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SHORT RESEARCH REPORT

Clinical pharmacy services in a London hospital, have they changed?

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Abstract *Background* The development of clinical pharmacy, has created a need for pharmacists to demonstrate the service they provide to hospital boards. *Objectives* To describe and compare the type and frequency of clinical pharmacy contributions to individual patients admitted to a large teaching hospital within a 1 week study period over four consecutive years 2009–2012. *Method* This study was a prospective 1 week study over 4 years (2009–2012). Pharmacists used data collection sheets to record the primary reason and outcome of interventions made. *Results* The most frequent reasons for pharmacists intervening in patient care have been due to efficacy of medication and for safety to prevent an adverse drug reaction. The percentage of accepted interventions by the medical team was similar ranging from 85 to 92 %. *Conclusions* Pharmacists consistently carried out interventions to patient care over a 4 year period and provide the Trust with a service that focuses on ensuring safety and efficacy of the medications administered. Impact of findings on practice Daily clinical pharmacy services in a UK teaching hospital allow pharmacists to contribute to protecting patients from the adverse effects of medications. Pharmacists most frequently intervene to patient care for the reasons of medication efficacy and safety and to prevent adverse drug reactions.

Keywords Clinical pharmacists · Clinical pharmacy services · Interventions · Teaching hospital · United Kingdom

Impact of findings on practice

- Daily clinical pharmacy services in a UK teaching hospital allow pharmacists to contribute to protecting patients from the adverse effects of medications.
- Pharmacists most frequently intervene to patient care for the reasons of medication efficacy and safety and to prevent adverse drug reactions.

Introduction

Prior to the 1960s hospital pharmacists mainly carried out traditional pharmacy tasks such as dispensing and the production of medicines [1]. However with the increasing development of medications requiring optimisation and in turn greater reporting of prescribing errors and adverse events, the need for a service that provided a more patient centred approach was required [2]. It is now recognised that pharmacists play an important role in medicines safety whilst patients are in secondary care [3].

The number of prescribing errors in secondary care has also seen the development of the role of clinical pharmacists. Errors are a common occurrence affecting 7 % of orders, 2 % of patient days and 50 % of hospital admissions [4]. A recent report from the General Medical

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Council in the UK showed that 8.9 % of orders in a selection of UK hospitals contained an error when written. The majority of these errors are intercepted before actual harm occurs to patients by the intervention of clinical pharmacy staff [5]. Pharmacists facilitate the safe and effective use of medication in patients [3, 5] and these interventions, which can lead to the reduction of adverse events, are associated with cost savings [6].

More than 15 years ago, the pharmacy department in a tertiary London teaching hospital began to collect data on their operational activities and interventions to demonstrate the service provided by clinical pharmacy. Over the past 4 years, this has been consistently collected in a robust and reliable way.

Aim of the study

To describe and compare the type and frequency of clinical pharmacy contributions to individual patients admitted to a large teaching hospital within a 1 week study period over four consecutive years 2009–2012.

Method

The study was a prospective 1 week descriptive clinical pharmacist interventional service evaluation, taking place in differing weeks in October, November or December over a 4 year period (2009–2012). The study was conducted at a tertiary London Trust that consists of three hospitals with 1,100 beds. The pharmacy department employs (not including the manufacturing department) 116 pharmacists and ward based clinical pharmacy services are provided to all directorates, except day surgery and outpatients. A clinical pharmacist is available 24 h a day, but ward based services are only provided Monday to Saturday during working hours. No significant changes to the hospitals have occurred over the 4 year period. An intervention was defined as an action that leads to a change in the patient's medication.

Data collection recording sheets were used to collect the type of intervention, the primary reason for the intervention, the specific drugs involved and if the intervention was accepted and pharmacists were trained to collect data on interventions they had made. If the intervention was not documented by the pharmacist, then the intervention was marked as unknown and not included in the analysis. The definition of the interventions had been previously agreed by the clinical teams.

