A problem-based approach to clinical education in dietetics

Jane Winter, Helen Matters and Caryl Nowson

Abstract  Developing the clinical skills and knowledge of dietetic students provides a challenge for both universities and health care agencies. Deakin University has recently adopted a group learning model using problem-based learning to deliver the clinical component of the Master of Nutrition and Dietetics course. This approach was designed to enhance integration of clinical theory and practice, develop closer links between on-campus and off-campus learning environments and provide students with more active learning experiences. The impact of the new approach was evaluated using student questionnaires, academic and competency outcomes, and a focus group convened with hospital supervisors. The evaluation indicated that students generally thought that this method of learning had helped to integrate their basic knowledge with dietetic case management. There was no difference in academic scores from the previous year and an apparent reduction in the number of students requiring additional placement time to meet competency standards. Hospital supervisors were supportive of the changes, although they had some reservations regarding the time and structure of clinical placements. As a result of this evaluation, recommendations for future development of the program include introducing problem-based learning to students earlier in their course, providing additional placement days during the block and increasing the amount of time dedicated to more complex topics. Based on the evaluation results obtained, this collaborative learning using a problem-based approach will continue to be used in the clinical education program at Deakin University. (Nutr Diet 2002;59:23–28)

Key words: clinical education, problem-based learning, dietetics

Introduction

The aim of health professional education is to prepare graduates for lifelong competent practice (1). In order to achieve this, graduates need to learn, not only the current state of practice with the relevant knowledge and skills, but they also need to develop effective learning skills for continuing professional development.

The structure of the Master of Nutrition and Dietetics course at Deakin University has in the past, like many other health professional courses, divided theory and practice components into university-based lecture blocks (on-campus) and placement-based practice blocks (off-campus). Although the university blocks involved a mixture of teaching methods, the majority of student time at university was spent passively in traditional didactic lectures. Supervision at placements was predominantly provided on a one-to-one supervisor-to-student ratio, requiring up to 25 different placement centres.

Inherent problems with the structure, as identified by the Deakin Advisory Committee on Nutrition and Dietetics task force, included:

- a significant time commitment from both university and placement staff;
- a lack of integration between the on- and off-campus components of the course, resulting in difficulties for students in linking theory with practice;
- lack of standardised student experience in placements; and,
- a reduction in the number of placements available for students.

Collaborative group learning was the format that was adopted as a means of addressing the above issues. Developing syndicate groups of eight to ten students that would work together to tackle problems on-campus, and attend placements together off-campus aimed to provide a better integration of theory and practice, while reducing the number of placement centres required. This provided the opportunity to offer more standardised experiences for the students and allowed the university to provide more significant resources to a smaller number of hospitals affiliated with Deakin University.

Group learning has been described in the literature as developing effective learners by encouraging them to become more active participants in the learning process (2). Collaborative learning allows students to try out new ideas, discuss issues and work together to explore unfamiliar topics. It provides the opportunity for the students to share the knowledge and skills related to specific study areas as well as their knowledge and skills about learning (3). The benefits of this form of learning are particularly evident in the education of beginning practitioners by assisting them to develop communication skills, practice technical language, appreciate and consider alternate view points, and develop skills in teamwork.

In order to derive the outlined benefits of group learning, while achieving a more integrated approach to clinical education, a problem-based curriculum model was introduced into the Master of Nutrition and Dietetics course.

Problem-based learning

Problem-based learning is an educational method that differs from the traditional means of presenting knowledge in a lecture by providing students in small groups with a problem that acts as a trigger to stimulate development of their own learning goals. In this form of learning, the problem is presented to students first, before they have learned the clinical concepts. It has been defined as ‘an instructional strategy in which students identify issues raised by specific problems to help develop understanding about underlying concepts and principles’ (4).

