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# **PROBLEM BASED LEARNING USING AMBULATORY PATIENTS**

Thesis submitted by

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in August 2005

For the degree of Doctor of Philosophy  
in the School of Medicine  
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## STATEMENT OF SOURCES

### DECLARATION

I declare that this thesis is my own work and has not been submitted in any form for another degree or diploma at any university or other institution of tertiary education.

Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

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## STATEMENT ON THE CONTRIBUTION OF OTHERS

Colleagues at the North Queensland Clinical School provided general advice on the direction of this research and participated as tutors in the problem based learning process. My supervisors provided detailed advice on methodology and implementation, and critically reviewed drafts of this thesis. Limited assistance with data collection was provided by two research assistants as described in the text.

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The University of Queensland Undergraduate Research Grant \$1354, to support evaluation and materials in the pilot phases.

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I also thank my colleagues who contributed to the following papers resulting from this work in which I was the principal investigator:

Sen Gupta TK, Hays RB, Jacobs HJ. Problem based learning using ambulatory patients. *Res Dev Problem Based Learning*. Australian Problem Based Learning Network. Newcastle, Australia: 1997;**4**:574-578.

Sen Gupta TK, Hays RB. "Problem-based learning using ambulatory patients. *Advances in Medical Education*. Scherpbier AJJA et al, editors. 1996, 525-527.

In addition the author was the principal investigator for five papers which have been presented at national and international conferences.

## DECLARATION ON ETHICS

The research presented and reported in this thesis was conducted within the guidelines for research ethics outlined in the *National Statement on Ethics Conduct in Research Involving Humans* (1999), the *Joint NHMRC AVCC Statement and Guidelines on Research Practice* (1997), the *James Cook University Policy on Experimentation Ethics, Standard Practices and Guidelines* (2001), and the *James Cook University Statement and Guidelines on Research Practice* (2001).

All human participation in this research project was conducted before the transfer of candidature to James Cook University and was covered by the Townsville General Hospital (now The Townsville Hospital) ethics approval (Appendix 3).

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Signature

August 26, 2005

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# ABSTRACT

## Introduction

Problem based learning (PBL) tutorials based on ambulatory patients were conducted for year 5 medical students undertaking their General Practice rotation. The students, who had little prior experience of PBL, participated in two sets of PBL tutorials over the four-week course, in addition to traditional seminars, tutorials, and practice-based teaching. Cases were constructed around real patients with ongoing problems which were often evolving or incompletely explored. Working in a PBL format students explored dimensions of the case, with access to the patient and other resources including health workers involved in the case, the medical record, and a house call. At the end of the week students presented the case and their recommendations for management and summarized this in a letter which formed part of the medical record.

## Methods

Sixteen PBL tutorials with eight groups of students were formally evaluated by a combination of student and tutor questionnaires, direct observation, and interviews with patients and tutors. All tutorials were observed by an experienced independent rater, using a validated instrument. Students completed questionnaires at the completion of each problem and participated in a focus group at the end of the rotation. Tutors completed a *Group Assessment Schedule* and were interviewed by a research assistant after each tutorial. The same research assistant interviewed the patient and the clinician responsible for the patient's care, probing their perception of the PBL process, the students' learning, and any positive or negative impacts on the patient's health care.



## **Results**

Students enjoyed the group work, but had mixed feelings about the PBL format. Groups struggled with the new approach but many saw the value of exploring a problem widely and holistically. Group characteristics such as leadership and prior experience of PBL, along with tutor factors had a major influence on the outcome. Groups and tutors adopted a variety of strategies to overcome problems with the new approach. Most groups undertook an appropriate range of PBL-related tasks, although self-evaluation occurred rarely, and groups did not make full use of available resources.

Students valued the real patient contact and authenticity of the case. The patient interview was seen as a key part of the process, providing students with rich information and immediate feedback. House calls, when undertaken, provided students with many insights which were often unexpected and only appreciated in retrospect. A standardized approach was developed to case design, tutor training, and implementation of tutorials. The most suitable cases were those that were evolving or incompletely explored, with a number of dimensions to investigate, and with a level of complexity appropriate to the students' prior knowledge. The use of real patients was seen as engaging, stimulating and contextually deep, providing immediate feedback and an opportunity to integrate and apply learning. Most students felt that this approach emphasised thinking, creativity and holistic care. The authenticity and opportunity to potentially contribute to patient care created an encouraging learning environment. Patients were willing to take part, with none reporting any adverse effects.

## **Discussion**

This approach appears to be consistent with the literature on PBL and the use of real patients, and extends the literature on clinical PBL by describing the added value of real patients and making specific recommendations on case selection, tutorial design and delivery and educational outcomes. There was an apparent mismatch between the educational innovation and student experiences, but tutors and groups worked together

to resolve these issues. This approach is consistent with trends towards community-based education, teaching holistic care, and the use of the patient's voice. It appears suitable for clinical teaching in a variety of settings providing suitable patients matched to the learning objectives can be identified, although further work is needed to address this question.

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# CHAPTER 1

## INTRODUCTION

Problem based learning (PBL) has been used world-wide in medical education since the 1970s. Most experience has been in the preclinical years of undergraduate medical courses, using paper-based cases. Much of the recent reform in medical education has not involved the more senior clinical years.<sup>1,2,3</sup> This thesis describes the development, implementation, and evaluation of problem based learning using ambulatory patients as one of the teaching strategies in a year 5 undergraduate course in General Practice.

In this introduction I will outline how my educational and clinical experience led to an interest in PBL. I will describe the environment in which this was occurring, including developments in General Practice in Australia, changes in medical education, in particular in the developing field of PBL, and opportunities that have arisen as a result of these changes. I will reflect on how my professional background and experiences of medical education as a learner have influenced my practice as a provider of medical education and led to the work described in this thesis.

### **1.1 Background and experience**

I came into a career in medical education with exposure to relatively conventional education. From secondary school I undertook a 'traditional' 6-year undergraduate medical programme in the early 1980s. Most clinical teaching was hospital-based and there were relatively few opportunities to undertake terms away from major teaching hospitals in the large cities.

My early experiences of medical education in a traditional course at The University of Queensland were not unusual: large group lectures (to 200 students or more); large volumes of material presented in a didactic fashion, with teaching and assessment strategies that emphasized isolated recall of facts rather than deeper learning and application; and there was little exposure to patients until the clinical years, in the second half of the course.

The course was structured in a traditional way, with three pre-clinical and three clinical years. The early parts of the course focused on the basic biological sciences, with a heavy emphasis on pathology in the fourth year, and rotations through the various clinical specialties in the last two years. There was little clinical exposure in the first half of the course and much of the material presented appeared irrelevant to patient care. When confronted with a patient it was difficult to recall, let alone apply, relevant prior learning. There was relatively little exposure to patients in the pre-clinical years, while in the latter years most patients were seen in the contexts of specialty units in large teaching hospitals.

Most teaching and assessment in the clinical years was by hospital-based discipline. There was little opportunity for integration of learning across disciplines. The only elective period in the clinical years was a relatively unstructured clinical attachment between years 5 and 6, which had to be undertaken outside the major teaching hospitals. The only mandatory community-based attachment was the four-week General Practice subject in year 5, which included a two-week attachment to a general practice.

The majority of undergraduate clinical education was therefore in large teaching hospitals, delivered by hospital-based registrars and specialists. Education was organized in traditional, discipline-based units, with no requirement for graduates to spend more than two weeks in the community.

Most graduates had similar experiences in their intern year. There were compulsory rotations in Medicine, Surgery, and Accident and Emergency, and some exposure to other disciplines. The intern year was undertaken in a large tertiary hospital, with little exposure to community medicine. There was little emphasis on training for

General Practice although some effort was made to give interns destined for rural practice exposure to anaesthetics and obstetrics.

After completing my intern year in a metropolitan hospital in the mid-1980s I moved to a remote community in Northwest Queensland in order to complete the requirements of my State Government bonded rural scholarship. These scholarships offered financial support for undergraduate medical students in return for which students had to repay service on an equal time basis after graduation. Scholarship holders were generally sent to rural and remote communities that could not be filled by other means. At that stage there was little in the way of formal preparation or support. Scholarship holders attended a two-day briefing before taking up their scholarship, but there was no requirement for additional rural experience or training, and no formalized support network.

The conditions of my bonded scholarship required me to commence unsupervised rural practice with minimal prior training or experience. I had only had a two-week General Practice attachment as an undergraduate, with limited rural exposure. This two-week attachment formed the only community-based education in my seven years of medical education to date. Most of my clinical teaching was therefore in hospitals, and most clinical teachers were specialists.

The contrasts in rural practice were immediately apparent: I had little preparation for practice in a community-based setting and found that I had to think and interact differently with patients and their families. I had to place increasing reliance on working in a small group with other members of the local and visiting health care team, using all available resources and the skills of all participants, and being able to define my limits, acknowledge them to patients, and then to go about finding solutions.

Working as a rural general practitioner (GP) with no formal preparation and clinical experience almost entirely based in large teaching hospitals brought a series of challenges. The work involved routine General Practice consultations, and inpatient and outpatient care at the small 16-bed hospital, which included management and stabilisation of emergencies, and uncomplicated obstetrics. Clinical support was

provided by base hospitals; aeromedical services including the Royal Flying Doctor Service; visiting specialists; and the flying specialist services. Part of each day was spent in private practice and part in the hospital, and I was 'on call' 24 hours a day. Other responsibilities included administrative duties in the hospital; practice management; and dispensing of pharmaceuticals. Relief for days off was provided from the base hospital, initially irregularly, but more formally (6 days every 6 weeks) when an industrial award was established in 1989.

In this remote setting I was undertaking rural General Practice with no on-site supervision. My training and experience offered me little preparation for this new role. I had attended school and university in major provincial and capital cities, and had no experience of life in a small rural community. There was little formal preparation for rural practice in the undergraduate course, and almost no exposure to rural role models. In addition, I was new to the region and had little understanding of the local health care system, and few personal and professional support mechanisms.

I therefore developed my own networks and training pathway, and enrolled in the Family Medicine Programme (FMP), later known as the RACGP Training Program, in order to formally train for General Practice. FMP used an apprenticeship-style approach, with trainees undertaking supervised placements in accredited general practices. At that time there was no formalized training stream for remote practice or distance supervision. However, some limited distance supervision was available, and the training programme did provide access to an informal network of trainees and supervisors.<sup>4</sup> Educational sessions were mostly centrally based in Townsville and Brisbane, where I was able to attend workshops from time to time. There was a loose curriculum framework, but no defined rural training path. The special skills and preparation for rural practice were in the early stages of being recognized and described.<sup>5</sup> Distance education was available in the form of regular teleconferences with other trainees, statewide satellite broadcasts, and the occasional on-site external clinical teaching visit. Other resources provided by the Family Medicine Programme included study packs, journals, and access to a bank of computerised questions. Some support was provided by the regional and state office of FMP, but

there were no resources for full distance supervision, and no particular emphasis on education for rural and remote practice.

I practised in this location for over 6 years and found that much of my learning was from my patients. When faced with a new or challenging clinical problem I went through the steps of identifying what I already knew about the problem, what I needed to know, and possible sources of information. I then had to apply my new learning to the clinical situation. In a sense this was a form of clinical problem-based learning, although occurring more often in an individual rather than a group setting, and I was not consciously aware of the parallels. The learning was, of necessity, case-based, highly contextual, applied, and self-directed.

Other resources were used in similar ways. There were a range of visiting specialists, including a Flying Surgeon who visited monthly, a three-monthly visit from the Flying Obstetrics and Gynaecology service, and annual visits from a chest physician. In addition I had access to other visiting allied health services as well as child health and other nursing services resident in the community. A substantial part of my learning occurred in discussions around real cases and clinical problems with these professionals, either on a one-to-one basis or in small groups.

While the terms of my scholarship only required me to spend one year in this community, I eventually spent over six years there. By accessing a variety of resources and developing networks I was able to meet my professional needs and overcome professional isolation. Some of these needs were met by the emergence of groups such as rural doctors associations in the late 1980s, with the Rural Doctors Association of Queensland being formed in 1990. These networks provided access to peer support, role models, and medicopolitical information and were instrumental applying political pressure to governments to address and resource the problems of rural practice.<sup>6</sup>

This was an unusual career path. Most Queensland Health scholarship holders tended to serve their bonded period and then return to the larger centres to undertake more formal training in General Practice or their chosen specialty. Very few scholarship holders undertook extended periods of unsupervised practice, as the

majority of postings were to hospitals with at least two-three doctors. Relatively few had the opportunity or the inclination to undergo training in the location in which they were serving their bond. The educational models for training for rural and remote practice that were emerging at the time emphasized a different model, that of closely supervised experience early in training, with the opportunity for less intensely supervised, more remote experience later in the training. There was a strong focus on appropriate preparation prior to entering remote practice, accreditation of appropriate practices and supervisors, and formalisation of the support and educational networks for the learner.

The model of education for rural practice that I underwent was regarded by many as educationally unsound. There was a growing view at the time that General Practice and rural practice were both specialties, which required specific preparation, and that recent graduates should not be exposed to them without adequate preparation and supervision. This was supported by Federal Government Provider Number legislation introduced in 1996, which required all new entrants to General Practice to either have undergone appropriate training or to be in a recognized training programme.<sup>6</sup> The process of allocation of posts for Queensland Health Scholarship holders changed during the 1990s to ensure that graduates were able to undergo appropriate training before being exposed to unsupervised practice.

Later models such as the Isolated Solo Terms project of the Family Medicine Programme in the mid-1990s<sup>7</sup> and the Pilot Remote Vocational Training Stream,<sup>8</sup> which commenced in 2000, provided training paths more in line with my experience. There were a number of significant differences in these programmes, which were designed to allow training in remote areas with minimal on-site supervision and support provided at a distance. Most trainees in these programmes were carefully selected doctors with significant prior experience and training, formal support structures were set up to meet their educational needs, and there was a process of accreditation of practices and supervisors.

In my case the combination of informal supervision, networks and other support seemed to succeed and I was able to formalize my General Practice training with completion of the requirements for Fellowship of the RACGP (FRACGP) in the

early 1990s. I was able then to take on increasing roles in medical education. A number of medical students undertook clinical attachments in my practice, which was also accredited for vocational training. Although I had no formal training in medical education I was able to reflect on my own experiences of education, both in my undergraduate years and in my early clinical practice. Most of my learning in General Practice had been experiential and case-based, and I used this approach with students. My patients were generally very interested in talking to medical students, and were only too pleased to be used as the basis of the students' education. As I started to use patients to teach students I was able to reflect on the ways in which I had learned from my patients.

This style of practice forced me to reflect on my educational background and was ideal preparation for the next phase of my professional life, in medical education. In 1993 I, became involved in vocational training for General Practice and rural practice, taking up an appointment as Medical Educator with the Family Medicine Programme (FMP) / RACGP Training Program.

Learners were motivated, most were in community settings, many had substantial prior experience, and they enjoyed working in groups and learning around their patients. I became involved with the vertically integrated teaching structure of the General Practice and Rural Health group at the North Queensland Clinical School, with major responsibilities for undergraduate teaching and vocational training, and some involvement at other levels including high school promotions, intern training, and continuing medical education.

The undergraduate programme included a four-week General Practice attachment, SM503. One of the teaching strategies developed in this course involved the use of real patients in problem based learning (PBL) tutorials, and formed the basis of this study.

The North Queensland Clinical School was one of many changes that were taking place in medical education in Australia. In the next section I will describe the changing culture of General Practice education in Australia, and will then outline



other changes in medical education and their influence on the work described in this thesis.

## **1.2 General Practice education in Australia**

There were many changes in General Practice education in Australia in the 1980s and early 1990s. Academic General Practice was emerging as a distinct discipline, with initial appointments in some medical schools in the 1970s. By the early 1980s all Australian medical schools had an academic General Practice presence.<sup>9</sup>

However, departments were described by a variety of nomenclature including ‘Social and Preventive Medicine’, ‘Community Medicine’, and ‘Family Medicine’. The focus of many of these departments included, but was not limited to, community-based teaching. Many departments encompassed a variety of disciplines and interests, and presented no clear single identity.

Indeed, only one school, the University of Western Australia named its foundation chair a chair of ‘General Practice’. In 1991 only two medical schools had departments or divisions with General Practice in their names.<sup>10</sup> General Practice was not considered as an academic discipline<sup>11</sup> and most of the fledgling academic units had difficulty in securing curriculum time and in attracting and funding core staff. In contrast, by 2001, ten of the eleven medical schools had ‘General Practice’ in their departmental designations, and all had chairs in General Practice.<sup>12</sup>

The emergence of the name General Practice as the preferred term in Australia for primary medical care in the community context was mirrored by the change in name from Family Medicine Programme to RACGP Training Program, and the development of the Australian Association for Academic General Practice which was formed to support and express the views of the growing numbers of GP academics across the country.<sup>9</sup>

There was also a growing international recognition of General Practice as an academic discipline. McWhinney had described the essentials of an academic discipline in 1966 as having a defined body of knowledge, a unique field of action, an active area for research, and academically rigorous undergraduate or postgraduate training programmes.<sup>13</sup> Kamien asserted in 2001, 'It would be a brave dean who would still publicly argue that General Practice lacks the essentials of an academic discipline.'<sup>9</sup>

Several elements of McWhinney's definition are relevant to the changes taking place in General Practice in Australia in the 1980s and 1990s. The body of knowledge and identity of General Practice was being shaped by the development of departments of General Practice in all medical schools, a growing literature including widely read journals such as *Australian Family Physician* and *Modern Medicine*, and publications in the 1990s of a range of textbooks on General Practice by Professor John Murtagh and others.

While there were substantial increases in teaching time devoted to General Practice curricula through the 1980s and 1990s, and a sixfold increase in research output over this period,<sup>14</sup> much more needed to be done to promote the research culture in Australian General Practice. Kamien concluded 'an entire discipline that produces an average of only 55 research publications a year in Australia is still in its academic infancy.'<sup>9</sup>

Despite reports such as the 'Doherty Review' of medical education in 1988 drawing attention to the shortage of resources available for teaching General Practice,<sup>15</sup> universities were slow to act on its recommendations. Dickinson pointed out that many of the single departments of medicine and surgery at the larger medical schools had a greater number of full-time-equivalent academic appointments than the twenty appointments in the ten academic departments of General Practice in 1990.<sup>16</sup> He observed ten years later that this position had hardly changed.<sup>17</sup>

In spite of their resourcing constraints, departments of General Practice were having an impact on medical schools. They were instrumental in pioneering the promotion of socially responsive curricula, addressing needs in such areas as Indigenous

health, rural medicine, and the health of people in disadvantaged areas. Departments of General Practice were often involved in development of teaching communication and consultation skills, and ethical and professional values to medical schools.

### **1.3 Undergraduate education in General Practice**

While many of these issues that were being promoted by the developing departments of General Practice are relevant to all aspects of medicine and are not unique to General Practice, there was only limited success in promoting community-based education. The majority of the undergraduate curriculum was still delivered in large teaching hospitals. Students generally saw General Practice attachments as a soft option. The workload was not demanding, examinations were not taxing, and students rarely failed. There appeared to be no formal curriculum or textbook of General Practice, and a career in General Practice was generally seen as a default option for students who could not make it into specialty training or those with other needs such as wanting to work part-time.<sup>11</sup>

Much of the medical school experience portrayed General Practice and rural practice negatively.<sup>18</sup> Little curriculum time was spent in the community: most medical schools had a 2-4 week General Practice or community medicine term, with no compulsory rural attachment.<sup>19</sup> Any further experience was largely left to students to organize themselves in elective time.

All medical schools in Australia at this time had an undergraduate programme although some were considering a move to a graduate course. The majority of students were school-leavers who were selected purely on academic merit. There was comparatively little attention paid to selecting students from a diversity of backgrounds, schools, or geographic areas. Indeed, of all the medical schools only Newcastle considered personal qualities via an interview process.

General Practice academics did not have a high status among medical students. There was no doubt they taught some interesting material and were competent in a

range of common conditions, but they were not really able to advance students' learning in 'difficult' disciplines such as Medicine and Surgery. They were interested in areas such as communication skills, the consultation process, ethics and compliance, which were seen by students as interesting, but more relevant to their future practice than to the immediate reality of passing impending examinations. Academic general practitioners were working in an environment in which there was little research culture or literature based in General Practice.<sup>14</sup> Their interests lay in areas such as teaching and communication skills, which were not particularly valued by medical schools, and they did not have a high profile with other clinical academics or within their profession.

The year 5 General Practice term at the University of Queensland may be taken as typical of an Australian undergraduate General Practice course in the 1980s. Students undertook this four-week subject as one of six rotations during year 5 of the six-year programme. The first and last weeks were based at the central campus, with the middle two weeks comprising a General Practice attachment. The introductory week aimed to prepare students for their General Practice attachment by teaching students about the academic basis of General Practice and common conditions that they may not have encountered in major teaching hospitals.

Students had a good deal of freedom in their choice of practice and were able to select a practice to attend on the basis of personal knowledge, or from a centrally maintained list. There was no formal system of practice selection or accreditation in place, little support or training for general practitioner teachers, and few incentives or rewards for preceptors.

Limited support for student travel was available, and the majority of placements occurred in the larger centres. Attachments were experiential and unstructured. Students were expected to learn by observing the general practitioner and by participating where possible in clinical encounters and practical procedures. Apart from a log of one hundred consecutive patients there were no formal learning activities or tasks over the two-week General Practice attachment.

The prevailing feeling among medical students at the time was that this was an interesting, but not particularly demanding term. General Practice was not seen as a separate discipline to be formally studied and mastered, nor was it seen as the first career option for most students. Students' interest and energy was more likely to be channelled into fascinating but complex inpatient cases than dealing with common, self-limiting illnesses, or issues around communication and consultation skills. Most recognized the role of the general practitioner in the health care system, but had little interest or incentive to study the content or process of General Practice care in any depth. GP academics were not seen as significant role models, and there was little emphasis on the concept of formal preparation for rural and remote practice.

Other changes in medical education in Australia included the move by three medical schools including The University of Queensland to a graduate entry programme. These courses had differences in selection procedures, curricula, and teaching methods, with an emphasis on PBL, group work, and self-directed learning (SDL). The first intake into the university's Graduate Medical Course was in 1997, with the first cohort undertaking year 3 of the course at the North Queensland Clinical School in 1999. Teaching staff had several years in which to develop curriculum material and prepare for new methods of teaching and assessment. Students enrolled in the University of Queensland's medical course were also affected by the curricular changes. The students involved in this study were in the last cohorts to undertake the traditional six-year undergraduate programme, and were doing so in an environment of curricular debate and reform. Considerable attention was paid to the new approaches to medical education, including the introduction of PBL

#### **1.4 Postgraduate education in General Practice**

At the same time the Family Medicine Programme was delivering vocational training in General Practice across Australia. Founded in the mid 1970s, the Family Medicine Programme (FMP) was funded by the federal government and delivered by an arm of the Royal Australian College of General Practitioners (RACGP). It offered training in all states and territories and was recognized as one of the largest single vocational training programmes in the world. FMP had a central structure and

management, with offices in each state and some regions. The programme was three-four years in length, and was based around rotations through hospital posts and General Practice attachments, augmented by seminars and workshops.<sup>4</sup>

The programme had developed a system of accrediting general practices and other positions as teaching posts, which was carried out at arm's length by the RACGP. Teacher training was provided by FMP, which also provided a teaching allowance and subsidy to practices. There were few other direct incentives for general practitioners to teach.

The programme was based on sound adult learning principles and had gained a reputation for educational innovation. Trainees (later called Registrars) were expected to develop learning plans in conjunction with their designated training adviser. Feedback was a prominent part of the educational process with trainees being required to collect at least two feedback forms from their supervisors each year. Direct observation of trainees' consultations was encouraged by means of video recording and review, or by direct observation by FMP staff. These visits developed into a formal programme of external clinical teaching visits, which were conducted both by staff and by experienced general practitioners who were recruited and trained. The training programme also pioneered some models of distance education including external study packs, interactive satellite broadcasts, and computer-based true/false questions and patient management problems.

The programme was delivered by Medical Educators, who were experienced general practitioners with an interest in education. They were supported by other general practitioners who took on part-time roles as Training Advisers and Area Coordinators, and reported to a State Director. Many FMP staff developed skills in programme design and delivery, and in innovative small group teaching. However the culture did not emphasize or value research. Most evaluation tended to be on specific aspects of the programme and disseminated internally. There was less emphasis on the need to secure external grants and publish in refereed journals compared to the University setting.

At this time there were few formal links between University departments of General Practice (or their equivalent) and the vocational training programme. General Practice training tended to be delivered by different organisations to learners at different levels, with little evidence of collaboration or cross-fertilisation.

The end point of vocational training was the Certificate of Satisfactory Completion of Training, although many trainees sat the RACGP Fellowship examination. The examination was optional until the introduction of Provider Number legislation in 1996 requiring new entrants to General Practice to provide evidence of having been trained (or be in training) for General Practice before they could be issued with a provider number. The introduction of Vocational Registration in 1989 did provide some incentive to undertake the RACGP exam, as this was recognized as one avenue to vocational registration.<sup>6</sup> The grandfather clause for Vocational Registration (VR) ended on 1/11/1995, meaning that successful completion of the FRACGP was the only route to Vocational Registration in Australia.

With the change of name from the Family Medicine Programme to the RACGP Training Program (RACGP-TP) came a series of changes. For the first time numbers entering the Training Program nationally were restricted to 400 in 1995. A competitive national selection process was implemented. For the first time entry to vocational training for General Practice was not automatic: graduates had to make a decision to apply and compete with their peers for places.<sup>6</sup>

Along with tightening of entry procedures, the pathway through the Training Program was becoming more structured. Teaching and learning was still based on an experiential apprenticeship style model, and learners still had considerable flexibility in the path they could follow. Teaching sessions still tended to be case-based, usually using real cases as the cue. These tended to be dealt with rapidly, and without a formal structure or framework. There was, however, more pressure to complete the programme, rather than take extended periods of leave and elective time, and more pressure to meet community and government needs by limiting the number of training practices available, and encouraging more training in rural and regional areas.

With the growing recognition of the need for a formal training programme for rural practice, a number of new initiatives were introduced. A Rural Training Stream was introduced with selection by an interview panel with representatives from the Training Program, rural health training units, and practising rural doctors. The Rural Training Stream emphasized early exposure to supervised rural practice, with Registrars encouraged to undertake hospital terms in regional hospitals, and a total of at least 12 months of General Practice training in rural practices. Registrars had access to rural training advisers who helped them tailor appropriate training plans, and had access to a wider range of resources. Advanced Rural Skills Posts were set up with curricula developed by the respective Colleges working through a Joint Consultative Committee structure, and accreditation mechanisms developed. These activities were co-ordinated by a central directorate of Rural Training, with rural co-ordinators being appointed in all regions.<sup>20</sup>

There was a growing movement for all Registrars, whether in the Rural stream or not, to experience some rural practice through a requirement to complete an Area of Medical Service Need term. Increased resources were available for rural training, with rurally oriented applicants being favoured in the selection process, incentives for rural registrars, and use made of various forms of distance education including teleconferencing and videoconferencing.<sup>21</sup>

### **1.5 Education for rural practice**

The Kamien report<sup>22</sup> together with growing political pressure to address the crisis in rural workforce led to a series of rural initiatives at the federal level, the General Practice Rural Incentives Program.<sup>23</sup> The Rural Incentives Program addressed a number of broad programme areas including training, continuing medical education and locum support; remote area support; recruitment and GP relocation; and undergraduate support. The Rural Undergraduate Steering Committee encouraged rural initiatives in medical schools through a series of targets.

These included increased recruitment of rural origin students; development of rural components in medical school curricula; a minimum of eight weeks of structured



rural clinical placement; educational support for rural clinical teachers and appointments of rural-based academic staff; support for rural student clubs; and support for academic departments of General Practice.<sup>23</sup>

Medical schools were encouraged to explore rural initiatives and community-based teaching, and regional clinical schools were being discussed. The pace of change varied between medical schools, with the smaller regional schools such as Flinders and Monash adopting these changes sooner than the larger and older metropolitan schools. At the same time University Departments of Rural Health were being established in all states.

A Rural Faculty was established within the RACGP to address issues relating to rural education, training and workforce. Rural Doctors movements were active in all states by the early 1990s, and the Australian College of Rural and Remote Medicine was formed in 1997.<sup>24</sup>

### **1.6 The North Queensland Clinical School**

The North Queensland Clinical School of The University of Queensland was established in 1993 and led the way in a series of these initiatives.<sup>25</sup> The Clinical School was a community-based dispersed campus some 1200 km distant from the main university campus. With departments of Medicine, Surgery and Psychiatry, as well as General Practice and Rural Health, the School attracted students with an interest in General Practice, and offered opportunities for innovation and collaboration across disciplines.

Students from the University of Queensland had the opportunity to complete part or all of the last 2 years of the six-year undergraduate programme in North Queensland. Students had a background of 3 years of pre-clinical science, and a fourth year of clinical medicine and pathology. The majority of students had entered university directly from school, and had undertaken a traditional undergraduate medical education programme. Until the formation of the North Queensland

Clinical School most clinical teaching was close to the main campus. However, there was increasing emphasis on teaching in regional areas, with more use being made of rural placements and consideration given to the development of resources outside of the main campus.

The department of General Practice and Rural Health was developed as a vertically integrated unit, with major responsibilities at undergraduate (university) and postgraduate (RACGP Training Program) levels, and other roles in intern training, continuing medical education and professional leadership.<sup>26</sup> This integration brought staff and learners from several levels together with shared office space, staff, and teaching activities. Innovative models of educational delivery could be trialed and the boundaries blurred between undergraduate and vocational training.

The opportunity to develop a year 5 General Practice course in North Queensland allowed a number of options to build on my prior experiences. Smaller student numbers and generous support from the local medical fraternity resulting in favourable staff: student ratio allowed for the opportunity for small group teaching and innovative approaches to education. As a newly appointed academic at a new Clinical school, I had to develop my own teaching strategies, which were based on my own experiences and feedback from learners, usually in a small group environment. There were a number of similarities with my earlier clinical experiences in remote practice: I was in a role for which I had little formal preparation, and much of my learning was experiential, based upon my real-world experiences and feedback from those around me who were involved in the process. This background had a major influence on my interest in developing clinical teaching around real patients.

The year 5 course in General Practice, SM503, was structured to run in parallel with the main campus. Students in both groups covered the same material, and met the same learning objectives, although emphasis, delivery and process varied according to local circumstances. Assessment was identical for both groups, as was the structure of the four-week course: students undertook an introductory week, a two-week attachment to a GP, and then a final week which included a number of wrap-up sessions and a summative examination.

The introductory and wrap up weeks included coverage of the theoretical basis of General Practice; common problems seen in General Practice such as ear, nose and throat (ENT), skin and eye problems and practical procedures; community-based activities such as visits with the Blue Nursing Service; communication and consultation skills workshops; and management of chronic diseases and self-limiting problems. Some of these sessions were case based using written simulations of clinical cases, or cases that the students had seen in practice. The small group format provided an opportunity to trial some innovative approaches to delivery.

One of the teaching strategies used from the initial rotation in 1994 was the concept of the *Problem of the Week*. In addition to more conventional lectures and tutorials, students were asked to examine one patient's case in more detail. Students were expected to work as a group on the case over the duration of the week, and report their findings in a tutorial at the end of the week. Learning objectives included promotion of group work; achieving an understanding of a GP's role in the management of chronic complex cases; and appreciation of the role of various team members in the care of a patient and their family. This activity was used to replace other scheduled sessions such as management of chronic diseases.

Students were initially exposed to a brief 'trigger', which was written information or a brief videotape of the start of a consultation. The group then worked through the case over a week. In the first tutorial observations and information regarding the patient were listed and discussed, hypotheses generated, and decisions made about further information required and how to obtain it. Students divided these independent tasks among themselves and worked independently on them during the week. Possible tasks included interviewing the patient at the clinic on-site; performing a house call to meet the patient and family in their own setting; interviewing the patient's GP; interviewing specialists and other health professionals involved in the patient care; and reviewing the patient's chart. Students met in a second tutorial at the end of the week to share and synthesize this information, and make suggestions regarding further management.

Informal evaluations of this approach when it was first trialed in 1994 were very positive: staff and students were enthusiastic about the opportunity to ground learning in the context of a real patient, and to explore one case in detail, considering multiple dimensions. There were some logistic issues to be resolved such as recruitment of patients and organisation of necessary resources, but there was sufficient interest in this approach to consider exploring it more formally.

The approach outlined in the *Problem of the Week* demonstrated many of features of PBL including small group work; exploration of a particular problem in depth, with the group identifying what was known about the problem, what they wished to learn about it, and how they would accomplish this; opportunity for individual work; and a group meeting at the end of the cycle where members shared and synthesized information.<sup>2,3</sup>

PBL had been used in medical education to help students learn in the context of real clinical situations. By overcoming the artificial divide between the basic and clinical sciences and requiring students to apply and integrate their learning to a clinical situation, the PBL format was able to address many of the criticisms of traditional medical education. Students in traditional curricula often wasted time in acquiring knowledge that is subsequently forgotten or found to be irrelevant, and complained of the difficulty in applying knowledge in a clinical context. The approach is based on principles of adult education and cognitive psychology, and is believed to lead to deeper understanding of the causes behind phenomena.<sup>27,28</sup> Other advantages included the opportunity for group work and leadership skills, and the promotion of communication skills and self-directed learning.

Most experience with PBL was in the preclinical years in undergraduate medical courses where PBL was a major teaching method. Cases were generally paper-based, with multiple groups of students in the same cohort working through the same case. There was less experience of PBL in the clinical years, where the teaching tended to be discipline-based, with tutorials, ward rounds and teaching around clinical cases.

Case-based teaching had long been used in medical education. Traditional bedside teaching involved the teacher discussing clinical signs or conditions demonstrated by a patient with small groups of students. Learning was contextual and relevant, and tended to be more easily recalled by students than the same material presented in a lecture or a textbook. However, teaching tended to be ad hoc, depending on what clinical material was available. Many conditions were not available for teaching in the wards or hospital outpatient clinics where these sessions were traditionally held, so that even within a medical course, students could have quite different educational experiences.

Case-based teaching shared some approaches with PBL in helping students meet similar learning objectives. Both were designed to directly help students develop the reasoning process used by clinicians in an effective and efficient manner. Actual patient problems are presented in the same manner that occurs in practice, with students free to choose the path they take in approaching the problem. The sequence of behaviours of students as they work with patient problems and carry out self-directed learning is similar to that required in clinical practice. The tutor has an important role to facilitate the development of the clinical reasoning process in students. Finally, patient problems were carefully selected to illustrate the kinds of problems, both in terms of content and process, which appear in practice.<sup>2</sup>

The *Problem of the Week* approach had been used in an effort to address some of the concerns of traditional medical teaching formats. This approach was used to help students apply and integrate their learning in the context of a real General Practice patient. There were some learning objectives generic to all cases such as illustration of the process of care and teamwork in General Practice, dealing with uncertainty, and the interplay of physical, social and psychological factors in many General Practice patient encounters.

Students undertaking this course were new to PBL. They were in the fifth year of a traditional undergraduate course, with limited experience of working in small groups and minimal experience of PBL. Both students and teachers were comfortable with the established model of didactic subject-based teaching. The medical school was also involved in a transition from a six-year undergraduate

course to a four-year graduate entry course. The year 5 cohort involved in this study was in the last year of the 'old' course. These students, in addition to being new to PBL, were in an environment of a medical school undergoing dramatic change with a perception that resources and attention were being diverted to the 'new' course.

My interest in PBL using ambulatory patients therefore stems from a variety of factors. Firstly there were my experiences of medical education as a medical student, in particular the contrasts between small group and large group teaching, and between learning in a teaching hospital and in the community. Secondly, my clinical practice as a rural GP in a remote location offered opportunities to both learn from patients, and to intimately involve them in the teaching of medical students. Finally, working in medical education at the North Queensland Clinical School offered the opportunity to develop an innovative approach to community-based education in a small group setting. My approach to medical education was driven by my background experiences, and my role, as a newly appointed academic in a new clinical school, developing my teaching skills experientially, based upon my real-world experiences and feedback from participants and other staff.

### **1.7 Research questions**

Most PBL courses are based around paper cases with relatively few reports in the literature of PBL using real patients.<sup>29</sup> Most of these courses used PBL extensively in the first half of the course, but tended to use traditional approaches to teaching in the clinical years. Early trials of PBL using real patients and discussions with the tutors and faculty involved led to a variety of questions. Was PBL using real patients feasible? Was it efficient? What sort of patients should be selected? How should cases be written? How should the conduct of the tutorial be organized? Did the role of the tutor vary? How should tutors be selected and trained? Were students able to meet the learning objectives equally well? Can curricular requirements be met equally well? Were there variations in the group process and learning outcomes? How could these be measured? How should PBL be introduced to senior medical students with little prior experience of PBL? How could this format be

evaluated? Could distinctions be made between the educational impact of the introduction of a new format (PBL) and a new approach (using real patients)?

These issues led to formulation of the principal research question (null hypothesis): 'There is no difference between PBL using real patients and PBL using paper-based cases'. In order to examine this issue a number of further questions were posed. What is the best way to approach PBL with real patients? How do outcomes vary when real patients are used rather than paper cases? What is the effect on the students' learning? What are the learning outcomes? How should this be evaluated? What tools exist to assist? What are the experiences of students, tutors and faculty? Is there any effect (positive or negative) on the patients involved? What are the wider implications of this approach for the faculty, the community and from a resource perspective?

The approach to the exploration of these issues will be more fully described in the section on methodology.

## **1.8 Summary**

This section has outlined how my educational and clinical experience led to an interest in clinical teaching with real patients. The environment in which this was occurring included major changes in General Practice, particularly in the areas of undergraduate and postgraduate training in General Practice and in rural medicine. Other developments in medical education such as the North Queensland Clinical School provided opportunities to adopt innovative approaches, including construction of problem based learning tutorials around real patients. The early experiences of this approach were positive and led to the formal evaluation reported in this study. The next section will describe developments and research in medical education generally, specifically in the area of PBL.

## CHAPTER 2

### LITERATURE REVIEW

The relationship between the basic and clinical [sciences] cannot be one-sided; it will not spontaneously set itself up in the last two years if it is deliberately suppressed in the first two. There is no cement like interest, no stimulus like the hint of a coming practical application.<sup>30</sup>

PBL remains one of the major developments in medical education in the latter part of the 20<sup>th</sup> century. This chapter will review the historical background and theoretical basis of PBL, with a description of applications of PBL in a variety of disciplines.

Approaches in medical education have tended to focus more on undergraduate rather than postgraduate applications as PBL is widely accepted as a teaching method at this level and the majority of reports are in this context. An examination of reviews and reports of clinical PBL will follow with a discussion on gaps in the literature and identified research questions. Relevant developments in medical education will be described. These include an increased emphasis on community-based medical education and teaching around real patients. Finally, developments in methodologies used for research and evaluation in medical education will be reviewed, specifically those used in evaluating PBL programmes.

The review is based on computerized literature searches of the Medline and Educational Resources Information Centre (ERIC) databases from 1980 through to 2001. The Medical Subject Headings (MeSH) included problem-based learning and medical education, clinical education, real patients and ambulatory patients. The literature review was updated prior to submission of the thesis, with additional references obtained from articles held by the author and bibliographies from selected articles.



## 2.1 Background

Problem-based learning is an important development in medical education which is increasingly being adopted by medical schools across the world as an integral part of innovative curricula designed to better prepare graduates to enter practice.<sup>31</sup> Medical schools making this change are doing so in an effort to ensure graduates are better prepared to enter practice with strong attributes of self-directed learning and grounding in knowledge, attitude and procedural skills.<sup>32,28</sup> PBL is believed to lead to deeper understanding of causes behind phenomena and to have other advantages such as the opportunity for group work, basic leadership training and developing communication skills.<sup>28</sup> However, its popularity with new schools, particularly in the developing world has led to some questions about its value in institutions without strong basic science infrastructure.

PBL is an approach which was first used in medicine but has now been adopted by a variety of disciplines including architecture, nursing, engineering and social work.<sup>33</sup> The approach is based on principles of adult education and cognitive psychology.<sup>28,34</sup> There are fundamental differences from the traditional, lecture-based course in which background knowledge in the basic sciences is acquired in the early part of the course and then applied to clinical problems in the later years. Finucane et al<sup>35</sup> cite a number of criticisms of the traditional approach. (Table 2.1) These include the artificial divide between the basic and clinical sciences, problems with acquiring information that is forgotten, appears irrelevant or is difficult to apply, and the impact of these factors on students.

**Table 2.1: Criticisms of traditional medical teaching**<sup>35</sup>

<p>It creates an artificial divide between the basic and clinical sciences Time is wasted in acquiring knowledge that is subsequently forgotten or found to be irrelevant Application of the acquired knowledge can be difficult The acquisition and retention of information that has no apparent relevance can be boring and even demoralising for students</p>
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## 2.2 Overview of problem based learning

Definitions of PBL vary across disciplines but can be summarized as ‘an educational method characterized by the use of patient problems as a context for students to learn problem-solving skills and acquire knowledge about the basic and clinical sciences’.<sup>1</sup> Neufeld and Barrows<sup>36</sup> describe PBL as a method in which students first encounter a problem, followed by a student-centred inquiry process. Much of the literature is derived from the major proponents of PBL, notably McMaster University in Canada, the University of Limburg at Maastricht in the Netherlands (now the University of Maastricht) and Newcastle University in Australia. As PBL has become more widely accepted in medical school programmes in North America, the United Kingdom, Asia, the Middle East and Australia,<sup>35</sup> many variants of PBL have evolved but there are a number of central elements that remain constant.

PBL emphasizes both the content and the process of learning. The content is derived from the problem which students are presented with. These are devised by faculty based upon carefully constructed learning objectives. In many cases the curriculum has had to be reorganized around problems rather than disciplines, with an emphasis on an integrated approach rather than separation into various components of basic and clinic sciences, and on cognitive skills as well as the acquisition of knowledge.<sup>37</sup> The problems, or cases as they are sometimes known, may represent important health problems of the region as well as prototypical situations and domains of knowledge.<sup>38</sup> They may, therefore represent community-based or individual patient problems. Cases need to be carefully designed to arouse the students’ interest and to meet the learning objectives appropriate to the learners’ needs. When structured this way the acquired knowledge is likely to be seen as highly relevant, and to be remembered in the context of the problem discussed.

One of the axioms of PBL described by Mennin and Majoor<sup>39</sup> is that the problem comes first. The problem is designed as a stimulus for the need to know, without the requirement for prior reading or preparation. Problems must be designed so that they cannot be solved at first glance with only the initial information presented. The design of the problem must take account of students’ prior learning and allow them to explore

various hypotheses and determine what further information they need in order to deal with the various aspects of the problem.

The presentation of the problem can take many formats. Cases are usually presented as neutral descriptions of observed phenomena, such as a real life case or example of professional practice. Many PBL problems are presented as paper-based cases, while others use real or simulated (standardized) patients (trained healthy people used to portray the features of real patients). Mennin and Majoor (2002) describe other forms of media including video, internet, and computerized multimedia applications, to allow greater variability in problem presentation. An example of a paper-based PBL case from the University of Liverpool is in Table 2.2.<sup>3</sup>

<p>Maria is 50 years old. She has two daughters aged 18 and 23, is divorced and is looking after her 82-year-old mother. She was called for screening by the National Health Service Breast Screening programme last week and was recalled to the assessment clinic. She has been told that she has a suspicious lesion in the left breast.</p>
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**Table 2.2: A paper-based PBL case from the University of Liverpool<sup>3</sup>**

In most PBL programmes each case is dealt with in a small group, typically 5-8 students, working in a tutorial situation, with the assistance of a facilitator or tutor. The tutor's role is as a guide to help students through the PBL process as they explore various dimensions of the problem. They help students create an optimal learning environment where all group members feel able and motivated to participate. Tutors use questions to clarify and stimulate students' thinking and to help them discover what they do and do not know about a particular problem, and what they need to know to deal with the problem, and its relevance. Other roles may include helping the group define the depth and breadth of knowledge needed; developing group and teamwork skills; and enhancing skills and attitudes such as communication skills, professional behaviours, critical reasoning and self and peer assessment. The tutor's role is not that of a content expert, and he or she is not expected to act as a resource for the group.<sup>2,41,42</sup>

Groups form for periods that vary between programmes, usually from eight weeks to a semester. Students are usually randomly assigned, a deliberate strategy that forces students to work with others whom they may not know well, and which mirrors the health care teams in which the students will ultimately be working. The time spent on each PBL problem also varies depending on the curriculum time available and the length and complexity of the case. The most common model involves two tutorial meetings over the period of a week. A key part of the process is self-directed learning between sessions.<sup>43</sup>

At the first meeting of a group there will be normally be some time spent on process: introductions, clarifications of expectations, and establishment of any ‘ground rules’. From time to time groups are encouraged to take time to reflect on the process, how well group members and tutors are working together, and how group members and individuals are developing in various domains such as knowledge; clinical reasoning and communication skills; personal and professional attitudes and skills; and self and peer assessment. Several authors have described how frequent feedback and self-reflection about individual and group process enhance learning and group development.<sup>39</sup>

At the start of each PBL problem the group will usually appoint a note taker or scribe to record the important points of discussion on a board or flip chart, and, in some cases, a group chair. The group then works through the problem following an approach often described as the ‘seven steps’ (Table 2.3)<sup>3,37</sup>

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**Table 2.3: The seven steps used in PBL tutorials**<sup>3,37</sup>

This discussion, guided by the seven steps, has been described as the engine that drives the PBL process.<sup>3</sup> Students discuss the information presented, clarify any uncertainty, and attempt to formulate the problem in their own words. Key concepts or issues are listed on the board. Students may work individually for a few minutes in order to organize their thoughts. This process may help make explicit the existing levels of knowledge and skill within the group.

Once the problem has been clarified and expressed clearly the group will analyse the problem and attempt to generate a series of hypotheses to explain the known phenomena. In the early stages the list may be exhaustive as little is known about the problem. The tutor may then provide further information about the patient's history, physical findings or investigations and the group refines its list. The provision of information serially, rather than all at once, is important, as at each stage the group is required to explore their understanding of the underlying mechanisms, and how the new information may lead them to re-evaluate or reprioritize their existing hypotheses.

At each step of the process students are encouraged to examine the recorded information in detail, looking for linkages with their previous learning, and exploring what they already know about the problem, and what they need to know. Mennin and Major describe the point where students '...come to the edge of their knowledge, where curiosity is transformed into exploration and then inquiry – a central motive for learning in PBL.' As students work through the early parts of a problem, sharing knowledge, hypotheses and understanding of underlying mechanisms, they will continue to refine their learning objectives.<sup>39</sup>

A central goal of the PBL tutorial process is the generation of learning issues: under the tutor's guidance students will have worked through the case and determined a list of learning issues that build on and connect with existing knowledge. They will reach a point where they have generated a series of content questions that cannot be answered with existing knowledge, and there is insufficient knowledge within the group to identify uncertainties. Further discussion of the case at this point is unlikely to lead to further insights or understanding. At this stage the group is ready to move onto the sixth of the seven steps, independent study or self-directed learning.

The tutor's role will be to help students define the issues most relevant to their stage of training and, where necessary, put limits on the depth and breadth. The students will then review and prioritize the learning issues, and decide how to progress with their self-directed learning between meetings. Tasks will need to be allocated, or in some cases the group may determine that all members may need to study a particular area.

