QUEEN'S UNIVERSITY

MD PROGRAM

PHASE II

PROBLEM-BASED LEARNING

STUDENT/ TUTOR HANDBOOK

PROBLEM-BASED LEARNING HANDBOOK

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This handbook, with updates and links to other sites on the web, can be found at *http://meds.queensu.ca/medicine/pbl/pblhome.htm*

The Faculty of Medicine at Queen's gratefully acknowledges the cooperation of the Undergraduate Medical Education offices at the University of Western Ontario and McMaster University for the use of some material contained within this handbook.

INTRODUCTION TO PROBLEM-BASED LEARNING (PBL)

This "PBL Handbook" has been designed to provide some useful guidelines and a variety of techniques and strategies that will facilitate your participation in a PBL group.

WHAT IS PROBLEM-BASED LEARNING?

PBL is an educational format that is centred around the discussion and learning that emanates from a clinically-based problem. It is a method that encourages independent learning and gives students practice in tackling puzzling situations and defining their own gaps in understanding in the context of relevant clinical problems, hopefully making it more likely that they will be able to recall the material later in the clinical setting. It is a way of learning which encourages a deeper understanding of the material rather than superficial coverage.

Based on the innovative PBL program introduced by McMaster University, this learning has been incorporated as a curriculum component in a number of medical schools around the world. Many schools in the United States and Canada, and all of the Ontario schools, have introduced problem-based learning into their curricula and there is ample evidence that students learn at least as well using a problem-based learning format as they do in a conventional curriculum.

The small group setting used in PBL encourages an inquisitive and detailed look at all issues, concepts and principles contained within the problem. The time spent outside of the group setting facilitates the development of skills such as literature retrieval, critical appraisal of available information and the seeking of opinions of peers and specialists. PBL encourages students to become more involved in, and responsible for, their own learning, and most students and faculty report that this is a highly enjoyable way to learn and to teach.

In keeping with the overall objectives of PBL at Queen's, each problem is intended to encourage the student "to develop an appreciation for the interrelated nature of the physical, biological, and behavioral mechanisms that must be considered with each health problem". By participation in this learning format, students will become proficient in the process of problem analysis, hypothesis generation, and the generation of learning issues that warrant further exploration. Each problem is intended to provoke critical enquiry, encourage independent access to a variety of learning resource materials, and generate small group discussion. The depth and breadth of the discussion on any particular topic will vary, depending on where the students are in the program. The problems have been developed to coincide with the relevant disciplines within each block of Phase II (e.g. IIA-Haematology and Oncology, Infectious Disease, Immunology and Allergic disorders, Medicine in Society themes). Accordingly, some of the learning objectives contained within the problem may well be discussed during corresponding lectures, laboratories, assignments or other small group sessions.

OBJECTIVES OF PBL AT QUEEN'S

By virtue of participation in the process of Problem-Based Learning (PBL), the student will achieve the following educational objectives:

1. Develop an ability to identify relevant health problems that warrant further discussion or self-study within the context of a clinical scenario presented as a "patient problem".

2. Develop an appreciation for the interrelated nature of the physical, biological and behavioural mechanisms that must be considered with each health problem during the process of generating a management plan.

3. Develop the knowledge base necessary to define and manage the health problems of patients, including the physical, emotional and social aspects, within the context of effective health care provision within society.

4. Reinforce the development of an effective clinical reasoning process including the skills of problem synthesis, hypothesis generation, critical appraisal of available information, data analysis, and decision making.

5. Cultivate the skills necessary to become self-directed as a learner, acknowledging personal educational needs and those of group members, and making effective use of available learning resources.

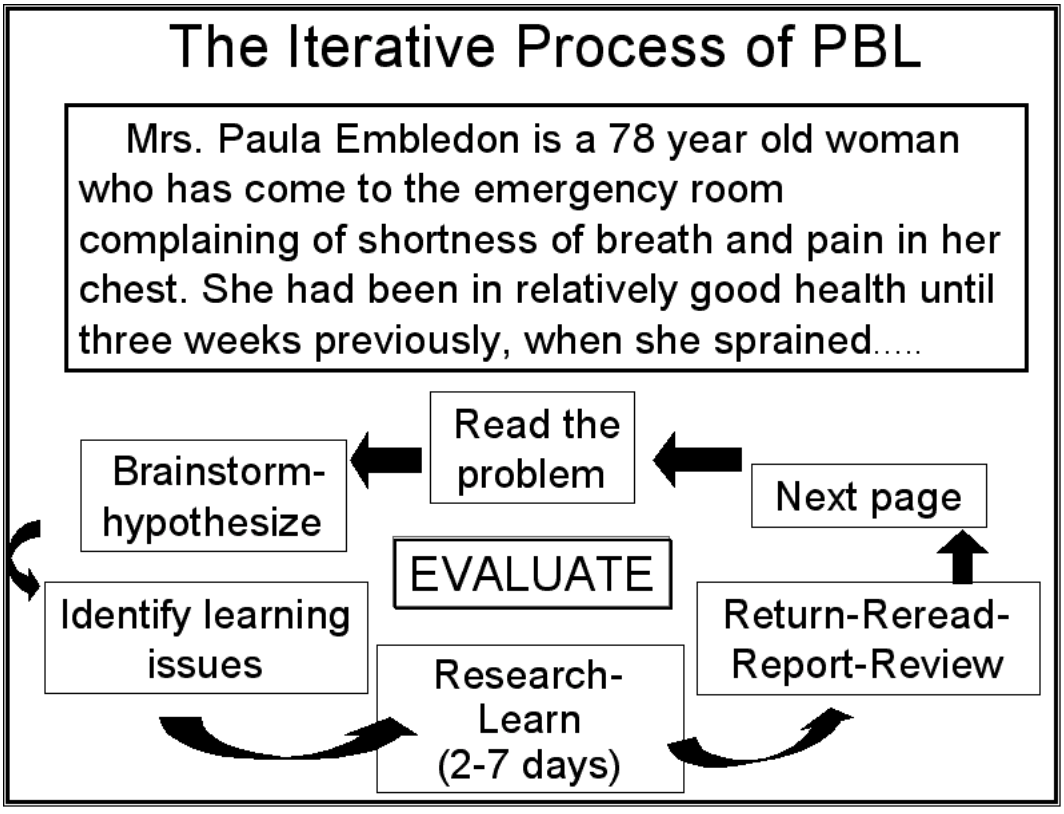
6. Function effectively as an active participant within a small group engaged in learning and the provision of health care .