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Problem-based learning was first introduced in the medical faculty at McMaster University in Canada during the 1960s and, although there is limited documentation of its use in dietetic education (5,6), it has been widely implemented and evaluated in medical and other health professional educational courses. The philosophy of problem-based learning is based on theories of adult learning which have identified that adults learn most effectively when they are responsible for their own learning, when the learning builds on their own experience, when the learning is immediately applicable, and when they are self-motivated to learn (7). Problem-based learning, through the use of problems as ‘triggers’, therefore aims to provide students with a context for learning, to motivate students, to activate prior learning, and to stimulate discussion. The learning is student-centred with an emphasis on self-direction (8).

Problem-based learning relies on a small group of students working through a ‘real life’ problem or case under the facilitation of a tutor. Once the group has been presented with the problem, they identify unfamiliar terms and concepts, and work together to generate learning objectives which will provide them with the required knowledge to manage the case. In a problem-based learning tutorial, the tutor plays a vital role in facilitating the learning process without dispensing facts (9). Effective tutors encourage active listening, tolerate silence, and only interrupt when appropriate (9,10). They must balance their role as facilitator of the group process, with their role as content resource. These tutor roles require a shift in practice by educators which, in turn, requires additional training and preparation time, a factor which needs to be considered prior to the implementation of problem-based learning.

The advantages of problem-based learning are suggested to include a more dynamic learning environment, promotion of deep rather than surface learning, development of self-directed skills, promotion of knowledge retention, and improved motivation (4). Potential disadvantages of a problem-based learning curriculum include students failing to develop an organised framework for their knowledge, the loss of interaction with inspiring teachers, and educators lacking the skills to effectively facilitate problem-based learning (11). Evaluation of the outcomes associated with problem-based learning compared with more traditional educational approaches is problematic as the actual implementation of problem-based learning varies between faculties. While it has not yet been demonstrated that graduates of problem-based programs are better practitioners, reviews of problem-based learning in the literature have indicated that it is judged by students and faculty to be effective, enjoyable and successful in meeting its objectives (12,13). Problem-based learning may also enhance transfer of concepts to new problems, and integration of basic science concepts into clinical problems (13).

As outcomes in terms of assessment results do not necessarily identify the strengths of problem-based learning, it has been suggested that qualitative and quantitative data collected throughout the program are required to fully evaluate problem-based learning (14).

Overall a problem-based educational approach utilising small group learning aims to develop graduates with the skills and attributes that employers, the community and the university have identified as highly desirable (15). These include a capacity for problem-solving, critical reasoning, effective communication, teamwork and collaboration, in addition to a solid knowledge base of nutrition and dietetics. Therefore a problem-based method of clinical dietetic education was developed and introduced at Deakin University in 2000.

Planning the changes

Prior to implementing the new clinical program in 2000, the key stakeholders, including academic staff, hospital dietetic staff and students, were identified. A problem-based learning advisory group was established in 1999 to guide its introduction and to assist in the development of the new program. The group involved participants with expertise in education (and prior experience with problem-based learning), and representatives of the identified stakeholders as well as representatives of the Dietitians Association of Australia (DAA).

Four major teaching hospitals in the Melbourne metropolitan area were approached to become affiliated with Deakin University. These centres were selected on the basis of their experience in student supervision, the number and variety of their patient population, and their capacity to manage groups of up to ten students. All hospitals were tertiary teaching hospitals, had at least seven staff available for student supervision and offered clinical specialist units. Issues including new contracts, level of reimbursement and resource allocation were negotiated with the placements. Affiliated hospitals were provided with funding according to the number of students placed with them and hospitals were able to use these funds at their discretion (e.g. for staffing or resource development).

In early 1999 the development of cases commenced in order to be ready for use in the problem-based learning block in May 2000. Actual case histories were provided by hospitals and adapted by academic staff for use as ‘triggers’. These trigger cases all followed a similar format which included a written referral to the dietitian and a mock medical record for the patient that was modelled on a sample hospital record. This allowed students to become familiar with the format of medical records, documentation and abbreviations. It also provided students with the opportunity to practice reading a medical record and deciding on key information they would require as dietitians managing the case.

