SHORT RESEARCH REPORT

Community pharmacists' interventions with electronic prescriptions in England: an exploratory study

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Abstract *Background* Prescribing errors in primary care are problematic. The electronic prescription service (EPS) is an English electronic system linking prescribing, dispensing and reimbursement, designed to rectify some of the problems associated with paper-based prescribing. *Objective* To document the numbers and types of interventions made by community pharmacists and their staff using EPS release 2 (EPSR2), compare these with those made for other prescription types, and comment on potential effects of EPSR2 on pharmacy practice. *Methods* We invited staff in 15 community pharmacies to record problems encountered arising from failures in prescribing, dispensing or supply systems for prescribed medication, for a 2 week period. *Results* Eight pharmacies participated, of which five used EPSR2. These pharmacies reported 69 problems with 68 prescriptions (median 7.5 problems per pharmacy, range 2–22). A total of 33 problems were clinical in nature and 6 were organisational or logistical in origin. Thirty unsigned prescriptions were reported, all non-EPSR2. Of the 69 problems, eight were primarily related to EPSR2 functionality. *Conclusion* EPSR2 should reduce the number of unsigned prescriptions in circulation. However, prescribers should avoid the use of Latin abbreviations that cannot be interpreted directly by patients, and consider the compatibility of regularly prescribed items with the NHS dictionary of medicines and devices.

Keywords Community pharmacy · Electronic prescribing · Pharmacists' interventions · Prescribing errors · United Kingdom

Impact of findings on practice

- To reduce the numbers of unsigned prescriptions in the UK, NHS prescribers in England should use the electronic prescription service release 2 (EPSR2) where appropriate.
- The creation of split prescriptions, where some items are prescribed electronically and some on paper, may cause problems; a method of highlighting prescriptions that are partly electronic and partly paper-based is needed.
- Since EPSR2 requires prescribed items to be compliant with the NHS dictionary of medicines and devices (DM + D), prescribers should change non-DM + D items to DM + D equivalents wherever possible to avoid subsequent problems with EPSR2.
- Community pharmacy staff in the UK will need to check the directions on EPSR2 prescriptions before printing labels, and amend any that are not appropriately phrased for patients.

Introduction

Prescribing errors occur in 4.0 % of drugs prescribed in United Kingdom (UK) primary care [1]. Community

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pharmacists play a key role in identifying and rectifying such errors, as well as resolving other problems such as unavailability of prescribed medication [2, 3]. However, previous UK studies have focussed on traditional paper prescriptions, either computer generated or handwritten [2, 3].

The introduction of England's electronic prescription service release 1 (EPSR1) for primary care began in 2005. EPSR1 prescriptions are standard paper prescriptions with an additional barcode. When the barcode is scanned in the community pharmacy, an electronic copy of the prescription data is downloaded to the pharmacy computer to populate the patient medication record and the labels for dispensed items.

EPS release 2 (EPSR2) is now being introduced, with the first sites having gone live in July 2009. EPSR2 is an electronic system linking prescribing, dispensing and reimbursement, designed to rectify some of the problems associated with paper-based prescribing such as unsigned prescriptions. Using EPSR2, electronic prescriptions are digitally signed by the prescriber and the electronic prescription transmitted to a nominated community pharmacy of the patient's choice. Patients are generally given a non-essential printed 'token' in lieu of a prescription, while the legal prescription is transmitted to the nominated pharmacy via a central server, the NHS 'Spine' [4]. A barcode on the token can be used to download the prescription at another pharmacy if required. Only items in the UK NHS dictionary of medicines and devices (DM + D [5]) can be prescribed using EPSR2, and schedule 2 and 3 controlled drugs cannot be prescribed.

No study has yet explored the types of prescribing errors identified or the interventions required by community pharmacists working with EPSR2. It is also not yet known whether EPSR2 will introduce new types of problems which community pharmacists will need to be aware of.

Aim of the study

We wanted to document the numbers and types of interventions made by community pharmacists working with EPSR2, compare these with those arising from non-EPSR2 prescriptions, and to comment on potential effects of EPSR2 on community pharmacy practice.

