Patient safety in healthcare preregistration educational curricula: multiple case study-based investigations of eight medicine, nursing, pharmacy and physiotherapy university courses

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ABSTRACT
Background We sought to investigate the formal and informal ways preregistration students from medicine, nursing, pharmacy and the allied healthcare professions learn about patient safety.

Methods We drew on Eraut’s framework on formal and informal acquisition of professional knowledge to undertake a series of phased theoretically informed, in-depth comparative qualitative case studies of eight university courses. We collected policy and course documentation; interviews and focus groups with educators, students, health service staff, patients and policy makers; and course and work placement observations. Data were analysed thematically extracting emerging themes from different phases of data collection within cases, and then comparing these across cases.

Results We conducted 38 focus groups with a total of 162 participants, undertook 82 observations of practice placements/learning activities and 33 semistructured interviews, and analysed 44 key documents. Patient safety tended to be either implicit in curricula or explicitly identified in a limited number of discrete topic areas. Students were predominantly taught about safety-related issues in isolation, with the consequence of only limited opportunities for interprofessional learning and bridging the gaps between educational, practice and policy contexts. Although patient safety role models were key to student learning in helping to develop and maintain a consistent safety ethos, their numbers were limited.

Conclusions Consideration needs to be given to the appointment of curriculum leads for patient safety who should be encouraged to work strategically across disciplines and topic areas; development of stronger links with organisational systems to promote student engagement with organisation-based patient safety practice; and role models should help students to make connections between theoretical considerations and routine clinical care.

INTRODUCTION
Globally, patient safety has now been at the forefront of the policy agenda for health services for over a decade,1–4 and there is an increasing recognition of the important role of the issue in higher education. For instance, World Health Organization (WHO) is actively developing a patient safety curriculum for multiprofessional education.5 Additionally, professional regulatory bodies are focusing more and more efforts on ensuring that practitioners are competent and safe to practise.6 7 For example, the Health and Care Professions Council, which regulates health, psychological and social work professionals in the UK has set generic safety standards.8 These specify that the practitioner must at all times maintain a safe practice environment and select appropriate hazard control and risk management strategies.

However, although the focus on professional values, safe practice and role
models has existed since the emergence of healthcare as a discipline, the potential underlying mechanisms surrounding the aetiology of errors in practice and education are a more recent development. This is particularly true in the medical domain that has for centuries been characterised by strong hierarchical structures and a large degree of professional autonomy. In attempting to bridge this gap, Charles Bosk distinguishes between technical and normative errors made by resident surgeons where technical errors are clinical errors, and normative errors are viewed as a failure in the conscientious execution of professional duties. While the former may be considered as forgivable learning experiences, the latter are seen as fundamental deviations from recognised standards of practice. Recognised standards of practice, professional knowledge and values are acquired by learners through interaction with peers and role models over time. However, these ‘standards’ may differ between organisational settings and teams, and are transmitted via the hidden curriculum and socialisation processes.

Professional knowledge may be viewed as acquired through a combination of academic (theoretical), organisational (service context), and practice (experiential) aspects, learned across a range of formal and informal settings and mechanisms. Students are exposed to all of these, usually with academic input in protected environments preceding or interspersed with practical work in healthcare settings. Curriculum content for knowledge and practical skills tend to be determined by senior members of staff who are expected to draw on professional expertise, health and social care policies, and relevant evidence to determine what and how learning should occur. The particular educational approach employed also reflects the culture of the higher education institute and its service partners, as well as the expertise of individual members of staff who support learning in both academic and clinical settings. There are, however, tensions between the idealised learning of campus-based activity and the real world of practice. These can undermine both the transfer of skills into routine patient care and effective learning in practice from experienced practitioners. We also know that many safety problems result from departures from, or violations of, accepted good practice, implying that learners must have strongly embedded knowledge, skills and attitudes; and learn in practice areas ‘fit for purpose’ (ie, equipped and staffed to appropriate levels) to avoid attrition of safe actions in the stresses of the clinical environment.

Formal educational activities and supervised placement experience are of major importance in prompting health professional students to internalise and apply principles of patient safety in practice. However, little is known about how higher education and healthcare settings work together to ensure that their students learn about patient safety, or where and how such learning may take place. In order to fill this gap, we sought to investigate the formal and informal ways preregistration students from a range of healthcare professions learn about patient safety, and to make suggestions for how learning can be more effectively transferred into practice.

