



PROBLEM-BASED LEARNING IN CLINICAL CLERKSHIP — THE EXPERIENCE AT THE UNIVERSITY OF TRANSKEI MEDICAL SCHOOL

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The entire medical course at the University of Transkei (Unitra) Medical School became fully problem-based and community-based in 1997, following the introduction of the innovative medical curriculum into the 2nd year course in 1993.

Descriptions of this curriculum and the process in the first 3 years of training have already been published.^{1,3} The present paper complements these earlier reports, and covers mainly problem-based learning (PBL) in the last 3 years of the medical course. A separate paper dealing with the details of the community-based education (CBE) aspects of the curriculum in the senior years of training is being planned.

Many established medical schools around the world are making the transition from traditional curricula to a PBL/CBE curriculum. The essential characteristics of the PBL/CBE curriculum include the use of clinical problems rather than discipline-based teaching for learning, the integration of basic and clinical sciences throughout the course, and the development of higher cognitive skills as well as knowledge. Various strategies have been adopted to implement these principles. Most PBL medical schools have successfully introduced these student-centred, tutorial-based learning methods in the early years of their courses. However, few have achieved the goal of incorporating the PBL philosophy into the later clinical clerkship years. Unitra Medical School is one of the few schools that has successfully attempted the introduction of PBL strategies at this latter stage.⁴ This article describes the clinical PBL programme at Unitra in its present form.

PBL IN ACTION

The major goals of the innovative curriculum in medical training at Unitra have already been reported elsewhere.^{1,3} However some of the most important goals of PBL in the clinical setting include: (i) acquiring adequate knowledge of the major disease processes seen in the community; (ii) developing



critical clinical reasoning, clinical decision-making and problem-solving skills; (iii) fostering independent, lifelong, self-directed learning skills; and (iv) acquiring the professional attributes and qualities required of a medical doctor.⁵

Some of the reported benefits of the innovative curriculum are that students trained using PBL strategies develop better clinical reasoning skills, use time more efficiently, and retain clinical knowledge better than their peers educated in more traditional clerkships.⁶⁻⁸ Such skills and attributes are especially important for subsequent practice as the need for continuing medical education becomes widely accepted and necessary to cope with the explosion of medical information and technology.⁹

The innovative medical curriculum at Unitra aims to equip its graduates with these important skills using PBL and CBE. The inclusion of community-based programmes in medical training is designed to offset the limitations of academic hospitals that expose students predominantly to patients with complex or multiple problems that are not representative of the problems in which the graduating student should have expertise.¹⁰⁻¹² At Unitra, students are gradually given increasing responsibility in patient care from their 4th through to 6th years.

There are a number of learning needs to be addressed in the PBL clinical clerkship. Students learn to apply the knowledge and diagnostic reasoning skills acquired on paper cases during the first 3 years of the course to address a variety of clinical problems in real patients. Multiple teaching methods are helpful in addressing these learning needs.¹³ The learning opportunities provided at Unitra include PBL tutorials, case presentations, case reports, bedside teaching sessions, expert resource sessions, grand rounds, clinicopathological conferences, and instructions in practical procedures. Each discipline has a core curriculum with lists of important and instructional clinical problems that students should gradually encounter and become familiar with during 3 years of clinical clerkship. Students are divided into small groups and rotate through the different clinical disciplines, spending 16 - 18 weeks in each of the major disciplines over 3 years. As far as possible efforts are made to expose each group in a class to the entire spectrum of common clinical conditions. Students keep logbooks of all important clinical encounters.

LEARNING OPPORTUNITIES

Clinical PBL tutorials

The PBL tutorial is one of the most important methods of learning in the innovative curriculum. A PBL tutorial group consists of 6 - 10 students and one or two tutors. By the time they reach the 4th year students will have had 3 years' experience with the tutorial process.

Each week a specific clinical problem is dealt with during two 3-hour problem-based tutorial sessions. The clinical PBL

tutorial method used is an adaptation of the PBL methodology encountered in the first 3 years of the curriculum, which in turn has been adapted from the method used at the Bowman Gray School of Medicine.¹⁴ Real patients replace the paper cases, except in the unlikely event that a patient with the condition of interest is not available during a particular clerkship.