Methods

We invited all 15 community pharmacies, from five English primary care trusts, who were participating in a wider evaluation of the EPSR2 system and for whom we already had the appropriate permissions. At the time of data collection, nine (60 %) were using EPSR2 ('EPSR2 live'), and six (40 %) were not ('non-EPSR2 live'). As we were limited in the number of pharmacies we could approach and were asking pharmacy staff to record data, we incentivised participation by offering a £100 high-street voucher to participating pharmacy teams, supplied on completion.

We asked pharmacists to record information on all problems arising from failures in prescribing, dispensing or supply systems, in relation to prescribed medication, over a 2 week period. The feasibility of using such self-reported data in community pharmacy has previously been demonstrated [3, 6, 7]. We designed a data collection form for community pharmacy staff to complete, piloted this and then used the feedback to produce a final data collection booklet. This presented the study objectives, instructions for staff and 36 forms (Sect. Appendix). One of the research team briefed participating pharmacists on the project's purpose, how to complete the data collection booklet and addressed any queries; we asked pharmacists to brief locum pharmacists and other staff members as needed. We asked participants to record brief descriptions as soon as possible after identifying prescription-related problems that needed resolving to dispense the prescription, indicating how they were resolved, and whether the prescription was EPSR1, EPSR2, or non-EPS (either handwritten or computer generated). We also requested details of the number of items dispensed over the study period.

Data were analysed descriptively. We classified recorded problems in three ways. First, we categorised the type of problem into one of 13 mutually exclusive categories (Table 1). Second, the origin of the problem was categorised as being of a legal, clinical, or an organisational/logistical nature. Finally, any problems primarily related to EPS functionality were classified as being either EPSR1- or EPSR2-specific. Each prescribed item could be associated with multiple problems. Classifications were discussed by the research team and agreed by consensus. Where we had data on the number of items dispensed during the study period, the prevalence of problems was calculated for each pharmacy.

This work was conducted as part of a larger evaluation of the EPSR2 system which was classed as a service evaluation; ethics approval was not required.

Results

Of the 15 pharmacies invited to participate, one provided only pilot data, and six did not return any data. Analysis was therefore based on eight (53 %) pharmacies, of which five were EPSR2-live (Table 2).

Staff in these eight pharmacies reported a total of 69 problems with 68 prescriptions over the 2 week study period (median 7.5 problems per pharmacy, range 2-22). Types

Table 1 Interventions reported

Classification	Number (%) of problems	Origin of problem			Prescription type		
		Clinical	Legal	Organisational	Non-EPS	EPSR1	EPSR2
Unsigned	30 (43 %)	0	30	0	19	11	0
Incomplete prescription	6 (9 %)	6	0	0	2	0	4
Missing prescription	5 (7 %)	2	0	3	2	1	2
Drug-drug interaction	4 (6 %)	4	0	0	3	1	0
Incorrect formulation	4 (6 %)	4	0	0	3	0	1
Incorrect drug	4 (6 %)	4	0	0	4	0	0
Incorrect quantity	4 (6 %)	4	0	0	3	1	0
Supply problem	3 (4 %)	0	0	3	0	1	2
Missing item	2 (3 %)	2	0	0	2	0	0
Incorrect dose	2 (3 %)	2	0	0	2	0	0
Duplicate drug	2 (3 %)	2	0	0	0	2	0
Incorrect instructions	2 (3 %)	2	0	0	1	0	1
Illegible prescription	1 (1 %)	1	0	0	1	0	0
Total (% of all problems)	69 (100 %)	33 (48 %)	30 (43 %)	6 (9 %)	42 (61 %)	17 (25 %)	10 (14 %)

Table 2 Details and workload of participating pharmacies

Pharmacy number	Location	Number of days' data collection	Number non-EPS dispensed items	Number of EPSR1 dispensed items	Number of EPSR2 dispensed items	Total number of items dispensed
37	Village high street	14	290	2,889	Not EPSR2 live	3,179
38	City—suburban	Not reported	Not reported	Not reported	Not EPSR2 live	3,709
39	Town shopping centre	14	Not Reported	Not reported	Not EPSR2 live	868
46	Inner city	14	418	1,254	140	1,812
48	Inner city	11	1,133	812	337	2,282
49	Town high street	14	Not reported	Not reported	Not reported	Not reported
50	Town high street	8	Not reported	606	311	Not reported
51	Inner city	14	Not reported	Not reported	Not reported	Not reported

