

The state of quality improvement and patient safety teaching in health professional education in New Zealand

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ABSTRACT

AIM: To investigate how quality and patient safety domains are being taught in the pre-registration curricula of health profession education programmes in New Zealand.

METHODS: All tertiary institutions providing training for medicine, nursing, midwifery, dentistry, pharmacy, physiotherapy, dietetics and 11 other allied health professions in New Zealand were contacted and a person with relevant curriculum knowledge was invited to participate.

Interviews were conducted using a semi-structured interview guide to explore nine quality and safety domains; improvement science, patient safety, quality and safety culture, evidence-based practice, patient-centred care, teamwork and communication, leadership for change, systems thinking and use of information technology (IT). Transcribed data were extracted and categorised by discipline and domain. Two researchers independently identified and categorised themes within each domain, using a general inductive approach.

RESULTS: Forty-nine institutions were contacted and 43 (88%) people were interviewed. The inclusion and extent of quality and safety teaching was variable. Evidence-based practice, patient-centred care and teamwork and communication were the strongest domains and well embedded in programmes, while leadership, systems thinking and the role of IT were less explicitly included. Except for two institutions, improvement science was absent from pre-registration curricula. Patient safety teaching was focused mainly around incident reporting, and to a lesser extent learning from adverse events. Although a 'no blame' culture was articulated as important, the theme of individual accountability was still apparent. While participants agreed that all domains were important, the main barriers to incorporating improvement science and patient safety concepts into existing programmes included an 'already stretched curriculum' and having faculty with limited expertise in these areas.

CONCLUSIONS: Although the building blocks for improving the quality and safety of healthcare are present, this national study of multiple health professional pre-registration education programmes has identified teaching gaps in patient safety and improvement science methods and tools. Failure to address these gaps will compromise the ability of new graduates to successfully implement and sustain improvements.

There is now a general consensus that widespread system change for improving the quality and safety of healthcare will not be a reality unless health professionals make improvement 'an intrinsic part of everyone's job, every day, in all parts of the system'.¹

This idea was founded by reports from the Institute of Medicine (IOM), which high-

lighted the poor quality of healthcare,² called for a radical redesign of the healthcare system³ and led to the third IOM report, *Health Professions Education: A Bridge to Quality*.⁴ The latter developed strategies for restructuring teaching and learning activities, and identified five high-level core competencies essential for improving the quality and safety of healthcare that applied across all health professions: provide

patient-centred care, work in interdisciplinary teams, employ evidence-based practice, apply improvement science and utilise information technology (IT). These were then adapted for nursing, who added a sixth core competency, 'patient safety'.⁵ The World Health Organization subsequently developed comprehensive curriculum guides in patient safety both for medicine⁶ and multi-professional groups.⁷

Improvement science has its roots in industrial quality improvement methods, but is relatively new for healthcare.⁸ As an applied science, improvement science offers a robust and pragmatic approach to addressing real life problems, in real life situations and in real time, utilising simple frameworks for change that are underpinned by a strong focus on measurement, sampling, qualitative and quantitative data collection and iterative tests of change using Plan-Do-Study-Act (PDSA) cycles. It has been advocated that mastery of the theory and methods of improvement science should be regarded as a core competency for all health professionals if we are to effect the necessary system changes.⁹ Its value as a way of keeping pace with change has also been recognised in both engineering and education.¹⁰

Building healthcare workforce capability in improvement science is a challenge. The field is broad and is subject to multiple interpretations and approaches.¹¹ Many practitioners lack the confidence and capability to effectively engage in change in their workplace.¹² Rather than intrinsic to everyday work, this has resulted in pockets of improvement, poor sustainability and beliefs that improving quality is a 'project' (and someone else's responsibility) or that it is simply techniques such as PDSA cycles.¹²