7. Recognize, develop and maintain the personal characteristics and attitudes necessary for a career in the health professions including the following:

    - awareness of personal assets, limitations and emotional reactions;
    - responsibility and dependability;
    - ability to relate to, and show concern for, other individuals; and
    - the evaluation of personal progress, that of other group members and the group process itself.

THE PROCESS OF PROBLEM-BASED LEARNING

For the duration of Phase II, randomly assigned small groups of 7 or 8 students will consider a problem together. Tutorial groups will meet for approximately two hours once a week for the duration of the Block. During each small group session, the student group will identify and prioritize a number of learning issues/objectives. Students will be expected to spend four to six hours each week on independent study outside the small group to research and elaborate upon new information and concepts. As they return weekly to their small group, they will bring this new knowledge and information to the group. With the assistance of a faculty tutor, important issues and learning objectives will be further identified and discussed. Each week, new information built into the original problem may be introduced by the tutor. Within each block, a PBL group will likely encounter five or six problems.



Throughout Phase II certain topics and themes will reflect health care issues outside the narrow range of problem identification, diagnosis and treatment. Many of these themes may relate to ethical, legal and psycho-social aspects of medicine. Specific educational material contained within the problems may not be covered in other components of the specific Block or course.

THE FIRST GROUP SESSION

Be sure you have the necessary information: Bring your handbook to the session, especially at first. The tutors will ensure that you have the information relevant to the case to be discussed that day.

Seating arrangements: Be sure that conversation can flow easily, and be sure that everyone can establish eye contact with everyone else in the group. If this is not the case, suggest seating changes during this first session.

Tutor introductions: Tutors will introduce themselves by telling the group something about their field and personal interests. Tutors may want to identify how they wish to be addressed (e.g., "Please call me John in these group sessions and Dr. Smith in the clinical/classroom setting"). Some students will be more comfortable addressing the tutor as Dr.

Student introductions: Students will be asked to introduce themselves to the group. Let the tutor and the others know about you, your interests, your background etc. Tell the group something about yourself they don't already know. Include areas of special interest or experience outside of medicine.

Objectives for PBL and the evaluation process: Briefly go over the process and the objectives of PBL (see diagram) and review the evaluation process. This information is contained in this handbook. It may help to discuss your understanding of the objectives. It is especially useful if the members of the group discuss their own experience in previous PBL groups - what worked, what didn't. This should lead to a consensus as to how to proceed in the current sessions and is an opportunity to prevent difficulties before they arise.

Starting the case: After the introductions and discussion are completed, the tutor distributes the first page (only) to each student and the process begins with one of the students reading it. Reading the case aloud keeps the group focussed, as well as revealing some interesting pronunciations of medical terms that need to be corrected, hopefully by other members of the group. Before moving on to the second page of the session, the group should have formed a clear idea of the problem so far, what is known, what is needed to know and where to go from here. "Cue" statements ("You ask some more questions", "You order more investigations") should be addressed.

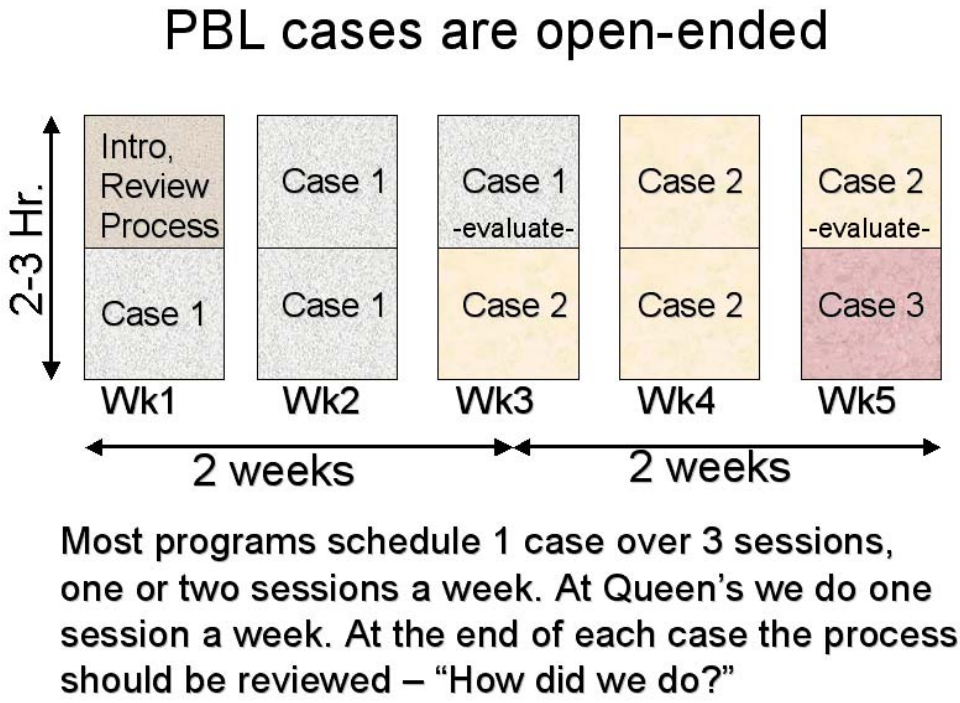
By the end of the session: Before the end of each session, the students in the group need to clarify their plans for their own learning between sessions by:

> **FIRST**, identifying all of the significant issues and settle on a "do-able" list of learning tasks for the next session.

SECOND, deciding which issues <u>everyone</u> will tackle and which will be divided up (some issues are so fundamental to the whole area that all students should read about them themselves).

THIRD, deciding what SPECIFIC questions individuals will try to answer.

FOURTH, deciding how they will address these learning issues (e.g., by looking up notes from a course, reading a section of a textbook, doing a literature search, searching the internet or consulting an expert)



Each of the pages for the case are labelled according to when it is to be done, e.g., Session 1 - page 1, session 1- page2, session 2 - page 1, and so on. There is a temptation (and sometimes considerable peer pressure) to get the next page ahead of time. Sometimes this is necessary to make up for cancelled sessions, but normally the case should be done as intended. The second session pages often contain information that can result in students not adequately discussing the material contained on the first session pages.

