Papers

Introducing quality improvement to pre-qualification nursing students: evaluation of an experiential programme

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Abstract

Objective—To evaluate a programme introducing quality improvement (QI) in nursing education.

Settings—Betanien College of Nursing and clinical practices at hospitals in Bergen.

Subjects—52 nursing students from a second year class working in 16 groups undertaking hospital based practical studies.

Intervention—Second year nursing students were assigned to follow a patient during a day's work and to record the processes of care from the patient's perspective. Data collected included waiting times, patient information, people in contact with the patient, investigations, and procedures performed. Students also identified aspects of practice that could be improved. They then attended a 2 day theoretical introductory course in QI and each group produced flow charts, cause/effect diagrams, and outlines of quality goals using structure, process, and results criteria to describe potential improvements. Each group produced a report of their findings.

Main measures—A two-part questionnaire completed by the students before and after the intervention was used to assess the development of their understanding of QI. Evidence that students could apply a range of QI tools and techniques in the specific setting of a hospital ward was assessed from the final reports of their clinical attachments.

Results—The students had a significantly better knowledge of QI after the introductory course and group work than before it, and most students indicated that they considered the topic highly relevant for their later career. They reported that it was quite useful to observe one patient throughout one shift and, to some extent, they learned something new. Students found the introductory course and working in groups useful, and most thought the programme should be included in the curriculum for other nursing students. They considered it important for nurses in general to have knowledge about QI, indicating a high perceived relevance of the

course. All 16 groups delivered reports of their group work which were approved by the tutors. Through the reports, all the groups demonstrated knowledge and ability to apply tools and techniques in their practical studies in a hospital setting.

Conclusions—The introduction of a short experience-based programme into the practical studies of second year nursing students enabled them to learn about the concepts, tools, and techniques of continuous QI in a way that should provide them with the skills to undertake it as part of routine practice.

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Pre-qualification health professional students must be prepared for the challenges they will meet during their practical training and when they are qualified. There is an expectation that clinical professional staff will participate in quality improvement (QI) work including

Key messages

- Groups of second year nursing students on the same ward were each assigned to follow one patient during a day's work, recording processes of care from the patient's perspective and identifying aspects of practice that could be improved.
- The groups agreed on an area that could be improved and produced flow charts, cause/effect diagrams, and outlines of quality goals using structure, process, and results criteria to describe the improvements.
- The students attended a 2 day theoretical introductory course in QI and a questionnaire was completed before and after the course to evaluate the students' understanding of quality improvement (QI).
- The students had a significantly better knowledge of QI after the course and as a result of the group work than before it.
- All groups demonstrated knowledge and ability to apply tools and techniques related to QI.

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clinical audit, quality assurance, and risk management clinical governance (interview with E Haugland, CEO, Haukeland University Hospital, as part of a seminar on Quality Improvement in Health Education presented to the administrative staff and teachers at Bergen College, May 1998). It is therefore important that, in the course of their training, they acquire the knowledge and skills to enable them to carry out QI work.

All improvement presupposes change. Learning the skills of QI through undergraduate education should be the starting point for a lifelong process of experience based learning that allows healthcare professionals—by the application of the relevant concepts, knowledge, and skill—to change and improve practice. Students all acquire the basic knowledge and skills needed to become skilled health professionals. In addition, they should develop the attitudes to service delivery and professional practice—including continuous development—expected of professional practitioners. However, for continuous QI, health professionals need to combine their professional knowledge with knowledge about processes of care and the techniques of QI, as described by Batalden and Stoltz.¹ The particular “improvement knowledge” needed for improving health care has been divided into eight knowledge domains:

