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What we know and what they do: nursing students' experiences of improvement knowledge in clinical practice

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Summary Nations around the world face mounting problems in health care, including rising costs, challenges to accessing services, and wide variations in safety and quality. Several reports and surveys have clearly demonstrated that adverse events and errors pose serious threats to patient safety. It has become obvious that future health professionals will need to address such problems in the quality of patient care. This article discusses a research study examining improvement knowledge in clinical practice as experienced by nursing students with respect to a patient-centred perspective, knowledge of health-care processes, the handling of adverse events, cross-professional collaboration, and the development of new knowledge. Six focus groups were conducted, comprising a total of 27 second-year students. The resulting discourses were recorded, coded and analysed. The findings indicate a deficiency in improvement knowledge in clinical practice, and a gap between what students learn about patient care and what they observe. In addition the findings suggest that there is a need to change the culture in health care and health professional education, and to develop learning models that encourage reflection, openness, and scrutiny of underlying individual and organizational values and assumptions in health care.

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Introduction

Background

In the twenty-first century, nations around the world face mounting problems in health care, including rising costs, challenges to access, and

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wide variations in safety and quality (Detmer, 2003). Adverse events and errors pose serious threats to patient safety (Institute of Medicine, 2000). Issues related to quality of care are not new to care delivery or practice, but the improvement of patient safety is an increasing concern (AAMC, 2001).

There is a spotlight on the serious mismatch between what we know to be good quality care and the care that is actually being delivered. Students and health professionals have few opportunities to get involved in educational interventions that would aid them in analyzing the root causes of errors and other quality problems (Baker et al., 1998; Landers, 2000; Buerhaus and Norman, 2001). Education does not occur in a vacuum. Much of what is learned lies outside of formal academic coursework. A "hidden curriculum" of observed behaviour, interactions, and overall norms and culture of a student's training environments are powerful in shaping the values and attitudes of future health professionals (Institute of Medicine, 2003). Heggen (1995) found that nursing students learn clinical practice from a knowledge reservoir of mixed quality, often comprising poor learning situations. Findings from a study by Bjørk (2001) revealed that new nurses are alone with the challenge of nursing, and that there was a lack of strategic thinking concerning learning and development of competence. Processes of work did not ensure opportunities for learning through collaborative reflection and dialogue. A recently released report in the USA describes the critical role of nurses in patient safety; suggesting nurses' workplace environments are a threat to patient safety, and there appears to be a need for a collection of mutually reinforcing patient safety defences in the nurses' work environment (Institute of Medicine, 2004).

As indicated by the Institute of Medicine (2001, 2003) in the USA, current training practices need to be reformed to develop learning opportunities with respect to improving health care. Such reforms include assessments of what types of changes are needed, and how the changes might be carried out. The first step in the process is to examine the current status of the learning context of health professional students, including their knowledge about how to improve health care and patient safety, as well as their experiences of what is happening in clinical practice. Such experiences include their perception of professional norms, rules, attitudes and behaviour.

The aim of this study was to examine nursing students' experiences of improvement knowledge in clinical practice related to the patient's perspective, process knowledge, the handling of ad-

verse events, cross-professional collaboration, and the development of new knowledge.

Knowledge domains for the improvement of health care

The knowledge to improve working processes was first described by Deming (1993) as 'a system for profound knowledge'. This is now referred to as 'improvement knowledge' considered to consist of four elements: (1) knowledge of the organization as a system of production; (2) knowledge of variation in processes, products and people; (3) knowledge of psychology, which includes the psychology of work and of change; and (4) the theory of knowledge to link theory and action (Batalden and Stoltz, 1993). The Institute for Healthcare Improvement (IHI) in Boston, USA, has further developed this concept of improvement knowledge and identified in 1998 eight knowledge domains for health professional students who seek to acquire skills in the continual improvement and innovation of health care. These domains are: customer/beneficiary knowledge; health care as process, system; variation and measurement; leading, following and making changes in health care; collaboration; developing new, locally useful knowledge; social context and accountability; and professional subject matter (Batalden et al., 1998). Table 1 describes these domains.