At the next session students are encouraged to reflect on what they have learned by discussing the list of issues on the board from the previous meeting. Some groups may spend some time on process, reflecting on what happened at the previous meeting and their expectations for this tutorial. Information is shared between members of the group who are encouraged to compare and contrast their learning with each other. This discussion and debate may involve revision of the hypotheses and deeper exploration of the underlying mechanisms. Learning and retention of knowledge is enhanced by this iterative process of elaboration of knowledge.<sup>44</sup> As information is acquired and understood it is applied to the problem, with the hypotheses considered, accepted, rejected or refined. The tutor has an important role in helping students apply the knowledge in the context of the patient's problem and in helping connect existing and newly acquired knowledge. The problem may not require definite resolution, particularly early in the course, as it may link to subsequent learning activities.

Through this period of independent study and application of new knowledge to the case which may continue to progressively evolve, students have learned to formulate their own questions and learning objectives, and to seek their own answers. They obtain skills in obtaining information from various sources such as published literature, content experts, and computer resources. The information gathered is seen as relevant and is immediately applied in an active format, which enables students to participate in the learning process and to receive instant feedback. Students are also developing higher order skills such as communication, presentation, and critical appraisal skills.

### **2.3 Rationale for problem based learning**

PBL was first used at the Faculty of Health Sciences of McMaster University in the late 1960s.<sup>2,45</sup> Several problems had been identified with traditional curricula including the inability of students to retain and apply material from pre-clinical years to clinical situations; perceived irrelevance of much of the preclinical material; lack of integration across disciplines; and the need to develop self-directed learning skills to support continuing education after graduation.<sup>27</sup>

Barrows and Tamblyn cite a number of deficiencies in the conventional approach.<sup>2</sup> In the field of neurology students often seemed to be able to demonstrate good techniques in performing a history and examination, yet were unable to recall or apply the basic knowledge needed. Barrows pointed out the paradox, in which he had previously taught in excellent detailed courses in neuroanatomy, neurophysiology, and clinical neurology, which the students had passed, and suggested, half-seriously, an ‘inverted curriculum’, which involved 2 years of patient contact followed by two years of basic science.

Other examples cited by Barrows and Tamblyn include Miller’s studies documenting poor retention of basic science information. Students in their 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> year of university were asked to retake a 1<sup>st</sup> year examination they had passed. None of them passed the retake. Levine and Forman retested students about to enter their neurology clerkship on 50 questions chosen because of their clinical relevance from their first year integrate neuroscience course; around one-third of the group passed. They further cite West’s summarisation of the fallacy of this educational approach: ‘both logic and research prove it to be ineffective, and, worse, inefficient.’ Other work cited revealed concerns about the thinking processes of medical students and residents, with McGuire stating that ‘many medical schools would find that their graduates are wanting in clinical problem-solving skills, if they would use the appropriate tools to evaluate them.’<sup>2</sup>

Other studies describe the inability of students to make appropriate use of what they have learned. A controlled trial in a large general hospital found that doctors and residents in 50% of cases were unable to perform critical screening activities on patients

with suspected pyelonephritis. The same group when tested on the same subject by means of multiple choice questions performed quite well, with a mean score of 82%.<sup>27</sup>

Similar examples are found in the non-medical literature. Research was conducted on the understanding of high school student about the movement of balls along a horizontal track. Many of the students demonstrated an ‘Aristotelian notion that constant force is required to produce constant motion ... while they used the language of Newtonian mechanics, such as force, momentum, impulse etc.’. While the students appear to understand the concepts of modern physics, they were unable to demonstrate their application to real life phenomena.<sup>27</sup>

An early example of the problem based approach is provided by Shoemaker, who was teaching electronics to radio technicians during the Second World War and who ‘... became tired of teaching formally about valves, condensers, ammeters etc. He decided instead to provide a lot of radios which did not work and said to the trainee technicians: ‘Your task is to figure out how to make these radios work, and if you are interested and puzzled about a transformer or condenser we have interesting books over here and I’d happily talk to you about it.’ He was amazed at how much more rapidly these students became effective and efficient than with his previous method.’<sup>46</sup> This approach, which Shoemaker called ‘learning in a functional context’ shares many features with PBL.<sup>37</sup>

The main conclusion from these and many other experiences is that while learners seem to have the skills to acquire basic knowledge, many have difficulty in applying the knowledge in a real world practical situation. This accords with findings in educational psychology which suggest that different instructional methods produce different learning outcomes. The use that students can make of a piece of knowledge depends very much on how the topic was taught. Conventional instructional methods do not always enable students to make the best use of their knowledge when applied to solving problems.

In developing new approaches in medical education, the early pioneers at McMaster were influenced by the case-study method as developed at Harvard Law School in the 1920s. They considered the use of cases as an instrument for learning very appealing.<sup>45</sup> In their description of the origins of PBL, Barrows and Tamblyn formulate two major



objectives of medical education.<sup>2</sup> Firstly, the physician should be able to evaluate and manage patients with medical problems effectively, efficiently and humanely.

Secondly, the physician should be able to continuously define and satisfy his or her particular educational needs in order to keep his skills and information contemporary with his chosen field and to care properly for the medical problems he encounters

They then describe a categorization of teaching and learning methods in medicine. The first category is based around the person responsible for deciding what the student is to learn: this may be teacher-centred or student-centred. The second is based on the organization of the curriculum: is it subject-based or problem-based? A curriculum can therefore be classified as teacher-centred/subject-based, teacher-centred/problem-based, learner-centred/subject-based, and learner-centred/problem-based.<sup>2</sup>

Teacher-centred learning is a familiar model, wherein the teacher assumes sole responsibility for what the student is expected to learn. Teachers dispense the information to the students and the method is seen as efficient for teachers and students. However, this approach does not recognize the varying backgrounds, experience and expectations of the students, who tend to be passive recipients. There is less emphasis on the application of knowledge, and less opportunity to meet the goals in self-evaluation and self-directed learning.

In student-centred learning the student learns to determine what he or she needs to know, with appropriate guidance from the teacher. Students participate more actively in the learning process and 'learn to learn' while meeting the stated learning objectives in their own way. Students are more likely to be motivated, to retain knowledge, and to be able to evaluate their educational goals. Disadvantages include the organisational demands, particularly in the early stages, the need to individualize evaluation, and potential insecurity on the part of the student and the teacher.

Subject-based learning is familiar to most students, with learning organized around a subject area, often in a hierarchical fashion. This approach seems efficient as the learning material is well organized and defined and easily learned, and assessment is easy. However, as the information is generally not integrated with other material or reinforced by clinical encounters, it does not ensure that the student will be able to

select, recall and apply the appropriate information in a particular clinical situation. Physicians are likely to encounter problems that will require integration of knowledge from many disciplines, and are unlikely to be able to use isolated pieces of information unless the cognitive connections between subjects have been actively laid down in the learning process.

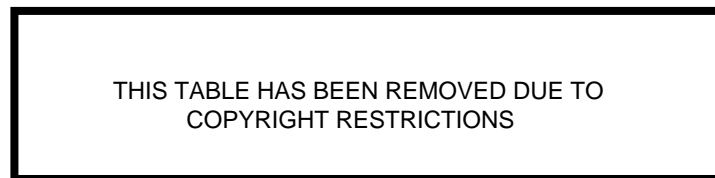
PBL, where a problem is used as a stimulus for learning around the subject can lead students to develop or apply problem-solving skills as well as acquiring knowledge. It is well suited to student-centred learning, but can be used in teacher-centred learning. This method has advantages in both acquisition of knowledge, and development of problem solving skills. Knowledge associated with a clinical problem is seen as relevant and tends to be more easily recalled and applied to other problems. Concerns about this approach include the risk of over emphasising problem solving skills, at the expense of the acquisition of basic knowledge, and perceived inefficiency.

While the most common combination of teaching and learning in medical schools is teacher-centred and subject-based, Barrows and Tamblyn argue that the student-centred, problem-based approach is tailor made for medical education. They concede that other combinations such as learner-centred and subject-based approaches are possible, although are less common in practice. They argue that PBL is so well suited to medical education, and is usually so intrinsically student-centred that they imply student-centred learning whenever they use the term problem-based learning in their classic text on problem-based learning in medical education.<sup>2</sup>

There is considerable support for this position from the educational literature. Knowles points out a number of flaws with the traditional teacher-centred subject-based approach.<sup>43</sup> Competencies that are rewarded include the ability to listen, take notes, memorise material, predict examination questions, cram, and reproduce the required material. There is an assumption that the learner's experience of the teaching-learning process is less important than the teacher's. A student in this method succeeds if he or she 'learns the material that is presented to him, and ...is able to reproduce it as accurately as possible on demand. As long as the product, i.e. precise reproduction, is correct, we are satisfied.' West agrees with this position: 'In general the atmosphere of a great many if not most, American medical schools appears to be one in which the

faculty assume responsibility for presenting a common body of subject matter to all students and the students assume the responsibility for repeating it on demand.<sup>47</sup>

Schmidt summarizes the principles of cognitive learning in a small set of theorems, which he uses to justify the foundations of PBL (Table 2.4).<sup>45</sup>



**Table 2.4: Principles of cognitive learning**<sup>45</sup>

The role of the importance of prior knowledge in learning has been extensively investigated.<sup>27,44</sup> Learning has a restructuring character that builds on earlier knowledge to understand new information. The retrieval of information needed to deal with a given situation or problem is enhanced when the retrieval cues are encoded with the information. This attribute, known as encoding specificity, means that performance improves the closer the given task resembles the original learning environment.

When students are stimulated to elaborate their knowledge then recall and processing of information is improved. This elaboration may take many forms: discussion with peers, teaching others, writing summaries, or answering questions. These elaborations provide redundancy, an inbuilt safeguard against forgetting. Schmidt argues that the educational method that best matches these principles is PBL.

Regehr and Norman contrast human memory to that of a computer by pointing out the factors that can influence human memory: the degree of meaning attached to the stimulus; context specificity, or the degree of match between the environment at the time of learning and the time of testing; processing specificity, or the concept that how information is learned will strongly influence how it is retrieved; and practising the task of remembering.<sup>44</sup> Again, PBL is suggested as the method that is most likely to produce at least the first three of these factors, and possibly the fourth, if the motivating effect of PBL does, in fact, prolong study time.

The research findings from cognitive and educational psychology support the PBL approach. PBL emphasizes active student-centred participation in learning. Students are expected to question, discuss, analyse, and integrate basic science principles with clinical problems from the real world. They first encounter these problems in situations likely to be seen again in their professional careers. The connectedness of ideas is promoted by the elaboration that occurs in small groups. The activation of prior learning, the formulation of an inquiry process, and the construction of meaning through reflection and discussion are more likely to lead to long-term retention of information in a form that can be recalled and applied when needed. Other benefits of the PBL process are described, including the emphasis on group process and group skills, and encouragement of co-operation rather than competition. Professional skills such as communication and clinical reasoning are fostered by this approach, as are professional and ethical attitudes and behaviours. Metacognitive skills are developed with students undertaking peer and self-assessment, critical thinking, and self-directed learning activities. The education objectives of PBL are summarized in Table 2.5.<sup>35</sup>

The PBL method is applicable to all forms of teaching. Walton cites a simple example from primary school: a child is given some plasticine and is asked to make it float. The discovery that plasticine sinks because it is heavier than water may be balanced by the

discovery that it can float if made into the shape of a cup or boat. The excitement of the discovery and sense of achievement contrasts with the opposite approach: making a boat because the teacher says so.<sup>37</sup>

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**Table 2.5: Educational objectives of PBL (after Finucane)**<sup>35</sup>

The medical education literature has identified PBL in very non-specific terms, embracing a variety of curricula, objectives and methods, and all of which are consistent with the principles of cognitive psychology described. Barrows' taxonomy<sup>48</sup> defines PBL as any method, which achieves four objectives. (Table 2.6) These include structuring of knowledge for use in the clinical context (SCC); development of an

effective clinical reasoning process (CRP); development of self directed learning skills (SDL); and increasing motivation for learning (MOT).

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**Table 2.6: Objectives of PBL (after Barrows)<sup>48</sup>**

Barrows identified three methods as best achieving these objectives: modified case-based, problem based learning and closed-loop or reiterative PBL. He believes closed-loop or reiterative PBL represents the method that best fulfils all the objectives. As a continuation of the problem-based method, students complete their self-directed learning and then return to the patient problem to identify areas of improvement in their reasoning. In this highly motivating method students go beyond the simple acquisition of new knowledge to evaluate their prior knowledge and improve their problem-solving skills.

#### **2.4 Introduction and implementation of problem based learning**

Dissatisfaction with existing approaches to medical education and a desire to embrace educational reform have led many schools to introduce PBL in its various forms. For example, in Australia the Karmel report in 1973 drew attention to curricular problems, lack of innovation and neglect of primary care in Australian medical schools.<sup>11</sup> This occurred on a background of criticism and call for reform, and led to substantial changes in a number of medical schools and the formation of a new school, in Newcastle, in 1978.<sup>35</sup> One of the innovative approaches of the new school was the introduction of PBL.

While PBL was new to Australia, it was becoming widely accepted and established internationally and would continue to be adopted in Australia. The three graduate entry programmes (The University of Queensland, the University of Sydney, and Flinders University of South Australia) that were developed in the 1990s all adopted PBL curricula. Finucane et al (1998) estimate that by 2000, 50% of Australia's doctors would be graduating from schools with PBL curricula.<sup>35</sup>

Some 100 medical schools in the United States were estimated to have adopted PBL to some extent by 1991, with growing acceptance in the United Kingdom, the Middle East, and Asia. Both the World Federation of Medical Education, and the World Health Organisation endorsed PBL as an educational strategy.<sup>37</sup>

Schools that have moved to a PBL curriculum have adopted a variety of approaches. Mennin and Majoor point out that a critical factor that influences the format implemented is the willingness of the faculty to shift roles from 'instructor of knowledge' to 'facilitator of learning' and to accept 'central' rather than 'departmental' control.<sup>39</sup> Students may be a potent driver of change, either positively, or negatively. Local resources, such as access to tutorial rooms, computers and library services may influence decision making and implementation. Some reports suggest that PBL may not be economically viable for medical schools with student intakes greater than 100.<sup>1</sup> However, The University of Queensland, which has an intake of 240, introduced a PBL course in 1997.<sup>35</sup> Technological advances in computing and communication may enhance the ability of larger schools to deliver PBL curricula.

Mennin and Kalishman suggest the strategy of offering a pilot PBL course within a traditional curriculum.<sup>49</sup> While this method may be successful in transforming a curriculum they point out that optimal conditions such as avoiding competition from the main curriculum and allowing free (unscheduled) time for students to pursue PBL-related learning issues.

Another approach is to offer a parallel PBL track, while leaving the traditional curriculum intact. This has the advantage of allowing interested staff and students to design, implement and evaluate a PBL curriculum, with an opportunity to compare the two programmes. However, there are resource implications of running two courses in

parallel, and self-selection of students and staff limit the direct comparisons that can be made between the parallel groups.

The experience of the three graduate entry schools in Australia, and of a number of schools in North America have demonstrated the feasibility of changing to a PBL curriculum, typically over a 3-5 year time-frame.<sup>35,50</sup> Elements of managing the change involve curriculum design, case writing, tutor training and working with faculty to reach agreement on the philosophy and approach of the programme. The inevitable co-existence of an 'old' and 'new' curriculum is an inevitable drawback of this approach, and will also need to be dealt with as part of the change management process.

In PBL various disciplines can be integrated throughout the curriculum and learning occurs in context, building on what the students already know. Students learn about normal structure and function as they explore clinical problems, and then apply this knowledge to their search for a solution. However, even in PBL programmes senior medical students tend to learn their clinical medicine in more traditional ways such as case studies and clinical clerkships.<sup>51</sup>

Many medical schools are facing the challenge of introducing PBL in combination with more traditional methods – the hybrid curriculum.<sup>31,32</sup> Most PBL cases are derived from clinical practice and are presented to students as a 'paper case', which may be augmented by brief videoclips, extracts from the medical record, copies of investigations or other clinical material.<sup>52</sup> Some schools report a difficulty with this approach. In Maastricht students were still noted to have difficulty in applying the knowledge acquired in the preclinical years of their study to the patient problems they encounter in their clerkships.<sup>53</sup> Reports from students and clinicians as well as experimental data supported this view. Gresham and Philp observed that preclinical PBL related more to intellectual achievement and personal growth than to the wider issues often raised in clinical practice. They describe the 'real-time real-patient' situation where 'additional stakes such as patient well-being, stresses of clinical decision making, bureaucratic infringements and potential litigation are ever-present concerns.'<sup>54</sup>



## 2.5 Problem based learning in clinical education

While there are a number of reviews which analyse the outcome of innovative curricula involving PBL in the pre-clinical years<sup>1</sup> there is little information about the use of this method in the clinical setting. Foley et al in their review of twenty-six reports of clinical PBL in the English literature point out that there is considerable confusion about nomenclature.<sup>55</sup> Eighteen of these reports described undergraduate curricula with only five separate programmes identified as meeting the criteria described in Barrows' taxonomy. A number described interesting innovations, many of which applied some PBL methods to traditional case-based teaching, but could not be classified as PBL. Other reports were identified that may utilise PBL principles but could not be classified with certainty as PBL due to lack of information. The authors drew attention to the imprecise use of the term 'PBL' and concluded 'there remains a dire need for more experimental studies to warrant the extensive use of PBL in the clinical setting.'<sup>55</sup>

They did identify a number of reports that describe the implementation and success of PBL curricula in the clinical setting.

Nash et al described a modified 3<sup>rd</sup> year surgical clerkship at the University of Kentucky, which uses PBL to acquire general surgical knowledge, clinical decision-making skills and critical-thinking skills. Groups meet three times per week to analyse approximately thirty patient cases over three months.<sup>56</sup> Foley et al concluded, 'this curriculum represents a significant and successful effort at introducing classic PBL into a very traditional hospital-based clinical setting.'<sup>55</sup>

Wendelberger and colleagues randomized 45 of 202 students taking paediatrics to participate in the PBL track. They found no differences between the performances of the two groups on the National Board of Medical Examiners examination. There was a 90% correlation between learning issues generated by PBL students and the clerkship's objectives.<sup>57</sup>

Chamberland et al describe sessions on learning clinical reasoning (LCR) at Sherbrooke. These sessions continue the preclinical PBL format into the clinical years

with groups meeting with a clinician to solve specific problems, which may have been missed during clinical exposure.<sup>58</sup>

The Goldstein et al study of a six-week general medicine clerkship at the University of Southern California conforms to the highest level of Barrows' taxonomy, the reiterative problem-based approach. Students worked in teams of three-four and were given primary responsibility for a hospital ward, handling the entire spectrum of patient care. Students presented weekly seminars on patient-related topics, ethical issues and discharge planning, and were involved in designing patient management problems for the other teams. Students were supervised by a sub-specialty resident (fellow) who managed the teams and selected appropriate patients.<sup>59</sup>

There are a number of more recent reports which describe clinical applications of PBL and seem to fit the reiterative approach described by Barrows.

Aspegren et al described the use of real patients rather than paper cases in a surgery rotation in a hybrid course in Sweden. The patient is selected by the tutor, asked to participate, and then meets with the student group of seven-eight and the tutor. Six of the students have defined roles: one interviews, another examines the patient, a third summarizes, a fourth follows up the patient during the week and there is a chairman and a secretary. Each student undertakes his or her task with the rest of the group present, who can then seek further clarification if desired. The patient is able to provide further history and correct misunderstandings. The group and tutor then continue the discussion in a tutorial room where they complete the first five of seven steps, based on the material from their history and examination. The tutor may supplement this with laboratory investigations or other information. After individual study the students meet to discuss their learning objectives and the progress of the case.<sup>29</sup>

Students report they enjoy being able to compare their own clinical reasoning with that of the staff. Compared to paper cases the majority felt PBL using real patients better helped them learn and understand and better prepared them for their future work as doctors. A minority had some concerns about ethical difficulties (5/27) and experienced some discomfort (6/28) in using real patients. The major factor (18/27) identified by the students in successful PBL with real patients was 'a well prepared, informed and

motivated patient'. Other factors identified included group size and tutor competence. The majority (18/19) of tutors preferred real patients. Advantages included the realism and stimulating effect of the situation; the opportunity for training clinical skills under supervision; and the focus on the patient-doctor relationship. Disadvantages included difficulties in finding a real patient and discussion of sensitive matters such as breast cancer or concomitant psychiatric disease.

Barrows and Tamblyn describe some theoretical reasons for the use of real patients in PBL.<sup>2,60</sup> As students develop basic skills in history taking, examination and clinical reasoning in simulation formats they should then have repeated opportunities to apply this learning to encounters with real patients, reinforcing their learning and providing incentives for more learning, since the patient experience will almost always raise many unanswered questions. They do raise some concerns about adverse effects of this process on the patient: the risk of upsetting or demoralising the patient; possible misunderstanding on the part of the patient; the time taken; the risk of exhausting a frail patient; and interference with scheduled activities and tests. They point out 'it is important that the patient experiences provided by teachers in medical schools be models of humane and caring attitudes if we are to expect these to be fostered in the medical student.'

The study from Aspegren et al suggests some solutions to these potential problems.<sup>29</sup> Careful selection of patients is important: ambulatory patients are often more robust than inpatients and an established relationship between the tutor and patient is more likely to be forgiving of minor lapses in tact or discretion. Most patients are grateful for the opportunity to contribute to the education of medical students.

Van de Wiel et al report their experience of using real patient tutorials in the preclinical years of their problem-based curriculum at Maastricht.<sup>53</sup> Patient tutorial groups (PTGs) were used to improve the integration of theoretical with practical knowledge in three ways: students practise taking a history to formulate and test a set of relevant diagnostic hypotheses; students are forced to translate their textbook knowledge into the language of patients and vice versa; and students learn to relate their patho-physiological knowledge to the patient's symptoms and signs as well as to the clinical concepts used in medical practice. Evaluation was by student questionnaire and focus groups with

students. Students found the tutorials instructive and valued the patient contact and opportunity to apply their knowledge in taking a history with a real patient. The aims of the PTGs seemed to be unclear for students and clinicians, and patho-physiological principles were discussed less frequently than intended. The authors commented they ‘wondered what the students learn in PTGs and what they apparently miss in the preclinical curriculum.’

Duban and Kaufman describe their experience in New Mexico.<sup>61</sup> A clinical skills course was created for all first year students to reinforce the basic and clinical sciences subjects studied concurrently in tutorial groups. They concluded that clinical skills can be efficiently learned from the beginning of medical school. The knowledge gained served as preparation for early exposure to patient care and can generate a better appreciation for the clinical relevance of basic science subjects. This can also serve as a forum for co-operative effort and shared learning between basic and clinical scientists. The authors comment ‘An innovative clinical skills course is the easiest avenue for introducing the principles of problem-based learning into a conventional medical school curriculum.’

Case-based approaches using PBL methods have been described in the clinical years by a number of authors. Barrington et al outline a PBL Case Studies course in year 4 of the Flinders University of South Australia undergraduate programme.<sup>51</sup> A PBL approach was applied to a learning model which had been criticized for its poorly interactive format. Clinical learning was emphasized by using real patients as the focus for problem solving. A small group of six students volunteered for this study and reported they valued the clinical focus, practicality and realism. Their perspectives were generally positive although they raised some process issues related to the second ‘report back’ session, availability of patients, and the amount of project evaluation material.

Gresham and Philp describe two modifications of the curriculum in teaching internal medicine in Alabama: ‘real patient on paper’ and ‘real-time-real-patient’ encounters. Cases were based on current or recent patients cared for by members of faculty. A faculty development programme was described with emphasis on avoiding intimidation in ward rounds and in Morning Report. The authors observed ‘student learning proceeds differently if the ultimate objective during a clinical rotation is to survive

unscathed.’ The curriculum was evaluated by subjective feedback from students, review of learning issue logs, and comparison of subjective and objective scores prior to curriculum modification and subsequently. The study concluded PBL strategies were well suited to clinical education provided that the faculty were committed to the methodology. In their curriculum it appeared to foster the development of life-long learning skills and to provide additional breadth and depth in learning opportunities.<sup>54</sup>

Most authors who describe their experience with clinical PBL are very satisfied with it. Aspegren et al have ten years experience and feel their approach is consistent with the shift in medical education away from learning subjects to acquiring competencies and reflects present knowledge about how adults learn.<sup>29</sup> They point out the similarity between the PBL process and clinicians’ clinical reasoning. Tutors therefore find it easy to let the students work in a similar fashion and find it stimulating to supervise the students’ clinical reasoning process because it gives another dimension to their own clinical thinking. Barrington et al described their case studies approach as the clinical thought process in slow motion, providing students with the opportunity to integrate previous knowledge into the solution of problems posed by real patients.<sup>51</sup>

Students are generally supportive of this approach, valuing real patient contacts. They find this approach motivating as they see this as the real thing, the goal they study for.<sup>53</sup> They feel it prepares them well for their future work as doctors<sup>29</sup> and enjoy the interaction with faculty.<sup>54</sup>

A more recent paper from the United Kingdom reported the feasibility of conducting PBL tutorials around real patients in a General Practice setting. Real patients from the community were used in a 7-week student-selected module which used a PBL approach in primary care. Patients were selected to represent common important clinical problems, and were initially recruited by tutors, and then, as the course progressed, by students. A 500 word summary of the patient’s case was prepared as the trigger, using the Maastricht ‘seven-jump’ sequence. A case outline was prepared, frequently using a ‘spider diagram’ or concept map. Students worked on the problem in groups, allocated tasks for independent work, and reported back at the end of the week. Evaluation was by means of student questionnaires. Real patients were found to be powerful triggers, with students examining a range of complex issues and using a variety of resources in a

multi-disciplinary approach. Students were supportive of the approach, and experienced no major logistical problems.<sup>62</sup>

Several issues emerge from the reports described and need to be considered further. Firstly, the role of PBL in the clinical setting needs further evaluation. Many innovative programmes use elements of PBL in the clinical setting, often as a modification of case-based teaching. The benefits of classical PBL compared to accelerated forms of case-based teaching need to be explored. More experimental studies need to be done to warrant the extensive use of clinical applications of PBL. In addition, authors writing about PBL should describe how their programme fits or departs from a PBL taxonomy and provide enough detail to permit others to replicate it.<sup>55</sup>

Secondly, an evaluation methodology for clinical PBL needs further development and refinement. Most studies use questionnaires administered to students and tutors and/or description of the methods employed. Others extend this approach to use focus groups,<sup>53</sup> student performance on examinations,<sup>54,57</sup> and interviews with patients.<sup>29</sup> These methodologies generally conform to the lower levels of the hierarchy of levels of evaluation proposed by Pitts et al (Table 2.8).<sup>63</sup> Their hierarchy is ranked from level zero-seven, with level one measuring 'satisfaction' and level four assessing learning through the demonstration of changed knowledge or the enhancement/attainment of a skill.

Finally, a number of logistic issues have been identified including availability, reliability and selection of suitable patients who match the requirements of the curriculum. Some authors address this problem by selecting patients to illustrate general themes or process issues, rather than specific content areas.<sup>29</sup> Possible effects of this process on patients need to be considered, as does the attitude and response of faculty to a new teaching method. Another challenge described by Gresham and Philp is to weave this learning process into the context of a busy clinical service with stretched resources of time and energy.<sup>54</sup>

## 2.6 Outcomes from problem based learning

Several reviews have highlighted the difficulties of evaluating the efficacy of PBL.<sup>1,32</sup> In many curricula PBL is introduced with a series of reforms including student selection, curriculum design, teaching philosophy and assessment methods. The effect of these confounding variables mean that it is difficult to determine the contribution of PBL to any outcome measures.<sup>64</sup>

Much of the early data on PBL was descriptive, based on anecdotal evidence of enthusiasts who were pioneering the method. Later empirical studies were quasi-experimental, often relying on small or highly specific studies with small numbers, and wide variations in settings and approaches to PBL. Schools had different views on curricula, objectives and assessment, and even expressed considerable differences in what they considered to be PBL. Pooling information from different programmes to measure the effectiveness of PBL may therefore not be reliable. These methodological problems mean that few controlled randomized trials of PBL have been (or are likely to be) conducted and that only limited conclusions can be drawn about the outcomes from PBL.<sup>65,66</sup>

There is agreement that students prefer the PBL approach: they enjoy the active participation in a process which they perceive as relevant, stimulating, and even fun. Teachers find PBL a satisfying way to teach, preferring the increased opportunity for student contact, and the minimization of barriers between students and staff.<sup>33</sup> The multi-disciplinary approach may have other advantages for staff: as faculty work together across disciplines designing, delivering and evaluating PBL curricula, they develop links which may foster research opportunities, clinical service delivery and enhance the work environment.<sup>67</sup>

Approaches to learning seem to be different for PBL students, who report they are more likely to study for deeper meaning and understanding, than for rote learning. They are likely to use a wider array of learning resources, to make greater use of the library, and to exhibit more choice and self-direction. Students in PBL courses are generally more satisfied and stimulated by their learning environment, tending to describe the early years of the course as challenging, engaging and difficult. In contrast, students in

traditional courses are more likely to describe their experiences as irrelevant, passive and boring. There is some suggestion that the self-directed learning skills enhanced by PBL courses may assist graduates to be life-long learners.<sup>66,67</sup>

Academic performances between students in PBL and traditional curricula show no consistent differences, with studies showing different results across schools and curricula. Differences across a range of attributes are marginal, with some researchers suggesting no difference, while other point towards slight trends. Performance on basic science tests as measured by the Dutch progress tests and the United States Medical Licensing Examination (USMLE) part 1 do not seem to vary greatly, although there is some evidence that long-term recall is improved in students in PBL curricula. PBL students appear to perform slightly better on clinical tests and in the clinical setting. The rate of progress through the course is little different or perhaps slightly better for PBL students.

Despite theoretical predictions there appears to be little evidence that some of the fundamental aims of PBL are demonstrably different for students in PBL courses. There is no evidence that students in PBL courses have improved clinical reasoning or problem-solving skills, or have improved motivation or interpersonal skills.<sup>67-70</sup>

Graduates from PBL programmes show some differences, although some studies suggest that after one-two post-graduate years all graduates are socialized towards the norm. Self-reports from New Mexico and McMaster graduates suggest they were better prepared for postgraduate study and practice. Clinical ratings from postgraduate supervisors found that these graduates were no worse than those from traditional curricula, and seemed to perform better in specific areas. Graduates from McMaster were more likely to spend more time in direct patient care, and to focus more on psychosocial issues. No major difference in career preference has been detected despite early beliefs that PBL graduates would tend towards careers in primary care.<sup>67</sup>

Introduction of PBL has an impact on the medical school; Des Marchais estimated an increase of 30% in the teaching load at the University of Sherbrooke in Canada. The experience at the University of New Mexico was that while PBL had an effect on increasing contact time between students and staff, the overall teaching load did not



change. The time invested in developing a PBL curriculum and training staff and students must be considered; this may be balanced by the institutional benefits that accrue from self-appraisal and innovation.

Finally, PBL has had a global impact in stimulating interest and debate in the pedagogical approaches to medical education. This has occurred in an environment of reforms in medical education and calls for greater social accountability and responsiveness for medical schools.<sup>50</sup> Mennin and Majoor conclude that ‘all things being equal, PBL is a more enjoyable and stimulating way to learn.’<sup>39</sup>

## **2.7 Developments in medical education**

The evolution of PBL over the past thirty years occurred against the background of considerable changes in medical education. Many medical schools were reviewing course and curricula, and moving to a dispersed community-based model of teaching. Medical schools are under pressure to become more responsive to community needs, and to deliver education in the context in which the majority of their students will practise, and where most of the patients are actually found.<sup>71</sup>

Just as the evolution of PBL as a teaching format was accompanied by an emphasis on small group learning, group process, metacognitive skills and student generated learning objectives, so too did medical education approaches mirror changes in society. For example, the provision of medical care early in the 21<sup>st</sup> century involves greater use of community facilities as hospitals evolve into high throughput, short stay and highly specialized centres. Economic pressures and the emergence of new techniques and therapies are changing the way that hospitals do business, with a growing emphasis on early discharge from hospital, with shorter stays and more outpatient treatment. The move of the major teaching resource – the patient undergoing medical treatment – into the community is matched by the increasing move to deliver education in this setting.<sup>71</sup>

As medical education evolved as a discipline, methodologies and research agendas were starting to address some fundamental issues. Curriculum designers across a variety of disciplines were asking questions like: ‘what are the learning objectives?’; ‘where can

they best be met?'; 'where are the resources?' etc. The movement to match curricular objectives with teaching location has been another driver for community-based education.<sup>72</sup>

Other changes included a more integrated approach to teaching. As many courses developed this approach they found the community more appropriate place for student education than the traditional hospital setting, in which there is a tendency to focus on particular organ systems or diseases. In common with the PBL approach there was a growing tendency to encourage students to think widely around clinical problems seen, and to link and integrate information from different areas and disciplines. Many schools were seeing the benefit of exposing student to real clinical material relatively early in their course, and structuring teaching around these experiences.

The increasing move to critically evaluate the ways and settings in which the students could learn from patients was paralleled by an appreciation of the patient as a resource. There was an increasing awareness of the importance of the experience of patients and their families as experts in their own illness, with the potential to contribute as partners in the teaching and learning process, rather than as passive observers or recipients of the process.<sup>73, 74</sup>

Pressure from the community and government influenced medical schools to become more responsive to community needs, and to deliver education in the context in which the majority of their students will practise, and where most of the patients are actually found. In many areas the emphasis shifted from the aim of producing a trained doctor to that of producing a trained and responsive workforce able to meet the community's needs.<sup>75</sup> For example, rural groups in Australia lobbied successfully to increase the rural exposure of all medical students to a minimum of eight weeks throughout the course.<sup>20,76</sup>

## **2.8 Research and evaluation in medical education**

This section will review the literature on educational research and evaluation and describe the distinctions between the two. Challenges in educational research will be

highlighted, and issues around programme evaluation discussed. This will be followed by a description of the specific tools used in this evaluation.

### **2.8.1 Evaluation in medical education**

Educational evaluation represents an attempt to measure and interpret the effects and effectiveness of teaching.<sup>77</sup> By gathering information about all or part of an educational intervention, judgements can be made about its merit which can lead to further development. Educational evaluation aims to inform the design and delivery of educational events to bring about improvements in the future.

Numerous approaches to evaluation of educational interventions have been described.<sup>77</sup> One approach links the ‘what to evaluate’ to the ‘how to evaluate’ under the sub-headings of programme / process / participants (Table 2.7).<sup>63</sup> Most authors support the view that any single approach is likely to be limited in depth or scope, and is likely to have problems with reliability and/or validity. As with assessment, a ‘mixed economy’ of methods is likely to yield the most useful information.<sup>78</sup>

Programme evaluation is described by Patton<sup>105</sup> as:

...the systematic collection of information about the activities, characteristics, and outcomes of programs to make judgements about the program, improve program effectiveness, and/or inform decisions about future programming. Policies, organizations, and personnel can also be evaluated. Evaluative research, quite broadly, can include any effort to judge or enhance human effectiveness through systematic data-based enquiry. Human beings are engaged in all kinds of efforts to make the world a better place... When one examines and judges accomplishments and effectiveness, one is engaged in evaluation. When this examination of effectiveness is conducted systematically and empirically through careful data collection and thoughtful analysis, one is engaged in evaluation *research*.

While both research and evaluation approaches may seek answers to questions that may subsequently inform action or policy using a variety of methodologies, there are some important distinctions between the two that are discussed in section 2.8.4.

**Table 2.7a: What to evaluate** <sup>63</sup>

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**Table 2.7b: Methods of evaluation**

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**A THE PROGRAMME**

- Existing databases – previous/other courses
- Review by committee
- Follow-up of drop-outs
- Time logs
- Cost-benefit analyses
- Curriculum evaluation models eg SPICES (Harden, 1984)
- Survey of past participants

**(i) Content**

- Curriculum mapping
- Standard guide
- Participant interviews
- Observation (live/recorded)
- Assessment of content through analysis of aims and objectives

**(ii) Outcome**

- Examination and assessment results
  - Audit eg prescribing, referring
  - Self-report
  - Peer assessment
  - Patient satisfaction ratings
- 

**B THE PROCESS**

- Participant questionnaires
  - Observation
  - Interviews
  - Discussions with the audience
  - Time logs
  - Analysis of resources
  - Analysis of curricular & extra-curricular activities
- 

**C THE PARTICIPANTS**

**(i) Learners**

- Satisfaction questionnaires, interviews, discussions, observations, anecdotes, notes, skits and songs
- Performance – tests and examinations, self and peer-assessment
- Personal attributes, approaches to studying learning styles
- Feedback from patients
- Demonstration of awareness of health needs

**(ii) Teachers**

- Ratings by others (eg learners, peers)
- Self-assessment - ? videorecording
- Questionnaires
- Evidence of interest in teaching, willingness to participate, discuss, innovate and analyse
- Interviews
- Demonstration of awareness of health needs

## 2.8.2 Research in medical education

Murray highlights a number of challenges in educational research, citing the ‘current vigorous debate as to what constitutes evidence in education, how educational research should be assessed, and to what extent the criteria of evidence-based medicine can be transferred to educational research.’<sup>78</sup>

Much of the dissatisfaction with medical education research stems from approaches that are descriptive, and rely largely upon satisfaction ratings from students.<sup>79</sup> Such measures are important, as learners who enjoy the programme are more likely to be motivated to learn more, but do not rank highly on the hierarchy of educational evaluation proposed by Pitts, Percy and Coles. They described a hierarchy of ‘levels of evaluation’ from Level 0, no formal evaluation, to Level 7, improvement in patient care. Many evaluations are at Level 2 (‘wants’) or Level 3 (‘needs’) (Table 2.8).<sup>63</sup>

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### **Table 2.8: A hierarchy of levels of evaluation**<sup>63</sup>

Recent developments in evidence-based medicine have been paralleled by an evidence-based approach in education. The Campbell Collaboration established in 1999 aims to inform both policy and practice in the social and behavioural sectors including education. Best Evidence Medical Education (BEME) brings an evidence-based approach to the practice of medical education, in an effort to ensure that ‘the implementation, by teachers and educational bodies in their practice, of methods and

approaches [is] based on the best evidence available.’<sup>78</sup> These movements have been driven by resource and accountability issues, and a recognition that educational programmers must be able to demonstrate that the desired outcomes are met. Parallels have been drawn between the impact of training medical students to practise as doctors at an expected standard, and other medical interventions which are designed to impact on health care. Several authors have argued that both should be rigorously evaluated before widespread implementation.<sup>75,78</sup>

However, there is considerable debate about approaches to research in medical education, recognizing that it is a complex field and is influenced by a number of important factors. For example, there is a considerable time lapse between any educational intervention as an undergraduate student and the desired outcome, of performance as a medical practitioner. Wood cites a number of other variables which may impact on professional practices such as postgraduate education, the clinical environment, pressure of career choice and personal circumstances.<sup>75</sup> In addition, the transition from student to practising doctor may be stressful, possibly due to the failure of medical schools to properly equip their graduates for professional practice. However, there is increasing attention being paid to the relationship between undergraduate medical education and performance of graduates as a measure of the success of the medical school programme. In contrast, the traditional approach is for medical schools to equip graduates with essential knowledge, but to rely on hospitals to develop these in the intern year and subsequent training into the wider skills and attitudes required for independent practice.

In addition, educational interventions are often complex and multifactorial. Like health services research, the interventions happen in the real world, and are subject to many external variables, which are outside the control of the investigator. Norman and Schmidt describe ‘... the futility of conducting research on interventions which, like PBL, are inadequately grounded in theory, in real environments which are so complex and multifactorial, with so many unseen interacting forces, using outcomes so distant from the learning situation, that any unpredicted effects would inevitably be diffused by myriad unexplained variables.’<sup>80</sup> The external variables may change during the study period, making interpretation of the findings even more difficult. The complexity of the

interventions and the changing environment mean that it may be difficult to attribute particular effects to particular parts of the intervention.

Several authors note there are significant problems with conventional approaches such as randomization.<sup>65,78</sup> Students enrolling in a particular course may have fixed expectations of the curriculum they will follow, and may not consent to possibly being randomized to another curriculum. Within a particular curriculum there may be considerable ethical and practical issues with randomizing at the level of an individual course. Other questions arise: how and when should students consent, and how should those who decline to participate in a trial be managed?

On the other hand, it may be ethical to randomize students where the proposed intervention is unproven but appears to have the potential to represent an improvement. However, there are other problems with applying these traditional research methodologies to the evaluation of educational programmes. Murray argues the paucity of funding available for educational research as evidence of the low value placed on educational research in the research community. In addition, there may be significant cultural problems impeding the advancement of methodologies in educational research: many educators are overloaded with curriculum development and service commitments, and clinicians may not apply the same rigour to their teaching and curricular innovations as they do to their own academic discipline.<sup>78</sup> Other authors support the argument that medical education research has low status, pointing out the tension experienced by some clinical academics who may have achieved high status in other parts of their professional careers.<sup>81</sup>

Short-term fixes, such as contract research in education, have also been described as contributing to the problem.<sup>82</sup> The need for increase rigour and coherence in medical education research has been dominated by a debate about research methodology. The emergence of ‘biomedical elitism’, that places a premium on quantitative methods and ‘hard science’ has been balanced by a shift in emphasis towards a more ‘reflexive and interpretative’ approach, which emphasizes the processes and goals of self-understanding.<sup>82</sup> These recent developments and debate about methodological approaches in medical education will be further discussed in the following section.



### 2.8.3 Methodological approaches in medical education research

Torgerson argues in favour of greater randomized control trial (RCT) methods in medical education on the basis that these are acknowledged as the ‘gold standard’ evaluation methodology and hence should be more widely adopted.<sup>83</sup> However, Norman warns of the perils of ‘grand educational experiments’, and goes on to assert that ‘...RCT = results confounded and trivial.’ The basis of his concern lies in the complex environment described in the previous section, wherein ‘... a controlled trial may well yield unbiased estimates of treatment effects, they will likely be lost in a sea of unexplained variance, and may not even be detectable’. He further states ‘What effects can be identified from such randomized designs are likely to be of such minimal importance as to be of little practical consequence. It is not that randomized trials are not possible to do on educational interventions, it is that they are not worth the effort involved in doing them.’<sup>84</sup> In addition, randomization relies on the maintenance of blind allocation, which is rarely possible in educational interventions.<sup>65,80</sup>

The difficulties of educational evaluation in a complex environment are supported by studies that demonstrate that changes in student performance are more influenced by the allocation of teacher than by other factors such as class size and composition.<sup>84</sup> One study found that 7% of the total variance in test score gains was attributable to differences in teachers. This variance is much more than that due to the curriculum, although, as Norman points out, ‘93% of the variance unexplained is much more again.’<sup>84</sup> Evidence from large studies of multiple interventions adds further weight to the complexities of educational research:

It was found that the variance in student achievement was larger within programs than it was between programs. No program could produce consistency of effect across sites. Each local context was different, requiring differences in programs, personnel, teaching methods, budgets, leadership and kind of community support.<sup>85</sup>

Norman argues that these findings support the emphasis on qualitative methods rather than ‘grand educational designs’.<sup>84</sup> The complex environment in which educational research occurs means that variables cannot be controlled in the rigorous manner that may be associated with an experimental design. Prideaux observes that the intervention

itself may be variable, for example, there are many variants of PBL. The outcome may be affected by variation in the environment, the culture, the students and teachers, and expectations and motivation. Attempting to control for these factors may indeed influence or remove the key factors that determine the success or failure of the intervention.<sup>65</sup>

Appropriate outcome measures are also more difficult to define in educational interventions than in other randomized controlled studies. Measurement against declared learning objectives may provide one approach. The hierarchy proposed by Pitts, Percy and Coles suggests that the ultimate goal is improved patient outcomes.<sup>63</sup> While these may be appropriate for some educational interventions – for example continuing professional development at the postgraduate level – they may be influenced by a variety of factors, both within and outside a practitioner’s control. In addition, there may be considerable time delay between the intervention and the opportunity to put it into practice, and a number of important impacts on a patient’s health may be expected to occur over many years and hence not necessarily measurable in the short-term.

An outcomes-based approach to medical education has gained popularity using a process to ‘design down’ the curriculum from a set of broad and significant outcomes for the educational programme.<sup>86</sup> Balanced against this view is the interest in learning processes, particularly in PBL research, where the process is central.

There are, therefore, at least three important factors that appear to limit the usefulness of the RCT in medical education research: difficulties with randomization control of variables, and choice of outcome measure. These difficulties have been used to support an eclectic approach to medical education, drawing on a variety of disciplines, perspectives and methodologies in an inclusive approach.<sup>65,78</sup>

For example, some authors have drawn attention to the limitations of traditional approaches such as outcomes-based research in PBL and called for ‘theory-based’ research investigating some of the fundamental questions in PBL such as the effect of prior knowledge on learning, the quality of the problems used, tutor performance and group functioning.<sup>87</sup> This approach requires educational researchers to critically

evaluate some of the fundamental assumptions on which PBL is based. They argue that attention should be focused on these questions using a mix of qualitative and quantitative methodologies drawn from a variety of disciplines. Some recent research findings in PBL and areas highlighted for further exploration will be described in section 2.8.5.

#### **2.8.4 The distinction between research and evaluation**

The primary purpose of research is different to that of evaluation, although the two approaches may use similar methodologies and generate similar data. Patton states that:

*Research*, especially fundamental or basic research, differs from evaluation in that its primary purpose is to generate or test theory and contribute to knowledge for the sake of knowledge. Such knowledge, and the theories that undergird knowledge, may subsequently inform action and evaluation, but action is not the primary purpose of fundamental research. <sup>105</sup>

The limitations of quantitative approaches that use traditional ‘scientific’ measures based on the assumption that variables can be identified and controlled have been well documented. The advantages of qualitative approaches have been discussed and have been argued by some authors as reflecting the differences between conventional research and evaluation (Table 2.9).<sup>63</sup>

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**Table 2.9: Differences between research and evaluation** <sup>63</sup>

Patton<sup>105</sup> supports the usefulness of qualitative methods in evaluations because they ‘tell the *program’s story* by capturing and communicating the *participants’ stories*.’ He describes numerous examples of evaluation case studies using qualitative methods which are drawn from programme evaluation, policy analysis, and organizational development and which serve to illuminate processes and outcomes for decision makers. However, he advocates a pragmatic approach to the choice of methodology. Qualitative and quantitative approaches have different strengths and weaknesses, which need to be considered when thinking about design alternatives and choices of methods. He describes the contrasts between qualitative and quantitative approaches thus:

The advantage of a quantitative approach is that it’s possible to measure the reactions of a great many people to a limited set of questions, thus facilitating comparison and statistical aggregation of the data. This gives a broad, generalizable set of findings presented succinctly and parsimoniously. By contrast, qualitative methods typically produce a wealth of detailed information about a much smaller number of people and cases. This increases the depth of understanding of the cases and situations studied but reduces generalisability.

In contrast to quantitative methods, which emphasize the central importance of the measurement instrument, in qualitative methods the focus is on the researcher undertaking the fieldwork, whose skill, competence, and rigor is vital in establishing the credibility of the method.