STUDENT RESPONSIBILITIES IN PROBLEM-BASED LEARNING

Problem-based learning is a student centred process and it is the responsibility of the individual student to participate fully, not only for his or her learning, but also to aid the learning of the others in the group. Although much of the student's time may be spent alone in the library or at the computer, the full benefits of PBL cannot be realized in isolation.

GUIDE TO PROFESSIONAL BEHAVIOUR IN TUTORIALS
(Courtesy of McMaster University)

- Respect
  - listens, and indicates so with appropriate verbal or non-verbal behaviour
  - verbal and non-verbal behaviour are neither rude, arrogant nor patronizing
  - allows others to express opinions and give information without "putting down" anyone
  - participates in discussion of differences in moral values
  - differentiates value of information from value of person
  - acknowledges others' contributions
  - apologizes when late or gives reason for being so

- Communication Skills
  - speaks directly to group members
  - presents clearly
  - uses words that others understand
  - uses open-ended questions appropriately
  - identifies misunderstanding between self and others or among others
  - attempts to resolve misunderstanding
  - tests own assumptions about group members
  - accepts and discusses emotional issues
  - able to express own emotional state in appropriate situations
  - non-verbal behaviour is consistent with tone and content of verbal communications
  - verbal or non-verbal behaviour indicates that statements have been understood
  - recognizes and responds to group member's non-verbal communication

- Responsibility
  - punctual
  - completes assigned tasks
  - presents relevant information
  - identifies irrelevant or excessive information
  - takes initiative or otherwise helps to maintain group dynamics
  - advances discussion by responding to or expanding on relevant issues

identifies own emotional or physical state when relevant to own functioning or group dynamics
- describes strengths and weaknesses of group members in a supportive manner
- gives prior notice of intended absence
- negotiates alternatives if unable to complete assigned tasks

- Self-Awareness/Self-Evaluation
- acknowledges own difficulty in understanding
- acknowledges own lack of appropriate knowledge
- acknowledges own discomfort in discussing or dealing with a particular issue
- identifies own strengths
- identifies own weaknesses
- identifies means of correcting deficiencies or weaknesses
- responds to fair negative evaluative comment without becoming defensive or blaming others
- responds to fair negative evaluative comment with reasonable proposals for behavioural change

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The following section describes how students should approach “the process of PBL”.

What are the issues? Identify the **important** issues in the problem. Include population, behaviourial and biological aspects. Beware of ignoring population and behaviourial aspects- these issues have been deliberately included in the problems and are integral to the comprehensive discussion that follows.

How well do you understand the issues? Are there any words or terms about which you are unclear? Consider the **basic mechanisms** that might explain each important aspect of each problem. Assess your current understanding of the basic structural and/or functional mechanisms that may contribute to the presentation of the problem. Use the collective skills and experiences of group members to explore or explain these phenomena. Identify current gaps in knowledge or understanding. As time progresses, you will become more comfortable with the differentiation of superficial appreciation versus "really understanding the basic principles". If you know something and can provide information that will allow the group to progress, then volunteer it! **Think Big!** Are there broader principles that you can derive from this problem that will help you to understand a class similar, but not identical, to this problem?

Learn from each other: Share your own knowledge, expertise, or ability to reason and synthesize information. Be receptive and appreciative of the contribution of your small group members.

Determine priorities for learning: Consider time, resources and objectives and set priorities regarding the relative importance of each learning issue. **Remember that the primary task of each problem is to provide a springboard to learning, not to make a quick diagnosis and**

work out a management plan. The problem is a stimulus for discussion, asking questions, and a framework for organizing your knowledge. It will allow for the acquisition of essential information, encourage the development of sound concepts and lead to the establishment of principles which will apply throughout your medical career.

The identification of key learning issues will reflect the biases and individual characteristics of each small group. There will be no right or wrong. As a group of mature adult learners, remain confident that as the PBL process becomes familiar to you, so will the abilities to take advantage of a unique opportunity to control your own learning needs.

Remember that the tutor, in a role as small group facilitator, will assist in the process of identification and discussion. He or she will monitor group progress and interaction, intervening where necessary to help maintain the direction of the group. The role of the tutor and the characteristics of a good tutor are described below.

Monitor group progress: Pay attention to the group process and work at becoming an effective learning group. As the provision of health care becomes increasingly diverse and demanding, so does the need to function effectively within the context of an interdisciplinary team. Conflicts and differences of opinion are an inevitable and necessary consequence of a comprehensive group process. Arguments rarely provide resolution or satisfaction within a small group- conflict and disagreement should allow an opportunity to deal with issues from various points of view.

All members of the group will be expected to take an active role. Indeed, the group will depend on the contributions of each member by virtue of "assignments" directed to independent study time between the small group sessions. Small group sessions will encourage ongoing evaluation and feedback directed at the process itself. This is the forum where open discussion should take place if problems with individuals are identified.

Avoid a series of "mini-lectures": Avoid giving a "mini-lecture" on what you learned since the previous session. All students need to be actively involved in a discussion of the learning objectives. The focus should be on what still needs to be clarified for some students or should involve sharing, briefly, material learned by one member which is particularly valuable or which sheds special light on a topic. Students may want to share photocopies of particularly valuable material or present a framework for integrating a number of concepts.

Some students benefit from setting up a **“diagnostic grid”**. The relevant points in the history, signs, symptoms and clinical tests are written across the top, while possible diagnoses are listed down the left-hand side. Further investigations may be requested, or questions asked, to test the diagnostic hypothesis until the grid is completed and a plausible differential diagnosis is apparent. This approach encourages problem-solving but has the potential disadvantage of emphasizing diagnosis only.

Another approach which can be used is **concept-mapping**. Concept maps are constructed by putting down all the words that relate to the case (e.g. fatigue, poor diet, serum iron, transferin, overwork, poverty). The words (usually in boxes or “balloons”) are joined by appropriate

connecting lines, with relational words (e.g. “is caused by”, “suppresses”, “leads to”, etc.). This approach results in wide ranging discussion and has the advantage of bringing all aspects of the case into the discussion, from pathophysiology to community factors.