- (1) *Health care as a process and system*: the interdependent people, procedures, activities, and technologies of caregiving that come together to meet the needs of individuals and communities.
- (2) *Variation and measurement*: the use of measurement to understand the variation across and within systems to improve the design and redesign of health care.
- (3) *Customer/beneficiary knowledge*: identification of the person, persons, or groups of persons for whom health care is provided or may be provided in the future, an understanding of their needs and preferences, and the relationship of health care to those needs and preferences.
- (4) *Leading, following, and making changes in health care*: the methods and skills for designing and testing change in complex organisational caregiving arrangements, including the general and strategic management of people and the healthcare work they do in organisations. Such activities include a general understanding of healthcare financing, information technology, the roles of different professional individuals in daily healthcare giving and the development of a supportive internal organisational climate for working, learning, and caring.
- (5) *Collaboration*: the knowledge, methods, and skills needed to work effectively in groups, to understand and value the perspectives and responsibilities of others, and the capacity to foster the same in others including an understanding of the implications of such work.
- (6) *Social context and accountability*: an understanding of the social contexts of healthcare giving and the way that expectations arising from them are made explicit. This specifically includes an understanding of the financial impact and costs of health care.

The National Strategy for Quality Improvement in Health Care³ was published in 1995 by the Norwegian Ministry of Health and Social Affairs and the Board of Health with the motto “You don’t have to be bad to get better” and placed learning the skills for quality improvement within the educational framework for healthcare professionals (box 2). In response to this a group representing hospitals and colleges in Bergen developed a programme integrating the philosophy and methodology of continuous quality improvement into the syllabus of healthcare students.^{4,5} The programme describes the objectives, the approach, and the teacher’s role in six learning environments:

- Personal improvement projects
- Training wards
- Observation practice
- Clinical studies
- Cross-educational projects
- Thesis writing.

Box 1 A response to the National Strategy for Quality Improvement in Health Care.

(7) *Developing new, locally useful knowledge*: the recognition of the need for new knowledge in personal daily health professional practice and the skill to develop new knowledge through empirical testing.

(8) *Professional subject matter*: the health professional knowledge appropriate for a specific discipline and the ability to apply and connect it to all of the above.²

In most pre-qualification courses there is little opportunity for healthcare students to learn about the skills and knowledge relevant to QI. While all qualified healthcare professionals will have acquired appropriate professional knowledge, most will not be familiar with the knowledge, concepts, and skills to allow them to take part actively in QI work. To address this gap in skills and knowledge that we believe is essential for good professional practice, we developed a pilot programme in 1999 for second year nursing students at Betanien College of Nursing, Bergen, as part of their practical experience, that allowed them to gain knowledge and skills for improvement through a focus on patient experiences and the

“Educational institutions play a part in giving healthcare personnel knowledge and skills, and they influence attitudes. Training in quality improvement must therefore be an integral part of education of healthcare personnel, and should be incorporated into both undergraduate and postgraduate education. The educational framework must ensure that healthcare personnel gain knowledge about the concepts and methods employed in quality improvement, enabling them to offer and document quality in their own services”.

Box 2 Responsibility of educational institutions according to the National Strategy for Quality Improvement in Health Care.

Table 1 An overview of the intervention

Time period (Spring 1999)	Location/intervention	Student involvement/tasks to be performed
Week 10	At Betanien College: Project leader informing the students about the project and about the tasks they are to do in their practical studies (1 hour)	The students are informed about what to do: <ul style="list-style-type: none"> • together choose one patient to follow for one shift each • make field notes
Weeks 11–20	In medical/surgical wards or at outpatient clinics: The students follow closely one patient (one shift each)	The students follow the instructions given in the introduction at college by following and observing one patient and making field notes
Weeks 22–23	At Betanien College: Theoretical introduction to QI (2 days) Students work in groups with specified tasks, supervised by their tutors, and produce a report (6 days)	Students fill in part 1 of the questionnaire before the theoretical introduction course Students work in groups and deliver reports for approval Students fill in part 2 of the questionnaire

Table 2 Issues to be addressed by students in the field notes

- (1) Describe what happens to the patient from his or her perspective with regard to:
 - Waiting and delays
 - Information given
 - What type of personnel is in contact with the patient
 - Examinations, procedures, etc
- (2) Identify any area where one could improve information, routines, etc
- (3) Is there any area where there is an obvious need to assure the quality of care, information, etc given?

processes of care. This was in line with the educational framework outlined in the 1995 Norwegian National Strategy for Quality Improvement in Health Care (boxes 1 and 2).