The distinction between research and evaluation does not, therefore, reflect the choice of methodology, but more the intended purpose. Qualitative approaches can also be used to build theory. This approach is particularly powerful as a source of grounded theory, which is theory that is inductively generated from fieldwork. The theory is not based on a preconceived hypothesis to be tested, but emerges from the researcher’s experiences, and observations in the real world.<sup>105</sup> Strauss and Corbin describe a constant comparative method which can be used for analysis drawing on aspects of grounded theory to produce the results. This approach uses a qualitative approach more for triangulation and hypothesis testing, than for developing new educational theory.<sup>106</sup>

The choice of methodology, both in research and in evaluative studies is pragmatic, reflecting the strengths and weaknesses of the relative approaches. Several authors advocate the use of triangulation, combining methods based on the recognition that every method has its limitations and multiple methods are usually needed.<sup>78,105</sup>

Triangulation can serve to strengthen a study by combining several different sources of data, including the use of both qualitative and quantitative methodologies. Triangulation may involve *data triangulation*, using a variety of data sources; *investigator triangulation*, using different researchers; *theory triangulation*, using multiple perspectives or paradigms to interpret one set of data; and *methodological triangulation*, using a variety of methods.<sup>105</sup>

Some authors have argued that educational evaluation becomes research when rigorous standards of reliability and validity are applied, irrespective of the choice of methodology.<sup>98</sup> Others suggest that the issue is more fundamental, and that increased rigour and coherence is needed, and achievable, in both educational research and evaluation.<sup>78,81</sup> Patton further suggests that in order to adequately assess any qualitative study, whether research or evaluation, the study's purposes, agreed-on uses and intended audiences must be understood. These factors will typically vary between research and evaluation studies. He cites dissertations as an example of a research study, which must also take account of a specific audience, the student's committee.<sup>105</sup>

### **2.8.5 Research in problem based learning**

A review of the PBL literature from 1992 to 1998 by Colliver looked at the evidence for the effectiveness of PBL in terms of knowledge acquisition and clinical performance.<sup>88</sup> He evaluated the evidence of links with underlying educational theory, the connections between PBL and educational outcomes, and the size of the effects of PBL as an educational intervention.

He concluded that 'The review of the literature revealed no convincing evidence that PBL improves knowledge base and clinical performance, at least not of the magnitude that would be expected given the resources required.' In addition to challenging the resourcing of PBL courses, he found few links between the research and underlying

educational theory. He was critical of the field of cognitive psychology, asserting that ‘the theory is weak, its theoretical concepts are imprecise... the basic research is contrived and *ad hoc*.’<sup>88</sup> He acknowledged that some aspects such as motivation, stimulation and enjoyment of learning were not challenged, but raised fundamental questions about the educational effectiveness of PBL.

Responses to this paper differ in their interpretation of the evidence, but agree on the need for further research to illuminate theory and practice. Albanese discusses the statistical concept of ‘effect size’, and argues that ‘effect sizes of 0.8-1.0 are an unreasonable expectation of PBL.’ His argument is based on other work, and issues such as the impact of student selection, and the effect size used in the studies reported. In addition, he cites a number of alternative theoretical frameworks for PBL apart from the Contextual Learning theory argued by Colliver. He examines the active ingredient of PBL, and argues that ‘even if knowledge acquisition and clinical skills are not improved by PBL, the enhanced work environment for students and faculty that has consistently been found with PBL is a worthwhile goal.’<sup>89</sup>

Norman and Schmidt agree with Colliver that there are not dramatic differences in cognitive outcomes with PBL. They acknowledge that the benefits of PBL have been promoted without due consideration for the associated resource costs. However, they take a different view of the cause of the problem, believing that the loose ties between theory and research or programme evaluation are attributable to problems with the evaluation process, not the theoretical models. They argue that ‘the evidence as presented is completely expected in view of the poor understanding of learning as exemplified by these curriculum level interventions, and that real progress will result from *more*, not less theory-based research.’<sup>80</sup> In addition to calling for more theory-based research they argue that basic cognitive research is not contrived and irrelevant, and warn that ‘curriculum level interventions, using simple experimental designs such as RCTs and limiting the manipulation to one variable, are doomed to fail.’ They believe it is more important to use a wide range of research methodologies which acknowledge the multiple variables involved, in order to take account of the complex multi-factor environment in which PBL is practised. They conclude that the challenging, motivating and enjoyable aspects of PBL may in themselves be a justification for the methods, providing the relative costs are explicit and not too great.

They further call for a systematic research programme in a range of settings in an effort to ensure that ‘theory development should be viewed as an essential and central component in the quest for prediction and control, not as a diversion from the “real” goal.’<sup>80</sup>

Further concerns about the evidence-based approach to medical education are raised by Dolmans.<sup>90</sup> For example, systematic reviews aiming to include only the studies based on randomized controlled trials or quasi-experimental designs with objective measures of outcomes, purportedly the highest quality papers, may lead to much of the literature being excluded. She cites one review in which only 15 of 91 identified citations met the inclusion criteria. She concludes with three messages to help address the gap between educational research and educational practice. Firstly, studies should be process-oriented, as well as outcome oriented, including narrative reviews and extend the objectivist view of science with the constructivist. Secondly, methodological quality needs to be improved, with more information reported about the context of a study and the more use made of triangulation of data. Finally, studies should report the underlying theoretical or conceptual framework, in an effort to build, test and compare theories.<sup>90</sup>

Other authors, including Farron and Norman, have been critical of the use of meta-analysis in evaluating educational approaches such as the effectiveness of PBL.<sup>66</sup> Concerns are raised over the orientation of the approach, and reliability of the outcome measures used, with studies cited that describe marked difference in effect sizes that are both positive and negative. The external measures of educational quality against which interventions are assessed also need to be considered. The end point of a ‘good doctor’, who is presumably a product of ‘good’ medical education, may, in fact, be a construct of the test itself. As with other authors critical of evidence-based approaches, Farron and Norman conclude with concerns about an undue focus on evaluation rather than understanding or explaining: ‘by ignoring the explanation of the results in a wider context, the non-tested attributes are marginalised.’<sup>66</sup>

### **2.8.6 Evaluation instruments**

A range of general approaches to educational evaluation have been described. These have been classified on the basis of their orientation. *Student-oriented evaluation*

predominantly uses measurements of student performances, such as examination results. *Programme-oriented evaluation* compares the performance of the course to the stated learning objectives, and may include descriptions of the curriculum and teaching activities. *Institution-oriented evaluation* is usually externally conducted and can be used to compare educational quality across institutions. Finally, *stakeholder-oriented evaluation* examines the perspectives of all of those involved, such as the students, the faculty, and perhaps the community or funding agencies.<sup>77</sup>

Most reports of evaluation in medical education include a mixture of outcome and process evaluation, with the emphasis on the student oriented and programme oriented approaches. A range of strategies have been described, including student questionnaires and focus groups, interviews with other stakeholders, group work characteristics and psychometric measures (Table 2.10).<sup>77</sup>

A number of approaches have been used in PBL evaluation using a range of qualitative methodologies. Specific aspects of the tutorial process have been evaluated by direct observation of tutorials, and by use of specifically designed evaluation tools. Another widely used instrument in educational evaluation is the *Approaches to Studying* questionnaire, which will be described in the next section.



**Table 2.10: Indicators used in evaluating educational innovations**<sup>77</sup>

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#### **2.8.6.1 Approaches to studying**

One widely used instrument is the *Approaches to Studying* questionnaire, which has been demonstrated to provide reliable results about the approach of students to

university study.<sup>91</sup> These results have been shown by researchers in Australia and the United Kingdom to be useful indicators of the characteristics of courses and learners. By exploring the approaches that students take to studying the instrument aims to provide academic staff with some insight as to whether their students are taking surface approaches (for example, memorisation of facts by rote) as compared to seeking deeper understanding.

The different approaches taken by students in higher education had been described by Marton and Säljö in 1976:<sup>92</sup>

In the case of *surface-level processing* the student directs his attention towards learning the text itself (*the sign*), i.e. he has a 'reproductive' conception of learning which means that he is more or less forced to keep to a rote-learning strategy. In the case of *deep-level processing*, on the other hand, the student is directed towards the intentional content of the learning material (*what is signified*), i.e. he is directed towards comprehending what the author wants to say about, for instance, a certain scientific problem or principle.

Ramsden and Entwistle used a variety of constructs from education literature to develop a formal *Approaches to Studying* questionnaire, which consisted of 64 items group across 16 sub-scales.<sup>93</sup> A broader classification of *Meaning Orientation* and *Reproducing Orientation* was used instead of the superficial versus deep approaches. Two additional dimensions were identified in this instrument: *Achieving Orientation* and *Styles and Pathologies* (Table 2.11).

Richardson developed a short form of the *Approaches to Studying* questionnaire, using 32 items to describe students' approaches on two main scales: *Meaning Orientation* and *Reproducing Orientation*.<sup>94</sup> He found that this instrument achieved satisfactory levels of reliability, and could consistently demonstrate differences on these orientations across a variety of student groups. The questionnaire could be used to provide an indirect evaluation of a teaching programme. By providing some insights into the preferred approach of students to study, academic staff could determine if their teaching strategies were matched by desired behaviours in the students.

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**Table 2.11: Approaches to studying questionnaire**<sup>93</sup>

The instrument developed by Ramsden provided some evidence as to whether students were adopting surface strategies such as reliance on recall and rote learning, instead of

the deeper strategies such as achieving full understanding and conceptual mastery. This information, could in turn, be used to inform curriculum design, teaching and assessment strategies in order to drive the students' learning and studying approaches in the desired direction.

Other authors have pointed out that while the most desirable and successful method is the deep approach, the policies and educational approaches in some medical schools may hinder rather than assist in the development of the desired approach. They suggest that changes will require not only review of the teaching, curriculum and particular assessment, but also a strategy to identify and assist students whose approaches to study may be of concern.<sup>95</sup>

## **2.9 Summary**

This chapter has reviewed the development of PBL and underlying educational theory. A wide variety of PBL approaches have been described in many different settings. Other changes in the medical education environment have included the move towards more community-based education, a re-appraisal of the role of the patient, and a renewed emphasis on learner centred approaches in medical education.<sup>96</sup>

There are theoretical reasons why PBL should be a successful educational strategy in the clinical setting, which are supported by a number of reports emerging from the literature. Judging by the relatively infrequent reports of its use, PBL is probably under-utilised in clinical education. Much more work needs to be done in this area to define the approach, methodology and evaluation of clinical PBL

A number of issues in educational evaluation have been highlighted, including the debate around an evidence-based approach to medical education. While there are some parallels to the evidence-based approach in clinical practice, some cultural and structural barriers exist. There is an increasing emphasis in both disciplines in evaluating the quality of studies and choosing appropriate methodologies in order to improve the evidence base. Two important factors in good educational studies are that

the educational rationale is made explicit and the evaluation is planned well in advance. Education research differs from evaluation in that its primary purpose is to generate or test theory aimed at producing generalizations for the wider community. Both approaches may use a mixture of qualitative and quantitative methodologies.<sup>105</sup> More rigorously designed research into the effectiveness of education is needed in order to attract research funding to elevate the status of educational research.<sup>97,98</sup>

The next chapter presents the methods by which this study designed and evaluated a model of clinical PBL and the process used to generate research findings.

## CHAPTER 3

### METHODS

This section will describe how the project was developed, implemented and evaluated. The first part will outline the educational design, including early experiences at the North Queensland Clinical School with PBL using real patients, and how the *Problem of the Week* format was developed. This will include a description of how the *Problem of the Week* integrated with the SM503 course in General Practice, and how it contributed to the overall learning objectives. Aspects of the development of the educational design that will be described will include: organization of the term; student selection and group allocation; tutor selection and training; patient selection and recruitment; case design; and tutorial delivery and implementation. Finally, evaluation of the tutorial process and other aspects of the *Problem of the Week* will be discussed. Methodological difficulties in educational research will be discussed, as will an outline and rationale for the evaluation strategies chosen in order to address the identified research questions.

#### **3.1 Development of the *Problem of the Week* concept**

The *Problem of the Week* was designed to illustrate common principles in the management of conditions in General Practice by involving students in a real case presented in a PBL format. This concept was based on the desire to make a relatively didactic course more interesting and clinically relevant, and reduce didactic content. The *Problem of the Week* met the learning objectives of the course by allowing students to explore in detail various aspects of a real-life case, which was often evolving or undefined.

As students in North Queensland were undertaking this course in parallel with the larger group at the main campus, the same learning objectives and assessment

procedures had to be met, although some differences in the format and style of delivery were possible. Students still attended formal tutorials on the academic basis of General Practice, including principles of the General Practice consultation and the approach of a general practitioner to a range of conditions. They were exposed to a range of common General Practice conditions, with further training provided in communication skills training via consultations with simulated patients and video review and feedback.

The *Problem of the Week* replaced other sessions such as the management of chronic conditions, which had previously involved discussion of paper-based cases. The *Problem of the Week* was allocated around three hours of curriculum time each week, with students expected to undertake a further two-three hours of self-directed study around the problem. The concept was to replace teaching sessions around paper-based or theoretical cases, with discussions around real-life General Practice patients with evolving or incompletely explored problems. Students therefore were exposed to similar teaching material to their colleagues on the main campus but with a different educational approach and format.

The *Problem of the Week* was introduced in the first General Practice term conducted in North Queensland in 1994. Initially this was a modified form of case-based teaching. Students were given a brief synopsis of the clinical picture and asked to explore aspects of the case and report back. Both written and video formats were used to provide stimulus material for students to trigger discussions around the case. The early experience with this format was fairly unstructured, but shared a number of principles with conventional PBL. Students were initially required to work on the case as a group to generate hypotheses, possible explanations, learning objectives, and identify possible resources. Through a combination of individual and group work they undertook these tasks, and reported conclusions and recommendations for management back as a group later in the week.

Early evaluations suggested this method was popular with students and staff and appeared to be successful in meeting the learning objectives of the course. The decision was therefore made to explore this concept more fully, and to continue to develop the *Problem of the Week* in a PBL format as one of the teaching strategies

in the General Practice term in North Queensland. This was also seen as an opportunity to help staff make the transition to the new PBL curriculum that was being implemented by the medical school.

The development of these tutorials can be considered in three phases. The first phase, from 1994-95, involved staff and students gaining experience in the technique. Considerable experience was gained in this phase, which was supported by reviewing the literature, attendance at conferences, discussion with academics, and informal evaluation. Group sizes were small, with only two rotations conducted in 1994, which was increased to four rotations in 1995 as the Clinical School became more established. Evaluation was conducted by means of interviews and questionnaires administered to students, staff and patients. This led to a number of changes in case selection, preparation of students, delivery of tutorials, and tutor training. The second phase was a more formal pilot in 1996-7, during which the tutor training process, the *Problem of the Week* Tutorial process, and the evaluation instruments were trialled and further refined. The third phase was the formal implementation and evaluation of sixteen PBL tutorials in 1998. (Table 3.1)

**Table 3.1: Development of the *Problem of the Week***

1994	1995	1996	1997	1998
Phase 1		Phase 2		Phase 3
Conceptual development		Pilot		Formal trial

The following sections will describe how the *Problem of the Week* was developed and refined in the early phases in response to feedback from participants in order to arrive at a standardized format to be used in the formal evaluation.



### 3.1.1 Organisation of the Term

Each student group undertook a four-week term, with a teaching week at the University's Clinical school in weeks one and four, and a General Practice attachment in weeks two-three (Table 3.2). This was the same format as was followed by students on the main campus. The learning activities and workbooks for the General Practice terms was the same across the two locations, although students in north Queensland tended to undertake more attachments in rural and remote settings. In the initial stages of phase one, students undertook the *Problem of the week* exercise once only. As the early evaluations were positive, a decision was made to run these tutorials in both teaching weeks. Each student group from 1995 onwards therefore undertook the *Problem of the Week* exercise twice over the term, in week one and week four.

**Table 3.2: The Year 5 GP term (SM503), The University of Queensland, 1998**

Week 1	Week 2	Week 3	Week 4
Introduction, lectures, seminars (on campus)	General Practice placement		Seminars, debrief, examination (on campus)

The size of the first group to undertake this term in North Queensland was only five students. Over time more students were located in the region, with groups of ten-fourteen. In the initial stages each student group undertook one *Problem of the Week*, in a group size that varied from five-ten. As the project moved into the second pilot stage, students were formed into groups of five-seven, with each group undertaking two separate PBL tutorial cycles, one in the first week and one in the last week of term. This was consistent with the literature on learning in groups, particularly in the PBL context, which suggested the ideal group size to allow appropriate group dynamics and participation is probably less than ten.<sup>2,60</sup>

Students therefore undertook the *Problem of the Week* in the week before and the week after their two-week General Practice placement. Two student groups undertook their General Practice rotation in North Queensland in 1994, which was increased to four groups per year from 1995. Rotations on the main campus occurred in eight time slots across the academic year.

### **3.1.2 Student selection and group allocation**

Selection of students to participate in this process was not random. Students elected to undertake their GP term in North Queensland, with a strong likelihood of selection bias due to rural interest etc. Students were allowed to form their own PBL tutorial groups for the General Practice term with no constraints other than ensuring group size was appropriate. The majority of students were undergraduates with no university experience prior to their current degree, and little prior experience with PBL. Entry to medical school for this student group was determined on the basis of academic performance, not on interpersonal, group or problem-solving skills.

The early experience in phase one was with six groups of students undertaking one or two problems each from 1994-5. The pilot phase in 1996-7 involved eight SM 503 terms. In each term two groups undertook two problems each, hence experience was gained with thirty-two PBL problems. The formal evaluation in phase three in 1998 was with sixteen PBL cases over four terms, with two PBL groups in each term (Table 3.3).

**Table 3.3: Numbers of student groups and *Problem of the Week* cycles**

1994-95	1996-97	1998
Phase 1	Phase 2	Phase 3
Conceptual development	Pilot	Formal trial
6 student groups	8 student groups	8 student groups
1-2 problems / group	2 problems / group	2 problems / group
10 <i>Problem of the Week</i> cycles	32 <i>Problem of the Week</i> cycles	16 <i>Problem of the Week</i> cycles

### **3.1.3 Tutor selection and training**

The move to a smaller PBL group size in 1995 presented some logistic challenges. In each of the four GP rotations held each year, four separate PBL cases were run, two in the first week and two in week four. As a total of four cases were now undertaken in each term there was a need for more tutors and more suitable cases. Two staff had by this stage gained considerable experience in tutoring these PBL tutorials, as well as experience in other PBL schools. This was supported by reviewing literature and other activities including observation of PBL tutorials in other medical schools, and discussion with national and international experts. A programme was instituted to recruit and train further PBL tutors from other members of faculty, and practising GPs with an interest in education. Tutors were recruited on the basis of their availability and demonstrated interest and skill in small group teaching in the General Practice context.

Tutors were required to complete a comprehensive training programme based upon that which was described in a Canadian PBL programme.<sup>99</sup> New tutors were provided with background reading on the philosophy of PBL, and the approach taken in this project. They then had the opportunity to observe a *Problem of the Week* tutorial cycle. The next step was to conduct a PBL tutorial under observation, with written and verbal feedback from an experienced PBL tutor. The same staff

member was involved in training all tutors used in the formal evaluation. The final step was participation in a half-day workshop with other tutors undergoing training.

In order to standardize the tutor performance in the *Problem of the Week* tutorials, a two page summary of the process was prepared (Appendix 1). Eight tutors were involved in the training process, with four used in the formal evaluation.

Interviews and questionnaires were used to evaluate the process of tutor training and develop a standardized approach to tutor training. Tutors were also asked to complete a *Group Assessment Schedule* as developed by the University of Manchester<sup>100</sup>. This validated instrument was used as part of the formal evaluation in the third phase.

A number of lessons were learned in the development of the tutor training process. Many tutors were new to the PBL process, and experienced some difficulties in teaching in a non-didactic style. Common issues raised related to problems with the group process, and how to move from a teacher-centred to a learner-centred model of education. These issues, and other raised by tutors, students and staff were discussed at the half-day workshop. Tutors particularly appreciated the opportunity to observe a tutorial, and to receive feedback on their performance. Tutors reported satisfaction with this approach to tutor training which then used for the formal evaluation phase.

### **3.1.4 Patient selection and recruitment**

The second logistic problem considered was recruitment and selection of appropriate patients. All patients were recruited from the teaching practice associated with the clinical school, and were generally under the care of the faculty involved in teaching the General Practice subject. In the early phases of this project, the patients used were often under the care of the member of faculty who was acting as the PBL tutor. As the project evolved, some of the tutors were not directly responsible for the patient's care. In an attempt to standardize the process as much as possible, none of the tutors used in the formal evaluation phase were directly responsible for the patient's medical care.

There was little experience in the literature to guide patient selection. Initially, teaching staff selected patients whom they believed were able to illustrate some of the learning objectives of the term. Patients had to consent to participate, and be willing to allow interviews with the students at the clinic and, if possible, at their home. Faculty involved in these tutorials selected patients who they felt would help students meet some broad learning objectives. These included the management of uncertainty and care of chronic complex patients in General Practice, as these were the modules that were replaced by the *Problem of the Week*. As the learning objectives were broad, the precise clinical problem did not seem to be as important as the processes of care that were demonstrated in the case. Evaluations in phase one and two suggested that successful cases for the *Problem of the Week* format could be developed around cases that were complex or incompletely explored, but the features of suitable cases had not been formally evaluated. Cases that met these broad parameters were selected for the formal evaluation, which aimed to explore the choice of case and features of suitable and unsuitable cases in more detail.

An important issue to be resolved before ethical clearance was obtained and a formal evaluation undertaken was whether patients felt there were any adverse experiences from participation. Patients in the pilot phases were asked about their feelings about participation in the *Problem of the Week*. Most were very willing to take part. They enjoyed the experience of being involved in the education of medical students and the interaction with the students. Several felt that their care was improved or they had learned more about their condition as a result of involvement in these tutorials. Only one patient in the pilot phase expressed reservations about involvement in the *Problem of the Week*, raising concerns about possible loss of privacy, particularly in relation to ongoing psychological and sexual problems.

No patients in the early phases felt that their care had been adversely affected or reported any other negative effects or significant inconvenience from involvement, hence there was no obstacle in proceeding to the formal evaluation.

This experience helped refine selection of patients for the formal trial of the *Problem of the Week* in phase 3. Clinicians were asked to select patients who were comfortable in talking about their condition. These were generally long-term patients with whom the treating doctor had established a good relationship. They needed to have relatively complex health problems which could be used to meet the broad learning objectives of the activity. Brief demographic data of the patients used in the formal evaluation together with their major problems are summarized in Table 3.4.

**Table 3.4: Demographic data of patients used**

Patient	Age	Gender	Groups	Problem
1	76	female	A, O	abdominal and flank pain
2	49	male	B, F	anxiety, depression
3	39	male	C	abdominal surgery, rectal polyp
4	72	male	D	shortness of breath, depression
5	80	male	E	falls
6	70	male	G	chronic musculoskeletal pain
7	56	male	H	burning feet, unemployed
8	62	male	I	diabetes, swollen testis
9	83	female	J	tiredness
10	55	male	K	irregular pulse
11	81	male	L	hypertension, back pain
12	80	male	M	carcinoma prostate, joint pain
13	73	female	N	weak and dizzy, hypertension
14	67	male	P	loss of energy, COPD

A standardized consent form was used with some modifications. Firstly, patients consented in writing to videotaping of a consultation, which formed the basis of some of the trigger material provided to the students. Patients were aware that they could decline involvement at any stage, and that they could request that the tape be erased. They were aware that the tape was only to be used for teaching purposes, and that declining to participate would not affect their treatment at the clinic.

Secondly, patients gave explicit permission for participation in the *Problem of the Week*. This included acknowledgement that students may wish to interview them at the clinic and at their home, would have access to their case records and may discuss their case with various health professionals involved in the case. Again,

patients were able to decline involvement in any aspect at any time, and were aware there were no sanctions for doing so. The clinician responsible for the patient's care provided the patient with an information sheet, sought verbal and written consent, and clarified any issues with the patient. Finally, a letter was sent to the patient confirming details of their involvement, and allowing a further opportunity to clarify any uncertainty or to decline involvement. A staff member telephoned patients the day before the first PBL tutorial as a final reminder. Patients were informed that they were able to decline involvement at any stage of the *Problem of the Week*, and tutors were asked to intervene if they felt patients were experiencing any distress or fatigue. Copies of the consent forms and information sheet for patients appear in Appendix 2.

### **3.1.5 Ethical clearance**

Ethical clearance was sought from the Townsville District Health Service ethics committee, which took responsibility for the facility in which the research was being conducted. Patients were asked to consent to both allowing videotaping of part of a consultation and to participation in this study. Copies of the consent forms and information sheet were sent to the committee, and approval was obtained before the formal evaluation commenced. A copy of the approval is in Appendix 3. Issues considered in obtaining approval from the ethics committee included confidentiality, patient inconvenience or harm, and the right of the patient to decline involvement at any time without penalty.

### **3.1.6 Case design**

Once a patient had been selected as the basis for a *Problem of the Week* and consent obtained, a case outline was written. This was a one-two page document which summarized the salient features of the case: the written and videotaped triggers, expected observations and conclusions the students could be expected to elicit, possible hypotheses, and suggested learning objectives and resources. Case materials and discussion with practitioners involved in the case were used in preparing this material. Concept maps, or spider diagrammes, were prepared for a number of cases (see Case Study 1 and Appendix 4).<sup>62,101</sup> Resource people who

were identified as being able to contribute to students' learning around the case were identified and contacted by telephone. They were given a brief description of the students' learning objectives and a suitable time for contact was negotiated. Experience from the trials in the early phases suggested that a variety of resources were useful to students. Health care professionals had to be available and interested, be familiar with the patient's case, and be seen by the students as able to assist in meeting the learning objectives they had devised. Fixed resources such as journal articles and other literature were provided if required.

The case outline was provided to the PBL tutor as an indication of desired learning activities, although tutors were not required to ensure students followed the outline precisely, and students were able to influence how deeply they explored each case. The outlines formed a useful tool to correlate the learning objectives of each case with the overall objectives of the course and to compare with the learning objectives that each PBL group devised. Several faculty were involved in writing cases in the first two phases of this project, but in the formal evaluation all cases were written by the same staff member.

A template was developed in the pilot stages and was used for cases in the formal evaluation. This was based on formats used by other PBL courses, modified according to experience gained in the pilot phases and reports in the literature. The template used for writing case outlines in the formal evaluation appears in Table 3.5. Case Study 1 illustrates a typical case outline, with a more detailed description of this case together with a copy of the student-generated referral letter in Appendix 4.

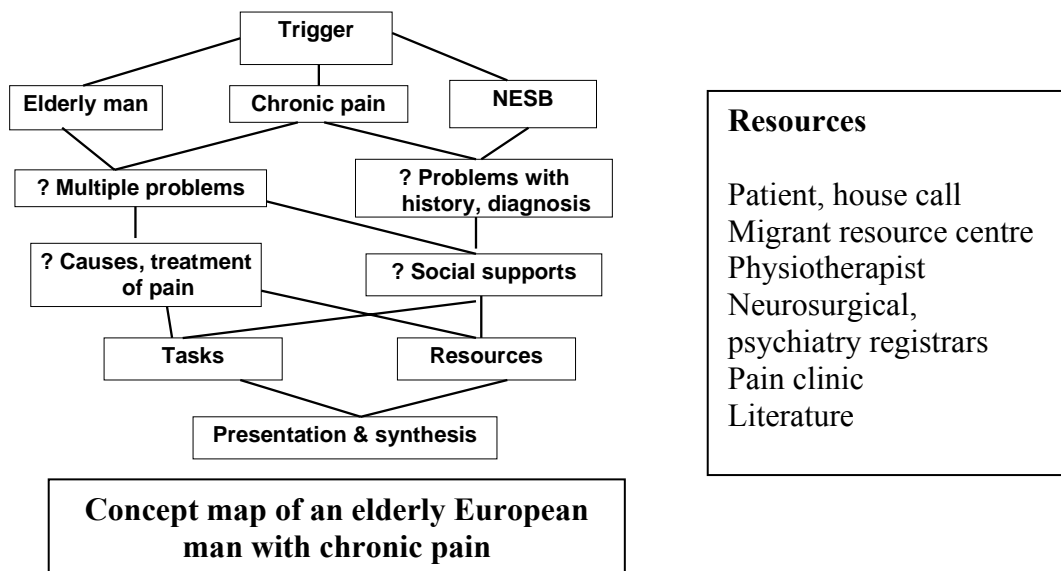
**Table 3.5:**  
**Template of case outline**

<b>TRIGGER:</b>	Video of Consultation, Overhead
<b>OBSERVATIONS:</b>	
<b>EARLY CONCLUSIONS:</b>	
<b>POINTS TO DIVULGE:</b>	
<b>ISSUES RAISED:</b>	
<b>RESOURCES:</b>	
<b>TASKS:</b>	
<b>LEARNING OBJECTIVES:</b>	



### Case Study 1: Patient 6, Group G

This case illustrates the development of a case of a patient with a chronic problem in which the students had to consider a number of dimensions. The trigger consisted of a brief video of the patient and an overhead transparency, ‘...elderly Hungarian man, several presentations over the past 12 months with pain in the left neck, shoulder and chest after walking ~50m.’ Students were expected to consider the relevance of the patient’s non-English speaking background (NESB), and possible explanations for his chronic pain such as angina, musculoskeletal, neurological or emotional causes. A concept map was developed as part of the case writing process which is summarized below.



Students were expected to identify important features they would seek to elucidate on the history and examination in order to work through the case. This would lead to a discussion about possible investigations and the need for referral. Questions to be addressed included the impact of the pain on the patient’s life, the significance of his non-English-speaking background, and resources available to deal with these problems. Students would also be expected to consider the most likely explanations for his chronic pain and options for managing his pain. Possible resources are summarized in the box.

Learning objectives in this case relate to the problems that patients with non-English speaking backgrounds may face in accessing health care, the approach to chronic pain and to the management of uncertainty, and possible causes and management in this patient. Full case details appear in Appendix 4 along with a copy of the student-generated referral letter.

### 3.1.7 Allocation of cases and tutors to groups

Other issues that were considered in the pilot phases were related to case selection, and allocation of tutors to groups. The PBL literature emphasizes that case selection and tutor characteristics are two of the major variables in a PBL case.<sup>52,45</sup> The project had to be designed to account for these factors and minimize their influence. Tutor availability and timetabling constraints meant that the same tutor was not able to tutor both PBL groups in the one week, so a variety of tutors was used. The author acted as a tutor in the early phases but was not a tutor in the formal evaluation. Limited availability of patients and teaching resources meant that it was not feasible to use the same patient case with both groups in the same week.

All cases fitted a template consistent with those used in other PBL programmes (Table 3.5). Broad learning objectives included illustrating the process of General Practice care, and management of chronic conditions or cases with multiple dimensions. There were no particular content areas defined, so all cases that satisfied these requirements were considered suitable, and there were no case- or content- specificity issues. As the focus was on the process of General Practice care encompassing multiple dimensions, a group or tutor with particular content expertise was felt to have no particular advantage. For this reason, no attempt was made to define the specific content area of cases or allocate cases to specific PBL groups.

Within a number of the General Practice terms in the pilot phases the same patient and case was used twice, for example, with one PBL group in week one, and the other group in week four. However, this raised a question concerning differences in performance of an individual group between weeks one and four, possibly based on the experience in week one that may have made students more comfortable with the PBL format in the second *Problem of the Week* cycle. There was, in addition, the potential for discussion about the case between the two PBL tutorial groups in the same rotation. In some instances in the pilot phase the PBL process appeared to be weaker on the second case, possibly because students had already discussed some of the issues and diagnoses with their colleagues, and did not have the opportunity to explore these fully for themselves in the PBL tutorials. For this reason, four

different patient cases were used in each SM503 term in phase three. While limiting options in terms of patient recruitment and selection, one confounding variable was removed, and issues relating to patient fatigue and overuse were also minimized.

Allocation of tutors to groups was also considered in phase two. Groups often performed better when they had the same tutor in both weeks one and four. The group process was more firmly established by week four, and the tutor and the group were developing a working relationship. However, tutors were not always available for both weeks, and a decision was made in the formal trial to allocate each group a different tutor for each problem to minimize the confounding effect of some groups having the same tutor, and some different tutors.

The process of allocation of cases and tutors to groups in the formal trial was not randomized due to the constraints of availability and avoidance of doubling up tutors or cases. Four tutors were used, all of whom had undergone the standardized training process. Allocation of groups to tutors was dependent on availability of tutors for the *Problem of the Week* cycle, with the result that two of the tutors were used on three occasions, and two tutors on five occasions. Each tutor was involved with a different tutorial group for each problem.

Allocation of cases to groups was driven by patient availability, and the suitability of their current clinical picture to the learning objectives. Fourteen different patients were used, two of whom were used on two occasions. Where patients were used on a second occasion, this occurred in a different term, so that students did not have the opportunity to discuss the case with a group who had previously worked on the same problem. The formal evaluation occurred over four rotations in an academic year. Within each rotation two separate PBL tutorial groups were formed. Each group undertook a *Problem of the Week* twice, in week 1 and week 4. The evaluation therefore consisted of eight tutorial groups undertaking two PBL problems each, making a total of sixteen problems. The allocation of cases and tutors to groups in the formal pilot is summarized in Table 3.6. Data relating to the age and health care problems of the patients used have previously been summarized in Table 3.4.

**Table 3.6: Allocation of cases and tutors to groups**

		<b>Student Group</b>	<b>Tutor</b>	<b>Patient</b>		<b>Student Group</b>	<b>Tutor</b>	<b>Patient</b>
Term 1:	Week 1	<b>A</b>	Tutor 1	Patient 1		<b>B</b>	Tutor 2	Patient 2
February	Week 4	<b>C</b>	Tutor 2	Patient 3		<b>D</b>	Tutor 1	Patient 4
Term 2:	Week 1	<b>E</b>	Tutor 3	Patient 5		<b>F</b>	Tutor 1	Patient 2
April	Week 4	<b>G</b>	Tutor 1	Patient 6		<b>H</b>	Tutor 3	Patient 7
	Week 1	<b>I</b>	Tutor 4	Patient 8		<b>J</b>	Tutor 3	Patient 9
Term 3: July	Week 4	<b>K</b>	Tutor 3	Patient 10		<b>L</b>	Tutor 4	Patient 11
Term 4:	Week 1	<b>M</b>	Tutor 1	Patient 12		<b>N</b>	Tutor 3	Patient 13
September	Week 4	<b>O</b>	Tutor 3	Patient 1		<b>P</b>	Tutor 2	Patient 14

### **3.1.8 Delivery and implementation of the *Problem of the Week***

The experiences in the early phases were used to refine the process for implementation of the Problem of the Week. In the first phase students were provided with stimulus material and provided with a loose structure to work through the case. Students struggled with this approach for a number of reasons and requested more structure and direction. Students were fairly new to the PBL process, and expressed some difficulty in adjusting to the format. At this stage they were in year 5 of a ‘traditional’ curriculum, and had become accustomed to more didactic content-based tutorials. They had some experience of self-directed learning and of working in small groups, but were less comfortable in generating and testing hypotheses, devising their own learning objectives and identifying resources. In addition, a number of students had a negative impression of PBL, partly based on misconceptions, and partly based on an earlier experience with a PBL-like process. Most students had undertaken an exercise in year 4 which was loosely structured like a PBL problem; however, the case took several weeks to unfold and left many students feeling frustrated with the slow pace and perceived lack of content.

Recognition of these issues led to several modifications in phase two. A strategy was implemented to acknowledge students’ negative perceptions about the PBL process. Tutors were asked to introduce the first PBL tutorial by eliciting students’

prior perceptions about PBL. Tutors then worked through these issues with the group to arrive at a point where they were satisfied that the students' concerns had been met. The rationale for the *Problem of the Week* was then presented and discussed with the students. The summary of the issues presented to the students in the formal evaluation appears in Table 3.7.

A brief summary of the steps involved in the PBL process was also prepared and presented to the students as an overhead transparency (Table 3.7). This was discussed in some detail at the initial tutorial, and supported by some detailed written material, which was provided to the students ahead of time (Appendix 5). These steps were derived from the approach taken in other PBL courses, but with minor wording changes to reflect the clinical context. The overall process of eliciting students' prior experiences, addressing concerns and explaining the *Problem of the Week* process and rationale took around 15-20 minutes. Tutors were asked to satisfy themselves that students understood the process and felt comfortable that their concerns had been addressed before proceeding.

Students worked through the problem following these steps, with tutor facilitation as needed. The overhead transparency outlining the process was available for the group to refer to throughout the tutorial. At the start of the tutorial, tutors ensured that students understood the process, and appropriate group processes had been negotiated, including a discussion on whether to appoint a chair for the group. Students initially viewed the trigger, which consisted of a brief video of the patient and a short statement about the patient. They then pooled their observations and impressions, usually working on a white board with one group member acting as the 'scribe'. Students then worked together in a hypothesis generation or 'brainstorm' session, to formulate some early conclusions relating to the health care problems of the patient and possible explanations. They then considered the issues that were

**Table 3.7: Overhead transparencies used in the introduction to the Problem of the Week**

<p style="text-align: center;"><b><i>Problem of the Week</i></b></p> <p style="text-align: center;"><b>Why ?</b></p> <p>simulates real life</p> <p>better understanding</p> <p>problem considered in depth</p> <p>involvement in patient care</p> <p>positive student feedback</p> <p>group controls the learning</p> <p>group work</p> <p>individual tasks</p>
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<p style="text-align: center;"><b><i>Problem of the Week</i></b></p> <p style="text-align: center;"><b><i>How ?</i></b></p> <p>‘trigger’ - limited information</p> <p>observations and impressions</p> <p>formulate early conclusions</p> <p>what issues do these raise?</p> <p>identify resources</p> <p>generate and allocate tasks</p> <p>report conclusions &amp; recommendations</p>
---

raised in the management of the case, possible learning objectives, and resources available to the group. Students generated and allocated tasks, which were undertaken independently throughout the week, prior to the reporting back and synthesis session at the end of the week.

As the *Problem of the Week* was a core teaching activity of the term it was not considered necessary to obtain student consent for participation. However, students did consent to participate in the evaluation, although the experience in the trial was that no students had any concerns with so doing, provided time was available.

Each teaching week was structured around the *Problem of the Week* in order to maximize the opportunity for students to work independently and gather information on the problem under consideration. The introductory tutorial was usually scheduled for the Monday and the wrap-up tutorial for the Friday. This allowed three clear working days for students to work on the case, gather material and undertake the identified tasks (Table 3.8). In a number of cases timetable constraints such as student examinations and public holidays meant that the tutorials were closer together. Responses from students indicated that they needed a minimum of two days, and some protected time during the day to undertake these tasks. This was achieved in all the tutorials in phase three.

**Table 3.8: Problem of the Week: Weekly cycle**

Monday	Tuesday	Wednesday	Thursday	Friday
Introduction, view trigger, meet patient, allocate tasks	Independent learning tasks Meeting mid-week to share information and plan presentation			Wrap up session, summary and recommendations

Patients were invited to participate as described in section 3.1.4, with written consent obtained and an information sheet provided well ahead of time. Patient involvement in these tutorials was structured to minimize inconvenience to them. Where possible, patients were asked to meet with a group of students at around a scheduled appointment time. This enabled the clinician responsible for the patient care to conduct a consultation with the patient after they had been interviewed by the students. Scheduling a clinical visit with the *Problem of the week* teaching session avoided the inconvenience of patients having to make an extra visit to the

clinic for teaching purposes. In addition, students had the opportunity to observe a clinical interaction between the patient and their general practitioner, after having first considered the case and conducted their own interview. On some occasions patients were required to make an extra visit to the clinic in order to participate in the Problem of the Week, and transport was arranged if required.

A number of other issues emerged in the pilot stages of the Problem of the Week, which were used to determine the format of the formal trial. The importance of managing the change in learning format has already been discussed. Students were initially still concerned with finding the diagnoses and answers to the problems that arose, and less interested in generating hypotheses and exploring issues in detail. Some tutors described the importance of limiting the amount of information initially presented to the students. The most effective stimulus material was found to be brief: no more than one or two sentences briefly outlining the case, and up to one minute of videotape. Limiting the amount of material initially presented to the students forced the group to generate hypotheses and explore what was known and not known about the patient, and consider possible issues and resources. Where more material was presented in the initial trigger, students were likely to confine themselves to documenting the information, and were less likely to think about and explore unknown aspects of the case. On one occasion in the pilot students had access to the patient's medical record at the start of the case and spent most of their time searching for answers in the medical record. The tutor's observation, which was supported by evaluations from a number of students, was that this approach worked against the desired PBL process. By moving directly to the diagnoses, or end-point of the tutorial, this group appeared to be less successful in meeting the learning objectives than if they had considered all aspects of the case before being presented with the case material.

Another issue that arose was that students often needed to share information that was uncovered during their independent learning tasks. All students were present for the initial discussion around the stimulus material. Towards the end of the first tutorial learning objectives were identified and tasks allocated. These typically included interviewing and examining the patient, visiting the patient at home, reviewing the file, talking to the general practitioner and other health professionals



involved in the care of the patient, and reviewing the relevant literature. All students in the group met the patient at the end of the first tutorial. The nominated students then interviewed the patient while the remainder of the group observed through a one-way mirror from an observation room. Arrangements were made with the patient at this stage to interview them at home. At this stage all students in the PBL group had the same information about the case, and had compiled a list of tasks to be undertaken by the group over the next few days.

The students undertook most of the tasks individually or in pairs. During the pilot phases, students and tutors found that it that it was useful for the tutorial group to meet mid-week to share information. For example, information from the home visit may have been useful for students who were talking to specialists or other health professionals involved in the case. In other cases diagnoses or investigations contained in the medical record were shared with the rest of the group. A thirty-minute timeslot was consequently made available in the teaching programme for students to meet and share this information in-between the two scheduled tutorials. The tutor was usually available for a few minutes at the start of the tutorial to clarify any uncertainties about process or clinical content, and then let the group proceed to share information. Both students and tutors found this exchange of information useful for preparing for the final tutorial at the end of the week. Groups could also use this meeting to prepare for their presentation at the wrap-up tutorial. (Table 3.8) This modification occurred in all tutorials in the formal evaluation phase.

The final tutorial involved the group presenting their findings to the tutor. After discussion of the various aspects of the case, they were asked to synthesize their thoughts and generate a list of recommendations for management of the case. These were formalized into a letter which was sent to the responsible clinician and formed part of the patient's medical record. The clinician was invited to the end of the wrap-up tutorial to discuss the synthesis and recommendations with the group, and provide feedback. The PBL tutor also provided brief feedback to the group on the tutorial process and on the content of the case.

In summary, the experiences and evaluation in the first two phases provided a standardized approach to delivery and evaluation of the *Problem of the Week* in the

formal trial. This activity formed an integral part of the year 5 General Practice term, providing a novel approach to replace existing sessions on care of chronic problems and management of uncertainty in General Practice. Protocols were developed for case development, patient selection and consent, tutor training, explanation of the PBL process to students, and implementation and evaluation of the tutorials. Evaluation of the *Problem of the Week* and experience gained in the development of the tools used will now be described in more detail.

### **3.2 Choice of methodology**

A number of avenues were explored in planning this study, including evaluation of the process, the outcomes, and how well the objectives were met. There were a number of factors external to the educational intervention that could impact on the evaluation.

As the students were in a traditional undergraduate course and new to the PBL process, an attempt would have to be made to separate these effects from the specific intervention of constructing PBL cases around real patients. During the course of the week in which each PBL case evolved, students were exposed to other forms of teaching, so it was difficult to separate out any educational impact of the *Problem of the Week* alone. Each student group undertook a variety of General Practice experience in the two weeks between their two PBL cases. Their knowledge and clinical reasoning processes would be expected to change over this time, so direct comparisons between groups in weeks one and four would be of limited value. In addition, different student groups undertook this rotation progressively over the academic year. Students undertaking their GP term later in the year had more clinical experience and had studied a greater range of subjects than those earlier in the year, hence comparisons between different student groups was also of limited use.

Comparison of the student groups across the two campuses was also considered. However, students who opted to come to North Queensland self-selected, with no facility to randomize or match for age, gender, and educational background.

Students across the two sites were exposed to different teaching styles and formats, and a different range of experiences in their GP attachment. There were also differences in the range of teachers with more clinicians and fewer social scientists involved at the North Queensland Clinical School compared to the main campus.

Another possibility that was explored was to compare different student groups within an academic year, with some groups undertaking the *Problem of the Week*, and other undertaking other teaching activities. However, student numbers in the North Queensland group were relatively low which would result in only eight student groups in the intervention arm. This approach would have required groups to be randomized within each GP term, to avoid effects from the progression of students' clinical experience over the year. There were still concerns about interactions between the two groups within the one term, and the low numbers of PBL cases undertaken. In addition, the evaluation methods relevant to PBL programmes were difficult to adapt to the groups in the traditional programme.

Consideration was given to comparisons with students in other PBL courses. However, the majority of reported evaluations are of pure- or predominantly PBL courses, with relatively few reports of a PBL intervention in an otherwise traditional course. In addition, most schools using PBL do so in the preclinical years. Differences in context, culture, curriculum and assessment were felt to preclude any useful direct comparisons between this cohort and those in other PBL courses.

Hence the study design involved only students from a single programme who chose to attend a distant Clinical School that offered a more rural focus. Student numbers were initially small as the School developed, so teaching tended to be in smaller groups, with lower staff: student ratios. This proved a substantial methodological challenge. In addition, the education environment was changing within the medical school. Students in the formal trial of the *Problem of the Week* were in the last cohort to undertake a traditional six-year undergraduate programme. They had been exposed to the debate around curricular reform and the introduction of PBL, which may have influenced their perceptions of PBL as will be discussed in section 4.2.

The difficulties in using quantitative approaches or randomized controlled trials to evaluate educational interventions have been described in section 2.8.1 and 2.8.2. Numerous authors have argued in favour of a wide range of methodologies using a mixture of qualitative and quantitative approaches. An emphasis on qualitative methods has been suggested in a complex environment, such as this study, where all the relevant variables cannot be controlled – or possibly even identified – in the rigorous manner associated with experimental designs.<sup>78,80,84</sup>

The approach taken in this study included a mixture of process and outcome evaluation, with an emphasis on the programme-oriented and stakeholder-oriented approaches. The process evaluation focuses on group work characteristics, psychometric measures such as learning styles, and student satisfaction. Important stakeholders identified and used as sources of data included students, patients, tutors and staff. Evaluation tools included questionnaires, focus groups and interviews, which provided mainly qualitative data. Additional quantitative data was derived from the *Approaches to Studying* questionnaire and *Group Assessment Schedule*, with mixed data from direct observation. Some student-oriented evaluation was conducted on outputs from tutorials including letters generated by students and print-outs from the whiteboard.

The choice of methodology was influenced by a variety of external factors including environmental issues and the difficulties inherent in educational research that have been previously described. The approach chosen reflects the model of programme evaluation described by Patton, as ‘...the systematic collection of information about the activities, characteristics, and outcomes of programs in order to make judgements...’<sup>105</sup> Triangulation of data sources and methodologies was used in order to strengthen the study. This study aimed to adopt a rigorous approach to data collection, gathering ‘thick slices’ of data on a limited intervention. By using this approach the study aimed to satisfy Patton’s definition of evaluation research as an ‘... examination of effectiveness ... conducted systematically and empirically through careful data collection and thoughtful analysis.’<sup>105</sup>

Evaluation of the *Problem of the Week* was therefore largely qualitative, and took a variety of forms. Information was sought from the perspectives of students, tutors,

patients and staff. Information was also sought on the group process and specific outcomes from the PBL tutorials. A number of tools were trialled in the first two phases and refined for use in the formal trial. These will be described in the next sections.

The data generated from this evaluation process was analysed using qualitative and quantitative methods in order to answer a number of key questions. Firstly, this study explored the feasibility of constructing PBL cases around real patients, with a view to generating recommendations into optimal approaches. Secondly, this study aimed to achieve better insights into the benefits, and any disadvantages, of using real patients as the basis for PBL cases thereby extending the limited literature in this field. The themes that emerge in this section will be of use to educators and curriculum designers in other PBL settings. The study also aimed to provide some insights into the introduction of PBL in the clinical years of a 'traditional' course, and to suggest areas for further research. Finally, some further insights were gained into the utility of available evaluation methodologies in such a setting.

### **3.3 Evaluation**

This section will describe how the *Problem of the Week* tutorials cycles were evaluated from the perspectives of the students, the tutors, the patients, and the General Practitioners. The process by which further data was obtained by direct observation and analysis of outputs from tutorials will be described. Subsequent sections will then outline the process for data collection, analysis and generation of research outputs.

