

# The education and training of medical students in electronic prescribing

Naomi Burns  | Michael Okorie 

Brighton and Sussex Medical School, East Sussex, UK

## Correspondence

Naomi Burns, Brighton and Sussex Medical School, East Sussex, UK.

Email: [n.burns@bsms.ac.uk](mailto:n.burns@bsms.ac.uk)

## 1 | PRESCRIBING EDUCATION AND TRAINING

Education and training in prescribing within undergraduate and postgraduate medical curricula were brought into greater prominence following the publication of the results of the EQUIP study which highlighted higher prescription error rates amongst junior doctors.<sup>1</sup> Furthermore, medical students have stated that they feel unprepared for prescribing on graduation<sup>2</sup> which is unsurprising given the complexity of the process. In view of this, a partnership between the British Pharmacological Society (BPS) and UK Medical Schools Council led to the introduction of a UK national prescribing assessment, the prescribing skills assessment (PSA), recognizing the importance of practical prescribing competence on graduation from medical school.

Although there seems to be a lack of consensus on the optimal approach to prescribing teaching and learning, a range of educational methods have been utilized in an attempt for medical students to achieve prescribing skills and competencies. These have included prescribing assessments, practice-based supervision, simulation, or scenario-based learning with the use of paper charts.<sup>3</sup> Digital resources such as e-learning programs, assessments, and podcasts together with virtual or augmented reality have also been utilized.<sup>4</sup> However, what seems less clear from the literature is the place of electronic prescribing systems in the teaching and learning of safe and effective prescribing skills, especially in comparison to paper-based systems. This article broaches the issue of how educators can introduce e-prescribing in their teaching of prescribing skills to undergraduates.

## 2 | ELECTRONIC PRESCRIBING

Electronic (e)-prescribing has been in use across the UK for more than a decade, particularly in primary care. The introduction of the Safer Hospitals, Safer Wards Technology Fund has enabled hospital trusts to implement electronic prescribing. In 2018, further funding was provided to speed up implementation across all hospital trusts and as such the UK national health service (NHS) is 'on course to eliminate paper prescribing in hospitals and achieve the NHS Long Term Plan commitment to introduce digital prescribing across the entire NHS by 2024'.<sup>5</sup> By 2021, 83% of NHS hospitals trusts were expected to have implemented e-prescribing systems.<sup>5</sup> Similar initiatives exist in Australia and the use of computerized provider order entry (CPOE) in the United States has been in place for some time.

The pros and cons of e-prescribing have been commented on extensively. Some of these are outlined in [Figure 1](#) below. Evidence suggests that the benefits may outweigh any risks, resulting in a reduction overall in medication error rates, improved workflow, and paper usage.<sup>6,7</sup>

A number of e-prescribing systems/providers are in use or development with a wide variety of clinical decision support (CDS) systems. This adds complexity to teaching and learning safe and effective prescribing, particularly for prescribers who have to work in different health care settings and for locums working at short notice.

## 3 | THE CHALLENGE

Systems and environments utilized in education and training should reflect and align with the everyday clinical practice of prescribers.

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Advantages	Disadvantages
Legibility	User training time
Clear identity of the prescriber	IT failure/malfunction
Easy access to full/past records	Prescriber 'alert fatigue' from CDS
Provision of clinical decision support (CDS)	Cost
No loss of paper prescriptions	Security concerns
Instant access available to multiple users	Inflexibility of options for prescribers
Auditable trails	Automated thinking by prescribers
Drug formulary control	Potential reduction of face to face patient care
Remote access	Complex prescriptions often still require paper
Standardisation of drug management/patient care by use of order sets/combinations of drugs	Legal issues (requirement for handwritten signatures for controlled drugs)
Reduced storage requirements	
Reduced forgeries	
Automatic drug changes; fewer drug re-writes	
Easy direct production of discharge prescriptions	
Reduced environmental impact of paper use	

**FIGURE 1** Advantages and disadvantages of electronic prescribing.

However, there appears to have been little progress in medical undergraduate teaching and limited evidence, we believe, on strategies to teach UK medical students and familiarize them with these e-prescribing systems. Whilst there is some focus on the training offered to qualified prescribers on the use of electronic prescribing systems<sup>8</sup> and to European students<sup>9</sup> there appears to be a lack of evidence for such training in UK undergraduates.<sup>10</sup>

Education and training in prescribing have relied on traditional learning methods with paper charts which might enable the ability to employ simulation or scenario-based exercises. This approach can highlight the principles of legibility and require the application of some basic prescribing knowledge (i.e., with respect to drug doses, frequency, and administration time). IT systems that support electronic prescribing on the other hand are more likely to auto-populate these functions and also provide decision support. The reality is that paper prescribing will be rapidly disappearing and consideration must be given to experience e-prescribing systems for undergraduates, despite potential challenges. Failing to prepare graduates for the real world, despite instilling basic principles of prescribing through the use of paper charts, fails to ensure competent prescribers and users of digital systems, reducing the advantages thereof.