Tutor guides, which defined possible discussion points and learning objectives for each topic, were also written. Each case was reviewed by dietitians working in the area and adapted as appropriate. Feedback from dietitians was also used to assist academic staff facilitating the tutorials.

Implementation

Timetable development

A revised timetable accommodating the more integrated program was developed and refined early in 2000. In the new program (Table 1), the time spent in lecture blocks was reduced with much of that content being covered during the problem-based learning component of the course.
Problem-based learning structure

Each week of the problem-based learning block introduced a new topic such as diabetes, renal disease, or aged care (Table 2). Students were presented with a case during a two-hour tutorial on Monday at the university and Deakin University staff acted as tutors. During this time students read through the ‘trigger’ case as described previously. As a group they identified key information, developed learning objectives, and compiled a list of additional information that they would seek to obtain in order to manage the patient. An abbreviated example of these is shown in Table 3. Tuesday was dedicated to group work or self-directed study. On Wednesday and Thursday students attended their placement. During this time they were involved in tutorials with experienced dietitians and other health care professionals, interviewed patients relevant to the topic, accessed medical histories and undertook food service activities relevant to the topic. Whilst on placement, students generally worked in pairs, taking it in turns to interview patients and then observe their partner and provide feedback. On Friday, students returned to the university and discussed the outcome of their learning issues within each study group. All the student groups came together to discuss the topic with a dietitian expert and working in the topic area to clarify any unresolved dietetic management issues.

Preparation of staff and students

A number of strategies were implemented in an effort to prepare both hospital and academic staff for problem-based learning. Academic staff involved in teaching dietetics at Deakin University and the clinical coordinators from the four teaching hospitals attended a two-day problem-based learning tutor training workshop at the University of Melbourne in February 2000. This provided insight into the philosophy of problem-based learning and the opportunity to observe and participate in tutorials, both as students and facilitators. Other hospital dietitians were then invited to a workshop, conducted by Deakin University, which provided specific details of the Deakin program and an example of a problem-based learning case.

In order to prepare the students for the transition to problem-based learning, each syndicate group had a half-day introduction to the philosophy of problem-based learning as well as a sample case to work through. Students participated actively in the sessions and verbal feedback indicated that they felt very positive about the introduction and appeared enthusiastic about embarking on a new form of learning.

Evaluation

Methods

A number of methods were used to evaluate the introduction of problem-based learning into the Master of Nutrition and Dietetics program. These aimed to determine the attitudes of both students and hospital supervisors to the new program, and to measure the students’ overall academic results (including reaching entry-level competency at the end of placement).

Student questionnaire

Students were asked to complete a questionnaire during the final tutorial of the problem-based learning block and return it at the end of the session. Students could elect to answer the questions anonymously. The questionnaire took approximately 15 minutes to complete (six questions) and was designed to determine students’ attitudes towards the problem-based learning block with a mix of open and closed questions. Students were asked, using a Likert scale, to rate their individual learning, their integration of knowledge and dietetic case management, and the importance of the hospital placement in helping to integrate knowledge with clinical management. They were also asked to list the three best and worst aspects of the problem-based learning block.

Academic outcomes

The assessment procedures overall were unchanged from previous years. Assessment of clinical knowledge is predominantly university-based through exams and written assignments. Clinical skills are assessed on placement by hospital supervisors using an assessment form that requires students to meet DAA entry-level competency standards (16). Therefore, student academic results for the units that encompassed problem-based learning were compared with the results of the previous year. The number of students requiring additional placement time in 2000 to meet the entry-level competency requirements was also assessed.