#### **3.3.1 Student perspectives**

All students were asked to complete a de-identified questionnaire at the end of each *Problem of the Week*. In order to maximize the return rate, time was set aside within each tutorial for completion of the questionnaire. Students were asked to complete a Likert scale (1-5) on how they had enjoyed the problem, and how it had helped them meet the learning objectives of the subject. There were further questions

relating to the usefulness of the various learning resources and how they would feel about the PBL process in other areas of the course. In the first two phases the students were asked about recommendations and suggestions, which were incorporated in subsequent iterations of the *Problem of the Week* as described in section 3.1.8.

Questionnaires were administered to all students in the formal trial at the end of both the first and second *Problem of the Week*. Again a specific time was allocated for completion to maximize the return rate.

Focus groups were conducted with groups at the end of the second *Problem of the Week*. These were conducted by an experienced research assistant using a semi-structured interview format. Questions had been trialled in the pilot phases of this project, with the interviewer using the focus groups to explore a number of areas of interest in more detail. Questions sought to probe more deeply into students' impressions of the *Problem of the Week* as a teaching format, and sought to explore the strengths and weaknesses of this approach. Where students expressed difficulties the interviewer sought to elucidate whether these were due to the PBL process in general, or due to some aspect of involvement of real patients. Students were asked about the usefulness, purpose and process of the various learning activities, and how they made use of the resources available. They were specifically asked to discuss advantages and disadvantages of working with a real patient compared to a paper-based case, whether they believed they were able to contribute to the care of the patient, and their views on the group process and learning outcomes.

Experience gained in administering questionnaires and focus groups in the second phase was used to guide the development of these instruments in the formal evaluation. Copies of the questionnaire and interview pro forma are in appendices 6 and 7.

Students were also asked to complete an *Approaches to Studying* questionnaire as developed by Richardson.<sup>94</sup> This was a widely used validated questionnaire, which provided insights into the approaches to studying and learning styles of the individual students in the group. Students could demonstrate superficial or deep

approaches to learning, which were described in terms of *Meaning Orientation* and *Reproducing Orientation*. While many groups exhibited a variety of these characteristics, these questionnaires enabled comparison between the learning style of the group and their performance in the PBL tutorials. A number of student attributes have been identified in the literature as being associated with successful PBL groups, so this information provided some insight as to whether difficulties were related to the PBL process itself, or some aspect of the make up of the student group. This information also allowed some comparisons between student groups. A copy of the questionnaire is in Appendix 8.

### **3.3.2 Tutor perspectives**

Tutors were interviewed at the completion of *Problem of the Week* tutorials in the first two phases. These comments were used to identify problems in the PBL process and case selection and develop the process for implementation in the third phase. Issues raised by tutors in these interviews were also used to develop the tutor training process.

Tutors were also asked to complete the *Group Assessment Schedule* (Appendix 9). This was an instrument that had been described in the literature for assessing group process in PBL tutorials in the established PBL course at the University of Manchester<sup>100,102</sup>. This instrument was used summatively to assess the workings and dynamics of the tutorial group. Group function was described in terms of communication, interpersonal relationships and problem solving on the basis of four variables. *Commitment and motivation* was regarded as a basic requirement for any group interaction to occur. The second variable was *interpersonal relationships*, the way that group members interact and relate to each other. *Group activity* assessed the way in which these interactions focused on group tasks and the way that roles are shared and negotiated to produce effective outcomes. Finally, *problem-solving abilities* reflected the ability of the group to function effectively in the proposed learning environment.

These attributes, while relevant to the effective functioning of a PBL tutorial group, were also considered to be relevant to the skills and attitudes that would be

important in graduates' future careers. A five-point scale was used which allowed observers to make judgements about different categories within a moderate group; to balance descriptors within a group; and to reward outstanding groups. Detailed descriptive guides were provided for each domain by a series of statements anchored around a mid-point (the 'average' or competent group) with additional comments about the two extremes, in order to assist the marking process and increase reliability.<sup>100</sup>

The schedule was used as one measure of the PBL process, and to compare the process of PBL using real patients with conventional PBL using paper-based cases. Comparisons were also made between the tutor's assessment and students' perspectives, direct observation of the PBL process, and outputs from the tutorials in the third phase.

### **3.3.3 Patient perspectives**

Patients were interviewed after the completion of the *Problem of the Week* by the research assistant using a semi-structured interview (Appendix 7). Patients were asked their experience of being involved in the Problem of the Week, and what they felt the students had learned. They were asked specifically whether they felt their health care had suffered or if they had any negative experiences from their involvement. None of the patients in the trial phases reported any negative experiences, although some information was used in developing protocols for the tutorials in the third phase.

### **3.3.4 General Practitioner perspectives**

The clinician responsible for the patient's care was also interviewed. Questions focussed on perceived positive and negative aspects for the patient in involvement with these tutorials. The general practitioner was also asked what he or she felt the students had learned from the case, whether the students had been able to contribute to the management of the case, and any other impression of the contribution of the students. These results were compared with the interviews with the students.



Comments received from the clinicians in the first phases were used to refine the tutorial process and interview schedule. In the third phase all clinicians were interviewed in the week following the completion of each PBL tutorial.

### **3.3.5 Direct observation of tutorials**

The approaches taken by groups to the PBL process were described by tutors and the independent observer. Additional data was provided by a two-part direct observation instrument developed by the Curriculum Research and Development group at the John A Burns School of Medicine, the University of Hawaii (Table 3.9).<sup>103, 104</sup> The same independent observer was present for all tutorials and noted the frequency of specified activities for both students and observers. These items consisted of specific activities of group members, and the kinds of information (eg behavioural, population and ethical) that they discussed, and were considered to be objective, requiring little inference on the part of the observer. The second part of the guide required a written narrative summary during a five-minute interval at the end of each half-hour period of observation, and was more dependent on observer inference.

The frequency of observed activities by item observed was summarized for students and tutors, and were reported in the format developed by the University of Hawaii, together with qualitative descriptions of each tutorial. The expected frequency of each activity was established by University staff with expertise in PBL, and based on PBL theory and curriculum documents. The descriptive aspect of this approach groups conceptually similar items into clusters and discusses the findings for each cluster rather than for individual items.

The first cluster is comprised of items that evaluate PBL activities including Item 1, 'Read one page of HCP aloud and discuss this page before going on to next page of HCP'; Item 2, 'List on board HCP data, hypotheses, learning issues, or other information related to HCP'; and Item 5, 'Divide assignments for independent study'. The University of Hawaii uses the term 'HCP' or 'Health care Problem' to describe the case outline progressively presented to the group. In these tutorials this term was used for the case outline or trigger initially presented to the students.

The second cluster addresses the way in which tutorial groups organize and conduct their discussion around the Problem of the Week. These consisted of Item 3, ‘Summarize or organize information orally or on board (e.g., by drawing concept map or other graphic representation’; and Item 4, ‘Probe, focus, or clarify information or terminology related to HCP’.

The third cluster consists of four items that assess the use and sharing of items about learning resources: Item 6, ‘Identify, or ask other group member to identify, resource material, person, agency or event (including meetings, presentations, rounds, and so forth)’; Item 7, ‘Cite source of information presented to the group’; Item 8, ‘Comment on accessibility or helpfulness of resource material, person, agency or event’; and Item 9, ‘Critically appraise information obtained from written, audiovisual, computer, human or other resource’.

Interpersonal interactions in tutorial meetings are evaluated in the fourth cluster of two items, Item 10, ‘Take steps to resolve disagreement or interpersonal conflict’; and Item 11, ‘Negotiate, elaborate, or change group process’.

The fifth cluster also consists of two items: Item 12, ‘Critically appraise own learning progress or interpersonal interaction in tutorial group’; and Item 13, ‘. Critically appraise group’s learning progress or interpersonal interactions’.

The final item cluster (Items 14a-14c) evaluates the students’ coverage of psychosocial and population health issues as well as ethics, personal and professional development, values and attitudes.

These data provided some qualitative and quantitative information on the performance of groups in the formal pilot. This allowed some objective comparison between groups, which could be correlated with comments from students and tutors. Furthermore, this data allowed some limited comparison between student groups in this evaluation and students in an established PBL course.<sup>103,104</sup> A copy of the tutorial observation guide is in Appendix 10.

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**Table 3.9: Problem based learning tutorial observation guide**<sup>103, 104</sup>

### **3.3.6 Outputs from tutorials**

Additional material that was collected during the formal evaluation included outputs from the tutorials, such as a copy of the group's work on the whiteboard during the tutorials, and letters generated by the group summarizing the case and their recommendations for the patient's GP and the medical record. While no formal

instruments could be found to evaluate these items, they could be compared to the original case objectives to provide some additional perspectives on the group's learning activities and ability to meet the original learning objectives.

In summary, a variety of instruments and approaches were used to evaluate these PBL tutorials from the perspectives of the students, tutors, patients and their GPs. The evaluation was largely qualitative, with additional quantitative and some further qualitative data provided by direct observation of the tutorials. Outputs from the tutorials were compared with the original case outline to provide some additional perspectives.

### **3.4 Data collection and analysis**

As described in the previous sections a variety of data was collected in the evaluation of these tutorials. Each of the 46 students involved in the formal evaluation completed two PBL tutorials. Questionnaires were returned by students in all sixteen of the PBL tutorials evaluated, with 85 responses received out of 92 possible. The entire student group was present at the final tutorial in ten of the sixteen *Problem of the Week* cycles, and all of these students completed questionnaires. In addition, focus groups were conducted on six of the eight groups by the same research assistant (who was not the author). These were all conducted at the same time, after the final PBL tutorial in week 4 and involved 32 of the possible 34 students.

Students were asked to complete the 32 item *Approaches to Studying* questionnaire at the start of the second *Problem of the Week* tutorial. The PBL tutors administered the questionnaires to each group at the same time of the four-week term. Responses were received from seven of the eight student groups (41 of 42 students). Students had the option to calculate and discuss their own sub-scores on this instrument. For each of the seven groups the mean scores were calculated on the major scales of *Meaning Orientation* and *Reproducing Orientation*, and on the sub-scales. These scores were used as a comparison between groups to provide some insights into the approaches of study of individual students in each group.

An independent observer was able to observe both the first and second tutorials for all sixteen problems. In order to allow the same observer to collect data on all tutorials, the student timetable had to be organized to accommodate this by running the tutorials for each group within a rotation at different times. However, no observations were made of the mid-week meeting. In addition, all tutorials were videotaped to allow discrepancies in observation to be checked.

Tutor feedback was obtained for twelve of the sixteen tutorials (Groups E – P). Tutors completed the *Group Assessment Schedule* (GAS) for each of these tutorials, and each tutor was interviewed by a research assistant. All of the tutors who participated in the formal pilot were interviewed on at least one occasion.

Patients involved in eleven of the sixteen problems were interviewed by the same research assistant. As two patients were used twice in the formal evaluation, ten of the fourteen patients involved were interviewed.

Outputs from the tutorials included the whiteboard printout of the group's work, which was available for seven *Problem of the Week* cycles, and letters generated by the group for the patient's GP, available for all sixteen tutorials. Case outlines were available for all sixteen tutorials. These were used to provide some additional insights on individual groups learning activities and ability to meet the original learning objectives, and will be presented as case studies, comparing and contrasting groups who struggled with the format with those who were more successful in managing the group process and meeting the learning objectives

The data collected and instruments used are summarized in Table 3.10. Data analysis was conducted using the approach recommended by Patton<sup>105</sup>. The data was organized and reviewed for completeness and to get a sense of the whole. The author transcribed data from handwritten records into an electronic form in a computer data base. This process assisted the author to be immersed in the data and to develop a high level of familiarity with it by reading and re-reading. Annotations were made on hard copies of the data, and preliminary themes and topics identified.

Categories were developed for the qualitative transcripts, which were categorized line by line. A constant comparative method as described by Strauss and Corbin<sup>106</sup> was used for analysis drawing on aspects of grounded theory to produce the results. This approach used a qualitative approach more for triangulation and hypothesis testing, than for developing new educational theory. In contrast, pure grounded theory would be more appropriate if a process of analytic induction was used to discover new insights and develop substantive (limited) theory that is grounded in the data (transcripts).

**Table 3.10: Data collection and instruments**

	Term 1: February				Term 2: April				Term 3: July				Term 4: September			
<b>Group</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>	<b>H</b>	<b>I</b>	<b>J</b>	<b>K</b>	<b>L</b>	<b>M</b>	<b>N</b>	<b>O</b>	<b>P</b>
Student questionnaire	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Student focus group							Y	Y			Y	Y			Y	Y
Tutor GAS					Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Tutor Interview					Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Direct Observation	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Video	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Patient interview	Y	Y	Y	-	Y	Y	Y	Y	Y	Y	Y	Y				
Letter	Y	Y	Y	Y	Y		Y		Y	Y	Y	Y	Y	Y	Y	Y
Output: printout	Y			Y			Y	Y					Y	Y	Y	
Approaches to studying		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Case outline	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

By an iterative process the data was broken up into separate summary concepts, which were categorized and linked into recurrent themes. Quotations were used to develop themes and were reported with the results and discussion to illustrate and illuminate these themes. Quantitative data was correlated with descriptions from students, tutors and the independent observer and outputs from tutorials. This approach allowed for some cross-case analysis, comparing tutorials groups who appeared to be more successful with those who struggled with the concept.<sup>107</sup>

Results and discussion are reported together in sections 4 and 5. Conclusions and interpretations of the data are presented in the final chapter in an effort to separate these from the results, as recommended by Patton.<sup>105</sup>

Themes that emerge will be summarized and discussed in each section. These will include the perspectives of potential stakeholders including the students, the PBL group, the tutors, the faculty, the patient, the community, and also implications for the curriculum and for resource allocation. (Table 3.11) Quotations from students, tutors and patients will be used to illuminate and add richness to the discussion. Quotations from students, tutors and patients will be used where appropriate to illuminate and illustrate the discussion.

**Table 3.11: Perspectives used in discussion**

Student perspectives
Group perspectives
Tutor perspectives
Faculty perspectives
Patient perspectives
Community perspectives
Curriculum and resource implications

The impact of evaluator effects had to be considered in this study as the author had been involved in the development and early evaluation of the Problem of the Week, and was interested in ensuring that the approach was successful. Attempts were made to minimize the evaluator effect by ensuring that all interviews and focus groups were conducted by an independent research assistant, who collected and typed this data. The same research assistant administered and collected the student questionnaires. Another independent observer was used to observe all of the PBL tutorials to collect qualitative and quantitative data. The evaluator was therefore not involved in these tutorials as a PBL tutor, or as an observer or data collector, but did conduct all of the data analysis.

### **3.5 Generation of research findings**

Research findings were generated from this evaluation process in order to answer a number of key questions. The first issue related to the feasibility of constructing PBL cases around real patients, and the optimal approaches. As there is little documented experience of PBL in the clinical setting, this study sought to extend the literature by addressing a number of questions. Was PBL using real patients feasible? Was it efficient? What sort of patients should be selected? How should cases be written? How should the conduct of the tutorial be organized? Did the role of the tutor vary? How should tutors be selected and trained?

Secondly, this study aimed to investigate the educational outcomes of using real patients as the basis for PBL cases. Were students able to meet the learning objectives as well as students in non-PBL settings? Can curricular requirements be met equally well? Were there variations in the group process and learning outcomes? What were the advantages and disadvantages of this approach?

Examination of these issues raised some further questions. What is the best way to approach PBL with real patients? How do outcomes vary when real patients are used rather than paper cases? What is the effect on the students' learning? What are the learning outcomes? Other important issues to be addressed included whether there was any effect (positive or negative) on the patients involved, and the wider implications of this approach for the faculty, the community and from a resource perspective

Responses from students, tutors, staff and patients were transcribed, analysed and grouped into interpretive themes in order to provide insights for educators, curriculum designers and policy makers planning to use clinical PBL in other settings.

This study provided further insights into the use of available evaluation methodologies in such a setting. Questions arose as to how this new format could be



evaluated and the utility of existing instruments. Could distinctions be made between the educational impact of the introduction of a new format (PBL) and a new approach (using real patients)? How could variations in the group process and learning outcomes be measured?

The study also explored issues relating to the introduction of PBL in the clinical years of a 'traditional' course. How should PBL be introduced to senior medical students with little prior experience of PBL? Finally, recommendations were made on areas for further research.

By rigorous evaluation of the *Problem of the Week* programme using a variety of methodologies, this study aimed to produce generalizable findings in these areas on PBL in the clinical context.

### **3.6 Summary**

This section has outlined the way in which the sixteen PBL problems undertaken by eight different groups of year 5 students were evaluated by a range of qualitative and quantitative approaches, which allowed for triangulation of results.

Approximately 1230 qualitative data items were coded and used in the final analysis, including student feedback by questionnaire (327 items) and in focus groups (274 items), and interviews with tutors (171 items) and patients (73 items). Direct observation of tutorial groups provided a mix of qualitative and quantitative data, with further quantitative data derived from the *Group Assessment Schedule* completed by tutors.

Chapters 4 and 5 present the results of the data collection described in the previous chapter together with interpretation and discussion. Chapter 4, *The Tutorial Process*, will discuss group work, the PBL format, and tutor factors. The data from direct observation and the *Group Assessment Schedule* will be used to support qualitative descriptions of the tutorial process, the performance of PBL groups, and strategies they used to overcome problems. Chapter 5, *Educational Issues* includes learning activities, design of cases and tutorials, the impact of using real patients,

and educational outcomes. This chapter will also explore the possible impact of involvement on patients in the section on *Effects on Patients* (section 5.6). The final section in this chapter will address *Methodological Issues* (section 5.7), including the impact of observation, and the utility of the instruments used.

Themes that emerge will be summarized and discussed in each section. These will be considered from a variety of perspectives, including those of the participants involved in the *Problem of the Week* as well as the faculty, the community, and also implications for the curriculum and for resource allocation. Quotations from students, tutors and patients will be used to illuminate and add richness to the discussion.

## CHAPTER 4

### RESULTS & DISCUSSION: THE TUTORIAL PROCESS

In this chapter, the information derived from student questionnaires and focus groups, and tutor interviews will be used to describe aspects of the tutorial process including group work, the PBL format, and the approach to the PBL process. Further qualitative and some quantitative data is provided by direct observation of the tutorials by an experienced educational facilitator. Some gender differences in the approach to the PBL tutorials and strategies that groups used to overcome problems will be discussed. Group characteristics as described by tutors and the independent observer will be presented together with supporting material from the *Group Assessment Schedule* completed by tutors. Finally, factors relating to tutor performance will be discussed.

#### 4.1 Group work

Comments by students were positive about the opportunity to undertake an activity in small group. They particularly valued learning by teamwork, interaction with others and active participation in small groups in contrast to some of their previous educational experiences of traditional didactic teaching, usually in a larger group:

*Anything is better than falling asleep in lectures all day – anything that allows us to think and ask questions is worthwhile.*

The learning environment was perceived as positive and fun. Students described an encouraging and positive environment within groups, with group work seen as fun, with opportunities for interaction and a bonding experience. All groups expressed a

preference for small group learning rather than traditional, more didactic, large group lectures.

Students also valued communication and discussion within the group. This was believed to be an interesting way to learn which encourages communication within a team and was helpful in solving problems. A significant dimension of the group work was the need for individual members to compromise with each other in order to reconcile the different viewpoints they had formed as a result of seeing patients at different times or conducting separate research tasks. One group commented on the satisfaction of reaching agreement.

*You get to chat more. We do a lot more chatting this year.*

Four of the eight groups specifically described the value of the opportunity to think. Groups felt that the discussions stimulated them to think, with one student commenting that the process required thought and creativity. Other benefits of working in a group in this way included the opportunity for others to criticize each others' thoughts and provide feedback, and the freer direction of a less structured process, which allowed groups to think about things.

The group was seen as a safe environment with small numbers of students working together on the same material in an atmosphere of trust. Three groups contrasted this experience with the more threatening environment of larger groups, which may have engendered a fear of speaking up or being wrong:

*Just the 6 of us – don't have to worry about speaking up because we know each other.*

*I'm not shy to say what I think and I'm not afraid to say something that's wrong. In Townsville there's a maximum of 6 people per group which means you can ask questions straight away and you don't have to worry about asking dumb questions.*

Other advantages of group work included the benefits of sharing the work. In a 'good' group where everyone was willing to work, the team-work was thought to

decrease the overall amount of work required, to simplify the task, and to encourage all members to work:

*Members of the team works together to deal with the problems made the matter easy and useful.*

*Having the others sort of pushed me along.*

Pooling information, hearing different ideas and exploring different perspectives was also seen as an advantage of the group process. Other students described group work as an opportunity to practise for real life and for personal development.

Two students made comments indicating less positive views, suggesting that they preferred not to work in small groups:

*We might have all contributed more and worked better on our own and just presented at the end.*

*Possibly smaller groups and independent work up until the presentation.*

These students, who were in the same group, made these comments in separate PBL tutorials. The overall performance of the group on these tutorials, as evaluated by direct observation and tutors' assessments using the *Group Assessment Schedule* are described in the section headed *Approach to the PBL Process* (section 4.3). This group scored around the median on each item across both tutorials, suggesting that group function was not severely compromised.

In summary, students' comments indicated that they were comfortable with the concept of small group work. They appreciated the change from the traditional large group didactic format, and saw a variety of benefits of this approach. These included the environment, which was perceived as positive, encouraging and fun. Students valued the communication and discussions within the group, and the opportunity to think, to be creative and to critique each other's ideas in a safe environment. Other benefits included the pooling of ideas and sharing the workload. In contrast, a few students expressed the opposite view, preferring to work on their own.

## 4.2 Problem based learning format

Students were new to PBL but their comments suggested that they felt there were a number of benefits in the format, including the ability to explore a topic widely from a holistic viewpoint:

*Can explore the topic – more widely than a text.*

*We looked at the whole problem, all the issues or lots of them.*

They valued the independence to discuss and allocate tasks in a group and the opportunity to undertake independent research.

Having a whole group working on a problem was seen as productive: ground was covered more quickly than normal with more ideas:

*Discussion within the group produced more ideas versus a single person working on the task.*

*We could put our heads together to think about the problem and had time to think about it.*

A common theme was that students were unfamiliar with the PBL format and struggled to understand the process. They described the need to clarify what was expected in order to increase the understanding of what they were meant to be doing. They expressed the need to better understand the PBL process, the thinking behind it and their role in the process. Two students in one group expressed the problem as uncertainty of expectations, and of their progress, and requested more specific guidelines. One student described a type of resistance to this new form of learning:

*Not trained like that – resistant to that – like to have all the information first.*

*The biggest problem is that the process is new to us. Over time you'd probably get more out of it.*

*Often found spend time wading around in uncertainty.*

Two tutors described these concerns and the students' responses to them:

*At first they panicked due to the lack of structure and bad previous experience where the session had not been explained properly.*

*I don't think they understood the process of PBL and became frustrated having to go through some of the stage.*

Unfamiliarity with the process was described by one student as an impediment to learning:

*I found PBL actually quite a difficult way to learn, because I'm not used to it.*

Some groups experienced difficulty in balancing the work, with disproportionate workloads for some, while another group struggled to find tasks for all members. Others expressed concern that if a member of the group didn't do the work it would let everyone down. Another student pointed out that if there is no overlap between tasks it was difficult to see how the different things relate.

Students also described prior negative experiences with PBL. While the majority of their university education had been in the traditional didactic approach, they had all undertaken a PBL-style tutorial in the previous year. However, this was a large group tutorial over a number of weeks, that was seen by the students as protracted, and as an inefficient way to cover a small amount of material. They questioned the relevance of the content and the usefulness of the overall experience. Two tutors specifically noted that this experience led to groups expressing resistance to further exposure to PBL.

These background experiences may have accounted for some of the comments from students who thought the *Problem of the Week* was a time consuming process:

*Ten times longer to sort things out.*

*You don't learn much in the time spent.*

*Seems unnatural, more time consuming. Unpractical for the 'real world', if spent same amount in didactic approach learn more. This PBL approach is all over the place.*

*It took a lot of work to come up with what seems like very little.*

One student expressed concerns about the extracurricular work required and time commitment to conduct the independent research. However, others wanted more time for preparation and to think about and plan the interview with the patient.

Some felt the process could have been streamlined. Three students thought the process could have been completed in 1 session of around 2 hours, with others feeling that the discussion was too drawn out and points laboured.

Students described their need for direction and structure:

*Although freer in direction you need something to bring you back.*

They acknowledged that the initial lack of lack of direction at first could be improved with more practice and that at this stage they needed more guidance through the problem solving. One commented on the importance of having some background information (acquired by didactic means) to solve the problems presented.

A more structured approach to problem solving would have been preferred by 2 students, although another found the structure rigid.

This led to some concerns about uneven learning among group members:

*Potential for unbalanced learning depending on what individual tasks you do.*

*Reporting back – giving others knowledge – some may not want to tell the others.*



Other students described real or potential problems in the group process, with concerns about disagreement and dominant people and potential problems if the group didn't get along.

A number of students raised issues about the presence of the tutor:

*Feeling that could have done most of it without the tutor.*

*Discussions were artificial and I felt we would have been better off alone.*

*Provide printed instructions and allow students to work through by themselves.*

*Sometimes it seemed uncomfortable / inappropriate having someone else there.*

One tutor found that the discussion started after she left the room:

*After I left the room they started talking apparently.* [quotation from tutor interview]

In addition, the education environment was changing within the medical school. Students in the formal trial of the *Problem of the Week* were in the last cohort to undertake a traditional six-year undergraduate programme. They had been exposed to the debate around curricular reform and the introduction of PBL, which may have influenced their perceptions of PBL as will be further discussed in section 6.4.

In summary, students had mixed feelings about the PBL format. They appreciated some of the benefits of the PBL approach, including the ability to explore a problem widely and holistically, and increased productivity from working as a group on a shared task. On the other hand they did experience a number of difficulties with the process and recognized their relative inexperience with the PBL format, and their prior negative experiences. Students struggled to understand the PBL approach, and expressed the need for more guidelines, direction and structure. These difficulties were described by some students as causing resistance to the new format, an impediment to learning, and as frustration with the time-consuming nature of the process. Other concerns included the heavy workload, difficulties with evenly allocating the work, real or potential concerns with the group process, and discomfort with the presence of the tutor. Observations from the tutors confirmed

that groups struggled with these issues, which limited their ability to work on the problems as a group, and may be expected to impact on educational outcomes.

### **4.3 Approach to the problem based learning process**

Groups were new to the PBL process and undertook a variety of approaches. These were described by tutors and the independent observer, with additional data being provided by a two-part direct observation instrument developed by the University of Hawaii. The independent observer noted the frequency of specified activities for both students and observers. These items consisted of specific activities of group members, and the kinds of information (eg behavioural, population and ethical) that they discussed. Additional information was provided by a written narrative summary during a five-minute interval at the end of each half-hour period of observation, and was more dependent on observer inference.

The students' approach to the PBL process will be described in this section, with section 4.2.5 focusing more on the students' learning outcomes.

A number of groups took a very direct approach with a greater focus on biomedical aspects such as medical issues and diagnosis rather than a holistic view. Tutors noted that groups who took this approach wanted to work as quickly as possible to get an answer or solutions without fully exploring the issue; and were not interested in forming hypotheses. These groups were likely to generate tasks which were relatively content-based, focused on purely medical sorts of issues.

*They focussed on medical aspects and despite pushing them in other directions they kept going back to medical stuff.*

*They couldn't really grasp the concept of looking at the whole patient.*

Tutors noted that these groups tended to use the medical records to arrive at the 'answer'. Their conclusions were generally correct, but tended to come straight from the patient's file without much independent thought or work by the group. One tutor suggested that access to the file should be delayed:

*It makes me think we shouldn't let them have the file until a bit later on.*

This situation led to one tutor describing some conflict in their role as a facilitator:

*They focused on biomedical issues and I needed to intervene but that was contradictory to tutor role so I don't know how well it worked.*

Other tutors observed that groups were locked into the biomedical model and could not see their role in social aspects even when identified. The tendency to compartmentalize issues was thought by one tutor to illustrate the deficiencies of medical training. One tutor described the difficulty one group experienced in thinking beyond the patient's diagnosis:

*Concentrated on finding diagnosis regardless of whether there may not have been one or whether it was going to be of any use to the patient/management or what they were going to 'do' with it.*

Tutors observed that these groups did not like uncertainty and wanted set answers and a concrete approach:

*Wanted to put a name to everything; didn't like the uncertainty of not having a diagnosis.*

Other tutors described their role in prompting students to look more widely. With guidance from the tutor through the PBL process most groups were eventually able to identify most of the issues:

*Some nudging by the tutor got answers [quotation from tutor interview]*

Tutors specifically described prompting students to discuss the social issues in one case, and the cross-cultural / ethnicity issues in another. Tutors were observed to probe psychosocial aspects well. Groups usually dealt with these issues, and were

noted to become more animated when ethics and community attitudes were discussed.

#### **4.3.1 Direct observation of tutorials**

Direct observation of the tutorials suggested that tutor factors were important in shaping the approach of each group. Medical tutors were noted to be more concerned with the outcome of the *Problem of the Week* rather than the PBL learning en route, and tended to actively direct the students along a pre-set route. Tutors with a background in education were observed to be more relaxed in their role, which impacted on the performance of the group. The PBL literature emphasizes the important role of the tutor, which will be more fully discussed in the section on tutor factors (section 4.1.7).

Direct observation of tutorials revealed a marked variability in the frequency of activities observed, with a range of between 36 and 108 activities over the two tutorials in a single Problem of the Week. (Table 4.1) The number of observed activities in each tutorial cycle declined over the year, with all the observations in the first half of the year being above average, and the majority of the observations in the second half of the year below the mean. Whether this was due to student fatigue, tutor factors, or other issues is not clear from this evaluation.

Student activity also demonstrated considerable variability between groups, again with a drop-off later in the year. Some groups had similar numbers of observations across the two different problems, while others had substantial differences, with both increased and decreased numbers of observations from the first to the second tutorial. For the majority of groups there were fewer student observations in the second tutorial compared to the first.

Observations of the tutors' activities revealed less variation between tutors than there was between student groups. The only exception noted was in tutorials B and D: the same group had 47 observed activities over the course of the first Problem of

the Week, compared to 26 in the second problem, with a different tutor. Again, there were fewer observations in the second half of the year than the first.

The number of observed student activities was lower in the second *Problem of the Week* cycle compared to the first for six of the eight different tutorial groups. The same pattern was evident when tutor observations were compared across the two problems, although the reasons for this are not clear.

Group	Student observations		Tutor observations		Total for students	Total for tutors	Overall total
	1st tutorial	2nd tutorial	1st tutorial	2nd tutorial			
A	23	42	23	20	65	43	108
B	9	27	19	28	36	47	83
C	40	31	10	23	71	33	104
D	22	39	10	16	61	26	87
E	24	22	14	11	46	25	71
F	16	24	20	15	40	35	75
G	10	18	15	16	28	31	59
H	17	19	12	14	36	26	62
I	10	39	12	13	49	25	74
J	17	30	10	6	47	16	63
K	11	19	9	13	30	22	52
L	14	10	14	9	24	23	47
M	23	21	14	11	44	25	69
N	11	15	19	8	26	27	53
O	12	15	8	9	27	17	44
P	5	8	9	14	13	23	36

**Table 4.1: Summary of total observed activities by group**

The frequency of observed activities by item observed is summarized for students and tutors in Table 4.2. These data, together with qualitative descriptions of each tutorial, are reported in the format developed by the University of Hawaii in Table 4.3. The expected frequency of each activity was established by University staff with expertise in PBL, and based on PBL theory and curriculum documents. The descriptive aspect of this approach groups conceptually similar items into clusters and discusses the findings for each cluster rather than for individual items.

The first cluster is comprised of items that evaluate PBL activities including Item 1, Item 2, and Item 5. The term ‘HCP’ or ‘Health care Problem’, used by the University of Hawaii to describe the case outline progressively presented to the

group, was used in these tutorials for the case outline or trigger initially presented to the students. These items were sufficient in the majority of groups, suggesting that once the initial difficulties with PBL and group process had been overcome, most students were able to approach the tutorials in the desired manner. Reading the problem aloud was exclusively a tutor-led activity, reflecting the inexperience of the groups with PBL, and, in most cases, with the tutor. Students generally dealt with the material in the initial trigger presented as a single overhead transparency within the first ten minutes of the first tutorial, and did not refer back to it later in the first tutorial or in the second. Most groups readily adapted to the process of listing information and hypotheses on the board, with some performing at a high level. The recorder or scribe played a variety of roles, which are described later, with most of the summarising done orally. A transition was noted from tutor-directed discussions in the first tutorial to a greater role for the students as they presented their findings in the second tutorial.

	Total Observations	Mean for Total Observations	Total Student activities	Mean for Student activities	Total Tutor activities	Mean for Tutor activities
<b>1</b> Read HCP	24	0.4	0	0.0	24	0.8
<b>2</b> List on board	84	1.3	76	2.4	8	0.3
<b>3</b> Summarise	215	3.4	167	5.2	48	1.5
<b>4</b> Probe, focus	266	4.2	66	2.1	200	6.3
<b>5</b> Divide assignments	52	0.8	25	0.8	27	0.8
<b>6</b> Identify resources	116	1.8	70	2.2	46	1.4
<b>7</b> Cite info source	85	1.3	70	2.2	15	0.5
<b>8</b> Comment on access	55	0.9	39	1.2	16	0.5
<b>9</b> Critically appraise	39	0.6	19	0.6	20	0.6
<b>10</b> Resolve disagreement	19	0.3	14	0.4	5	0.2
<b>11</b> Negotiate group process	22	0.3	15	0.5	7	0.2
<b>12</b> Evaluate own progress	16	0.3	9	0.3	7	0.2
<b>13</b> Evaluate group	6	0.1	4	0.1	2	0.1
<b>14</b> Discuss...	88	1.4	69	2.2	19	0.6

**Table 4.2: Summary of frequency of observed activities by item**

The second cluster addresses the way in which tutorial groups organize and conduct their discussion around the Problem of the Week. These consisted of Items 3 and 4. Both frequency and quality of activity was sufficient in most groups. Probing tended to be dominated by tutors, again consistent with the students' inexperience with PBL. In groups where students demonstrated a higher frequency of these activities the tutors were observed to be less active. Division of assignments was

often difficult to directly assess, as it tended to occur outside the observed tutorials, but was reflected in the performance of students in the second tutorial.

The third cluster consists of four items that assess the use and sharing of items about learning resources: Items 6, 7, 8 and 9. Item 6, identification of resources, was significantly underutilized by most groups, although some performed at a high level. The frequency and quality of the other three activities often fell short of the expected level.

Interpersonal interactions in tutorial meetings are evaluated in the fourth cluster, Items 10 and 11. Conflict was not often apparent in the observed tutorials, although may have occurred in the interim session. Group process was managed well by some groups, but in others seemed to evolve without any specific direction. The frequency of these items appeared to drop off in the second half of the year. Some form of negotiation of group process was only seen in half of the groups observed, and only once in the second half of the year.

The fifth cluster also consists of two items: Item 12 and 13. These items occurred rarely, even where prompted by the tutor. Item 12 was observed in only seven of the sixteen groups, and Item 13 in only five. Groups tended to close with their recommendations and letter rather than self-evaluation.

The final item cluster (Items 14a-14c) evaluates the students' coverage of psychosocial and population health issues as well as ethics, personal and professional development, values and attitudes. Groups usually dealt with these issues well, and were noted to become more animated when community attitudes and ethics were discussed. Tutors generally probed these areas well.

In summary, these findings suggest that few groups were able to meet all of the expected activities in these PBL tutorials. Some of these findings such as insufficient self- and group evaluation, may reflect the students' inexperience with PBL, and are corroborated by other observations. On the other hand, these students were more familiar with clinical medicine than most PBL students in earlier years, and may have taken shortcuts in the clinical reasoning process more readily.

However, most groups were observed to demonstrate desired levels and quality of activities in a number of areas, such as the first two clusters, which evaluate PBL activities and the way in which tutorial groups organize and conduct their discussions. Some groups were observed to perform at a high level in these areas. There was more variation between groups in the items that assess the use and sharing of items about learning resources: these items were sufficient in only some groups. Available resources were not identified or under-utilized. Groups tended to accept information on face value without critically appraising or challenging the information or its source. There were few problems with group process noted, most groups being free of conflict. However, groups did not tend to formally negotiate or change their own group process. Discussion of psychosocial aspects was undertaken sufficiently by most groups, and was probed well by tutors, although population aspects and professional ethics and values were less well explored. These are consistent with the results reported in the internal evaluation from the University of Hawaii.

Variation in performances between groups was noted by tutors and by direct observation. Groups who focused on a direct biomedical approach to the problem tended to use the medical record to get straight to the diagnosis, and were less interested in exploring the problem holistically and generating hypotheses. Tutors observed that these groups were not comfortable dealing with uncertainty, and required prompting to think widely, which caused some conflict in the tutor's role. Variations in the numbers of observations for students were noted across the different tutorials with a smaller variation observed between tutors. There was a general decrease in the number of observed activities for both groups over the year, possibly due to increasing experience with the clinical reasoning process.

Some of the variability between the performance of student groups may be related to tutor factors, with the tutor's background appearing to influence the facilitation process. Medical tutors were observed to be more likely to guide students along a pre-determined route towards the outcome of the Problem of the Week, while tutors with a background in education were more relaxed in their role and able to focus the group on the learning process. However, tutors had undergone a standardized training process, and quantitative observation of their activities did not reveal a



**Table 4.3: Frequency and quality of activities observed**

<b>Activity</b>	<b>Frequency of activity</b>	<b>Quality of activity</b>
1. Read one page of HCP aloud and discuss this page before going on to next page of HCP	Sufficient in most groups	Sufficient in most groups, tutor-led
2. List on board HCP data, hypotheses, learning issues, or other information related to HCP	Sufficient in all groups	Exemplary in some groups, sufficient in most
3. Summarize or organize information orally or on board (e.g., by drawing concept map or other graphic representation)	Sufficient in all groups	Sufficient in most groups
4. Probe, focus, or clarify information or terminology related to HCP	Sufficient in all groups	Sufficient in most groups
5. Divide assignments for independent study	Sufficient in all groups	Sufficient in all groups
6. Identify, or ask other group member to identify, resource material, person, agency or event (including meetings, presentations, rounds, and so forth)	Sufficient in most groups	Exemplary in some groups, sufficient in most
7. Cite source of information presented to the group	Sufficient in some groups	Sufficient in some groups
8. Comment on accessibility or helpfulness of resource material, person, agency or event	Sufficient in some groups	Sufficient in some groups
9. Critically appraise information obtained from written, audiovisual, computer, human or other resource	Sufficient in a few groups	Sufficient in some groups
10. Take steps to resolve disagreement or interpersonal conflict	Sufficient in a few groups	Sufficient when occurred
11. Negotiate, elaborate, or change group process	Sufficient in a few groups	Exemplary in some groups, sufficient in some
12. Critically appraise own learning progress or interpersonal interaction in tutorial group	Sufficient in a few groups	Insufficient
13. Critically appraise group's learning progress or interpersonal interactions	Sufficient in a few groups	Insufficient
14. a) Discuss psychosocial aspect of HCP b) Discuss population or community medicine aspect of HCP c) professional ethics, attitudes, or values of health care givers	Sufficient in most groups Sufficient in some groups Sufficient in some groups	Sufficient in most groups Sufficient in some groups Sufficient in some groups

substantial variation. Student and group factors, including inexperience with PBL and possible negative preconceptions of PBL may also have influenced the process. However, evaluation of the groups' PBL activities and the way in which discussions were organized and conducted suggested that these activities were satisfactory, and that, at the level of this evaluation at least, the performance of these groups was similar to other groups in PBL-focused courses. In this evaluation the relative contribution of these factors and others such as case design and selection to the overall tutorial process cannot be determined. These issues will be further discussed in subsequent sections on Educational Outcomes (5.5).

#### **4.4 Gender differences**

Some interesting gender issues were described by two tutors. The females in the group were more interested in social issues and wider contexts. They were more likely to do the house call while the males examined more concrete 'medical' topics.

*The female group members focused (unprompted) on other aspects of the patient's life; they recognized importance/saw the wider context of the patient. They initially saw the other aspects in terms of diabetes but then discovered other health and psychosocial aspects.*

*The males took on much more defined medical topics while the females took on much more 'wishy-washy' or applied topics like control or management and psychosocial issues. The females also did the house call. [quotations from tutors]*

This gender difference had implications in allocation of tasks

*Female Chair was allocating tasks, two tasks remaining, and she asked male student to do more undefined task, male student was markedly uncomfortable with this but didn't want to come straight out and say he didn't want to do it. Female Chair sensed this and after a time relented and offered him the remaining more defined and medical task.*

*In above example, female Chair had joked ironically about giving the applied topic to male student saying 'you can have that one -you want to be a surgeon don't you?'*

The tutors who described these tutorials were not surprised that there were some significant gender differences in the approach to PBL:

*.. males tended to be more interested in medical sort of stuff and tended to be lazier and pick the easy options. [I] believed there is a perception that other, less well defined topics were 'girly stuff' and that they required a bit more creative effort to get something out of it.*

In summary, differences were noted in some groups in the approach of male and female students, who tended to focus on different aspects of the case. These differences tended to be driven by the students, possibly on the basis of pre-conceived stereotypes or career plans, but did not surprise the tutors. In this evaluation it was not possible to determine whether these observed differences reflected a different approach between the genders to the cases, or were due to other factors such as conforming to stereotypical roles.

#### **4.5 Strategies to overcome problems**

All groups experienced some problems with the PBL process, with similar issues being described by students, tutors and the independent observer. Groups were relatively new to PBL, with any prior experiences generally being unfavourable. They struggled with the approach, the format and the rationale. Some groups experienced difficulty with the group process, while others expressed concerns about their background knowledge. Tutors and groups acknowledged and responded to these issues in different ways, which had a major influence on the outcome of the tutorials. This, in turn, influenced the overall evaluation, as it was not always possible to separate the effect of the new format from the effect of the discussion around real patients.

One solution to the problems that groups were experiencing with the PBL format was to provide more structure and guidance. Another was for tutors to explain the rationale behind PBL so students could see the ‘need’ for the real life aspects of the Problem of the week. Tutors noted that after discussion of the rationale and format students seemed clearer and a bit happier about the process. This also allowed students to build up a relationship with the tutor and vice versa.

*I pushed the ‘real-life’ aspect of POTW rather than on the process of POTW -which I might have emphasized in the previous lessons. This seems to be far more relevant to them than the ‘abstracts’ -its actual- patient coming into a practice. [quotation from tutor]*

A particular barrier was noted in the first tutorial when the initial resistance of the group had to be dealt with. In addition, groups may have been unfamiliar with each other and the tutor, so the PBL process tended to be slower.

*[I] believed first POTW is difficult one; need to spend time dealing with how it works –first group more resistant.*

*So they weren't familiar with Townsville, with me or with each other; they were unsure of themselves and the process. [quotations from tutors]*

Direct observation of the tutorials supported the view that students came to these sessions with a negative attitude to PBL. Tutors who took time to work through this issue prior to starting were noted to be successful in changing the students’ negative body language and focusing their attention on the PBL case. The observer also described how the management of the sessions by the students tended to flow better where the PBL process has been outlined prior to working through the case:

*One tutor took considerable time doing this and referred back during the tutorial. Surprisingly, the students responded well and took a more active role throughout, including in the second tutorial where the group was well prepared, including letter.*

In this tutorial the students had been well briefed and well prepared, to the extent where they came to the final tutorial with the letter already prepared. This contrasted with another group who were less well prepared:

*In contrast another group was given no direction at the beginning, minimal discussion, tutor dominated, and group broke up very early. Instead of regrouping in the interim the group showed no organisation in tutorial 2, difficulty when probed, and no prepared response for the GP.*

A number of groups expressed concerns about the adequacy of their background information and prior experience. For example one group had not yet undertaken their psychiatry rotation, and felt that they were unable to deal with this topic in the context of the *Problem of the Week* as it was outside their area of knowledge. This may have reflected their prior experiences with traditional, more didactic teaching:

*The students felt they did not have enough knowledge to start. They kept pushing for more information. I got the impression that they would have preferred a didactic lecture. [quotation from tutor]*

In contrast, one tutor observed the difficulties that a group experienced due to their preconceived ideas:

*They had some preconceptions about how a patient with diabetes ought to present and be managed, which tended to block them a bit.*

In contrast some groups were observed by the tutor to be confident about content:

*It seemed to me that they felt they had a lot of the knowledge they required within the group.*

*They were quite confident about the content of the problem and what they were meant to be doing.*

*They knew a lot more about diabetes than other aspects of the case.*

Both students and tutors noted an improvement in group process with experience across the two POTW tutorial weeks. Students generally appreciated the group approach, which reflected the team approach in General Practice, while conceding that group dynamics could improve, and probably would with practice. One student clearly described the improvement in group process over the two weeks:

*Last time we didn't work well as a group. This time we more focussed and goal directed and it came from us. There was improved group dynamics and we didn't waste as much time.*

This change was also described by one of the tutors:

*The group dealt with the problem pretty well; they worked pretty well as a group and had more idea of what to do than the first group -didn't know whether this was because it was their second POTW.*

Overall, students found this a better experience than their previous encounters with PBL:

*From past negative PBL experiences, I have found this one surprisingly helpful. Using it as a consolidating process rather than knowledge-gaining process seems to be preferable.*

In summary, tutors and groups used a variety of strategies to overcome problems related to the relative inexperience of the students with PBL and with group work, and to overcome any prior negative attitudes to PBL. These approaches included providing more structure and guidance for students, explaining the rationale for PBL and the benefits of using real patients, and allowing students to work through their concerns. Groups who worked through these issues were observed to perform better, and further, were able to establish a working relationship with each other and the tutor. Students also expressed concerns about their prior knowledge and preparedness at this stage of their training to undertake the *Problem of the Week* format. However, both students and tutors noted an improvement in group process over the two tutorial weeks, with students more positive about this format than their

previous experience with PBL, valuing the opportunity to consolidate and apply knowledge, rather than gaining new information. The different ways in which tutors and groups responded to these issues influenced the process and outcome of the tutorials, and therefore impacted on the overall evaluation. It was not always possible to separate these effects from the effect of constructing PBL tutorials around real patients. Possible explanations for variations between groups will be further discussed in the following sections on *Group Characteristics* (4.6) and the *Group Assessment Schedule* (4.6.1).

#### **4.6 Group characteristics**

The PBL literature emphasizes the importance of group work: students in these courses often self-select on the basis of their interest in, or aptitude for, small group work, and, further, have opportunities to be trained, discuss, and practise these techniques with feedback. In contrast, the students in this study did not self-select into a PBL course, and did not have a strong background in small group work or PBL. Some of the variability in performance of groups may be explained by individual characteristics of the students or the group, rather than the format of PBL using real patients.

Tutors described a number of features of groups that worked well. These included groups that were enthusiastic, independence in organising themselves, and willingness to try a new process:

*The group dealt with the problem well. They had a little/some previous experience with PBL - some negative but not all. Still they were willing to give it a try*  
[quotation from tutor]

Tutors also described how leadership and chairing skills were important and could sway group opinion:

*There were two natural leaders, although everyone still had their say and got involved.*

*One student 'bought into' the process and acted as a leader for the group -assisted others and sort of managed the group i.e. identified what things the group could do. A couple were talkative and seemed to be okay about PBL -saw the value and seemed to 'push' the group, which overcame resistance the others may have had to the concept of PBL.*

*On suggestion they quickly allocated/organized the Chair and Recorder for the session. They worked well together even though they didn't know each other/hadn't worked together before.*

*The Chair was a good facilitator and 'cracked the whip' -grouped ideas, assigned roles but didn't dominate and consulted the group on decisions.*

The observer noted that the groups which performed better had a leader who tended to be confident, knowledgeable, and able to direct the discussions. The leader was not necessarily the most outspoken, or the board scribe. Where no leader emerged the group was very quiet and the tutor inherently took the role, sometimes with extreme frustration. The tutors who deferred to the group leader found the group could progress well with only minor probing.

