

Exploring the utility of the Prescribing Safety Assessment in pharmacy education in England: experiences of pre-registration trainees and undergraduate (MPharm) pharmacy students

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Abstract

Objectives (i) To provide a preliminary indication of the performance of pharmacy undergraduate students and pre-registration pharmacy trainees in the Prescribing Safety Assessment (PSA). (ii) To determine the feasibility of administering and delivering the PSA in schools of pharmacy. (iii) To examine the potential relevance of the PSA and associated training materials to pharmacy education. (iv) To assess the attitudes of the cohort towards the PSA and their readiness to prescribe.

Methods Four schools of pharmacy in England recruited final year undergraduate pharmacy students and pre-registration pharmacy trainees undertaking training with both hospital and community pharmacy employers in their locality to undertake the PSA. Performance data and feedback from candidates were obtained.

Key findings Pre-registration pharmacy trainees in community ($n = 27$) and hospital ($n = 209$) settings mean average scores were 86.3% and 85.3%, respectively. There was a significant performance differential between undergraduate pharmacy students ($n = 397$) and those in pre-registration training, with the mean average score for undergraduate students being 73.0% (t test $P < 0.05$). Candidates felt their current course did prepare them for the PSA, some highlighted that additional curriculum content would be needed should this become a compulsory high-stakes assessment for pharmacy trainees. The majority of candidates felt that this assessment was useful and applicable to their training.

Conclusions The PSA process and associated learning tools could be introduced to pre-registration pharmacy education to support trainees in their development towards future prescribing roles.

Introduction

Prescribing medicines is a core activity for the UK National Health Service. Around 1 billion prescriptions are written annually in primary care in England and Wales, equating to an average of 18 for every member of the population.^[1] Although doctors currently write the vast majority of prescriptions in the UK, other professional groups, including pharmacists, are able to undertake further training and supervised practice in order to become independent prescribers.^[2]

Prescribing is a challenging task for any healthcare professional. Prescribers have to select the correct medicine, dosage, route and frequency of administration, sometimes in the face of diagnostic uncertainty, taking into account potential individual variability in drug handling and response as a consequence of co-morbidity, genetics and interacting drugs.^[3] Given that individual patients have different wishes, and the outcome of any prescription is uncertain, the prescriber needs to counsel the patient and

plan an appropriate strategy for monitoring and follow up for evidence of benefit and harms.

Given these complexities it is perhaps not surprising that many studies have found evidence of poor prescribing. Prescription errors amongst recent medical graduates have been observed at a rate of 7%–10%.^[4,5] There is a lack of research examining errors made by non-medical prescribers.^[6] It is evident that there are many trends that make prescribing increasingly demanding, including the advanced age and vulnerability of patients, the growing complexity of the treatment regimens and an increasingly pressurised healthcare system. In these circumstances it is important that new prescribers are well trained and meet minimum standards of competency. However, studies suggest that medical students and recent graduates often feel underprepared for and anxious about prescribing,^[4,7] a concern echoed by their supervisors.^[8]

In response to these concerns, the *British Pharmacological Society* and *Medical Schools Council* developed and introduced the Prescribing Safety Assessment (PSA) with the intention of enabling final year medical students to demonstrate that they have the necessary knowledge and skills to prescribe and supervise the use of medicines at the standard expected of a foundation doctor in an NHS hospital.^[9] The PSA was first piloted in 2010, and by 2014 was taken by all final year UK medical students. All medical schools in the UK participate, along with five in Ireland and one in Malta. The PSA is held in medical schools between February and June each year. Passing the PSA is now an essential part of successful completion of the foundation training year for newly qualified doctors. The vast majority of medical students, by preparing for and undertaking this assessment, have now been found to meet a pre-specified standard of prescribing competence before entering clinical practice.^[10]

Pharmacists constitute a significant part of the NHS workforce and are highly trained in all aspects of medicines use. Currently, the route to registration as a pharmacist involves completion of a General Pharmaceutical Council (GPhC) accredited 4-year MPharm degree and 1 year of pre-registration training or a 5-year MPharm degree with integrated pre-registration training, followed by successful completion of the GPhC's registration assessment.^[11] In order to qualify as an independent prescriber, pharmacists with a minimum of 2 years experience must complete a GPhC accredited programme, typically run over 6–12 months. Pharmacist independent prescribers can prescribe autonomously within their area of clinical competence.^[12] The demand for pharmacist prescribers is increasing in line with the recommendations of Lord Carter's Review of Productivity in Hospitals.^[13] In addition the Five Year Forward View^[14] and GP Forward View^[15] both set out Government plans to develop

a prescribing pharmacy workforce undertaking patient facing roles in general practice. It is expected that in the future prescribing will become a standard element of career progression for all pharmacists in clinical roles.

