Poor drug history documentation in admission medical notes: clerking prompts and junior doctor education alone do not significantly reduce errors

M Richards, D Espitalier-Noel, H Stacey, J Thomerson & T Butt

Abstract

Introduction: *Poor drug history documentation on admission may lead to medication errors; a leading cause of avoidable harm.*

Aims: *To assess the quality of drug histories in the notes of patients admitted to an emergency assessment unit and impact of interventions to improve documentation.*

Methods: *Data were collected on the accuracy of documentation in 281 drug histories including errors of omission, frequency and dose.*

Results: *The mean error rate was high at more than five per drug history. Omitted drugs included warfarin and long-term steroids, the consequences of which were potentially serious. Clerking prompts and education alone did not improve errors significantly.*

Conclusion: *The error rate in drug histories is unacceptably high. More research is needed to explore factors involved in such documentation errors.*

Keywords:

Medicines Reconciliation, Patient Admission, Drug history, Medication errors

Key points

- The rate of errors in drug history documentation on admission to hospital is unacceptably high. Omission errors were most likely to be carried over to the prescription chart, and these included drugs likely to result in potential harm to patients such as long-term steroids, anticoagulants, and analgesics.
- Although reductions in frequency errors were seen, prompts for drug name, dose and frequency in the admissions booklet, and focused education alone did not significantly reduce errors overall.
- Further interventions such as providing mandatory education on the importance of history taking for all doctors involved in clerking and admitting patients, and access to Summary Care Records, may help in minimising these errors.
- Doctors re-clerking patients should, where possible, clarify previously documented drug histories and address any gaps or discrepancies rather than assuming their accuracy.

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Introduction

Medication errors on admission to hospital are common, and are a leading cause of avoidable harm.[1-3] Obtaining an accurate and complete drug history is essential in helping to prevent these errors.[4-7] Medicines prescribed to patients on admission and those taken prior to admission have been reported to vary by as much as 70%.[5,6,8] These discrepancies may not only affect patient safety, but may also conceal explanations for patients' illnesses.[5] In addition, such errors can have significant cost implications,[1] with significantly increased morbidity, prolonged length of hospital stay, and increased mortality.[9] The inaccurate documentation of medication history at the time of admission may also result in a considerable amount of wasted time and effort in seeking this information later on during a patient's hospital stay.[10]

Errors caused by failure to reconcile new medications with on-going home treatments are common when patients are discharged from hospital, but the time of admission is the critical point in which to identify and resolve them.[11] Inaccurate documentation of drugs in the notes could contribute to errors on discharge; without documentation of a complete drug history in the notes, medicines reconciliation on discharge from hospital may be more difficult.

Recording an accurate drug history constitutes the first step in the process of medicines reconciliation (MR). This process is defined as "the process of identifying the most accurate list of a patient's current medicines – including the name, dosage, frequency and route – and comparing them to the current list in use, recognising any discrepancies, and documenting any changes, thus resulting in a complete list of medications, accurately communicated".[12]

Since it is recognised that MR can reduce errors and, consequently, reduce avoidable harm, it is high on the national agenda and is noted to improve patient safety.[13] Drug regimens are becoming

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increasingly complex due to an increased number of medicines available and to an ageing population who are prescribed multiple medications for numerous comorbidities. Therefore, ensuring that MR takes place so that patients are prescribed the correct medications on admission to hospital is becoming even more important.[14-16]

Previously, one of the authors looked at the types of errors identified by pharmacy staff during the process of medicines reconciliation, focusing on the patients' prescription chart.[17] There are also other studies which have explored similar aspects of MR,[3] but we found few that focused specifically on the drug history recorded by doctors in the medical notes at the time of admission to hospital.

We sought to determine the accuracy of drug histories recorded in the medical notes on the emergency assessment unit (EAU) in a busy district general hospital, using the drug history obtained by the pharmacists through their MR process, as the 'gold standard'.

Method

Initial audit

A prospective audit was undertaken between September and December 2012. A proforma for data collection was prepared and piloted by the research team. Only medical patients in whom independent pharmacy MR had been carried out were included. The pharmacist's drug history was used as the gold standard with which to compare the drug history in the medical notes.