Improvement knowledge includes an overall understanding of the connection between quality and safety. The knowledge domains (Batalden et al., 1998) describe factors that are of crucial importance to patient safety. In the present study, we focussed on five of the eight domains (marked by asterisks in Table 1). Three domains were excluded due to the current students' experiences in clinical practice and their level of learning.

An understanding of the health-care system and its processes from a patient perspective represents a fundamental change from the traditional perspective of health professionals. The current system often behaves as though control over decisions, resources, access, and information is in the hands of the caregivers, and is only ceded to patients when the caregivers choose to do so. A fundamental idea in improvement knowledge is the patient perspective, where the patient is the source of control (Berwick, 2002; Kitson, 2002; Coyle and Sculco, 2003; McGarry and Thom, 2004; Davidson et al., 2004).

As a part of an organization, practitioners need to develop their knowledge of the product and services produced by them and their organization. Batalden and Stoltz (1993) describe processes as the way in which services/products are produced.

Table 1 Knowledge domains for health-profession students seeking competency in the continual improvement and innovation of health care (Batalden et al., 1998)

Knowledge domains	Description
1. Customer/beneficiary knowledge ^a	The identification of the person, persons, or groups of people for whom health care is provided; the understanding of their needs and preferences and of the relationship of health care to those needs and preferences
2. Health care as process, system ^a	The interdependent people (patients, families, eligible populations, caregivers), procedures, activities, and technologies of health care-giving that come together to meet the needs of individuals and communities. Understanding work as a process
3. Variation and measurement ^a	The use of measurement to understand the variation in performance of processes and systems of work, to improve the design and redesign of health care
4. Leading, following and making changes in health care	The methods and skills for making change in complex organizations, including the general and strategic management of people and the health-care work they do
5. Collaboration ^a	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. Developing new, locally useful knowledge ^a	The recognition of the need for new knowledge in personal daily health professional practice and the skill to develop new knowledge through empirical testing, using Plan-Do-Study-Act cycles to conduct serial experiments of improvement
7. Social context and accountability	An understanding of the social contexts (local, regional, national, global) of health care 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 linkage of quality and cost)
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

^a The knowledge domains that were focused on in the present study.

The core processes in health care are access, assessment, diagnosis, treatment/care and follow-up (Nelson et al., 1996). Understanding a process includes the ability to identify, to map and to improve the process. Measurement of variation over time is a prerequisite for improving processes (Batalden and Stoltz, 1993). In clinical practice, understanding variation means being able to identify and handle adverse events. The health-care system is traditionally characterized by the performance of independent practitioners. To improve health care, the independence needs to be replaced by collaborative interdependence; this refers to everyday cooperation across unit boundaries and the breaking down of the 'silos' that isolate medical specialties, occupational categories, and work units (Adler et al., 2002; Batalden et al., 1998b). Interdependence is necessary to integrate the knowledge of different disciplines into an efficient and safe health-care service. Interdependence also allows patients to be a part of the decision process. To involve the students in interdisciplinary groups in clinical training may expand their learning process (Wahlström and Sanden, 1998; Fundingsrud, 2000; Freeth et al., 2001; Glen, 2004). It is senseless to train health professionals separately and to expect them later to determine how to work together (Headrick et al., 1996).

Developing new knowledge is another prerequisite for improving care. The process of developing new knowledge is connected to Batalden and Stoltz's (1993) 'plan-do-study-act' (PDSA) cycle. Important learning happens in the last stage of the process/cycle, when students act and learn by studying the results of plans that have been implemented (Langley et al., 1994). Such learning arises from reflection on the results of change, and may then be successfully included in the next stage of change. It is important to help students and caregivers to use the PDSA cycle as a systematic way of developing new knowledge through learning by experience (Batalden and Stoltz, 1993).