A considerable amount of work has been undertaken internationally to develop and implement frameworks to build capability in quality improvement science and patient safety across the healthcare sector.¹³ In New Zealand, the Health Quality & Safety Commission (the Commission) has identified building sector capability in quality and patient safety as one of its strategic priorities.¹⁴ As part of this mandate, the Commission has developed a framework for quality and safety capability for the New Zealand healthcare workforce.¹⁵ This

framework provides a common understanding of what healthcare workers and consumers are expected to 'know and do' with respect to quality and safety domains across all levels of the health system. These expectations apply also to new graduates, implying the required knowledge and skills should be addressed as part of the pre-registration education and training. There are concerns that pre-registration education for the health professions has not kept pace, and that institutes of higher learning have been slow to adapt and prepare students to become critical thinkers, problem solvers and lifelong learners.¹⁶

Whether New Zealand tertiary institutions providing health professional education are teaching quality and safety knowledge and skills is unknown. The aim of this study was to identify how quality improvement and patient safety domains are being taught in the pre-registration curricula of health professional training.

Methods

Sampling frame

We identified all tertiary education institutions (university and technical institutes) in New Zealand that provided health professional education in 18 disciplines (Table 1).

Table 1: Included health professional disciplines.

Tertiary education institutions	
Audiology	Midwifery
Chiropractic	Nursing
Dentistry	Occupational therapy
Oral health/dental therapy	Optometry and optical dispensing
Dietetics	Osteopathy
Medical imaging	Pharmacy
Medical laboratory science	Physiotherapy
Medical radiation technology	Podiatry
Medicine	Speech language

Study instrument

A semi-structured interview guide was developed to solicit participant information.

Table 2: Quality and safety domains.

1. Improvement science	Use improvement science methods and tools to analyse and define gaps in the quality of care, monitor the quality and reliability processes and outcomes of care, and design, test and implement changes to continuously improve the safety and quality of care.
2. Patient safety	Use a human factors and systems-based approach to understand and respond to adverse events and inform the design of safer and more reliable safety systems.
3. Quality and safety culture	A culture where reporting and learning are the norm in the context of mutual respect and transparency.
4. Evidence-based practice	Able to locate and critically appraise evidence to identify bias and determine validity. Integrate best research with clinical expertise and patient preferences and values to achieve optimal outcomes for patients.
5. Patient-centred care	Empowering patients/consumers and their families/whānau to interact with healthcare providers to achieve outcomes consistent with their preferences, needs and values.
6. Teamwork and communication	Collaborating effectively with others across professional, organisational and cultural boundaries to achieve shared quality and safety goals and ensure care is continuous and reliable.
7. Leadership for change	Doing what is right and setting examples for others.
8. Systems thinking	Appreciating healthcare as a complex and dynamic adaptive collection of interrelated and interdependent components with a common purpose or aim.
9. Using information technology (IT)	Using information technology to manage knowledge, mitigate error and support decision-making.

Interview questions were constructed to explore nine domains (Table 2), which were identified and adapted from the Institute of Medicine core competencies,⁴ the Quality & Safety Education for Nurses framework⁵ and the recently developed New Zealand Health Quality and Safety Commission’s Knowledge to Action Framework.¹⁵

Study participants

Each eligible institution was contacted and invited to identify the appropriate course coordinator/s or curriculum leader/s who would be willing to participate in this study. After receiving consent, a time for an interview was scheduled and participants were sent information describing the Commission’s interest in this area, outlining the purpose of the study and describing the quality and safety domains of interest.

The semi-structured interview schedule was piloted with two sites. The first site was used to check the logic and clarity of the questions. The second site was used to pilot test the questions. Minor changes were made based on the feedback. Information from the pilot test site was included as part of the analysis. To maintain consistency, at the time of the interview, participants were given a brief description of each domain according to the definitions (Table 2), and then asked to what extent each domain was included in the curriculum, how it was included and at what stage of the programme.

Their views were also sought about their perceived importance of including quality and safety knowledge and skills in their pre-registration programme, and what the associated barriers and challenges were. One researcher (GR) conducted the interviews, which were digitally recorded and then transcribed. Interviewee consent was given verbally and each was informed about the confidentiality of their responses.