Pharmacists were required to select one primary reason for the intervention. Selecting "efficacy" as the reason for intervention meant that a change to the medication was made in order to produce a better therapeutic effect. "Safety in order to prevent an adverse drug reaction (ADR)" was making a change to medication so that a particular patient does not experience an adverse event e.g. making a change to take into account renal function. An intervention for the reason of "compliance and concordance" meant making a change that increased the patient's decision to take the medication. Interventions to reduce the length of hospital stay were chosen if the decision allowed the patient to be discharge from hospital when treatment was previously delaying that e.g. switching from intravenous to oral. "Cost-effectiveness" is when an intervention made allowed a less expensive medication/treatment regime to be prescribed without compromising patient care. "Safety in reaction to an ADR" meant an intervention that was made when a patient had already suffered an adverse medication event.

To describe the type and level of clinical pharmacy contributions, descriptive statistics were reported. Chi square tests assessed differences in the result of interventions made by pharmacists and assessed differences in the types of pharmacist intervention over the 4 year period. However, given the magnitude of the available dataset, standardised residuals were also calculated to investigate the clinical significance of any statistical differences detected. To give a denominator for the number of interventions recorded, inpatient data for the hospital was taken from Hospital Episode Statistic. The data is provided each financial year, therefore the years 2009–2010, 2010–2011 and 2011–2012 were looked at. The data for 2012–2013 was not available at the time of writing so the average data from the previous 3 years was used. The number of finished consultant episode bed days for each year were divided by 365 and multiplied by 7 to correspond to the number of patients in beds for 1 week [7]. The average number of interventions over the 4 years and the average number of bed days were also calculated which were then used to determine the number of interventions per 100 bed days.

Results

In 2009, 2,693 interventions were made by 50 pharmacists, 3,645 interventions were made in 2010 by 64 pharmacists, 3,305 interventions were made in 2011 by 51 pharmacists and in 2012, 2,951 interventions were recorded by 64 pharmacists (see Table 1).

On average per 100 bed days 47 interventions were made by pharmacists to patients care.

Figure 1 show's if an intervention was accepted by the medical team, discussed but not accepted or if advice only was given. Over 4 years, the percentage of accepted

Table 1 Total number of interventions and primary reason for pharmacist intervention in patient care over a 4 year period

Reason for intervention	2009 n (%)	2010 n (%)	2011 n (%)	2012 n (%)
Efficacy	1,137 (42)	1,610 (44)	1,316 (40)	1,177 (40)
Safety: to prevent ADR	1,030 (38)	1,218 (33)	1,318 (40)	1,108 (38)
Compliance/ concordance	198 (7)	283 (8)	179 (5)	229 (8)
Reduce length of stay	136 (5)	275 (8)	236 (7)	140 (5)
Cost effectiveness	97 (4)	164 (4)	117 (4)	138 (5)
Safety: in reaction to ADR	95 (4)	95 (3)	139 (4)	159 (5)
Total	2,693	3,645	3,305	2,951
FCE bed days	6,614	6,652	6,688	6,651*

n Number of interventions, *FCE* Finished consultant episode

* Average data used

interventions by the medical team was similar ranging from 85–92 %, the percentage of interventions not accepted was consistent at 2–3 %. Although statistically significant ($p < 0.01$), there were no clinically relevant trends over time regarding the outcome of the intervention.

Throughout the 4 years, the most frequent reasons for intervention (see Table 1) have consistently been efficacy and safety to prevent an adverse drug reaction. Although statistically significant ($p < 0.01$), there were no clinically relevant trends over time regarding the reason for intervening.