We wanted students to identify areas for improvement from the patient's perspective. In other parts of the course students quickly become familiar with assessing their own knowledge and how to acquire necessary information through problem-based learning, an approach to learning established here in 1995. Our assumptions at the start of this project were, firstly, that, while working on the wards, students would identify problems and, by trying to resolve them, would realise that they needed more knowledge and tools to implement improvement; and, secondly, that this would motivate them to learn about the theory and methods of QI.

We were keen to learn how much students benefited from this programme. This paper assessed (1) students' knowledge of QI before and after the project, (2) their perception of its usefulness, and (3) their acquisition of knowledge, concepts, tools, and techniques relevant to continuous QI and their ability to apply them to a specific situation in a hospital setting.

Intervention

The intervention (table 1) began with a 1 hour classroom based introduction just before the start of clinical practice. The students were informed of the project and were told what to do on the ward. At this stage there was no discussion of the theory of QI. During the following 10 weeks, in the second term of their

second year, the students completed their practical tasks in groups while based on medical or surgical wards or at outpatient clinics. The students working on the same ward constituted one work group. Each group chose, with their supervisors, a patient whom they followed closely for one shift each. Students were instructed to review and record all the processes of care from their patient's perspective. Where appropriate and depending on the patient's condition, the observational data were supplemented with information derived from conversation with the patient. Students collected data and described the patient's experience of waiting, receiving information, all their interactions with hospital staff, and details of all contacts, tests and procedures. Table 2 shows the issues the students were asked to address in their field notes. They were asked to ensure patient anonymity. Each patient was informed about the project and asked if they were willing to be the subject of the student's project. The students were also told to consider how care could be improved as they recorded the processes of care experienced by their patients. They were asked to keep these anonymous notes until they finished the 10 week clinical practice period. Back in college the students had a 2 day theoretical introductory course in QI. Following this, working in their ward groups, students produced flow charts to identify areas of possible improvements and cause/effect diagrams and defined goals using structure, process, and results criteria that related to the wards and clinics where they had been working. Each group wrote a final report to be approved by their teachers. Table 3 summarises the tasks the groups were to address.

Students were directed to "*Quality development in health care. A textbook for health profession students*"⁶ as a guideline. This book includes descriptions of concepts, tools, and techniques for continuous QI.

Table 3 Content of reports

- (1) Field notes from all the shifts (made anonymously)
- (2) Summary of the reflections made at the end of each shift with regard to areas where the quality of care could be improved or assured
- (3) Description or evaluation of the experiences the group made after closely following one patient: did you learn more of what it is like to be a patient?
- (4) Flow chart depicting what the patient went through when observed by the students
- (5) Cause/effect diagram related to the area chosen for quality improvement
- (6) Quality goal with structure, process, and result criteria related to the area chosen for improvement
- (7) Evaluation of the entire process including addressing the following questions:
 - What was useful?
 - What have they learned?
 - What could have been done differently with respect to the care giving?
 - Recommendations for further projects?

Methods

The study took place between January and June 1999. Fifty two nursing students from one second year class participated in the programme within their usual hospital based practical studies.

DESIGN

The effectiveness of the intervention was assessed using a specifically designed questionnaire administered to students before and after the 2 week session including the theoretical introduction course and working in groups. Each student served as his or her own control. Reports written by groups were used to evaluate both the group work and to determine how well students had learned to apply tools and techniques to specific situations in a hospital setting.

