A collaborative evaluation of pharmacy interventions in the care of inpatients in community hospitals

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ABSTRACT

Objectives To quantify medication-related errors, in particular prescribing errors, identified by pharmacists and assess their potential impact on inpatients in community hospitals.

Methods Pharmacists recorded all interventions to optimise medication for community hospital inpatients over 14 days in November 2013. Interventions were subsequently classified by type (prescribing error; omitted or delayed drug administration; or attributable to other issues) and rated for potential clinical impact.

Results 15 organisations participated in the study reporting on 4077 medication charts. In total, 52 033 medication orders were screened by pharmacists. A medication-related intervention was made on 1 in 3 charts for one or more medications. A total of 2782 interventions were recorded. The majority were categorised as a prescriber error (67%, 1872/2782). The remainder (33%, 910/2782) were not directly attributable to prescriber error; of these omitted and delayed medicine administration accounted for 11% (298/2782). Of the 1872 interventions classed as prescriber error, a third, if left undetected, might have caused moderate or severe patient harm. The prescribing error rate was 3.6 errors per 100 medication orders.

Conclusions Pharmacists reported intervening to improve the care provided to over a third of patients in this study. Two-thirds of interventions were in response to prescribing errors, a third of which, if left undetected, could have led to harm. The results suggest that inpatients in community hospitals are subject to prescribing errors at a rate comparable to those seen in acute and mental health hospitals. A clinical pharmacy service is vital to ensure patient safety in community hospitals.

INTRODUCTION

Within the UK, community hospitals provide an alternative to acute, general hospital care, nearer to people's homes and responding to local need. These services are commissioned by primary care organisations and may be supplied by a range of healthcare providers including National Health Service (NHS) trusts, social enterprises or private organisations. Community hospital inpatient facilities provide healthcare for people who need intermediate care, between that provided by an acute hospital and that provided by a care home. Patients are primarily elderly. Patient care at a community hospital is usually nurse led, and the administration of medicines is undertaken by nurses. There is generally no on-site medical cover; cover is provided by visiting doctors who are usually responsible for writing prescriptions. Similarly, there is usually no on-site pharmacy; medicines are obtained either from a local hospital pharmacy or a community pharmacy. Clinical pharmacy services are provided by visiting clinical pharmacists, and the frequency of these visits is typically once or twice each week. The level of dependency of patients occupying this type of bed has increased over the last 10 years.[1 2] Although rehabilitation is often required, there is an increasing demand for more ongoing acute care. Transfer to this type of inpatient facility is often used to free up acute beds, and, in some circumstances, patients are admitted directly to this type of facility to avoid an acute admission.

Patterns of medical input to these community hospitals are varied and often historical. In some organisations, a local general practitioner is contracted to provide this service. Where the community hospital is part of an NHS acute trust, the medical input may be under the control of the consultant geriatrician and be provided by the acute team. In some organisations, a mixed model of provision may occur with general practitioners providing the majority of care, linking with a visiting geriatrician.

Similarly, clinical pharmacy services to these community hospitals vary. The aim of such a service is to scrutinise the paper-based medicines charts on which the prescriptions are written for clinical appropriateness, accuracy and safety and to intervene to optimise care; this is in addition to any medication supply service. The frequency of attendance by a clinical pharmacist is often based on historical patterns of service and may not reflect the dependency of the current patient population.

Pharmacist interventions in the care of patients in acute hospitals have been shown to reduce the risks associated with medicines.[3 4] There have been no similar studies reported of pharmacist interventions in community hospitals in the UK.

AIM

This collaborative evaluation aimed to quantify medication-related errors, in particular prescribing errors, identified by pharmacists, and assess the potential impact on inpatients in community hospitals had the errors not been identified.

METHODS

Organisations with community hospitals within east and southeast England were invited to take part in the collaborative evaluation. Pharmacists who provided a prescription review service to inpatients in the community hospitals were asked to record interventions made to inpatient care every time they reviewed an inpatient medication chart over a 14-day period during November 2013. The

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inpatient medication charts are a paper-based prescription and administration chart.