The acquisition of appropriate, functional knowledge in the PBL curriculum is based on a sequence of three processes: activation of prior knowledge, learning in context, and elaboration.¹⁵ The clinical PBL tutorial at Unitra utilises these principles and is a 3-step process, with the tutor guiding the students through the various learning activities. The first tutorial session is held at the bedside, and introduces the group to a patient selected by the tutor. After the necessary introductions students take a history from the patient and formulate hypotheses to explain the patient's condition. The tutor guides them along the clinical reasoning process, making sure that everyone in the group participates actively without anyone dominating the deliberations. Once the history-taking is complete one of the students is mandated to carry out a physical examination of the patient in order to test the hypotheses listed. The tutor ensures that proper clinical techniques are used for eliciting physical signs and provides information on intimate or technical examinations when required, as the students are not expected to carry out such examinations at the time of the tutorial. The group discusses the clinical findings, formulates and ranks a list of differential diagnoses, suggests a logical sequence of investigations, and makes an outline of the desired management. The group then draws up a list of learning issues that have arisen from the case for further individual study; these should cover the epidemiological, pathophysiological and management aspects of the condition in an integrated fashion. This session utilises the PBL concept of activation of prior knowledge and learning in context.

The use of real patients rather than paper cases will sometimes illustrate the imprecise nature of clinical care where a conclusive diagnosis is not immediately apparent and management is tentative or undecided.¹⁶ Under such circumstances there may be a need for further history-taking, examination, special investigations and consultations to resolve the problem. Observation of the clinical reasoning process involved in problem identification and problem solving is often more important for the students than the actual diagnosis at this stage of their careers.

The second PBL tutorial consists of the presentation of learning issues and takes place at least 2 days after the first session, giving students time to consult various sources. This expansion of the student's existing knowledge is followed by discussions and wrap-up of the case with an update of the clinical situation. This concludes the second part of the process and leads directly to the third part, namely an assessment of



the tutorials by both students and the tutor. The tutor gives feedback on the performance of each student in the group, and this becomes part of the continuous, formative assessment. The feedback session is a very important aspect of PBL because it helps to identify deficiencies within the group so that corrective measures can be adopted immediately. It also helps individual students in their quest for self-directed learning.¹⁷

Tutors play a vital facilitative role in the PBL tutorial. Although their tutoring skills are considered to be more important to student learning than expertise in the subject area,^{7,18} evidence suggests that students guided by subject-matter expert tutors may benefit more than students guided by non-expert staff or student tutors.^{19,20} Consequently, clinical PBL tutors at Unisa are in most cases discipline experts, although not necessarily subject experts.

Case reports and presentations

There are two 1½ hour sessions a week set aside for case presentations. Students are expected to clerk a specific number of patients who present with listed conditions during each clinical block. Each student is expected to know their allocated patients well, to read up their conditions and to write up a short commentary that includes a pathophysiological discussion of the disease process. The report is handed in to the tutor for assessment, after which two or three of these cases will be presented to the group during a bedside session. These case presentations differ from the traditional situation where the student presents to the clinical tutor in that the student now presents to the group. The group takes responsibility for criticism of the presentation and discusses the case. The tutor's role is to guide and ensure that everyone participates actively, as well as acting as a resource person. Restraint is sometimes required on the part of the tutor who may feel inclined to take over the proceedings. A different condition is presented at each case presentation session, thus providing an opportunity for students to learn about 10 - 14 new conditions during each 6 - 8-week clinical block, in addition to the spectrum of conditions covered in PBL tutorials. Case presentations are student-centred, and complement the PBL tutorials.

Bedside clinical skills sessions

There are two 1½ hour bedside sessions a week. These are designed to demonstrate specific clinical skills, such as history-taking, physical examination techniques, and management procedures. The tutor selects the case from a given list of conditions to be covered during the block, and a new skill is covered on each occasion. Some of these sessions are conducted in the emergency or outpatient clinics and introduce students to emergency care. At the end of each bedside session students identify learning issues for further study. A second session on the same topic may sometimes be necessary to discuss and reinforce the learning issues.

Expert resource sessions

Expert resource sessions are designed to give students an overview of key subjects, and to provide them with a forum where they can summarise concepts and discuss unresolved issues arising from previous PBL tutorials, case presentations or bedside sessions under the guidance of an expert.⁷ A list of seminal topics is drawn up and given to all the students, who may add topics. There are two expert resource sessions of about 1 hour each per week. Students must prepare before each topic is discussed, and the tutor then guides them in discussing the topic as broadly as possible in order to fill in the gaps left by the students' contributions.