Both the English Department of Health and the Scottish Government have signalled their interest in pursuing a scenario in which pharmacists will be independent prescribers by virtue of their primary registration.^[16] To explore this, the Pharmacy Education Reform team undertook a small scale trial of the PSA with pharmacy undergraduates and pre-registration trainees in 2015.^[17] This reported a positive outcome and recommended that a second pilot trial of the PSA with larger cohorts should take place.

Aims

The purpose of this pilot study was to investigate the application of the PSA to pre-registration pharmacists and undergraduate (MPharm) pharmacy students. The specific aims were:

- (i) To provide a preliminary indication of the performance of pharmacy undergraduates and pre-registration pharmacy trainees in the PSA.
- (ii) To determine the feasibility of administering and delivering the PSA in schools of pharmacy.
- (iii) To examine the potential relevance of the PSA and associated training materials to pharmacy education.
- (iv) To assess the attitudes of the cohort towards the PSA and their readiness to prescribe.

Methods

Recruitment of candidates

All English schools of pharmacy were invited to participate in this pilot by Health Education England. Four schools of pharmacy volunteered to take part and subsequently invited final year pharmacy students ($n = 500$) and local pre-registration trainees ($n = 250$) from community and hospital settings to take part in this study. The involvement of candidates was voluntary and their consent to use the data obtained to inform developments in pharmacy education was obtained. Assessments were run between 25 April 2016 and 19 May 2016 on 4 dates; dates were agreed by the PSA team and Universities with the aim being to limit the numbers of dates used.

PSA structure

The PSA is based on the competencies identified in the General Medical Council's Outcomes for graduates (originally published in *Tomorrow's Doctors*^[18]), such as

writing new prescriptions, reviewing existing prescriptions, calculating drug doses, identifying and avoiding both adverse drug reactions and medication errors and amending prescribing to suit individual patient circumstances. Each PSA comprises eight distinct sections: prescribing (PWS), prescription review (REV), planning management (MAN), providing information about medicines (COM), calculation skills (CAL), adverse drug reactions (ADR), drug monitoring (TDM) and data interpretation (DAT). These are covered in 60 question items that have to be completed over 2-h (candidates allowed reasonable adjustments are given an additional 30 min) (Figure 1). The content of each question relates to diseases and medicines that foundation doctors are likely to encounter in the early stages of their postgraduate training. A range of question styles are used including free-text and multiple choice formats.^[9]

The PSA used for the pharmacy pilot events had been previously validated and standard set for use in medical education. The assessment consisted of 30 questions to be taken over 60 min. To aid feasibility of delivery of this pilot study the assessment was shorter than that currently used in medical education but was at the same level of difficulty in terms of both content and the clinical reasoning skills required. The items had been through the quality assurance and approval processes of the standard PSA, but had been retired from secure high-stakes usage, and so were available for use in this pilot. The only modification to the assessment build was the replacement of an item requiring an intravenous fluid prescription with a second

item requiring a prescription to be written on a general practice prescription form. The distribution of the clinical settings of the case scenarios are illustrated in Table 1.

Candidate preparation

All volunteer candidates were registered on the PSA online system and sent an e-mail requesting them to activate their accounts. After registration they then had access to general information about the PSA, 12 orientation videos and four 1-h practice ‘papers’.

Delivery of the PSA events

Each PSA event was delivered live online to each location under invigilated conditions. After logging into the PSA system candidates were given a unique event-specific password that allowed them to enter the 30-item assessment described above. All participants had access to the online BNF and calculator throughout the assessment. The candidates had 1-h to complete the assessment.

Post-assessment review

All prescriptions written by the candidates were scrutinised immediately after the assessment (‘post-assessment review’) to ensure that the answer matrix for the prescribing items took into account any creditworthy responses that had not already been anticipated. The PSA system automatically identifies all unrecognised drugs and