A pharmacy intervention was defined as

> An intervention which results in the correction of a prescribing/transcribing error or the provision of pharmaceutical advice which optimises the patient's care.[5]

The data collection tool was based on that used by Dodds, trialled in six organisations and then revised in line with the minor comments received.[5]

Participants were asked to record the type of care the patient was receiving, the stage in the patient's care, the number of medicines prescribed and whether the allergy status of the patient was recorded. Where the pharmacist made an intervention from information on the medication chart, they were asked to record the name of the drug and the type of intervention from a predetermined list. Pharmacists were then asked to self-assess the clinical impact of their intervention according to a framework similar to that used by Dodds and adapted from the National Reporting and Learning System (NRLS).[5 6] Table 1 gives an overview of how the interventions were assessed, with examples given to provide clarity.

Organisations also reported the frequency of their clinical pharmacist visits to the community hospitals.

Each intervention was subsequently classified as either a prescribing error (based on the definition by Dean *et al*[7]), as an omitted or delayed drug administration (if the administration record on the medication chart had not been completed and following investigation with nursing staff the drug had not been given) or as attributable to other issues.

Table 1 Overview for assessing clinical impact

Level	Descriptor	Examples
1	None/insignificant—no harm would have occurred to the patient.	▶ Wrong timing when optimal timing desirable but not critical ▶ 'As required' medicines that have only been required minimally during the admission not prescribed on discharge
2	Low/minor—would have caused minimal harm. May have required extra observation or minor treatment.	▶ Regular or 'as required' medications taken prior to the admission and not prescribed, eg, topical preparations, laxatives, etc. ▶ Inappropriate continuation of a medicine with a good safety profile ▶ Brand not stated when this might impact on clinical outcome according to British National Formulary guidance
3	Moderate—could have resulted in a moderate increase in treatment with significant but not permanent harm to the patient.	▶ Omitted or inappropriately prescribed long-term medicine (stopped drug restarted, therapeutic duplicate) ▶ Wrong drug or wrong dose; wrong route, wrong dose frequency ▶ Wrong brand when this is important according to British National Formulary guidance ▶ No instructions to step up or step down medications ▶ No stop date for short course of medicines
4	Severe/major—could have resulted in permanent harm	▶ Errors involving the prescribing of high-risk drugs or failure to arrange monitoring in early stages of dose stabilisation ▶ New allergy or serious adverse drug event not documented

RESULTS

Of the 34 organisations contacted, 15 (44%) agreed to take part. One organisation was only able to provide data for 7 days, and their data were also included.

In total, 4077 medication charts (equating to 52 033 medication orders) were screened by pharmacists; an intervention by a pharmacist was made on 1 in 3 (37.7% (1537)) of these charts for one or more medications. A total of 2782 interventions were made.

The majority of patients in community hospitals were receiving care as part of a rehabilitation programme. Further details are shown in table 2.

The number of regular medicines being taken ranged from 0 to 25 with a mean of 9 medicines. When 'as required' medicines were included, the range went from 1 to 29 medicines with a mean of 13 medicines.

In total, 152 (3.7%) charts had no allergy data recorded. Also, 7 of the 15 organisations reported that all charts screened by pharmacists had allergy information included.

The frequency of pharmacy clinical visits ranged from 1 to 5 times a week, twice weekly being most common.

The majority of interventions made were categorised as a result of a prescribing error (67%, 1872/2782). Table 3 gives further details of the types of prescribing error. Of the remaining 33% (910/2782), omitted and delayed medicine administration accounted for 11% (298/2782). The remaining 22% were categorised as follows:

- 6% were attributed to pharmaceutical issues such as suggesting an alternative formulation or advising on storage arrangements;
- 6% were drug monitoring or clinical monitoring;
- 5% were patient counselling;
- 1% were cost optimisation—suggesting a more cost-effective drug;
- 1% were arranging a compliance aid;
- 4% were attributed to other interventions.

The number of prescribing errors (1872) was divided by the number of medication orders (52 033) to determine the prescribing error rate. This was calculated as 3.6 prescribing errors per 100 medication orders.