Users of electronic prescribing systems must be sufficiently trained and competent,<sup>10</sup> but also aware of any potential pitfalls and risks that might arise, as with any system. Lyell et al set out to study automation bias, the overreliance of CDS, on 120 medical students at Australian universities. Participants were asked to prescribe medicines using a simulated e-prescribing system for nine scenarios.<sup>11</sup> Findings showed a reduction in prescribing errors when CDS was correct but increased errors when it was deliberately populated as incorrect or failed to provide alerts. This provides a further challenge in balancing the benefits of CDS and the risks of overreliance in trainees.

## 4 | THE WAY FORWARD?

So how should we train our medical students on electronic prescribing? What should it look like? When should it occur? Methods adopted from that of qualified prescribers may include scenario-based practical exercises in small groups or online, ward-based

training, as well as e-learning packages and reference guides to provide an overview of the systems' features.<sup>8</sup>

A combination of different interventions i.e. through blended learning may be required. This might be facilitated by computer-based learning scenarios and web-based/online modules or written material for self-study, allowing students to learn about the design of a system, in the same way that qualified prescribers may be trained. Any e-learning used in this context needs to be engaging, interactive, relevant, and simple with clearly defined learning outcomes.

Training systems, customized from live e-prescribing versions could provide students with the opportunity to experience prescribing in a safe environment. The lack of availability of such systems can only hinder progress. Liverpool John Moores University in the UK has recently developed a partnership with a medical technology firm ensuring nursing, pharmacy, and medical students, gain an insight into e-prescribing.<sup>12</sup> A demonstration version of the software product is being built by lecturers. Perhaps only through investments like this which require significant resources in terms of time, knowledge and skills, can such systems be developed and available for medical educators.

Prescribing safely and effectively is known to be influenced by the working environment. There is therefore a need to practice prescribing in real-time clinical practice or through simulation to mimic working environments. It was recognized in 2003 in the US with the increasing uptake of CPOE, that sufficient opportunities be given to students to participate in these systems.<sup>13</sup> More recently, it was described how final year medical students were permitted to prescribe in three hospital departments, in a trial to assess the impact of CPOE on their training. Students showed greater satisfaction using CPOE despite failing to gain better prescribing skills. This method of teaching was considered easy to implement and was recommended as soon as possible in the students' training.<sup>14</sup>

Prior to the introduction of the PSA in the UK, in 2012, Kent, Surrey, and Sussex Deanery in collaboration with South Thames Foundation School set up a Prescribing Assessment Group, made up of medical and pharmacy representatives and a regional prescribing assessment for newly qualified doctors was developed. It has been used for 10 years with the aim being to assess foundation trainees' ability to competently write up a drug chart and identify prescribers requiring further support. It focuses on five prescribing scenarios requiring the use of local paper drug charts and guidelines. In one

of the hospital trusts where electronic prescribing was introduced, a decision was made to adapt the regional prescribing assessment, moving from paper drug charts to an electronic chart. This has been run successfully since 2016 and demonstrates that paper-based prescribing assessments can be adapted to electronic ones.

## 5 | RECOMMENDATIONS

Suggestions of different approaches to the teaching and learning of e-prescribing to medical students may include

- Online e-learning programmes eg SCRIPT, PSA preparation modules
- Supervised live practice-based e-prescribing systems
- E-prescribing systems training accounts (non-live) in simulation suites
- Bespoke development of medical schools' prescribing platforms e.g student drug formularies
- Bespoke platform development with e-prescribing software companies

Recognition is given that some of these methods can be time-consuming and costly but likely to be beneficial in the long run.

## 6 | CONCLUSION

There is a dearth of published literature on the experience of teaching and learning of medical students in electronic prescribing and medical schools are encouraged to share their experiences. This might enable the appropriate adaptation of curriculum content to align with electronic prescribing in clinical practice. With a robust national prescribing assessment for medical students, there is a need to develop teaching and learning methods that prepare to graduate medical students for the complex task of prescribing. The reality is that electronic prescribing systems are now widespread in health-care settings but prescribing teaching and learning in medical education is seemingly lagging behind.

We believe progress must be made urgently to address any barriers to the use of electronic prescribing systems to educate medical undergraduates as this might equip them with skills to be safe and effective prescribers of the future.

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### CONFLICT OF INTEREST

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## DATA AVAILABILITY STATEMENT

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## ETHICS STATEMENT

Not required.

## ORCID

Naomi Burns  <https://orcid.org/0000-0002-9406-0180>

Michael Okorie  <https://orcid.org/0000-0003-1960-8860>

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