Whatever method is used, the student should **make a point of critically appraising** the points raised. Why is a certain investigation necessary, what is the sensitivity and specificity of a particular test, have treatment options been proven effective, and so on.

Asking questions: Questioning is one of the most important means of facilitating learning, not only for the individual asking the question, but for the group as a whole. It can serve to keep the group focused, and prevent it from getting bogged down. It also can help other group members by forcing them to present information and concepts more precisely. The only question that can be considered "stupid" is the one that is not asked.

Information sharing sessions: Use the group to develop effective communication skills. It is important for everyone to communicate effectively. This entails communication not only of technical information, but also of feelings at a personal level. We come together with varying abilities to communicate, and it is only through active practice that we can improve these abilities. It is important that each member become an active participant in the group in order to contribute his or her unique knowledge and ideas to the learning process.

In starting sessions where you are sharing what you have learned, it is helpful to begin with a brief survey of what each of you did to address the learning objectives identified by the group in the previous session. Students will be encouraged to refine their presentations and make them more precise. Tutors might ask, "How might you quickly summarize what you've been saying? What's a more precise way of saying that? How could you better organize that to get your point across more effectively?"

The psychosocial aspects of medicine: Several important aspects of medicine are considered "soft" by both teachers and students, e.g., ethical, social or emotional problems. Beware of the tendency to treat these areas in a non-rigorous manner. Students may assume that there is no research and no clear guidelines in these areas. The discussion may degenerate to the level of a debate about personal opinions with no appeal to the body of literature on which these disciplines rest. Challenge your colleagues by asking them, "What are the studies in this area?" or "What is the evidence?" Push them to look for general principles which will be applicable to several situations and not just the case being discussed.

The physician and society: After extensive consultation with many groups representing physicians, associated health professionals and members of the public, the EFPO organization (Educating Future Physicians for Ontario) published their "Summary: What People of Ontario Need and Expect from Physicians". The eight "EFPO Roles of the Physician" are as follows:

- Medical expert/clinical decision maker
- Communicator/educator/humanist/healer
- Collaborator/member of the health care team
- Gatekeeper/resource manager

- Health advocate
- Learner
- Scientist/scholar
- Person/individual

These were since modified and adopted by the Royal College of Physicians and Surgeons (CanMEDS2000 – Appendix I) and can be found at the RCPSC web site: <http://rcpsc.medical.org/english/publications/canmed_e.html> In analyzing problems in PBL, you should consider how these roles may be relevant to the problem and whether or not there are learning issues and objectives to be considered from the perspective of these different roles in any particular clinical situation.

Most learning occurs between sessions: It is extremely valuable for students to create their own summaries of what they learn between sessions. This gives invaluable practice in organizing knowledge and makes it much more likely that students will remember what they have learned. This also makes study and review easier. Remember that the major purpose of the tutorials is to identify learning issues and to provide a forum for students to check out their understanding. At the same time, through this group work, you are learning to work together and how to evaluate knowledge.

Before moving to the next page of a case: You should decide, as a group, that you have completed what you want to learn about the issues raised by the page you are on. It is sometimes tempting, especially when the group is feeling stuck, to move to the next page with the hope that more information will make the task clearer. Frequently, additional information confuses the issue. Also, there is the danger that important issues on one page become less interesting as new issues on the next page come to the foreground. **The final step** in the process consists of a review of the learning issues from the Tutor Guide, with discussion as to whether or not issues were adequately discussed, and, if not, what should be done.

Group dynamics: It is essential that the tutorial become more than a cold, pragmatic assessment of medical cases and information. We all communicate more effectively when we can open up with our true feelings and share "who we are." Not all of us have developed the skill to communicate feelings and personal concerns to a group in a manner that provides for constructive resolution. Any group of people who work together closely and consistently will have to address problems in the areas of leadership styles, listening abilities, and giving constructive criticism and feedback. Learning these skills can be as difficult as mastering complex scientific disciplines. It's a group responsibility to facilitate the learning of all members.

The tutorial is a small group of people with common interests and concerns. Opportunities often arise for individuals within the group or for the group as a whole to administer to emotional needs. It also provides opportunity for social interaction and the development of friendships. Finally, through its openness and caring, the group can enhance the personal growth of each individual.

STAGES IN THE LIFE OF A PBL GROUP

Stage One - THE HONEYMOON. "WOW! Isn't this fun!" Students enjoy this phase but may not learn as much as they could. In their enthusiasm, students are not focused and make many assumptions which go unchallenged. This has been called "group think" a process in which the group concentrates so much on having a friendly, enjoyable group that they avoid challenging one another. It is as if no one wants to "break the spell" and get down to the very hard work involved. Fortunately, this stage does not usually last very long.

Stage Two - FRUSTRATION. "Aaaagh! We don't know enough about anything! This is too slow; we'll never finish!" At this stage, students are feeling overwhelmed by the vastness of medicine and the apparent lack of structure of PBL. Lectures look more attractive to some students because they provide boundaries on what they must know for exams. At this stage, students need help coming to terms with the uncertainties inherent in medicine.

Stage Three - SETTLING DOWN. "Hmmmm! This is hard work, but we are learning skills we might never have learned in a traditional course. Also, we are learning general principles which apply over a wide range of areas". After some struggle and soul searching, students begin to experience, first hand, the power of this way of learning. They begin to realize that they are able to take charge of their own learning, sort out the important from the trivial and learn how to use knowledge effectively.

THE ROLE OF THE TUTOR

The tutor is a university educator who leads a task-oriented group to successfully achieve the objectives of a teaching programme. In doing this the tutor has to fulfil several responsibilities and is accountable to the teaching programme for the satisfactory completion of them. These responsibilities require abilities and skills relevant to the principles and practice of problem-based learning, group dynamics, the assessment of student learning, the use of learning resources and managerial skills.

The role of the tutor is very different from the usual teacher's role. Rather than being a "content expert" who provides the facts, the tutor is a facilitator, responsible for guiding students to identify the key issues in each case and to find ways to learn those areas in appropriate breadth and depth. Although students have much more responsibility in PBL than in most conventional approaches to teaching, the tutor is not just a passive observer. He or she must be active and directive about the learning process to assure that the group stays on target and makes reasonable choices on what issues are key to study. Faculty members also have considerable influence on what is learned by selecting the problems in the first place and by creating tutor guides and specific objectives for each phase of the curriculum.