Table 1. Outline of the second year Master of Nutrition and Dietetics timetable for Deakin University in 1999 and 2000

<table>
<thead>
<tr>
<th>No. of weeks, 1999</th>
<th>February to October</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture block</td>
<td>Clinical placement</td>
</tr>
<tr>
<td>(including 1 week food service)</td>
<td>Food Service placement (community)</td>
</tr>
<tr>
<td>Community placement</td>
<td>Lecture block</td>
</tr>
<tr>
<td>Paediatric placement</td>
<td>Clinical placement</td>
</tr>
<tr>
<td>No. of weeks, 2000</td>
<td>Problem-based learning block: adult</td>
</tr>
<tr>
<td>Community placement</td>
<td>Food Service placement</td>
</tr>
<tr>
<td>Problem-based learning block: paediatrics</td>
<td>Seminar, workshop</td>
</tr>
<tr>
<td>Clinical placement</td>
<td></td>
</tr>
</tbody>
</table>

Focus group

A focus group was conducted at the conclusion of the final clinical placement to determine the views of the hospitals’ dietetic staff regarding the changes to clinical placements, including problem-based learning and group learning. Clinical dietetic coordinators and dietetic managers were invited to attend the focus group convened by an independent facilitator from the University School of Nursing.

Results

Student questionnaire

All 35 students completed and returned the questionnaire (100% response rate). Students rated their individual learning of topics, the role of problem-based learning in helping integration of knowledge with clinical management, and their hospital placement during the problem-based learning block very highly (Table 4).

The most common response to the best aspect of problem-based learning was working in groups (n = 19), with hospital placements, trigger cases and the style of learning also identified as positive aspects (Table 5). The responses to the worst aspect of problem-based learning were more diverse with the most common response being that the Friday sessions at university could have been better structured. Also rating as negative aspects were insufficient time spent on some topics and uncomfortable tutorial rooms (Table 5).

Students’ written comments from the evaluation included: ‘problem-based learning greatly assisted my individual learning of medical and nutritional issues’, and ‘made me think and research more than just sitting in a lecture’. One student summarised it as, ‘the problem-based learning approach encouraged more self-directed learning and time management which are helpful skills for professionals’.

Academic outcomes

At the completion of the final eight-week clinical placement, four out of 35 students, from three different placement hospitals required additional placement time to reach competency as assessed by their clinical supervisors. This compares with seven out of 33 students not achieving competency at the equivalent time in 1999.

The results for the unit ‘Clinical Science and Dietetics’ are derived from examinations covering knowledge of dietetic case management. As can be seen from Table 6, results obtained in 2000 were very similar to those obtained in 1999.

Focus group

The focus group was attended by seven dietitians, with all four placement centres represented. The results were summarised as a five-page report, which was divided into broad areas of discussion about the problem-based learning block, including strengths of the overall program, and weaknesses of the overall program.

A primary concern of dietitians participating with the new program was the apparent reduction in clinical placement time, and they stated it impacted on skill development. They felt that the students came to their placement with a limited understanding of clinical dietetics, and only ‘theoretical knowledge’. Students were also

Table 2. Problem-based learning topics and lecture topics in 2000

<table>
<thead>
<tr>
<th>PBL topic(a)</th>
<th>Lecture (L) and workshop (W) topics(b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aged care</td>
<td>Trauma, burns (L)</td>
</tr>
<tr>
<td>Cardiovascular disease</td>
<td>HIV/AIDS (L)</td>
</tr>
<tr>
<td>Oncology</td>
<td>Paediatrics (W)</td>
</tr>
<tr>
<td>Gastroenterology</td>
<td>Food allergy (L)</td>
</tr>
<tr>
<td>Renal disease</td>
<td>Coeliac disease (L)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>Sports nutrition (L)</td>
</tr>
<tr>
<td>Nutrition support (oral, enteral, parenteral) (2 weeks)</td>
<td>Women’s health issues (W)</td>
</tr>
<tr>
<td>Liver disease</td>
<td>Food service systems (L,W)</td>
</tr>
</tbody>
</table>

(a) PBL, problem-based learning. Topics were studied for one week unless indicated otherwise.
(b) Lecture topics were for at least two hours, workshop topics were for one to three days.