These comments highlight not only the importance of leadership skills within a group, but the importance of opinion leaders in facilitating a group's approach to change. The education literature clearly describes the importance of group process and leadership within groups in the PBL process. Leadership and group skills are recognized as one important component in preparing groups new to the PBL process. The additional dimension, that of managing the educational change process, is no less important. These examples highlight the importance of engaging key group members to assist with this transition.

One tutor described a very self directed group:

*The Wednesday session they were all there and by the time I got there they were sitting in a circle sorting out what each was doing and up to.*

A number of groups were less than enthusiastic, and were described by tutors as demonstrating laziness, poor punctuality and participation or a lack of commitment:



*Very active participation but a little bit of laziness in terms of contacting resource people and didn't want to do a house call. They had planned a house visit but the car broke down but there was no real enthusiasm.*

*I had to mark them lower than I really wanted to because there wasn't really active participation but also because of punctuality and group work. I still think they found it a useful learning exercise.*

*There was a lack of commitment.*

These groups seemed to be prepared to work through the PBL process in the classroom process but were insufficiently committed to want to undertake further tasks or independent research.

The observer noted that the tutor may have had some role in the performance of groups who were thought to have problems:

*Whilst it is difficult to motivate some students it is unlikely that all within a group are alike. Comments came to me that the group was 'poor', 'lame', and 'difficult', were true if you looked at the outcome of the session, but along the path there were opportunities for open questions and suggestions which may have incited a better response. The experienced tutors know how to challenge a student without frightening them into inaction.*

However, attendance was also an issue with less than half the groups having all members present at the start of a tutorial. Students were sometimes over 15 minutes late, which caused additional strain for the tutor and other students.

Direct observation of the tutorials also suggested that the group process was likely to change around mid-tutorial when the more outspoken were fading and other students could be drawn out. Again, the tutors were the key to changes in dynamics, depending on how they dealt with the leaders in the group. Tutors tended to let groups run their own course, however, when they did intercede they quickly became the dominant focus of the group.

The observer also noted that students only rarely undertook the process of self-evaluation of their own learning progress or interpersonal interactions in the tutorial group. Some of this occurred in the first tutorial when PBL as a teaching method was discussed and group's prior negativity was addressed. Some groups undertook self-evaluation at the start of the second set of tutorials when the previous evaluation forms were discussed, with the more experienced tutors using these comments to motivate the students. Tutors could possibly make more use of this opportunity to make the students aware of the progress they have made.

Similarly, no significant evaluation of the group's learning progress or interpersonal interactions was noted in the direct observation of tutorials. The final letter was seen as the closure. Groups with more experience of PBL could be expected to close with an evaluation of their progress, for example by reinforcement of their achievements to the GP. Tutors could be encouraged to support this particular group function.

Direct observation also suggested that while students with possible language problems, for example overseas students, for whom English was a second language, did not appear to participate actively in the first tutorial. However, their reporting back in the second tutorial was generally well informed and cohesive. The observer suggested that placement of students should be monitored to ensure they are balanced between groups. In these tutorials students were allowed to select their own tutorial groups, but there is experience to suggest that allocation of students to tutorial groups may be preferable.

In summary, characteristics of groups that worked well included enthusiasm, organisational skills, independence, and a willingness to try a new process. As expected from the literature on group work, leadership and chairing skills were also important. The most effective leaders were observed to be confident, knowledgeable, and able to direct the discussions, not necessarily the most outspoken member of the group. The nominated chair, or other opinion leaders in the group, also had a significant role in facilitating the group's approach to change, and encouraging them to embrace the new format.

However, where no leader emerged the group process suffered, with the tutor having to take over the role. These groups were less likely to be enthusiastic about the process, being described by the tutors as demonstrating laziness, poor punctuality and participation, and a lack of commitment. These groups were noted to work through the PBL process in the classroom, but were less likely to undertake independent tasks or further research.

The observer noted that the tutor may have influenced the performance of groups who were thought to have problems, for example by the way in which they phrased questions, or by missing the opportunity to challenge students. However, group process was affected by punctuality, particularly where some group members were 15 or more minutes late. Tutors also influenced group process by the way in which they facilitated the group and interacted with the leader at the change in group dynamic observed mid-tutorial. Tutors who intervened at this point, when some students were starting to contribute more, and others were fading, tended to rapidly become the dominant focus of the group.

Direct observation of the PBL tutorials revealed that self-evaluation of learning progress and interpersonal interactions occurred only rarely at both the student and group levels. These activities would be expected to occur more frequently in more experienced PBL tutorial groups, and may have been better supported or encouraged by tutors. Finally, students who may have had language difficulties were noted to participate more passively in the first tutorial, but were still engaged in the independent tasks and research, and able to participate more actively in the second tutorial.

The range of factors that appeared to contribute to the variability in performance of groups suggests that the individual characteristics of the students, the group, or the tutor are a major factor in determining the educational outcomes, in addition to the format of PBL using real patients. Consideration should also be given to allocating students to groups rather than allowing them to self-select. These issues will be further discussed in section 5.5 on *Educational Outcomes: Student Learning*.

#### 4.6.1 Group Assessment Schedule

Assessment of group function by means of the *Group Assessment Schedule* (GAS) also revealed a mixed picture, with variable responses between groups. (Table 4.4) Tutors were asked to rate each tutorial group on four variables related to group functioning: commitment; interpersonal relationships; group interaction and interactivity; and problem solving abilities.

Three tutorial groups scored highly (above the mean for all groups) on all four parameters. These groups were those that adapted best to the PBL process, reported the greatest satisfaction with the *Problem of the Week* tutorials, and demonstrated a variety of group skills. The direct observation of these tutorials revealed that the quantity of interactions was no different to other groups, but that the quality was greater.

Two of these tutorial groups, I and J, were in fact the same group, observed across the two *Problem of the Week* cycles. These were the groups that tutors had described earlier (sections 4.5 and 4.6) as being enthusiastic, willing to try a new approach, and being confident about the content and process of the problems. Tutors also described these groups as working well together, with a defined leader who was able to facilitate the group and help organize and allocate tasks. The third group, L, had also been highlighted by the tutor as being very self-directed (section 4.6). This group was also described by the tutor as being open to a new teaching format:

*They weren't antagonistic – we talked about PBL and some had experiences in the past which were generally favourable and said that they had enjoyed the last one*

Two of these groups (I and L) shared the same tutor. The role of tutor-related factors has been described in this evaluation and the PBL literature. While it is not possible in this evaluation to quantify the effect of a specific tutor on the functioning of a PBL group, it does seem likely that an experienced and effective tutor could encourage a group who already had the group skills and motivation to successfully deal with PBL to perform at a high level.

One group (F) scored below the mean on all four parameters, and two groups (M and P) were low on three of the four. These groups reported less satisfaction with the PBL process, with direct observation confirming the group process was less than ideal, with both the quantity and quality of observed activities below the mean.

	<b>Item 1</b>	<b>Item 2</b>	<b>Item 3</b>	<b>Item 4</b>	<b>Mean</b>
	<i>Commitment</i>	<i>Interpersonal relationships</i>	<i>Group interaction &amp; interactivity</i>	<i>Problem solving abilities</i>	
<b>Group</b>					
<b>E</b>	4.5	6	6	6	5.6
<b>F</b>	4.5	6	3	3	4.1
<b>G</b>	4.5	6	6	6	5.6
<b>H</b>	7	6	7	6	6.5
<b>I</b>	7	7	7	7	7.0
<b>J</b>	7	8	8	8	7.8
<b>K</b>					
<b>L</b>	8	7	7	7	7.3
<b>M</b>	6	6	4.5	4.5	5.3
<b>N</b>	6	7	6	6	6.3
<b>O</b>	4.5	7	7	6	6.1
<b>P</b>	4.5	6	4.5	6	5.3
<b>Mean</b>	5.8	6.5	6.0	6.0	

**Table 4.4: Group Assessment Schedule summary**

These groups were described by the tutors as struggling with the PBL process, requiring a lot of prompting, and as being interested in moving straight to the ‘answer’, rather than exploring hypotheses and undertaking independent tasks.

Tutor comments suggested that for Group F there was little value in undertaking a PBL tutorial constructed around a real patient:

*Didn't know how real the interview with the patient was and how much the students actually contributed to care and management. They didn't use other resources well eg other health workers – they might have got the same amount of information without a real patient.*

The lowest scores across all groups were for commitment, and the highest scores were for the scale assessing interpersonal relationships. This scale also demonstrated the least variability between groups, with all groups being assessed as 'competent' or better. The greatest variability between group scores was on the items for group interaction and interactivity and for problem solving abilities. These items correlated most strongly with the overall performance of the groups. There was no consistent pattern in change in group performance from the first to the second tutorial, with the assessed scores of some groups improving, and other groups decreasing. However, the score of Group F-H improved from 4.1 to 6.5, suggesting some improvement in group functioning. Whether this change was due to improvement in the PBL process with experience, or other factors such as case design and tutorial facilitation, or a combination of these was not clear.

The quantitative performance on groups by direct observation was compared with the scores on the *Group Assessment Schedule* for the eleven tutorials where both items were available (Table 4.5). Each group was assigned a rating from -- (well below the mean for all groups) to ++ (well above the mean), with +/- being neutral. The two scores agree for most groups and are consistent with the descriptions from interviews and questionnaires with tutors and students.

Groups N and E, who had been described by tutors as being less than enthusiastic (section 4.6), had scores on the *Group Assessment Schedule* close to the mean. However, direct observation data suggested the performance was equivocal or low, indicating that triangulation by multiple measures of group performance may be needed to provide the best estimate of group function. Similarly, groups F, M and P who scored lowest on the *Group Assessment Schedule* had low or equivocal scores

by direct observation. In contrast, the groups who performed best tended to be rated highly on both scales.

<b>Group</b>	<b>Direct Observation</b>	<b>Group Assessment Schedule</b>
E	+/-	+/-
F	+/-	--
G	-	+/-
H	+/-	+/-
I	+	++
J	+	++
L	-	++
M	+/-	+/-
N	-	+/-
O	-	+/-
P	--	-

**Table 4.5: Comparison of Direct Observation with Group Assessment Schedule**

In summary, these data support the findings that variations in group performance were influenced by a variety of factors including the students' prior experiences with PBL and willingness to adopt a fresh approach; tutor factors including the ability to manage negative perceptions of PBL; and group factors including leadership, commitment, organisational skills and interpersonal relationships. The lowest scores across all groups were for commitment, with the greatest variability between group scores being for the items for group interaction and interactivity, and for problem-solving abilities.

Groups' performance was more aligned with these three factors than with issues of case design or patient selection. These groups had relatively little experience in small group work throughout the course. However, they had worked together in

other settings and scored highest on the interpersonal relationships scale. Scores on this scale also demonstrated the least variability between groups.

Agreement between the instruments used was strongest for groups who performed well. For other groups a mix of qualitative and quantitative data, using triangulation by multiple measures of group performance may be needed to provide the best estimate of group function. Tutors described an improvement in group performance from the first to the second Problem of the Week, but this observation was not supported by the quantitative data.

#### **4.6.2 Approaches to studying**

Responses from the seven groups who completed the approach to study questionnaire are summarized in Table 4.6. Mean scores were calculated for each student group on the major scales, *Meaning Orientation* and *Reproducing Orientation*, and on each of the sub-scales. These data allowed comparisons between student groups on their approach to learning as described by Richardson.<sup>94</sup>

In this study the students' approach to studying may have been influenced both by their prior university experiences and by their learning activities in their current year 5 General Practice term, which had included one previous *Problem of the Week* cycle. The relative contribution of these two factors could not be determined in this study, neither was it clear whether students who self-selected to attend the North Queensland Clinical School were representative of the wider student body? However, it is likely that responses to this questionnaire from year 5 students in a six-year undergraduate course would be more influenced by their previous educational experience than by a relatively brief intervention late in the course such as the first *Problem of the Week* cycle. Interpretation of these results is limited by these factors. In addition, the questionnaire was designed to measure the approaches to studying in individual students. The results can therefore be used to draw inferences about the approach of individuals in groups, but not the overall function of the group. However, some comparisons between groups are possible.



Group	B-D	E-G	F-H	I-K	J-L	M-O	N-P	Mean
Responses	6/6	6/6	6/6	5/5	6/6	6/6	6/6	
Use of evidence & logic	2.8	2.7	3.3	3.4	2.5	2.8	2.5	2.9
Relating ideas	1.8	2.4	2.6	2.7	2.6	1.9	2.4	2.3
Comprehension learning	3.0	3.2	3.0	3.4	3.4	2.8	3.0	3.1
Deep approach	2.3	2.3	2.4	2.2	2.9	2.3	2.1	2.3
Meaning orientation	2.5	2.6	2.8	2.9	2.9	2.4	2.5	2.7
Surface approach	2.3	2.2	2.6	1.5	2.6	1.9	2.7	2.2
Improvidence	1.2	1.5	2.3	1.6	2.1	1.7	1.9	1.8
Fear of failure	0.9	1.7	2.3	0.9	2.4	1.3	2.2	1.7
Syllabus-boundedness	2.2	2.7	3.1	2.6	3.1	3.0	3.4	2.9
Reproducing orientation	1.6	2.0	2.6	1.7	2.6	2.0	2.5	2.1

**Table 4.6: Approaches to Studying questionnaire**

There was little variation between groups on the *Meaning Orientation* scale, with the groups' mean scores in the range of 2.4-2.9. There was a greater variability between groups on the *Reproducing Orientation* scale, with a range of mean scores from 1.6-2.6. Some outliers were noted on two of the sub-scales of the *Reproducing Orientation* scale. Group I-K had low scores on the *Surface Approach* and *Fear of Failure* sub-scales, and group B-D had a low score on the *Fear of Failure* sub-scale. However, these findings were not consistently supported by the other quantitative or qualitative observations.

Comparisons with results from the *Group Assessment Schedule* and Direct Observation (Tables 4.4 and 4.5) reveal no consistent pattern. For example, Group F-H achieved the lowest *Group Assessment Schedule* score of the first *Problem of the Week* Tutorial, but was above or close to the mean in all scales and sub-scales of the Approaches to Study questionnaire. Group J achieved the highest scores on the *Group Assessment Schedule* and on Direct Observation, but was close to the mean on the *Meaning Orientation* scale, and above the mean on the *Reproducing Orientation* scale. This group did have the highest score on the *Deep Approach* sub-scale.

The lack of correlation between the performance of student groups on the *Approaches to studying* questionnaire and the other qualitative and quantitative instruments used suggests that differences in approaches to studying were not

responsible for the observed differences between groups, but that other factors were important. These findings also support the importance of triangulation of data sources, as was adopted in the methodology of this study.

#### **4.7 Tutor factors**

Most students appreciated the contribution of the tutor who was seen as a facilitator, to support and motivate students and keep them on track. One student described the role as a:

*... facilitator to [let us] get not too far off track.*

Students acknowledged the role of positive, encouraging tutors, mentioning some of them by name:

*[name deleted] and [name deleted] were very encouraging.*

*[name deleted] is cool.*

Particular roles including prompting, moving the group along, drawing the group's attention to important or overlooked details:

*Point out the little things we missed.*

*Other PBL's drag on, spending a long time on uncrucial things but this tutor was excellent.*

*Prompt us if we get stuck.*

*Came up with stuff that we didn't think of. [quotations from students]*

Direct observation of the tutorials suggested that the tutor had an important role in managing the process, even where the group had identified a leader:

*One of the advantages of PBL is the inherent management of the process. Bar one group the manager was the tutor.*

The role of the tutor in managing conflict was noted in one tutorial, where a tutor and student clashed. Another case was described by the observer where two tutors were present as part of PBL tutor training process, with some issues of control noted.

*Two tutor scenario for training or medical support did not work as well as single tutor. Students gravitated to one tutor and in one instance the support tutor began to direct the student discussions along a particular theory. This caused conflict with the tutor 1 which was dealt with but could have changed the flow of student thinking. These tutorials were not as relaxed.*

This situation resulted from the system used to train tutors as described in the methods section which involved a new tutor co-facilitating with a more experienced tutor. Other tutorial groups who experienced difficulties with the presence of observers or others outside of the group are discussed in section 5.7.1, *Impact of Observation*.

Students recognized that tutors had different styles, which may vary according to the circumstances. Some tutors were described as unobtrusive, and others as directive at times:

*Directive at times, needed to push us more in the first session.*

*Yes, not dominant – they prompt if we're all lost – didn't say wrong or right – challenge thinking.*

Some saw the tutor as a content expert with extra information rather than as a facilitator of the process. In some cases the information was seen as causing a potential power imbalance between the tutor and the students:

*Provided extra knowledge.*

*Not really coordination role, we coordinated ourselves fairly well.*

*Sometimes it's a bit of a power thing – withholding information.*

Several groups saw the information held by the tutors as an efficiency, saving them from independent research, while another felt that material was more readily learnt from a tutor than from other sources such as textbooks.

*Yes. [effective in helping learn] Saved us from putting in much research.*

*Have to 'lecture' (group supervisor providing us with info from his/her experience) as opposed to just being a team leader.*

*The tutor should act as a textbook or reference text. I think I learn better or remember more if it comes from a tutor rather than a textbook.*

Direct observation of the tutorials found that tutors tended to probe, focus or clarify information or terminology related to the case more than the students. Tutors used this approach as a technique to motivate groups. Students at times did not see the tutor as a source of information, perhaps as a result of the introductory session.

Students found the feedback from tutors valuable, with some groups requesting more:

*More feedback would be useful, if they could step in and correct us.*

*Don't know if can rely on own knowledge.*

*Good to get positive feedback.*

Two students commented that they preferred to work by themselves:

*Felt that do better without tutor, didn't need tutor at beginning, limits what you are saying.*

*Unsure of expectations. Sometimes it seemed uncomfortable / inappropriate having someone else there.*

Negative comments about tutors were rare. Only one student specifically commented that the tutor did not have a role in facilitation:

*[tutor's role in helping student learn] not particularly useful.*

*[tutor] not really a co-ordination role, we co-ordinated ourselves well.*

As discussed in the earlier section (4.2) on PBL format, students expressed concerns more with the concept of having a tutor present for their discussions, rather than the actual performance of the tutor. This is consistent with the students' relative inexperience with PBL, which was reflected in the difficulty some groups faced in coming to terms with the process.

Direct observation of the tutorials revealed some important differences in tutor performance. Tutors with the content knowledge of a medical degree tended to focus on details of the case rather than learning outcomes:

*Medical tutors seem most concerned with the health care problem outcome rather than the PBL learning on route and tend to actively direct the students along a pre-set route. There is often a feeling of frustration when whatever medical issue is not apparent to the students. This can become very negative when the group is passive by nature. The tutor then changes to direct teaching and usually ends with allocating the assignments.*

The education background of the tutors was also observed to impact on their role and the performance of the group:

*Obviously the tutors with a background in education were more relaxed in their role which flowed to the students' performance. These tutors easily dealt with the dominant speakers, distracted or nonsensical without interrupting the process.*

However, one of the non-medical tutors did appreciate the presence of a medical co-tutor. Given the different approaches that have been observed, any benefit that the non-medical tutor may have felt from having a medical tutor present may be more related to their potential anxiety related to medical content than to any real educational outcome or benefit.

The observer recommended that the tutors meet as a group at the completion of each tutorial set to discuss the problem, its presentation and outcome, the group dynamics, the PBL process and how the students related to the plan. The importance

of individual approaches was not discouraged, but this was seen as a mechanism to provide peer review, feedback and an opportunity to discuss any difficulties, particularly for those tutors without a strong educational background. This was also seen as an important mechanism for feedback to the faculty involved in developing these problems.

In summary, students recognized the important facilitative role of the tutor in the PBL process, supporting and motivating students, and keeping them on track. The role of the tutor in managing conflict was also acknowledged, with other conflicts noted between tutors who were co-tutoring. Tutors had different styles, varying from unobtrusive to directive according to the circumstances. Students welcomed feedback from tutors, and requested more.

Some students resisted tutor input, either due to their unfamiliarity with the process, or to a desire to be allowed to work independently, with some groups expressing concerns about a tutor being present during their discussions. They did recognize that tutors had content knowledge relevant to the case. In most cases tutors were able to use this to help guide groups through the PBL tutorial; process, highlighting important or overlooked information and helping students identify significant links, but tensions were expressed in a small number of tutorials due to this perceived power imbalance. Some groups preferred to use the tutor as an easily accessible source of information, while others did not, possibly due to the material presented about the PBL process in the introductory session, or to the tutor's facilitation style.

Direct observation of the tutorials suggested there were differences in tutors' approaches depending on their content knowledge and educational experience. The observer recommended that while individual approaches should not be discouraged, tutors should meet to discuss the PBL tutorials and student performance as a feedback mechanism for faculty and for tutors, particularly those without a strong educational background. The importance of tutor training has been highlighted in the literature, with the format used in this evaluation described in the methods section.

## 4.8 Summary

This chapter has described the tutorial process from the perspectives of group process, the PBL format and the approach to the PBL tutorials. Some of the difficulties experienced by groups have been described, together with the strategies that they used to overcome these. Students highlighted the important role of the tutor in these tutorials. Some unexpected findings included gender differences in roles and allocation of tasks within some groups. Most data was qualitative, based on questionnaires, interviews and focus groups with key stakeholders, and supported by quantitative data, based on observation of group activity and the *Approaches to Studying* questionnaire.

The next section will explore educational issues, including learning activities undertaken by students and issues around educational design, delivery and evaluation.

## CHAPTER 5

### RESULTS & DISCUSSION: EDUCATIONAL ISSUES

The previous chapter described the overall tutorial process, including group work, the PBL format, and the approach of the students to the *Problem of the Week* format, based on qualitative data from students, tutors, and an independent observer, supported by quantitative data on group function and PBL process.

In this chapter the learning activities undertaken by students will be explored in some detail (5.1) by using qualitative data on the learning activities undertaken by students, and reviewing their educational outcomes. This will lead to a discussion about case design and selection, and design of PBL tutorials based on real patients (sections 5.2 and 5.3). Some recommendations will be made regarding choice of patient case and the educational settings in which these tutorials are most likely to be appropriate. Finally, the impacts of using real patients and educational outcomes focusing on student learning will be described in sections 5.4 and 5.5.

#### 5.1 Learning activities

Students undertook a range of activities in each *Problem of the Week* cycle (Table 3.8). These included viewing the video trigger in the first tutorial, which was followed by a group discussion or ‘brainstorm’ in which hypotheses were discussed, learning needs identified, and tasks allocated. Immediately following this first session, students interviewed the patient. Other tasks which were undertaken independently before the next tutorial included reviewing the patient’s chart, a house call, seeking other resources such as other health professionals or communities agencies who were involved in the case, and reviewing the literature.



Students then met with their tutor for the second tutorial to share their findings and synthesize their thoughts and recommendations for the case.

The house call and literature review were undertaken by only some of the groups, but the other tasks were completed by all groups and will be discussed in the next sections.

### **5.1.1 Learning activities: Video trigger**

Some students described the benefit of this activity as a trigger or primer to start thinking about the problem and to present an initial picture of the overall situation:

*It's a primer before seeing the patient, in terms of knowing what questions to ask and why before the interview.*

The video presented an opportunity for students to identify the main problem, as seen from the patient's perspective, in his or her own words. Students saw advantages in using a video of the patient over reading a description of the case.

*They say different things on the video, which is good.*

Most students saw the benefit in having a brief trigger with limited information:

*Good that only get small bit (ie of information).*

*Pretty good, not much information but good for brainstorming.*

On the other hand, some students' comments were less positive, with concerns expressed about the amount of information:

*The video was vague.*

*Doesn't give enough information to spend an hour talking about it.*

However, a number of students would have preferred to see the patient first, instead of the video:

*It's easier and better to talk to the patient.*

*Would have been able to find out anyway – got to interview anyway.*

*Have the patient as the trigger with us talking to him and formulating a Mx plan based on that. The initial session was not beneficial.*

*Have the patient present in the first session, clearly define what is required of us.*

Some noted technical problems with the quality of the videotape:

*Not very good – couldn't hear it very well because of the air-conditioning noise on the tape.*

*The initial video interview was very hard to hear and to review later on. It took a lot of time – analysed already and our role was useless.*

One student felt that observing the doctor interview the patient in the video added an extra dimension:

*Good to see the video. The doctor manages to build up a good rapport with patients. I like to see how the doctor manages things.*

In summary, most students valued the initial video trigger as an opportunity to start to think about the problem from the patient's perspective and to present an initial picture of the overall situation. The limited information available was seen as a starting point for the hypothesis generation process, although some groups felt there was insufficient information. The technical quality of the videotape was mentioned by two groups. One student described the additional benefit of being able to observe an experienced general practitioner interact with the patient.

### **5.1.2 Learning activities: Hypothesis generation**

This was seen as an important activity by most students, with comments suggesting that the main aims were achieved. Groups used this time to generate hypotheses, to create ideas and prioritize, and to formulate tasks.

*More ideas – different way of thinking about the patient.*

*Identify main problems and prioritize issues.*

*Good to do when thinking broadly otherwise we narrow down on the main issues.*

*We were looking for unknown factors which was good because it makes you think about possible causes.*

*We seemed to be raising some pretty obvious issues. We guessed some of his problems before we actually got to talk to him. Some of the issues that didn't seem to be as important turned out to be important. [quotations from students]*

Students also described this as an opportunity to focus on what they needed to find out, and to sift relevant from irrelevant information:

*To find out what we needed to research.*

*Give indication of what to look into as a group.*

*Work out what extra stuff needed.*

*Relevant and irrelevant issues.*

*To give us a targeted approach.*

*To identify things that we wanted to find out about and came up with hypotheses.*

Some described this as a process of distillation and an opportunity to focus issues before talking to the patient.

*Can identify issues prior to talking to the patient – more efficient and less time consuming.*

*Focus the interview.*

Students saw other positives from the hypothesis generation exercise including the opportunity to put things in perspective, to ensure they were on the right track, and to clear up uncertainties about what was presented on the video. Others enjoyed the opportunity for group work in this part of the process, and another student commented on the value of the group being able to take the doctor's perspective:

*We are putting ourselves in the shoes of the doctor.*

The main concerns about this part of the process related to the time taken with one student feeling the hypothesis generation session dragged on and another describing it as frustrating. One student suggested the process could be improved by shortening this discussion, while another described a different issue:

*I was frustrated because the others knew more than I did.*

One student described the difficulty with the hypothesis generation session in terms of the unfamiliarity with the process, which is consistent with other student descriptions in section 4.1.2:

*Not trained like that – resistant to that – like to have all information first.*

Another student suggested that the original hypothesis generation session could be moved to after the interview with the patient. This comment suggests that the purpose of the hypothesis generation session - to think about the problem, what was already known and what research needed to be done – was not clear to this particular student.

In summary, students valued the hypothesis generation session as an opportunity to work independently in order to generate hypotheses, to create and discuss ideas, to clarify their understanding of the case and further information needed. They used this time to prioritize their activities, and to start to formulate tasks. They enjoyed being ‘in the shoes’ of the doctor, although a minority of students did experience difficulties with the time taken or in adjusting to the new approach. The search for unknown factors or explanations was seen as positive, as it required students to explore many areas to think about possible causes.

### **5.1.3 Learning activities: Patient interview**

This was regarded by students as a critical part of the process, providing the major source of information. One student described the range of information gathered in the interview:

*Clarified history, patient personality and background.*

The tutors agreed on the value of the patient interview in terms of the reality of the situation for the students:

*It was more real for the students; they can interview the patient.*

*They did enjoy talking to the patient -probably the only part they enjoyed.*

*The patient made it more real.*

*The real patient contributed very strongly to the process -made it more real.*

[quotations from tutors]

Tutors also described the range of issues covered in the interview and the things that students were able to learn:

*Allowed them to see how health (or medical issues) and other aspects of life interact.*

*Content -One of the medical students spoke the same language as the patient; the home visit provided very different perspective of medical history just because of the nuances of language etc. Tutor felt they really contributed to the management of the patient.*

*Patient was able to give the students a lot of information and they were able to deduce a lot of things.*

Tutors felt some groups needed assistance with the process of the interview:

*The interview with the patient was a bit difficult -they had trouble building up the 'big picture'.*

*Fortunately the students watching could go in at the appropriate time to ask the necessary questions.*

*I had to break the interview because it was going on for so long. They were going into a whole range of things -the patient had many / complex problems.*

*They were good at asking about quality of life questions but were struggling to understand that the patient was quite happy how he was despite all the problems*

*and that he had only come in / interested in getting medications and that if he had problems he would ask.*

*Process -They lost some opportunity to use the patient, who is meant to be the main resource. [quotations from tutors]*

These comments suggested that at times some groups were overly focussed on detail, experiencing difficulty with putting the overall picture together or limiting the depth and breadth of the interview. Usually two students interviewed the patient, with the rest of the group, and the tutor, observing using a one-way mirror, and hence able to intervene and assist if needed.

Students valued the immediate feedback available from the patient in the interview, the chance to check or reject hypotheses. They contrasted this real life interaction to the paper-based simulation:

*Allows you to reject or accept hypotheses.*

*Meant could follow hypotheses then and there and come to conclusions – not, ifs.*

*Past PBL's you just ask the doctor who says yes or no but that's less training to be a doctor.*

Some groups wanted more time allocated to the patient interview. Two groups described benefits in allowing more time in the initial interview to enable them to take a better history. However, some groups felt the information from the patient interview was so important that there was little point in undertaking some of the other suggested activities:

*We could have done the interview and then discussed it then and there.*

*It would be good if we had other resources here without having to look up much.*

*We could have done other things (other resources) but the effort was not worth it.*

*We got most of the stuff out of the interview, file and GP.*

*Would be good if you could spend more time with the patient so you don't have to do a house visit. Would prefer not to do a house visit even though ... can see the benefits including finding out about the home environment and family dynamics but*

*... it was a hassle [to] organize a house visit especially in terms of transport because none of us have cars.*

One tutor described a similar experience where a group did not seem to come to terms with the reality of the patient interview, and did not make use of the other resources:

*Content -Didn't know how real the interview with the patient was and how much the students actually contributed to care and management. They didn't use other resources well e.g. other health team workers -they might have got same amount of information without a real patient.*

Some student concerns with the patient interview related to the format, and possible inconvenience to patient. Others saw benefits in the approach of having two students interview the patient with the rest of the group observing, although in one case, the tutor noted that only two students attended the patient interview, not the whole group:

*Having two people can be awkward – our own interviewing styles sometimes clashed. But you need two in case one forgets to ask something.*

*It was good that we got to do it and others watched which meant that we didn't have to explain it to them later.*

*A lot of time on something we aren't assessed on. Patient probably didn't like being harassed so much by us.*

In summary, the patient interview was seen by students and tutors as one of the most important parts of the PBL process. Some students described this as the only useful activity. Students valued the interaction with a real patient, the quality of the information obtained, and the opportunity to have immediate feedback on their questions and hypotheses. Tutors described the reality of the situation as an important factor for the students. Students and tutors agreed that the interview provided a range of information about the patient, including history, personality and background. Some groups struggled with appropriate questions and limiting the breadth and depth of the interview. A number of students requested more time with

the patient, although this was sometimes seen as an opportunity to avoid undertaking some of the other tasks. The format of the interview generally seemed to work well, although there were some concerns about inconvenience to the patient.

#### **5.1.4 Learning activities: Chart review**

Students generally made fewer comments about the value of the chart review. It was seen as a useful source of information but they had to work hard to extract information. Once they had this material they felt it was worthwhile and educative.

One student described the benefit of being able to trace a patient's history longitudinally via the chart:

*Forced to read through a patient's chart – able to see progression of disease.  
[negatives] trying to comprehend the chart.*

However, some tutors commented that some groups used it as the main source of information. They pointed out that students may have been tempted to make use of this resource to limit their own personal effort, and the possibility of students relying on the accuracy of the material in the chart. Delaying access to the file was suggested by a tutor as a way to overcome some of these problems.

*They came up with the right conclusions but they didn't do a lot of work -they just went with what was in the file.*

*Once they got the patient's file they relied on that for their information -they didn't really challenge it and assumed it told the full story.*

*They just wanted to get their hands on the file and use that.*

*It makes me think we shouldn't let them have the file until a bit later on.*

Two students described the difficulty in accessing information from the file, and the time consuming nature of the process:



*Perhaps if we had the entire case without access to the notes. But with this said we did learn a lot by understanding the principles behind what you were doing. This was a time consuming and seemingly fruitless task to complete in the week before an exam. Difficult to access important past hx information.*

These comments suggested that students struggled with the large, complex, and disorganized charts found in teaching hospitals. Many of these patients had multiple problems with some uncertainty around the diagnosis, and were undergoing multiple investigations or seeing a variety of health care providers. Some students appeared to appreciate that distilling relevant information from a complex medical record was an important task in real life. The way in which the *Problem of the Week* approach connects student learning to the real world will be further discussed in the final chapter.

In summary, the patient's file was an important source of information presenting a detailed longitudinal account of a patient's history. Students found that extracting relevant information was sometimes hard work and time consuming but once they had this material they felt it was worthwhile and educative. The tutors and observer appreciated that distilling a patient's history from complex hospital records, particularly if there were multiple problems in varying stages of differentiation, and many health care providers involved, may be a useful learning task, but this was not always appreciated by the students.

There were risks that groups may use the chart as the main source of their information without critically evaluating it and the possibility that they will then limit their other activities. This was particularly apparent in the groups described in section 4.1.3, who were more focused on the diagnosis or the 'answer' to the tutorial, rather than the learning process or educational activities. Delaying access to the file may help in overcoming these problems.

### **5.1.5 Learning activities: House call**

Groups who undertook the house call found it a useful experience. Students valued the opportunity to learn more about the patient in his or her own environment:

*Another time to ask questions.*

*Useful – more social/psycho aspect – coping in own environment.*

One tutor described in some detail the breadth of issues students were able to explore in the course of the house call:

*The home visit was very useful valuable in finding out about the patients situation - i.e. family dynamics/relations and how this impacted on management of his problem -i.e. who cooks, relies on daughter for transport, family member activities, as well as other factors such as stress. The family dynamics were very significant in this case and unexpected. They also found out about the patient's beliefs and practices regarding his condition and management of his condition. They came up with a number of issues/suggestions for management based on these.*

While another tutor described an opportunity that arose in the course of the house call for students to contribute to the care of the patient:

*Content -One of the medical students spoke the same language as the patient; the home visit provided very different perspective of medical history just because of the nuances of language etc. Tutor felt they really contributed to the management of the patient.*

A number of students described reluctance to undertake a home visit. Reasons cited included transport difficulties, perceived lack of relevance or usefulness, and pressures of time:

*Was not that useful in the first case.*

*Neither cases didn't really need one, did one though.*

*Would be good if you could spend more time with the patient so you don't have to do a house visit. Would prefer not to do a house visit even though ... can see the benefits including finding out about the home environment and family dynamics but ... it was a hassle [to] organize a house visit especially in terms of transport because none of us have cars.*

Tutors made more comments about the role of the house call and seemed to have a firmer view about its benefits than the students. The home visit was seen as an opportunity to learn about relevant issues in the patient's life which may not otherwise have come to light, and which the students were more likely to value after the event.

*Without the house visit all the surrounding issues would not have come up. The quality of the information was enhanced. They had more to think about.*

*I think they learned some things from the home visit that they wouldn't have from the file.*

*Allow more time and effort to go to do home visit or session of follow up for next visit.*

*They didn't want to do a home visit at first but I think they were glad they had later on.*

*Didn't want to do a house call- didn't think they would get anything else out of it - they were happy if they could speak to both patient and wife in the interview. They also had an exam in a couple of days, they said they would make a time if they couldn't get a good feel for it.*

*They didn't do a home visit which was disappointing. At the time they didn't really see the need or point of it but by the time they got to presenting it they realized it would have been good. They could have got a lot out of it.*

Some patients also expressed reluctance for a house call. Three gave no reason for declining, while one felt it was inconvenient due to prior commitments, although he was happy to work around these. Another patient felt it was inappropriate as he lived in a small hotel. However several patients felt the house call was no problem, with one patient cooking dinner while talking to the students. One patient felt there was no need for the students to visit.

In summary, the home visit was able to provide students with a range of perspectives on the patient, their environment and the family setting. Tutors and students described a range of issues that were explored including psychosocial problems, family dynamics, impact of the patient's illness on the family, as well as

the opportunity to observe the patient in his or her own environment. Many of these would not have been uncovered without the home visit, and had not previously been considered by the students. Once a home visit had been conducted students and tutors agreed on its value, although a number of groups did not undertake a house call and there were a number of obstacles to be overcome. These included reluctance on the part of patients and students, and transport difficulties, perceived lack of relevance or usefulness, and pressures of time. The home visit provided an opportunity to learn about relevant issues in the patient's life which may not otherwise have come to light, and which the students were more likely to value after the event.

#### **5.1.6 Learning activities: Resource people**

Groups were encouraged to seek input into the case from the patient's GP, hospital Registrars and Consultants, allied health professionals, and a variety of community health resources. The identified resource people were generally useful but hard to get hold of and some confidentiality issues arose:

*Couldn't get hold of the GP.*

*Didn't talk to [GP] – didn't think we could do that – would be like asking for answers.*

*Phoned Blue Nurses and ACAT but they couldn't provide information as it was confidential.*

*I was told to speak to the registrar but that wasn't very useful – he didn't bother to look up the chart – couldn't remember the patient.*

Students who contacted the patient's GP generally found this valuable for gaining additional information about the patient or a summary of the case:

*Spoke to GP for the second case he gave me a brief summary of the background which was quite useful.*

Students found that this exercise gave them some good insights into role of allied health professionals. They contacted a wide variety of health professionals and other

agencies involved in the patient's care, including Social Workers, Centrelink, Migrant Resource Centre, Blue Nurses, Aged Care Assessment Team (ACAT), and other allied health professionals (unspecified). Again, the resource people were generally helpful in assisting students to understand the case, but there were some access difficulties:

*Social worker gave clear explanation.*

*I tried to find the cardiac rehabilitation person but I couldn't find them. I did see someone who gave me some pamphlets; I don't know whether it was an OT or a physio or someone like that.*

One tutor described how a student accompanied the patient to a specialist appointment:

*One student went with the patient to see the specialist (the patient had an appointment). We thought it would be a good idea (for the student) so I sort of encouraged that. The patient had her partner there and didn't really need the student for support but the student got some good feedback. The patient seemed to appreciate the student being there and this gave more opportunity to chat.*

Students saw benefits in having to use other resources as they explored aspects of the case. They valued the opportunity to interact with the various health professionals involved in a particular case, and saw some advantages in learning about a specific condition, as well as about the health care system and how different team members work together.

*Good to talk to health professionals involved.*

*Learnt all about shingles and PHN, and its management – practised 'health team' work. Opportunity to talk to Drs and ask questions about the case.*

*Came to a good understanding of the problem and the way various allied health workers function together as a unit.*

*Talking to the different Drs and specialists. Treating the patient.*

*Showed the importance of teamwork, built up good communication with other allied health professionals as well.*

One tutor described a group who did not make full use of the resource people, and commented that this may have limited the educational value for the students:

*Didn't know how real the interview with the patient was and how much the students actually contributed to care and management. They didn't use other resources well e.g. other health team workers -they might have got same amount of information without a real patient.*

Direct observation of the tutorials suggested that the students could have used a wider range of resources rather than focusing on the patient interview and case notes. Two groups consulted specialists, three groups dieticians, two groups social work or welfare, and one group community health. Students seemed reluctant or unable to explore other resource options. Tutors could explore barriers to contacting possible resources in the first tutorial to ensure the students know how to access as well as whom to access. Students could also be encouraged to think more widely and access information from other sources such as meetings and ward rounds which were readily available.

In summary, students experienced some difficulties in contacting resource people, including access, confidentiality issues, and the health care workers recollection of the patient's case. However, students who did make contact were able to use a variety of resources and found the experience useful from the perspective of learning about the patient's case, and about how health care teams work together.

#### **5.1.7 Learning activities: Literature review**

The literature review was the least popular learning activity. Some groups described how the literature review flowed from the hypothesis generation session, and how they divided up the tasks:

*Needed for knowledge part, was useful based on issues from brainstorming.*

*We all used the literature a bit for each of the topics that we had.*

*Split up the tasks – someone looked up medical issues.*

Several groups experienced difficulty in finding answers to specific questions:

*Terminal case hard to find information. Difficult to deal with issues timed badly with exam tomorrow.*

*Didn't get access to all information.*

*Hard to contact / search the information which we need.*

*Tell us before the presentation how to get access to information.*

*[improve by]... information given on the area so that we could build on that.*

In summary, while the literature review appeared to be of limited value some groups did find it of value in exploring the patient's problem. The difficulties described may reflect the students' own inexperience in searching for answers to specific clinical problems. These students had not had much exposure to the techniques of Evidence Based Medicine, and would have had little experience in framing appropriate questions and difficulty accessing databases.

#### **5.1.8 Learning activities: Final presentation**

Students described some benefits in the final session where they were required to discuss the case and present their findings to the tutor:

*Made us think about management – what the doctor should do.*

*Brought everything together.*

One student found this section useful but a bit repetitive.

In summary, students made relatively few comments on this aspect of the Problem of the Week. They did see the importance of having a session in which to wrap up the problem under discussion, again describing it as an opportunity to understand the role of the doctor.

## 5.2 Case design and selection

Students strongly felt that the patient needed to have some unanswered questions, at a level that they could deal with. Cases where the diagnosis was well defined were less effective, as were those with complex or esoteric issues to be resolved that were well beyond the level of the year 5 students. In addition, much of the satisfaction for students came from those cases where there was a possibility of making a contribution to clinical care.

*The current treatment regime by the end of the week was effective and our task seemed somewhat futile.*

*Our role didn't really seem that important. We were analyzing what had already been done.*

*When we received the patient the case was already drawing to a close.*

*Need a patient in which you feel there is something to work to – not one which is completely investigated.*

*Perhaps a new patient would provide a better learning experience.*

*Patient with something that would be investigated – not been through multiple specialists.*

Some groups described 'unsuitable' patients, those whose cases were too complex or too rare. Students disliked both presentations that were too vague, and those that were well-resolved, suggesting that a case of intermediate definition was the most appropriate.

*More suitable patient, more clearly set out what required.*

*Unsuitable patient, unsure of goal/aim of PBL.*

*Painful at times, patient could have been more suitable.*

*Better at times but patient not really suitable to learn anything much.*

*More suitable patient, better triggers.*

These last five comments from students all relate to the same case (Group M) and are discussed more fully in Case Study 2. This case study highlights the importance of patient selection, to ensure that the problems that the students are asked to



analyze still have some unanswered questions. It also provides insights into the group process and how it is influenced by the tutorial content, and into the evaluation instruments used.

In contrast, two groups described problems with unorthodox treatments and rare conditions:

*Time consuming -problem is quite rare.*

*Using a non-indicated medication regime made it hard to research SE etc. The initial video interview was very hard to hear and to review later on. It took a lot of time -analysed already and our role was useless.*

Students felt that the complexity of case needed to be appropriate for their level and learning needs. They commented that some cases were too complex and they had insufficient background knowledge to manage the case in the allocated time:

*Not an easy problem. complex in that there was 2 problems and a management dilemma and a psychological/social situation.*

*I think the problem was too complicated in an area where we have had very little training. It seems to me that this method of teaching requires a background knowledge to build on.*

*A lot of work for minimal return; actually we found PBL quite difficult when we had minimal background.*

*Patient's problem too broad-range for us to manage in 4 days.*

*A real case could get too complicated. You can focus on a small case to bring home a message. You could miss something out. Real case more detailed.*

However, one tutor felt the group could have dealt with a more complex problem:

*They could have dealt with a more complex problem -he was healthy and well despite problems - not huge diagnostic problem.*

One student in a different PBL group agreed that a complicated case may have been more useful.

There was agreement that patients chosen for these PBL problems should ideally illustrate common problems with multiple aspects to be discovered.

Students thought some patients were too complex, particularly for the first case, with some concerns about patients who had previously been used for a Problem of the Week:

*Maybe start with an easier patient.*

[would prefer...] *slightly more simple list of pt probs.*

*The patient was difficult in terms of the complaints, diagnosis etc.*

*Didn't like it that the patient was used last year as well.*

Groups saw benefits in patient not having a firm diagnosis at the start of a case:

*Making us more involved in the treatment and diagnostic process by not having a firm to pretty firm diagnosis before we started.*

*Don't give us any idea of the diagnosis beforehand; let us try to figure it out. We'll ask if we're really stuck.*

This theme was also expressed by groups who suggested that fairly new patients should be used. These patients were less likely to be fully investigated, and offered more opportunities for students to learn.

*Use of a new patient who perhaps had only presented for the first time and was coming in for a second visit.*

*More common case. Use a patient who hasn't been seen.*

*Need new patients. All the investigations had been done. There was nothing new to do or suggest.*

*Good if you have newer patients – learn more.*

Some groups commented that the most suitable cases were those where students can make a difference:

*Provide us with a case for which our input may make a difference to the patient.*

*Need a patient we can actually do something for.*

*Case wasn't particularly interesting and it was difficult to know that our research could be of any benefit.*

Tutors agreed that patients whose cases were incompletely explored were the most suitable for the *Problem of the Week* format. These were typically newer patients, or those with evolving problems which had not been completely explored:

*The patient hadn't been seen very often at the clinic so not all the aspects about her had been looked at.*

*A few things hadn't been worked out with the patient which in some ways was good -it gave them 'meat' to work with.*

In summary, students and tutors were clear that the ideal patient for use in this format was one whose problems were evolving or incompletely explored. These patients were often new to the practice, or had had developed a recent problem which had not been fully evaluated. Students saw the value of exploring cases which had not been fully defined and which raised some unanswered questions, as this offered them an opportunity to be involved in, and perhaps contribute to, the management of the case. The complexity of the case had to be appropriate for the learners' level of knowledge, and students expressed a preference for common problems. 'Ideal' cases were seen as those that were not too complex, representing a common problem, and with multiple aspects to be discovered. These sorts of cases were described by the students as providing the maximum learning opportunities at the right level.

Students and tutors agreed that unsuitable cases for this format included those that were too complex or esoteric for year 5 students. The content had to be appropriate to the background knowledge of the students. Some groups struggled with cases involving unorthodox treatments. Less suitable cases included those that were too vague as well as those that were well defined; there was agreement that some intermediate degree of definition or differentiation was ideal.

### Case Study 2: *Problem of the Week* Group M

This case illustrates problems that some groups experienced with the PBL process relating to case design and selection. The written trigger provided to students was ‘...an 80 year old man with a history of carcinoma of the prostate.’ Expected observations from the video were that the patient was an elderly man who appeared alert and fairly well. He complained that he felt ‘not so hot’, experiencing pain and stiffness in a number of joints and burning feet. These were limiting his activities and he could no longer go ballroom dancing.

The case outline anticipated that students would be able to form some early conclusions as to the possible causes of his symptoms (e.g. neurological, vascular, orthopaedic or malignant causes) and consider the possibility of other disease processes (e.g. degenerative or occult disease). Students would be expected to consider possible causes of his various symptoms, whether they were related or separate, the approach to defining these problems and the role of the GP. Possible resources included the patient, the medical record, the GP, a house call, the literature, and the urology and neurology registrars. Learning objectives related to the approach of a GP to this sort of problem, and their role in co-ordinating care, management of acute exacerbations, and health promotion strategies.