Clinicopathological conferences

Interdisciplinary clinicopathological conferences take place every fortnight. Students are expected to play a major role in these events, which provide an opportunity for the integration of clinical material with basic sciences and are open to doctors and students alike. Student presenters acquire skills in participating in large audience meetings and articulating their thoughts and experiences to a wide group of discipline experts, as well as to junior and senior students from all clinical disciplines.

Practical procedures

As part of their practical experience students are expected to carry out a variety of procedures under supervision, including venepunctures, setting up of intravenous drips, lumbar punctures, drainage of abscesses, and stitching of wounds. These general skills are augmented by discipline-specific procedures such as delivery of babies, taking of Pap smears, assisting at operations and participating in labour ward duties while in their obstetric and gynaecological rotation. Students are expected to keep logbooks of all procedures, and to have these initialled by their supervisors. These logbooks are handed in for assessment at the end of each block.

Table I shows a typical week in the PBL programme for obstetrics and gynaecology. Other disciplines have similar programmes with minor modifications to suit their individual needs. The self-directed nature of the innovative curriculum means that from 09h00 to 11h30 every morning students can choose to attend ward rounds, clinics or theatre, or to use the time for individual study or clerking. The bedside clinical skills sessions, the case presentation sessions and the PBL tutorials are, however, compulsory.

COMMUNITY-BASED EDUCATION

Students spend a total of 18 weeks in community clinical clerkship during the last 3 years of the medical course. During their 4th year small groups of students spend 10 weeks in selected rural hospitals to which they have been assigned.



Table I. Department of Obstetrics and Gynaecology 5th year schedule, 1998

Day	08h00 - 09h00	09h00 - 11h30	11h30 - 12h30	14h00 - 17h00
Monday	Departmental audit meeting	Rounds/clinics/clerking/study	Bedside clinical skills session	Integrated PBL tutorial
Tuesday	Departmental audit meeting	Rounds/theatre/clinics/clerking/study	Individual study/clerking	Radiology: 14h00 - 16h00; study
Wednesday	Departmental audit meeting	Rounds/theatre/clinics/clerking/study	Case presentation session	Expert resource sessions: 14h00 - 16h00
Thursday	Departmental audit meeting	Rounds/theatre/clerking/study	Bedside clinical skills session	Integrated PBL tutorial
Friday	Journal club; registrar presentations/grand rounds	Rounds/clerking/study	Case presentation session	Clinical clerking/study

General practitioners who have been trained as preceptors supervise the students, and they are visited once or twice a week by circuit-riders from Unitra. Students at these rural hospitals participate in outpatient clinics, ward rounds, case clerking and presentations, as well as skills sessions and visits to peripheral clinics.

In both their 5th and 6th years, the students spend 4 weeks each in any one of 4 health centres around Umtata that were specifically built with funds from the Kellogg Foundation for training health personnel. These health centres are run by the Department of Family Medicine; here students are exposed to the principles and practice of family medicine, as well as to community health care.

As already stated, a more detailed description of the CBE aspects of the innovative curriculum at Unitra will be reported in a future paper.

ASSESSMENT OF STUDENTS DURING CLINICAL CLERKSHIP

Assessment is a critical component of the PBL/CBE curriculum. When assessment is specific and broad-based it helps fill instructional gaps by encouraging students to read on their own and to participate in additional educational opportunities.¹² In line with educational recommendations,^{7,11,12} Unitra uses multiple assessment methods in order to even out the individual weaknesses of each method. Two main types of assessment are used to assess clinical students, namely continuous assessment and summative assessment. Continuous assessment is designed to provide ongoing feedback to students in order to direct their future learning and to provide them with guidance about areas of relative strength and weakness.¹⁷ Feedback is given as frequently as possible, after each learning session. Summative assessment, on the other hand, is designed to make pass/fail and grading decisions. Such assessments must meet recognised standards of reliability and validity and are as broad-based as possible, using a range of cases or problems. Although frequent testing would be desirable,¹² one summative assessment is usually carried out at the end of each clinical block because of the time-consuming nature of these assessment methods.