QUESTIONS TUTORS MAY ASK

Appropriate questioning is one of the most important means of facilitating learning. It can serve to keep the group focused and prevent it getting bogged down. It also can help group members by forcing them to present information and concepts more precisely. Knowing how and when to ask appropriate questions is one of the principle skills of a good tutor.

- **Questions may elicit a students' reasoning process.** If a student asks for more information about the case (e.g. "Did the patient vomit?"), the tutor might ask "What are you hoping to find out? What are your reasons for asking that question? How would knowing the answer make a difference in your understanding of the patient's problem?

- Putting this particular situation aside, **what is the core information** you will need to know for future similar situations (ie. five years down the road in your own practice?)

- Is there anything about this situation that presents **a learning issue outside of this problem**?

- The tutor encourages students to **make connections**. The tutor might ask, "What is the association between hypertension and headaches? How might issues about patient lifestyle be related to this problem?

- Tutors **emphasize open-ended questions to promote discussion** rather than focusing on yes/no type questions or using quiz type questions.

- **Questions can direct students** along another path: Assume this is the situation ..., what do you need to know?

- Tutors must learn to **tolerate silence**. When communication stops or is at a stand still, wait thirty seconds, someone is bound to talk. It may help to ask the group why they are stuck or to ask someone to summarize.

- Tutors should **emphasize mechanisms and causes** of patients' problems. The tutor might ask, "What processes could have caused this problem? What are the mechanisms involved here?"

- Tutors should periodically ask students to **explain and define medical terminology used.** The tutor might ask, "What is cholesterol? What does that level of cholesterol usually mean?"

- Tutors should ask **higher order questions.** For example, in discussions of treatment it is more helpful to ask "How do we decide what to do?" than "What is the best treatment?"

- Other examples of helpful questions are:

  Why do we treat this condition? What is the mechanism of action of this drug?

What is the evidence that treatment makes any difference? How do you decide which lab tests to do?

OTHER HELPFUL HINTS

- Do not be afraid to join the group as a participant.
- Do not dominate the group with your opinions but rather facilitate the group dynamics.
- Remind students of topics previously discussed but not fully understood.
- Focus the group by introducing terms to describe what the discussion is about (e.g. body image). Even better, help the students label the general principles themselves.
- Before considering any intervention, ask yourself, "Will my comments help the students to learn how to learn?"
- Encourage the students to focus their discussion, rather than going off in all directions at once. It may be helpful to get the group to construct “diagnostic grids” or “concept maps” (see above).
- Periodically remind students about how much they are learning. Be specific and give examples.

HOW TO CHECK OUT STUDENTS' INFORMATION

If students are going to be able to learn from each other they need to trust the information each brings to the group. They need to feel free to challenge any information anyone contributes. When different students bring conflicting information to the group, ask how the experts get the information. For example, if students find different prevalence rates for a disease, ask how these demographic data are derived.

Check out students' understanding by asking them to use their knowledge by:

- drawing a diagram to illustrate a concept
- creating a grid showing relationships among concepts
- summarizing the discussion to this point

Be on guard with a talkative, enthusiastic group. Everyone may be enjoying the process so much that they become unfocused and fail to question or challenge assumptions.

If students present information which is incorrect, you may be able to detect this in several ways: You may know enough about the area yourself to know that the information is incorrect; another student may question or disagree with the information; the presentation may not make sense even to a novice. Make a note of points that students seem uncertain about in discussion, to come back to if they don’t resolve the issue. Try to avoid interrupting the flow of discussion if it is going well at the time. If you are unsure, you may wish to use some of these questions:

- Does everyone understand the information presented?
- Does everyone agree with this information or do you wish to know more?
- Would it be valuable to distribute a summary sheet of this information?

PUTTING ON YOUR "EXPERT HAT"

If the tutor is an expert in an area where students are having trouble, the tutor can volunteer to be a resource person to the group, but should leave the responsibility in the hands of the students about when and if to switch hats temporarily. But - beware! It may be difficult to give up the expert role again.

It is wise not to play guessing games with the students. If they are stuck and ask for your help, give them some assistance. This will certainly remove some frustration and may open the gates to other important learning objectives.

STUDENTS ARE INDIVIDUALS

Some students are very confident and need to be challenged to do their best. Other students are hesitant to take risks in a group setting and may not learn much from their peers until they become more comfortable. A few students are silent. This may be because of shyness, politeness (these students have trouble getting a word in edgeways in a talkative group), lack of preparation or personal problems.

Students all seek approval from their tutors. They need guidance and role models whom they can respect and trust. It is essential for tutors to be honest with students. Bluffing, instead of admitting ignorance, is counter to one of the main purposes of PBL. Even though effective tutors avoid the expert role, they have a powerful impact on students. Students appreciate seeing the human side of their faculty. Tutors should be themselves “warts and all”.

CHARACTERISTICS OF A GOOD TUTOR

A. Knowledge

1. The tutor should have:

- an understanding of the overall goals for the teaching programme;
- an understanding of the objectives and logistics of the specific component of the programme for which he or she is tutoring;
- a knowledge of various educational roles and an ability to use them appropriately;
- a knowledge of the respective usefulness of various learning resources and educational events;
- a knowledge of some basic principles and methods of evaluation;
- a knowledge of the steps necessary to promote problem-based learning, problem solving and critical thinking in students;
- a knowledge about the rationale and techniques of self-directed learning;
- an understanding of the mechanics of group dynamics and the mechanics of peer feedback;

B. Personal Attributes

1. The tutor should demonstrate an acceptance of:

- the problem-based approach as an effective method for acquiring information and for developing the ability to think critically;
- the self-directed learning approach, i.e. the student being primarily responsible for the student's own education;
- the small group tutorial as a forum for integration, direction and feedback;

2. The tutor should fulfil responsibilities in the tutor role by:

- attending the orientation/training workshops and meetings;
- arranging his or her personal schedule during the teaching period in order to be adequately available;
- being prepared to have individual meetings with students as required;
- supporting the efforts of the coordinators of the programme by ensuring that student evaluations are completed, contacting planners about problems or suggestions for improvement;
- coordinating student evaluation activities throughout the teaching period.