Research team

At the time of the study, three of the four members of the research team were employees of the Commission (GR, GB, IS) and one (SW) was contracted to the Commission for a one-year period. Two (GR, SW) also held teaching and research positions within the University of Auckland and were involved in teaching quality improvement in the undergraduate medical programme as well as within the Masters in Health Leadership program. Three of the four members of the research team (GB, IS and GR) had been involved in the development of the Commission’s Knowledge to Action Framework. The researchers had no formal relationships with participants prior to the study being undertaken. The Commission’s interest in the study was identified in the background information sent out to participants before the interview, and the interviewer’s role was made clear to participants at the time of the interview.

Analysis

Given the assurance that anonymity would be preserved, it was established *a priori* that data would be aggregated by domain across all disciplines. For each interview, data were extracted and categorised by discipline and domain question using an excel spreadsheet. Responses were then collated by domain. For each domain, two researchers (GR and SW) independently interpreted the data and identified themes using a general inductive approach¹⁷ as well as selecting and categorising quotes. Discrepancies were discussed and further reflections drawn from the remaining research team members to reach a consensus. Although the interviews were semi-structured and responses variable, attempts were made to determine the frequency of responses where possible. Potentially identifying information was masked to protect the participants and their institutions. No attempt was made to specifically compare responses between professions.

Participants were not asked to provide feedback on the transcribed interviews.

Ethics approval

A Health and Disability Ethics Committee ethics approval was sought but not required for this study.

Results

Forty-nine tertiary education institutions were contacted and 43 people (88%) representing the 18 eligible disciplines agreed to participate (Table 3). Two declined and three did not respond to our invitations after at least three attempts. Most disciplines have one or two teaching institutions in New Zealand, whereas 15 providers (mainly technical institutes) provided undergraduate nursing tuition. Two interviewees stated that their institution provided discipline-specific education and training for a second institution.

Interviews were conducted by phone (36/43; 84%) and face to face (7/43; 16%).

Table 3: Responses by discipline and type of institution.

Discipline	Interviews N=43	University N=21	Technical institute N=21	Other N=1
Audiology	1	1		
Chiropractic	1			1
Dentistry	1	1		
Oral health/dental therapy	2	1	1	
Dietetics	2	2		
Medical imaging	3		3	
Medical laboratory science	2	2		
Medical radiation technology	1	1		
Medicine	3	2		
Midwifery	4	1	3	
Nursing	14	3	12	
Occupational therapy	2	1	1	
Optometry and optical dispensing	1	1		
Osteopathy	1		1	
Pharmacy	1	1		
Physiotherapy	1	1		
Podiatry	1	1		
Speech language	2	2		

They were recorded and field notes taken. The length of interview ranged from 25 minutes to 50 minutes and only the participants and the interviewer were present at the time of the interview. In some cases, more than one person from the educational institution participated in the interview. Data saturation was achieved by approaching all institutions and the high response rate.

Of the 43 that were interviewed, the majority were either programme or academic leaders or heads of school (Table 4).

Table 4: Institutional roles of interviewees.

Position	N (%)
Head of School, Head of Discipline	12 (28%)
Dean/Associate Dean/Deputy Dean	4 (9%)
Program Lead; Course Director; Clinical Director; Team Manager	21 (49%)
Senior teaching role	6 (14%)

Coverage in teaching curricula are summarised below by the nine domains (Table 2), followed by participant perspectives and challenges of including quality and safety into pre-registration curricula.

Improvement science

In pre-registration health professional education there was a major gap in curricula relating to the inclusion of the core concepts of improvement science. With the exception of two institutions, specific teaching of quality improvement science methods, tools and skills was absent, such as using a framework for improvement, sampling and measurement strategies, diagnostic tools and methods to understand the full extent of the problem or the uses of tools such as run or control charts to describe system performance over time and evaluate success and sustainability of improvements. The concept of testing change ideas using iterative PDSA cycles was only mentioned by two educators from separate disciplines.

Most participants understood the concept of improving quality, but had limited knowledge of the specific application of improvement science. It was interpreted as being addressed through the concepts of evidence-based practice, audit and quality assurance systems.

“one of the things we do—we have clinical practice tutorials and we talk about best practice requirements.”

“often included in an audit—eg, documentation around vital signs/falls risk assessment—the student in the ward reviews six charts—amazing learning from this.”