of problem are shown in Table 1. In relation to the origin of each problem, 30 (43 %) were problems with the legal aspects of the prescription; these all related to unsigned non-EPS and EPSR1 prescriptions. A further 33 (48 %) were clinical in nature. Potentially serious clinical errors included a prescription for an incorrect insulin pen (incorrect formulation) and a prescription for both erythromycin and simvastatin (drug–drug interaction). The remaining six (9 %) arose due to organisational or logistical problems. One, an EPSR1-specific problem, arose when a doctor mistakenly reprinted a copy of a previously dispensed prescription rather than creating a new one. Another two were EPSR2 prescriptions where the pharmacy had been incorrectly nominated. Manufacturing delays and prescription print-quality problems were also reported.

Five pharmacies reported the number of items dispensed during the study period, for these pharmacies the individual problem reporting rate ranged from 0.19 to 0.69 % (1.9–6.9 problems per 1,000 items dispensed) giving an overall rate of 0.58 % (69 problems in 11,850 dispensed items). The two EPSR2 live pharmacies reported 21 problems in 4,094 dispensed items (0.51 %), and three non-EPSR2 live pharmacies reported 31 problems in 7,756 items (0.40 %).

Overall, eight problems (12 %) were judged to have been caused specifically by the EPSR2 system, and one (1 %) due to EPSR1. Specifically, we identified four cases, all at the same pharmacy, of incomplete EPSR2 prescriptions with no dose visible on the screen; the dose was printed on the dispensing token and therefore manually entered by the pharmacist. Some prescribers used Latin abbreviations, which we classed as 'incorrect instructions'. With EPSR2 these were transferred automatically to the dispensing label and had to be amended manually by pharmacy staff. For example "QDSPRN" had to be amended to "Four times a day when required". Two missing prescriptions were caused by community pharmacy nominations which had been incorrectly set up. The final problem involved a missing prescription: a patient

arrived at the pharmacy having been told that their prescription had been transmitted electronically but the pharmacy staff had not received it. The GP surgery was called and it transpired that a paper prescription had in fact been issued, which was subsequently faxed to the pharmacy.

Discussion

The results of this study indicate that in line with previous work [3], circulation of unsigned paper prescriptions remains problematic, creating extra work for pharmacy and GP staff, as well as inconveniencing patients. EPSR2 prescriptions are digitally signed before transmission, thus eliminating this problem.

Problems specific to EPSR2 were also identified. One example of miscommunication resulted in a patient appearing at a pharmacy expecting an EPSR2 prescription, when their prescription was on paper and waiting at the GP surgery. This type of problem is likely to be problematic especially during EPSR2 roll-out, and may be exacerbated when a patient's medication is partly prescribed electronically and partly on paper (for example if any non DM + D items or controlled drugs are required). We also identified new problems caused by prescribers' instructions appearing automatically on the label directions. Traditionally, instructions on a prescription are interpreted and transcribed onto the medicine's label by pharmacy staff, using wording appropriate for the patient. The EPSR2 system can automatically transfer prescribers' dosage instructions onto the medication label without pharmacy staff actively entering them. The extra input needed by community pharmacy staff to manually edit prescribers' instructions may somewhat negate time savings envisaged through instructions being transferred automatically onto the label. Community pharmacies and their local GPs need to jointly establish common instruction templates for use on patient labels in order to fully realise the time-saving potential of EPSR2.

Our problem reporting rates are in line with similar studies [3, 8] but lower than that reported using more intensive data collection methods [9].

Implications for practice

Electronic prescription service release 2 (EPSR2) is likely to result in a decreased proportion of prescriptions arriving unsigned at community pharmacies, thus reducing unplanned workload for pharmacy and GP staff, and patient inconvenience. Problems were reported which were caused by prescribed items not being on DM + D; steps should be taken to ensure that all items on EPSR2 are DM + D-compliant. The use of both paper and electronic prescriptions for the same patient has the potential to be problematic; a system

which highlights the presence of additional non-EPSR2 prescriptions for EPSR2 patients should be investigated. GPs, pharmacists and software developers should work together to find solutions to problems such as the enduring use of abbreviations within an electronic system.