Analysis of the interviews showed that the possible diagnosis of peripheral neuropathy had already been raised in the patient’s clinical notes, and confirmed in the neurologist’s report. In addition, the patient had been used in the previous year with another group of students, who had explored the same issues in some detail and recorded their findings in the chart. This meant that the ‘answers’ to the identified health problems were available in the patient’s medical record, which caused some tensions in the group. Some students used the available information to rapidly ‘solve’ the case, while others were prepared to explore the case, in detail possibly to further their own learning or on the basis that the diagnosis may have been wrong. These tensions in the group led to confusion over the process, the goals and the learning objectives. Students were however clear in their view that a better choice of case would have been one that had not been fully investigated, where they had more to do than analyse the historical record, and where could potentially contribute to management.

Review of the outputs of the case suggests that the whiteboard printout and letter closely matched the case outline, with students covering the expected material in appropriate depth and breadth. Students did not have access to the case notes as they were working on the whiteboard. However, they did have access to the notes by the time they generated the letter, so this finding was unexpected given their views on the choice of case. While the reason for this mismatch cannot be precisely determined the outputs may have been influenced by those students within the group who wanted to follow the PBL process and explore the case, despite having a firm diagnosis. Performance of student groups on the two quantitative scales used was low to equivocal on both. The direct observer also commented on difficulties with the process:

*...group new at what they were doing -> needed an endpoint and couldn’t find one*

In this case the qualitative data highlighted much more clearly than the quantitative data the way in which case selection limited the students’ engagement with the process and learning outcomes. The early availability of the diagnosis did not require extensive critical appraisal of the case, and the PBL process and student learning slowed by mid-week.

These views may have reflected, to some extent, some characteristics of the student group: they were new to the PBL format, may not have appreciated what they could learn about General Practice and the role of the GP from considering a less common problem, and they may not have developed the skills to put limits on a complex problem, or break it down into manageable units. Students may have had more confidence about their background knowledge had they had more experience in PBL, as a number of comments suggested that they wanted to come into these tutorials prepared with all the information needed to fully explore the problem. Students more familiar with PBL may have been more comfortable about approaching a problem in which they did not have all the necessary background information, and using the PBL tutorial to identify and address gaps in their knowledge. Cases that had recently been used for a PBL tutorial with another group were also less appropriate, as many of the issues had already been considered and documented in the patient's medical record.

### **5.3 Tutorial design**

Direct observation of the tutorials revealed some important insights into instructional design issues. In the *Problem of the Week* the significant health care problems of the patient were summarized on an overhead transparency within the first ten minutes of the first tutorial. Students generally did not refer back to this overhead later in the tutorial process, so little benefit was seen in having the material available for the second tutorial.

Listing of data and hypotheses was mainly conducted in the first tutorial, and tended not to be used in the second tutorial. The recorder or 'scribe' listed data and hypotheses, with organisational aspects being dealt with by the tutor or group leader. The recorder may have been the student closest to the board or the dominant personality. In some cases the recorder was observed to 'hide behind the pen', using the role as a means of not responding. However, in most cases the scribe was actively involved in the group's discussion.

Groups tended to summarize the information orally, rather than on the board which was seen more as a means of recording data. Groups who were engaged in and understood the PBL process tended to summarize their progress, usually led by the tutor in the first tutorial, but more commonly by the students in the second tutorial.

Observation also suggested that while the student handout on PBL was informative further attention should be paid to reviewing and testing its contents with the students. The observer felt this should be done consistently and prior to starting. Students tended to state they were familiar with the process, but were then noted to lose direction when left to it. The PBL process, rather than the problem itself, could then be used to motivate students when attention was fading. Inability to fully understand the PBL process was a common theme in tutorials where students were unsure of the outcome, and were unprepared with their summation and letter.

The flow of the session was also influenced by the way in which the group or the tutor dealt with the issue of previous, possibly negative, exposure to PBL. Group leadership has also been discussed as an important determinant of the group's performance. However, most groups tended to have a lull at the 20-30 minute mark, when they appeared to have reached their limits, and a change in strategy by the tutor was required. Group process was likely to change at this stage mid-tutorial, when other students could be drawn out as the more outspoken students faded. Again, the role of the tutor and their interaction with the group leaders was the key to this change in dynamics. Tutors generally let the groups run their own course but where they did intervene they quickly became the dominant focus of the group.

Most groups were noted to significantly under-utilize the resources available to deal with the problem. Students focused predominantly on the patient interview, the case notes and occasionally the GP. Students did discuss possible access to a range of other medical and community services, but appeared unwilling or unable to access these. Tutors could probe this area in the first tutorial to ensure the students know how to access as well as whom to access. Students could also be encouraged to think more widely and access information from other sources.

Another issue was the division of assignments, which was difficult to assess as, apart from the choice of patient interviewer, most of the allocation of tasks occurred after the interview. The process may have been enhanced for some groups if this had occurred explicitly, with the guidance of the tutor. In some cases it was evident at the second tutorial that the process of division of tasks, consultation and planning had not happened.

The observer also noted a lull at the 20-30 minute period, when students seemed to have reached their limits. Constant probing by the tutors was often met with resistance at this point if it included issues already discussed. Possible solutions including tutors redirecting the group's thinking towards research and activities, or letting them have a break. The group size was thought to be appropriate for this kind of PBL activity, with the only challenge noted when all students in a group were unable to succinctly report in the second tutorial.

In summary, direct observation of the tutorials confirmed that the tutorial process was influenced by tutor factors and by group attributes including effective leadership, which is consistent with the PBL literature. A major influence was the way in which the groups' previous, possibly negative experiences and impressions of PBL were dealt with, either by the group or the tutor.

However, some observations of the tutorial process were consistent across the majority of PBL groups. The health care problems were usually listed and discussed within the first 10 minutes of each tutorial cycle, with most of the listing of data and hypothesis generation occurring in the first tutorial as well. The scribe or recorder tended to be actively involved in the discussions. Groups tended to summarize their findings verbally rather than on the board, which tended to be used more for the recording of data. This summary process occurred more often in groups who were enthusiastic and had adapted well to the PBL process. Tutors had a greater role in leading the summary process in the first tutorial compared to the second, where the better performing groups tended to take a more active role. There was a consistent lull at the 30-minute mark of the first tutorial, which often had to be actively managed by the tutor, either by probing and refocusing the group, or by offering them a short break. Some resources were noted by the observer to be significantly

underutilized: groups used the patient interview, case notes, and in some tutorials the GP, but made less use of the house call, resource people and literature. Other dimensions of the tutorial process were not always observed and therefore harder to assess, although the performance of the groups in the second tutorial gave some indication as to how effective this had been.

#### **5.4 Impact of using real patients**

One of the key differences in this study was that real patients were used as the basis of PBL tutorials, not written simulations. Students were overwhelmingly positive about the use of real patients in these tutorials. Real patients were seen as interesting, engaging their interest, and easier to understand.

*Nice lady to talk to. Interesting learning things as a patient's case (real life) rather than textbook learning.*

*'Hands-on' approach is good. Use of real patient very helpful +eye opener. [positives]... Working with a real patient. Very stimulating. Good topic for discussion stimulated me to think.*

Several students specifically commented on the opportunity for direct involvement with a patient:

*I enjoyed being more involved with patients.*

*You have to elicit the history out of the patient.*

Tutors described the involvement of the real patient with real issues as a turning point:

*The real patient affected the process enormously; it was the turning point -real person and real issues.*

*It drew them into the process -real person with real problems.*

*Having a real patient made a huge difference.*



Students appreciated having real problem to solve and its relevance to real life:

*Dealing with complex issue and trying to solve.*

*Problem to diagnosis [sic].*

*[positives]... dealing with a real life problem.*

*Encourages learning, as real life case. Attaches importance to material learnt.*

*Because it's a real life situation you need to think about the issues and question the issues. Are you going to question what a lecturer tells you?*

*There's some realism attached – a real case which you are looking at as a whole.*

*Able to see relevance of material studied. Dr [name deleted] is cool.*

*Real case made it more relevant. Positive, encouraging tutors.*

*It gave the problem a real face -contextually deeper.*

*Common problems GPs face therefore very useful for 'real life'. Teamwork is also great skill to develop.*

*Allows you to research topics relevant to a real patient and integrate them.*

*Useful for gaining clinical slant to info.*

Other benefits of the reality of the situation included the associated responsibility and an ability to identify with the GP:

*With a real patient you feel it's important to get more information, you have to be careful and thorough – it's real, not playing.*

*Useful putting you in the clinician's seat especially as the GP's job is not as simple as straightforward application of pharmacology.*

*We are putting ourselves in the shoes of the doctor.*

The interaction with a real patient offered the chance to apply learning, and to discover things for themselves:

*'Hands on' approach is good. Use of real patients very helpful + eye opener.*

*More practical, realistic.*

*Things you've learned in the back of your mind.*

*Discovering things yourself.*

A number of students described how reality tended to enhance learning:

*Remember it more.*

*See to remember it better.*

*Patient based learning makes it easier for me to remember.*

*More likely to retain knowledge. Improves my communicating and empathetical skills.*

Students also described how a real patient helped them learn about some specific conditions and the process of care:

*open my mind about life issues.*

*Go into the Mx + lifestyle counselling + know difficulties of changing one's lifestyle.*

*I learned a lot about shingles and PHN and its management – practised health team work.*

*Better than last week. See how a concerned medical interpreter can make a difference.*

*Learnt that language is an important barrier.*

*Made us realize how complicated a patient's issues can be and how the major issue can be masked by the more obvious clinical conditions.*

Students appreciated the holistic nature of these PBL tutorials. They were encouraged to take a broad multidimensional approach, looking at the multiple factors involved in the care of the patient and their inter-relationship. The reality of the situation, and the teamwork involved were important in helping students understand the significance and relevance of the holistic perspective.

*Learn more about and become more aware of psychosocial issues.*

*Doesn't involve just one problem – wholistic approach.*

*Can explore the topic – more widely than a text.*

*Heaps. Because it's real – it does matter, it makes you look at so many things.*

*Touch on all aspects of patient care.*

*Can raise important issues and look at issues broadly rather than thoroughly.*

*Enforced the multidimensional nature of a situation.*

*Team work. Learning to consider all the aspects of a patient's condition and case.*

The interaction with the patient and their family was seen as leading to a rich experience. Students valued the discussion with the patient including the non-verbal clues. The patients' perspectives on the case were particularly important. One student also saw this as an opportunity to practise communication skills.

*Can get pt's point of view / opinion.*

*Different to what's in text – understand from patient point of view.*

*You can ask them things and get their own personal opinion.*

*Interviewing the patient you get information from the patient's point of view and nonverbals.*

*Develops interpersonal skills and non-verbals.*

*You can pick up on the little things like body language.*

*Visual cues.*

The immediate feedback of a real case was also important, allowing students to reject or confirm hypotheses.

*Meant could follow hypotheses then and there and come to conclusions – not, ifs.*

*Fake patients don't have answers – this one you do.*

Students appreciated the possibility of impacting on patient care:

*Good that there is a real patient – actually doing something, recommendation that we come up with are taken into consideration – they're of benefit.*

*May be able to contribute.*

A number of students agreed they were able to contribute to the case, although the contribution to patient care may depend on the case. They described their ability to take a fresh approach to a real health care problem, and to make recommendations to the patient's GP that were recorded in the file, with the possibility of making some new recommendations.

*Yes. We are stepping back and taking a fresh approach.*

*Yes. Because we write a letter to the GP and the GP listens to what we have got to say.*

*Yes. I understand that our recommendations go into the file of the patient and are taken into consideration.*

*Real patient got us more involved than usual because we made recommendations to the patients real GP.*

*The GP said they hadn't thought of some of the recommendations.*

*Researching information for patient care is interesting and it actually makes you feel like what you are doing is going to make a difference (even though you probably don't pay much attention to our letter).*

The tutors agreed that it was important that students felt they can contribute to the case:

*The students felt they had actually made a true contribution.*

*I think it's important that the group feels they have made real contribution and it wasn't just an exercise.*

*Having a real patient was definitely positive and the students did contribute to management - further investigations for the medical side but also good functional suggestions.*

However some students were not convinced that they were able to make a significant contribution to the case. They felt that their contribution was only minimal, and the doctor had already decided what to do. Some did express the view that they would appreciate some follow-up after the case on the usefulness of their recommendations:

*Doctor already thought of them.*

*I think the doctor has already decided what to do.*

*Don't really feeling that contributing – there's a lack of follow-up – you don't know if your suggestions were carried out. We had some follow-up.*

*Involve in follow up and know what the GP actually does.*

*Case wasn't particularly interesting and it was difficult to know that our research could be on any benefit.*

The students had strong views on suitable cases as discussed in the section on case design and selection. Cases could not be constructed around any patient drawn at random from General Practice; newer patients with complicated, evolving or incompletely explored problems were thought to be the most suitable for this format. The reality of this format was contrasted with paper-based simulations:

*Fake pts usually 1 thing wrong.*

*It was an interesting and complex case that you just wouldn't see in a text book or paper case - shows that each patient is unique.*

A few concerns were expressed by students around issues of the patient's time and availability:

*Can't really call in the patient all the time – it's one off.*

*From the patient perspective they have to come in and give up their time, be watched and videoed.*

There were some concerns about intruding on the patient's privacy:

*Possibility of feeling guilty, saying certain things – too personal, subjective.*

*The patient had private problems that I didn't feel comfortable.*

Other concerns that students expressed included the narrow learning opportunities provided by only one case. These students tended to focus on the content issues presented in the Problem of the Week, rather than the approach to the patient and other process issues. These views contrast with the group of students previously discussed who saw benefits in exploring a particular problem and associated process of care issues in some depth.

*Only learning about a specific case.*

*Don't learn much – narrow – same amount of time.*

*Learnt a lot about PHN but that's about it.*

*Small amount of medical knowledge came out through the case. If this was the way the course was solely structured, we may feel we were 'missing out' on learning.*

*You only learn how to deal with a particular case rather than learning a broad base of information and applying it to variable presentations.*

*Can't see benefit because don't have knowledge anyway.*

The use of real patients in the *Problem of the Week* also carries some risks. For example, the availability of a real patient cannot be assured: unexpected events such as a family crisis, illness or even death may occur, or the patient may change their mind and decline involvement. In addition, the patient's condition may change, so they present a different clinical picture or set of problems to that outlined in the case design. None of these events occurred in the formal trial, with all patients available for the students to interview. In the pilot phases one patient failed to attend their appointment: when contacted by telephone they explained they had forgotten their appointment, but were happy to consent to a house call.

A number of strategies were employed to minimize the risks on non-attendance. Patients chosen for participation were usually well known, and with chronic stable conditions. Clear information was provided to patients well ahead of time and consent obtained. Participation was confirmed with a letter a week before the first *Problem of the Week* tutorial, with a follow-up telephone call the day before the tutorial. However, the chance still existed that a patient may be unavailable, so contingency plans had to be in place, for example to convert the format to a more conventional case study, with the option to involve the patient later in the week if possible.

In summary, students were positive about the use of real patients. They appreciated the direct involvement with patients and described the approach as interesting and engaging. Tutors' observations supported the interest and enthusiasm of the students, describing the use of a real patient as a major turning point. Secondly, students saw the relevance of dealing with a real-life problem, interacting with a real patient with real problems, in contrast to other teaching methods using textbooks or paper-based cases. They valued the immediate feedback of a real case,

with the opportunity to confirm or reject hypotheses in real time, contrasting this with their experience with paper-based simulations: 'fake patients don't have answers'. The use of a real patient scenario was described by a number of students as contextually deeper, helping them learn about a specific condition, and the process of care around that problem in the General Practice setting. However, a number of students saw this as a downside, feeling that their learning around the *Problem of the Week* was narrow in proportion to the effort required.

The authenticity of the real patient encounter was also thought to enhance learning by offering the chance to apply knowledge, and discover things for themselves. Other learning benefits described by the students included the observation that the material was easier to understand, and they were stimulated to think. They described how the reality enhanced their learning by providing an encouraging environment, and helping them attach importance to the material they were studying. Students valued the richness of the discussion with the patient and his or her family. This interaction provided the chance to practise communication skills and pick up non-verbal cues, and an opportunity to explore the problem from the perspective of the patient and his or her family. By researching aspects of the problem relevant to a real patient they were able to integrate and apply their learning from a range of disciplines. Another advantage of this approach was the opportunity to identify with the role of the GP and take some responsibility for patient care. The ability to contribute to patient care by direct involvement in the case was important to a number of students, who were conscious that their fresh approach, formal recommendations, and other ideas that were recorded in the patient's file may be of some assistance in managing the case. Tutors supported the potential ability of students to contribute to the management of the case, although some students were less likely to accept that their input was relevant or helpful, and requested follow-up information and feedback on the progress of the case. Finally, students also valued the holistic nature of the patients' problems that emerged through the tutorial process, citing the reality of the case, the broad approach, the multiple interacting factors discussed, and the teamwork.

Some student concerns about the use of real patients related to patient selection, including the level of evolution and complexity of the problem, but there were

advantages in the unique and unpredictable nature of a real, rather than a simulated or paper-based case. Other concerns related to the patient's time, availability and privacy, and possibly narrow learning opportunities. Risks of using real patients, such as the possibility of non-attendance, also had to be considered and managed.

### **5.5 Educational outcomes: Student learning**

This study had no comparison group so it was therefore difficult to make firm conclusions about the educational outcomes of this approach compared to traditional teaching. In addition, students were more accustomed to traditional didactic teaching, where information is provided more directly, and described difficulties with the PBL process. The students' approach to the PBL process has been described in section 4.1.3.1; this section will focus more on the students' learning outcomes.

Students described differences in their learning outcomes compared to traditional methods. Some thought they learned more from reading books and attending lectures, while others preferred this approach to lectures and paper cases.

*There are facts to learn and skills to obtain. The best way to learn most of these is by reading texts and talking to doctors.*

*This is not the way I learn. I have found that the most effective way for me to learn is to be given the information or read a book. However, I did learn from this session that not everything you read in textbooks is practical.*

*Better than lectures and made up case scenarios PBLs.*

*Beats the shit out of lectures.*

They felt that these tutorials could replace case discussion and lectures, but with some limitations.

*[useful] in replacement of case discussion or lectures but not to replace clinical work.*



*Good for learning specific cases, diseases and drug but does not give overall perspective of subject matter.*

*To cover all we have learnt in med thus far in PBL tutes would take a lot longer than 6 years.*

These students felt that these PBL tutorials could not replace clinical work, and had concerns about the ability to cover all the material and from all perspectives. Some students felt that this approach was good in combination with didactic methods, and expressed a strong preference for a combination of methods.

*Should be used as an adjunct to lectures. Need to take a combined approach. It's fun but I still want to know stuff, lectures give you basic information and have an important role, POTW applies this information. PBL is good in theory but not for the bulk of work we have to get through, I wouldn't want to be in the GMC. The skills we learn in PBL can be taught in a couple of classes, you don't have to do it all the time.*

*Good as a combination with didactic teaching. Would not like to rely entirely on PBL and self-directed learning.*

This was seen as a practical applied method, good for consolidation, integration B16 and reinforcement of existing knowledge.

*PBL's good for practical problem solving but not for total acquisition of knowledge. A very good detailed discussions and a good [?!laugh] helpful in solving problems. It is a very practical way of learning.*

*Good as a means of applying (and therefore reinforcing) medical knowledge in a real-life situation.*

*From past negative PBL experiences, I have found this one surprisingly helpful.*

*Using it as a consolidating process rather than knowledge-gaining process seems to be preferable.*

*Good to consolidate and build on current knowledge. Best way to learn application of knowledge.*

Students who felt that this approach was most useful to consolidate existing limited information thought that it would therefore not be appropriate across the entire medical course.

*Consolidates limited amount of information.*

*[applications elsewhere in course...]Other very medical stuff wouldn't work.*

*Good as occasional but not for whole course – GMC – can't see how you could learn everything that you needed to by yourself.*

*Surgery maybe, Medicine too much content.*

Students noted that thinking and the approach to patients was emphasized:

*Learn more about how to approach a patient and the thinking process, being able to put things in perspective.*

*PBL stimulates your thinking, you think of the consequences, you don't just take it for granted. PBL teaches people to think.*

*Make my brain working.*

*Encourages you to think.*

*More interesting style of learning. Made us think. Good using an actual patient.*

*Had to think a bit more than usual problem was, patient wasn't that great a case.*

*Actually required thought and creativity.*

*It required more thought/effort compared with normally copying from a textbook.*

Some students described how the thinking process required them to consider the patient's problems, how to approach them, and the inter-relatedness of the problems:

*Encourages us to do more research, question things more and think more about the problem of the patient and how they inter-relate.*

*We think about the case together as a team, learn from others, active involvement, improve my thinking process, and approach the problem better.*

However, direct observation of the tutorials suggested that students did not always critically appraise the information they were considering and presenting to the group:

*For students so far along in their education they were very simplistic in justifying their responses. Without the experience of their tutors the students all quickly fell into the trap of hearsay rather than evidence based responses. This is a criticism of a casual approach which the student respond to and is/can however, be challenged by the tutors by their probing. The final meeting with the GP is another opportunity to challenge the students who rely on this level of reporting.*

However, the level of critical thinking and appraisal was difficult to assess and some of this may have occurred in the interim meeting which was not observed.

There was a divergence of opinion among the students on how much they learned. Some felt this approach enabled them to learn better, deeper or broader:

*Good but can remember the other...*

*Got information from others – social issues – learnt a bit about other surrounding social issues.*

*Quality okay.*

*Good quality, because you discuss it you don't forget it.*

*Quality is excellent; they are real and common problems, especially the first case.*

They were obliged to consider a broad range of conditions and interactions:

*Forces you to consider a range of possible conditions and interactions – independence in the elderly can be a problem.*

Some appreciated the opportunity to learn a lot about a problem

*I learnt a lot about shingles and PHN and its management – practised health team work.*

*I learnt all about shingles and PHN and the drugs used in their treatment.*

*Learnt a lot about bowel cancer. Questions and answers from Dr's – as opposed to boring lectures from them.*

*Learnt about rectal cancer and its treatment options.*

*Sometimes I didn't know much about it. Gave me an insight into cancer patients (something I have been resisting studying).*

*[positives...] increased knowledge on bowel cancer.*

*Learnt things the long way so probably won't forget.*

In contrast, some students thought that they learnt less. There were concerns about the amount of time spent on acquiring this information, which was seen by some students as narrow.

*Quantity – not significant.*

*You don't learn as much.*

*I don't think we are really learning anything.*

*Time and effort is unbalanced (ie with what you learn).*

*Quality and quantity is zero.*

*Pretty little. It's part of the experience though and it may help in the future.*

*Small amount of medical knowledge came through the case. If this was the way the course was solely structured, we may feel we were 'missing out' on learning.*

*You only learn how to deal with a particular case rather than learning a broad base of information and applying it to variable presentations.*

Insufficient background information was a problem for some students, who suggested this approach may be more appropriate when they had developed sufficient clinical knowledge.

*A lot of work for minimal return; actually we found PBL quite difficult when we had minimal background.*

*Very helpful when we have a bit of clinical knowledge from which to consider the problem.*

*Think PBL is really valuable once a good core knowledge is established.*

Other issues the students raised included the experience of working through a case.

*First experience of being able to work through a case from dx to Mgt and being able to discuss any queries along the way.*

*It was good to have time to focus in on an individual case from history to management.*

Some saw benefits in terms of developing communication skills:

*Improves my communicating / empathy skills.*

*Involve more communication skills.*

Some students had concerns with the structure compared to traditional methods, which is again consistent with their unfamiliarity with PBL.

*You get a good overview but we are just throwing around ideas.*

*It is sort of disjointed compared to a lecture – no structure to what we are learning.*

Some students were concerned that this material was not directly linked with the assessment, and with the amount of feedback received.

*A lot of time spent on something we aren't assessed on. Patient probably didn't like being harassed so much by us.*

*Use this as assessment rather than the fake interviews in the exam.*

*Not getting enough feedback. Dissatisfied with the solutions.*

Other educational issues that the students raised included the dependence on their own effort, the role of the facilitator, the ability to ask questions, and the complexity of the case.

*There's a difference in what you get out of it. If it's totally your responsibility then you have to do it and you get more out of it e.g. long cases,*

*Facilitator is the key – if can find good ones.*

*Interaction is great and questions are much easier to ask.*

*Enables you to raise questions at numerous times.*

*Not an easy problem. Complex in that there was 2 problems and a management dilemma and a psychological/social situation.*

Students felt the format was particularly applicable to teaching about General Practice

*Particularly useful for GP.*

*I enjoyed the problem-based learning. – a good team approach to cases encouraged in GP.*

*Probably more useful in a subject like General Practice where a patient is likely to have multiple problems.*

*I find it's very good for General Practice because that's similar to what you do in reality. Not like hospitals where you only deal with a problem, not with the whole patient.*

They felt there was some applicability in other settings, as part of a combined approach, and where there was sufficient background knowledge.

*Easily could be integrated into med and surgery.*

*Especially in incredibly boring subjects like biochem, histology and pathology.*

*Depending on structure.*

*So late in course it is very difficult for some to convert to a new system of learning when habits have been set.*

Quantitative data was obtained from the student questionnaires on the students' views on the usefulness of the Problem of the Week. Students were asked to respond to the questions 'How useful did you find this as a teaching method compared to "traditional" (didactic) methods?' and 'How useful would you find PBL in other parts of the course?' A five-point Likert scale was used, with 1 representing the lowest score ('not useful' and 5 the highest ('very useful')). Responses from students are summarized in Table 5.1.

Group	Usefulness as a teaching technique			Usefulness of PBL in other parts of the course	
	Mean	Range		Mean	Range
A	3.8	3-4		3.7	3-4
B	4.2	4-5		3.7	3-4
C	3.5	3-4		3.2	2-4
D	4.2	4-5		3.6	2-5
E	2.5	1-3		2.3	1-5
F	3.4	2-4		2.6	2-3
G	3.2	2-5		1.8	1-3
H	4.0	3-5		2.8	2-3
I	3.8	3-4		3.8	3-4
J	4.2	4-5		3.7	3-4
K	3.8	3-5		3.0	2-4
L	4.2	3-5		3.7	3-5
M	3.2	3-4		3.2	2-4
N	4.0	4		3.8	3-4
O	3.8	3-4		3.3	3-5
P	3.5	3-4		3.8	3-4
<b>Mean</b>	<b>3.7</b>			<b>3.2</b>	

**Table 5.1: Student questionnaire – usefulness of the Problem of the Week**

These results demonstrate a range of views between the students on the utility of this approach. The mean scores of all groups except Group E were above 3, the median point of the scale, for the question regarding usefulness as a teaching technique. The concerns of the students in this group related to the PBL process. They were unsure of the expectations, and described difficulty in adjusting to a new process relatively late in their course. There was also a diversity of opinion between groups, with six of the sixteen group responses covering three or more points on the five point scale. (Groups E, F, G, H K and L). Groups E and G represented the same groups of students in weeks 1 and 4, as did groups F and H.

Most student groups felt the PBL format would be less useful in other parts of the course, with the scores of only three groups the same or higher than for the *Problem of the Week* approach. Student groups E-G and F-H had the greatest concerns about the usefulness of PBL in other parts of the course. Mean responses from these groups on this question were all below the mid-point on the scale, with student comments providing some insights into their concerns:

*So late in the course it is difficult for some to convert to a new system of learning when habits have been set [Group E]*

*That is not the way that I learn. I have found that the most effective way for me to learn is to be given the information or read a book. However, I did learn from this session that not everything you read in a textbook is practical. [Group F]*

*A lot of work for 'minimal' return; actually we found PBL quite difficult when we had minimal prior information [Group F]*

*Do not enjoy PBL [Group G]*

*Small amount of medical knowledge came through the case. If this were the way the course was solely structured, we may feel we were 'missing out' on learning [Group G]*

*You only learn how to deal with a particular case rather than learning a broad base of information and applying it to various presentations. [Group G]*

*There are facts to learn and skills to obtain. The best way to learn most of these is by reading texts and talking to doctors. [Group H]*

These responses suggest that the student concerns about the use of PBL in other settings relates to their inexperience with the process and personal learning styles, rather than the PBL format or the use of real patients in the Problem of the Week.

In summary, the students participating in this study had mixed views on the value of learning clinical medicine with real patients within a PBL format. They were more used to traditional didactic teaching, which some believed to be more efficient and effective than this method. However, students who held this view did recognize that they could learn some practical information from this method that was not available from textbooks. Other students felt this approach was preferable to lectures and made-up scenarios and could replace lectures and case discussions, but could not substitute for clinical work.

Students described this approach as a practical applied method, good for consolidation, integration and reinforcement of existing knowledge. They felt that it was not appropriate across the whole course, expressing concerns about the efficiency of the approach, and the ability to cover all the material from all perspectives. They expressed a preference for a combination of approaches, using



lectures to provide basic background information, and PBL to practise the application of knowledge. They did acknowledge that their experience with PBL was limited, and they had experienced difficulties in changing the educational approach relatively late in the course.

Specific features of the PBL approach that students valued included the emphasis on the approach to the patient, which included consideration of all of the patient's problems, how to approach these, and their inter-relatedness. They contrasted the need for thinking and creativity to other experiences they had in learning or copying from textbooks. Other educational outcomes identified by the students included the ability to work through a case exploring all dimensions from presentation to diagnosis to management, the real-life application of communication skills and the opportunity to ask questions and discuss aspects of the case.

Direct observation of the tutorials suggested that students did not always critically appraise all of the material they discussed or presented, but the observer acknowledged that these activities were difficult to observe and may have occurred outside of the formal PBL tutorials. Some students felt that by exploring a problem in detail and considering a wide range of possibilities their learning was better, deeper or broader. On the other hand, some students saw this aspect as a downside, feeling that their learning was too narrow or was inefficient, taking too much time for the material covered. These students had also expressed concerns about the amount of background knowledge they had, and preferred to gain this first from lectures or textbooks.

Other concerns about educational outcomes related to the PBL structure and their unfamiliarity with the process. Students described their struggle with the process, how the outcomes were dependent on their own efforts, the important role of the facilitator, and their difficulties in coming to terms with the complexities of some cases. Some students were concerned that these tutorials were not directly linked with the assessment, and with the amount of feedback received.

Students felt this approach was particularly applicable to teaching about General Practice, where patients with multiple problems to be managed were frequently

encountered. They saw the similarity of this approach to reality, with the importance of teamwork in General Practice, and the distinction, as one student observed, of hospitals that deal with particular problems, and GPs who deal with the whole patient. Students felt that this educational method could be used in other settings, particularly as part of a combined approach where background information was provided in other ways. Some students saw possible ways to integrate this method into other clinical disciplines, while others saw opportunities in teaching biochemistry, histology or pathology.

Conclusions regarding the students' learning outcomes are limited by the absence of a control group, but comments from students, tutors and observers suggest that this approach did allow students to explore some additional dimension of the patients' problems, and experience some different educational outcomes. The view held by many students that PBL cannot be used to teach new content also has to be balanced against the relative inexperience, and possible resistance of this student group to PBL, and the medical education literature suggesting that content can be delivered in a PBL curriculum.

### **5.6 Effects on patients**

This approach involved intense engagement of real patients, and often their families and health care providers. The important role of the patient required them to commit considerable time and energy to the process, so patients were interviewed to explore whether they experienced any downsides or adverse impacts on their health as a result of their involvement.

The majority of patients involved in these tutorials were very supportive, experienced no problems with being involved, and would do it again. They were pleased to help students learn, and saw their role in the teaching process as an important positive that would prompt them to participate again:

*Yes if it means – make people better Drs. Don't mind discussing medical problems with them.*

*If you can help that's ok – they have to learn somehow.*

*Talking to students. If it does something to help that's ok.*

*Feel helping them learn more about being a GP, about doing consultations, and maybe if they hear similar stories later on they can learn and remember back to this one... more things, and can better their practice – if it means I can help I don't mind. Dr has been kind and taken an interest in my condition. I feel this gives me a chance to reciprocate.*

Patients liked helping the students. They appreciate the students' input, and described the groups as pleasant and agreeable. One patient described a particular cultural connection to one student:

*Good talking to the student who spoke Hungarian – could understand what he was feeling etc.*

Patients described that they were receptive to being approached to participate by their doctor. Some saw participation as an opportunity to thank or repay their doctor.

*not really [any worries]. Dr talked to me about it, assured me nothing to worry about. Nothing else to do, if I can help them that's ok.*

*Didn't bother me really. I live alone and am normally shy. Dr explained it all to me. Dr has been kind and taken an interest in my condition. I feel this gives me a chance to reciprocate.*

The majority of patient reported no negative experiences or problems. They did not feel coerced or pressured. They had some initial concerns about communication with students and the relevance and usefulness of their information, but did not appear to experience any of these difficulties in their interviews with the students:

*[no problems]...weren't forced – volunteered.*

*No negative experience – experience was largely positive. No complaints about students visiting at home.*

*Old to young – no difficulties. Thought it might be hard ‘getting across’ to them because of age difference but didn’t have any problems.*

*Alright, felt like I was rambling on – they said can you tell us what has happened so far? I stopped in middle to ask if ok... felt I was rambling... but they said no, keep going. So I explain from day 1 to now, everything that’s happened.*

One patient, who had undergone extensive treatment in a larger centre with much greater exposure to students, appreciated the smaller student numbers when responding to a question about any downside of being involved in the Problem of the Week:

*Nothing at all. 2-3 students max would be better – in Brisbane lots of students. Up here it doesn’t happen, that was good. With this it didn’t happen, there were only a couple of them.*

No patients reported any adverse effects on health or health care when directly questioned about this aspect. One patient appreciated transport being supplied. Another patient suggested that this exercise was different to the routine of regular monthly visits:

*Yes, I suppose it did in a way. I have to come in once a month. Staff tend to treat me like furniture – I guess they all get tired – I come in often. I don’t suppose they could give you a cup of tea and say hello – they’re busy.*

The majority of patients said that they had no problem with being involved and would do it again:

*Yes if it means – make people better Drs. Don’t mind discussing medical problems with them.*

*Talking to students. If it does something to help that’s ok.*

Patients responded to a question about whether they would participate again with some specific benefits, including helping students learn, appreciating the chance to help, and the possibility that students may contribute to the care of their case. One patient was accustomed to having students around, and another said he would respond to a request from the doctor.

*Yes – it helps them learn – better than learning out of a text book.*

*yes – anyway to help. Helps to learn. Doctors from other areas didn't pick it up.*

*Yes – used to lots of students around.*

*Yes – if asked by Dr.*

*Appreciated the chance to help. They may be able to shed light on something that Doctor missed himself. I think they sit down and have a meeting and talk about it.*

One patient expressed more concern about his own medical condition than the involvement with patients:

*No worries about students but about medical condition – tests etc, when's it all and how's it all going to end?*

Two patients were less enthusiastic. One was thought by the interviewer to reluctantly agree to participate in further tutorials with a lack of enthusiasm, while another expressed concerns about repeating the history on a number of occasions.

*Yes, probably [but didn't seem too enthusiastic]*

*Not really. Maybe same type, same things. Different Doctor – have to go thru history. Maybe if it was for something different (ie different medical problem).*

*Otherwise just have to tell another Dr everything again. You can't choose your Dr here – everytime you see a different Dr and have to go though everything again.*

In summary, patients generally experienced no difficulties with this process. They were pleased to help students learn, and to contribute towards them being better doctors. Patients were aware of their role in helping students learn, and were interested in helping to produce better doctors. Some expressed their willingness to assist their treating doctor, and were receptive when approached by their doctor.

They appreciated the input of the students, and found the interaction pleasant and agreeable. One patient described enjoying the change in routine and extra attention. At least one patient saw potential benefits in the students being able to contribute to management of the case by uncovering some new material in their discussions.

Some patients were concerned before the interview with the students about their ability to communicate, or the relevance and usefulness of what they could tell the students. However, no patients experienced any problems with the interview process, although one expressed concern about having to repeat his history on a number of occasions. None of the patients were aware of any adverse effects on their health or health care, and most would participate again.

## **5.7 Methodological issues**

### **5.7.1 Impact of Observation**

Only one student group reported any issues with direct observation, describing the video recorder as distracting:

*The video recorder distracted my concentration and a 'normal' me. Also, not enough time for discussion.*

[negatives...] *video recorder.*

[improve by...] *Use hidden camera, extend the time a bit.*

*No video recording.*

Other groups, while conscious of the video recorder, seemed to be able to ignore it and proceeded with the PBL tutorials. No groups appeared to have any concerns with the presence of the independent observer, who took no part in the tutorial. Most groups observed did not know the facilitator, and the presence of another 'stranger' did not appear to influence the group functioning. One group did experience some difficulty with the presence of the tutor, some members expressing the view they would prefer to work by themselves. . As discussed in section 4.2 students in this group felt that the presence of the tutor was uncomfortable or

inappropriate. However, they appeared to have no other problems with the presence of the observer.

The only other concerns raised by groups related to the tutorials where there were two tutors present, and the occasional conflict between the tutors in the management of the tutorial process. While student groups were not specifically asked about the impact of observation in the focus groups and questionnaires no other groups raised this as a concern in the general discussion. The independent observer confirmed that most groups experienced little impact from the observation process:

*The students were initially apprehensive of the microphone and the video but this usually ceased once the video interview was shown. My presence was rarely commented upon. I do not believe either tool needs to be hidden or has impacted on the tutorials.*

In summary, direct observation of the tutorial groups by an independent observer and by videotaping the tutorial did not appear to have a major impact on group process or tutorial function, with only one group describing the presence of the video recorder as distracting.

### **5.7.2 Utility of data collection tools**

Direct observation of the tutorials was conducted using an observation guide developed and validated by the University of Hawaii. The observer described some changes that may improve the utility of this instrument:

*Recommend you consider reviewing the sheets to better represent each tutorial. This may allow the boxes to be included on one leaf and the free text on the reverse. Having to turn the page for reference can be distracting. Allow notes to be taken throughout the session as these will reflect issues at that moment rather than generalizations in the final comments. Both can be significant. Include a timeline to record the attention level of the group. This would be better in quick note form as individuals can be highlighted.*

The instrument was found to be useful in assessing the majority of the tutorial activities observed. The suggested amendments to formatting will streamline the recording process, with additional changes suggested to enhance the richness of the content of the observations. In addition, the observer suggested some modifications to the items, to better reflect the PBL process in the *Problem of the Week* tutorials:

[Item 5 – Division of assignments]...*Better phrased as division of task for tutorial 1; evidence of consultation and planning for tutorial 2.*

*Psychosocial aspects etc is better linked/situated with resources as it is part of the general discussions.*

The observer suggested that consideration should be given to observing the interim student meeting, as important activities such as critical appraisal may be occurring here, and are otherwise not recorded:

*Critically appraise information from resources is sometimes missed in the assessment as it can occur simply in discussion of the video. Care must be taken and perhaps also observing the interim student meeting would prove critical thinking has occurred otherwise you are assessing the outcome in the second tutorial.*

The observer also noted that the section around Item 3 (summary) was a good indicator of the group's discussions and overall functioning.

Tutors used the *Group Assessment Schedule*, developed by the University of Manchester, as an estimate of group function. As discussed in section 4.1.6.1, tutors were able to use this schedule to describe group functioning across four parameters. The lowest scores across all groups were for commitment, with the greatest variability between group scores being for the items for group interaction and interactivity, and for problem-solving abilities. Groups scored highest on the interpersonal relationships scale, with scores on this scale also demonstrating the least variability between groups.

Group performance was evaluated using the *Group Assessment Schedule*, direct observation of tutorials, and comments from students and tutors. Agreement



between the instruments used was strongest for groups who performed well. For other groups a mix of qualitative and quantitative data, using triangulation by multiple measures of group performance may be needed to provide the best estimate of group function. For example, tutors described an improvement in group performance from the first to the second Problem of the Week, but this observation was not supported by the quantitative data.

As described in section 4.6.2, there was little correlation between the performance of student groups on the *Approaches to studying* questionnaire and the other qualitative and quantitative instruments used. This suggested that differences in approaches to studying were not responsible for the observed differences between groups, but that other factors were important, and supported the importance of triangulation of data sources.

The other instruments used for data collection, questionnaires for students, focus groups with students, and interviews with patients and tutors were developed specifically for this project, and had been trialed in the two years of *Problem of the Week* cycles prior to the formal evaluation. Qualitative data from these instruments provided the majority of the qualitative data in this evaluation, and was supported by the other items used. Case Study 2, described in section 5.2 also illustrated the triangulation of data sources, and using qualitative data to illuminate and explain quantitative findings. Similarly, the quantitative findings regarding students' concern about the use of PBL in other settings appear on the qualitative data to be explained by their inexperience with the PBL process and personal learning styles, rather than the PBL format or use of real patients in the *Problem of the Week*.

In summary, the direct observation of these tutorials provided a useful method to record information on tutorial function. Some specific suggestions were made by the observer to change elements of the recording process to improve the utility of the instrument and the richness of data gathered in the context on these PBL tutorials. The *Group Assessment Schedule* provided further quantitative data on PBL process. Triangulation of these data sources with information derived from questionnaires, interviews and focus groups appeared to provide the most robust and

richest information, and this approach has been used in the evaluation of these PBL tutorials.

## **5.8 Summary**

This chapter has explored the learning activities undertaken by students and reviewed educational outcomes. Insights into case design and selection, and design of PBL tutorials based on real patients have been described. Some recommendations have emerged regarding choice of patient case, the educational settings in which these tutorials are most likely to be appropriate, and appropriate methodological issues.

The next section will describe key themes that have been developed, including group work, the PBL process, the use of real patients, and the Problem of the Week format. Additional perspectives, including curriculum and resource implications and those of the faculty and community will be discussed. The significance of this study will be summarized, including the new findings relating to learning activities and learning outcomes, comparison with the literature and implications for other settings. Finally limitations of this study and areas for further research will be summarized.

## CHAPTER 6

### CONCLUSIONS

This chapter will summarize the key themes that have emerged from the Results and Discussion chapters. These include general issues around group process and the PBL process, and more specific themes that relate to the use of real patients and the *Problem of the Week* format. While the main aim of this study was to evaluate the use of PBL using real patients in order to explore differences compared to PBL using paper-based cases, a number of related issues will be summarized. These include recommendations about the optimal approach to the Problem of the Week, particularly to patient selection, case writing, curricular objectives, and conduct of tutorials; comments on the introduction of PBL into a traditional course; and a discussion on evaluation of a PBL programme and the utility of the instruments used.

The previous chapters have described the *Problem of the Week* format from the perspectives of the students, the PBL groups, the tutors and the patients. Additional perspectives including those of the faculty, the community, and curriculum and resource implications will be outlined in this chapter.

The significance of this study in the current medical education environment will then be discussed, including a summary of new findings, and a description of what is similar and different to the educational literature. Recommendations will be made for the use of the *Problem of the Week* format in other Schools, including case selection and development, and delivery of a tutorial cycle. Finally, additional areas to be explored that result from the issues raised in this study will be discussed. These include the use of the *Problem of the Week* format in other settings (for example, other disciplines or with hospital inpatients), ways in which efficiency and resource issues can be addressed, and the possible utility of this approach in other

PBL programmes and hybrid curricula. Limitations of the study and the impact of observation will be summarized.

## **6.1 Key themes**

The key themes to emerge will be discussed under the four major headings that were defined: group work, PBL process, the use of real patients, and the *Problem of the Week* format.

### **6.1.1 Group Work**

Group work was cited by the majority of students and tutors as one of the attractions of this approach, with agreement that it was interesting, fun and enjoyable. With the exception of a small number of students who preferred to work on their own, students enjoyed the change from a traditional large group didactic format, and the communication, discussion and interaction within the group. Students valued the opportunity to think, to be creative, to share tasks, and to be able to pool and critique each other's ideas in a safe environment. Some groups felt that their united effort as a group was stronger than the sum of the individual contributions.

Most reports of PBL concur that learning and teaching is more enjoyable for students and teachers. The small-group cooperative format that emphasizes active participation is described as a powerful motivating influence, likely to lead to enhanced retention and recall.<sup>2,3,35,39</sup>

Performance of groups in this study was influenced by students' prior experiences, and the ability of opinion leaders in a group to influence the process. The effect of student selection could not be determined in this study. In contrast to most PBL courses, selection of students to enter the course was not based on an interest in, or demonstrated ability to work in small groups. While students had relatively little experience of small group work in the course, the students who did attend the North Queensland Clinical School had chosen to undertake a different experience for part

or all of the last two years of their course. Furthermore, students were allowed to form their own PBL tutorial groups.

Differences were noted in some groups between the approach of male and female students, who tended to focus on different aspects of the case. These gender differences were noted by the tutors and observer to be driven by the students, possibly on the basis of pre-conceived ideas or career plans. The tutors were not surprised by these gender differences, but it was not clear in this evaluation whether male and female students took a different approach to these problems, or whether other factors such as conforming to stereotypical roles were important.

The positive experiences of students and tutors with the small group format are consistent with the educational literature, and would be expected to create an environment in which a novel or innovative educational approach would be favourably received.

### **6.1.2 The problem based learning process**

Students had mixed feelings about the PBL process. Both students and tutors were relatively new to PBL, with students having some reservations on the basis of their limited, but usually negative, prior experiences. Students did appreciate the opportunity to work together as a group to explore a case broadly and holistically. However, they had difficulties understanding the PBL format, and expressed the need for more guidelines, direction and structure. Students were also concerned about the heavy workload, difficulties with allocation of tasks, real or potential difficulties with the group process, and discomfort with the presence of the tutor. These problems were described by some students as causing resistance to the new format, and an impediment to learning, leading to frustration with the time-consuming nature of the process. Observations from the tutors confirmed that groups struggled with these issues, which limited their ability to work on the problems as a group, and may be expected to impact on educational outcomes.

Similar concerns about the efficiency of PBL have been described in the literature. Finucane et al outline possible disadvantages of PBL including cost, both in start up

and maintenance; demands of staff time; stress for students and staff; and difficult implementation where there is a lack of enthusiasm.<sup>35</sup>

Groups in which the PBL process worked well demonstrated enthusiasm, independence, and a willingness to try a new process. Leadership and chairing skills were also important, with the most effective leaders observed to be confident, knowledgeable, and able to direct the discussions. The nominated chair or other opinion leaders in the group also had a significant role in facilitating the group's approach to change, and encouraging them to embrace the new format. However, where no leader emerged, the group process suffered, with the tutor having to take over the role. These groups were less likely to be enthusiastic about the process, being described by the tutors as demonstrating laziness, poor punctuality and participation, and a lack of commitment. These groups still worked through the PBL process in the classroom, but were less likely to undertake independent tasks or further research.

The tutor was found to have an important role in helping to manage the PBL process in these tutorials, consistent with the medical education literature. The tutor's role may have been more important in the setting of this study compared to other PBL programmes where students were more familiar with the PBL process. Some groups expressed considerable negativity towards PBL, which a number of tutors explicitly acknowledged and attempted to manage. However, tutors themselves were relatively new to the PBL process. The observer noted that the tutor may have influenced the performance of groups who were thought to have problems, for example, by the way in which they phrased questions, or by missing the opportunity to challenge students. Tutors also influenced group process by the way in which they facilitated the group and their interaction with the chair. For example, tutors who interceded at critical points such as the change in group dynamic observed mid-tutorial, when some students were starting to contribute more and others were fading, tended to rapidly become the dominant focus of the group.

These tutor factors, including experience, facilitation skills and background appeared to influence the performance of student groups and may have contributed to some of the variability between groups. Medical tutors were observed to be more

likely to guide students along a pre-determined route towards the outcome of the Problem of the Week, while tutors with a background in education were more relaxed in their role and able to focus the group on the learning process. However, tutors had undergone a standardized training process, and quantitative observation of their activities did not reveal a substantial variation.