C. Skills

The following skills are expected:

1. Skill in facilitatory teaching, i.e.,
   - asking non-directive, stimulating questions, challenging students as appropriate;
   - presenting consequences of student conclusions, opposing views, cues as needed;
   - indicating when additional external information is required;
   - referring students to resources as appropriate;
   - avoiding lecturing to the tutorial group unless an exception has been recognized, justified, and agreed to be made.

2. Skills in promoting group problem solving and critical thinking by helping students:

   - to examine a range of phenomena, from the molecular level to the family and community level;
   - to assess/appraise critically evidence supporting hypotheses;
   - to define issues and synthesize information.

3. Skills in promoting efficient group function by:

   - assisting the group to set early goals and a tutorial plan which may be modified later including an organizational framework and an evaluation plan;
   - sensing problems in tutorial functioning and helping the group to deal with them;
   - making students aware of the need to monitor the group's progress;
   - serving as a model to demonstrate productive ways of giving feedback.

4. Skills in promoting individual learning by:

   - helping students to develop a study plan, considering the goals of the student and the programme;
   - helping students improve study methods including the collection of appropriate learning resources.

5. Skills in student evaluation and coordinating the evaluation of students by:

   - reviewing and clarifying programme goals with the tutorial group;
   - helping students define personal objectives;
   - helping students select appropriate self-evaluation methods;
   - reviewing learning achievement and ensuring that the student gets feedback;
   - preparing the evaluation report on the individual student learning progress, including comments as to whether the student has or has not completed the objectives of the programme.

USING LEARNING RESOURCES

A continuing challenge for PBL groups is "How much detail is enough?" It is crucial for you to learn how to answer this question for yourself. Until you develop this skill you cannot take charge of your own learning and you remain dependent on others to decide what you should know.

Bring books and previous class notes and use them in the tutorial, if necessary, to clarify concepts and terminology. It is helpful to have a good medical dictionary to check the meaning of terms. We often use words as if we knew what they meant; it may be helpful to challenge your colleagues to define key terms.

To obtain additional information, you may be directed to a specific resource or asked how you might find a good resource (journal article, book, expert, etc.). It is important to avoid "guessing games" or wasting time tracking down an obscure reference. But, on the other hand, it is important to develop skill in finding good information.

You are encouraged to discuss matters of interest pertaining to specific problems with your peers, with more senior medical students, and with interns and residents in postgraduate training programs within the Health Sciences complex. Similarly, by virtue of the multidisciplinary nature of many of the learning issues that will evolve from individual problems, you would be well advised to address these issues with other professionals of the health care disciplines.

There will not be a specific list of references developed for each problem considered. Part of the overall learning experience implicit in PBL is the development of skills that will facilitate access to learning resources throughout your future professional career.

HEALTH SCIENCES LIBRARY

All students have had the benefit of a formal introduction to the acquisition of use and learning resource material through the Information Literacy program that is coordinated by the Health Sciences librarians. They are familiar with the various types of reference materials available, the use of CD-ROM/CD-PLUS facilities to access computerized reference listings, and have standard reference texts readily available.

The Health Sciences library functions as the primary reference source for the PBL program. It should be emphasized that the smaller hospital libraries in Kingston are not intended (nor staffed) to meet the needs of the undergraduate students. Accordingly, we specifically request that small groups avoid using the hospital libraries.

MULTIMEDIA RESOURCE CENTRE

The Multimedia Resource Centre (LRC) has been developed by the Faculty of Medicine for the use of students and faculty. It has facilities to support computer-assisted learning, including "cruising the web", as well as other audio-visual materials. The Learning Resource Centre houses new acquisitions and a full range of learning resource materials to support undergraduate curriculum initiatives. Faculty members who assist in the development of new problems are encouraged to acquire or develop resource materials that can be located in the LRC.

FACULTY

Students in the small groups may wish to discuss material applying to a current problem with members of faculty who have a special interest in the area or who have indicated a particular willingness to act as a reference source. At the present time there is no intention to develop specific lists of faculty resource people to coincide with each problem.

Students who wish to use faculty as a resource should prearrange a meeting, normally by making an appointment. Students should be clear about the specific areas to be discussed and should have done some background reading and preparation prior to the meeting with a member of faculty.

PBL EVALUATION

Evaluation of the PBL program, as with other aspects of the curriculum, is essential in order that the impact of this learning format be properly appraised. Within each group, the tutor will be expected to assess the preparation, organization and overall contribution of each student to the small group process. Correspondingly, the students will provide feedback to each other and to the tutor on a regular basis. Each PBL session will end with a "wrap-up", both to discuss the progress of the session completed and to clarify objectives to be completed prior to the next meeting. Participants will be actively involved in the process of regular review of the PBL.

1. At the completion of each Block, each student will be awarded a **Satisfactory/ Unsatisfactory** grade which will form part of the Phase II record. An **Unsatisfactory** grade may warrant a specific remedial program and will be brought to the attention of the Student Progress and Promotions Committee. The Student Evaluation Form must be completed by the tutor for each student at the completion of the Block, and submitted to the PBL Coordinator c/o Office of Undergraduate Medical Education. A photocopy should be given to the student.

2. Tutor evaluation forms should also be completed by students at Block completion and forwarded to the PBL Coordinator. These evaluations will be copied and forwarded to the tutor.

3. **Evaluation of PBL cognitive material will be assessed as part of end-of-Block examinations.**

Satisfactory/Unsatisfactory performance will be assessed primarily through participation in the PBL small group format and will be based on the domains outlined in the PBL Student Evaluation form. The criteria for an unsatisfactory performance, in addition to the specific items in the form, include non-attendance at PBL sessions. **Two or more "Unsatisfactory" evaluations during the undergraduate medical program will result in a comment to that effect on the Dean's Letter which accompanies the student's transcript.**

GROUP INVOLVEMENT IN THE EVALUATION PROCESS

At the completion of each problem, approximately ten minutes must be set aside to allow informal feedback as to the effectiveness of the session just completed. This time can be devoted to group comments as to the involvement and contribution of individual members. It may also be used to allow the tutor to provide direction or leadership, particularly if the learning process seems to be blocked or if conflicts have arisen. At all times, group members should be encouraged to consider the process and take responsibility for initiating change.

