

Multistage problem-based case discussion for medical students

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ABSTRACT

Purpose: Students are presented with a variety of case formulas to promote the development of clinical reasoning..

Methods: 120 third-year medical students at our medical university were randomly assigned to 18 small groups. After each ICM (Introduction to clinical Medicine) course, they were given a paper case. A few days later small group sessions were formed and students asked tutors some questions to have more history and physical examination data and discussed and developed a differential diagnosis list. Then, all small groups met in a large group session for further discussion. After that, back to small groups, students ordered paraclinical tests and they were given the results by tutor. At this stage, each group tried to further narrow the differential diagnosis list and to determine the most probable diagnosis. Finally, in the large group session a consensus diagnosis was reached after reflective observation. A questionnaire was used before and after intervention. The small group tutor rated student's abilities at the end of first day and last day.

Results: The attitude of students about the positive effects of MPCD increased significantly from the first day to the last day ($P < 0.05$). the progress checklist of the student's abilities showed a statistically significant improvement post intervention.

Conclusion: Our study suggests that using MPCD method is an effective way to increase clinical reasoning skills of medical students.

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Introduction

Major changes in educational strategies have been recommended in the curriculum of medical schools over the past two decades.(1) Although the practice of medicine is increasingly a multidisciplinary effort, clinical teaching of medical students is accomplished primarily within a department structure.(2)

The need to include instructional activities in the medical curriculum to promote the development of problem-solving abilities has been asserted at the national and international levels.(3) some recent research efforts have been focused on the attainment of a better understanding intelligence and reasoning.(4) The medical curriculum is changing and student-centered learning is currently used in medical schools. Problem-Based Learning (PBL) and Clinical Reasoning Learning develop the student' reasoning strategies.(5) Clinical reasoning concepts can be viewed as descriptions of mental operations or as a thinking frame- a structure to organize and support clinical

thinking.(6,7). It is enhanced by appropriate organization of knowledge. In the past, efforts were made to increase problem solving ability with the assumption that such ability could be applied across the clinical problems(8). Therefore, few physicians have been specifically taught clinical reasoning skills during their medical training (9). and even primary care physicians may fail to take important patient information in their initial interactions with patients(10). then, student must acquire the most effective interviewing skills when they interact with patients during their clinical training (11) But there are some concerns about the erosion of the environment in which medical student and residents learn the clinical skills, attitudes, and behaviors that they will need to practice high-quality medicine(12). So, exposure to a wide variety of clinical situations is essential. Prior training for such clinical encounters helps students develop working knowledge, understanding, and communication skills for dealing with challenging doctor-patient interactions(11). Students must be

taught how to apply clinical reasoning methods through a variety of teaching methods, including the use of case studies(6). Case method is a component of PBL that emphasizes small group work to solve clinical problems that are presented as case studies. Students are presented with a variety of case formulas including paper or written cases, videotape cases, simulated client cases, and real client cases to promote the development of specific type of clinical reasoning(13)

ICM (Introduction to Clinical Medicine) used Multistage Problem-based case discussion (MPCD) to develop the clinical reasoning skills of medical students and this study discusses the benefits of MPCD in term of how it (a) contributes to application of appropriate organization of information in clinical reasoning condition;(b) makes experiences that students might not otherwise have; (c) increases the visibility of student' clinical reasoning processes; (see table 1).

TABLE 1: Educational goals of multistage problem-based case discussion

The students at the end of program should:

- 1- Give a full, clear, chronologic account of how each of the symptoms developed. Their attributes and their context.
- 2- Focus their interview on obtaining the patients story and creating a shared understanding of the problem.
- 3- Be able to get goal-oriented physical examination data related to the case.
- 4- Be able to select diagnostic tests appropriately.
- 5- Be able to discuss the pathophysiolog of findings.
- 6- Be able to discuss about the case and develop differential diagnosis list.
- 7- Be able to reach a consensus diagnosis for each case by reflective observation.

Methods

120 third-year medical students at our medical university were randomly assigned to 18 small groups, 6-7 in each group, in 7 ICM courses from Feb. through May 2003.

The characteristics of ICM had briefed previously¹⁴ and in a few words, ICM is an integrated program beginning after basic medical courses and continues for 2 semesters. It is a bridge between basic medical sciences and clinical courses. ICM covers pathophysiology, pathology, pharmacology as well as physical examination and history taking skills, preliminary surgery courses and some paraclinical procedures. It also includes problem-solving tutorials. It aims

at providing students the knowledge, skills and attitudes that they need to start the journey ending to general practitioners and increase the effectiveness of their clinical clerkship.

