

Problem-based learning

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Introduction

The origins of problem-based learning (PBL) probably go back to 1920s. Celestin Freinet, a primary school teacher, returned from World War I to his village in south-east France. Due to his injuries, he was too breathless to speak to the class for more than a few minutes, so he created a new system of learning. This new system encouraged his pupils to take control of their own studies, communicate effectively, be more cooperative and evaluate their own progress. PBL, as currently employed in medical education, was first used and recognized at McMaster University, in Canada, in the late 1960s. PBL is an active form of learning stimulated by, and focused around a clinical, community or scientific problem.

In this paper we discuss how to design a one-week PBL course for medical students. We will introduce and use Harden's 10 questions as the framework for describing this course. At the end of this article we will reflect on the advantages provided by this course over a more traditional approach.

The topic is "The patient with upper gastrointestinal bleeding" and is part of the "Gastrointestinal diseases" block. The course is designed for a group of 8 medical students in the fourth year of their training.

(I) What are the needs of the community in relation to the product of the course?

The burden of gastrointestinal (GI) disease is heavy for patients, the society and the economy. GI haemorrhage is one of the most common causes of hospital admissions. There has been a progressive increase in the incidence of upper GI hemorrhage along with other GI diseases that predispose to GI haemorrhage such as chronic liver disease, Barrett's oesophagus and oesophageal cancer. The rise in alcohol consumption is particularly alarming. Cirrhosis, secondary to chronic liver disease (including alcoholic liver disease), can lead to portal hypertension. This predisposes to GI bleeding.

The incidence of upper GI haemorrhage increases with age. Furthermore there has been a progressive increase in the use of anticoagulants and antiplatelet therapy, for the treatment and prevention of cardiovascular and cerebrovascular diseases that predisposes to GI hemorrhage.

GI hemorrhage has been identified as one of "the top 20" common medical presentations by the Royal College of Physicians of the United Kingdom. It is important that all medical students and newly qualified doctors are aware of its presentation, causes and management.

(II) What are the aims and objectives?

By the end of this one-week course the students should be able to:

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- Assess the likely causes of upper GI bleeding from history and examination, and understand the significance of taking an alcohol intake and drug history
- Assess the severity of bleeding
- Initiate the investigation of common causes of acute and chronic GI blood loss
- Outline immediate treatment and the initial stabilization of a patient with acute upper GI bleeding
- Outline plans for management and follow up of patients with upper GI bleeding

(III) What content should be included?

1) Problem scenario:

You are the on-call House Officer (first year resident) and you are about to see Mrs H. J. who has been admitted by her family physician and is carrying this letter:

Dear Doctor;

Re: Mrs H.J., 52 years old

Thank you for seeing this patient who has been having black stools for the past 3 days. She is a housewife and has recently been diagnosed with back pain and has started taking Ibuprofen on a regular basis. She is otherwise fit and healthy and has not had similar episodes in the past.

On examination, she looks pale with blood pressure of 110/60 and pulse rate of 90/min. Abdominal examination showed mild epigastric tenderness.

Thank you for your help in her management.

Yours sincerely,

Dr G. Practitioner

This is presented at the start of the first session as a letter from patient's family physician, printed on paper.

2) The Tutor:

The Tutor acts as a facilitator, a monitor and stimulus to the process. Instead of providing information, the tutor allows students to seek out information for themselves. Appropriate feedback and assistance from the tutor helps the students in this process of active learning. He / she needs to make sure all the students are involved.

3) Fellow students in the group are also educational resources as students learn from each other.

4) Additional learning resources: A suitable room in the Education Centre with whiteboards, pen and enough chairs that are organised in a circle

The students are presented with a list of useful resources that they may find useful in their self-directed learning:

- Web resources such as: eMedicine, BMJ
- Useful chapters in a number of textbooks such as:
 - Oxford or Harrison's Textbook of Medicine
 - Textbook of Medical Physiology (by Guyton)
 - Clinical Medicine (by Kumar and Clarke)
 - Pharmacology (by Rang)
 - Evidence-Based Medicine (by Sackett)
- A number of Journal articles
- Medical School's Study Guide

(IV) How should the content be organised?

