Factors Influencing the Development of Effective Error Management Competencies in Undergraduate UK Pharmacy Students

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Abstract. Patient safety (PS) is a key healthcare goal, yet health professionals struggle to acquire appropriate expertise, including Human Factors/Ergonomics skills, reflected in undergraduate curricula content. More than 50% of adverse events are medicines-related, yet focus on pharmacists as experts in medicines is scant. This pilot investigation used focus groups and interviews to explore undergraduate PS teaching in purposively-selected UK pharmacy schools. Results revealed barriers to PS teaching including risk-averse pharmacist 'personality' and Educational Standards negatively influencing students' error-management behaviours.

Keywords. Patient safety; HFE; undergraduate pharmacy; personality

1. Introduction

'*Healthcare hurts*' has been a constant message since the Institute of Medicine report 'To Err is Human' (Kohn et al., 2000). Studies suggest at least 210,000 US deaths annually result from medical error (Blaisek et al., 2014). One consequence has been the emergence of patient safety (PS) as a topic of interest. Safety is an emergent property of systems: consequently, safety science focuses on systems thinking, which has not come easily to healthcare (Schyve, 2005).

A socio-political outcome of this history is articulation by healthcare providers of safety as an explicit organisational goal (Sammer et al., 2010), delivery of which requires practical strategies. Carayon (2010) reiterates the view that Human Factors and Ergonomics (HFE) is a '*key systems engineering tool to design and improve healthcare systems… improv[ing] quality of care and patient safety*.' She underlines the importance of all HFE domains, which means challenging misconceptions that appear endemic in healthcare (summarised in Russ et al., 2013), including the notion that HFE is synonymous with 'non-technical skills.' A related misconception is to interpret HFE as identifying 'failures of people,' leading to the idea that the purpose of HFE interventions is to eliminate human error. Activity underpinned by such misunderstanding tends to blame individuals, and recommends behaviour modification (rather than system re-design) as a corrective strategy, an approach which directly undermines safety.

The PS spotlight is increasingly falling on medication safety, given that more than half of adverse events are medicines-related. Interestingly, the focus on pharmacists (as experts in medicines) has been scant. However, the potential contribution of pharmacists to PS has been recognised in proposals for an integrated health and social care model, with pharmacist and physician collaboration to provide safe pharmaceutical care (e.g. Wilson and Barber, 2013). Thus, an appropriate focus on PS within undergraduate curricula is required, but little is known about what is currently taught. Direction from the regulator with respect to PS is found within the Standards for the Initial Education and Training of Pharmacists (GPhC, 2011), notably:

- **Standard 1**: 'There must be clear procedures to address concerns about patient safety

arising from initial pharmacy education and training. Concerns must be addressed immediately.'

- **Standard 5.11**: 'Evidence of assessment demonstrating unsafe practice must result in failure.'

Parallels can be drawn with other disciplines and, although limited, studies suggest progress is slow, with regulatory bodies providing little direction for teaching. The World Health Organization (WHO; 2011) developed a PS curriculum for educators, but it is not clear how providers ensure learners develop PS competencies, and even less is known about HFE teaching (Robson et al., 2013). The aim of this study was to complete a pilot case-study to explore PS teaching in a purposively-selected sample of UK pharmacy schools.

2. Methods

As PS learning emerges from a blend of explicitly-taught and implicitly-acquired knowledge, semi-structured interviews were used. For students (and staff without a direct PS teaching remit) focus groups were used. The objectives were to:

- audit course documentation for PS and HFE framed as explicit outcomes
- use interviews/focus groups to explore staff and student perceptions of PS and HFE teaching
- identify good practice and areas for development and framing recommendations

The interview and focus group schedules were developed using Eraut's theory of acquisition of professional knowledge (1994). This was considered appropriate as the development of PS skills is a critical element of health professional knowledge. Professional knowledge includes shared language: the extent to which there is a shared PS language was explored by asking participants to define a number of terms for comparison with the WHO PS curriculum (2011). Other questions explored participants' awareness of institutional strategies for teaching PS; their opinions as to the key PS competencies students should develop; and the extent to which HFE principles were covered in the course. A further set of questions explored understanding of the GPhC Standards (2011) relating to PS and the impact that these may have on teaching and learning.