Lave and Wenger's (1991) theory of 'situated learning' states that learning is connected to participation and action within a social context, and that opinions and identity development occur as reciprocal social processes. Learning by participation in a community of practice is based on relationships between the students and the clinical staff in the wards, relationships that develop knowledge, skills and professional identity. Faculty and clinical staff are role models, and they have a crucial responsibility to guide and reflect together with the students. According to Schön (1987, p. xii), learning by doing with the help of coaching is 'to combine the teaching of applied science with

coaching in the artistry of reflection-in-action'. This coaching includes beliefs, values and attitudes that are the reason behind action, and an open discussion of these underlying values and their importance for improving patient care.

Methodology

Sample

Twenty-seven nursing students in the second year of their 3-year training program at Bergen University College participated in six focus groups. Each group included four or five female students. To recruit students on a voluntary basis, an introductory letter inviting the students to participate was distributed during a normal class. Each student had 8 weeks experience of one medical and one surgical ward at the Haukeland University Hospital in Bergen, Norway. Altogether, the students had clinical experience from more than 20 different clinical hospital settings during their second year of learning, and from several nursing homes in their first year at nursing college.

Data collection

To record the nursing students' experiences of improvement knowledge in clinical practice, we used the method of focus groups, as described by Krueger and Casey (2000). The discussion topics were planned in advance and were conducted by an interview guide, who followed a series of opening, introductory, transitional, key and ending questions (Krueger and Casey, 2000). The guideline questions were in accordance with five of the eight knowledge domains described by Batalden et al. (1998), and covered the students' (1) understanding and experiences of the patients' perspective, (2) understanding of the concept of process, (3) experiences with adverse events, (4) experiences with teamwork and cross-professional collaboration at school and in clinical practice, and (5) use of their experiences to develop new knowledge. The major topics had subtopics to expand on these five domains.

The six focus group sessions took place during the students' working time in an undisturbed conference room at the hospital in March 2002. Each group session lasted for about 2 h. The moderator set the tone and described the purpose of the focus groups. She led the sessions by following the guideline questions, listened to the students' stories, asked questions where clarification was necessary,

and encouraged participation from all the students. The co-moderator took notes and tape-recorded the interviews. She was seated at the periphery of the circle observing the group process, and the students' body language and reactions.

Analysis

A typological 'coding' approach was used; that is, the data sets were coded into categories based on the major topics in the guideline questions (Hatch, 2002). The steps in the analysing process were: verbatim transcription, coding, categorizing, making an overview grid, comparisons, condensation, and drawing out the essence. In this categorization process, the five knowledge domains (Batalden et al., 1998) were used as the main categories. Statements concerning the students' learning environment were coded as an additional category. The observed emotions, speech intonation, and the level of intensity was important information when analysing the data. Both authors independently constructed an overview grid as a descriptive summary of the content of the group discussions, with the categories as one axis and the focus groups as the other. When the grids were compared, they turned out to be quite similar. Comparisons across all six focus groups identified similarities and differences. Finally, the essence of the data was condensed and highlighted.

Credibility and usefulness

The guideline question was piloted on a group of students at the same level in another nursing college. The guide was improved on the basis of feedback from those students; a few guiding questions were clarified to make the key objectives more understandable.

Author 2, moderating the focus group, was familiar with the body of improvement knowledge, but she had not been involved in the students' educational program. Author 1 had followed and guided the students for 15 months and, to minimize the risk of influencing the interview process, she acted as co-moderator observing the interview process. Both authors independently analysed the material to ensure credibility.

Ethical considerations

According to Norwegian ethical guidelines, the Dean of Nursing Education approved the study. Written informed consent from the students was

obtained, and data anonymity and confidentiality were assured. The students agreed on confidentiality regarding the topics discussed during the group sessions. The data were kept in accordance to Norwegian recommendations, with tapes and transcripts locked up separately from the students' names.

Results

Overall, the findings indicate deficiency in improvement knowledge in clinical practice, and a gap between what students learn and what they observe in the wards.