The students need a detailed introduction to PBL early in their training. In the induction sessions, the students have an introductory lecture that provides an overview of PBL and the framework of the block. The tutor explains how the course works and the objectives of the course which should be part of the overall objectives of the block and the curriculum.

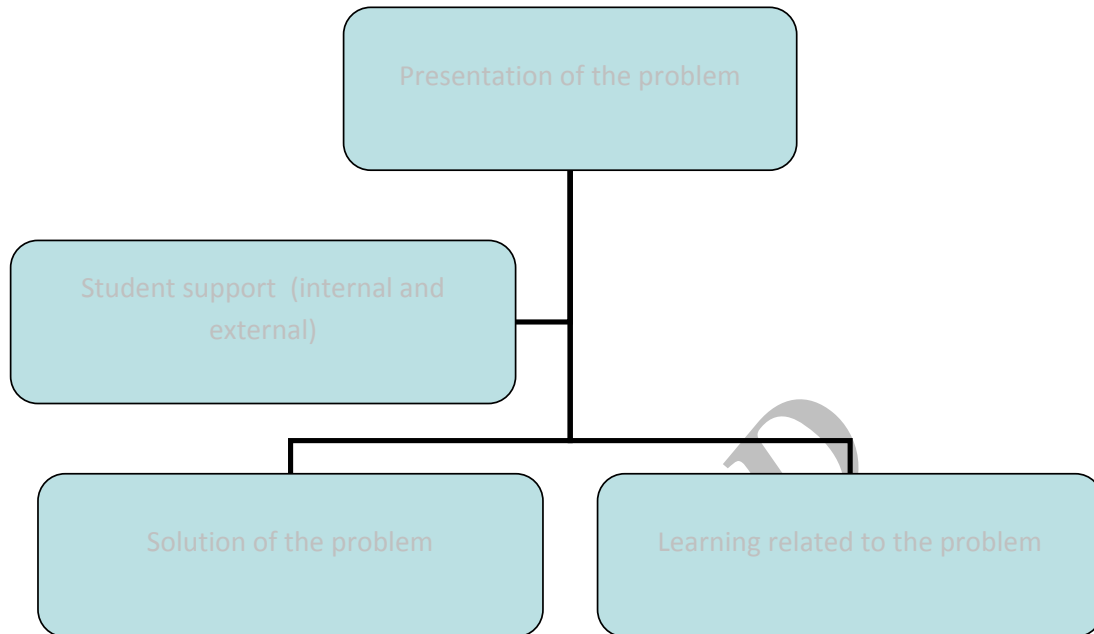


Figure 1. Organisation of a PBL course

The concept map in the figure 1 shows the organisation of a PBL course.

Our course is constitutes of the following stages:

(I) Stage 1: First meeting on Thursday

At the beginning of the session, students are given a few minutes for introducing themselves as this creates a better atmosphere within the group. Then the facilitator explains how the session is organised.

One of the students takes the role of chairperson, who controls the discussion and one takes the role of scribe, who writes the conclusions on the whiteboard(s). The problem scenario is handed to the students and one of them reads it out loudly. They identify the problem and discuss unfamiliar terms and concepts and help each other clarify some areas of uncertainty. The facilitator will make further information about the scenario available upon request, for example vital signs or results of basic investigations. The group determines main issues and possible explanations using their own prior knowledge, and identify gaps in their understanding. They must reach an

agreement as to which issues require explanation and formulate these issues as learning goals.

(II) Stage 2: A period of individual study for 4 days

By accessing a number of educational resources, the students spend a few days and study about the learning issues and acquire necessary knowledge through self-directed learning.