METHODS

Overview of study design

We drew on Eraut’s work on formal and informal acquisition of professional knowledge. This theoretical framework views knowledge as the outcome of both formal and informal learning created in different contexts, including academic (taught at the university), organisational (management or policy agendas) and practice (clinical work in healthcare settings) contexts (table 1). Although these contexts are intrinsically related, they value and produce differing types of knowledge which may not easily be understood, accepted or transferred from one context to the other. We also drew on illuminative evaluation as an ethnographic, participatory method. Illuminative evaluation aims at investigating issues that are important to individuals in certain contexts.

To investigate the different types of professional patient safety knowledge acquired in various contexts as well as their alignment, we conducted eight in-depth comparative qualitative case studies of purposefully selected academic healthcare professional preregistration university courses in medicine, nursing, pharmacy and physiotherapy (table 2). Conceptualising courses as case studies allowed examination of the various contexts of knowledge acquisition within their specific local setting, before making comparisons within and across disciplines. Data collection and analysis proceeded in an iterative manner, thereby enabling the findings from earlier

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<th>Table 1</th>
<th>An overview of the three contexts in which professional knowledge is acquired</th>
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<td>Academic context</td>
<td>Course content as planned, delivered and received. Thought to generate theoretical knowledge, which is mostly communicated through written language and academic debate.</td>
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<tr>
<td>Organisational context</td>
<td>Relates to organisational policies and procedures. Policy and management views of patient safety and influences on education and practice.</td>
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<tr>
<td>Practice context</td>
<td>The cultures to which students are exposed—patient safety in day-to-day working. Concerned with actions/experiences and corresponding uncertainties and ambiguities.</td>
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Formal planned and ‘informal’ education

‘Informal’ education
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<th>Table 2 Case study sites and professions</th>
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activities to inform future data collection, which allowed connections to be made between the three contexts under investigation, and encouraged a coherent overview to emerge.23

Sampling
Case study sites (ie, where courses were based/delivered) were purposefully selected based on demographic and historical differences (table 2) to identify a range of diverse courses across the professions of medicine, nursing, pharmacy and physiotherapy. This led to eight in-depth case studies.

Within these courses, we purposefully recruited a range of participants representing the different contexts using snowball sampling techniques.6 Participants included course leaders, profession-specific healthcare managers and those with a safety remit, students, clinical educators, newly qualified staff and patients involved in delivering education. Initial participants were identified through our existing contacts at the relevant academic institutions, and subsequently through recommendations of participating individuals. To be eligible to participate, individuals had to fulfil the criteria for our purposive sample, that is, provide (any pertinent) insights into how patient safety education was delivered and/or received. During the later stages of data collection, we particularly attempted to recruit and obtain insights from participants who were likely to have different experiences to those that had already been expressed in order to obtain insights into a range of perspectives.

Data collection and handling
Data collection consisted of a mixture of documents, observations, researcher-facilitated focus groups and interviews across the three different contexts (table 3). This provided an insight into individual attitudes to patient safety education (interviews), views and underlying dynamics of different groups (focus groups), official guidance and policies (documents), and teaching and learning behaviours in context (observations). Designated researchers led on data collection relating to each course.

| Table 3 Data collection activities and types of participants to investigate different contexts |
|---------------------------------|-------------------------------------------------|
| **Data collected**               | **Academic context**                            |
|                                 | Collection of course documents. Focus groups with students and patients. Observation of teaching in academic and practice settings. Interviews with course leaders and key informants. |
|                                 | **Organisational context**                      |
|                                 | Collection of organisational documents from practice settings. Collection of policy documents from professional bodies. |
|                                 | **Practice context**                            |
|                                 | Focus groups with newly qualified staff. |

Interviews were semistructured in nature. Interviews and focus groups were audio-recorded and transcribed, while researcher field notes constituted data for the observational part of the study. Topic guides for interviews and focus groups, as well as observation notes were tailored to participants’ roles and relevant settings. Sample topic guides and observation recording sheets illustrating salient points can be viewed in box 1. Key themes explored were the planning and implementation of patient safety curricula; the safety culture of the places where learning and working take place; the student–teacher interface; and the influence of role models and organisational culture on practice.17 Documents were collated and examined for relevant patient safety-related content.

