Reviewer's report

Title: Medication errors with electronic prescribing (EP): Two views of the same picture

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Reviewer: Johanna Westbrook

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The objective of this study was to compare information about electronic prescribing obtained using a retrospective medical record audit and interviews with a sample of hospital staff and patients.

The premise of the study is that if we can rely upon qualitative methods to identify EP-related errors this is a more efficient method which also provides some insights into how errors occur. Designing a study to investigate whether this is in fact the case is an excellent idea. Further, there is a distinct shortage of good research applied to the evaluation of the effectiveness of EP systems and a study of this nature is very welcome.

There are a number of areas where clarification of the language, approach and results would significantly strengthen the paper.

A key issue was a failure to clearly provide the findings to support what I think appears to be the main message ie qualitative analysis may be a useful way of highlighting the broad categories of errors which can occur with EP systems, consistent with the types of errors which can be demonstrated on audit. The paper reports to be a comparison of the results from the two methods. However the paper is not balanced in terms of the results presented. There is very little data presented from the audit and no table with any numbers regarding the 85 errors identified from this audit. This makes it very difficult to accurately make a comparison with the broad types of issues reported from the interview data.

Introduction

There are a number of general statements made in the introduction which should be referenced including references to a number of systematic reviews which have been conducted, as readers may not be as familiar with this topic area as the authors given that it is a health services research audience. For example page 5 first sentence.

Also page 4 para 1, line 3 re-word ie hospital trusts don’t think.

Methods

Greater clarity around the methods used would help to interpret the findings. This could occur in several sections:

Greater detail around the description of the EP system in place would be useful.
Statements such as “..electronic prescribing … was the norm on all NHS wards, with paper charts reserved for drugs with highly variable regimens..”(p 6) “At QHB the vast majority of clinical information was available electronically..” (p9) is not as helpful as specific information about the number and type of wards using the system. For example, was the emergency department using the system, for how many types of drugs with variable doses were paper charts used? Also details about where clinicians accessed the system would be useful background information, particularly as later in the paper one of the problems raised was related to doctors not prescribing at the bedside which raises questions about what type of hardware is available (eg only stationery PCs, tablets, computers on wheels etc). Given the still quite limited adoption of EP in hospitals this level of detail is important and of interest.

The description of the sampling and recruitment process is not very clear and is mentioned in multiple paragraphs in the methods section. It would be good to bring this information together in a succinct and clear way.

For example page 6 Para 2 it states that “..the head of pharmacy services who then provided information about the study to potential participants.” Did the head of pharmacy run information sessions? Directly approach doctors, nurses and pharmacists across the three wards? There are further questions about who gave information leaflets to patients? Did the head pharmacist also approach individual patients??

Later on page 7 para 2 slightly different information is presented regarding recruitment “Pharmacy staff and the majority (?) of senior clinicians were identified and approached by a senior hospital manager”. Down the bottom of this page it is stated that 19 patients were recruited using purposive sampling based on use of ‘as required’ medication and previous admission history. The rationale for this approach should be stated as well as some indication of what elements of ‘previous admission history” were the eligibility criteria.

Interview Schedule - As the paper is very reliant upon the qualitative data it would be valuable to have the interview questions included in the text or as an appendix. On page 7 para 4 it states that four members of the implementation team and three users developed the interview guide. Were the researchers members of this group? This is the first time that this term is used.

The data analysis section for the quantitative audit is very scant just stating that the ‘…research pharmacist reviewed the data.”

Some detail about the information and methods relating to the staff diaries would also be helpful. It seems to be a limitation that the time and resources taken for data analysis were not included here. Qualitative data can be very labour intensive to analyse properly and I think this should be considered in the equation.

The description of the qualitative data analysis is also quite brief and somewhat confusing when matched with the results. The authors state they identified and
agreed on the general themes for the data. These major themes are not presented as part of the results.

Then the data were specifically searched for medication incident information. Finally a classification scheme was developed based on the stage of medicine use process through “iterative review of the individual report” and this was applied to the text description of errors. Does this iterative review refer to the reports of the medication incidents alone or the entire interview accounts?

The relationship between the development of the classification scheme and the themes identified from the interviews is not clear. Without information about the specific interview questions posed it is difficult to decipher this process. Given that the authors state that participants were not asked specifically about medication errors one would expect some general themes about the Ep system to have emerged. Yet all the results are presented only under the ‘error classification’ scheme. Also it is not clear why the interviewees were not asked directly about medication errors given that this was the point of the interviews and comparison with the medical record audit.