Table 3. Examples of problem-based learning (PBL) ‘triggers’ for two patient cases and tutorial outcomes

<table>
<thead>
<tr>
<th>PBL topic</th>
<th>Key information supplied in trigger</th>
<th>Learning issues identified by students</th>
<th>Additional information sought by students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aged care</td>
<td>91-year-old female referred with poor oral intake, fractured neck of femur, infected wound Serum albumin concentration 30 g/L</td>
<td>Why are the elderly at nutritional risk? How do you assess poor nutritional status? What screening tools are available? What supplements are available or suitable?</td>
<td>Additional biochemistry Anthropometry (weight, height, weight change) Diet history—current oral intake Appetite Food likes and dislikes Current or recent food intake Previous dietary advice Social situation Appetite Food likes and dislikes Additional biochemistry</td>
</tr>
<tr>
<td>Renal disease</td>
<td>34-year-old male, married with two children End-stage renal failure, for haemodialysis BMI 31.5 Loss of weight: 8 kg in one month Nausea, vomiting, anorexia Elevated serum urea and creatinine and lowered serum albumin concentrations and haemoglobin</td>
<td>Review physiology of kidneys. What are the usual symptoms of end-stage renal failure? How does haemodialysis work? How is it different from continuous ambulatory peritoneal dialysis? What are the nutritional requirements for end-stage renal failure? How does the hospital menu cater for renal patients?</td>
<td></td>
</tr>
</tbody>
</table>
sometimes too focused on the trigger case without looking at patients and nutritional issues more broadly.

A number of strengths of the program were identified and these included hospital supervisors getting to know students well, the advantages of ‘focusing on specific body systems in turn’, and the process of peer review (once students were a little more advanced). It was stated that, ‘the problem-based learning approach allows for linking dietetic theory with clinical experts…making the content more relevant and in tune with contemporary practice’.

The weaknesses of the program were believed to include a lack of preparedness for clinical practice, including familiarity with the dietetic process; students having difficulty understanding the relevance of some tasks; and the higher number of students placing supervisors under additional pressure and causing patients to be ‘overexposed’ to students.

The group agreed that it would be helpful for students to have had exposure to a clinical environment prior to the commencement of the problem-based learning process.

**Discussion**

Our results have indicated that the students rated their learning using the problem-based approach highly, a finding consistent with the literature (7,8,14,15). They also rated working in groups as one of the most positive aspects of problem-based learning. Some of the negative aspects were the physical environment of the tutorials, the limited time spent on each topic (i.e. only one week) and the limited time spent on placement.

There was no difference in the final academic results of this group of students compared with the previous year, and there was an apparent reduction in the number of students requiring extra placement time to achieve competency. This may indicate that development of clinical competency was enhanced with the new approach. Reviews of the literature agree that a problem-based curriculum, whilst showing positive signs, has yet to demonstrate an improvement in knowledge or clinical skills (7,8,14,15). Therefore this will continue to be monitored in future years.

The focus group with hospital supervisors at the four hospitals affiliated with Deakin University indicated that, while problem-based learning was a positive experience, there was a concern that it had a negative impact on clinical time. Although the total number of placement days was reduced by only four days in 2000, the problem-based learning block allowed for only two days per week on placement and this may have influenced students’ understanding of processes such as client review and discharge planning.

In order to improve the program for future years, a number of changes have been incorporated. These include the introduction of a problem-based learning block linked with a clinical placement program earlier in the dietetics course, increasing the number of placement days within the block, and expanding some topic areas to two weeks to allow a more in-depth exploration of relevant issues.

From our perspective as academic staff involved in the implementation of the new program we have found the format both challenging and enjoyable. The weekly tutorials introducing each topic have provided a forum for a much broader discussion of dietetic issues than has ever occurred in the past with a traditional lecture format. We have come to know the students much better and the new learning environment has resulted in an improved relationship between students and staff that is more equitable in nature.

This change to a more cooperative environment at the university may, however, make students’ adjustment to the culture of the clinical environment more difficult as they need to come to terms with and work within the hierarchy that often exists in the hospital system.