Analysis
Data collection and analysis were iterative and concurrent. Regular analysis workshops within subject-specific groups and the extended project team facilitated discussion of emergent hypotheses, emerging findings within/ across courses, and development of further lines of enquiry relating to future data collection. Data collection continued until we ascertained that we had obtained relevant insights into different contexts within each course, and no further themes emerged.

Data for each case study site were coded by at least two independent members of the research team (researcher triangulation), who then compared and summarised a coding framework for secondary checking by others. This process involved both deductive and inductive coding activity, as each lead researcher initially coded data from their respective case studies against the different contexts of knowledge in Eraut’s framework. During analysis, themes were iterated across sites, different data sources (data triangulation)
and professional groups. This involved examining both similarities and differences, constantly searching for disconfirming data. In order to facilitate comparison across the different courses and learning contexts, emerging data were indexed across the following dimensions: risk assessment, communication, patient handling, infection control, prescribing and administration of drugs. These were integrated across Eraut’s different contexts of professional learning (table 1).6

Ethics and governance
Ethical approval was obtained from the Newcastle and North Tyneside Local Research Ethics Committee 2 (reference 06/Q0906/97). Each site also obtained site-specific approval from local ethics committees, and from relevant university committees. Comprehensive information sheets facilitated informed consent, which was obtained from all participants via signed consent forms. Anonymity was preserved during data collection and analysis by use of case study site codes.

RESULTS
Our complete dataset is summarised in box 2. Overall, we conducted 33 semistructured interviews, 38 focus groups with a total of 162 participants, and 82 observations of practice placements and learning activities. We also collected a total of 44 documents.

Our findings echoed those from previous research in some respects (see box 3)24–41 However, rather than considering these in any depth, we have chosen to focus on key novel insights to emerge from this analysis which are presented below.

Patient safety-related tensions in the formal curriculum
Although most interviewees reported that the highly visible policy drive on patient safety made an explicit curriculum content and outcomes increasingly important, most academic tutors perceived that teaching patient safety as a ‘stand-alone module’ was inappropriate. The following quotations illustrate how academic leads conceptualised patient safety as more of an overall outcome of their programmes, rather than a curriculum topic, and as an overarching theme which integrated different learning activities.

…and then clinical procedures is another area and we don’t stand up and say: this is about patient safety.

Box 2 Our complete dataset

- 17 interviews with course leaders and key informants
- 16 interviews with professional leads and key managers
- Eight focus groups with a total of 47 2nd year students
- Eight focus groups with a total of 44 final year students
- Eight focus groups with a total of 21 newly qualified staff
- Six focus groups with a total of 22 patients
- Eight focus groups with a total of 28 practice staff
- 82 hours of observations
- A total of 44 documents

Box 3 Summary of findings consistent with previous research

- Patient safety material is being incorporated into both formal and informal curricula.24 27–31 34 35 37 This is consistent with our work, but we have also shown that patient safety was more visible in practical sessions and on placements than in formal curricula.
- Patient safety in the curriculum is currently largely implicit rather than explicit.24 27 29 31 34 35 41 Our work has confirmed this with patient safety being viewed as implicit in curricula as an overall programme outcome as opposed to a distinct area of competency.
- Patient safety teaching requires influencing not only skills and knowledge but also attitudes and reflection.24–26 28–30 32 34 36 40 Our work builds on this by highlighting the need for reflection on action in enabling students to learn about safe practice. Currently, reflective practice seems to be more commonly applied to ethical and professional dilemmas than to technical skills or knowledge acquisition.
- Teaching root-cause and significant event analysis can promote the development of reflective practice:25 26 28 30 32 35 37–40 Although participants recognised the importance of root cause and significant event analysis to enhance reflective practice, systems to promote patient safety employed in organisational settings and resulting policies were rarely found in curricular documentation or teaching activities.
- Different preregistration courses differ significantly in how they approach teaching about patient safety.27 33–39 This was confirmed by our work. Definitions of patient safety and key learning topics reflected the professional group involved.
- Clinical staff as role models.29 33 Our work confirmed that patient safety role models are key to student learning in helping to develop and maintain a consistent safety ethos. However, we also found limited exposure to positive role models and supervised practical opportunities.
- The effectiveness of interprofessional learning about patient safety.23 35 36 40 41 Our work confirms that interprofessional learning is viewed as important, but not very common. This is particularly true for more theoretical topics, such as information sharing, recording risk assessments and handovers.
We say: this is about good practice and being a good doctor, and being patient-focused, you know. (Interview with course leader, Site A, Medicine)

