

From hospital admission to discharge: an exploratory study to evaluate seamless care

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AIM • To evaluate the effect of pharmaceutical care from admission, through a hospital stay and following discharge.

DESIGN • The study design was descriptive, using qualitative methods to compare intensive pharmaceutical care provision between a trial group and control group of patients.

SUBJECTS AND SETTING • General medical patients admitted to the medical admissions unit of a London Teaching Hospital were purposively sampled according to age, sex, and admitting diagnosis.

OUTCOME MEASURES • Discrepancies occurring in prescriptions for trial and control groups. The patients' ability to describe their drug treatment regimen before and after the intervention.

RESULTS • Of the 110 drugs observed on admission in the trial group, 85.5% were associated with a discrepancy, of which 60.0% were classified as unintentional. The intervention resulted in a reduction of unintentional drug discrepancies occurring at discharge. Within the trial group 11.8% of drugs were associated with unin-

tentional discrepancies, significantly lower than 70.2% unintentional discrepancies on admission ($\chi^2 = 20.25$, $P < 0.001$, $df = 1$). Significantly more drugs prescribed on discharge in the control group were involved in an unintentional discrepancy; 60.1% ($\chi^2 = 19.27$, $P < 0.001$, $df = 1$). While the mean number of prescribed drugs in both cohorts was similar on discharge, the mean number of unintentional discrepancies was lower in the intervention cohort than the comparison cohort. Before the intervention patients recalled 37.4% of the names of their drugs, 40.4% of the indications, 24.2% of the doses and 43.4% of the frequencies of their drugs. Following intervention the trial group could recall 80.0% of the names of their drugs, 87.3% of the indications, 81.8% of the doses and 87.3% of the frequencies of their drugs.

CONCLUSION • Although this was a small study, the overall effect of the intervention on admission to hospital was a reduction in the number of unintentional discrepancies observed in the trial group. The study shows that a pharmacist's intervention improves the patient's ability to recall their medication regimen and reduces the number of unintentional drug discrepancies. There is a clear need to ensure improved pharmaceutical care is delivered to patients.

The now well-known concept of pharmaceutical care underpins professional development and has implications for governance in pharmacy. Pharmaceutical care has recently been defined as a practice in which the pharmacist takes responsibility for a patient's drug-related needs and is held accountable for this commitment.¹ Of course, for pharmaceutical care to be fully realised, the standard of care must be continuous across the health care interface, ie, seamless. Seamless care has been defined as the smooth transfer of care for patients between primary and secondary care.² Various methods have been shown to assist this transfer, including (i) the supply of patient information leaflets and medication counselling before discharge by a pharmacist, which improve patient understanding,³ and (ii) compliance to medication regimens on return home.⁴

A patient's discharge from hospital has to be planned on admission by identifying and meeting the patient's needs on return to the community, whether medical, physical or social.^{5,6} Studies have shown that effec-

tive discharge information must be communicated across the primary-secondary health care interface care following hospital discharge between the hospital doctors and the patient's general practitioner.⁷⁻¹⁰ Nurses, doctors and social services are usually involved in patient discharge but the role of the pharmacist is often not fully established. As a result of poor communication regarding prescribed drugs, drug-related problems and discrepancies frequently arise on admission through poor medication history taking by doctors during hospital stay, whereby patients inevitably have a number of changes made to their drug regimens¹¹ and upon discharge into primary care.^{5,12}

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Discrepancies in supplies of medicine are attributable to a variety of causes, for example, alterations in disease state, increased drug efficacy, avoidance of side effects, patient compliance, formulary management and local prescribing policies.¹³ Problems have also been highlighted upon discharge: sometimes, the GP does not receive information about drug changes promptly and this can result in repeat prescribing of previous medicines.⁸⁻¹⁰ Once again, the main reason for these discrepancies is the lack of information transfer across the primary-secondary care interface.^{12,14} Research has highlighted the positive effect of communication between the hospital and community pharmacist,^{5,11,12} and investigated the effectiveness of discharge communication.^{7-10,14} It is clear that there are many aspects of the interface between primary and secondary care that need to be improved, including discharge correspondence forms.⁷ The effect of providing elderly patients with a pharmacy information letter following discharge has been studied in Aberdeen.¹⁵ Information on discharge medication was

provided to patients while in hospital and was sent to each patient's GP, community pharmacist and community nurse. Some 77 per cent of patients in the trial group (who had information provided) found the information letter to be "useful" or "very useful". Community pharmacists and nurses found the information to be "useful"; GPs, however, did not. Overall, the study showed that a pharmacy discharge letter on discharge significantly decreased the incidence of drug-related problems, once home.

Although there is work published on each aspect from admission to discharge, there are few studies looking at all of these aspects across the primary and secondary interface as a whole. Pharmacists working on medical admissions units often find themselves devoting time in contacting patients' GPs in order to clarify drugs, doses and so on. Upon admission, the prescriber may have missed drugs and strengths of medicines by accident. These can be classified as unintentional discrepancies, that is, changes that have occurred without professional intent. Subsequently, patients may miss doses of important drugs.