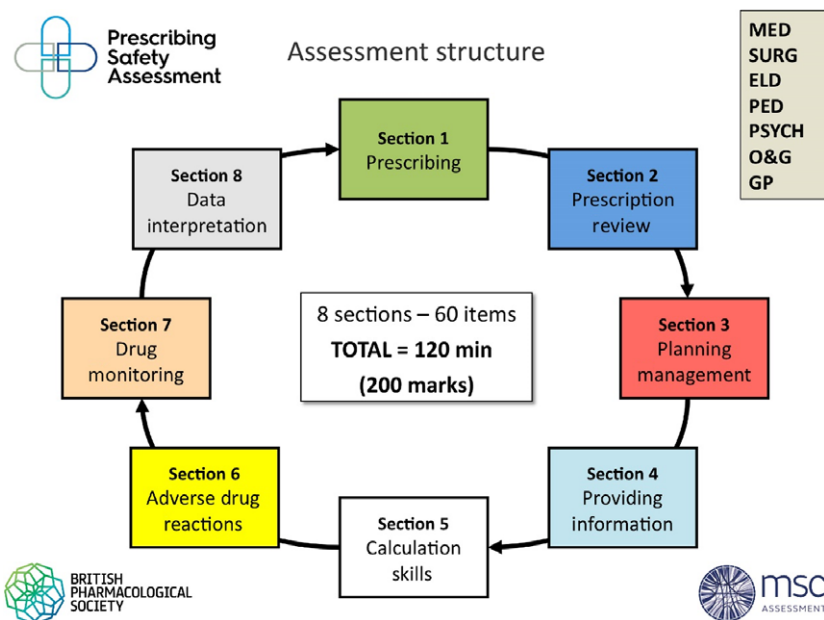


Figure 1 Structure of the Prescribing Safety Assessment (PSA).

Table 1 The distribution of the cases included in the abbreviated PSA according to clinical setting

Clinical setting	Number of items
Medicine (MED)	9
Surgery (SURG)	1
Elderly care (ELD)	2
Paediatrics (PED)	1
Psychiatry (PSYCH)	3
Obstetrics and Gynaecology (O&G)	2
General practice (GP)	12
Total	30

unrecognised drug order sentences that have been provided by candidates. These were carefully reviewed by the PSA team and appropriate scores allocated and added to the electronic marking scheme. This allows the candidates' marks to be automatically updated.

Feedback questionnaire

After exiting the assessment, all candidates were immediately taken to a standard feedback form designed for all PSA candidates. This asked the students if there were any items which were unclear or perceived to be beyond their scope of learning. Students were also asked to comment on how they felt the PSA test could be improved and to rate on a likert scale statements including the following: 'My course prepared me for the content of this assessment'.

Data analysis

Thematic analysis of the student feedback was undertaken. The performance data was analysed using SPSS and the *t*-test. This was used to compare performance between MPharm students and pre-registration trainees and between trainees based in hospital and community pharmacy settings.

Ethical approval

This evaluation of the PSA in pharmacy education was undertaken as part of wider Health Education England service development, ethical approval was sought and obtained.

Results

Candidates

Pre-registration trainees based both in community ($n = 27$) and hospital settings ($n = 209$) and 397 MPharm students undertook the assessment.

Candidate performance

MPharm students achieved an average mark of 73.0% (range 13%–93%). Pre-registration trainees based in a community setting achieved an average mark of 86.3% (range 63%–96%) and those in a hospital setting 85.3% (range 43%–98%). There was a significant difference in overall performance between undergraduate pharmacy students and those in pre-registration training (*t* test $P < 0.05$), in all question types except those involving calculations (CAL) where no performance differential was found. Community pharmacy pre-registration trainees performed better than those trained in hospital in providing information (COM) questions (*t* test $P < 0.05$) and planning and management (MAN) questions (*t* test $P < 0.05$). There was no other significant difference in performance between hospital and community pharmacy pre-registration trainees. Overall both MPharm students and pre-registration students performed best in calculation (CAL) questions (*t*-test MPharm $P < 0.05$ Pre-registration $P < 0.05$) and worst in data interpretation (DAT) questions (*t*-test MPharm $P < 0.05$ Pre-registration $P < 0.05$).

Candidate feedback

Most candidates (71%) either agreed or strongly agreed with the statement 'My course prepared me for the content of the questions in this assessment' on completion of it. Thematic analysis was performed on further feedback obtained from the candidates. Three key themes emerged:

Acceptance

Candidates were overwhelmingly accepting of the PSA as a method of assessing their knowledge and skills. They felt it was useful and realistic:

It was useful to prepare for my exams. I find it easier to learn by applying the knowledge to case studies than just to read knowledge so this was useful and enjoyable (MPharm student)

Very realistic...probes for real life situations (Pre-registration trainee)

Pharmacy students should have more access to questions like this throughout the course and then it may prepare them better for "real life" (MPharm student)

Content

The majority of candidates reported that the content of the assessment was relevant and applicable to their training and future professional roles:

Everything tested was reasonable and the participant should be expected to know at this level (MPharm student)

However, a minority of MPharm students reported that their course had not prepared them to undertake prescribing tasks and did not recognise the relevance of prescribing skills to their future practice. There were particular comments about questions relating to fluids prescribing. This feedback was considered and addressed by the PSA team during the post assessment review process.