We don’t specifically signpost it and as they’re learning going through medical school we need to discuss it within the context – to say: this was a safety issue, and put a flag on it – and we probably don’t do that often enough even though we discuss the issues. (Practice tutor focus group, Site D, Medicine)

Definitions of patient safety and key learning topics reflected the professional group involved: for example, physiotherapists highlighted physical safety (eg, prevention of falls and safe manual handling); whereas pharmacy focused on medication errors; nursing was particularly concerned with issues of hands-on care (infection control, safe drug administration); while medicine was mainly concerned with diagnostic errors and high-risk procedures. It was much less common for any preregistration course to include teaching about the underpinning causal factors such as cognitive errors,\textsuperscript{42} or service requirements, such as incident reporting systems, and it was therefore unclear how learners would develop a conceptual understanding of more complex systems and processes of safe practice. Some of the curricular documents showed that there were explicit learning activities around significant event analyses, but few documents showed that there were explicit learning processes of safe practice. Some of the curricular documents showed that there were explicit learning activities around significant event analyses, but few documents showed that there were explicit learning processes of safe practice. Some of the curricular documents showed that there were explicit learning activities around significant event analyses, but few documents showed that there were explicit learning processes of safe practice. Some of the curricular documents showed that there were explicit learning activities around significant event analyses, but few documents showed that there were explicit learning processes of safe practice. Some of the curricular documents showed that there were explicit learning activities around significant event analyses, but few documents showed that there were explicit learning processes of safe practice. Some of the curricular documents showed that there were explicit learning activities around significant event analyses, but few documents showed that there were explicit learning processes of safe practice.

…there’s also a big problem with the fact that you do feel that there’s a criminalisation of making errors and that’s always a problem because the thing about owning up and doing it has got to be in a safe environment for the near miss thing, but if somebody is doing that and people feel it’s gonna wipe out their career for an error then they’re not going to want to report it… (Final year student, Site D, Medicine)

Teaching ideal practice

The university setting provides a relatively controlled environment for students to learn to be competent practitioners. All courses included educational activities focusing on aspects of patient safety examples in relevant topics. Explicit patient safety-related content was evident in the following five areas across professional disciplines: prescribing and administration of drugs, communication skills, infection control, risk assessment, and moving and handling.

One common observation was that teaching demonstrated and emphasised ideal practice, coupled with warnings about adverse consequences (often in the form of patient complaints) of not achieving this.

One patient might take it the wrong way and they’ve got a complaint against you (Verbal quote of teaching staff noted by researcher, Clinical Procedures year 2, Site A, Medicine)

It was much less common to rehearse the factors that undermine performance, or address complex variations in practice, as expressed by a third year physiotherapy student:

One of the main things to say is that we have, when we do our assessments and our practical things like (…) keeping the patients safe but you don’t actually learn it until you’re out on placement, until you are in that setting. … once you get in practice it’s a whole different ball game. (Year 3 student, Site B, Physiotherapy)

Reflection on action—encouraged in a variety of ways—was seen as another important tool in enabling students to learn about safe practice, and was more commonly applied to ethical and professional dilemmas than to technical skills or knowledge acquisition. However, systems to promote patient safety employed in organisational settings (such as team safety culture, reporting functions, or root cause analysis) and resulting policies were rarely found in curricular documentation or teaching activities.

Systems and safety in interprofessional practice

Although many course curricula clearly covered overlapping areas, such as infection control, safe prescribing, communication and falls prevention, it was uncommon for students to learn about these in multi-professional groups. This was despite respondents citing the effectiveness of teaching quality and safety in interprofessional teams as important. Yet, there was very little of interprofessional safety education in information sharing, recording risk assessments and handovers than in more practical topics.

Physios and Occupational Therapists we’re pretty much… the way we train we are used to working together, but especially doctors and pharmacists don’t: it doesn’t seem to be part of their training in any way. Quite often they don’t really have a clue. (Year 2 student, Site D, Physiotherapy)

The importance of supervised practice

The principle of learning safe evidence-based practice ‘on the job’ was valued and promoted by staff in all disciplines, and data showed that patient safety was more visible in practical sessions and on placements than in formal curricula.

