A Simulation–Based Group Study Method for Preclinical Medical Students

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Abstract

Group study has been identified to be an effective method in promoting student motivation, academic success, and mental health. We present a model of a semi–structured group study method that allows students to practice and develop their clinical decision–making, communication, and physical exam skills. This method centers around a case–based approach by running multiple simulated patient cases in parallel, and introducing time dedicated for case presentations, review of laboratory results, and patient counselling. The proposed group study method may be useful as an adjunct to the UBC curriculum in building student competency, while also encouraging bonding between fellow medical students.

Introduction

As a leader in medical education, the UBC MD Undergraduate Program (MDUP) has renewed its curriculum to facilitate student progression towards yearly milestones.[1-4] This preclinical curriculum, formatted as a "spiral," leverages spaced repetition of both foundational knowledge and clinical skills to maximize retention and familiarity before students enter clerkship and residency. However, recent internal surveys indicate that over half of preclinical students feel they lack opportunities to practice their clinical skills.[5] This finding is reflected across medical schools, where instructors and students have highlighted students' struggles with clinical skills and decision–making.[6]

In parallel with formal curriculum, students can integrate their knowledge and actively practice toward competencies through group study.[7] The literature describes these social learning environments as a method for students to share key concepts and address knowledge gaps while enhancing motivation and accountability for their learning, thus improving academic outcomes.[7-9] These groups have also been shown to promote student well–being, providing an avenue for both social and academic support that is particularly crucial during the transition into clinical years.[9-11]

Positioned at the intersection of competency–based education and peer learning, this case study presents the iterative development of a group study method that allows for the deliberate practice of clinical roles. This method aims to promote the integrated application of clinical skills and decision–making, communication skills, and foundational knowledge, which aligns with the UBC MDUP milestones in all categories, particularly in the roles of "Medical Expert" and "Communicator."[4]

Methods

Our presented group study method was developed by five medical students of the UBC MDUP, who continually modified the approach through intermittent evaluation and adjustment in a Plan–Do–Study–Act (PDSA) model of quality improvement.[12,13] The final iteration consisted of each group member creating a patient profile for a disease related to the curriculum topic of the week and being prepared to roleplay as that patient. Every group member took a turn roleplaying as the "patient" and "provider," practicing history–taking, physical examination, differential diagnosis, and patient counselling in a timed manner as illustrated in Figure 1. Full descriptions of the iterations and PDSA cycles can be found in Appendix 1.

Patient cases were either written manually by group members or found from resources that provided prewritten cases. Group members wrote patient profiles by selecting a disease and researching the expected signs, symptoms, physical exam findings, laboratory results, imaging results, possible differential diagnoses, and the proposed assessment and management plan. Prewritten cases were found from sources such as The Human Diagnosis Project[14] and Clinical Case articles from the New England Journal of Medicine.[15]

Discussion

Self–regulated learning

Self–regulated learning (SRL) is the process of a learner being proactive in motivation, behaviour, and metacognition[16] and has been associated with academic achievement,[17,18] success in clinical skills,[19] and improved mental health among medical students.[20] Metacognition involves learners evaluating their own knowledge and recalibrating learning strategies to reach defined goals, which has also been associated with improved academic outcomes and skills attainment.[21,22] In SRL, interdependent learning and motivation encourages the learner to transition through phases of planning, performance, and self–reflection.[23,24]

Promoting metacognition prior to clinical years may improve SRL during the transition to clerkship and beyond, which is beneficial as poor SRL may contribute to difficulties when learning in clinical environments.[25,26] This group study method utilizes the SRL framework to complement weekly curricular learning by creating and solving cases near the limit of the group's knowledge base. This active and performative learning environment fosters self–observation and self–evaluation as participants confront the bounds of their clinical skill and reasoning in real time. For example, amidst taking a history, students may find it necessary to pause the roleplay to ask for assistance from the group, as the group identifies and expands its knowledge limits.

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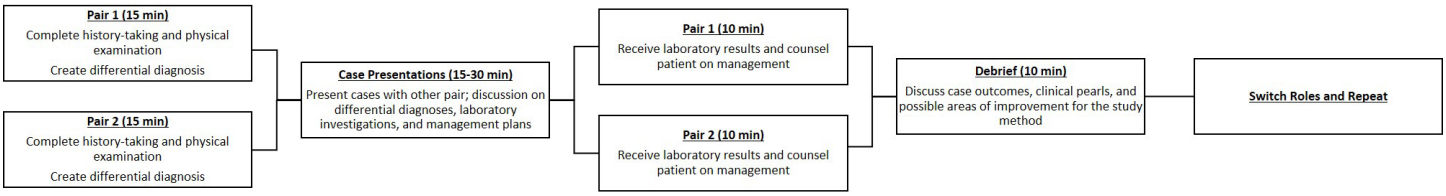

Figure 1 | Flowchart of Iteration 3.