Haven't really been taught about fluid or inpatient treatment charts, so more info[rmation] would be needed on these if this was a regular part of the assessment schedule (MPharm student)

Range of long term therapies vs acute management [should be included]. De-prescribing as well as prescribing (i.e. rationalising medication at end of life) (Pre-registration trainee)

Some students and trainees would have liked access to mock tests throughout the year. Pre-registration trainees reported that undertaking the PSA was useful in relation to their preparation to sit the GPhC registration assessment:

Very useful in further developing my knowledge of prescribing and for the GPharmC exam, continue involving pharmacists (Pre-registration trainee)

Feasibility and logistics

Feedback was very positive in terms of preparation, layout and timing of the assessment. Some candidates felt they needed more time but this was balanced with those that felt there was adequate. This may reflect a lack of familiarity with resources particularly the electronic BNF. Some candidates were unfamiliar with hospital prescribing charts. Candidates commented on when and where this assessment should be located if it were to be incorporated into pharmacy training:

I think it would be a good idea to incorporate this into pharmacy pre-registration training as part of core skills training (Pre-registration trainee)

I think final year students should take the PSA at the beginning of the year just before they sit their final exams. This will help reflect progress with regards to knowledge gained throughout the entire MPharm course (MPharm student)

MPharm students were also positive but a number commented that exam periods should be avoided when considering the timing of the assessment.

Feedback from institutions hosting the assessment

Feedback from University staff was very positive. Support from the PSA team was excellent in terms of pre assessment preparation, administration of the assessment on the day and post assessment provision of results. Some Universities had minor IT challenges, for example, registering pre-registration trainees with University logins. No issues had any impact on the successful running of the assessment.

One university reported very low MPharm attendance and two others noted disengagement from some MPharm students who subsequently left the assessment early (performance data from these students is included in the overall data set). Organisers stated that scheduling the assessment so that it was co-hosted alongside a preregistration pharmacist study day increased the number of pre-registration pharmacists attending substantially. However it was also noted that one community pharmacist employer was unable to send trainees due to a clash of dates, and therefore, even earlier notice of assessment dates would be advantageous moving forward. Earlier access to past papers to support student preparation was also requested. Universities and Health Education England expressed their commitment to further future engagement with the PSA.

Discussion

The aims of this study were to assess the performance of pharmacy trainees in the PSA; the feasibility of its delivery; its relevance to pharmacy training and the attitudes of pharmacy trainees towards this assessment.

Performance

Pharmacy pre-registration trainees had less variation in their marks compared to MPharm students and overall scored more highly. This suggests that the practical clinical exposure gained during the pre-registration training year confers an advantage when undertaking this assessment. This is noteworthy as discussions continue with regards to how pharmacy trainees can be equipped to undertake prescribing roles and where in training programmes prescribing assessments should be located. Further testing with larger cohorts is required to be able to draw any firm conclusions about variation across question domains and to inform future discussion about curriculum and assessment design for these trainees.

Feasibility of delivering the PSA within pharmacy training

This pilot study has shown that it is feasible to deliver the PSA to large numbers of pharmacy students across a number

of institutions and that local networks can be utilised to support pre-registration trainees to undertake the assessment. Pharmacy pre-registration differs from medical training in that it is delivered by both NHS and non-NHS private sector employers (although contracted to provide NHS services). While on a small scale, in this study the PSA was delivered to pre-registration trainees based in all sectors and across all employer types. It would be feasible to incorporate the PSA into undergraduate pharmacy training within current delivery models including integrated 5-year programmes.

Relevance of the PSA to pharmacy training

Overall candidates undertaking the PSA felt it was relevant and applicable to their training, describing it as useful, practical and confidence giving. MPharm students felt their current course did prepare them for some aspects of the PSA but that additional content would be needed should this become a compulsory high-stakes assessment for pharmacy students. Some pharmacy students do not acknowledge the relevance of prescribing skills to their future practice. This highlights a wider issue which needs to be addressed by educators if advanced clinical roles for pharmacists are to be expanded and integrated into the wider healthcare system.

Attitudes of pharmacy students to the PSA

Students were accepting of the PSA and engaged in preparing for and undertaking it. It is noted that the students in this study were largely (although not entirely) a self-selecting group and that the minority who raised questions about the relevance of prescribing to their future roles may be greater in number should the PSA become a compulsory component of pharmacy training.

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Weaknesses of the study

There are some important limitations that must be acknowledged when interpreting the performance data. The size of the cohort was small and may not be representative of the larger group of pharmacy trainees since this was a self-selected and possibly highly motivated cohort of individuals. The motivation of the candidates was also uncertain given that they were all volunteers for whom there were no significant implications attached to their performance in this pilot.

Conclusion

This study aimed to assess if a current tool, the PSA, used to prepare medical students for prescribing roles has a future utility in pharmacy education. The results show that the PSA was feasible and acceptable to pharmacy trainees and their educators. It must however be noted that evidence from the training of doctors shows that educational interventions alone do not prevent prescribing errors in clinical practice. Significant clinical exposure and opportunities to practice the complex task of prescribing in advance of taking on this role must be facilitated. Feedback from Universities highlighted that the PSA results can be used to inform curriculum development, particularly the detailed feedback about performance in individual domains.

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