Strengths and limitations

This exploratory study is the first to look at problematic prescriptions in pharmacies using EPSR2. Limitations include the apparent mixed engagement of pharmacies in data collection which reduces the generalisability of the findings, and that only some pharmacies provided data on the number of dispensed items during the study period, limiting our ability to calculate problem prevalence rates; we suggest that future studies incorporate researchers periodically contacting participating pharmacies to increase engagement and to identify and resolve any barriers to ongoing participation. Future studies should establish the numbers of dispensed items, broken down by EPSR1, EPSR2 and non-EPS items, and use a larger sample size, in order to investigate differences in problem rates between the different types of prescription and whether other pharmacy-related factors and/or inter-pharmacist variability affect the problem rates documented. Finally, we did not formally assess the clinical significance of the problems identified.

Conclusion

Electronic prescription service release 2 (EPSR2) has the potential to reduce the number of unsigned prescriptions received at pharmacies. However, prescribers should avoid the use of Latin abbreviations that cannot be interpreted directly by the patients, and consider the compatibility of regularly prescribed items with DM + D. Further work is needed to explore the causes of other types of problem identified and how they can be resolved before we can draw clear conclusions regarding the impact of EPSR2.

Appendix

The School of Pharmacy, University of London | The University of Nottingham | LSE The London School of Economics and Political Science

THE UNIVERSITY OF LONDON; THE UNIVERSITY OF NOTTINGHAM; THE LONDON SCHOOL OF ECONOMICS

ELECTRONIC PRESCRIPTION SERVICE EVALUATION

RECORD OF PRESCRIPTION INTERVENTIONS AND QUERIES

Date log started:_____

Date of last entry:_____

Number of prescriptions dispensed within that period:_____
of which are EPS release 1:_____
of which are EPS release 2:_____

Contact: Matthew Reynolds

Telephone: 020 331 30503;

Email: matthew.reynolds@imperial.nhs.uk

Site ID:

Please keep your completed forms; they will be collected by the EPS team during future data collection sessions.

Our aim:
To detect the rates and types of prescription problems encountered by community pharmacies.

What are we interested in?
Detecting interventions, near-misses, and queries which you encounter on prescriptions presented to you.

What we would like you to do:
We would like you to record a brief description of each intervention or query, how you dealt with it and what the outcome was.

The situations we are interested in fall into four categories:

- **Prescription legality and validity problems**
- **Clinical queries**
- **Supply queries**
- **Patient preferences**

Please include or exclude situations in line with the examples on the opposite page.

What we would like you to record:

- what the problem or query was
- whether, and how, anyone else was contacted, e.g. GP
- what action you took
- what the outcome was
- whether this delayed the availability of the prescription

All information provided will remain anonymous. Thank you for your continued support.

Please include	Please exclude
Prescription legality and validity problems	
Unsigned / incomplete prescriptions	Problems with extra requirements of a controlled drugs prescription
Unclear or ambiguous prescriptions	
Out-of-date prescriptions	
Forged prescriptions	
Clinical queries	
Patient allergic to prescribed medicine	Establishing medication review date
Establishing brand when clinically relevant	Establishing the brand of medication preferred, when clinically unimportant
Clarifying a potentially significant dosing or frequency query	
Correcting a prescription to increase the probability of treatment being timely and effective	
Establishing correct dosage form / device	
Potentially significant interactions	
Supply Queries	
Managing a lengthy (>1 day) delay caused by manufacturing or supply problems, or discontinuation	Informing patients when medicine is out of stock but will be delivered restocked within usual timescales
	Supplying an emergency supply
Patient preference queries	
	Establishing or amending flavour preferences

Date:		3/2/11	
Prescription type:		Hand-written	☒
	EPS1	FP10	☐
		Barcode not used	☐
		Barcode used	☐
		EPS2 paper token	☐
		EPS2 paperless	☐
Form completed by:	Pharmacist ☒ / Technician ☐ / Dispenser ☐ / Pre-reg ☐ / Counter Assistant ☐		

1) What was the problem/query? Who discovered the problem?

Rx presented by pt. but not signed by prescriber

2) What action was taken?

Patient asked to take back to GP

EXAMPLE

3) What was the outcome?

Pt returned 5mins later with a signature. Rx dispensed as normal

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