Data pertaining to the completeness and accuracy of the drug history recorded in the notes were collected, along with that prescribed on the prescription chart, and subsequent amendments to the prescription chart made by the pharmacist. Any discrepancies between the documented drug history and the gold standard were recorded. Where patients had first been admitted and assessed in the Emergency Department (ED) prior to being clerked in EAU, both the documented drug history by ED doctors and by EAU doctors were assessed. When looking at the accuracy of the prescription chart, only those discrepancies confirmed as being unintentional by the medical team were recorded. Intentional changes made to medications, which had been documented in the notes or verbally confirmed by the pharmacist reviewing the prescription chart, were not included. Similarly, where the medication had a clear clinical indication for being stopped, for example antihypertensives in patients with low blood pressure, these were deemed as intentional changes and not recorded as discrepancies, even if they were not documented as such in the notes.

Table 1. Overall data numbers and corresponding error rates

Parameter		Audit 2012	Reaudit 2014
No. of Patients	*Total*	61	107
	ED admissions	23	75
	EAU direct admission	38	32
No. of drug histories		99	182
Total no. of medicines		725	810
No. of errors	*Drug History*	557	932
	Drug chart	129	246
Mean % error rate	*Drug History*	5.6	5.1
	Drug chart	2.1	2.3

Data collected included discrepancies in drug name, dose, frequency of administration, and omission or addition of a drug. Additional data collected included the source of information used to obtain drug history by both the medical staff clerking the patient and the pharmacy staff carrying out medicines reconciliation.

Recommendations and re-audit

Following our initial data collection and analysis, a change in the admissions 'clerking' booklet used in the trust was introduced, whereby a drug history 'prompt box' was added to encourage more detailed information in the drug histories recorded. Prior to this, there had been only a blank page for recording this information. At the same time, educational sessions for junior doctors focusing on accurate history taking and documentation was introduced to the formal teaching programme of junior doctors in medical specialities (Foundation Years 1 and 2 and Core Medical Training) at the Trust. This teaching was in the form of an hour long interactive lecture, delivered a minimum of three times a year, and focused on the importance of taking an accurate drug history and common medication errors. The sessions also provided real-life case studies, and examples of errors occurring frequently on admission. A re-audit was subsequently carried out in July and August 2014 (prior to the 'changeover' period for new doctors) to assess for any improvements.

Results

Overall error rates

The number of errors overall equated to a mean error rate of more than 5 errors per patient drug history. The error rate was lower on the prescription chart at around 2 errors per chart. Interestingly, despite implementing the recommendations made following our previous audit, the overall error rate remained unchanged on re-audit (Table 1).

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Table 2. Percentage error rate according to type of error in documented drug histories

Type of error	Drug History % error rate		Drug chart % error rate	
	2012	*2014*	*2012*	*2014*
Drug errors (omissions)	31.2	32.2	21.7	21.9
Dose errors	27.1	26.2	4.2	7.1
Frequency errors	39.3	26.7	3.9	3.8

Types of errors

Overall, errors in drug frequency were the most common error in the drug histories documented in 2012. There was a reduction in frequency errors in 2014 from 39.3% to 26.7%. In general, frequency errors, along with dose errors, were mostly a lack of documentation entirely rather than an incorrect figure. However, such errors were less likely to be transcribed to the prescription chart, whereas omission errors were most likely to be transcribed to the prescription chart (Table 2).

Drugs involved in errors

Medicines commonly omitted in the drug history, according to their frequency of prescribing, included long-term steroids, anti-parkinson's medications, analgesics, and warfarin (table 3).

Errors of commission (i.e. additional drugs) were far less common, and were present in only five of the documented drug histories. Each of these documented drug histories had one additional medication recorded. These errors involved; metformin, oxycodone, varenicline, inhaled fluticasone and omeprazole. The number of regular medications these patients took varied from 1 to 14. Commission errors are not included in the table above and were omitted from all percentage error rate calculations.

Errors according to department and route of admission

For all errors combined, the rate was lower for EAU (29.7% in 2012, 26.1% in 2014) than for ED (36.1% in 2012, 31.4% in 2014).