Students recognized the important facilitative role of the tutor in the PBL process, supporting and motivating students, keeping them on track, and in managing conflict. Tutors had different styles, varying from unobtrusive to directive according to the circumstances. Students welcomed feedback from tutors, and requested more. Some students resisted tutor input, either due to their unfamiliarity with the process, or to a desire to be allowed to work independently, with some groups expressing concerns about a tutor being present during their discussions. They did recognize that tutors had content knowledge relevant to the case. In most cases, tutors were able to use this to help guide groups through the PBL tutorial process, highlighting important or overlooked information and helping students identify significant links, but tensions were expressed in a small number of tutorials due to this perceived power imbalance. Some groups preferred to use the tutor as an easily accessible source of information, while others did not, possibly due to the material presented about the PBL process in the introductory session, or to the tutor's facilitation style.

Other PBL programmes also recognize the importance of group and facilitation skills. Students with these skills may elect to apply to PBL courses, or they may be attributes sought in the selection process. Many programmes encourage students to further develop these skills early in the course.<sup>2,3,35,39</sup> Attempts were made in this study to develop group skills, but these were limited by the short time frame and students' prior experiences. Tutors have also been observed to have a significant independent influence on PBL group function, with some debate in the literature on the effect of tutor content expertise on group function.<sup>2,31,42</sup>

Groups also demonstrated a variable approach to the expected PBL activities. Groups were consistently strong in some specific areas and weaker in others, with both student and tutor effects important. Few groups were able to meet all of the expected activities in these PBL tutorials. Most groups were observed to

demonstrate desired levels and quality of activities in a number of areas, such as the clusters, which evaluate PBL activities and the way in which tutorial groups organize and conduct their discussions. Some groups were observed to perform at a high level in these areas.

There was more variation between groups in other items. For example, available resources were frequently not identified or under-utilized. Groups tended to accept information on face value without critically appraising or challenging the information or its source. Self-evaluation of learning progress and interpersonal interactions occurred only rarely at both the student and group levels. Although most groups were free of conflict, groups did not tend to formally negotiate or change their own group process. These activities would be expected to occur more frequently in more experienced PBL tutorial groups, and may have been better supported or encouraged by tutors

The descriptions of group performances are similar to reported results from other PBL evaluations.<sup>103,104</sup> Some of these findings such as insufficient self- and group evaluation, may reflect the students' inexperience with PBL, and are corroborated by other observations. On the other hand, these students were more familiar with clinical medicine than most PBL students in earlier years, and may have taken shortcuts in the clinical reasoning process more readily.

Other factors affecting group process included punctuality, particularly where some group members were 15 or more minutes late. In addition, the participation of students who may have had language difficulties varied from the first tutorial, when they were passively engaged in the tasks to the second when they took on a more active role. All groups were observed to improve with practice, becoming more proficient as they accepted and understood the PBL process, and worked with their tutors to devise strategies to overcome problems with the process.

The variation in the PBL process between groups affected the educational outcomes. Groups who focused on a direct biomedical approach to the problem tended to use the medical record to get straight to the diagnosis, and were less interested in exploring the problem holistically and generating hypotheses. Tutors



observed that these groups were not comfortable dealing with uncertainty, and required prompting to think widely, which caused some conflict in the tutor's role.

Three major influences affecting the PBL process and contributing to variability between groups were identified in this study: tutor factors, student factors and group factors. Groups' performance was more aligned with these three factors than with issues of case design or patient selection. Agreement between the instruments used was strongest for groups who performed well. For other groups a mix of qualitative and quantitative data, using triangulation by multiple measures of group performance may be needed to provide the best estimate of group function. Tutors described an improvement in group performance from the first to the second Problem of the Week, but this observation was not supported by the quantitative data.

However, evaluation of the groups' PBL activities and the way in which discussions were organized and conducted suggested that these activities were satisfactory, and that, at the level of this evaluation at least, the performance of these groups was similar to other groups in PBL-focussed courses.

However, individual students and groups had a variety of experiences with this approach, influenced by these three major factors. This variation in experience would be expected to affect the educational outcomes of the *Problem of the Week* in addition to the effects of using real patients. In this evaluation the relative contribution of these factors and others such as case design and selection to the overall tutorial process cannot be determined. These issues also have implications for the introduction of a PBL course in other settings, particularly, as in this study, where a subject involving PBL is introduced late in a traditional course.

However, both students and tutors noted an improvement in group process over the two tutorial weeks, with students more positive about this format than their previous experience with PBL, valuing the opportunity to consolidate and apply knowledge, rather than gaining new information. The different ways in which tutors and groups responded to these issues influenced the process and outcome of the tutorials, and

therefore impacted on the overall evaluation. It was not always possible to separate these effects from the effect of constructing PBL tutorials around real patients.

### **6.1.3 The use of real patients**

Students valued the authenticity of the *Problem of the Week* format. They described the approach as interesting and engaging, stimulating their thinking and allowing them to develop empathy with the patient and his or her family. They appreciated the richness of the interaction with and around a real patient. They valued the immediate feedback of a real case, with the opportunity to confirm or reject hypotheses in real time, contrasting this with their experience with paper-based simulations: ‘fake patients don’t have answers’. Students also appreciated the rich discussion with the patient and their family. This interaction provided the chance to practise communication skills and pick up non-verbal cues, and an opportunity to explore the problem from the perspective of the patient and his or her family.

The use of a real patient scenario and the opportunity to hear the patient’s voice was described by the students as being contextually deeper, helping them learn about a specific condition, and the process of care around that problem in the General Practice setting. Students saw the relevance of dealing with a real-life problem, interacting with a real patient with real problems in the real world, in contrast to other teaching methods using textbooks or paper-based cases. They felt that the use of real patients enhanced their learning by allowing them to apply their knowledge in a practical way and to learn things for themselves.

Other learning benefits described by the students included the observation that the material was easier to understand by providing an encouraging environment, and helping them attach importance to the material they were studying. In addition, by researching aspects of the problem relevant to a real patient they were able to integrate and apply their learning from a range of disciplines. Most students saw the value in exploring a case in detail, feeling that they gained insights into the process of care and the impact of an illness on the patient and his or her family, in addition to learning more about specific medical conditions. However, a number of students

saw this as a downside, believing that their learning around the *Problem of the Week* was narrow in proportion to the effort required.

Another advantage of this approach was the opportunity to identify with the role of the GP and take some responsibility for patient care. The ability to contribute to patient care by direct involvement in the case was important to a number of students, who were conscious that their fresh approach, formal recommendations, and other ideas that were recorded in the patient's file may be of some assistance in managing the case. Tutors supported the potential ability of students to contribute to the management of the case, although some students were less likely to accept that their input was relevant or helpful, and requested follow-up information and feedback on the progress of the case. For many students this approach offered them their first opportunity to contribute in a meaningful way to the care of a patient which was important in stimulating their interest and engagement. They also appreciated the opportunity to experience and understand the role and approach of the GP.

Finally, students also valued the holistic nature of the patients' problems that emerged through the tutorial process, citing the reality of the case, the broad approach, the multiple interacting factors discussed, and the teamwork. They realized that these cases were more complex and challenging than paper cases, that the limits of the case were not clearly defined and there may be real-life decisions about conflicting priorities – and that these factors reflected the real world.

The risks of using real patients have been described in section 5.5. Issues such as unexpected non-availability of patients or change in their clinical condition need to be considered and managed. However, in this evaluation the substantial benefits of using real patients were felt to outweigh the risks.

In summary, the use of real patients appeared to add a dimension of empowerment to the students' learning. Students felt empowered by involvement in the case, knowing that their opinions were valued and they could potentially contribute to the management of the patient. The real-life interaction with a patient, his or her family, health care providers, and a real problem also appeared to be an empowering and

motivating stimulus for learning. Other empowering features of the involvement of real patients included the relevance, the immediate feedback, the chance to enhance practical communication skills, and the ability to apply theoretical learning in a real-life situation.

Other evaluations of the use of real patients in PBL also report staff and student satisfaction with the approach.<sup>53,54,55,62</sup> The experiences in this study are similar to a Dutch report which found the real-patient encounters helped students to practise and test their clinical skills, with a depth of discussion that was not noted with written cases.<sup>53</sup> Dammers et al described real patients as being potent trigger stimuli in PBL, resulting in the use of a wide range of resources and imaginative presentation of the students' learning. Their study concurred that the use of real patients was a powerful motivating influence for students, providing focus, contextualization and relevance.<sup>62</sup>

#### **6.1.4 The *Problem of the Week* format**

As described in the previous section students and tutors felt that this approach created a favourable learning environment. In addition to the small group format, the *Problem of the Week* provided a contextually rich focus for the students, which was relevant, engaging, and connected to the real world.

##### **6.1.4.1 The *Problem of the Week*: choice of case**

The choice of case was important. Students expressed a strong preference for cases that were problematic or incompletely explored. These patients were often new to the practice, or had developed a recent problem which had not been fully evaluated. Students saw the value of exploring cases which had not been fully defined and which raised some unanswered questions, as this offered them an opportunity to be involved in, and perhaps contribute to, the management of the case. Case Study 2, in section 5.2, describes students concerns when working through a case that had been well defined, and how the lack of a problem to analyze and possibly 'solve' limited the group's engagement with the process and affected their learning outcomes. The complexity of the case had to be appropriate for the learners' level of knowledge,

and students expressed a preference for common problems. 'Ideal' cases were seen as those that were not too complex, representing a common problem, and with multiple aspects to be discovered. These sorts of cases were described by the students as providing the maximum learning opportunities at the right level.

Cases with multiple potential sources of data were also valued by students. They felt that having to work on independent tasks and then share and analyse their findings encouraged group work and was useful for teaching integration as they were required to apply their learning from different disciplines. These sorts of cases may have had multiple perspectives, for example, several problems to be managed, possibly with a mix of physical and psychosocial problems, multiple hypotheses to be considered, or a number of health care providers involved in the management. The opportunity to explore multiple perspectives around the case was valued by the students, as they were able to follow a case through its evolution, although over a fairly short time frame, and learn about the health care team. In contrast, cases that were unidimensional, focusing on one fairly straightforward problem, were thought to be less appropriate.

Students and tutors agreed that unsuitable cases for this format included those that were too complex or esoteric for year 5 students. They felt the content had to be appropriate to the background knowledge of the students. Some groups struggled with cases involving unorthodox treatments. Less suitable cases included those that were too vague as well as those that were well defined; there was agreement that some intermediate degree of definition or differentiation was ideal.

However, this contrasts with the experience in PBL courses, where the problem under discussion is used as a trigger to stimulate students to think about the problem, what they already know, what they need to know in order to deal with the problem, and possible sources of information. Students may have minimal prior knowledge of the content of a particular PBL problem. However, they are familiar with PBL and are trained and develop experience in approaching a problem in which they did not have all the necessary background information, using the PBL tutorial to identify and address gaps in their knowledge. Experienced PBL students

also develop skills in defining their learning objectives and placing limits on the material to be learned or explored.

In contrast, the student groups in this study were new to the PBL format. They may not have appreciated what they could learn about General Practice and the role of the GP from considering a less common problem, and they may not have developed the skills to put limits on a complex problem, or break it down into manageable units. Students may have had more confidence about their background knowledge had they had more experience in PBL, as a number of comments suggested that they wanted to come into these tutorials prepared with all the information needed to fully explore the problem.

Cases that had recently been used for a PBL tutorial with another group were also less appropriate, as many of the issues had already been considered and documented in the patient's medical record.

The suitability of patients used in the *Problem of the Week* also related to the learning objectives of the tutorials. In the tutorials evaluated in this study the learning objectives relate more to the process of care, dealing with uncertainty, and the management of a patient with multiple chronic problems in the General Practice setting over time – rather than specific medical conditions. Patients need to be chosen to reflect the learning objectives. This format could be used in other settings to teach the approach to undifferentiated presentations e.g. common problems presenting in General Practice like abdominal pain, headache or tiredness. However, if the learning objectives require a patient with a specific medical condition there may be considerable more difficulty in identifying a suitable patient. The availability, and willingness to participate, of real patients is unpredictable, and may limit the ability to use this approach to teach an entire curriculum in a particular discipline. However, this will depend on the way in which a curriculum is structured and how learning objectives are written: if these are designed around specific clinical conditions then there may be problems in arranging student access to suitable patients. On the other hand, if the objectives are broad, for example around common presenting conditions, then the *Problem of the Week* approach may be appropriate. For example, a musculoskeletal medicine course could be constructed

around a series of common presentations (e.g. neck pain, back pain, shoulder problems, the injured ankle, common self-limiting conditions etc) with the tutorial design ensuring that appropriate areas and curricular objectives were covered in the discussion.

This approach is also appropriate for learning principles around general thematic areas e.g. pathology, prescribing, microbiology. For example, suitable patients could be identified in most ambulatory clinics who could illustrate some common problems in polypharmacy, problems with compliance, or important interactions. Designing a tutorial around a general topic, for example, important drug interactions, may allow a number of important principles to be explored, although it may be difficult to ensure that specific interactions are encountered. If there are important content issues the students need to cover in order to meet the learning objectives then there are a number of strategies the tutors could use to ensure this happens. One approach would be to introduce a number of structured prompts (for example, ‘is this patient suitable for warfarin therapy? What interactions might be expected? What precautions should be taken? What should the patient be told?’). Such an approach would, in effect, move the tutorial away from a consideration of just the patient’s problems, to a hybrid version which would blend the richness of the real patient encounter with some specific, ‘paper-based’ triggers needed in order to meet the learning objectives.

Other studies of clinical PBL describe a range of suitable patients, depending on the context and learning objectives.<sup>55</sup> Dammers et al reported little difficulty in recruiting suitable patients from general practice, usually on the basis of the complexity of the patient’s problems, and personal recommendation from the GP. In these patients students were able to devise appropriate learning objectives and identify suitable resources.<sup>62</sup>

#### **6.1.4.2 The *Problem of the Week*: tutorial design and delivery**

Designing a *Problem of the Week* tutorial must therefore take account of a number of factors. The learning objectives must be considered and kept in mind as the problem is developed. Suitable patients, as outlined above, must be recruited,

consent obtained, and their availability confirmed for the designated teaching slot. The patient should understand the expectations of his or her role, preferably supported by some written documentation. Consideration should be given to preparing the student group and the tutors. Faculty need to ensure that students understand the purposes of these tutorials, the learning objectives, and the expectations placed on them. Support and training in understanding the PBL process should be provided if necessary, and any concerns addressed. Tutors should have appropriate training and experience, and be aware of any potential concerns or problems. Logistical issues, such as availability of a tutorial room, suitable audiovisual equipment and a consultation room must be checked. As described in the methods section, there are advantages in running the initial PBL tutorial close to the site of the patient's usual practice, in order to minimize inconvenience to the patient and ensure that students have the opportunity to interview the patient after the initial hypothesis generation exercise.

Designing a PBL case around a real patient also requires consideration of the learning activities available for the students. A video trigger needs to be prepared and edited. This is usually done at an earlier consultation. Attention needs to be paid to the technical quality of the recording, with sufficient time allowed to make a repeat recording if any problems are encountered. The patient can be asked to briefly state the problems in his or her own words, or, alternatively the entire consultation can be recorded. The trigger needs to be reviewed and possibly edited to ensure that students are shown a brief (30-60 seconds) summary of the salient features of the case. This material needs to be succinct, but provide enough stimulus material pointing to the key features of the case to enable the students to generate and discuss hypotheses. A written trigger may be needed to augment the video material by providing important background information, for example the demographic details of the patient or time course of the illness, or to provide any salient details not available on the videotrigger. Students may also be expected to deduce non-verbal cues from the video (for example, the patient's demeanour or aspects of the doctor-patient interaction) and may also learn something from observing an experienced clinician interact with the patient. The most successful triggers are those which provide limited information about the problem or problems from the patient's perspectives, in order to present an initial picture of the overall



situation and start the students thinking about the case. The power of a brief video of a real patient, with rich visual and auditory information providing stimulus material for the students to identify, discuss and interpret, was an important feature of this approach.

The hypothesis generation phase provides an opportunity for students to work independently in order to generate hypotheses, to create and discuss ideas, to clarify their understanding of the case and further information needed. The case outline should list some of the hypotheses and tasks that students would be expected to generate in this time. This is a critical part of the tutorial, and a functional group process is vital for success. Once groups start to function, they can work more independently, prioritizing their activities, exploring hypotheses, and ‘putting themselves in the shoes of the doctor’. Tutors may need to facilitate the group process or use the guide to direct the group in certain directions, depending on the learning objectives of the case. Tutors may also need to prompt students with specific triggers, or help them to limit the scope of their exploration of the case.

The patient interview was seen by students and tutors as one of the most important parts of the PBL process, students valuing the real-life and real-time interaction which provided high quality information and immediate feedback on their questions and hypotheses. Students needed to be well prepared for the interview, by having considered relevant dimensions of the case and deciding what information was needed from the patient. Tutors need to ensure that students are focused on the key features of the case and are able to explore the relevant areas on history and physical examination.

The chart review provided an important opportunity for students to trace the longitudinal time course of the patient’s problems, and to synthesize the perspectives of the multiple health care providers involved. In more complex cases with multiple problems in varying stages of differentiation, and many health care providers involved this may be a challenging task. However, it was considered to be worthwhile and educative, and added to the reality by mirroring the real world problems that health care providers face. This activity was of most use where there was a significant amount of past history relevant to the current problems in the

patient's hospital record, and would be of limited use in less complex cases, or where the record was brief or non-contributory. Case writers need to ensure that the record is available at the appropriate time, which should be after the hypothesis generation session, to prevent students using this as their sole source of information without critically evaluating it and seeking collateral evidence. The record should be used as one of the sources of information, but should not provide students with all the 'answers'. Tutors (and students) should be clear on the use to be made of the patient's medical record, which may need to be reflected in the case design and the learning objectives.

The home visit was able to provide students with a range of perspectives on the patient, their environment and the family setting, including psychosocial problems, family dynamics, impact of the patient's illness on the family, as well as the opportunity to observe the patient in his or her own environment. This activity was found to add considerable value to the students' holistic understanding of the case, as many of these would not have been uncovered without the home visit, and had not previously been considered by the students. There were a number of obstacles to be overcome in undertaking a home visit, including reluctance on the part of patients and students, transport difficulties, perceived lack of relevance or usefulness, and pressures of time. Once a home visit had been conducted students agreed with tutors on its value, and should be encouraged to undertake this activity providing the patient consents and the insights to be gained are relevant to the learning objectives.

The resource people available provided a variety of resources which the students found useful from the perspective of learning about the patient's case, and about how health care teams work together. Students did experience some difficulties in contacting resource people, including access, confidentiality issues, and the health care workers' ability to recall details of the patient's case. In designing the case consideration should be given to defining the resources available to the students. Students were more likely to find this a useful learning experience when some contact had been made with the resource people to ascertain their availability and brief them about the activity and the students' expected learning objectives.

The literature review was of limited value in this study in helping students explore the patient's problem, possibly due to the students' inexperience in searching for answers to specific clinical problems. Students may need to have more experience of evidence based medicine, and be supported in framing appropriate questions and accessing databases. However, the discussion around a patient's case would be expected to raise learning objectives of specific content areas to be researched by students and shared with the rest of the group. Broader content areas may be available from standard texts and references, while the answers to more specific questions may need more detailed search strategies. Both the design of the case and the tutor's facilitation should consider possible areas to be explored further in the literature, while retaining the flexibility for students to generate their own tasks in areas of interest.

While students made relatively few comments on the final presentation, they did see the importance of having a session in which to wrap up the problem under discussion, again describing it as an opportunity to understand the role of the doctor. Tutors described a range of approaches of student groups to this session, reflecting the enthusiasm and motivation of the group. Some groups were well prepared, having met mid-week to synthesize their findings and presented the case and their recommendations fluently and with minimal prompting. One group presented their findings as a role play, with each member adopting a part, while another group came to the final tutorial with a letter summarizing their findings already prepared. On the other hand, most groups spent the first part of the final session sharing information and discussing the implications for the management of the case. In these groups the tutor often had to play a role in helping the group synthesize their findings together in order to come up with some recommendations in the second half of the tutorial. In designing these tutorials some consideration should be given to preparing students for this final presentation, and to defining expected outputs consistent with the learning objectives.

In summary, once a suitable patient is recruited a case outline should be developed detailing the expected activities for the tutor, summarizing the information available for the patient and expected hypotheses and learning activities. Learning objectives for the case, matched with curricular objectives, should be outlined, together with

any administrative arrangements, for example, the availability of the patient for a house call or contact details and availability of health care providers involved in the case.

#### **6.1.4.3 The *Problem of the Week*: learning outcomes**

The students participating in this study had mixed views on the value of learning clinical medicine with real patients within a PBL format. They were more used to traditional didactic teaching, which some believed to be more efficient and effective than this method. However, students who held this view did recognize that they could learn some practical information from this method that was not available from textbooks. Other students felt this approach was preferable to lectures and made-up scenarios and could replace lectures and case discussions, but could not substitute for clinical work.

A number of concerns with the process related to the students' concerns about the PBL format and their unfamiliarity with the process. The lack of correlation between the performance of student groups on the *Approaches to Studying* questionnaire and the other qualitative and quantitative instruments used, described in section 4.6.2, suggests that differences in approaches to studying were not responsible for the observed differences between groups, but that other factors were important. Some cases were complex, and students struggled to put limits on their learning. Student concerns that these tutorials were not directly linked with the assessment and about the amount of feedback received should be addressed in other applications of this approach. These findings are consistent with the literature on introduction of educational innovations which emphasize the need to enlist institutional support, manage the cultural shift, and ensure timely debate and discussion.<sup>49</sup>

Specific features of this approach that students valued included the emphasis on the approach to the patient, which included consideration of all of the patient's problems, how to approach these, and their inter-relatedness. They contrasted the need for thinking and creativity to other experiences they had in learning or copying from textbooks. Other educational outcomes identified by the students included the

ability to work through a case exploring all dimensions from presentation to diagnosis to management, the real-life application of communication skills and the opportunity to ask questions and discuss aspects of the case. Students described this approach as a practical applied method, good for consolidation, integration and reinforcement of existing knowledge

Some students felt that by exploring a problem in detail and considering a wide range of possibilities their learning was better, deeper or broader. On the other hand, some students saw this aspect as a downside, feeling that their learning was too narrow or was inefficient, taking too much time for the material covered. These students had also expressed concerns about the amount of background knowledge they had, and preferred to gain this first from lectures or textbooks. They felt that it was not appropriate across the whole course, expressing concerns about the efficiency of the approach, and the ability to cover all the material from all perspectives. They expressed a preference for a combination of approaches, using lectures to provide basic background information, and PBL to practise the application of knowledge. As discussed earlier, this view has to be balanced against the relative inexperience, and possible resistance of this student group to PBL, and the strong evidence from the medical education literature that content can be delivered in a PBL curriculum.

Students felt this approach was particularly applicable to teaching about General Practice, where patients with multiple problems to be managed were frequently encountered. They saw the similarity of this approach to reality, with the importance of teamwork in General Practice, and the distinction, as one student observed, of hospitals that deal with particular problems, and GPs who deal with the whole patient. Students felt that this educational method could be used in other settings, particularly as part of a combined approach where background information was provided in other ways. As discussed in section 6.1.4.1 this approach could be used in a variety of other settings, depending on the curriculum design and learning objectives.

#### **6.1.4.4 The *Problem of the Week*: summary**

In this study there was a mismatch between the educational innovation and the student experience. The evaluation of the new approach involving PBL cases based around real patients was influenced by a number of other factors. PBL was an innovation to many of these students and some tutors, with experience from the literature and the earlier pilots used to overcome some of the anticipated difficulties with the process.

Tutors and groups used a variety of strategies to overcome problems related to the relative inexperience of the students with PBL and with group work, and to overcome any prior negative attitudes to PBL. These approaches included providing more structure and guidance for students, explaining the rationale for PBL and the benefits of using real patients, and allowing students to work through their concerns. Groups who worked through these issues were observed to perform better, and further, were able to establish a working relationship with each other and the tutor. Students also expressed concerns about their prior knowledge, and preparedness at this stage of their training to undertake the *Problem of the Week* format

Characteristics of groups that worked well included the approach and enthusiasm of the members, leadership and chairing skills, and the influence of the nominated chair, or other opinion leaders. Conversely, groups who experienced problems with these areas were less likely to be enthusiastic about the process, and were noted to work through the PBL process in the classroom, but were less likely to undertake independent tasks or further research. These groups were also noted to have problems with punctuality, with some group members 15 or more minutes late.

Tutors also influenced group process by the way in which they facilitated the group, their interaction with the leader, and their questioning style. They had important roles in supporting and motivating students, keeping them on track, and occasionally managing conflict. Some tensions arose where tutors were seen as content experts: on the one hand they were able to use their background knowledge to guide the students through the process, but on the other they were also seen as an easy path to the solution, with some conflict and power imbalance experienced in

their role when they resisted this approach from the students. Differences were highlighted in the approach of varying tutors, depending on their background, experience, and training process, with recommendations made on standardized approaches to tutor training and tutorial delivery.

While efforts were made to minimize the effect of external variables on the *Problem of the Week* format, these were reflected in the differences between groups. These effects, which were largely attributed to a mix of tutor, group and student factors, could not be predicted prior to a *Problem of the Week* cycle, although their impact was minimized to some extent by the strategies described earlier in this section. The evaluation attempted to overcome these effects by coding and collating data under separate headings, trying to separate the effects of the PBL format and group process from those of the use of real patients and the *Problem of the Week* format, with further triangulation from a variety of data sources. All groups reported positive features around the use of real patients, although the learning activities and learning outcomes were best for those groups who had worked through their concerns and were able to work with their tutor in a functional PBL approach.

These issues highlight some of the difficulties that may be experienced in the introduction of PBL into a traditional course. Student selection tends to be different between the two approaches, and students and staff have developed different approaches to teaching and learning, to the extent where the introduction of a PBL module into a traditional course may be met with some resistance. Curricular and assessment requirements may not be matched, and may not fit well with the hybrid model, with the possibility that students may become frustrated with aspects of the PBL process.

This study also highlights some of the difficulties with the evaluation of an educational programme or module, particularly where a control group is not feasible. Direct observation of the tutorial groups by an independent observer and by videotaping the tutorial did not appear to have a major impact on group process or tutorial function, but there may have been an effect that was not described by the observers or participants. The direct observation of these tutorials did provide a useful method to record information on tutorial function. Some specific suggestions

were made by the observer to change elements of the recording process to improve the utility of the instrument and the richness of data gathered in the context on these PBL tutorials. The *Group Assessment Schedule* provided further quantitative data on PBL process. Triangulation of these data sources with information derived from questionnaires, interviews and focus groups appeared to provide the most robust and richest information, and this approach has been used in the evaluation of these PBL tutorials. The education literature has highlighted a number of these issues. Several authors have drawn attention to the difficulties inherent in research into education innovations, calling for more high quality studies.<sup>65,78,82,83,84</sup> The use of a variety of methodologies and approaches may help to overcome some of these problems and improve rigour and reliability.<sup>105</sup>

Despite the many variables that appeared to influence the PBL process, rich data was gathered on the *Problem of the Week* format. Specific insights leading to some recommendations were gained in a number of areas including choice and design of case; tutorial design and delivery; and learning outcomes. The positive aspects of the evaluation, particularly in terms of learning outcomes and student and tutor satisfaction supports the concept that the use of real patients in PBL works and is worth further exploration in other contexts.

## **6.2 Additional Perspectives**

The major focus of this study was to evaluate the *Problem of the week* from the perspectives of the students, the tutorial groups, and the tutors. This section will explore some broader perspectives of this approach.

### **6.2.1 Curriculum and resource perspectives**

The evaluation of the *Problem of the Week* in this study raised some issues around curricular and resource requirements that are similar to those in other PBL courses. The small group PBL format requires the availability of sufficient rooms and tutors who are able to commit to regular meetings with a PBL group over a term or semester. Tutors need specific training, support and feedback. Students also need to



be familiar with the PBL format and will require support in developing and maintaining the skills needed. Similar issues have been highlighted in a number of reviews of PBL programmes, particularly when the format is introduced into a large course.<sup>35</sup>

Questions also arose around the ability of this format to meet the learning objectives prescribed in the curriculum. Paper cases can be carefully constructed to meet specific learning objectives, so that a series of paper-based PBL cases can be used to cover broader objectives of a particular course or module. Cases can be designed to cover specific rare or important conditions that students may not otherwise be exposed to. The use of real patients in this study was found suitable for teaching students about general processes, for example, the approach of the general practitioner to patients with chronic disease, the management of uncertainty, undifferentiated presentations, and the interplay of physical and psychological factors in a patient's illness. However, the availability of patients with specific diagnoses to illustrate a particular condition could not always be guaranteed, particularly in the context of a larger course with multiple tutorial groups running in parallel. One approach to addressing this problem may be to write cases around presenting complaints rather than specific diagnoses, for example, acute chest pain, tiredness, shortness of breath etc. Tutorials could be constructed to require students, supported by their tutors, to explore a broad range of issues, irrespective of the patient's final diagnosis, if, indeed that could be established. Groups working in parallel on similar problems with different patients could then still meet the learning objectives of the case, providing they were broad enough to accommodate this, and the tutorial guide was appropriately written. Another approach could be to use a hybrid version of PBL with additional written triggers or prompt being provided by the tutor in addition to the stimulus material provided by a real patient, as described in section 6.1.4.1. Further work needs to be done on the ability of this approach to meet more specific learning objectives, particularly in the context of a predominantly PBL course.

The availability of suitable patients may also be an issue in larger courses. Learning objectives may need to be broad enough to accommodate a variety of patients who meet the required framework. Patients with a clinical link to faculty staff or tutors

may be most suitable for these tutorials. However they cannot be used for more than one or two PBL cycles, as the learning of later groups would be compromised by having to work through a case that had already been extensively explored, and concerns about possible effects on patients. However, in some cases a patient's condition may change raising new areas to be explored, and the possibility of re-using a patient for a different PBL problem.

In this study students described how the use of real patients was particularly useful for teaching about General Practice, but were concerned about its applicability in other settings for example Internal Medicine or Surgery, or in 'non clinical' disciplines.

### **6.2.2 Faculty Perspectives**

The faculty involved in these tutorials enjoyed the fresh approach. Introduction of PBL in other settings has been accompanied by reforms in selection, curriculum and assessment, and a refreshed approach to medical education. This has served to revitalize staff and students, to focus efforts on improving educational outcomes, and has stimulated research in medical education.

Other innovations that tutors appreciated include the cross-disciplinary or interdisciplinary aspects, which the GP tutors felt reflected their own role, and helped students understand the role of the GP. Tutors enjoyed having students involved in the care of their patients, and the opportunity to discuss and debate management with them. While this situation may have theoretically led to conflict or concern about possible criticism of the responsible clinician by the students, no such concerns were expressed by either students or tutors. Tutors in fact welcomed feedback from students on their management and diagnoses, and were open to the possibility that students may uncover new, relevant information. Patients were also aware that having a group of students discuss and debate their case may lead to new insights.

### 6.2.3 Community Perspectives

The approach described in this study is consistent with recent trends in community-based education. As hospitals provide increasingly specialized and technical services for the sickest patients, more medical care is being delivered on a short-stay basis or in the community. Medical education is also moving into the community, partly in response to the shift of patients, and partly due to a desire to best prepare graduates to practise in this setting. There is an increasing focus on teaching around ambulatory care using patients who may have chronic diseases that are managed in the community, and who may have a range of physical and psychological issues affecting their health.<sup>71</sup>

The *Problem of the Week* approach therefore promotes a holistic model of care rather than compartmentalized individual silos or the separate disciplines found in a major teaching hospital. While this is clearly relevant to teaching around General Practice, it may also have relevance to other generalist disciplines, for example, Paediatrics, General Medicine, and General Surgery. There may be further implications of this approach in teaching around more specialized areas in an integrated and holistic manner.

The use of the patient's voice has been described in medical education as an important and empowering tool. Patients are recognized as an expert in their own illness, and as a major contributor to the management decisions in the second half of the consultation. Constructing PBL cases around real patients not only forces students to critically evaluate the impact of all aspects of the case on the patient, but also offers an opportunity for the patient to contribute to the students' learning in a variety of ways. In addition to the stimulus of learning around a real patient case, there are other possible ways in which patients may be able to contribute, for example by participation in the final tutorial, by providing specific feedback to students, or by reviewing and commenting on the students' recommendations.

### **6.3. Significance of this study**

The results of this study extend the current understanding of the use of real patients in PBL. In the following sections the new findings will be discussed and compared with the literature, and learning activities and learning outcomes will be summarized. Implications for other educational settings will be outlined, including implementation and practical applications.

#### **6.3.1 New findings**

This study demonstrates that PBL problems can be constructed around real patients in the General Practice setting and that the learning objectives can be met. This approach appears to be an extension of traditional case-based teaching, offering a number of additional advantages including the PBL format and the opportunistically to explore a real case in some detail. Patients have long been used in traditional bedside teaching or in ambulatory care. For example, clinical tutors have used patients to demonstrate history taking, physical examination or other clinical skills, usually with small groups of students. Students may be required to interview or examine patients, possibly observed by a clinician who provides feedback. Students are used to presenting cases and discussing them with their peers and teachers. Traditional ward rounds and outpatient clinics involve a number of patients being seen as part of the clinical service, but with a strong teaching component that may involve Registrars, junior doctors and medical students.

Both approaches use patients as a stimulus for clinical teaching. In traditional clinical teaching, patients may be selected to illustrate specific conditions, problems or presentations. Some teaching is opportunistic or ad hoc, taking advantage of available clinical material. Courses are usually structured to allow sufficient clinical exposure for students to cover important curricular requirements, or to meet these learning objectives in other ways, for example, didactic teaching or by the use of multi-media. The *Problem of the Week* also requires the availability of suitable patients who consent to participation. Recruitment and selection of appropriate patients in both approaches is easier when the learning objectives are broad, for example, around a particular clinical problem, say abdominal pain, rather than a

specific diagnosis, for example biliary colic. Similarly, patients who illustrate various processes (for example management of uncertainty, dealing with multiple chronic problems, or polypharmacy) are more likely to be available than patients with more specific conditions.

However, the *Problem of the Week* differs from traditional approaches in a number of important ways. Traditional clinical teaching is more teacher-centred: the teacher usually sets the agenda and defines the tasks, although learners can meet their own learning needs by questioning and discussion. Students are freer in the *Problem of the Week* format to set their own agenda, and decide on and allocate tasks as a group, although the facilitator does have a role in helping students meet the learning objectives of the case. While the need to meet specific learning outcomes means that the approach is not completely student-centred, students do have considerable freedom to explore aspects of the case in great detail in order to meet their own learning objectives.

The opportunity to explore a particular case widely and holistically was another feature of this approach that was valued by the students. Students valued the learning opportunities that were provided both by the in-depth exploration of a case, and the broad exploration from a variety of perspectives. This contrasts with the episodic exposure that students may have to other patients seen in an ambulatory setting, where they see snapshots of the whole picture, in distinction to the treating clinician who may have built up a much more complete picture after years of treating the patient. The *Problem of the Week* also offered students the opportunity to trace the longitudinal course of a clinical problem, to be immersed in the intricacies of a complex case and to appreciate the multiple dimensions involved and the problems to be unraveled. This view has to be balanced against the concern expressed by a few students that their learning was narrow in relation to the effort involved. This issue may be addressed by ensuring students understand the concept, and by careful patient selection and case design with appropriate learning objectives.

Close involvement with patients is a feature of most forms of clinical teaching, but there were a number of features of this approach that appeared to engage students' interest. They valued the richness of an in-depth interaction with real patients and

their families which stimulated their interest, offered an opportunity to practise communication skills and provided immediate feedback. The authenticity of the real patient encounter stimulated students to think, and provided an encouraging learning environment, helping them attach meaning to the material they were studying. In common with other PBL formats, this approach enhanced learning by requiring students to discover things for themselves, activating their prior knowledge in order to apply and integrate their learning from a range of disciplines. However, students felt that the *Problem of the Week* approach was contextually deeper, helping them learn about the approach to real problems in the real world. In addition they valued the immediate feedback of a real case, which provide the opportunity to confirm or deny hypotheses in real time, in contrast to their limited experiences with paper-based cases.

Another major factor which engaged the interest of the students was the opportunity to contribute to patient care, possibly for the first time in the course. By ‘putting themselves in the shoes of the GP’ they were not only meeting one of the learning objectives of the course, but were positioning themselves to uncover important information or suggest fresh diagnoses or management strategies. In order to achieve this, the students firstly had to appreciate the multiple aspects of the case and their inter-relatedness, and secondly, they had to work to independently investigate multiple aspects of the case, and share and synthesize their findings. Groups that were able to work through these processes to the point where they were potentially able to contribute to patient care demonstrated a sophisticated level of higher order thinking that enabled them to meet such learning objectives as appreciation of holistic care and the management of uncertainty.

In summary, the *Problem of the Week* approach adopted in this study builds on and extends features of both traditional clinical teaching, and PBL based on paper cases. The approach may be more student-centred than other forms of clinical teaching, with the possibility of students actually contributing to the health care of the patient. The engaging and contextually rich nature of the process seems to add value to the PBL format. As with other forms of PBL, the group process, the real world scenarios, the need to retrieve learned information, and share and synthesize new findings is important in creating a favourable learning environment which

stimulates students to learn. This approach appeared to have the additional dimension of empowering students to be actively involved in patient care and to take responsibility for their own learning. This study demonstrates that PBL tutorials around real patients can be delivered in this way, with considerable potential for further development in hybrid courses and with more senior medical students.

#### **6.3.1.1 Learning activities**

Some of the specific learning activities undertaken by students in the context of the *Problem of the Week* appear to have been of particular value. These were not confined just to those activities that involved interaction with the patient and his or her family. For example, the video trigger was found to present a rich opportunity for students to start to think about the problem from the patient's perspective, presenting an overall view of the situation. In analyzing a limited amount of visual and auditory information in the context of a specific condition, the students were simulating the thought processes of experienced clinicians, who may be processing and analyzing initial impressions of a patient encounter early in a consultation, possibly unconsciously. Similarly, the discussions with resource people were useful in helping students understand the role of allied health professionals in relation to a particular case. Students found this a more meaningful way to appreciate the services available than having allied health professionals teach them about general issues in a didactic manner. This approach mimics the PBL process whereby students identify a problem in a particular patient, consider the range of available services and modalities, and then 'solve' the problem by tailoring a particular solution to a particular patient's problem. This approach appeared to be particularly powerful when students were able to speak to allied health professionals directly involved in the case, or, better still, actually accompany the patient to a treatment session, supporting the view that the authenticity of this method is one of its main attractions. Similarly, the chart review was of most use as a learning exercise when students were critically reviewing the file in order to seek specific information or summarize salient features of the case for the colleagues. The skills involved in distilling a complete history from a complex medical record were not always

appreciated by students until after the event, although tutors tended to be aware of the learning potential of this activity.

However, the real patient encounters were most valued by the students. The patient interview was seen by students and tutors as one of the most important parts of the PBL process. As this occurred relatively early in the process it provided an opportunity for all students to engage with the patient, having already spent some time as a group thinking about possible problems and explanations. The difficulties experienced by some groups in formulating appropriate questions and limiting the depth and breadth of the interviews provide some useful learning opportunities for the students. This approach highlighted to the students the difference between having to actually perform a history or examination on a real patient, compared to describing what they would do, as typically happens in case-based teaching. The discussions prior to the clinical encounter had provided the students with some areas to explore, allowing them to dissect or make explicit the clinical reasoning processes of experienced clinicians. However, the encounter with a real patient was more open-ended: neither the students nor the tutor could be certain what would be discovered. Students had to learn to deal with whatever issues arose, either by exploring them appropriately, or by deferring discussion. The need to prioritize information, and put limits on the depth and breadth of the issues explored was an important feature of this approach, and also has implications for case design. The use of real patients, while being the major attraction of this approach, can also lead to unpredictable learning outcomes. These may not necessarily be undesirable, and may still be consistent with the learning objectives of the problem, particularly if they are written broadly. However, curriculum designers and tutors need to be aware of this issue and be prepared to recognize and manage it if appropriate.

These issues illustrate how the *Problem of the Week* approach can be used to teach students about the clinical reasoning process, one of the fundamental aims of PBL. By exploring a particular case in depth, students were able to simulate and understand the clinical reasoning skills of an experienced clinician, some of which may be tacit or unconscious. Practising these skills in the context of a real case, and receiving feedback as the case progresses over the week, appeared to help students



appreciate the linkages and inter-relatedness of the various pieces of clinical information.

The other activity that provided a rich learning environment was the home visit, which appeared to extend the students' learning in a variety of ways. Again, in a number of cases the value of this as a learning exercise was appreciated by the students more in hindsight, although the value was more apparent to the tutors. Similar issues arose around the breadth of issues that arose, the richness of the experience, and how additional background information helped students understand the importance of a holistic approach to a patient's physical and psychological problems. Despite some student resistance to this activity there appeared to be sufficient benefit in it, particularly in the context of teaching about General Practice, to insist that time is set aside for students to undertake a home visit, providing patient consent is obtained.

Tutors had also suggested inviting the patient and possibly family members along to part or all of the final tutorial session. This would allow students to discuss their reasoning processes, diagnoses and management plans with the patient, and receive immediate feedback. The impact of the presence of the patient on the group discussion in the final tutorial is not known, as this approach was not trialed. Possible discomfort about open discussions or inhibition of the group process could be dealt with, for example, by inviting the patient to the second half of the final tutorial, to allow the group to first meet, share information and discuss recommendations. Other potential advantages would include strengthening the voice of the patient and emphasizing to students the importance of involving patients and families in the decision making process.

### **6.3.1.2 Learning outcomes**

The learning outcomes of the students in this study illustrated some significant differences from both case-based clinical teaching and from other forms of PBL. Once the effects of the newness of the method to students and tutors had been addressed, a number of important issues emerged. The students' description of this approach as a practical, applied method, good for consolidation, integration and

reinforcement of existing knowledge is consistent with their experience and the PBL literature. These students did not feel that new material could be covered in this format, but there appears to be no reason why it could not be, particularly in PBL courses with students who were used to the approach. This issue should be further explored.

The use of real patients seemed to specifically affect learning outcomes that emphasized the approach to the patient. These included consideration of all of the patient's problems, how to approach these and their interrelatedness. The holistic focus and ability to examine a broad range of problems may explain the students' view that this approach was particularly relevant to teaching about General Practice. However, there appears to be no reason why this approach could not be used to teach in other areas of primary care. The use of this approach in other specialties could also be investigated. For example, an obstetric case could be written around the care of a patient in the third trimester of pregnancy. Learning objectives could include consideration of the medical, social and psychological aspects of care, and learning activities could include discussions with the obstetricians, midwives and other health professionals involved in the case, a visit to the birthing centre, a home visit to see what plans have been made to accommodate the baby, and a review of the evidence for the various tests performed at this stage of pregnancy. In this approach students would be learning both about specific aspects of antenatal care, and the processes of care and teamwork involved, in a potentially motivating and stimulating environment.

Other educational outcomes, including the opportunity to ability to work through a case exploring all dimensions longitudinally from presentation to diagnosis to ongoing management, and the real life application of communication skills, would be equally relevant in other settings. Other benefits include an appreciation of the team approach in health care and the opportunity to critically evaluate and discuss their tutor's management of a patient.

The dimension of empowerment that the use of real patients appeared to add to the students' learning was described in section 6.1.3. Students felt empowered by their involvement and potential contribution to the case, by the real-life interaction with a

patient, and relevant players in a real health care problem, and by the relevance, the immediate feedback, the chance to enhance skills, and apply theoretical learning in a real-life situation. Long-term effects on students' learning would be predicted from the education literature from such empowerment, but was not evaluated in this study. Further work is needed to explore this area.

### **6.3.2 Comparison with the literature**

Many of the findings in this study are consistent with the PBL literature. Students enjoyed the group process, the interaction and the fun. These elements are described in most PBL programmes, and are particularly apparent with student groups experienced with PBL and selected on the basis of the ability to work in small groups.<sup>2,3,35,39</sup> Students in this study appreciated the PBL format, but many groups struggled with some elements such as self- and group-evaluation. This finding does not seem to be specific to PBL interventions in hybrid courses, as other studies of experienced students in PBL courses report similar results.<sup>104</sup> The real-life context and use of real patients was an important motivating factor and a powerful stimulus to learning. Other studies of clinical PBL have also described the motivating and stimulating effects of patient involvement, which serves to provide students with contextualization, relevance, interest, purpose and focus.<sup>53,54,55,62</sup>

Major influences on the group function included student factors, tutor factors and group factors. The interplay of these factors had a major impact on the overall functioning of the group and on student satisfaction and educational outcomes. The tutor effect appeared to be less strong in this study than in others reported in the PBL literature<sup>42</sup>, although the tutor's background and educational experience did appear to affect the outcome. These three major factors had a greater influence on the outcome than did case design or patient selection and contributed to marked variation between groups in their performance. Groups who were prepared to try the new methods, who had natural leaders, and were able to develop a successful approach, were far more likely to be satisfied with the approach, and to have positive educational outcomes. The difficulties experienced with programme evaluation and with introduction of a PBL course into an established traditional curriculum are consistent with the educational literature which has been

reviewed.<sup>49,65,78,82,83,84</sup> The central role of interpersonal skills and group dynamics for successful functioning of a PBL programme is discussed widely in the literature, with many schools emphasizing these attributes in the selection process, and encouraging students to further develop these skills throughout the course.<sup>2,3,35,39</sup>

Some findings in this study were not expected from the literature. The gender differences in roles adopted within the PBL group does not appear to have been previously described. In some groups differences were noted in the approach of male and female students, who tended to focus on different aspects of the case. Female students in some cases were more interested in biopsychosocial aspects of the case and in performing the house call, compared with male students who focused more on the purely medical aspects. These differences tended to be driven by the students, possibly on the basis of pre-conceived stereotypes or career plans. The reasons for these differences were not apparent in this study, and do not appear to have been reported in other PBL settings, and are worth further exploration.

In addition, a number of the specific learning activities, including the video-trigger, the patient interview, and the home visit added a rich dimension to the *Problem of the Week* and potential to extend students' learning that was not fully appreciated prior to the formal evaluation. The use of these resources in the context of clinical PBL does not appear to be described in the literature, and should be further explored. Another unexpected outcome was the empowerment and stimulation of this approach where it worked well, as it appeared to combine the most educationally desirable features of PBL and traditional clinical teaching. This empowering effect, allowing students to 'put themselves in the shoes of the doctor', is another important finding of this study, which supports the need for further research into clinical PBL. While other studies have described the use of clinical PBL in the general practice setting, none appear to have demonstrated such a clear effect on the ability to teach students about processes of care in a discipline such as General Practice. This study also extends the literature in describing suitable patients and resources for this format, and the way in which clinical PBL tutorials can be designed and delivered.

### **6.3.3 Implications for other settings**

This section will summarize the findings of this study in relation to the planning and implementation of PBL tutorial using real patients, and highlight possible practical applications in other settings.

#### **6.3.3.1 Implementation**

A number of important lessons were learned about this approach, which could be applicable in other settings. Firstly, the importance of case design and student selection was apparent. The ideal patient for use in this format appeared to be one whose problems were evolving or incompletely explored. Cases which had not been fully defined or which raised some unanswered questions offered the best opportunity for students to be involved in the case, possibly contributing to the care of the patient. Cases that were well defined were less suitable, as there were fewer problematic areas to explore, and the ‘answers’ to the questions raised tended to be available in the medical record or from treating practitioners. Similarly, cases that had recently been used for a PBL tutorial with another group were thought to be less suitable, as many of the issues had already been explored and were documented in the patient’s medical record. However, these patients could be used in other tutorials if other problems emerged that matched learning objectives.

Cases with multiple dimensions, often with an interplay of physical and psychological factors, or with a number of health providers involved appeared to be particularly suitable, as they allowed the students to consider the case from a variety of perspectives. Cases that were more complex, focused on less common presentations, or with vague or poorly defined presentations were thought by participants in this study to be less suitable for this format. However, these views may represent the perspective of students and tutors who were not accustomed to PBL. These questions could be addressed in other PBL programmes.