Results

The results regarding the audit are very brief. It would be useful to have a table of the 85 errors by type and severity (and how this was assessed) included.

Table 1 is not really a classification of errors. It is a classification of the steps in the medication process where errors may occur. The authors make this distinction in the methods section.

The results are very interesting but at times the information presented is unclear. Some of examples of this include:

eP interface errors – The meaning of the third sentence is unclear. Does the interface here refer to between a hospital and another health care facility? Page 10 para 2 The link between para 1 and 2 here is not entirely clear. Further explanation is also required to fully understand the point regarding the need for a dr to write a note on the EP system to prescribe a medication at discharge. The last sentence refers to a similar issue in the medical record audit. I assume this was identified by comparing the admission medications list with those prescribed for the patients while in hospital? In general, while the authors are very familiar with the medication error auditing process, many readers will not be and a level of detail needs to be provided to them so that they can understand the results.

Errors at the prescribing stage - The authors state that the record review provided a ‘wide range of examples..” It would be good to have a table to refer to here rather than just having to trust that this was the case.

Page 10 last paragraph “No cases of prescribing to the wrong patient were detected in the record review” How was this determined?

Does, form and frequency - In the second part of this paragraph it is not clear
whether the results being presented refer to the findings from the audit or the interviews.

Supply and administration errors - The link between the first two sentences is not clear.

Dose omission – The last sentence in this paragraph is left hanging and is not very informative in terms of what the ‘difficulties’ were.

Page 13 para two “Two interviews described…” Two interviewees…” Also knowing whether these were patients or staff is useful here. “Record review identified several cases where oxygen had been given but not prescribed” How was this identified?

Research resources comparison - “On average only four patients' [records] could be reviewed..”

As mentioned some discussion of the associated analysis resources should be made.

The results section also includes some inconsistency in the tense used.

Discussion

The first sentence commences by describing the ‘classification of the prescribing process” yet in the methods this classification is described as a classification of ‘the stage of medicine use process” and labelled in the results as an ‘error classification scheme’. Thus changes to improve the precision and consistency in the language used throughout is needed and I think will reduce some of the potential confusion in the paper.

Para 2 The results would appear to allow the use of a more precise conclusion, rather than “..produced similar pictures” which sounds rather vague. For example, the results suggest that the methods appear to be able to identify the same types of broad categories of medication errors.

Paragraph 3 belongs in the results. For example, this is the first mention of the issue of personal accountability. How was this demonstrated?

Paragraph 4 Also contains new results as this issue has not previously appeared in the paper. In discussing this issue it would be valuable to know what the researchers have assessed in terms of viewing the actual system to identify whether this was a problem.

Page 16 Re-word “The general view..” Line 4 “It also provided ..” It is not clear what ‘it’ is in this instance.

Page 16 para 3 line 2 Unless you have read reference 12 there is not sufficient information to interpret this sentence.

Page 17 The value of medical record audits are summed up as “Counts are good for efficacy testing but we suggest that counting is not the only way.” While I think
this is true, I think a little more credence to the value of audits should be acknowledged, ie they are also good for assessing the effectiveness of systems, they are able to quantify the size and significance of errors, eg by classifying the severity of errors etc and you are able to quantify significant changes over time. This does not detract from the value of qualitative accounts which also have an important role in providing insights into how errors occur and identifying specific types of errors which perhaps should be the focus of audits.

Page 17 para 2 The link between this paragraph and the preceding one is not clear.

Abstract

I think several of the issues raised above should be incorporated into a revision of the abstract. Further, some of the results are overstated in the conclusion. For example the statement that “The method is cost-effective..” cannot be sustained.

In the methods section of the abstract it states “A classification scheme was developed and applied to the errors identified in the records review”. This is not mentioned in the body of the paper and is an inconsistency adding some confusion as to exactly what was done. If the classification was applied to both the interviews and the audit data then a table of the 85 errors identified in the audit classified using this schema should be presented.

Overall I think this paper has considerable value, but needs to improve the precision and clarity of information presented to fully realise this value.

Level of interest: An article of importance in its field

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:

'I declare that I have no competing interests'