The individualised process assessment (IPA)

It is generally agreed that assessment methods should conform to learning and teaching methods. If assessment is the means by which competence for subsequent practice is determined then such assessment should focus on the competencies necessary for practice, and these in turn should be dictated by the curriculum objectives. Assessment should be in line with the objectives of training rather than the learning experience only,¹² and Unitra therefore recently modified the clinical IPA to conform with these criteria.

In the modified IPA a student is given a patient to clerk for 45 - 60 minutes, and takes an extra half-hour away from the patient in order to prepare for the presentation to the examiners. This presentation lasts a further 45 - 60 minutes. The original IPA consisted of a first part, where the student clerked the case and handed in a written account of the patient with a list of learning issues for marking, a second part 2 days later in which the student presented the learning issues in an oral examination lasting 45 - 60 minutes. The modified IPA takes place by the bedside where the interaction between the candidate and the patient can be observed directly. In contrast to the traditional long case examination, the modified IPA gives the student an opportunity to present and discuss the patient, as well as to formulate investigative and management plans that go beyond hospital care into the community. There is as little interruption from the examiners as possible. A modification of the assessment form designed for the Objective Structured Long Examination Record (OSLER) by Gleeson is used.²¹ Marks are awarded separately for history, physical examination, investigations and management plans. The examiners assess the student's presentation independently, taking into consideration the complexity of the case. A final mark is awarded after the examiners hold a private discussion. Thereafter the candidate is given feedback regarding the case and reasons for the particular mark awarded. The assessment form is signed by the student and the examiners, with this mark contributing a quarter of the overall end-of-block mark.

The objective structured clinical examination (OSCE)

As medical education moves increasingly away from tertiary



hospitals to community and primary health care settings, so the assessment of skills becomes critically important in ensuring that students develop those competencies necessary for safe practice. The OSCE tests history-taking and communication skills, physical examination skills, and the interpretation of special investigations or charts.²² The OSCE consists of several manned stations of 5 - 10 minutes each, at least three or four of which have real patients who are not ill, and who are comfortable with being interviewed or examined by several students. In cases where discomfort is possible several patients may be selected for that station. The examiner uses a checklist to assess the candidate at each station.²²

The modified essay question (MEQ)

There is evidence to suggest that the essay test with its different modifications is more reliable than the multiple choice question in the assessment of knowledge relevant to PBL clinical clerkship and community-based learning.^{23,24} The MEQ is especially suited to testing knowledge associated with continuity of care, which is a primary objective of community care.¹² The MEQ is therefore an important component of summative assessment at Unitra. Case scenarios are used to assess the student's ability to formulate diagnostic hypotheses, explain pathophysiological mechanisms, and to construct logical investigation and management plans.

PROBLEMS OF IMPLEMENTATION

Although PBL appears to be well suited for clinical education because it imparts skills for lifelong learning and prepares students for community practice, it requires extra commitment from both students and faculty for its success. One of the greatest challenges facing PBL implementation is for the clinician, who in all probability was trained using the traditional curriculum, to change roles from instructor to facilitator, shifting the learning responsibility to the students. The success or failure of the PBL system in clinical clerkship depends *inter alia* on how well the clinician accepts this change,⁵ which in turn depends on the effectiveness of the tutor training programmes.²⁵ Unitra grapples with this and other problems by organising regular workshops for tutor training, curriculum review and curriculum development.

Successful implementation of the PBL programme does not necessarily guarantee success in the field for graduates. Unitra is acutely aware of this. Only careful follow-up and documentation of Unitra graduates in the field in comparison with their conventionally trained colleagues will ultimately resolve this issue. However, with the exception of one or two external examiners who were not fully briefed about the innovative curriculum and its assessment methods, the comments following the November 1997 final examinations were very favourable. The professionalism and clinical skills of the candidates were highly rated. Of the 29 candidates who sat the final examinations only one failed, and many are currently

doing their internship in various hospitals around the country. What remains to be seen is how they perform as doctors in the field. Research has been initiated to address this issue.

CONCLUSION

The medical curriculum at Unitra is now fully problem-based and community-orientated. Unitra has demonstrated that it is possible to implement an entire clinical course using PBL methods, in spite of being one of the most under-resourced medical schools in the country in terms of facilities and staff. There is no evidence that the innovative curriculum costs more to implement, or that it is only suited to medical schools with small student numbers. Commitment from both students and staff plays a significant role. In addition constant internal and external evaluation of the programme plus curriculum review and development are essential for continued success.

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