It is the responsibility of the tutor to give appropriate positive or negative feedback as part of the PBL evaluation process, either individually with each student or in the small group format. The Interim **Student Evaluation Form** may be completed by the tutor at any time during the block if the tutor feels it is necessary. The form must be filled in, and copied to the student and the PBL Coordinator, if there are serious difficulties which require correction. Normally, however, interim evaluations do not have to be submitted to the PBL Coordinator. Similarly, the **Tutor Evaluation Form** may be completed by each small group participant on an interim basis midway through the Block if the tutor wishes.

Student Evaluation Form - PBL

Student Name: _____ Date: _____

Block (e.g. IIA): _____ INTERIM _____ FINAL _____

Tutor: _____

Note: This evaluation must be submitted to the PBL Coordinator, Faculty of Medicine. A copy should be given to the student. Sections I -IV are formative for the benefit of the student. Section V contributes to the official record of the student's performance. Please use additional pages if necessary.

		Satisfactory	Unsatisfactory
I.	**Critical Appraisal**	( )	( )

Clarifies, defines and analyses the problem; Is able to generate and test a hypothesis; Identifies learning objectives.

II.	**Self-Directed Learning**	( )	( )

Utilizes relevant resource materials; Applies previous knowledge to current problems; Demonstrates initiative and curiosity; Is organized and prepared for small group sessions.

III.	**Group Participation**	( )	( )

Participates constructively and contributes to group process; Demonstrates commitment and responsibility for Th. group process; Is able to provide and accept constructive feedback; Contributes to group harmony.

IV.	**Humanistic Attitudes and Skills**	( )	( )

Is aware of personal strengths and limitations; Integrates physical, biological and behavioral components of each problem; Listens to conflicting opinions; Tolerates shortcomings of others.

V.	**Overall Performance**	( )	( )

VI. Narrative Report The tutor may wish to address specific areas of student performance, strengths and areas needing improvement. If overall performance is unsatisfactory this section must be filled in.

Tutor Evaluation Form PBL

Tutor Name:_____ DATE: _____

Block (e.g. IIA):_____ INTERIM_____ FINAL_____

Student Name (Optional) or Student Number:_____

Please evaluate your tutor's contribution to the learning of your group. Please attempt to comment on specific behaviours, rather than inferences. This feedback will be useful to the tutor and should contribute to the overall effectiveness of your small group.

The form should be given to the tutor, or to the PBL Coordinator, Undergraduate Medical Education Office (for forwarding to the tutor).

		Strength	Weakness
I	**KNOWLEDGE OF PROCESS**	**( )**	**( )**

Understands the objectives of the PBL process, familiar with problems; Understands what students can learn in time available.

II	**ATTITUDES**	**( )**	**( )**

Shows enthusiasm as a tutor; Is interested in students and their learning; Attends sessions as planned; Provides timely feedback and completes evaluations.

III	**SKILLS**	**( )**	**( )**

Asks non-directive, challenging questions; Avoids mini-lecturing; Is able to direct group to alternate sources of information and learning materials; Is able to assist group focus on learning issues and objectives; Provides re-direction where necessary; Facilitates feedback and evaluation process; Encourages critical thinking and a thorough look at available material; Assists in the creation of a comfortable, non-threatening atmosphere for learning.

ADDITIONAL COMMENTS:

HOW PBL PROBLEMS ARE CREATED

The problems created for the Problem-based Learning (PBL) are intended to provide a learning focus for Phase II undergraduate students throughout the system-specific Blocks. As such, these problems tend to deal with scenarios that correspond to the content and learning objectives of each Block (e.g. Phase IIA- Haematology and Oncology, Infectious Disease, Allergy and Immunology).

General Guidelines:

1. Each problem should revolve around a common clinical scenario and present to the student information normally available to a physician at the outset. This may include certain aspects of History of Present Illness, relevant Past Medical History, Family History and Social Circumstances and Systems Review. Initial findings from Physical Examination would also be appropriate.

2. The problem format should allow for sequential, interdependent actions to be taken in the evaluation and ultimate management plan for the patient.

3. Each problem will be addressed over a 2-3 week period. Accordingly, information such as additional historical information, physical findings, or results of early therapeutic interventions or investigations are normally provided as a "second sheet"- available to the small group after initial learning objectives have been identified, researched and discussed (Week #2).

4. The tutor is not expected to be a content expert, but rather a facilitator of a self-directed, student oriented learning experience. Each problem will contain a "Tutor Guide" that identifies a range of topics that ideally will be addressed during the small group sessions. This guide is attached to the tutor's copy of each problem and is not given to the students. At the end of a particular problem the tutor may review the list of topics with the group.

5. The clinical problem will ideally provoke enquiry and discussion in areas that should emphasize aspects of basic sciences (anatomy, physiology, pharmacology and therapeutics, pathophysiology) and interrelated clinical sciences. The epidemiological, sociological and ethical considerations contained within each problem will be emphasized as an essential component of effective health care provision in our society.

6. If appropriate, associated visual materials may accompany the problem (Photographs, Lab reports, ECG's, X-rays etc.) Resource availability may be a limiting factor.

The following is an example of a problem suitable for Phase IIA (first year students)

Little Benjie Morrison
"Page 1"

You are a physician in the Emergency Room of a university teaching hospital. Benjie Morrison, a 13 month old caucasian male is brought by ambulance to the Emergency Room, apparently after suffering a seizure at home. You learn from the ambulance attendants that the child had been ill with a fever that day, and became unresponsive with definite tonic-clonic generalized movement of all four limbs approximately 30 minutes ago. This apparent seizure lasted approximately 2 minutes.

The child is in no apparent distress at present, moves all four limbs, cries vigorously, and is noted to have a rectal temperature of 40.1 centigrade, a pulse rate of 120 beats/minute, BP 90/60 mmHg and a respiratory rate of 24 resp./min.

The mother arrives, obviously distraught and exhibiting an unusual amount of anger. She confirms that Benjie has been sick only for that day, and she attributes this illness to his recent immunization against measles, mumps and rubella (MMR) given 6 days previously in the family doctor's office. She says "I didn't want him to get any needles--Don't you know that children are dying because of these needles! The only reason I agreed is that the doctor said it was required by law."

Benjie is the youngest of three children, all under the age of four. His past health has been unremarkable other than for an ear infection within the last month. Benjie's mother is twenty-one, single and appears to be attentive to the child.