(III) Stage 3: Second meeting on Tuesday next week

The students share what they have learnt. All group members should be encouraged to participate and inform one another about their findings. They build new learning on to prior knowledge. At the end, the most important step is for the group to summarise their work and generalise the learning to other situations in which such knowledge and skills would be applicable.

The students should review whether the learning objectives have been met, if not, further individual work is done on Wednesday and at the start of the next PBL course (on Thursday), the group has 20-30 minutes to discuss those issues before starting the next subject. The first session is

organised on a Thursday so the students have time to study during the weekend.

(V) What educational strategies should be adopted?

In terms of the SPICES model, the approach taken to the conduct of the course is:

- 1) Student-centered
- 2) Problem solving
- 3) Integrated
- 4) The course is hospital-based, but many causes of upper GI bleeding are managed and need long-term follow up in the community.
- 5) It has a standard program and is not elective.
- 6) It is difficult to provide a systematic and thorough coverage of the core content of the curriculum with PBL, but it encourages self-directed learning and the students will be able to identify their own learning gaps and work towards it.

(VI) What teaching methods should be used?

The following methods constitute the main educational activities in our course:

- 1) Small group learning
- 2) Independent study

(VII) How should the assessment be carried out?

Attendance at the whole course is a prerequisite for successful completion. There is no formal assessment at the end of a one-week PBL course but students should review whether the learning objectives have been met. In mid-semester, one-to-one meeting between each student and the PBL tutor takes place during which, learner's reflection and any problems can be discussed and feedback from the tutor is given. An important principle is that all students should reach all the outcomes.

(VIII) How should details of the curriculum be communicated?

The Student Liaison Officer (SLO) has the main responsibility of communicating details of

the course and keeping students, staff and all who are involved informed. Programs and timetables are distributed via e-mail and included in the Study Guide. The students receive the Study Guide at the beginning of the semester.

(IX) What educational environment should be fostered?

The educational environment of the course encourages interaction and cooperation between different members of the team. The atmosphere is informal and students are encouraged to interact with each other.

(X) How should the process be managed?

- 1) At the Medical School level:

The "Faculty Board" have the ultimate responsibility of planning, implementing, coordinating and monitoring the educational process. The "Curriculum Development Group", consisting of consultants and different specialists, has the responsibility of designing and reviewing the curriculum.

- 2) At the local level:

Each teaching hospital has a "Student Liaison Officer" which is responsible for organizing the teaching sessions in that hospital. The SLO works closely with the clinical lecturers who run the teaching sessions.

Discussion

Compared with traditional methods of instruction, a PBL course like this has the following advantages:

- It is relevant, covers a very common and important area in the medical curriculum, needs interdisciplinary approach, and is very relevant to students' future practice.
- It is student-centered and they are able to set their own learning goals.
- It integrates basic and clinical sciences and enables them to activate prior knowledge

(anatomy, physiology, pharmacology, etc...) and build on it.

- Students actively learn using the problem as a focus for their learning.
- The subject is an open problem and they can explore a variety of related subjects, for example studying different causes of upper GI bleeding and their management, or variceal GI bleeding in a patient with chronic liver disease.
- It is more nurturing and enjoyable and motivates the learners.
- It promotes personal transferable skills such as teamwork, discussion skills, clinical reasoning and problem solving.
- It prepares them for adult learning and life-long learning.
- It promotes a deep approach to learning.
- Students are able to transfer their learning from one situation to another.

To have an effective PBL course, the tutor should have an understanding of the PBL process, knowledge of the curriculum and group facilitation skills. The role of the tutor is to guide the students through the process and encourage them to think more deeply, discuss the issues and critique each other. He/she should allow students to make mistakes and learn from them. He/she should resist the urge to teach and avoid giving the information directly to the students.

The aim of a course like this is to help the students develop skills in scientific reasoning, self-study and self-evaluation. Students' feedback

is encouraged and valued for continuing modification and improvement of the course.

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