All small groups in the above-mentioned ICM courses were led by an instructor who was a qualified general practitioner with the experience of 18 months internship of all major and some minor wards. After each ICM course (cardiology, nephrology, hematology, rheumatology, gastroenterology, endocrinology and pulmonology) all the medical students, were given a hypothetical paper case (stage 1).

A few days later small group sessions were formed at CSLC (Clinical Skills Learning Center that is an environment for learning physical examination and clinical reasoning skill in medicine). The time elapsed before session was necessary for students to think and study about the case individually. Every small group session ran over 4 hours per week. First, students asked tutors some questions to have more history and physical examination data related to the case and they were given the opportunity to discuss the reasons for their question. Then, team members discussed about the case and developed a differential diagnosis list. This session lasted 1.5 hours(stage 2). In the next stage, all small groups met in a large group session to further discuss about the case for 45 minutes that was led by a third-year internal medicine resident. During this stage every small group presented the differential diagnosis list and explained how they reached the list(stage 3).

After a 15 minutes break, back to small groups, students ordered paraclinical tests and they were given the results by tutor. At this stage, each group tried to further narrow the differential diagnosis list and to determine the most probable diagnosis (stage 4, 1 hour). Finally, in the large group session, stage 3 was repeated and also a consensus diagnosis for the case was reached after reflective observation and multidirectional discussions (stage 5, 45 minutes).

A questionnaire (table 2) according to educational goals was used to compare attitudes of students at the end of first day of MPCD with those at the end of last day towards the content of education and appropriateness of method, quality of management of small and large groups plus time and place of education. The students were asked to determine their idea about the quality of each variable by the following scales: strongly agree, agree, no idea, disagree, strongly disagree (see table 2). The data were transcribed and coded (2,1, 0 ,-1 ,-2) for computer analysis, yielding

TABLE 2: The questionnaire used to compare attitudes of medical students towards MPCD

Attitude of the students at the end of first day of MPCD					ITEMS	Attitude of the students at the end of first day of MPCD				
Strongly disagree (-2)	Disagree (-1)	No idea (0)	Agree (+1)	Strongly agree (+2)		Strongly disagree (-2)	Disagree (-1)	No idea (0)	Agree (+1)	Strongly agree (+2)
0/120	5/120	22/120	52/120	41/120	I feel MPCD is helpful in increasing my ability of clinical reasoning skills.	0/120	1/120	6/120	73/120	40/120
11/120	39/120	55/120	11/120	4/120	I will be able to lead a better history taking towards making a differential diagnosis list after MPCD	1/120	3/120	6/120	82/120	28/120
1/120	6/120	51/120	60/120	2/120	MPCD will affect me positively to look for , and see sequences of path physiological events when I take history of patients.	2/120	3/120	13/120	80/120	22/120
1/120	9/120	51/120	51/120	8/120	Small group and large group discussion are appropriate methods for MPCD.	4/120	3/120	8/120	74/120	31/120
3/120	10/120	28/120	60/120	19/120	General practitioner is the appropriate leader of small group	3/120	13/120	17/120	76/120	11/120
0/120	11/120	44/120	57/120	8/120	Internal medicine resident is a better selection for management of the large group.	1/120	0/120	8/120	76/120	35/120
0/120	3/120	40/120	65/120	11/120	CSLC is a suitable place for applying this session.	1/120	1/120	11/120	70/120	37/120
3/120	17/120	43/120	55/120	2/120	4 hours case discussion at the end of each course is enough.	3/120	21/120	17/120	66/120	13/120

several variables characterizing the case discussion process, and measuring of out come of the encounter. More over, the tutor of small groups rated the abilities of students through 6 items using 10 score scale (1 = not at all to 10 = completely) at the end of first day and last day of MPCD (see table 3). Analysis was done using SPSS software, version 11. Means, frequencies and sum of scores were calculated and they were compared. P value less than 0.05 considered significant.

Results

The response rate was 100%. Table 2 represents the results. Summaries of findings were as follow:

- 1) The positive attitude of students about the helpfulness of MPCD to grow the ability of clinical reasoning increased from 77.5% to 94.1%. This difference was statistically significant (P=0.002).
- 2) Increasing the feeling of the ability of leading a history taking towards making a differential diagnosis list from 12.5% to 91.6% showed also significant difference (P=0).
- 3) The positive attitude towards the ability of looking for pathophysiology of findings during a history taking increased significantly from 51.6% to 85% (P=0).