Improving the quality of care was recognised as important and students had opportunities to address perceived deficiencies in the quality of care as part of their learning. This was, however, carried out more in a research context, with the focus on identifying evidence or policy practice gaps, and then identifying solutions.

“a group went into a dementia care unit and recognised there was no suitable outdoor area for them—so did some focus groups and a literature review and went back with a proposal and how they could go about doing it.”

A systematic approach to identifying and analysing problems, testing change ideas and using data to monitor change over time was not evident.

Patient safety

While patient safety was an important priority for most professional groups, approaches to teaching and learning about safety were mixed.

There was one example of a two-day inter-professional experiential workshop on patient safety at one university. This was underpinned by a systems approach that addressed concepts of human error and human factors and involved students working in multidisciplinary teams using vignettes of patient harm to learn about the root cause analysis methodology.

This depth of approach was not evident across other institutions or disciplines. Curricula mostly emphasised incident reporting per se rather than the potential for learning, although for some higher-risk professions (eg, midwifery) there was a stronger emphasis on learning from adverse events.

“so they are always looking at unpacking—so whenever there is an adverse outcome or near miss, that also goes through an audit process—what happened, why, what contributed to it... and be open to what you could learn.”

In contrast, safety wasn't a focus at all for some allied health disciplines that didn't consider themselves 'high risk'.

"reporting not a big deal... incidents are few and far between. We are fairly low risk."

Patient safety was otherwise interpreted and included in the curriculum in the context of other categories; the Code of Patient Rights¹⁸ (11 interviewees), cultural safety (three interviewees), occupational health and safety risks and hazards (nine interviewees), legislative requirements, protocols and policies to meet competency and accreditation requirements (15 interviewees) and how to keep personally safe (five interviewees).

Quality and safety culture

An overall understanding of a 'just culture', the components of such a culture and how this could be measured was lacking. There was however a general awareness of the concept of a 'no blame' approach, but the learning aspect was most often focused around the individual and their accountability.

"we don't mention the word 'blaming the individual'—so when incidents happen or we use scenarios, we always talk to students about how this links to the competency-based practice and how this fits within the legislation."

A considerable number of educators (eight interviewees) reported student difficulties in speaking up during clinical placements where there were hierarchies and power imbalances.

"suggestions can be met with defensive responses so students tend not to offer comments."

Concern was expressed about the mismatch between what is taught with regard to an open safety culture, which supports speaking up about safety concerns, the 'pushback' students experience in the clinical setting during a placement, and the implications of this for future clinical practice.

Evidence-based practice

Evidence-based practice is a strong focus across all programmes and appears to be well integrated into programmes for all 18 disciplines.

Approaches to teaching and learning ranged from formal teaching to the topic being 'threaded' throughout the course. By

graduation, students were expected to be able to do a literature review, use the literature effectively in assignments and in some cases, as part of their reflective journals when critiquing their practice.

"they can access the literature and do critical appraisal—there are a couple of times in the programme where they learn this and have key assignment during the programme where they review and critique the literature."

Patient-centred care

Patient-centred care was consistently included and well embedded in all programmes. This was reported as underpinning most aspects of education, and was represented by ideas around informed consent, presenting and discussing evidence-based options with patients and taking account of their preferences and values as part of a shared decision-making approach.

"patient-centred care is very much the bedrock of how we set up the curriculum."

Cultural competency, cultural safety and Māori models of health were commonly emphasised in nursing.

"we introduce frameworks for care—patient centred, Māori concepts, Pasifika concepts of holistic care."

Even where there was limited patient exposure in the training, there was an awareness of concepts such as health literacy, cultural competency, ethics, informed consent and patient rights. However, ideas around the involvement of consumers/patients at governance levels and as partners in the co-design of services were rarely reported.

Teamwork and communication

Teamwork and communication featured consistently across all programmes with formal teaching around the concepts of teamwork dynamics and change management. There was a strong emphasis on communication skills as a necessary element of effective teamwork.

"focus early on communication skills so they can work effectively in teams... we teach them how to negotiate safely within the team."

Simulation training in teams was also a reasonably common theme—either within their own discipline or where possible with other disciplines. This was more established in some programmes than others.