Grounded theory (GT) was used to underpin analysis (Charmaz, 2014), specifically as constructivist GT, which incorporates theoretical perspectives assuming self, society and reality are constructs developed through interaction, relying on communication, language (and the extent to which it is shared). Initially, sampling was purposive (all staff with a PS teaching remit), but became theoretical as data analysis progressed. Two institutions were included in this study; one with an integrated pre-registration year. This study was approved by Loughborough University Ethics Approvals (Human Participants) sub-committee.

3. Results

Themes were identified through sequential 'in vivo' coding and iterative comparison across transcripts. Initial open codes were firstly grouped into axial codes and then themes (n=7), 3 of which are discussed in this paper (Lack of shared PS language; managing errors and HFE).

GT requires that data are constantly sifted and compared, seeking evidence of recurring themes. Word frequency queries can be useful, visually representing participants' words, but must be used cautiously as they lack context or interpretation. Although not the principal sifting method used, one query (Figure 1) effectively highlighted the influence of legislation
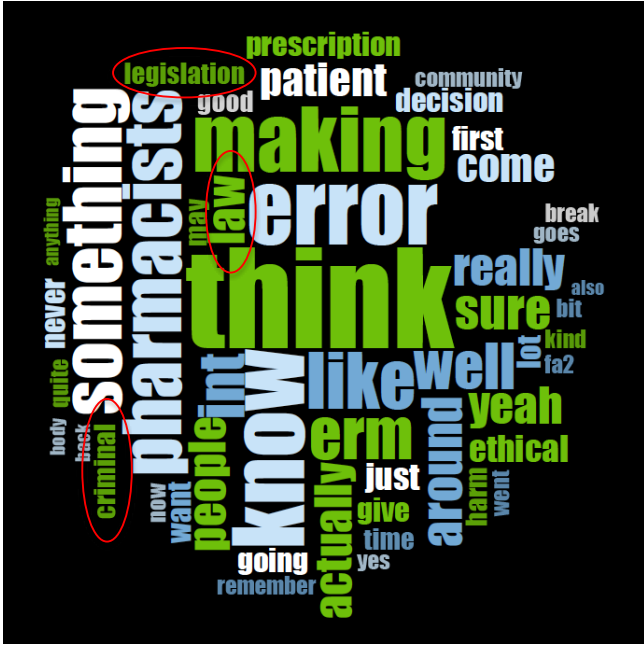
on behaviour.

Figure 1: The legislative framework has a strong influence on pharmacist affective state.

Another result from data sifting suggested that between individuals and institutions the Standards were interpreted differently. The variance in interpretation of Standard 1 ('*There must be clear procedures to address concerns about patient safety…*') is illustrated in Figure 2, where some participants believed that the Standard (1) only defined teaching; (2) inferred fitness to practice (FtP) requirements; (3) both; or (4) other (the Standard covers (1) and (2) but also communicates with the public to let them know their safety is paramount).
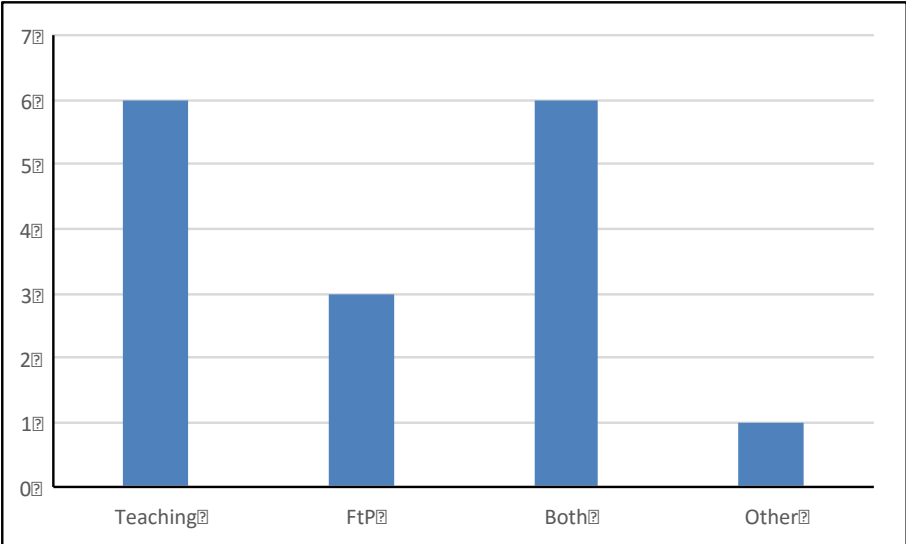