QUESTIONNAIRE

A questionnaire developed specifically for this study was used to assess the benefits of the course and to determine the extent to which the course objectives had been reached. Students were informed about the questionnaire and were given time to complete the first part just before the start of the theoretical introduction course. They were then instructed to keep the questionnaire themselves until the project was completed and their reports were approved, and then to fill in the second part of it. The first part of the questionnaire assessed how the students rated their knowledge in relation to the concepts of QI, whether they were aware of current QI projects on the wards where they had worked, the extent to which they considered knowledge of QI relevant to their later career, whether they had learned anything new by closely following one patient for one shift, and their views on the usefulness of the knowledge of patients' experience gained from the project. The second part of the questionnaire was completed 2 weeks later when they had finished the group project and delivered their reports to their teachers. This part included an assessment of their knowledge of QI, the usefulness of the theoretical introduction course and of working in groups and writing the reports, how strongly they would recommend this project to other students, and their views on the importance of nurses having knowledge of QI. The students were asked to rate their knowledge as excellent (5), very good (4), good (3), fair (2), or poor (1). The response options to all other questions were measured on a visual analogue scale marked with five numerical scale points. At each extreme were written statements representing the opposite extreme responses ranging from "to a small extent" (1) to "to a large extent" (5). In some of the questions the students could add comments. The questionnaires were anonymous.

REPORTS

The 52 students were divided into 16 clinical practice groups of 2–4 students. They brought their own individual reports of their experiences of following one patient for a shift. In

college, working in their groups, the individual data were discussed and transformed into a single report of the patient on the ward. The group then had to choose one problem from their report and, together, make a flow chart, analyse the causes and effects of the problem area, and construct a cause/effect diagram. Students had to agree on the goal for QI and on the strategies to use to reach the goal. In the 2 week period in which they were working and writing up their reports each group received three 1 hour tutorials. The content requirement for the reports included field notes, reflections and problem areas, experiences by following one patient, flow charts, cause/effect diagrams, quality goals with structure, process and result criteria (using a worksheet adapted from the Royal College of Nursing Standard of Care Projects), and a group evaluation of the entire process including the usefulness, what they had learned, what could be changed, and recommendations for future projects (table 3).

DATA ANALYSIS

Data were coded in accordance with the above description and analysed using SPSS 9.0 for Windows. Some students, instead of circling a number, made a cross between two numbers. To increase the reliability of the results such responses were coded as, for instance, 4.5 and were not assigned to a whole number. Statistical analysis included frequency, mean values, and the Student's two tailed *t* test.

The data contained in the group reports were used to evaluate how students used the different tools and techniques in a specific situation. Three factors were compared: (1) the problem chosen; (2) application of the different tools and techniques (flow chart, cause/effect diagram, and quality goal using structure, process, and result criteria); and (3) group evaluation of the entire process.

APPROVAL

Both the college dean and the head nurses in the hospitals involved approved the project. Throughout the planning the teachers and nurses involved in the students' clinical education were kept informed of the project to enable them to be able to supervise the students appropriately.

Results

QUESTIONNAIRE

Thirty eight students (73%) returned both parts of the questionnaire; 58% indicated that they knew the meaning of the concepts of QI before the introductory course. When asked if they knew of any current QI projects in which the nurses in the ward were involved, 27% said they didn't, 27% said they did, and 46% didn't know. Thus, about half of the students did not know the concepts of QI well enough to determine whether there were current QI projects on the wards before the theoretical introductory course.

Before the course the students estimated their own knowledge of QI as "fair", and this had risen to "good" by the end of the course—from a mean (SD) value of 2.0 (0.9), range 1–4

Table 4 Results from the questionnaire

Questions	N	Mean (SD)	Range
To what extent the students thought it was relevant for their career as nurses to have knowledge about QI	38	4.2 (0.7)	2.5–5.0
To what extent the students found it useful to follow one patient through one shift	36	3.0 (1.0)	1.0–4.5
To what extent the students found the theoretical introduction useful	38	4.0 (0.9)	2.5–5.0
To what extent the students thought the group work at the college was useful	38	3.7 (0.9)	1.0–5.0
To what extent the students recommend a similar project in the curriculum for other students	38	4.0 (0.8)	1.5–5.0
To what extent the students thought it was important for nurses in general to have knowledge about QI	38	4.3 (0.8)	2.5–5.0

Scores range from 1 (to a small extent) to 5 (to a large extent).

to a mean (SD) of 3.1 (0.6), range 2–4. The difference between values at the start and the end of the project was statistically significant when analysed by a paired sample *t* test ($t = -8.2$, $p < 0.001$; fig 1).