For EAU direct admissions (i.e. GP referrals), omission and frequency errors were markedly reduced after the introduction of the prompts in the admissions booklet (42.1% to 12.4% for frequency errors and 26.5% to 9.6% for omission errors), unlike for ED-referred admissions where there was no significant change (Table 4). The frequency error rate was reduced in general throughout in the re-audit.

Interestingly, we found that where a patient had initially been clerked by an ED doctor prior to being referred to and clerked by an EAU doctor, many EAU doctors avoided documenting the drug history again, instead preferring to state "see ED clerking", resulting in a duplication of errors.

The route of admission to EAU had an impact on drug history error rates; information pertaining to dosing and frequency was more accurately

Table 3. Frequency of errors according to drug type (2012 audit)

Drug type	Drug		Dose		Freq		Total no. of prescriptions audited
	Number	% of total	Number	% of total	Number	% of total	
Long-term steroids	10	58.8	12	70.6	12	70.6	17
Anti-parkinson's	2	50.0	3	75.0	4	100.0	4
Warfarin	5	50.0	5	50.0	6	60.0	10
Diabetes	4	30.8	6	46.2	7	53.8	13
Digoxin	2	28.6	2	28.6	3	42.9	7
Analgesia (excl. strong opioids)*	14	26.4	27	50.9	28	52.8	53
Insulin	4	25.0	10	62.5	10	62.5	16
Strong opioids	4	23.5	10	58.8	10	58.8	17
Antiplatelets	11	23.4	18	38.3	29	61.7	47
Beta blockers	6	23.1	12	46.2	20	76.9	26
Antihypertensives	11	21.2	18	34.6	24	46.2	52
Diuretics	10	20.8	20	41.7	25	52.1	48
Antianginal	4	20.0	9	45.0	12	60.0	20

*Includes paracetamol, weak opioids, NSAIDs, amitriptyline (low dose), pregabalin

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Table 4. Percentage error rates in documented drug histories according to department

Department	Drug error (omissions)		Dose error		Frequency error	
	2012	2014	2012	2014	2012	2014
EAU (overall)	35.9	33.8	20.3	23.3	32.9	21.3
EAU (direct admission via GP only)	42.1	12.4	13.3	12.3	26.5	9.6
EAU (A&E referral)	31.3	43.5	24.7	31.0	36.8	29.1
A&E (all)	23.0	29.9	36.7	30.1	48.5	34.2

documented when the patient was referred by their GP (i.e. direct EAU admissions) (Table 4). In the re-audit, omission errors were also significantly fewer when the patient was referred by their GP compared to those admitted and referred through ED.

Source of information used to obtain drug history

In the initial audit, the source of information used to obtain the drug history by the clerking doctor was not documented in any of the notes, whereas the source used by the pharmacy team was recorded in 83% of cases. Following the introduction of the prompt box, only 4 of the histories had the source of information recorded. Pharmacy had a similar rate of 88.7% in the re-audit.

We classed sources of information available as either 'immediate' or 'external'. Immediately available sources included the patient, Medical Administration Records (MARS) provided by nursing homes, patients own drugs (PODs), or a previous electronic discharge letter (EDL), and these were, in general, available to clerking doctors. Examples of external sources included Summary Care Records (SCRs) and information from GPs; although the former in particular was routinely accessible to pharmacists, they were not available to clerking doctors at the time of the study.

Interestingly, we found that even when an immediately available source of information had been used by the pharmacy staff for a drug history during their MR process the drug history documented by doctors still had significant errors (Table 5).

Discussion

It is clear from our findings that the rate of errors in drug history documentation on admission to hospital is unacceptably high, and may result in potential harm to patients or adversely affect patient care.