“We do simulation training with them—and we look at it in terms of understanding peoples’ roles and the importance of inter-professional engagement.”

Where there wasn’t dedicated teaching around the dynamics of teamwork and communication, students had opportunities to participate in team activities within their own discipline by working on group assignments or projects. Interviewees also mentioned that students gain relevant experience during their clinical placements where they had opportunities to work within a team and attend multidisciplinary hospital seminars.

Inter-professional education emerged during discussions about teamwork and was viewed very positively, even though for some the logistics of organising inter-professional learning events was a major barrier.

Examples of interdisciplinary teamwork involved students working together on a community project and a particularly unique example was a one-month rural immersion project where students ‘lived, worked and played’ together. Where inter-professional learning wasn’t already happening, there was an awareness of its importance as the way of the future.

“There are limited direct interactions [with other professional groups]... but we are hoping that is going to change as we see it is an important area.”

Leadership

The concept of leadership was mostly frequently discussed in the context of teamwork, communication and advocacy for patients. Formal teaching on leadership styles, change theory and models were addressed in only a few disciplines towards the end of the education programmes and mostly in association with professional practice papers.

In nursing, leadership was interpreted with reference to competencies around ‘supervision, delegation and direction’ where registered nurses have responsibilities for enrolled nurses.

“in the leadership and management paper we talk about directing and delegating—how do you give orders/communicate with others and how do you provide direction for care... how do you delegate and who is responsible once you delegate.”

Where a discipline had more of a public health role, there was some focused work around leadership models and styles. Others described it as ‘embedded in their values’.

Systems thinking

Systems thinking is a difficult concept to define and a relatively new idea for healthcare. It wasn’t explicitly included in any undergraduate programme, but most felt that students appreciated the complexities of the healthcare system and recognised the need for coordinated and integrated care across inter-dependent services.

“intuitively, people know they are working in a very complex system—we often teach them silos but because students cross silos all the time, they see where things fall in the gaps.”

Knowledge of the New Zealand health system, funding streams and structural and contextual factors that impact on health was mentioned as part of an awareness of ‘systems’.

Using information technology

Using and understanding of information technology as an important enabler of integrated care, patient safety, patient engagement or measuring and monitoring system performance was not addressed to any great extent in any curricula.

Responses referred to the ability of students to manage information technology in general, including the need to access library databases to find relevant information, access course material offered in online modules, keep electronic portfolios for assessment purposes, utilise electronic patient management systems while in clinical placements and the responsible use of social media. For the disciplines that were highly dependent on technology, this was seen as an important component, but was specifically focused around their area of work (eg, radiology).

A novel use of computer-based learning using virtual simulation and avatars as the basis for some learning was described by one nursing programme:

“we always have our eye on the future here... we anticipate the possibility that simulation might be conceived as part of clinical experience... quality simulation is also a good way to learn.”

Perspectives and challenges

There was general agreement that improving quality and safety in healthcare in the pre-registration curricula for health professionals was important. Challenges incorporating this teaching could be categorised into key themes; how to include more material in their already stretched curricula; having expert faculty with relevant education and experience; the tension around having to meet registration competency requirements; together with the complexities of providing students with relevant practical experience in clinical settings.

“(sic there is) challenging complexity of bringing together all of the different pieces people believe that people working in healthcare should have—how do you do that in training programmes—how do you bring together the range of requirements in 3,600 hours and adapt frequently to meet changing demand?”

“None [of our staff] have specific education in quality and safety.”

“space in the curriculum is constrained around core aspects that professional organisations mandate that we have to cover.”

One of the specific challenges mentioned was the disconnect between what was taught, what students subsequently experience in their clinical placement and their role as future health professionals.

“we can do so much but it is also about the culture they go into. We need more collaboration with the healthcare industry to create the change.”

Finally, it was apparent that educators on the whole were aware of the changing healthcare landscape and the need for new models of teaching such as inter-professional education as well as the need for students to acquire a relevant skillset to function in an increasingly complex healthcare system.

“Training in isolation is not as effective... if we want real change, has to be done interdisciplinary.”

“It is our expectation that students will get out there and change the culture of the environment for the future—we talk about them being cultural agents of change. We want movers and shakers.”