There have been some losses with the changes in the clinical education program. With fewer placements being used, input from many experienced dietitians has been reduced in this component of the course. In order to utilise the expertise of these dietitians we have changed the format of the placements earlier in the course ensuring greater student-supervisor interaction. A number of dietitians have also been invited to provide workshops for students and contribute to their study guides. Rural placements were not practical for the problem-based learning

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### Table 4. Individual learning as assessed by students using a Likert scale

<table>
<thead>
<tr>
<th>Question</th>
<th>Mean response (SD) n = 35</th>
<th>Median response (range) n = 35</th>
</tr>
</thead>
<tbody>
<tr>
<td>The problem-based learning block assisted in my individual learning of topics</td>
<td>1.9 (0.6)</td>
<td>2 (1–3)</td>
</tr>
<tr>
<td>The problem-based learning block assisted in integrating basic knowledge with dietetic case management</td>
<td>1.8 (0.7)</td>
<td>2 (1–3)</td>
</tr>
<tr>
<td>Placement in a hospital assisted in my learning in dietetic case management</td>
<td>1.5 (0.7)</td>
<td>1 (1–3)</td>
</tr>
</tbody>
</table>

(a) Students rated on a scale with responses from 1 to 5 indicating from strong agreement to strong disagreement with the statement.

### Table 5. Best and worst aspects of problem-based learning (four most common responses)

<table>
<thead>
<tr>
<th>Best aspects</th>
<th>Worst aspects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group work (n = 19)</td>
<td>Friday sessions (n = 9)</td>
</tr>
<tr>
<td>Hospital placement (n = 9)</td>
<td>Insufficient time on some topics (n = 6)</td>
</tr>
<tr>
<td>Trigger cases (n = 8)</td>
<td>Tutorial times and or location (n = 5)</td>
</tr>
<tr>
<td>Style of learning (n = 8)</td>
<td>Insufficient hospital time (n = 4)</td>
</tr>
</tbody>
</table>

(a) Students listed three aspects.

### Table 6. Comparison of grades achieved for clinical science and dietetics units in 1999 and 2000

<table>
<thead>
<tr>
<th>Year</th>
<th>High distinction (&gt;80%)</th>
<th>Distinction (70–79%)</th>
<th>Credit (60–69%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999 (n = 33)</td>
<td>7</td>
<td>17</td>
<td>8</td>
</tr>
<tr>
<td>2000 (n = 35)</td>
<td>6</td>
<td>21</td>
<td>8</td>
</tr>
</tbody>
</table>
block. However, four students were placed in a rural setting for the final eight-week block in 2000. We will continue to offer and encourage students to undertake rural placements during the final placement block to provide them with the opportunity for a valuable rural experience.

It should be recognised that the introduction of problem-based learning requires significant planning and preparation in terms of developing the program and written materials and training of staff. As others who have introduced problem-based learning have found (8), recognised training workshops are vital in developing the staff’s role as tutors, and we would strongly recommend that any faculty considering implementation of problem-based learning undergo appropriate training. A new approach to clinical education cannot be adopted without the cooperation and support of key placement centres, as students of problem-based learning are expected to continue the process into the clinical setting. Input from hospital dietitians was a crucial factor in successfully implementing problem-based learning at Deakin University.

Conclusions

In response to economic and educational pressures, a number of changes have been implemented in the Master of Nutrition and Dietetics program. The most significant of these is a move to a collaborative learning model, which uses problem-based learning to achieve a more relevant, interesting and integrated clinical program. Initial evaluations have been positive in terms of student and staff attitudes, and students’ final academic results. However, there are further refinements to be made on the basis of the evaluation presented here. Future evaluation needs to be rigorous to ensure the course continues to meet both educational and professional standards and graduates are ready for entry-level dietetic practice.

Acknowledgments

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References

17. Albanese M. Problem-based learning: why curricula are likely to show little effect on knowledge and clinical skills. Med Educ 2000;34:729–38.