Iteration	Plan	Do	Study	Act
1	•In a group learning environment, review content as outlined by UBC MDUP's weekly learning objectives •Improve retention of content delivered in lectures through active learning	• Weekly 2-3 hour study group • Members taught one another using projectors or whiteboards (active learning) • One designated notetaker created collective notes for study	• Good for creating study notes for content described in learning objectives • Poor long-term retention of content • Desire to encode content through narrative and experiential learning • Lack of practice of clinically applicable skills, such as history-taking, physical examination, and differential diagnosis development	• Change didactic study method into an experiential role-play of patient cases
2	• As a group, perform a work-up of a patient case • Practise entire work-up, from history-taking, physical examination, laboratory investigations, differential diagnosis, counselling, and management • Improve clinical reasoning skills	• Weekly 3-hour sessions • One member prepared to role-play as a patient with a condition related to the week's content, ready to act out relevant clinical findings and provide expected laboratory results and imaging for his/her condition • Other members role-played as various health care providers as determined by the case creator, such as a medical student, general practitioner, specialist, or paramedic • Cases often had multiple stages, such as an initial encounter for history and physical examination, a second encounter for further counseling on laboratory results and next steps for management, third encounter for specialist appointment, etc.	• More clinical application of week's content • Cases were not time-efficient due to the multi-stage role-playing • Focusing on single cases limited student exposure to different diseases • Lack of practice of case presentation • Lack of time constraints	• Continue with patient cases, but provide a different structure to improve efficiency and clinical realism
3	• Incorporate more cases • Fewer stages of role-play • Dedicated time for case presentation and peer critique of differential diagnoses and clinical reasoning	• Weekly 3-hour sessions (Figure 1) • Every member prepared a patient case related to the week's content • Members paired up and conducted history-taking and physical examination separately (15 min) • All pairs reconvened to provide case presentations, differential diagnoses, proposed list of laboratory investigations, and management plans; other members provided critique and advice on next steps (15-30 min) • Pairs separated again to discover their laboratory results and counsel patients (10 min) • Debrief on conclusions for all cases (10 min) • Reverse roles and repeat for a new case	• Improved efficiency for time and better simulation of time constraints in a clinical setting • Increased exposure to a variety of conditions • More opportunities to practise case presentation • Provided a structure for practice of independent clinical decision-making skills and subsequent critique and collaborative clinical reasoning • Failure to incorporate analysis of trends in laboratory investigations • Lack of practice reading consultations and patient charts • Limitation to primary care encounters • Lack of realism of physical exam findings (ex. inability to replicate body habitus, heart murmurs, dermatological findings, etc.) • No supervision or feedback from practising physicians	• Continue to monitor and modify approach based on perceived needs gleaned from external clinical experiences • Schedule re-evaluation of methodology

Table 1 | PDSA cycles of three iterations.

Extension of roleplay in medical education

Active learning (AL) has been highlighted as a means of encouraging medical student learning and engagement.[27-30] This group study methodology prioritizes AL in its participants, as responsibility for learning is placed on group members in a multimodal fashion. Specifically, students are forced to think critically in a stepwise fashion to rule out pathological conditions, as roleplay requires active participation in the selection of investigations and derivation of differential diagnoses. Traditional roleplay and simulation methodologies are commonly utilized in the pedagogy of medical communication skills in which students rotate between the roles of patient, interviewer, and observer when learning to take patient histories.[31] Our method builds upon this foundation, as students in the role of the interviewer extend past history–taking to perform relevant physical exams, order laboratory investigations, and present an oral report to an audience of peers while synthesizing relevant findings in predetermined timeframes. In anticipation of scenarios that commonly occur in clerkship, these structured cases serve as a means to practice concrete medical skillsets in real time.[32] This extended format of practice is built upon previous data illustrating common pitfalls of roleplay as a learning tool.[33]

Integration into the UBC MDUP

There are a number of ways through which this group study method can be implemented into the formal curriculum beyond the formation of independent student groups. The described study technique can be enhanced by involving clinical skills preceptors to provide direct observation and teaching points on medical presentation and clinical skills. Faculty can also choose to involve standardized or volunteer patients to enhance accuracy or realism of clinical cases, although this comes at the cost of student learning and engagement in case preparation. This can serve as an adjunct to the Family Practice preclinical curriculum, clinical decision making sessions, or roleplay focused questions during case–based learning sessions.

Limitations

Despite the improvements made through iterative development, this methodology is not without limitations. First, changes at each iteration were primarily based on members' perceptions of what would be most beneficial. Incorporating a validated measure to systematically assess the strengths and weaknesses of an iteration would strengthen the rationale and impact of changes. Second, the group study method must be constantly adapted to the group's level of training in order to be maximally helpful to students. For example, first–year medical students may find it difficult to adopt the exact format of the most recent iteration as they lack exposure to various physical exams, history–taking skills, investigations, and medical diagnoses necessary to finish a case. Lastly, the authors chose not to cite empiric improvement in their medical knowledge, clinical skills, or well–being, as it would not be possible to establish causal effect to this group study method alone.

Conclusion

Our proposed group study method may be useful as an adjunct to the UBC curriculum in building student competency prior to clerkship. The use of structured cases forces medical students to be confronted with gaps in knowledge and ultimately allows purposeful integration of medical knowledge into clinical practice. By placing these simulations before actual patient encounters, students have an opportunity to make mistakes, practice difficult scenarios (e.g., counselling on sensitive issues), and learn critical lessons without experiencing the negative consequences that follow such errors in real–world clinical settings. Finally, the strong peer–led nature of this study method promotes bonding among fellow medical students, which has been proven to play a critical role in student well–being.

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