited, international, global health setting. Here we describe a collaborative effort between the University of Global Health Equity (UGHE) in Rwanda and Stanford University School of Medicine, California, USA to create and deliver a CBCL clinical reasoning curriculum for UGHE students. UGHE, whose inaugural medical school class started in 2019, has a curriculum philosophy and structure that intentionally blends pedagogies including Team-Based Learning (TBL) and CBCL, rather than prioritizing a particular one. We aimed to benefit students and colleagues at both of these institutions, without having to travel, by utilizing cross-cultural medical education on a popular web-based video conferencing platform. In this paper, we describe the feasibility and acceptability of creating a collaboration that works for all involved and is culturally and educationally appropriate.

2. Pedagogical Approach

American clinicians authored cases (9 in total) in the disciplines of cardiology, pulmonary, renal, musculoskeletal, dermatologic, neurologic and behavioral health based on their own clinical experiences. These cases were reviewed by U.S. and Rwanda-based medical faculty. In some cases, based on the suggestions of Rwandan faculty and an American medical student with prior experience living and working in sub-Saharan Africa, case details were modified to make the cases more appropriate and applicable to the practice of medicine in Rwanda rather than the United States.

Students were provided the initial portion of the case presentation, reading, and/or videos and sound clips, and a few questions as homework to prepare for the CBCL small group sessions. Cases were then delivered by either American or Rwandan clinicians via a virtual platform (Zoom Video Communications, Inc.) for 90 minutes each with 6 - 8 students per faculty facilitator. Students worked through the case by obtaining information about the case, answering relevant questions, making diagnostic and treatment decisions, then updating their differential diagnoses and treatment plans with guidance from the case facilitators. After each session, students optionally completed course evaluation surveys, in which they were asked both multiple choice and open-ended questions to assess their experience of these learning methods. These course evaluations were part

of the course quality improvement efforts and were submitted anonymously.

3. Course Evaluations

Students were actively engaged and understood the case material and asked probing and insightful questions. Course evaluations showed that 106 of the 120 total student responses (88.3%) said that the difficulty level was “about right”, while only 11/120 (9.2%) said it was “too easy” and 3/120 (2.5%) said it was “too hard”. This provides evidence that even though the cases were largely based on clinical encounters at an American academic medical center, they are nonetheless at the appropriate level of difficulty, understandable, and instructive for Rwanda-based medical students. In the open-ended questions, the most commonly cited positive aspect of the pedagogical experience was the opportunity to develop diagnostic frameworks and practice clinical reasoning and organizing one’s ideas (see **Table 1**). The second most commonly cited positive descriptors were terms such as “engaging” and “interactive”. In the third most common positive response, respondents cited the opportunity for discussion in small “break-out groups” as being a positive aspect of the experience.

Based on the subjective assessment of facilitators, additional perceived benefits of the collaboration included: capacity building of resource poorer areas through providing educational content and delivery from a distance; providing additional educator support as the Rwanda-based home institution increased its own faculty numbers; creating international educational experiences and exchanges between students, residents and faculty without requiring travel, which increases accessibility for more faculty/residents/students to be involved and exchange ideas while mitigating the environmental impact of global health work; and promoting faculty and trainee development and global health careers through collaborations.

Based on UGHE students’ course surveys, the primary critiques of the CBCL experience were primarily a desire for more time (see **Table 1**). Tied for second in critique, some students wanted more directly applicable homework and some wanted more opportunities for discussion in small break-out groups. After the first CBCL session, course surveys on the optimal size for group discussion unanimously reported that students preferred being in groups of five or fewer

Table 1. Categorization of student responses to the positives and negatives of CBCL.

General	Categories	# of Responses
Positives	clinical thinking/diagnostic framework	28
	interesting/engaging/interactive	24
	talking with others/breakout rooms	16
Negatives	more time	6
	more applicable homework	2
	more breakout groups	2

(6/6 responses). Due to limitations in the number of clinicians available to teach, however, this was not feasible and our initial group sizes ranged from 4 - 8 students. Based on this feedback, however, we incorporated smaller breakout sessions with fewer than five students per group into later sessions, and this was met with approval in subsequent surveys as students praised the breakout rooms as a positive, engaging learning experience.

Perceived challenges faced during the collaboration, as described by facilitators and case authors, included: inconsistencies in internet connectivity, although this was less of an issue connecting to UGHE than it may be in other developing areas; appropriate modification of cultural details to make cases realistic and sensitive; assessing the appropriate learner level at the partner institution during case development; and time zone differences and scheduling logistics.

4. Discussion

Taken together, the qualitative and quantitative student feedback provide evidence that this remote, internationally collaborative CBCL approach was feasible, effective, and acceptable for students. A large majority of students found the sessions to be of appropriate difficulty and engaging. While this description of our educational method and quality improvement in education pedagogy was primarily to test the feasibility of this approach, a study incorporating a control group and additional measures of pedagogical effectiveness and outcomes of students' preparation for clinical rotation outcomes is warranted. Additionally, research has indicated that adopting a strategy wherein the course instructors are blinded as to the ultimate diagnosis of the patients in the cases has been shown to have additional utility for demonstrating the step-wise process of clinical decision-making (Waliany, Caceras, Merrell, Thadane, Johnstone, & Osterberg, 2019). This particular strategy was not utilized in our educational approach, as the case authors and reviewers were the same individuals who served as case facilitators. In the future, a rigorous medical education study using blinding and randomization of student groups could be assessed through collection of pre and post examination scores to determine the most effective pedagogical approach for learning outcomes.

5. Conclusion

From the perspective of global health education and inter-cultural exchange, this collaboration demonstrates feasibility and acceptability of international partnerships. Using virtual, video conferencing technology, similar future collaborations can improve capacity building in lower-resource settings. Traditionally, partnerships have sent educators to a site for on-site education, but this strategy can be both time and cost-prohibitive. The pandemic and the availability of online resources in education have opened the door for global education exchanges, such as demonstrated by this partnership. We believe that our project can serve as an exciting model and inspiration for additional partnerships to follow.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Abbreviations

- CBCL = Case-Based Collaborative Learning
PBL = Problem-Based Learning
TBL = Team-Based Learning
UGHE = University of Global Health Equity