The students' understanding and experiences of the patients' perspective

'Everyone talks about having the patient in focus, but it's not like that'. The students appeared not to experience a patient perspective, but rather a professional, and they explained this as being due to a lack of resources and a heavy workload. *'It's so busy. It's not easy to focus on the human element'*. At the same time, the students reacted strongly to staff behaviour. *'They're sitting in the nursing station complaining, instead of documenting in the medical record or talking with patients'*. The students felt that patients were expected by health personnel to behave in certain ways, and that the patients were slotted into groups based on diagnosis and classifications. *'With this diagnosis, you shouldn't have so much pain'*. Some students reported that the patients felt they were not taken seriously. *'For the staff, everyday life in the hospital was routine, but for the patients it was new and scary'*. The students reported several dilemmas in clinical practice. They experienced different realities, depending on who told the stories. *'The nurse reported that the patient had been sleeping well, but the patient said he had been awake most of the night'*. Which of the stories should guide the next steps in the process of patient care?

The students' understanding of the concept of process

The students were not trained to understand health care as a process, and how to use measurements to understand the variation of performance as a tool for improvement. They followed different nurses

and guidelines to identify practical procedures, and emphasized that similar procedures were carried out in different ways. They tried to find the best way to perform. *'I have to find my own way'*.

The students' experiences of adverse events

All the students experienced adverse events, and reported numerous examples, such as the rules for treating intravenous catheters were not always followed, a lack of double control of medication for injections or infusions, unsatisfactory documentation of care, transportation of the wrong patient to the department of radiology, staff with long, red (or purple) fingernails and jewellery in breach of the rules. The students told their stories in a way that emphasized their own reactions, and they expressed their uncertainty and helplessness when facing these situations. *'It is so scary – how long will it take for me to be like them?' 'Nothing happens when adverse events arise, because you are usually alone'*. They seemed to be afraid of the consequences of suggesting areas of improvement. They had experienced withdrawal and negative reactions among staff, and were afraid of being excluded from the community of practice. One student said laughingly: *'You wouldn't be invited to the next Christmas party!'* The students also reported that adverse events happened across professions. It seemed to be easier to talk about adverse events happening outside their own profession and department. Certain events were issues at staff meetings, and some students had sighted the registration forms for reporting adverse events. They did not know what happened with the filled-in forms or if the data were regarded as a reason for change.

The students' experiences with teamwork and cross-professional collaboration

Cross-professional collaboration did not seem to be an integrated part of the students' clinical training. They had experiences of teamwork within their own nursing students' group and other health-care students at the college. This was reported positively. *'It was useful to see how different professions approached the patient from different perspectives. But there are a lot of similarities – we're not as special as we often think'*. The students' impressions from the clinic were that various health professionals met and talked about the patients, but did not seem to design a common plan for patient care. The students reported that the physicians had a strong influence on the culture

of collaboration. *'It depends on the physicians if the meeting before the round includes sharing knowledge or giving orders'*.

How the students use their experiences to develop new knowledge

There was no indication that the students had experiences with building new knowledge in clinical practice. They used the nursing process as a way to work, but they had not reflected on it as a way to learn from experience. Some students knew the PDSA cycle from personal improvement projects, but had not explicitly heard of or seen this tool being used to improve patient care. During the interviews, the students suggested using the PDSA cycle to improve the double control of medications, the removal of pacemaker electrodes, and the management of pressure-sores prophylaxis.

The students saw reflection as a useful tool in their learning process: *'I have learned a lot by thinking through things I have done'*. They criticized the practicing of the system of reflection. They had to produce written reflections, disclosing their own thoughts, without getting the intended feedback. This resulted in negative reactions and a tendency to reflect on the less important topics. *'I don't want to reflect just to please my teacher'*.

The students' learning environment

The students experienced a gap between their theoretical learning, including the written guidelines at the ward, and their experiences of practice performance. They found it difficult to cope with this gap. When they politely asked why things were actually done in ways that were different from those they had been led to expect, a common answer was: *'You may have learned one way in school, but it's not the way we do it here'*. The students found themselves in a difficult position. *'We're not a part of the real working staff as students!'* They were usually not invited to participate in staff meetings or other collaborative meetings, and typically felt like guests. The students often mentioned the challenge of 'fitting in', and their fear of causing trouble by asking the wrong questions. The students strongly believed that, when they graduated, they would do things differently from what they had observed. The students had met individuals with a positive attitude to change and improvement, but they did not experience this as a system property.