Really it’s a very practical thing and it’s a very workplace related thing and I think that’s where the learning should come from. So therefore you’re sort of dependent on the people that are delivering teaching or teaching and learning in that setting. And my feeling would be it would be much more real and much more powerful for learning if students actually see it happening, rather than just get told about it when it’s actually divorced from practice. (Interview with course leader, Site C, Pharmacy)
...but it doesn't really, for me, put it into context... because as soon as you go onto the ward you look at a patient who's got an intravenous drip up or a catheter and moving them is suddenly a lot harder than it is moving one of your friends... (Year 2 student, Site B, Nursing)

Students were enthusiastic about patient safety as a priority in their learning, seeing it as relating to dealing with 'real issues for real patients'. However, some professions had little compulsory training in practice settings: for pharmacy, voluntary work experience had to compensate for limited formal clinical exposure in healthcare settings during the university programme, and increased student numbers and risk limitation meant that medical students got much less hands-on working experience with patients than might have been the case in previous decades.

I learnt more in the summer than I did all last year at Uni, just being there for on hand experience. (Year 2 student, Site B, Pharmacy)

...you go to Uni to learn the theory, you go to do your preregistration, you go to learn the practical. Although there’s a little bit of practical dotted throughout the course, it’s not kind of a gradual build up to go to preregistration, it’s like...It’s a total of about nine hours on the...less than that-eight or nine hours on the wards talking to patients, and then all of a sudden...you’re doing eight hours a day... (Preregistration student, Site C, Pharmacy)

Many respondents noted that differences between academic and practice expectations were not always explored by placement supervisors, or formally acknowledged by lecturers/academics, and this left learners unclear about what was acceptable variation versus unsafe practice.

...the stranger moving into an established group of people, and they very quickly find out how best they can...feel secure in the group. If they challenge what is unacceptable behaviour, if they say: “in college we were taught this” someone will laugh at them, some will decide what they’ve learned and the student will feel challenged. (Patient focus group, patient, Site B)

The use of simulation could, to some extent, help to bridge the gap between theory and practice. Existing approaches here included mainly role play exercises including clinical activities and interactions with patients.

Role models and relationships with mentors

Learning from and with practitioners was highly valued by all student groups in both academic and practice settings, especially if practitioners were good role models who could assist students in exploring areas of uncertainty through effective supervision and mentoring. Much learning in the practice setting was informal, depending on which patients were available and willing for contact. The way mentors or educators behaved, and the way they taught, influenced students’ learning, with the educational impact also dependent on the students’ opportunity to try out their own skills and understanding. For example:

...say we were out doing house calls and we’re out doing all sorts of things: I sort of try to be very reflective in the way I’m practising and to try and instil in the student good practice... which is what I’m sure most people do because an awful lot of what the students learn through osmosis as well as actual, you know, a, b, c, d step wise sort of seeing a process through.... I’m just trying to give the best example of good practice that I can when I’m with the students, with the total transparency that I am not perfect... (Junior doctor focus group, Site A, Medicine)

Students recognised that relationships with the mentor or educator were critical to their learning. Factors identified as important included availability (eg, time together, attention, emotional approachability); willingness to teach; and attitudes to questioning. Students were generally very aware that mentors or educators assessed their placements, and could pass or fail them in relation to safe practice, and clinicians were conscious of the tension between their responsibilities as clinicians, and as educators—both were perceived as tending to make a full and frank discussion of how safety may break down in practice quite difficult.

“I think they (the students) are putting the theory into practice... sometimes you are not able to do it exactly by the book, given the situations you’re in at the time. And it’s not necessarily unsafe what you’re doing—it’s just that you’ve adjusted the theory into the practical situation.” (NHS staff focus group, Site B)

Similarly, the relationship with mentor or educator and the influence of hierarchy also affected how confident students felt to challenge unsafe practice in other staff.

DISCUSSION

Main findings

Our work has shown that patient safety tended to be viewed as implicit in curricula as an overall programme outcome as opposed to a distinct area of competency. Teaching was predominantly based on idealised scenarios, offering limited opportunities for interprofessional learning, as well as restricted transfer of knowledge between educational, practice and policy contexts (as investigated with the help of Eraut’s framework). For example, there were few opportunities for students to acquire insights into organisational policies and procedures, such as incident reporting or root cause analysis. Supervised practice and the role of mentors in clinical practice settings were seen as pivotal in ensuring that safe practice is not only understood in theory, but also...
effectively translated into practice. The key contributions of our work are summarised in box 4.