Before the introductory course and group work, most students indicated that they considered the topic highly relevant for their later career (mean value 4.2). Students reported that it was “quite useful” to observe one patient throughout one shift (mean value 3.0) and “to some extent” they learned something new (mean value 2.8). They found the introductory course (mean 4.0) and working in groups (mean 3.7) useful to a “large extent”. Most students thought the programme should be included in the curriculum for other nursing students (mean 4.0). The students considered it “important” for nurses in general to have knowledge about QI (mean 4.3), indicating that they perceived it to be highly relevant to the course (table 4).

REPORTS

All 16 groups delivered reports of their group work which were approved by the tutors. The results from the reports are presented in the three categories: problem chosen, ability to apply the different tools and techniques, and group evaluation. The work of one group is presented in figs 2, 3, and 4.

Problem chosen

Field notes were used as the basis on which the groups had agreed on and chose one problem area to improve. The following areas were chosen: insufficient information—that is, information given to patients not meeting their perceived needs ($n=10$ groups); waiting time ($n=2$); planned operations cancelled because of inadequate preparation by staff ($n=2$); inadequate pain relief ($n=1$), and inadequate premises for outpatient care ($n=1$).

Figure 1 Reported knowledge before and after the intervention ($n=37$).

Ability to apply different tools and techniques

Each group made a flow chart of the processes relating to the patient; nine depicted the entire process in the chosen period; six described the entire process but focused in more detail on the specific problem area, and one focused only on a specific problem area. Figure 2 shows a flow chart that outlines a process of pain treatment.

The students analysed the chosen problem using a cause/effect diagram describing the problem and the possible causes. Figure 3 shows a cause/effect diagram describing the circumstances of a patient who has to wait too long for pain relief.

All the groups formulated quality goals and indicated how they planned to achieve these using structure, process, and result criteria. Figure 4 shows an example of the criteria needed to ensure that a patient receives adequate postoperative pain relief.

Evaluation

In the group evaluations all the groups concluded that working with this project had been very useful. The students reported that they understood the importance of focusing on QI. They found the knowledge meaningful and planned to use it in their work as registered nurses. They particularly found it both interesting and relevant to focus on the process from the patient's perspective and contrasted this with the “usual” emphasis of nurses and other health professionals on specific procedures. By mapping the patient's process the students discovered that lack of cooperation between the different health professionals increases waiting time for the patients. Many of the groups identified more clearly defined responsibilities and better routines as areas for improvement. Several groups emphasised the importance of understanding the terminology and concepts of QI which made them more confident in the hospital setting. They also commented that working with projects in a clinical setting using real problems and patients was particularly meaningful, and felt that they could never achieve the same level of learning in a classroom setting. Ten of the groups commented that they would prefer a theoretical introduction course before the clinical practice.

Discussion

The students had a significantly better knowledge of QI after the theoretical introduction course and group work than before it, and most students indicated that they considered the topic highly relevant for their later career. They reported that it was quite useful to observe one

Figure 2 Example of a flow chart: treatment of pain.

Figure 3 Example of a cause/effect diagram.