Discussion

In this qualitative study, we investigated how quality and safety domains are being taught in the curricula of health professional pre-registration education in New Zealand. Interviews were conducted with key personnel from 43 tertiary institutions representing 18 health professional disciplines, including medicine, nursing, midwifery, dentistry, pharmacy, physiotherapy, dietetics and 11 other allied health professions.

Most curricula were described as being integrated, meaning that rather than being taught in isolation, topics were integrated both vertically and horizontally throughout the course. It was difficult therefore to quantify the extent to which any one of the domains was included in the curriculum. The insights gained however were valuable in getting a sense of the state of quality improvement and patient safety teaching and learning across New Zealand pre-registration health professional education and training programs.

There was considerable variation in how each of the domains was addressed by education providers. However, the importance of improving the quality and safety of healthcare was recognised by all and the building blocks for the delivery of safe and effective care were certainly evident. Evidence-based practice, patient-centred care and teamwork and communication were the strongest domains and well embedded in programmes, while leadership styles, change theory, systems thinking and the role of IT to support measurement, learning from data, integration of care and patient engagement were less explicitly included.

Patient safety was acknowledged as being an important priority, but some key aspects relating to the safe delivery of care, for example human factors and an appreciation of system factors, were not consistently addressed. Patient safety was focused mainly around incident reporting, and to a lesser extent learning from adverse events. Although a ‘no blame’ culture was articulated as important, the emphasis except in a few institutions tended to be on reporting in a context of accountability rather than on learning in the context of a just culture.

In contrast to other domains, the core principles of improvement science to enable students to improve the quality and safety of services using a systematic and scientific approach were largely absent (except for two institutions) from pre-registration curricula and there was a lack of familiarity with improvement science theory, methods and tools among those interviewed. Approaches to improving quality and safety appeared to be mainly addressed in a research context where students drew on the evidence to identify gaps and implement solutions. While this approach is valid in some contexts, in complex settings, there is a need for a different approach and skillset. While participants were receptive to considering ways in which improvement science might be incorporated into their curricula, there were significant challenges raised: an already stretched curricula, meeting registration competency requirements and the limitations with respect to accessing expert faculty with relevant education and experience.

Participants were very aware of the changing healthcare landscape and the need for new approaches to education and training to better prepare students for complex work environments. The importance of inter-professional education was recognised as was the need for students to develop lifelong learning skills that would enable them to adapt and respond to changing demands. While a number of programmes are already taking steps in these directions, some find the logistics of providing relevant inter-professional clinical experience a barrier. Furthermore, concerns about the disconnect between what is taught and what students sometimes experience in the clinical setting suggest the need for better collaboration across educational and healthcare settings.

The main strength of this study is the inclusion of the multiple healthcare disciplines and encompassing whole-of-country tertiary health curricula of these professions. There was a high response rate, allowing valuable insights and establishing a baseline for the current undergraduate educational status quo.

Bias is a known limitation of qualitative studies and we attempted to address this by having two researchers review the transcriptions independently and having

a process to address any disagreements. A further limitation was that by using only one source of information for each of the programmes, we may have an incomplete understanding of curricula content reflecting only the knowledge of the interviewee rather than the entire teaching faculty. Requesting documentation about the curricula may have better informed the discussions, however, the purpose of the study was to gain some insight into the current state of quality improvement science teaching in health professional education in New Zealand, rather than undertaking a comprehensive stocktake.

To our knowledge this is the first study investigating pre-registration quality and safety education in New Zealand. Internationally, a number of studies have investigated the quality and safety content in health professional curricula.^{19–36} Of these, four were systematic reviews;^{19–22} two focusing solely on the patient safety content,^{19,20} one investigating both the patient safety and quality improvement content²¹ and the other on the quality improvement content alone.²² Although most studies have concentrated on medical and nursing programmes, we identified one study investigating how pre-registration students from medicine, nursing, physiotherapy and pharmacy learned about ‘keeping patients safe’.²³ We were unable to identify any papers that included as wide a range of health professionals as our study.

