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Review Article

Why include Case-based Learning in the medical curriculum? – A review

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Abstract

Introduction: Clinical teaching is an irreplaceable component of medical education. It takes place through many teaching–learning methodologies in various settings such as the bedside, classrooms, and the community. Case-based Learning is a method which had been devised to fill the gaps seen in bedside teaching where learning is mostly opportunistic. CBL evolves around pre-selected typical cases from an existing collection through small-group discussions.

Method: The objective of the study was to identify the positive features of CBL in clinical education. A narrative review was done to search articles on PubMed and Google Scholar between 2018 and 2023. The search terms were 'case-based learning' 'clinical education' and 'medical curriculum'.

Results: The narrative review identified articles (n=14) relevant to our study. Case-based learning and discussion were seen as an effective and acceptable learning tool by medical students. It helped them to gain clinical reasoning skills which are critical in clinical decision-making and management. Exposure to case-based learning scenarios, allowed them to relate basic sciences to clinical sciences. Students were able to recollect the concepts that they had learnt by correlating them with case scenarios in a stress-free environment enhancing their critical thinking abilities. It promoted collaborative learning skills among students.

Conclusion: CBL was perceived as a good learning tool by students. It is possible to combine CBL with other traditional clinical teaching methods such as bedside teaching. The case-based learning approach promotes recapitulating the basic concepts learned, relating them to a clinical scenario that results in the consolidation of the concepts.

Keywords: Case-based discussion (CBD), Clinical teaching and learning, Clinical reasoning, COVID-19, Medical Education

Introduction

Medical education in the 21st century is evolving more rapidly than ever, owing to advances in technology and needs of the people.

Clinical teaching is an irreplaceable component of medical training. It takes place through many teaching and learning methodologies in various settings such as the bedside, classrooms, and the community. Case-based Learning (CBL) is a method which had been devised to fill the gaps seen in bedside teaching where learning is mostly opportunistic. In CBL, learning evolves around pre-selected typical cases from an existing collection through small-group discussions. More medical schools worldwide have incorporated CBLs in their curricula during and after the COVID-19 pandemic (Donkin, Yule & Fyfe, 2023). In this review, we have

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aimed to identify the various positive features seen in the CBL method.

Thistlewaite *et al* proposed the following definition for case-based learning. “The goal of CBL is to prepare students for clinical practice, through the use of authentic clinical cases. It links theory to practice, through the application of knowledge to the cases, using inquiry-based learning methods”. They further state that CBL appears to foster effective learning in small groups, possibly through the effect of having more engaged learners, but perhaps also through having more structured learning activities closely linked to authentic clinical practice scenarios (Thistlewaite *et al,* 2012).

Methodology

The objective is to study the positive features of CBL in clinical education. A narrative review was done to search articles on PubMed and Google Scholar between 2018 and 2023. The search terms were ‘case-based learning’ ‘clinical education’ and ‘medical curriculum’.

Results

A narrative review identified articles relevant to our study from 2018 to 2023 (n=14). Among them 6 were interventional studies, 4 were observational studies and 4 were review articles. The articles gave a broad perspective, and we were able to study them critically.

Acceptable and popular among medical students

In the University of Glasgow, UK, case-based learning was seen to be more effective when it was conducted as small group discussions rather than tutor-led ones. It was well appreciated by the students who reported that they felt they learnt more. This model improved student engagement, motivation and knowledge gain and had a positive impact on assessment performance. This further led to clinical reasoning skills which are critical in clinical decision-making and management. The hypothesis-generating step and the discussions are opportunities for students to consolidate topics, first in small peer groups and then with the tutor for clarification, as required (Sartania *et al.,* 2022).

The Clinical Cases in General Medicine Elective at a medical school in Texas, USA, an 8-week-long elective course consisting of weekly hour-long sessions was shown to be well received by the students. Students reported that it greatly expanded their knowledge and their way of thinking. Twenty-seven per cent of the students preferred case-based studies to traditional lectures, 11% preferred lectures and the rest wanted to incorporate CBL into their curriculum (Dai *et al.,* 2020).

CBL as a platform to integrate basic and clinical sciences

Exposure to case-based learning scenarios encouraged students to correlate basic sciences to clinical sciences. Students were able to recollect the concepts that they had learnt by associating them with case scenarios in a stress-free environment enhancing their critical thinking abilities (Novack, 2020). CBLs are increasingly used worldwide to bridge the gap between the classroom and clerkship. A study conducted at a university in Pennsylvania, USA showed that CBLs promoted hypothetico-deductive skills and clinical reasoning in a safe environment, as preparation for clerkship (Duca et al, 2021).

Possibility of conducting online and the advantages of online CBL

CBLs are delivered face-to-face in a classroom or in an online mode. In an Australian study, the online learning mode of delivering CBL was seen as a safe and flexible learning experience and helped the students to individualize their learning process (Osborne *et al*., 2022). A scoping review on adaptation of clinical rotation during found sixteen papers from an array of countries describing the use of online clinical case scenarios to remedy the disruption in clinical clerkships for clinical year students during the COVID-19 pandemic (Park, Shim & Lee, 2021). In a university hospital in Beijing, China, anaesthesia residents on rotation who participated in an online case-based learning in

the WeChat platform performed better in the anesthesiology assessment compared to those who followed the traditional method in the previous year (Duan et al., 2021).

Increased performance in assessments

In an Indian study, the group of students who were exposed to online clinical case-based learning faired significantly better in the post-test of a basic science module compared to their peers who underwent the same module in a traditional approach. In the focal-group discussion following the study, the students further reported that the case-based learning method induced them to study deeper and also to use online resources for their learning (Vedi & Dulloo, 2021).

A study done in a medical school in Florida, USA showed that all students performed well in the post-session assessment on a module held using a case-based learning method. Here the discrimination between stronger and weaker students was low, indicating that CBLs help weaker students overcome their difficulties in this method. The CBL method promoted collaborative learning skills. When engaging in CBLs students learned actively, became responsible for their peers' learning, developed team spirit, and interpersonal skills, and took ownership in their learning process (Nguyen et al., 2021).

Promote clinical reasoning

A study conducted on medical students in Munich, Germany demonstrated that the clinical case discussion approach is an effective and sustainable clinical-reasoning teaching resource for medical students. In this study, students who participated in live face-to-face sessions outperformed those who engaged in the same clinical case-based learning designed for individual study (Weidenbusch et al., 2019).

In a systematic review on methods to improve diagnostic reasoning among medical undergraduates, one study using "illness scripts" which is similar to a case description, through a small group discussion was found to promote clinical reasoning (Xu et al., 2021).

CBL as a tool to bridge gaps in experience

Exposure to emergency medicine, trauma and orthopaedic conditions in the training period is limited by the cases seen during the particular stint. Several schools have attempted to bridge this gap using CBLs, in post-graduate and undergraduate training, and have found them effective. This is true for other serious but less common conditions where a fair amount of competency is expected (Burke et al., 2023; Chen et al., 2023; Poacher et al., 2022).

Conclusion

Case-based learning was perceived as a good learning tool by students, and it can be combined with other methods of teaching in any medical curriculum. Case-based learning approach promotes reviewing learnt concepts in basic sciences and relates to clinical scenarios to consolidate them. In addition, it promotes teamwork, self-reliance and collaboration. Clinical reasoning is another important feature that can be cultivated through CBL. The adaptability of CBLs to the online mode can be seen as an added advantage to be used in times of crisis. We strongly recommend that CBLs be incorporated in medical curricula.

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