Discussion

Methodological considerations

The open-ended nature of focus groups makes them useful in exploring attitudes, opinions and perceptions (Gray, 1997). The impact of the moderators might have influenced the students' response. However, the students were perceived to be honest, and they appreciated sharing their experiences with people who wanted to listen to their stories.

A potential problem in focus groups is the risk of respondents exerting too much influence on each other. When asked key questions on improvement knowledge, the students reported troubling experiences with considerable emotional impact. Their common agreement resulted in a tendency to support each other, leading them into a 'blind alley'. The effect of this can be a one-sided focus on their negative experiences, forgetting their positive experiences. Carey (1995) emphasized that the real data from focus groups is always negative, when comparing surveys and focus groups in evaluation of a curriculum. An individual interview or survey may inhibit negative responses, whereas negative responses may be supported or encouraged in a group setting (Carey, 1995). The amount of negative feedback could be a reflection of students' perception of their reality, but it is not a complete picture of their experiences with health care. We find it important that students can talk freely about their experiences in a situation without defensiveness or negative reactions. Such behaviour seemed to release considerable tension and emotional stress indicating the need for safe arenas where the students are invited to learn from their experiences.

This study has focused on the nursing students' experiences. For a more thorough insight, one could consider inviting opinions from other groups of students, faculty, clinical staff and patients.

General discussion of the findings

The findings indicate that the students did not find much evidence of improvement knowledge in their clinical training, although this does not necessarily mean that such knowledge is absent from clinics. The five knowledge domains focused on in this study might well have been present in their clinical practice environments, but were perhaps not expressed explicitly such that the students could recognize and verbalize it. With this reservation, the

results will be discussed in relation to the students' experiences.

Even though most perspectives in health care are patient-focused, the students in this study did not seem to experience a patient perspective in the clinic. One explanation could be that the underlying values and assumptions are unclear to the students and not openly discussed. The lack of understanding of the patients' perspective seems to be a main challenge in the present system of care (Berwick, 2002). The students talked about '*finding their own way*' to perform, not about finding the best way from the patients' point of view. It seems that the students learn to look at the system from a professional perspective. To balance this view, they could try to look at the processes from the patients' perspective when collecting data and planning the patient care. In their teaching, the faculty might focus on the similarity between the nursing, research and improvement processes (Kyrkjebø, 1999). The challenge is that the body of improvement knowledge is embedded in all forms of professional training (The UK Department of Health 2002, The Danish National Council of Quality Assurance in Healthcare 2002, The Norwegian Directorate of Social and Health Affairs 2003).

The students in this study were not familiar with the concept of 'processes'. They knew the nursing process, but did not seem to make connections between this and other processes. In health care, as in many service industries, workers usually describe what they *do*, not what they *make* (Batalden and Stoltz, 1993). The lack of awareness of what health professionals make and how they make it may explain why 'process' as a concept is unfamiliar. Even if the concept is common, there is a lack of understanding processes, including identification, mapping and improvement (Langley et al., 1994). The result is a lack of measurement of variation in processes. A key aspect of continuous improvement is the measurement, analysis, and interpretation of variation (Mohammed, 2004). Teaching students to collect data over time and to use tools as 'Statistic process control' might enable them to understand processes and discover adverse events. Traditionally health care has not been recognized by a culture of reporting and acting on adverse events. History shows that fear of punishment, exclusion, or lack of promotion can explain some of this (Adler et al., 2002). The findings in this study confirm this. The fact that errors can have fatal consequences for individuals in the health-care system can be another aspect resulting in attitudes of covering up and concealing errors. The lack of measurement of variation can influence

patient safety and result in lost opportunities to learn and improve.