**Strengths and limitations**

The strengths of the study are in its breadth and coverage. We collected a large amount of data from many different groups of participants, through a range of methods investigating several healthcare professional courses in detail. This not only allowed comparisons within, but also across healthcare professional disciplines. There was also strong triangulation across datasets, and the main conclusions and recommendations of the study are evidenced by several different types of data collection and groups of respondents. The theoretically informed nature of this work helped to conceptualise and relate the different contexts of learning by drawing on Eraut’s framework.6 18 This was further facilitated by the expertise of a large multidisciplinary team, who contributed towards the design of common data collection instruments and analysis frameworks which all went through several iterations before use. All raw data were coded by more than one researcher, which helped to validate our findings. In the final analyses, saturation was found to be reached in relation to the main findings.

However, there were limits to this study. The complexity of the subject area (patient safety) meant that respondents often appeared to have different understandings and priorities—but it is possible that this was due to the operational examples given in discussion, rather than a genuine lack of consensus across disciplines. Additionally, many findings were about the challenges of all clinical education rather than being particular to patient safety learning (eg, nature of the curriculum). The wealth of data obtained meant that it was hard to do justice to the more subtle findings. Further discipline-specific findings from this project can be found elsewhere.11 17 45

**Box 4 Summary of key contributions of this work**

**What was already known on this topic**

- Healthcare is a high-risk environment in which practices may lead to considerable potentially avoidable morbidity and mortality.
- Preregistration education and training represents the most fundamental opportunity to ensure that healthcare staff understand the key issues relating to patient safety and appreciate how to effectively translate these into practice.
- UK accrediting bodies are systematically increasing their expectations that preregistration courses demonstrate how they ensure that their graduates are safe to practise.

**What this study adds**

- While courses cover many aspects of safe practice, most do not explicitly label these as patient safety related topics. This may be related to different conceptualisations of the field.
- There are few opportunities for learners to understand how to deal with risks to safety arising in practice, and the minority of courses explicitly engage with policy and practice related activities of healthcare settings such as incident reporting or root cause analysis.
- Enhanced relationships between academia and practice alongside effective clinical placements with high-quality student supervision and feedback are core to the development of more effective patient safety focused care. Limited exposure to positive role models and supervised practical opportunities can undermine this integration.
- Increasing expert input via the appointment of educational ‘patient safety champions’ (on similar lines to, for example, the ‘cleanliness champions’) should be considered in order to strengthen the explicit role of patient safety in curricula; these champions could work simultaneously across healthcare professional education and training programmes.

**Considering the findings from this work in relation to the published literature**

The findings from this work highlight how patient safety is different from a subject such as dermatology, in that it is actually a product or outcome of a highly complex sequence of actions by multiple people and technologies. There are, therefore, didactic knowledge and technical skills to be acquired by learners,46 but also an understanding of the systems and cultures that do or do not enhance safety. In this sense, it has more in common with the teaching of professionalism as an ethos and expectation—a set of values, a mode of practice and a code of behaviours.47 Our work has reinforced the latter assumption, in that staff and students in all settings resisted making patient safety a ‘modular’ subject. These findings are consistent with the literature on the ‘hidden curriculum’, which underscores the importance of implicit learning (eg, as observed here through role models and practice placements) but also the need for integrating explicit (taught) and implicit messages.48 However, there was evidence that gaps in current knowledge and lack of educational capacity and sophistication in some instances may mean that students exit without a cogent grasp of either the current evidence base, or its systematic translation into hard-wired safety messages for practice.

More surprisingly, there seems to be very little link between healthcare systems and preregistration learning. For example, the now ‘bread and butter’ activities of significant event and root cause analysis rarely get taught or form the basis for learning examples in preregistration curricula.49 This may be a missed
opportunity, or may be an expression of a continuing cultural divide between clinicians and health service managers. Indeed, educational expertise may be missing in the context of organisational health service education for, and training in, patient safety. Policy documents inspected in the study often failed the ‘clear messages’ test, with crucial issues about safe injection practices being buried in text alongside the minutiae of procurement practices. Again, safety is only one of many areas where health service organisations and academic practice might benefit from closer working and a broader set of competencies in how to achieve effective communication and learning.

