

Invited Article

MEDICAL EDUCATION

Role of Problem-Based Learning (PBL) in Postgraduate Medical Education

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Abstract

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Introduction

Problem-based learning (PBL) is a student-centred teaching method used in many medical schools in Sri Lanka and worldwide [1,2]. This method is used predominantly during the pre-clinical phase of undergraduate medical education [3]. The application of PBL in postgraduate medical education is limited. This article will discuss the potential applications of PBL in postgraduate medical education (PGME).

What is PBL?

Barrows, who introduced PBL into medical education defined it as a “A learning method based on the principle of using problems as a starting point for the acquisition and integration of new knowledge” [4]

In this approach, a clinical problem is given to a small group of students to discuss over several sessions. Analysing the problem helps to identify knowledge gaps and acts as a stimulant to explore, not only the basic scientific and clinical facts, but also social, psychological, ethical and professional issues and how these aspects are interconnected [3].

Pioneering this approach, McMaster University describes PBL as “a pedagogical approach, which uses cases, and problems as the starting point for acquiring the desired learning objectives” [5].

History of PBL

The philosophical roots of PBL go back to the era of Socrates, who used problems with his students to help them to explore “their assumptions, their values and the inadequacies of their proffered solutions”. Similarly, Aristotle suggested “students begin problem-solving by determining both their perceptions and beliefs”. This approach is in-

line with the modern PBL process. The evolution of educational theories such as adult leaning theory and constructivism provided the basis for the concept of PBL [1].

PBL is one of the most pioneering innovations in medical education. It was introduced by Barrows and Tamblyn at McMaster University in Ontario, Canada, in response to didactic teacher-centered and discipline-based medical education. The driving force was Barrows' determination to bridge the gap between theory and practice in the clinical setting and to increase clinical reasoning abilities through this novel method. The PBL curriculum was designed to stimulate learning by allowing students to understand its relevance with application to their future role as doctors [1,4,5,6].

This method of teaching and learning spread rapidly in the first few years from its inception. Following the McMaster model, Maastricht (Netherlands) and Newcastle (Australia) universities implemented PBL at their new medical schools. In 1979, The University of New Mexico medical school offered a PBL curriculum as an alternative track. During 1990 to 2000, established medical schools like Harvard (USA), Sherbrooke (Canada), Manchester and Liverpool (U.K.) changed their traditional curricula to incorporate PBL. By 2003, 70% of U.S. medical schools were following the PBL approach. As medical schools worldwide adapted PBL to their own requirements, variations in process followed depending on the available facilities, staff preference and local constraints. This resulted in a wide range of diverse PBL models. Such different variants are practiced in Sri Lanka as well [5,7,8,9].

It is notable that many North American medical schools that pioneered PBL follow graduate entry programmes. Their success in implementing PBL argues in support of introducing PBL to postgraduate medical education.

How is PBL conducted?

PBL tutorials are conducted in several ways. Most of the medical schools in Sri Lanka and in the region follow the Maastricht "seven jumps" process, which is inspired by a Dutch folk dance, which has seven steps of jumps.

The seven steps are:

1. Clarify concepts
2. Define the problem
3. Brainstorm (analyse the problem)
4. Systematic classification
5. Formulate learning objectives
6. Self-study
7. Discussion

In short, it is identifying what they already know, what they need to know, and how and where to access new information that may lead to the solving the problem [3,9].

A typical PBL group consists of 8 to 10 students and a facilitator (tutor). During the first PBL session, students use "triggers", i.e. a problem or a case scenario to define their own

learning objectives. Subsequently they move to independent, self-directed study before returning to the second session to discuss, refine and re-organize their newly acquired knowledge [3].

Well-designed problems are underpinned by a structure for reasoning, equally explicit to tutors and students [3]. Typically;

- A trigger initiates the discussion
- Groups brainstorm to identify cues and key issues and possible solutions
- Lateral thinking produces a wide array of possible explanations and mechanisms
- Hypotheses are critically explored through reasoning and organized by priority

More importantly, a well-designed case scenario allows the students to identify the links and connections between the basic scientific and clinical facts and social, psychological, ethical and professional issues. Formation of this cognitive network is an essential prerequisite for the high-level clinical reasoning and decision making expected at post graduate level [10,11].

Why PBL for postgraduate medical education?

The PBL approach combines acquisition of knowledge with the development of generic skills and attitudes [12,13]. These generic attributes make PBL an ideal teaching method for postgraduate medical education. Several systematic reviews have proved that PBL;

- Encourages independent learning
- Stimulates reflection
- Improves clinical reasoning
- Enhances critical thinking
- Promotes evidence-based decision-making
- Facilitates teamwork and peer communication

PBL in postgraduate medical education

The attraction of PBL as a learner-centred, interactive educational approach has prompted educationists to recommend this method for postgraduate training. There are many examples, worldwide, of adopting PBL in postgraduate courses. The evidence base regarding the potential of PBL in PGME is gradually emerging.

In the UK, PBL built into voluntary monthly tutorials for physicians undertaking a postgraduate clinical research degree was found to increase their confidence and ability to appraise research. A study conducted in the UK showed that the implementation of a PBL system into a pain medicine postgraduate program created a positive learning atmosphere and improved trainee satisfaction. A randomized controlled trial in 1999, involving postgraduate medical education and training of occupational health physicians in the Netherlands showed that a problem-based program appeared to be more effective than a lecture-based program in improving performance. Another study conducted in Australia showed that evidence-based behaviour change was observed among specialists and trainees in gynaecology who followed a course using PBL [14 -16].

The PBL approach is being increasingly adopted in continuing medical education (CME) as well. In the USA, physicians attending a CME activity perceived the effectiveness of interactive, case-based methods to retain information and change practice. Another study conducted in Canada during a CME programme on headache diagnosis and management demonstrated greater knowledge acquisition with greater improvement in clinical reasoning skills with PBL when compared with a lecture-based approach [17,18].

Addressing concerns regarding implementation

The major concern regarding the PBL approach is its resource intensive nature. It requires more staff for facilitation of a PBL when compared to a lecture. This challenge is greater for institutions which mainly rely on part-time faculty. Implementing PBL tutorials require more physical space and other resources to accommodate simultaneous smaller group-learning. However, the smaller number of students enrolled for postgraduate courses make implementation of PBL in postgraduate medical education more feasible. Many postgraduate and CME programmes worldwide conduct online PBL.

Conclusion

PBL is proven to be an effective way of delivering medical education and offers several advantages over traditional teaching/learning methods. The educational basis and the process of PBL make it an ideal teaching/learning tool for postgraduate training. However, the potential of PBL in PGME is yet to be realized.

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