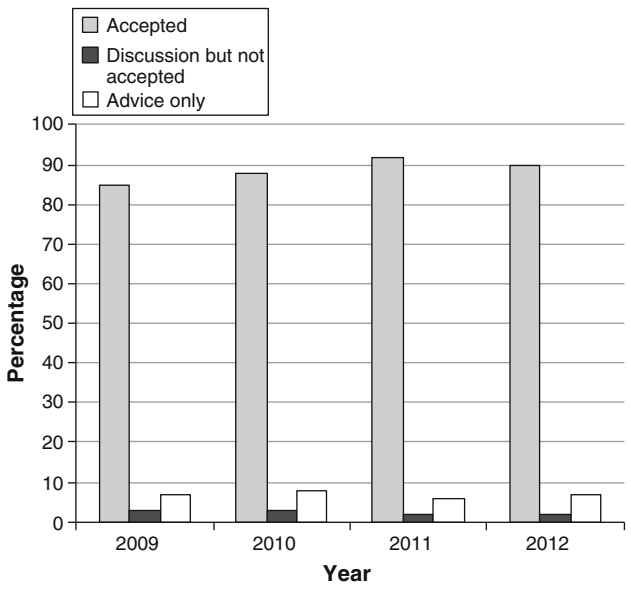

Fig. 1 Graph to show if interventions made by pharmacists over a 4 year period were accepted, not accepted or if advice only was given

Discussion

These data demonstrate that pharmacists were consistently making interventions to patient's medications whilst in secondary care. Although the number of interventions documented per week varies from year to year, and this can be attributed to the varying number of patients in the hospital on the weeks chosen, the reasons for and the acceptability of interventions are consistent.

When a pharmacist identifies a potential intervention that needs to be made, they suggest the issue and a possible resolution with the medical team attending the patient. Feedback is given on prescribing errors at the point of discovery and although this data has not previously been used to influence prescribing practice, by collating more specific data this can be used to provide targeted teaching. Over the last 4 years the number of interventions accepted has been similar ranging from 85–92 %. This high level of acceptance suggests the medical team value pharmacist's contribution to patient care. The 2011 and 2012 (92, 90 %) acceptance rates are slighter higher than other research documenting average acceptance rate of pharmacists interventions by medical staff as 85.5 % [8].

NHS Trusts in the United Kingdom have a responsibility to ensure that patients are protected against the risks of taking medicines [9]. The pharmacy department contribute to this requirement as over the 4 years safety to prevent adverse drug events and the efficacy of the medication have consistently been the most frequent reasons for pharmacists intervening in patient care.

Taking the 2012 interventional data from 1 week, extrapolated over the year would equate to over 150,000 interventions per year. Others have described that 2 % of these could have resulted in a potentially lethal outcome while a further 5 % would be potentially serious and 53 % would be potentially significant [2009 Equip study [5]]. If this was applied to the data collected, this would indicate that pharmacists prevent 3,000 potentially lethal incidents, 7,500 potentially serious incidents, and over 80,000 potentially significant incidents per year in the hospital studied. Looking at admission numbers for the week in 2012 the data collection took place, 4,879 patients were admitted, of which 1,180 were admitted to wards with a clinical pharmacy service. Therefore only 24 % of patients admitted during the week had a clinical pharmacist reviewing their medicines. Our results suggest that the majority of patients admitted to the tertiary hospital could possibly have benefitted from a clinical pharmacy intervention and the clinical pharmacy service should be evaluated taking this into account.

The UK has one of the highest numbers of hospital pharmacists in Europe and this has allowed clinical pharmacy in the UK to develop differently. The previous

shortage of junior doctors has allowed pharmacists to step up into clinical roles previously carried out by the medical teams [10]. Therefore the findings in this study are not necessarily transferable to other countries were clinical pharmacy is not carried out daily. However this data can be used to demonstrate the value of developing a ward based clinical pharmacy service.

A limitation to the study is that no standardized definition of interventions were used nor was a validated scale for the importance of interventions made, future evaluation of the service could involve peer reviewed intervention.

Conclusion

This study has demonstrated that the clinical pharmacy service provided by a London Hospital has remained consistent over the past 4 years with pharmacists consistently carry out interventions to patient care. The clinical pharmacy team are providing the hospital with a service that focuses on ensuring safety and efficacy of the medications administered. Rather than continuing to prove the demonstrated value of clinical pharmacists within secondary care in the UK, the focus should move to the development of the services to further enhance the contribution of pharmacists to patient care during their hospital stay.

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Conflicts of interest None.

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