The importance of recording an accurate drug history in a patient's notes should not be underestimated. The drug history obtained by doctors on admission and documented in the medical notes is often used to complete the patient's prescription chart. If, therefore, there are errors in the history, these may be transcribed to the prescription chart. Although many emergency admission wards have pharmacists who work to reconcile medicines, errors may still 'reach' the patient causing harm or potential harm before the process of pharmacist-led MR can take place. Also, on many emergency admissions wards, pharmacist-led MR may not take place 'out of hours' or at weekends due to lack of resources and staffing. Incorrect administration of drugs, including interrupted or inappropriate drug therapy, may therefore result.[5]

Without an accurate list of current medications recorded in the notes with which to compare the prescription chart, changes made to medications on admission to hospital may be more difficult to recognise and so communication of these changes may therefore be lacking. This difficulty may be exacerbated if patients are being concurrently or sequentially reviewed by multiple physicians or medical teams;[18] a process which is commonplace in today's NHS due to the introduction of shift work, and inpatient bed pressures, resulting in patients being moved from one ward to another more frequently.

In addition, in our experience, a prescription chart may more easily be subsequently lost or become missing, as compared to a set of medical notes. In this situation, doctors have little option but to re-write the prescription chart, often only having the original drug history recorded in the notes as their source of reference. Medication errors in the drug history may therefore again be transcribed to

Table 5. Percentage error rate according to availability of source of information used.

Source of information	Drug error rate (%)		Dose error rate (%)		Frequency error rate (%)	
	2012	2014	2012	2014	2012	2014
Immediate source*	33.1	34.6	33.7	24.4	42.9	22.9
External source$	32.3	31.8	19.2	27.0	40.7	30.5

*includes patient/POD/EDL/MARS

$includes Summary Care Record (SCR)/GP/information from pharmacy dispensing record/unidentified

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the prescription chart, despite the fact that they may have been identified and rectified on the prescription chart previously.

Finally, when assessing patients on the post-take ward round following admission to hospital, consultants or senior medical staff may rely exclusively on the documented drug history in the admission clerking[19] rather than the prescription chart, so even if errors are not transcribed to the prescription chart or are subsequently amended, these will not be recognised. It is therefore essential that a complete and accurate drug history, including doses and frequency of administration, is documented in the admission notes or 'clerking' of all patients admitted to hospital.

In our study, despite the introduction of a drug history prompt box in the clerking proforma, and focused education of junior doctors, the overall error rate in the drug history remained high with little change. There was, however, a reduction in frequency errors.

Errors in dose and frequency were mostly a lack of documentation entirely rather than an incorrect figure; these errors, however, were generally not transcribed to the prescription chart. One possible explanation for this is that doses and frequencies were deliberately omitted from the drug history by junior doctors but an effort was made to ensure that this information was provided on the prescription chart.

We can speculate reasons for this theory; taking and documenting a comprehensive drug history can often be time-consuming,[5] and numerous pressures and targets exist within emergency and acute medicine to assess patients within limited time frames. Doctors may therefore document the 'minimum' information in the notes and thus may document the drug name in the majority of cases but choose to omit dose and frequency information (even if it is known) in order to save time. These theories could be further explored in future qualitative research, for example by interviewing doctors regarding their reasons for omitting this information in their drug histories.

Omission errors were the most likely to be carried over to the prescription chart suggesting it is likely that the drugs omitted were genuinely not known to the doctors completing the histories. We did not explore possible reasons for these omission errors, and causes of errors identified are not discernible from this study but such errors may have been a result of failure to take a thorough and comprehensive drug history using all sources of information immediately available;[4,5] again, we could hypothesise, due to time pressures. This theory is supported by the fact that pharmacists were able to obtain a complete drug history using the same information sources that would have been immediately available to the junior doctors completing the drug history and that pharmacists often have more time to dedicate to medicines reconciliation, whereas medical staff are usually responsible for many other aspects of their patient's care. Further research focusing on the time taken by junior doctors to complete a drug history as compared to pharmacist colleagues may be helpful in exploring this theory further.