Topic Pain treatment
Subject Postoperative pain treatment
Target group Patient with postoperative pain
Clinical ward Surgical ward

Quality goal: The patient is satisfied with postoperative pain treatment

Structure criteria What kind of resources do we need?	Process criteria What do we have to do?	Result criteria What do we expect to attain?
The ward has: <ul style="list-style-type: none"> Personnel who have knowledge and skill in individual pain treatment One nurse who has the responsibility for the patient's pain treatment Interprofessional forum to plan the treatment An environment focusing on co-operation and improving Well arranged medicine cupboard Available resources for pain treatment: drugs, radio, music, documentation, physical environment. 	The nurse: <ul style="list-style-type: none"> Assesses the patient's pain Takes the patient's pain seriously Motivates the patient to tell when he has pain Is not so strict with the "4 hours rules" Clarifies the patient's expectation about pain relief Knows the medicine cupboard Uses the nurse documentation in an appropriate way Gives pain treatment in an appropriate way Observes, evaluates and documents the effect of the treatment 	The patient: <ul style="list-style-type: none"> Expresses that he has been treated with respect Expresses that he is satisfied with the pain relief Does not have to wait more than 10 minutes before treatment Understands the effect of the pain treatment Express that the pain relief is as expected

Figure 4 Example of quality improvement goal using structure, process, and result criteria.

patient throughout one shift and, to some extent, they learned something new. The students found the introduction course and working in groups to be useful, and most thought that the programme should be included in the curriculum for other nursing students. They considered it important for nurses in general to have knowledge about QI, indicating that they perceived the course to be highly relevant.

All 16 groups delivered reports of their group work which were approved by their

tutors. Thirty eight of the 52 students returned the questionnaire, a lower response rate than expected, which was probably due to unclear instructions to the four teachers involved in the project. As the semester ended after the project, and since the questionnaires were anonymous, we did not send out reminders.

The students found the topic relevant even before the introductory course, probably because of the current interest in the quality of health care by the press and the public interest in QI. Nearly half did not know if there were any ongoing QI projects on their wards, possibly because they did not know what type of projects can be considered to be related to QI or because the nurses informed the students about ward projects without using the concepts of QI. In our experience, a lot of nurses working in practice are not familiar with QI terminology and tools.

Ten of the groups would have preferred to do the introductory course before observing the patients as they felt frustrated because they did not understand the rationale behind mapping the patient's process. However, it was our intention that students should track the patients' process and make notes with an open mind. They were given short instructions about observing the patient, with special emphasis on noting procedures applied to the patient, patient's contact with staff, information given to the patient, and waiting and delays experienced by the patient. Our hypothesis was that, through this experience, students would discover the need to learn more and be motivated to deal with the theory underpinning thinking in QI. However, from the feedback the faculty is inclined to reconsider this part of the programme and to include some theoretical introduction before they embark on the observation exercise in the clinics. Next year's evaluation should show whether introducing students to some of some concepts of QI before they gain practical experience is more effective.

All groups had the knowledge and ability to apply the tools and techniques in their practical studies in a hospital setting. The students made flow charts and defined a problem, described the causes of the problem by a cause/effect diagram, and suggested solutions by describing quality goals using structure, process, and result criteria. This project emphasised the planning stage of the plan-do-study-act (PDSA) cycle. They did not implement the plan in practice. Students learnt about this cycle in the theoretical part of the programme with examples of techniques and tools they could use, and they used a textbook example as a guideline.⁶ Our experience from teaching about these tools is that students in general find it helpful to visualise their work. A programme for teaching continuous QI to medical students created at Dartmouth Medical School in the USA aims to provide students with an active learning experience and education in the theory and application of continuous QI. Working in groups of two, students identified an area of improvement within a practice, assisted the practice in formulating an improvement plan, helped to implement that

plan, and wrote up their experiences. This model also emphasises the planning step of the PDSA cycle but ends with completion of the study. The factors linked to the success of this model included focusing students' expectations on experiential learning rather than passive learning, providing a clear overview of the goals and the overall aim of the educational experience, introducing the concepts and tools early in the programme, ensuring a clear understanding of the timelines and expectations, and providing examples of ideal projects.⁷ These experiences are similar to those in our study, and they conclude that it is important that the staff members have a personal interest in QI.