Figure 2: Comparative interpretation of Standard 1.

4. Discussion and Conclusion

Curriculum mapping found very little for systems content in high-level course documentation,

and HFE (characterised by a systems approach) was invariably interpreted as non-technical skills and considered to be concerned with human error. This misunderstanding is certainly not unique to pharmacy (Russ et al., 2013). Many participants struggled to define Ergonomics and those who did mentioned desks / chairs and display screen equipment.

The broad range of definitions provided for a selection of internationally agreed PS terms indicated lack of a shared safety language (possibly the first safety risk). Secondly, it was noted that system terminology was absent from participants' discourse, despite safety being an emergent system property. For example, safety relies on risk management, yet terms such as hazard and risk were poorly understood, with safety seen as '*nebulous*,' '*abstract*' and '*difficult to manage*'. This was also noted with the collective definition of '*mitigation*, as, without exception, the responses described *'excusing'* the pharmacist; suggesting mitigation of pharmacist accountability. The discussion of mitigation possibly reflects the academic context (where mitigation excuses impaired student performance) and may suggest a lack of familiarity with safety systems modelling. It may also suggest certain personality characteristics, which could be highly relevant to safety education.

Rosenthal et al. (2010) suggest risk-aversion is a pharmacist trait. There are studies exploring pharmacist personality traits, including high attention to detail ('sensing'; Lowenthal, 1994); 'introverted' and 'technical' (Van Rensburg et al., 2003), characteristics seen as valuable for dispensing which, at the time, was considered to be the primary pharmacist role. This current study confirmed this attention to detail but also a zero-error approach, for example *"We're very self-critical and we are constantly striving towards zero error." (1/FA2/P1); "If it's not 100% right, then it's 100% wrong." (1/FA2/P4);* and *"They're very critical and they're very… nit-picky, I think a lot of pharmacists are, and… I think that people that stay in practice are the one that are the most nit-picky." (2/I/P4).* The impact of zero error tolerance on the curriculum appeared to be teaching/learning activities supporting error elimination, rather than facilitating students to develop skills that could allow them to contribute to the development of resilient systems, for example *"…what we want to avoid is them actually making mistakes in the future, because some of the mistakes that we are failing them for are would – they are quite careless, so it's maybe trying to make sure their attention to detail is a bit more… you know…?" (1/I/P3).*

Perfectionist personalities tend to ascribe achievement outcomes internally, rather than attributing them to external causes (Oades-Sese, 2014). Responses to failures can result in global attributes such as shame, for example *"…it's a terrible thing when you make a mistake as a pharmacist. How could I do that, could I not see it's 10 mg not 5 mg, so, it's just the worst thing, well it's not the worst thing in the world, but it's very bad... And pharmacists really beat themselves up." (1/FA2/P4).* An alternative mindset is attributing causes externally by identifying factors affecting performance such as training needs. Looking outwards, the pharmacist (while still taking responsibility for the error) can recognise a performance (or systems) failure rather than personal unworthiness and work to improve future performance.