Other research has shown that such medication errors may also be due to oversight and prescribing uncertainty,[4,5] or due to poor communication from primary care, and the admitting doctor being more focused on the admitting condition than with the treatment of unrelated co-morbidities.[20]

Medicines omitted in the drug history included long-term steroids, anti-parkinson's medication, anti-coagulants, insulin and anti-hypertensive therapy. This is concerning as the implications of such omissions and the potential for patient harm is significant. Although actual harm was not assessed in our audit, it is clear that such errors may result in patient harm when omitted from therapy.[3-6,17]

We found that the overall error rate was lower for patients admitted directly to EAU than for those admitted via ED and that the interventions introduced following the original study resulted in an improvement in drug history documentation for patients clerked by EAU doctors only but not for those clerked in the ED. This may be due to the fact that patients admitted directly to EAU are referred by their GP and so are more likely to arrive with a printed list of medications, providing the clerking doctor with a more accurate list. Patients presenting to A&E may be more unwell, and consequently less able to provide information pertaining to their medications, and are less likely to have a list with them, presuming they have arrived as an emergency. The main priority in ED is to acutely manage and stabilise the patient, and hence a full history may not be taken in the belief that a more detailed history will be taken by the medical team to whom the patient has been referred. In addition to this, ED have pressures related to the '4 hour target', and may therefore spend less time than EAU staff in obtaining a comprehensive drug history. Finally, educational sessions provided to junior doctors following the original audit were only compulsory for foundation year and Core Medical Trainees from medical specialties only, so may have been poorly attended by ED junior doctors, and specialist/specialty registrars. In addition, it is likely that locum doctors and doctors in non-training grades may not have attended the sessions.

Interestingly, where patients had initially been clerked by an ED doctor prior to being referred

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to and clerked by an EAU doctor, EAU doctors often avoided documenting the drug history again, instead preferring to state "see ED clerking". None of these doctors, however, documented whether or not they independently verified the drug history taken by ED, and current evidence suggests that once a drug history has been documented, doctors are less likely to confirm its accuracy with another source.[19] As a result, errors made by ED may not have been identified on second assessment by the EAU doctors, and hence carried over to the EAU clerking. In fact, EAU drug histories were generally less accurate if the patient had first been clerked by ED. This may be attributed to the fact that there was no blank prompt box for the EAU doctors when the patient had already been clerked in ED. Our findings therefore demonstrate the importance of independently verifying a drug history previously recorded in the notes and not assuming that what is documented is accurate.

When recording a drug history, the source of information should ideally be recorded as it allows better judgement of the quality of information provided and can help resolve queries. However even with a 'prompt', few of the clerking doctors recorded the source of information they had used to obtain the drug history and, although we were unable to ascertain reasons for this, time pressures and lack of understanding of the importance of providing this information may be to blame.

Limitations of our study

As with similar studies of this type, using the pharmacist's drug history as the 'gold standard' is a limitation[21] as we cannot provide evidence that the medication histories taken by pharmacy staff were accurate, even if they were more comprehensive than those obtained by the doctors.

Another limitation of our audit is that there is a possibility that some of the patients' own drugs (PODs) may not have been available at the time of clerking, despite being there at the time of pharmacy consultation as they may have been brought in later by relatives. However, the other immediately available sources of information used (MARS, patient, EDL) would also have been available to the clerking doctor at all times. Conversely, there may have been cases where additional sources of information were available to the clerking doctor that were no longer accessible to the pharmacy staff e.g. if PODs were sent home with relatives.

The education provided to junior doctors following the original audit was not mandatory and did not reach all grades of staff in all departments. Many doctors in the hospital are involved with clerking patients and all should receive education as a compulsory requirement of their induction for it to be a more valid intervention.

Finally, we made an assumption that the junior doctor completing the drug history in the notes, also completed the prescription chart on admission. Although from experience, we know that this is common practice in the majority of cases, we were unable to verify this.

Further recommendations for improvement

Further strategies which could be employed to reduce drug history errors include:

- Mandatory educational sessions for all junior doctors involved in clerking or admitting patients, focusing on the importance of taking a good drug history,[3] (e.g. as part of the hospital induction process)
- Increased pharmacist involvement in the process (for example, pharmacists helping to amend drug histories as well as prescription charts).[13]
- Increased awareness and access to Summary Care Records (SCRs) for doctors on the emergency floor.[22]

Acknowledgements

The authors would like to thank Dr Joseph Bland for his help in data collection.

Conflict of interest

Nothing to declare.

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