The 1872 interventions classified as a prescribing error were further analysed, and table 4 shows the clinical impact that was prevented by the intervention.

The 82 interventions that were identified as prescribing errors and classified as severe/major (level 4 intervention) were further

Table 2 Charts screened by care area

Care area	Number of charts screened by pharmacy
Rehabilitation (all)	2807
Terminal care	136
Step up (admission avoidance)	239
Step down (facilitated discharge)	674
Other (includes mental health, care home beds and all other specialties)	221
Total	4077

Table 3 Types of prescribing error

Types of prescribing error	Number	%
Allergy status incomplete	205	7
Omitted drug, ie, medicine not prescribed	278	10
Inappropriate addition of drug	43	2
Wrong drug	15	1
Wrong or missing dose	209	8
Wrong or missing formulation or route	106	4
Wrong frequency, timing or duration	221	8
Drug interaction addressed	46	2
Legality of prescription	214	8
Prescriber actions required—eg, suggest starting therapy for at-risk patients or stopping therapy no longer needed	472	17
Adverse drug reactions/side effect reported or cautions/ contraindications addressed	63	2
	1872	67

investigated using British National Formulary categories to see whether there were any trends relating to the drugs involved. Table 5 gives the top five most frequent drug types involved. For anticoagulants, the most frequent error type was wrong or missing dose (5/15). Other errors with this class of drug included all types except prescription legality. For antibacterials, the most frequent error types were allergy status incomplete (6/12) and prescriber actions required (4/12). The latter would include stopping therapy no longer needed.

DISCUSSION

One of the aims of clinical pharmacy services is to identify errors and discrepancies on prescriptions. These are commonly errors of prescribing and errors of administration (where these are obvious from the medication chart). Studies have shown that 96% of pharmacist interventions are accepted and usually result in a change to the prescription or administration, resulting in an improvement in patient care.[8 9]

Pharmacists reported intervening to improve the care provided to over a third of the patients within this study.

This study found that two-thirds (67%, 1872/2782) of the pharmacist interventions involved prescribing errors. Of these, a third, if left undetected, might have led to moderate or severe harm to the patient, which could have been associated with an increased length of stay or other detrimental sequelae. This study reported interventions during 1 month of the year, so any seasonal influences are unknown.

A major study commissioned by the General Medical Council of prescribing errors made in 19 UK acute hospitals (EQUIP)[3] found that pharmacists had an important role to play in intercepting errors before they could affect patients. The EQUIP study reported an error rate of 8.9% (11 077 prescribing errors in 124 260 medication orders). A systematic review of prescribing errors in hospital inpatients (acute and mental health) undertaken as part of the EQUIP study, but reported separately, found a median error rate of 7% with an IQR of 2–14%.[10] Within our study, we calculated a prescribing error rate of 3.6%; this error rate is within the IQR reported in the systematic review. However, one of the difficulties in comparing error rates is that different studies use different methods. Our error rate is lower than that found in the EQUIP study, and this may reflect study design. EQUIP used the number of newly written regular, 'when required' and discharge medication orders screened by hospital pharmacists, including any medication orders omitted, as the denominator.[11] Whereas we used the total number of prescription items on the prescription chart that included items previously prescribed, this would include medication orders that had been previously checked and corrected. Thus, the denominator we employed would be greater than if only newly prescribed or newly omitted items had been used. This could explain our lower prescribing error rate.

It is interesting to note that a recent study in mental health hospitals used the same method as EQUIP, and they report an error rate of 6.3%.[12] The authors of this study comment that their rate is higher than that previously reported in UK psychiatric hospitals of 2.4% and 2.2%;[13 14] they suggest that this may be because they only included newly omitted and newly written items.

There is the perception within the NHS that inpatients at community hospitals are medically stable, requiring few medication changes and therefore minimal pharmaceutical intervention. Thus, a prescribing error rate much lower than that in acute and mental health trusts might be anticipated. Our results indicate an error rate that is comparable to that reported in other settings. Significant numbers of prescribing errors do occur in community hospitals, and pharmacy support is still essential to prevent many such errors regardless of the setting.