In the context of education, it is appropriate for learners that knowledge and skills are taught in manageable ‘bites’, and then applied to more complex situations in healthcare settings. It is also good practice to integrate learning into tasks that relate to clinical practice under supervision as learners become closer to independent practice. Very few courses, however, had a sophisticated understanding or approach to simulating adverse events and risk assessments. This seems surprising, given the many educational settings in which simulations are used for complex interpersonal communications or embedded assessment of skills. Novel teaching and learning methods in this respect could include, for example, simulating scenarios surrounding whistleblowing and associated behaviours, managerial approaches to improve organisational systems through drawing on results obtained from reporting systems and structured procedures designed to improve patient safety including time-outs and handovers. The claim that ‘everything should be about safety’ has face validity, but this does not assist curriculum leads or clinical tutors to understand the core knowledge relevant to safety systems. Nor does it guide course teams in how to develop safe practices in their students.

Our findings fit in well with global efforts toward patient safety education. For example, the Accreditation Council Graduate Medical Education (ACGME) has recently published guidelines for the Graduate Medical Education Next Accreditation System (NAS), which will be rolled out from 2013. The fundamental developments in this guidance include greater emphasis of professionalism, interpersonal and communication skills, practice-based learning and improvement, and systems-based practice. Additionally, there is considerable emphasis placed on the quality and safety attributes of the practice setting in which young practitioners train. These developments reflect the trend towards increasing appreciation of the importance of practice-based learning, reflective practice and systems-based approaches towards improving patient safety observed in our work.

Implications for policy, practice and future research
Based on our interpretation of the data, and drawing on Erat’s framework, we summarise key recommendations for educators and clinical tutors which are equally suitable as course outcomes and healthcare organisational targets (box 5). What is needed is genuine organisational commitment to ensuring that staff have time and resources for close supervision, small group teaching, and discussion of practical and theoretical safety issues in order to facilitate both practical and conceptual integration. A very hectic clinical environment where students become passive onlookers can mean that important learning opportunities are missed. In this environment, students need to be systematically taught about how and why errors arise, and how they can react early to perceived increased risks and minimise these, rather than only teaching what ‘should’ happen. This needs to include teaching patient safety-related content that is both explicit (as evident in discrete areas, e.g., prescribing and administration of drugs), but also more implicit, focusing on learning about the aetiology, the opportunities offered by near misses to understand systems failures, and appreciating the impact of errors, particularly if these result in adverse events. Mechanisms to achieve this may include more focus on the frequency, underlying causes and reporting of near misses and adverse events; discussing particular periods of risk (e.g., during handovers and transitions of care); teaching of significant event and root cause analysis to enhance reflection; reflecting on the importance of an open and fair organisational culture that promotes system approaches to improve safety (as opposed to blaming individuals) and creates high-reliability organisations (as oil and aviation are considered to be); and providing opportunities for students to learn when to call for additional help. In order to achieve this, it is vital that closer links between academic staff and healthcare organisations are developed. Establishing such connections may be facilitated by appointing designated patient safety champions to drive content development and role models in clinical placements to narrow the theory–practice gap.

In relation to future research, there is a pressing need to develop and test valid criteria for assessing learning in relation to patient safety. The best way to measure results of a patient safety curriculum is likely to be through students’ self-perceived changes in practice over time. The impact of patient safety champions to lead expertise for education should be piloted, exploring feasibility, core training and impact, and there should be more in-depth study of practice education in relation to patient safety. This is not to say that other curriculum content should be taken out to accommodate the changes proposed. Rather, we advocate that patient safety needs to be more explicitly integrated into what is already present in the curriculum (e.g., extending reflective learning through applying root cause analysis).
CONCLUSIONS
Patient safety is now part of the rhetoric of all stakeholders in health professional education, and learning and assessment has changed to accommodate organisational policy priorities. Teaching and assessment which are informed by clinicians and highlight areas of safe practice are common, particularly where the focus can be on a discrete set of well-defined practical tasks. We acknowledge that professional education is complex, situated and social; but the opportunities for preregistration students to be part of a team which is involved with routine organisational safety systems are limited. Few schools have recruited academic leads for patient safety. This is an important omission, as such champions could inform their didactic teaching by spanning boundaries between theory and practice, and also support staff to develop their own expert knowledge and application with learners to promote safe patient care.

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Patient safety in healthcare preregistration educational curricula: multiple case study-based investigations of eight medicine, nursing, pharmacy and physiotherapy university courses

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