(End of week one)

Little Benjie Morrison "Session 2"

Your examination reveals the following:

Neuro- Alert and irritable, pupils react equally, slightly hyperreflexic upper and lower extremities, will sit up and is comforted by mother.

Cardio/Respiratory- Vital signs as reported earlier, chest is clear (no wheezing heard), Heart sounds normal.

Abdominal- soft, no apparent tenderness, no masses felt

Head and Neck- neck supple, fontanelle not palpable, throat slightly inflamed, bilateral anterior cervical and pre-auricular lymph nodes, obvious right otitis media.

Skin and Extremities- Slight redness at injection site, no signs of recent bruising, no rashes.

You proceed with some investigations.....

(End of "hand-out" material on this case, end of week two)

TUTOR GUIDE

Week #1

This problem is intended to provoke small group discussion around a number of issues that address aspects of childhood illness, infectious disease and some of the linked issues. These should include the role of immunizations, public perceptions of health care issues and some of the misconceptions/myths and inevitable emotions that often result in the setting of an ill child.

Some of the intended learning issues **("topics for discussion")** might include:

Paediatrics

- manifestations of illness in a child
- age specific physiological parameters (well vs "ill")
- etiology of febrile illness in a child
- febrile convulsions vs. other cause
- convulsions-pathophysiological basis sequelae

Immunology/Immunizations

- historical development
- recommended immunization schedule (Canada)
- concept of "live" vs. inactivated
- types of immune response (ie cell mediated vs humoral)
- characterization of adverse/allergic reactions
- principal of informed consent

Infectious Disease

- significance and prevalence of "ear infections"
- predisposing factors: environmental
  nutritional
  exposure (ie school, Day care)
  Anatomical
  immunological
  socio-economic
- prevalence of antibiotic use

Family Implications of Illness

- managing a crisis situation
- tresses of single parenting
- dealing with an upset/angry parent
- support systems

Other Issues

- accessing Emergency Health Care system
- appropriate care in the prehospital setting

It can be seen from this list of topics that there is more than enough material for students to research and learn about prior to returning in week three to complete the case.

Week #2

Because this case is intended for first year students the problem has been interrupted prior to disclosing the physical findings to ensure that students discuss the issues and possible investigations before seeing page two, which, in effect, reveals the answer. On their return in week two, the students should review page #1 and discuss the case before being given page two. Clinical skills (history and physical), differential diagnosis, diagnostic investigations in acute care setting, resource utilization, therapeutics-symptomatic and antibiotics, disposition and instructions to parents are among the topics they would discuss.

Based on the reported findings on physical examination the group should be prepared to consider possible diagnoses that range from common (otitis media, expected febrile reaction to recent immunization) to less frequent, but potentially very serious (bacteremia, meningitis, onset of new seizure disorder). The differential can be further rationalized by a careful history and examination (which poses difficulties with an irritable child).

The appropriateness and scope of diagnostic investigations in a primary care setting is always an issue in times of financial restraint, limited resources and must be weighed against the potential for pain and suffering caused to the patient (and parents!)

Appropriate Investigations might include:

COMPLETE BLOOD COUNT (CBC)- haemoglobin, haematocrit, white blood cell count and differential
BLOOD CULTURES
SERUM ELECTROLYTES including Glucose
URINALYSIS
CHEST XRAY

Optional and for discussion (when and why):

Lumbar Puncture with CSF analysis
Electroencephalogram (EEG)
CT Scan of Cranium

Students would determine that except for an elevated WBC (12.3-80% PMN's), these initial investigations are within normal limits. Optional investigations are not normally done in this particular scenario, but are certainly worthy of discussion.

Working Diagnosis:
- Febrile convulsion
- Otitis media
- Possible febrile response to recent immunization

Management considerations:
- symptomatic for fever
- oral fluids
- specific antibiotic choice
- Instructions to parent
- Arrangements for follow-up

PBL ON THE WEB

There are many web sites describing PBL programs in schools around the world, as well as references to recent literature. The list is expanding all the time. To check out these sites start with our own PBL Home Page: http://meds.queensu.ca/medicine/pbl/pblhome.htm.

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January 2002

APPENDIX - CanMeds2000 - Skills for the New Millennium
Report of the Societal Needs Working Group

The Royal College of Physicians and Surgeons of Canada's Canadian Medical Education Directions for Specialists 2000 Project –Sept. 1996 <http://rcpsc.medical.org/english/publications/canmed_e.html>

Skills for the new millennium delineates a competency framework that will assist future specialists in responding to innumerable challenges as health-care providers - challenges that will require them to function in a health-care system in a constant state of flux and facing increasing fiscal constraints - while providing the best specialty care. This roles framework, based on the Educating Future Physicians for Ontario (EFPO) Project roles, has been accepted by The Royal College of Physicians and Surgeons of Canada's Council as the desired future direction of postgraduate medical education (PGME) in Canada, thus changing the face of specialty care in the next millennium. [**These competencies are appended here because they apply to all physicians, not just specialists**]

Essential Roles and Key Competencies of Specialist Physicians

Medical Expert
- demonstrate diagnostic and therapeutic skills for ethical and effective patient care
- access and apply relevant information to clinical practice
- demonstrate effective consultation services with respect to patient care, education and legal opinions

Communicator
- establish therapeutic relationship with patients/families
- obtain and synthesize relevant history from patients/families/communities
- listen effectively
- discuss appropriate information with patients/families and the health care team

Collaborator
- consult effectively with other physicians and health care professionals
- contribute effectively to other interdisciplinary team activities

Manager
- utilize resources effectively to balance patient care, learning needs, outside activities
- allocate finite health care resources wisely
- work effectively and efficiently in a health care organization
- utilize information technology to optimize patient care, life-long learning, other activities

Health Advocate
- identify the important determinants of health affecting patients
- contribute effectively to improved health of patients and communities
- recognize and respond to those issues where advocacy is appropriate

Scholar
- develop, implement and monitor a personal continuing education strategy
- critically appraise sources of medical information
- facilitate learning of patients, housestaff/students and other health professionals
- contribute to development of new knowledge

Professional
- deliver highest quality care with integrity, honesty and compassion
- exhibit appropriate personal and interpersonal professional behaviours
- practise medicine ethically consistent with obligations of a physician