Selection of cases also needs to be matched to the learning objectives of the course. This was easier to do when the objectives were broad. In this study, learning objectives relating to processes of care in General Practice could be met by a range

of patients, irrespective of their age, gender or medical problems. Suitable patients could usually be identified that illustrated issues such as management of chronic, complex problems, the role of the general practitioner, and the management of uncertainty etc. For example, cases could be constructed around a number of patients with chronic pain irrespective of the underlying cause, with students meeting general learning objectives such as the approach to management of chronic pain, the range of disciplines and modalities used, and the psychological effects of chronic pain, in addition to learning more about the specific cause illustrated by their case. This approach appeared to be particularly suitable for teaching students about processes of care. While these are clearly important in all aspects of primary care, there appears to be no reason why a similar approach would not work in other specialties, for example the approach to antenatal care as described in section 6.3.1.2 in the previous section. This is another area that could be explored in future studies.

Narrower learning objectives, for example teaching students about a specific condition, may be more difficult to meet with this approach, as availability of sufficient suitable patients may be difficult. Due to the potential problems of reusing a particular patient, different patients would have to be recruited for each tutorial group. However, patients illustrating a clinical problem or presenting complaint would be more readily available in ambulatory clinics, particularly if the condition was relatively broad (e.g. headache in a neurology clinic, abdominal pain in a surgical clinic etc).

This approach is also particularly suitable for meeting learning objectives relating to holistic care. Again, a range of suitable patients can be identified to teach students about the importance of holistic care and the interplay of physical, psychological and social factors. Students also learn more about the specific medical conditions that the patient may have, and appear to be able to integrate these factors in a deeper and contextually richer way.

Matching learning objectives to available patients is an important issue for educators wishing to try this approach in other settings. This study describes a range of learning objectives that were able to be met in the setting of a year 5 General

Practice course. With the experience gained in the pilot study, cases could readily be constructed around patients available in a General Practice clinic. Further work needs to be done to see if this approach can be used in other settings or with learning objectives that are narrower. If suitable patients cannot be recruited then other strategies may need to be considered such as augmenting the PBL format with didactic teaching, or providing specific written simulations to augment PBL using real patient, in a hybrid form of paper-based and patient-based PBL. For example, tutors could expand content by asking predesignated ‘what if?’ questions.

Lessons were also learned about the implementation of the Problem of the Week. As with all forms of PBL, preparation of the tutors and the student groups was vital. In this study there were some specific issues concerning students’ experience with PBL to be addressed before the tutorial cycle. The way in which this was done had a major impact on the performance on the groups, and therefore on the outcomes from the *Problem of the Week* process. In addition, there were some specific issues relating to the use of real patients. Considerable preparation was needed to confirm the availability of the patient at the appointed time, secure their consent to participate and allow a house call, and ensure that the resource people were available to students and were adequately briefed. Standard protocols and information sheets were developed to assist with this process and improve the efficiency of tutorial delivery. (Copies are in Appendix 5). Some tutors had expressed concerns ahead of time about using their own patients for these tutorials, on the basis that students may be critically evaluating management of their patients. However, no such concerns were evident after the tutorials were completed, with some tutors welcoming the opportunity to discuss and debate management with their students.

Students in this study expressed some concerns about the use of the *Problem of the Week* approach in other parts of their course, as described in section 5.5. However, the qualitative data suggest that these concerns relate more to the inexperience of the students with the process and their personal learning styles, rather than the PBL format or the use of real patients in the *Problem of the Week*.

The strategies described to overcome some of these problems may be of use in other settings where PBL is introduced into a traditional course. These included providing more structure and guidance about the PBL process, explaining the rationale for the use of PBL and the benefits of using real patients, and allowing students to work through their concerns. Other issues to be considered in the introduction of a PBL programme include the impact of student selection, staff and student approaches to teaching and learning, and matching curricular and assessment requirements to the teaching methods.

This study provided some insights into how best to evaluate a specific educational intervention within a wider educational programme. A control group was not possible, and there were no specific quantitative measures of learning outcomes. Triangulation from a variety of data sources, and observation of the processes was used to try to separate the effects of the intervention under study, the use of real patients as a basis for PBL problems, from confounding variables such as inexperience of students and tutors with the approach, as has been discussed in section 6.1.4.4. Each of the instruments used provided some insights into the *Problem of the Week* process. None of them alone were exhaustive or provided definitive data. For example, agreement was low between the two instruments used to measure group process. However, triangulation from multiple data sources with a mix of qualitative and quantitative data appeared to provide the richest source of information. There appeared to be no effect of direct observation.

No adverse effects were noted on patients as a result of participation in this process. Most were pleased to help, appreciated that they had a role in training better doctors, and were willing to assist their treating doctor. Some enjoyed the extra attention and were aware of the possibility that the students may be able to contribute to the management of their case. Some patients were concerned about their ability to communicate with students, having to repeat their history on a number of occasions, or possible intrusions of a house call, but most of these issues were resolved with explanation and discussion.

A number of additional perspectives have also been considered. Curriculum and resource implications include the availability of sufficient rooms, tutors, and access



to training and support for tutors and students. Patients who are able to help meet the learning objectives have to be available. Cases may need to be written with broad learning objectives to ensure sufficient patients are available, or be written with structured prompts to ensure that specific learning objectives are met.

Faculty involved in these tutorials reported their satisfaction with the method, valuing the educational innovation, the cross-disciplinary approach, and the chance to debate management – possibly their own – with students. From the community perspective this approach is consistent with trends toward community-based education, holistic and integrated teaching, and using the voice of the patient.

### **6.3.3.2 Practical applications**

The findings of this study have implications for use in a range of other educational settings. Established PBL courses may consider trialing PBL cases using real patients, either in specific clinical teaching modules, or to engage students' interest in the pre-clinical years. As this study demonstrates, PBL can also be introduced into a traditional course. Applications in other schools and in other disciplines are still to be explored.

Some of the micro skills, or small group techniques in PBL, also have application in other settings. For example, the home group tutor system used at the James Cook University (JCU) School of Medicine<sup>108</sup> is based upon some of the experiences from the *Problem of the Week* at the North Queensland Clinical School. Students in the first three years of this six-year undergraduate course are assigned a tutor in groups of eight-ten. They meet with the tutor once or twice each week over the course of the semester to discuss educational process and educational progress. The group functions to provide a form of educational pastoral care, with the tutor also having specific roles in assessing students' progress via review of their learning portfolio etc. Students undertake training in group process, and are encouraged to reflect on their own and the group process. Groups work through a series of cases over the semester, which are designed to prompt discussion and identify linkages with the course work. Groups also undertake a series of independent tasks outside of the formal tutorial sessions.

The year 4 programme at the JCU School of Medicine has also drawn on the *Problem of the Week* experience in helping students meet curricular objectives in the clinical skills / pathology programme across the whole of the year. Each week students work through a clinico-pathological case with their tutors in groups of eight-nine. Students are initially provided with brief trigger material under a series of headings such as presenting complaint, history, examination, investigation etc. They work through this material as a group, formulating and testing hypotheses. They then undertake a series of independent tasks throughout the week, which may include researching topics in more depth, and identifying suitable patients that match the theme of week. Students share this information at a follow-up meeting with their tutor at the end of the week when the learning outcomes of the case are clarified and summarized. These tutorials can be developed around real patients, as in the *Problem of the Week* format.

#### **6.4 Limitations of the study**

Limitations of this study included the lack of a matched comparison or control group. Students self-selected into the Clinical School and into PBL groups, so only limited inferences can be drawn about the wide-scale applicability of this work. There was no objective measure of outputs or learning outcomes and no long-term measures of the impact of this educational intervention. The study was conducted with small numbers of students as an isolated intervention in a small part of only one undergraduate course. Confounding variables included the students' newness to PBL and possible resistance to the approach and tutor effects. In addition the educational environment was changing within the medical school which was moving to implement a full PBL curriculum. This aspect was not specifically explored with the students in this study.

As discussed in section 6.1.2, individual students and groups had a variety of experiences with this approach, influenced by student, group and tutor factors. This variation in experience would be expected to affect the educational outcomes of the *Problem of the Week* in addition to the effects of using real patients. In this

evaluation the relative contribution of these factors and others such as case design and selection to the overall tutorial process cannot be determined. The focus was on describing the processes in detail in order to gain an understanding of educational outcomes, using a variety of tools. These instruments were found to have limitations as previously described, although some of this effect was minimized by using triangulation from multiple perspectives and data sources. There appeared to be no effects on participants from the observation process, but this could not be independently quantified.

### **6.5 Further research questions**

This study raises a number of questions for further exploration. PBL using real patients appears to be effective in teaching around the processes of care in a year 5 General Practice course. Can this form of PBL be used in other clinical settings e.g. non-primary care or other disciplines? Some suggestions have been made on ways in which this approach could be used in teaching Obstetrics, Internal Medicine or Surgery, but these are yet to be trialed or evaluated. This experience is only with ambulatory patients, who are relatively well. Can this approach be used with inpatients or are patients in hospitals too ill? Are they likely to have well defined problems that do not fit into the model described? Another issue to be addressed is whether this approach can be used to meet more specific learning objectives in specialty areas, or whether it is more appropriately used to meet broader, integrating learning objectives.

The long-term impacts of this approach are also worth exploring. The empowering and motivating effects described may have some medium- or long-term educational impacts, but this needs to be formally evaluated. The method appeared to be successful in teaching students about processes of care and approach to undifferentiated disease, but the long-term retention and application of this knowledge is still unknown. Are the skills learned generalisable? Could students who have worked through a problem (say) of undifferentiated headache be able to apply their learning in the future to other undifferentiated presentations in the General Practice setting? Much has been written about the importance of content

specificity: clearly knowledge about headache does not necessarily predict knowledge about other areas. However, this approach has emphasized processes of care in the primary care setting: the importance of a holistic approach, the management of undifferentiated problems, and the importance of teamwork etc. Less is known about the ability of students to apply these sorts of processes in other settings. It is not clear whether these are specific and generalisable skills that can be retained and transferred to other clinical situations.

As already discussed, in a hybrid curriculum or where there are other external educational influences, the impact of a specific intervention may be difficult to identify or measure. There appears to be a need for better tools and approaches for programme evaluation. On the other hand, there is further debate as to whether this is necessary – or even important.<sup>84</sup> These are all areas for further consideration.

The *Problem of the Week* approach requires students to explore a limited number of carefully selected problems in considerable depth. This is similar to the process in conventional PBL courses, where curricula are constructed around a series of paper-based cases. However, there are differences, firstly in the richness of the use of real patients, and secondly, in the unpredictable nature of the process. There are also contrasts to conventional clinical teaching, where students may have more frequent but shallow clinical encounters. Several questions need to be further explored. Do students learn different things in these two approaches? Can in-depth exploration of a case help students understand processes of care, the management of uncertainty, the principles of longitudinal management of a case and holistic care? Can this method be used as a bridge between inpatient and ambulatory care?

There are some important resource implications. Medical education is expanding world-wide. Student numbers are increasing, hospitals are focusing more on short stay cases and seriously ill patients, and access to inpatients who are able to be involved in clinical teaching is limited. This approach may provide another option for clinical teaching where patient access is scarce. Further, it may make use of chronic, stable ambulatory patients who may not otherwise be used for clinical teaching, but who are likely to demand an increasingly large proportion of the available health care resources. This method may also allow curricular coverage of

complex issues in ambulatory patients that may not be able to be met in traditional ways in the teaching hospital of the future.

The approach described also required some resources in organizing each tutorial. A number of questions arise: is it worth the effort in the current environment? Can efficiency be improved? Can it be used where clinical resources are scarce? The utility of this approach in other PBL courses and students used to PBL is still to be evaluated. Should all PBL courses – or all medical courses - be using this method? Does it increase the chance of more comprehensive patient case review and exploration? The issue of gender differences between the approach and tasks undertaken by male and female students is also worth further investigation.

Other questions remain that may be addressed in established PBL courses. Students in this evaluation did not feel that new material could be covered in this format, but there appears to be no reason why it could not be, particularly in PBL courses with students who were used to the approach. This study suggested that cases that were more complex, focused on less common presentations, or with vague or poorly defined presentations were less suitable for this format. However, these views may represent the perspective of students and tutors who were not accustomed to PBL and could be addressed in other PBL programmes. Issues also may arise with recruiting sufficient patients to meet the learning objectives. One approach may be to ensure that learning objectives are broad enough to allow patients to be recruited, as has been described. It is not certain that this approach could be used to meet more specific learning objectives. A range of other strategies may need to be considered such as augmenting the PBL format with didactic teaching, or providing specific written simulations to augment PBL using real patient, in a hybrid form of paper-based and patient-based PBL. While this study demonstrates that a set of learning objectives around teaching processes of care in an undergraduate General Practice course can be met using this approach, questions remain about what other curricular areas can be taught in this way.

The *Problem of the Week* approach appears to add another option to the educator's toolkit. This evaluation has described the implementation and empowering effect of this method. However, its role in conventional or hybrid PBL courses still needs to

be further evaluated. There are further questions about how this approach could be used in conventional clinical teaching. While it could clearly be a useful adjunct method in a variety of curricula, little is known about the optimal mix of deep, complex patient encounters and more superficial, high volume encounters. Can the ‘micro skills’, or specific teaching techniques and small group format of this approach, be used alongside more conventional teaching strategies, for example, to teach students about antenatal care as described in section 6.3.1.2.

Another issue is that the use of real patients leads to an open-ended process, whereby neither the tutor nor the students are quite certain what will be uncovered, where the tutorial will go, or what the eventual learning outcomes will be. The unpredictability of real patients, in many ways the major attraction and richness of this method, can also lead to tensions between a truly student-centred approach, and the need for the tutor to ensure that the main learning objectives are met. Finally, further involvement of the patient, and their family in the wrap-up tutorial could be further explored, with questions raised about the impact of this approach on the patient, the tutorial group, and the students’ learning outcomes. These are all areas that could be further explored.

## **6.6 Summary**

In conclusion, this study has described the evaluation of a series of PBL tutorials used for teaching year 5 General Practice students in an undergraduate medical course. Recommendations have been made around case design and selection, and the delivery and implementation of these cases. Some practical guidelines have been produced about how to write a case and how to run a *Problem of the Week* cycle. A number of specific features of this approach have been described, including the motivating and empowering effect of the involvement of real patients, and the ability of this approach to teach students about processes of care in the General Practice setting. Many of the findings were consistent with the medical education literature, although further work is needed to explore the benefits of PBL using real patients in other settings. Further work also needs to be done to explore what else

can be taught using this approach, whether there are long-term impacts, and whether the skills acquired are generalisable.

The primary focus of the evaluation was from the perspectives of the students, tutors and faculty. All were supportive of the approach, as were patients, none of whom experienced any detrimental effects from involvement. Consideration of wider issues including the curriculum, resources, and the community also supported the view that this approach is worth further exploration. This work represents one of the first formal evaluations of PBL using real patients and demonstrates that it can be implemented successfully in the setting described, with considerable potential for further development in other contexts, particularly with senior students, and in hybrid courses.

This study describes a number of ways in which this approach can be used to enhance conventional PBL using paper-based cases. In the setting described in this study there appears to be a number of benefits from a variety of perspectives in using this approach. The null hypothesis – that there is no difference between PBL using real patients and PBL using paper-based cases – therefore appears to be disproved, although further work is needed to explore the utility of this approach in other settings.

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## *Appendix 1: Summary of the Problem of the Week process for tutors*

### **Problem of The Week by Numbers**

#### **1. Ahead of time**

- know the problem
  - read the case notes and watch trigger
  - prepare OHP transparency for trigger if needed
  - prepare / read case description and learning goals
  - think about organisation of the PBL tutorial, information to divulge etc
- prepare resources
  - check room is booked and equipment available
  - arrange with patient
    - consent for teaching +/- house call
    - GP Clinic appointment (1 - 1<sup>1</sup>/<sub>4</sub> hours after tutorial starts)
      - confirm in writing
  - notify GP clinic
    - rooms needed
    - appointment times and charts required
  - prepare resource people
    - ring, confirm availability, explain what is required
    - list contact details and suitable times

#### **2. On the day**

- set up the room
  - group sitting around large table
  - need whiteboard (electronic if possible), TV, video
  - check video works!
  - rewind videotape to appropriate place
- get list of group members from Carolyn
- arrange OHP transparencies (HOW & WHY of POTW, case trigger)
- check GP clinic
  - rooms available for consultation and observing
  - videocamera set up and working

#### **3 Tutorial 1** (nb times are approximate, group should be ready for pt interview after ~1 hour)

##### **facilitation skills**

- try to control group process but still allow the group sufficient freedom
- watch time carefully, try to prevent the group getting bogged down or frustrated
- if this happens considering drawing their attention to it and asking how they might handle it
- ask questions and challenge the group rather than leading them or telling them

##### **Introduction (10 minutes)**

- introduce self and group members if appropriate
- if week 1 (first POTW tutorial)
  - discuss previous experiences of PBL
    - usually fairly negative, so worth getting out in the open
  - ask them to read handout if they haven't done so
  - explain why we do POTW as per OHP transparency
    - replaces other teaching
    - more opportunities for learning but onus is on group
    - opportunity to contribute to case, criticise management etc
    - importance of considering case from variety of aspects (as per introduction to GP session) and put limits on case
  - explain process as per OHP transparency
    - tutor will facilitate process
    - need to appoint chairman and scribe
    - allow any questions

## ***Appendix 1: Summary of the Problem of the Week process for tutors***

- if week 4 (second POTW tutorial)
  - invite comments on first POTW
- provide them with summary of their comments and tutor's feedback

### **Trigger (5 minutes)**

- view videotrigger and repeat if necessary
- project OHP transparency

### **Observations and Impressions (10 minutes)**

- ask group to list and pool observations and impressions from triggers
- encourage all to participate (if slow - ask them to list these in pairs etc)
- encourage to think widely and list the obvious
- try not to lead, challenge assumptions if appropriate

### **Explanations and conclusions (15 minutes)**

- encourage to think creatively around the problem and try to link available items of information to each other and to group's pre-existing knowledge
- may need to suggest structure (eg identify main problems and form lists under each heading), draw attention to areas mentioned but then neglected etc
- this may be very visual -arrows linking pieces of information or speculation

### **Identify Learning Issues / Questions / Objectives (10 minutes)**

- encourage group to think of the issues generated by information on whiteboard
- may need guidance if focus is too narrow (too "medical")

### **Resources available (5 minutes)**

- may need help in identifying some obvious resources eg chart, GP
- need to tell group if patient has consented to house call

### **Allow group to generate & allocate tasks (5 minutes)**

- ensure some even division of labour and all tasks are covered
- students to interview pt should go to GP clinic, others can watch if desired
- students doing housecall should have access to a car and meet the pt briefly at the clinic to sort out a suitable time

### **Conclusion of tutorial 1**

- introduce students to pt and let interview run
- instruct them to keep it to 15 - 20 minutes
  - may need a break with 5 minutes to go to collect their thoughts and sort out any further issues to resolve
- group may need summary of problems and tasks
- ensure someone has the chart and it has been signed out

## **4. Planning session**

- explain to group they have up to 30 minutes to exchange information and plan their presentation later in the week
- clarify any uncertainties and leave them to it
- put the chairman in charge, leave a 'phone contact for yourself

## **5. Second Tutorial ("wrap up") (1 - 1½ hours)**

- assemble feedback forms and proforma "letter to GP"
- explain you want to hear their thoughts on the case and let them present
- clarify any uncertainties or debatable issues on the way through
- note any major teaching points and discuss these with the group in a summary at the end
- ask them to clarify their recommendations and commit them to paper (via proforma)
- thank them for their contribution and ask them to complete feedback forms before leaving

*Appendix 2: Consent forms and information sheet for patients*

**NORTH QUEENSLAND CLINICAL SCHOOL**

CENTRE FOR GENERAL PRACTICE



**THE UNIVERSITY OF QUEENSLAND**

North Queensland Clinical School  
PO Box 1805  
Townsville Qld 4810 Australia  
Telephone (077) 81 9666  
Facsimile (077) 81 9649

I, \_\_\_\_\_ consent to being involved in a clinical tutorial with Year V medical students from the North Queensland Clinical School as explained by Dr \_\_\_\_\_ and outlined in the "Notes for patients".

I understand that students may

- discuss my case with each other, their tutor or other health professional
- interview and/or examine me at the GP Clinic, Townsville General Hospital
- request to visit me at home

I understand that declining involvement in any part of this request would not in any way affect my medical case in the GP Clinic.

I understand this tutorial is part of the teaching programme for year V medical students and that the usual rules of confidentiality apply.

Patient's signature \_\_\_\_\_ date \_\_\_\_\_

Witness \_\_\_\_\_ date \_\_\_\_\_

p\wnn\gpclinic\consent

*Appendix 2: Consent forms and information sheet for patients*

NORTH QUEENSLAND CLINICAL SCHOOL

CENTRE FOR GENERAL PRACTICE



THE UNIVERSITY OF QUEENSLAND

North Queensland Clinical School  
PO Box 1805  
Townsville Qld 4810 Australia  
Telephone (077) 81 9666  
Facsimile (077) 81 9649

CONSENT TO VIDEOTAPING OF CONSULTATION

I \_\_\_\_\_ consent to my consultation  
recorded on videotape with Dr \_\_\_\_\_ on \_\_\_\_\_ (date).

I understand that declining this request would not in any way affect my medical  
care in the General Practice Clinic.

I also understand that the videotape will only be used for the purposes of teaching  
medical students and that I can request that the videotape be erased at any time  
after recording.

Patient's signature \_\_\_\_\_ date \_\_\_\_\_

Witness \_\_\_\_\_ date \_\_\_\_\_

p:\wwn\gpclinic\consent

## **Notes for patients**

Thank you for agreeing to help with teaching the Year V undergraduate medical students. The students are in the second last year of their medical course at The University of Queensland and are undertaking their general practice attachment at the North Queensland Clinical School.

As part of their teaching students study your case in depth each week as part of a problem based learning tutorial. We select cases that illustrate some important aspects of general practice, such as looking after problems that are long term, multiple, difficult to sort out, or which need a team approach.

If you choose to be involved in this teaching process the first step is to make a video of a normal consultation. This doesn't call for any great acting ability: just be yourself. This is used as a trigger to get the students thinking about the case.

It is important to realise that you can decline participation at any stage. You may, if you wish, view the videotape after it has been made, or request that it be erased. The videotapes are stored securely and are only used for teaching purposes. No intimate or personal examinations are done in front of the camera.

You will be given an appointment at the GP clinic to see your regular GP and the students. This will take 1 - 1½ hours, usually on a Monday afternoon. The students work in small groups and will have watched part (1-2 minutes) of the videotaped consultation. They will have thought about your case and come up with some questions and issues. They may want to talk to you about these, perform a physical examination, read through your hospital chart, or talk to other health professionals for example, doctors or allied health staff who may have treated you. Where appropriate, one or two students may wish to visit you at home, with your permission.

The students work independently during the week and meet to discuss your case. They often make practical suggestions for management of your case which are typed as a letter in the hospital chart and are passed on to your GP. As doctors in training the students are bound by the usual rules of confidentiality and professional behaviour.

This approach to teaching is different to that used in other parts of the world and is being studied by Dr Sen Gupta as a PhD project. As part of this research you may be asked to answer a few questions as a questionnaire or short interview.

Please remember:

- participation is voluntary. You can decline to participate at any stage and this will not affect your care at the GP clinic
- if you have any questions please contact Dr Sen Gupta at the Clinical School on 819666

DR T K SEN GUPTA  
Senior Lecturer

*Appendix 3: Ethics approval*

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*Appendix 4: Problem of the Week case outline*

**Problem of the Week: Case Outline: Case 6, FS**

**Trigger:** Video of consultation

Overhead: “elderly Hungarian male, several presentations over the past 12 months with pain in the (L) neck, shoulders and chest after walking ~50m

**What issues does this raise?**

Language problem: non-English speaking background (NESB)

Chronic problem – “still alive”

Possible diagnosis - angina [need to list and prioritise]  
- musculoskeletal – ? spinal  
-? shoulder  
- systemic,  
?neurological, ? emotional

**What further information is needed?**

History – Examination – Investigation - Referral?

<b>Tasks to be “generated”</b>	<b>Resources</b>
How does this pain affect his life?	patient, housecall
How does NESB affect this man’s health care? What can be done?	migrant resource centre
What is the most likely explanation (s) for his pain?	patient, ? physiotherapist, ? neurosurgical Registrar
What are the options for managing this patient’s chronic pain?	pain clinic, articles, psychiatrist, physiotherapist

**Case Objectives**

After completing this case students will be able to:

1. Discuss the problems that patients with non-English speaking background face in seeking health care
2. Discuss the approach to management of chronic pain
3. Describe the concept of uncertainty as it applies to this case
4. Discuss the possible causes of this patient’s symptoms

**Resources**

Happy to allow house call: address [deleted]

Patient available at GP clinic Monday August 21, 2.30 pm

Video of consultation with GP

GP: Tarun Sen Gupta

Physiotherapist: [name deleted]

Director of Migrant Resource centre: [name deleted] – available August 20, 2pm

Sister [name deleted] General Practice clinic – ring for appointment

Journal articles – Library and in General Practice Office, Book 1

Rheumatologist - [name deleted]



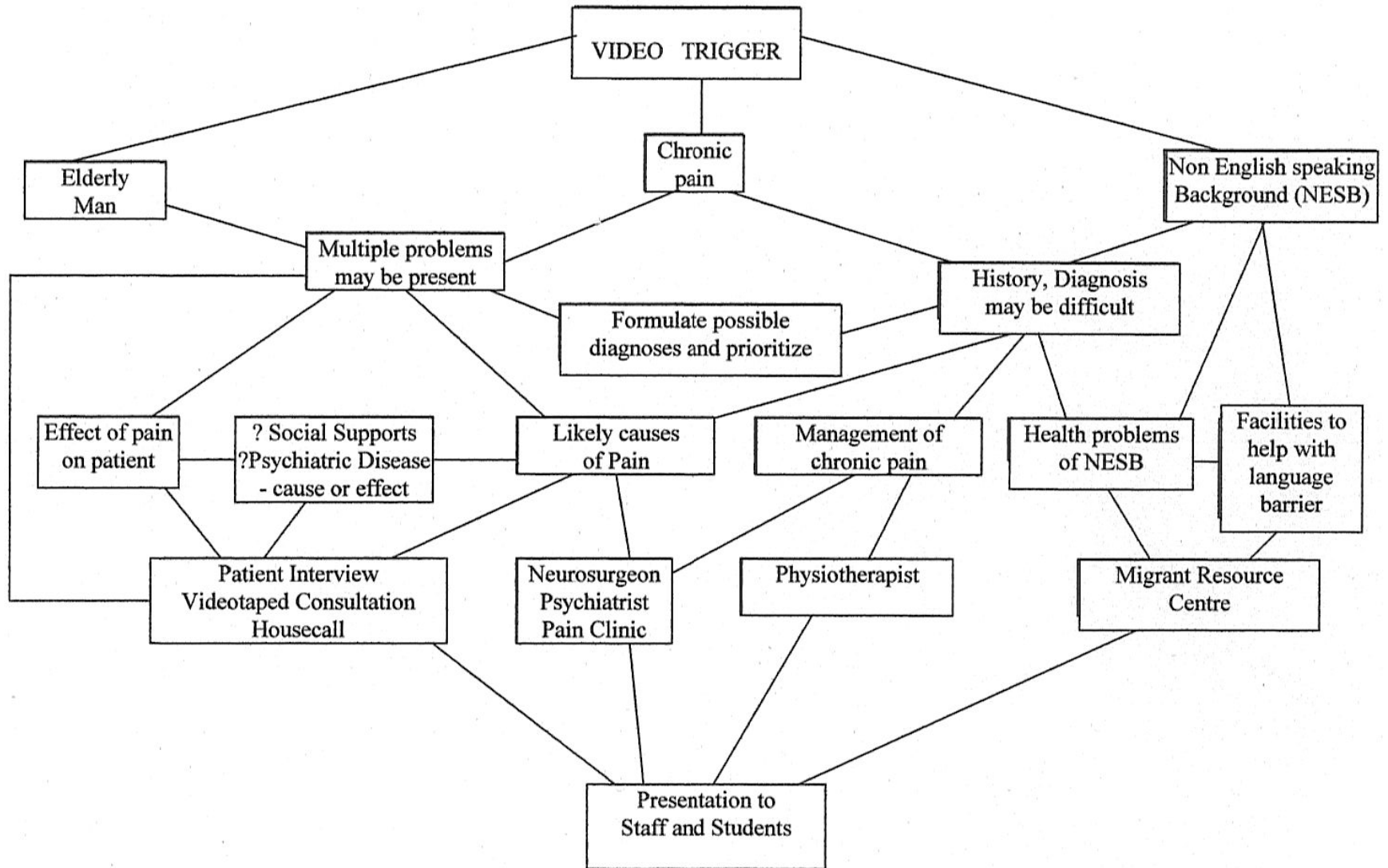


Figure 1. Concept Map of an elderly migrant presenting with chronic pain

*Appendix 4: Problem of the Week case outline*

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## **PROBLEM OF THE WEEK - INTRODUCTION**

The “Problem of the Week” applies problem-based learning (PBL) to a real case from the GP clinic. This session, which is usually facilitated by the staff member who acts as the patient’s GP, replaces other, more didactic sessions. You will be given a brief video introduction to the patient and asked to work as a group to pool your observations, brainstorm possible causes of the patient’s problem, identify resources available and work to solve the problem. The cases are often evolving or incompletely explored

### **WHY?**

We use this approach in addition to more traditional methods for a variety of reasons:

- the problem is drawn from real life, not theory
- we believe better understanding of the problem can be achieved
- students can contribute to the care of the patient
- feedback from previous student groups has been positive.
- experience is gained in working in a group: working on a problem as a team, allocating tasks and ensuring that the workload is evenly distributed
- the group has control of, and responsibility for the learning process

### **HOW?**

- . a video “**trigger**” will be shown providing limited information about the patient
- . working as a group you will be asked to list your **observations and impressions**
- . you will then be asked to brainstorm possible **explanations and conclusions**. As in other forms of brainstorming the purpose is to generate a list of possibilities, irrespective of how unlikely they may be
- . these will raise a series of **issues** which need to be identified and discussed
- . you will be asked to identify the **resources** available to answer the questions raised
- . the group will then generate and allocate **tasks** for members to work on throughout the week. These may include interviewing the patient, reviewing the chart or the literature, talking to health professionals involved or a housecall etc.
- . at the end of the week the group will **report the case** and present their recommendations and conclusions for future management. A letter could be prepared for inclusion in the patient’s chart.  
The objective is not necessarily to make the correct diagnosis but more to think about the problem: the approach to the problem, its effect on the patient and the

### *Appendix 5: Problem of the Week detailed outline for students*

patient's family, and the sorts of things that a GP can do to help. There often are no right or wrong answers; rather a series of issues which need to be raised and considered.

The group process is essential in order to accomplish this effectively: the group needs to take control of the learning process and ensure that everyone contributes. One of the staff will help facilitate the session but the success depends very much on the functioning of the group. Previous groups have struggled with, but enjoyed and valued the challenge of working with their peers in this manner

Your contributions to the case are welcomed: frequently a group will discover new information or suggest management strategies which are helpful to the GP managing the case. You are free to criticise the management, as long as you can recommend some improvements! You will be provided with some feedback after 1-2 months as to the progress of the case and any impact that your management may have had.

As considerable part of the curriculum time is spent on these problems of the week you will be asked to evaluate how useful the problems were to you as a learning exercise. We welcome your comments and constructive criticism.

The following points may be of help in tackling the problem:

- . the group may find it useful to appoint a leader or chair
- . it may be useful to meet briefly part-way through the week to share findings and plan the presentation
- . the patient interview can easily become unstructured and run over time. You may find it useful to limit this in time or allocate two separate groups to interview the patient about different areas
- . the problems are open-ended and essentially have no limits. Because of time constraints it is important to recognise this and to place limits on the breadth and depth of exploration of the problem

**In summary,** the steps to follow are:

- . view the trigger
- . pool observations and conclusions
- . formulate early conclusions
- . identify issues raised
- . identify resources
- . generate and allocate tasks
- . report conclusions and recommendations

## **Notes for facilitators**

Preparation includes:

- . writing the case, preparing the resource people
- . organising the GP clinic time and notifying the GP clinic
- . setting up the room - seating best around 2-3 tables
  - electronic white board
  - TV and video working
- . seems to work best if pat's GP present, particularly for 2nd session

Need to explain points as per handout and overheads emphasising;

- . considerable time is spent on the POTW which replaces other sessions for the reasons outlined
- . importance of group process - facilitator will help but onus is on the group
- . importance of placing limits on case
- . case is to be considered from a variety of perspectives, reinforcing ideas in introductory session (Pendleton, Stott & Davis)

Need to facilitate in a way which controls the group process but still allows sufficient freedom to the groups. In particular, time needs to be watched carefully so that the group does not get too bogged down. Important learning points should be summarised, matters of fact clarified, and perhaps some didactic teaching allowed if the occasion seems appropriate.



**INTERVIEW PRO FORMA: QUESTIONS FOR STUDENTS**

- 1a. What do you like about the POTW sessions and PBL (compared to normal lectures)?
- 1b. What do you dislike about the POTW sessions and PBL (compared to normal lectures)?
  
2. How useful were the video trigger and case description?
  
- 3a. What was the purpose of the brainstorming session?
- 3b. How did you feel about the process of the brainstorming session?
  
- 4a. How useful was the patient interview?
- 4b. How useful was the housecall?
- 4c. How useful was meeting the GP?
- 4d. How useful were other resource people?
- 4e. How useful was the literature?
- 4f. How useful was the final session when you presented the case?
  
- 5a. What are the benefits of working with a real patient rather than a paper case? What do you think you learned from using a real patient?
- 5b. What are the disadvantages of working with a real patient rather than a paper case? What do you think you may have learned from a paper case?
- 5c. Do you feel you are really contributing to the care of these patients?
  
- 6a. What are the benefits of working in a group setting on these problems?
- 6b. What are the disadvantages of working in a group setting on these problems?
  
7. What is your opinion about the quality and quantity of the information learnt by participating in POTWs
  
- 8a. How would you describe the role of the lecturer in the POTW?
- 8b. Do you think this role is effective in helping you learn?
- 8c. Could the tutor do anything differently to improve the sessions?
  
9. Can you see similar methods of teaching being adopted in other areas of the course?

## **INTERVIEW PRO FORMA: QUESTIONS FOR TUTORS**

1. How did this group deal with the problem? General comments about the group etc
2. How did they deal with the process of PBL
3. How did the group deal with the content of the problem?.
4. How did using a real patient affect the process and content?
5. What do you think you did well? What would you do better next time?

## **INTERVIEW PRO FORMA: QUESTIONS FOR PATIENTS**

- 1 Were you happy to be involved?
- 2 How did you feel about being involved?
- 3 Did you have any worries about being involved?
- 4 What did you like about being involved?
- 5 Were there any positives?
- 6 What did you not like about being involved?
- 7 Were there any negatives?
- 8 How did you find talking to the students?
- 9 How did you find the home visit?
- 10 Do you think being involved influenced your health?
- 11 Do you think being involved influenced your health care (how you were looked after)?
- 12 Were there any impacts on your health / health care?
- 13 Would you do it again? Why?



## Appendix 8: Approaches to Studying questionnaire

### APPROACHES TO STUDY

Your student number (optional): \_\_\_\_\_  
 Name of staff member: \_\_\_\_\_  
 Department \_\_\_\_\_  
 Subject code: \_\_\_\_\_

**How to complete this questionnaire:**

Please answer every item quickly by giving your immediate response.  
 Circle the appropriate code number to show your general approach to studying.

- 4 means definitely agree
- 3 means agree with reservations
- 2 is only to be used if the item doesn't apply to you, or if you find it impossible to give a definite answer
- 1 means disagree with reservations
- 0 means definitely disagree.

1.	I try to relate ideas in one subject to those in others, wherever possible	4 3 2 1 0
2.	I usually set out to understand thoroughly the meaning of what I am asked to read	4 3 2 1 0
3.	Ideas in books often set me off on long chains of thought of my own, only tenuously related to what I was reading	4 3 2 1 0
4.	I like to be told precisely what to do in essays or other assignments	4 3 2 1 0
5.	I often find myself questioning things that I hear in lectures or read in books	4 3 2 1 0
6.	The continual pressure of work — assignments, deadlines and competition — often makes me tense and depressed	4 3 2 1 0
7.	I find it difficult to 'switch tracks' when working on a problem: I prefer to follow each line of thought as far as it will go	4 3 2 1 0
8.	Lecturers seem to delight in making the simple truth unnecessarily complicated	4 3 2 1 0
9.	I usually don't have time to think about the implications of what I have read	4 3 2 1 0
10.	In trying to understand a puzzling idea, I let my imagination wander freely to begin with, even if I don't seem to be much nearer a solution	4 3 2 1 0
11.	I generally put a lot of effort into trying to understand things which initially seem difficult	4 3 2 1 0
12.	I prefer courses to be clearly structured and highly organised	4 3 2 1 0

*(More items overleaf)*

.....CUT OR TEAR HERE IF YOU WANT TO KEEP A RECORD OF YOUR SCORE.....

When you have answered all items, you may use this table to calculate your scores:

Subscales and SCALES	Code	Items to add	Sum	Divide by	Score
Deep approach	DA	2+5+11+18		4	
Comprehension learning	CL	3+10+16+22		4	
Relating ideas	RI	1+14+24+29		4	
Use of evidence and logic	UE	17+20+28+31		4	
MEANING ORIENTATION		All four sets above		16	
Surface approach	SA	8+9+15+19+21+23		6	
Improvidence	IP	7+25+30+32		4	
Fear of failure	FF	6+13+27		3	
Syllabus-boundedness	SB	4+12+26		3	
REPRODUCING ORIENTATION		All four sets above		16	

Please hand the upper part to your lecturers so that scores for the class can be calculated.

## *Appendix 8: Approaches to Studying questionnaire*

*(continued from previous page)*

13.	A poor first answer in an exam makes me panic	4 3 2 1 0
14.	In trying to understand new ideas, I often try to relate them to real life situations to which they might apply	4 3 2 1 0
15.	When I'm reading I try to memorise important facts which may come in useful later	4 3 2 1 0
16.	I like to play around with ideas of my own even if they don't get me very far	4 3 2 1 0
17.	I am usually cautious in drawing conclusions unless they are well supported by evidence	4 3 2 1 0
18.	When I'm tackling a new topic, I often ask myself questions about it which the new information should answer	4 3 2 1 0
19.	Often I find I have to read things without having a chance to really understand them	4 3 2 1 0
20.	In reporting practical work, I like to try to work out several alternative ways of interpreting the findings	4 3 2 1 0
21.	I find I have to concentrate on memorising a good deal of what we have to learn	4 3 2 1 0
22.	Often when I'm reading books, the ideas produce vivid images which sometimes take on a life of their own	4 3 2 1 0
23.	The best way for me to understand what technical terms mean is to remember the text-book definitions.	4 3 2 1 0
24.	I need to read around a subject pretty widely before I'm ready to put my ideas down on paper	4 3 2 1 0
25.	Although I generally remember facts and details, I find it difficult to put them together into an overall picture	4 3 2 1 0
26.	I tend to read very little beyond what's required for completing assignments	4 3 2 1 0
27.	Having to speak in tutorials is quite an ordeal for me	4 3 2 1 0
28.	Puzzles or problems fascinate me, particularly when you have to work through the material to reach a logical conclusion	4 3 2 1 0
29.	I find it helpful to 'map out' a new topic for myself by seeing how the ideas fit together	4 3 2 1 0
30.	I find I tend to remember things best if I concentrate on the order in which the lecturer presented them	4 3 2 1 0
31.	When I'm reading an article or research report, I generally examine the evidence carefully to decide whether the conclusion is justified	4 3 2 1 0
32.	Tutors seem to want me to be more adventurous in making use of my own ideas	4 3 2 1 0

Now you can use the table overleaf to calculate your scores.

Thank you for the time it took you to complete this questionnaire. Your lecturer is very interested in your responses and will have a report back soon about the scores for the whole class. You will then be able to compare your own scores with the general pattern of responses for the class as a whole, and perhaps discuss them with your lecturer.

## GROUP ASSESSMENT SCHEDULE

### DESCRIPTORS FOR THE FOUR VARIABLES

#### VARIABLE 1: COMMITMENT

Areas to consider include motivation, interest & enthusiasm and also punctuality, attentiveness and preparation.

(Ring ONE Number )

3	4.5	6	7	8
Poor	Competent		Outstanding	

<i>In the poor group</i>	<b>In the satisfactory (Competent) Group</b>	<i>In the Outstanding group:</i>
<i>Late starts are a regular problem and tolerated by group</i>	there is a policy of punctuality Most sessions are fully attended And under way within 5 min	<i>all group sessions start punctually</i>
<i>Absences by members are ignored.</i>	unanticipated absences are notified on the day via group members.	<i>There is full attendance except for reasons of illness, funeral or religious duties, in which case prior apologies are received.</i>
<i>Loss of concentration or attention is regularly apparent.</i>	Most members appear attentive and involved most of the time.	<i>All members are clearly involved in and attentive with evidence of active listening.</i>
<i>There is little sign of advance preparation</i>	There is preparation for group work by most members, most of the time.	<i>The group is appropriately prepared for each session.</i>
<i>Allocated tasks are left undone</i>	Most members cover the tasks they undertake within the agreed time span	<i>All members complete undertaken tasks efficiently and contribute further items spontaneously.</i>
<i>The group fails to cover basic learning objectives.</i>	Most of the week's chose learning objectives are covered during the week	<i>There is sound coverage of all chosen learning objectives and exploration of some topics in extra detail.</i>

## Appendix 9: Group Assessment Schedule

(In the above “most” =75%)

### VARIABLE 2: INTERPERSONAL RELATIONSHIPS.

Looks at areas such as mutual assistance and support, encouragement and confidence-building, sensitivity and the ability to manage conflict.

(Ring ONE Number )

3	4.5	6	7	8
Poor	Competent		Outstanding	

<i><b>In the poor group</b></i>	<b>In the satisfactory (Competent) Group</b>	<i><b>In the Outstanding group:</b></i>
<i>Members are unfriendly to each other most of the time.</i>	Members are usually friendly to each other.	<i>Members are almost always friendly to each other.</i>
<i>Members do not show respect for each other.</i>	Members usually show respect for each others views.	<i>Members constantly show respect for each others views.</i>
<i>Members usually show destructive, negative behaviours (rudeness, aggression, dominance, obvious boredom).</i>	Members are usually constructive and positive towards each other.	<i>Members are always constructive and positive towards each other.</i>
<i>There is no evidence of ability to deal with conflicts and stress</i>	There is some evidence of ability to deal with conflict, stress and difficulties appropriately.	<i>There is clear evidence on a number of occasions of the ability to deal with stress and difficulties.</i>
<i>There is no evidence of awareness of needs of each other.</i>	There is evidence of individual need recognition and some ability to care for and to encourage each other.	<i>Individual needs are accurately assessed and there is clear evidence on a number of occasions of providing support and encouragement.</i>
<i>Individuals may be “put down” and/or isolated.</i>	Most of the time individuals are not isolated by the group.	<i>The group is cohesive and individuals are never isolated by the group process.</i>
<i>Behaviour produces lack of confidence.</i>	The behaviour of the group promotes confidence.	<i>The group behaviour strongly promotes confidence.</i>

(Usually = > 50%      Most = 75% )

**Appendix 9: Group Assessment Schedule**

**VARIABLE 3: GROUP INTERACTION AND ACTIVITY.**

Considers relevance of contributions, task-sharing, effectiveness of roles and development of group rules.

(Ring ONE Number )

3	4.5	6	7	8
Poor		Competent		Outstanding

<i>In the poor group</i>	<b>In the satisfactory (Competent) Group</b>	<i>In the Outstanding group:</i>
<i>There is poor task-orientation and members produce much (&gt;50%) irregular input.</i>	Members make task-orientated inputs some of the time, but there is irrelevant input.	<i>There is quick task-orientation which is maintained with minimal irrelevant input.</i>
<i>There is little salient questioning. Tasks are rarely completed.</i>	Members usually show salient questioning.	<i>Most questions are salient.</i>
<i>There is an inability to share tasks.</i>	Tasks are usually shared equitably.	<i>There is agreed and equitable sharing of all tasks.</i>
<i>No role changes occur.</i>	Some role flexibility is seen.	<i>Roles are frequently and appropriately changed.</i>
<i>There is a failure to use skills and knowledge.</i>	The skills and knowledge of each member are usually used.	<i>The skills and knowledge of each member are maximized.</i>
<i>There is no evidence of self-government and an inability to make appropriate rules.</i>	Self-governing some of the time, some rules made and used.	<i>There is clear evidence of self-government. Appropriate rules are made explicitly and applied when necessary.</i>

(‘Usually’/’some’ = >50%

‘Most’ = 75%)

**Appendix 9: Group Assessment Schedule**

**VARIABLE 4: PROBLEM-SOLVING ABILITIES**

Looks at abilities to define problems and identify and implement solutions, analyze and challenges. Also consider progress and use of help.

(Ring ONE Number )

3	4.5	6	7	8
Poor	Competent		Outstanding	

<i>In the poor group</i>	<b>In the satisfactory (Competent) Group</b>	<i>In the Outstanding group:</i>
<i>Members frequently need leading in the conduct of problem-solving</i>	Members do not usually need leading in the conduct of problem-solving.	<i>There is clear evidence of self-direction. Members are always able to take the lead in problem-solving</i>
<i>Cues are often missed.</i>	Cues are usually recognized and problems defined.	<i>Most cues are recognized easily and problems defined succinctly.</i>
<i>Few hypotheses are formed and solutions seldom identified.</i>	Hypotheses are frequently created and solutions usually identified.	<i>There is a wide range of hypotheses created and solutions identified for most problems.</i>
<i>The range of items to research is limited to one or two fields.</i>	A range of items to research is selected in most fields.	<i>A range of items to research is selected in all the relevant fields.</i>
<i>Information gathering is poor and/or non-selective.</i>	Shows evidence of targeted information gathering.	<i>There is frequent evidence of targeted information gathering.</i>
<i>There is no evidence of attempts to validate solutions.</i>	Shows evidence of having attempted to check the validity of its own solutions.	<i>There is regular evidence that the validity of solutions have been effectively checked.</i>
<i>There are many inappropriate appeals to the facilitator.</i>	Appeals to the facilitator are usually appropriate.	<i>There are very few appeals to the facilitator and these are all appropriate.</i>
<i>The process is frequently bogged down.</i>	Members are only bogged down on a few occasions.	<i>Progress is quickly and steadily made.</i>

(‘Usually’/’Some’ = >50%

Most = 75%)

*Appendix 10: Problem based learning tutorial schedule guide*

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## **Problem-Based Learning Tutorial Observation Guide**

Marlene A. Lindberg, Terry A.F. Higa, LoriAnn, W. Sanchez and Paul R. Brandon

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*Appendix 10: Problem based learning tutorial schedule guide*

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*Appendix 11: Glossary*

**GLOSSARY**

ACRRM	Australian College of Rural and Remote Medicine
FMP	Family Medicine Programme
FRACGP	Fellowship of the Royal Australian College of General Practitioners
GAS	Group Assessment Schedule
GP	General Practitioner
HCP	Health Care Problem
JCU	James Cook University
PBL	Problem based learning
PTG	Patient tutorial group
RACGP	Royal Australian College of General Practitioners
RCT	Randomized controlled trial
SM503	The year 5 General Practice term, The University of Queensland
SDL	Self directed learning
VR	Vocational registration