TABLE 3. The progress checklist used to compare the ability score of medical students at the end of first day and last day of MPCD

Items	Score at the end of first day	Score at the end of last day
Students' ability of asking questions about symptoms of case	6 (mean)	9 (mean)
Students' ability of asking questions about signs of case	6.5(mean)	9 (mean)
Students' ability of asking questions about paraclinical data of case	6.5(mean)	9 (mean)
Students' ability of thinking about pathophysiology of each finding	6.5(mean)	9 (mean)
Students' ability of clinical reasoning	6.5(mean)	9 (mean)
Students' ability ability to provide a differential diagnosis list	6.5(mean)	9 (mean)

- 4) Appropriateness of small and large groups discussion was admitted by 49% at first and 87.5% at the end (P=0).
- 5) "General practitioner as the appropriate leader of small group" was attested by 65.8% at first and 72.5% at the end (P>0.5).
- 6) 54.1% at first and 92.5% at the end of MPCD believed that Internal medicine resident is a better selection for management of the large group (P=0).
- 7) 63.3% at first and 89.16% at the end supposed that the CSLC is a suitable place for applying the session. This change was significant too.
- 8) "Was the spent time per week sufficient?" 47.5% responded yes at first while this increased to 66% at the end (P=0).

The total score across the all of items (sum) increased from 461/1920 ($8 \times 2 \times 120 = 1920$) at the first day to 971/1920 at the last day (P<0.05).

The progress checklist of students' abilities that was filled at the end of first day and last day by small group tutor showed (table 3) also significant improvement of the history taking abilities and goal oriented thinking.

Conclusion

The formal and explicit teaching of clinical reasoning is rarely undertaken in medical schools despite widespread recognition that knowledge acquisition alone may be insufficient to develop good clinical judgment. (6,15,16) while the results of the evaluation of clinical reasoning in Neufeld's study in medical students indicate that the problem solving or clinical reasoning process remains relatively constant from medical school entry to practice, (17) several other studies have shown that students participating in the teaching intervention performed significantly better on the diagnostic thinking inventory than control students. (6,15,16)

Supervised patient care, problem-based learning, and ongoing feedback through standardized patients all have proven efficacy in several domains.(18) More over, the data of Schmidt and Dauphinee's study suggest that medical schools that offer conventional and problem-based programs in parallel will provide opportunities for experimenting with new ideas about instruction without sacrificing beforehand what is valuable in conventional medical education.(19) Using a clinical reasoning thinking frame to organize clinical observations is an effective way to help the students learn and apply clinical reasoning concepts.(7) the clinical reasoning case studies are effective teaching tools because they provide students with a holistic picture of the client. In addition, these case studies model the clinical reasoning process by organizing client information according to the types of clinical reasoning that would be used to gather that information. (6,8,20) The case method provides training in the solving of clinical problems and is thus especially useful at the clinical level of medical education, and in an integrated and problem-based curriculum. The case method consumes less teaching resources than PBL, and might thus be useful in a situation with increasing numbers of medical students. (21) Teaching through case has been utilized in professional schools to facilitate discussion around issues that students face after graduation. (8,20) Self, Olivares and Baldwin's study indicates that even moral reasoning skills are teachable and measurable, and that smallgroup discussion significantly increases moral reasoning skills.(22) A small group case discussion class would seem to be the ideal setting for a virtual library.(23) Thomas believes that written cases can range from a short sketch used to illustrate a theoretical point to elaborate cases, presented in section, with questions to help students develop clinical thinking patterns and integrate theoretical content. They are

particularly useful in helping students achieve high-level learning involving analysis and synthesis of knowledge. (8) Glick and Armstrong believe that clinical cases for PBL should capture the relevance of patient encounters, and not serve merely as a “take-off” point for scientific study. As a vehicle of learning, the case should drive the science and the science should drive the case. (24) Since small-group education figures prominently in the courses of both basic science and clinical faculties, the orientation contributed to unifying them behind a shared educational approach.(25) On the other hand, Silver and Wilkerson’s study indicated that with the increased interest in problem-based, small-group learning in medical education, a debate has arisen about whether the tutor should be an expert in the subject under discussion. (26) Findings in the Wilkerson study emphasized the importance of initiating more research on the needs and perceptions of faculty adopters, the advantages of incorporating the individual motives of candidates into recruitment efforts, and the value of personal methods of communication in the early implementation of the faculty-intensive innovation like PBL.(27)

MPCD improved clinical reasoning by multistage case discussion; i.e. individual and group thinking together plus active discussion over the paper case at small group and then finalizing all discussion in the large group class. At the second and fourth stages, by asking for additional information, they learned a critical attitude. During the consensus processes and by developing a strategy of fact-finding and making their lists, they learned the significance of individual findings, problem framing and the synthesis of history and physical examination and Para clinical data in medical concepts. Third and fifth stages of the sessions brought up the process of clinical reasoning, the discussion of the path physiology of findings and clustering of problems. So, they learn reflective observation to reach a consensus diagnosis for each case.

In conclusion, our study suggests that using MPCD method is an effective way to help third-year medical students to increased their clinical reasoning skills.

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