The literature describes multiple methods to establish the quality and safety content of professional curricula, including surveys of faculty and students,^{24–29} interviews with faculty students and health service managers,^{23,30–32} focus groups with faculty and students,²⁷ case studies of selected programmes,^{23,31} analyses of curriculum documentation,^{23,24,26,30,31,33,34} analysis of curriculum guidelines,³⁵ and course materials and gap analysis.³⁶ In general, the findings from our study are similar to these studies, which also found deficiencies with respect to the inclusion of quality improvement and patient safety in the curricula of health professional education programmes. Quality improvement content has been described as fragmented or woven across multiple courses within a programme rather than being an explicit focus in the

curriculum.³⁰ Patient safety was described in one paper as being “not visible as a curricular theme”.³¹ A further study identified discrepancies between faculty, student and practitioner views with respect to the adequacy of pre-registration education in quality and safety and the ability of faculty to teach this content.²⁹ Indeed, faculty misunderstanding of concepts such as informatics and inter-disciplinary teams have been reported to lead to student confusion.²⁶ Other barriers and challenges have been reported that are similar to our key findings. Specifically, few faculty have the necessary knowledge of safety science and improvement methods, the lack of regulation as a driver for the inclusion of patient safety and improvement science in the curricula and the influence of the practice settings in which students learn.^{32,37,38}

This study adds information about the baseline of improvement science and patient safety teaching and learning in New Zealand pre-registration education and training programmes for health professionals. However, the findings from our study and the literature raise questions about how best to include improvement science knowledge, methods and tools into curricula. Whether it is included as a specific focus or woven throughout the curricula, or a combination of both, it must be included in such a way that improvement becomes an intrinsic part of health professionals’ work, rather than an ‘add on’ to their profession-specific content knowledge.

One approach to re-orientate quality and safety education for health professional students is to foster much greater collaboration across professional training bodies, for curricula to be shared and to be supported by academics, healthcare educators and improvement science specialists. This has already been reported in Wales where universities, the Institute for Healthcare (IHI) Open School clinical teachers and local healthcare organisations collaborated.³⁹ The latter provided opportunities for student participation in actual improvement campaign learning events. This not only helped bridge theory-practice gaps, it provided opportunities for educators to meet and discuss how to incorporate quality improvement into their curricula.³⁹

Furthermore, engaging clinicians as well in these discussions has the potential to address the disconnect between what students are taught and what they sometimes experience in their clinical placements.

In New Zealand, examples were shared that described inter-professional learning experiences both within the educational institutions as well as in the field. These could be augmented further. For example, one study has described a novel approach to raising awareness of safety hazards among medical students and residents through a simulated ‘safety room of horrors’ where students were asked to identify as many common hospital-based patient safety hazards as possible within a timed period. While students were able to identify many of the hazards, they missed important patient safety priorities such as pressure injury and catheter-related risks, medication reconciliation and chart base errors.⁴⁰ These types of educational interventions could also provide opportunities for teaching and learning improvement science methods. This could be supported by access to online learning modules, and facilitated by the growing number of healthcare practitioners with expertise in improvement science.

Conclusion

An aspirational goal for New Zealand health training organisations is that all health professional graduates in New Zealand enter the workforce as lifelong learners where improvement is an intrinsic part of their everyday work. Although the building blocks for improving the quality and safety of healthcare are present, there is a need to augment knowledge and skills in improvement science and patient safety to keep pace with the needs of rapidly changing healthcare environments.

How best to achieve this is a question for health educators, improvement science specialists and clinicians to work on together, informed by pedagogical approaches suitable to the teaching of improvement science,^{12,41} and utilising the Knowledge to Action Framework as a resource.¹⁵ Collaboration with other disciplines grappling with similar issues would be also be invaluable, for example education and engineering.^{10,42}

Competing interests:

Gillian Robb reports involvement in undergraduate medical and postgraduate education of quality in healthcare for approximately ten years at the University of Auckland. Dr Sue Wells reports grants from Health Research Council of New Zealand, grants from The Stevenson Foundation, grants from Roche Diagnostics Ltd, grants from National Heart Foundation of New Zealand outside the submitted work; and Clinical Advisor, Primary Care Programme, Health Quality Safety Commission.

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