We have shown that group observation in clinical practice provides nursing students with an introduction to the methodology of continuous QI. We believe that this method of learning would also be useful in interdisciplinary health professional education. A student driven ward unit with nursing, physiotherapy, and medical students was started in Bergen in 2000. In this setting interdisciplinary teams could record and analyse patient processes and use this as an introduction to learning systems analysis and new designs for improvement. An Interdisciplinary Professional Education Collaboration (IPEC) set up in the USA⁸ aims towards a future in which "health professional education has evolved into an integrated teaching/learning environment in which health professionals are working together across discipline boundaries, using the best knowledge for improvement to continuously improve health care". A similar group has now been established in Europe—the European Interprofessional Education Collaboration (EURIPEC)—with members from different countries and professions. This group is working with such problems as how to accelerate the introduction of continuous QI into mainstream professional education, and this study suggests one way for it to start this work.

Headrich *et al*⁹ have described courses in interdisciplinary learning in continuous improvement in which 76% of the students reported that they had used something from the course elsewhere in their lives or work. Examples included using PDSA cycles to improve time management and studying, use of team process techniques to improve the productivity of meetings, and direct applications to improvement activities in the workplace.

This study shows that brief programmes to introduce continuous QI to health professional students is a starting point for using this knowledge in a more extensive way, and we

hope that this experience will enable them to participate actively in QI when they are qualified. Ideally, future research should assess the long term outcome of this intervention following qualification of the students.

Conclusions

This programme raised the awareness of students of the importance of QI in health care, and provided them with the motivation, knowledge, and skills needed to include continuous QI in their clinical work. The students demonstrated an increased understanding of the importance of focusing on the care process from the patient's perspective, the need for interdisciplinary cooperation, and team performance as prerequisites for improved health care. The teachers and clinical supervisors involved have to be prepared for their tasks, and it is important to give clear information to both students and their clinical supervisors about the tasks and the expectations when following the patients through the shift. From the reports and results of the individual evaluations we feel that this is a useful way of introducing students to the methodology of QI. With only small changes the project was so successful that it is now established as part of the theoretical and practical nursing curriculum at the college, and we recommend other health professional educators to develop similar programmes for their students.

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- 1 Batalden PB, Stoltz PA. A framework for the continual improvement of health care: building and applying professional and improvement knowledge to test change in daily work. *Jt Comm J Qual Improv* 1993;19:432–52.
- 2 Batalden PB, Berwick D, Bisognano M, *et al*. Knowledge domains for health care students seeking competency in the continual improvement and innovation of health care. Boston: Institute for Health Care Improvement, 1998.
- 3 Ministry of Health and Social Affairs and Norwegian Board of Health. *National strategy for quality development in health care*. 1995: IK-2482 (in Norwegian).
- 4 Kyrkjebø JM. How can continuous improvement be integrated in health professions education (in Norwegian)? *Tidsskriftet Sykepleien* 13/98.
- 5 Kyrkjebø JM. Beyond the classroom: integrating improvement learning into health professions education in Norway. *Jt Comm J Qual Improv* 1999;25:588–97.
- 6 Kyrkjebø JM. *Quality development in health care. A textbook for health profession students* (in Norwegian). Bergen: Fagbokforlaget, 1998.
- 7 Weeks B, Robinson JL, Brooks WB, *et al*. Using early clinical experiences to integrate quality improvement learning into medical education. *Acad Med* 2000;75:81–4.
- 8 Headrich L, Knapp M, Neuhauser D, *et al*. Working from upstreams to improve health care: the IHI Interdisciplinary Professional Education Collaboration. *Jt Comm J Qual Improv* 1996;22:149–63.
- 9 Headrich L, Moore SM, Alemi F, *et al*. Using PDSA to establish academic-community partnerships: the Cleveland experience. *Qual Manag Health Care* 1998;6:12–20.