Negative consequences of global attribution can be resolved if, after failure, individuals have access to support. Mechanisms rewarding outcome (e.g. examination grade) rather than process contribute to the development of global attribution, something that health professional students are likely to have experienced at school. Medical errors elicit negative global attributes, often compounded by lack of support (Dekker, 2013). Where outcomes are severe, individuals may be actively isolated from colleagues because of investigation, possibly becoming 'second victims.'

The fear factor seems personality-driven with pharmacists in this study reporting huge perceived responsibility, "*You… have the potential to affect hundreds of people every day… You can hurt a lot of people.*" The job can amplify these traits, particularly with legislation

which criminalises dispensing errors by using error-reporting and documentation against the pharmacist (Langley, 2014). In addition, the Educational Standards seem to promote zero-error attitudes, particularly Standard 5.11 ('*unsafe practice in assessment must fail*'). However, it may not be the Standard per se that is problematic, but the lens through which it is viewed. The definition and recognition of unsafe practice is vague, and making errors is not necessarily unsafe, but safety threats emerge from failure to manage error. The official line in Institution 1 was that '*students fail if they harm patients*' across all assessments and there was evidence suggesting that students may respond by adjusting their assessment behaviour, for example *"…after the assessment, some students said 'I just left that because…' and one wanted to come in and score out their answer because they realised they could fail the whole OSCE if they caused harm, and it was better to lose half marks for one station."* (1/I/P6)

Assessment was different in Institution 2. Standard 5.11 applies only to Objective Structured Clinical Exams (OSCE; felt to authentically measure practice behaviours). OSCEs comprise multiple, equally-weighted stations; if students cause harm at any station, they receive 0% but are alerted to the presence of an error. If they identify and correct the error, while their overall mark (0%) doesn't change, the error doesn't result in immediate failure. Even if corrected, multiple errors make passing difficult, but this approach does allow error-recovery and recognises that multiple errors may indicate wider problems. This different approach to assessment is interesting and may support a change in culture where pharmacists feel free to report and learn from errors.

Both institutions described activities exploring error. At Institution 1, these were largely related to dispensing, and didn't escalate error recovery beyond near-miss logging. Exceptions included inter-professional sessions on disclosure and apology, and teaching about aseptic control, "*During summertime, I visit all the units and gather together all the mistakes that have happened in the units and write them up into a series of scenarios. Then we have workshops where… students are given the problems and are asked… 'what would you do, how could you avoid it, look at what the consequences were, and they get to discuss… how they resolved the problems, what happened and how you could avoid it in future."* (1/FA2/P2)

For both institutions, weaknesses in error-management teaching were perhaps more evident in what wasn't said. There was a lack of a clear understanding of terms such as 'error,' 'violation' and 'near miss' as well as scant awareness of reporting frameworks and just culture.

In conclusion, this pilot study has identified a number of factors that may contribute to a lack of effective PS teaching in Pharmacy education. Some of these (particularly personality type and the legislative framework) may be difficult to overcome. The implications for pharmacy education are significant, suggesting a need for reform especially around the Educational Standards, which are within the control of the Pharmacy profession via the General Pharmaceutical Council. Re-visiting and developing the Standards to encourage embedding of HFE principles within curricula would be a positive step, although not without its challenges as there is a recognised shortfall in healthcare HFE expertise. It would also be useful to extend the pilot study: the institutions involved in this study are long-standing 'traditional' pharmacy education providers and anecdotal evidence from (among other sources) the Pharmaceutical Special Interest Group (Pharma HUF; http://www.pharmahuf.org/) suggests other courses (particularly those offered by new providers) may be beginning to engage with the HFE agenda. The SIG will provide a useful platform for further discussions by engaging with pharmaceutical professionals across education, regulators (e.g. MHRA), care providers, manufacturers (e.g. ABPI), distributors and retailers.

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