The EQUIP study reported the level of severity of the prescribing errors after validation by an independent panel of senior pharmacists and doctors.[3] Dean and Barber found that at least four judges consisting of senior doctors, senior pharmacists and senior nurses were required to achieve reliable scores.[15] In our evaluation, pharmacists self-scored the severity level according to a framework adapted from the NRLS similar to that used by Dodds.[5 6] To aid consistency, participants were given written guidance on self-scoring, which included examples to provide clarity. We acknowledge that the self-scoring may be less reliable than that provided independently. It is difficult to compare severity rating with other studies as lack of standardisation between severity scales makes it impossible to compare results directly. However, it is clear that significant prescribing errors are not uncommon in community hospitals.

Table 4 Clinical impact of prescribing interventions

Clinical impact descriptor	Number	%
Level 1—none/insignificant	452	24.1
Level 2—low/minor	794	42.4
Level 3—moderate	544	29.1
Level 4—severe/major	82	4.4
	1872	100.0

Table 5 Most frequent medicines involved in level 4 prescribing error interventions

Medicine (British National Formulary category)	n=82
Anticoagulants (oral and parenteral)	15 (18.3%)
Antibacterial drugs	12 (14.6%)
Opioid analgesics	6 (7.3%)
Insulin	4 (4.9%)
Bisphosphonates and drugs affecting bone metabolism	3 (3.7%)
All other drugs/types	42 (51.2%)
Total	82 (100.0%)

When the results were examined in more detail, the prescribing errors that were classified as a level 4—severe/major involved three drug groups (anticoagulants, insulin and opioids) that have already been included in National Patient Safety Agency (NPSA) alerts and are known to be associated with increased harm.[16–18] The high potential severity rate appears to be attributable to a relatively small group of drugs that are known to cause severe harm. The NPSA charged organisations with implementing safety procedures to reduce the risk associated with drugs in these alerts, and this study suggests that further work is required to improve patient safety in these areas.

CONCLUSION

This is the first multicentred evaluation of pharmacy interventions for inpatients in community hospitals in the UK. The self-reported study found that pharmacists intervened to improve patient care in over a third of patients.

An analysis of interventions made as a result of prescribing errors found an error rate of 3.6 errors per 100 medication orders. In addition, the study found that a third of these prescribing errors, if left undetected, could have led to harm. Our result suggests that inpatients in community hospitals are subject to prescribing errors at a comparable rate to those seen in acute and mental health hospitals.

Medicines associated with a high-risk profile, which are used within community hospitals, pose a significant risk to patients, and further study is required to define the contributing factors.

A clinical pharmacy service is vital to ensure patient safety in community hospitals.

Key messages

What is already known on this subject

- Pharmacist interventions in the care of patients in acute hospitals have been shown to reduce the risks associated with medicines, but there have been no similar studies in community hospitals reported.
- The reported median prescribing error rate (acute and mental health hospitals) is 7% with an IQR of 2–14%.
- The severity and morbidity of the current patient population in community hospitals is increasing.

What this study adds

- Pharmacists reported intervening to improve the care provided to over a third of the patients within community hospitals in this study.
- The prescribing error rate in these community hospitals was 3.6 errors per 100 medication orders, which is within the IQR reported for acute and mental health hospital inpatients.
- A third of the prescribing errors reported, if left undetected, could have led to harm.

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Competing interests None declared.

Ethics approval Ethics approval was not sought as the study was a service evaluation. Organisations remained anonymous and patients were not identifiable from the data collected.

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement Full details of the methodology and data collection forms can be accessed from the Specialist Pharmacy Service website entitled "Pharmacy interventions to the care of inpatients in Community Hospitals". http://www.medicinesresources.nhs.uk/en/Communities/NHS/SPS-E-and-SE-England/Meds-use-and-safety/Service-deliv-and-devel/Delivery-services-across-CHS/Pharmacy-interventions-to-the-care-of-inpatients-in-Community-Hospitals/

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