The students reported few experiences of cross-professional collaboration. The transition from independence to collaborative interdependence is difficult; nevertheless, it is crucial to achieve a culture of improvement (Adler et al., 2002). Aron and Headrick (2002) underline that some of the skills necessary for improving health care are the ability to perceive and work effectively in interdependencies, and to work in teams and collaboration. Traditionally, most health professionals are educated in homogeneous groups of students, with minimal integration between disciplines. Health professionals are supposed to collaborate after they graduate, and students learn that collaboration is important, spending little time and energy on practising collaborative skills. Cross-professional teams at school and in clinical practice might be used as an arena for learning by experience. It is likely that mutual respect will develop when students learn how to work together and participate in collaborative situations. Improving the process of working together across disciplines begins with an agreement that cooperative work is essential for effective and safe health care (Batalden et al., 1998b).

Even though the students understood the models of nursing process and in some cases the PDSA cycle, they did not seem to be familiar with these models as tools for building new knowledge. In daily work, the students usually shared anecdotes with other students to deepen their understanding. Nevertheless, they seemed to lack feedback from experienced health professionals when dealing with difficult questions. Reflection stimulates the learning process over time (Schön, 1987), but the students missed a community of practice inviting them to reflect in and on action (Lave and Wenger, 1991). The students' experiences indicate a need for coaching and support in their learning processes, and they anticipated a more transparent learning environment inviting openness and questioning. To integrate and foster the ability to critically evaluate the knowledge base that supports good patient care, it is vital that students have competent role models, and that staff and faculty take quality evidence seriously by utilizing it themselves, and by being receptive when presented such information by students (AAMC, 2001).

To design a system of reflection students, faculty and clinical staff need to work together. Accordingly, faculty development in the science of improvement is of the utmost importance. Faculty members, like their charges, have been educated in systems where improvement knowledge has been almost non-existent. To be able to guide

the students, they need to demonstrate competence in the teaching of improvement knowledge and skills. The area of faculty development is a critical point of leverage between the inclusion of improvement knowledge in the curriculum and clinical guidance in quality improvement (AAMC, 2001). This aspect is reinforced by the gap between 'what we know and what we do' (Adler et al., 2002). Pfeffer and Sutton (2000) have highlighted what they call the 'knowing–doing gap' and the renewed interest in the problems of diffusion of innovation. For years, faculty and clinical staff have been discussing this gap, but it appears that they are not succeeding in helping students to cope with it, and eventually to close it. The students' experiences in this study strongly support this situation.

Our findings suggest that student learning is focusing on what we already do and know, with little opportunity to reflect on how this knowledge is related to quality of patient care and safety. It is interesting and encouraging that students regularly mentioned individuals who were interested in change and improvement, even if the students did not describe the wish to improve as the system property. Moreover, the study indicates that clinical learning situations could be characterized by an organizational culture that seemed unable to teach students how to identify quality concerns and effect changes in practice. The students reported an attitude in clinical practice such as '*We know the answers; we know how things should be done*'. This may indicate a culture where problem solving does not include learning with openness and a re-examination of the underlying individual and organizational values and assumptions. The culture in healthcare can be characterized by a low level of flexibility and a high risk of sanctions and disapproval (Adler et al., 2002). New ideas may be seen as threatening in a culture dominated by advocacy in which a typical purpose is to win (Argyris, 1982).

Conclusions and implications

The study indicates that there is a lack of knowledge and the use of improvement science in nursing education. Moreover, the students seemed to experience a gap between what they learn and what they observe in clinical practice. These findings contribute to the awareness of the need for a change of the culture in health care, including increased transparency and reduced fear. The students' learning processes seemed to be influenced by the system of care, the culture, role

models and their reflection in and on action. A systematic approach involving the whole educational system involves increasing the number of graduates who are prepared to improve patient care and safety. The challenge is to create a culture in which students, together with faculty and clinical staff, can combine practice and reflection, and growth and development over time in a community of practice that is characterized by openness about beliefs, values and attitudes.

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