The basis of this study is to evaluate the effect of pharmaceutical care from admission, through a hospital stay and following discharge. The main aims were:

- 1 to assess the effects of providing an intensive patient-centred care plan to patients admitted to a London teaching hospital from admission thorough and following discharge from hospital
- 1 to investigate whether these discrepancies were occurring within a general medical emergency population (on admission and follow-up)
- 1 to identify ways of reducing these problems through recommendations in improving current pharmaceutical care
- 1 to assess patient recall and understanding of their medicines and medicines management

METHOD

Research design The study was exploratory, employing qualitative methods to implement intensive pharmaceutical care compared between two patient groups. Drug discrepancies observed were recorded and the types of discrepancy classified, then compared on admission and at follow-up at two weeks. A patient's ability to describe their drug treatment regimens before and after the intervention in the trial group and in the control group (where current pharmaceutical care was offered) was measured and compared. The study involved questioning patients using face-to-face interviews on admission and responding to a telephone interview questionnaire on follow-up. Ten per cent of recruited patients were followed up by home visit. Ethical approval was sought and granted. The director of general medicine and the consultants in the trust consented for patients to be recruited.

Recruitment of patient sample General medical patients admitted to the medical admissions unit were invited to participate. In order to be included, participants had to:

- 1 be aged 18 years or older
- 1 be resident within the London Boroughs of Kensington and Chelsea or Westminster
- 1 be English speaking
- 1 have no discernible mental illness
- 1 have access to a telephone
- 1 be discharged to their home, not a nursing home or hospice
- 1 be taking four or more medicines

Patients were sampled purposively according to age, sex, and admitting diagnosis (categorised using BNF classification) using a sampling frame developed from the ward's demography. This ensured that the sample was representative of the ward population. Eligible patients signed a consent form and were provided with an information sheet detailing the particulars of the study.

Data collection Demographic data on all patients were collected, including admission date, recruitment date, ward and bed, hospital number, consultant, and patient's name, address and telephone number for follow-up. Details about the patient's GP included address, telephone and fax numbers (in order to obtain medication details) and the type of GP practice. In order to match patients from the trial and control groups, age, date of birth, sex, presenting complaint, BNF category of medicine, total number of drugs the patient was taking on admission to hospital, and allergies, were recorded.

All drugs prescribed on admission via the admitting doctors were documented for both groups. Those in the trial group also had the record of medicines obtained from their GP as well as a record obtained from the patients themselves, so that all sources of information could be compared and discrepancies noted. Other relevant data recorded for both groups included discharge and follow-up dates, when the discharge summary was faxed to the GP (to ensure that vital information had been sent), what discharge counselling on drugs was given and by whom.

A questionnaire was devised to explore a patient's recall of their medicines. Patients in the trial group were presented with this questionnaire at the point of recruitment, upon admission. The same questionnaires were used at follow-up and for home visits, for both cohorts of patients.

The intervention Patients in the control group received the current pharmaceutical care delivered at the hospital, without additional information about their medication on admission, unless they asked. Patients were discharged in the usual manner: discharge medicines were dispensed in the pharmacy and handed to the patient by a member of the nursing team. Pharmacist counselling at discharge was not a routine service and no extra information was highlighted or given to GPs.

A full drug history on admission was obtained from the GP's record for patients recruited to the trial group. This was compared with the admission drug history and amended and corrected where necessary. Any drug discrepancies were identified and described. Upon admission, patients were counselled and educated on their medicines. Explanations included the name of the medicine, indication, dose, frequency, and any further aspects relevant to their drugs, including changes to therapy made upon admission through to discharge. The pharmacist counselled patients on their discharge medications and any changes that occurred to their medication regimen, together with reasons behind those changes. These reasons were also summarised on the discharge prescription for the GP. During follow up (two weeks post discharge) the investigator compared the two prescriptions in each of the trial and control groups and identified and described discrepancies that occurred.

RESULTS

A total of 41 patients met the inclusion criteria of the study; 34 patients (83 per cent) agreed to participate. One of these patients later dropped out of the study because of a fear of creating problems with the GP. A second patient died.

Of the 32 remaining patients, 15 were recruited into the trial group and 17 into the control group. Demographic data are summarised in Table 1. The mean age of males in the trial and control group, was 67.4 years and 55.4 years, respectively. For females, the mean ages were 67.9 years and 63.9 years in trial and control groups, respectively. The mean age of males as a group was 61.0 years (range 35–87 years) and for females was 65.7 years (range 20–94 years). In each group, the mean number of drugs on admission was 7.3 (trial) and 6.7 (control). Mean number of drugs on discharge was 7.3 (trial) and 6.1 (control). No differences in patient demographics were observed between the two cohorts, as expected.

Discrepancies on admission and discharge

Discrepancies were classified as either unintentional (without professional intent) or intentional by the investigator. Classification by a consensus panel would have been preferred. Analysis of 110 drugs involved on admission in the trial group revealed a discrepancy in 85.5 per cent of all drug cases, of which 60.0 per cent were classified as unintentional. The average number of unintentional drug discrepancies occurring per patient was 4.4. No evident pattern was observed between the number of drugs on admission and number of drug discrepancies.

A total of 94 drug discrepancies were observed in the trial group following admission to hospital in 85.5 per cent of prescribed drug supplies (n=110). These discrepancies were either unintentional or intentional. Unintentional discrepancies were observed in 70.2 per cent of prescribed drugs (n=66) and included those relating to the drug, dose, form, frequency, brand or an

TABLE 1: PATIENT DEMOGRAPHICS

	Control group		Trial group	
Sex				
Male	8	(47.1%)	7	(46.7%)
Female	9	(52.9%)	8	(53.3%)
Total	17		15	
Mean age (range)				
Males	55.4	(35-75)	67.4	(43-87)
Females	67.9	(20-91)	63.9	(30-94)
Total	67.7	(20-91)	59.9	(30-94)
Disease groups by British National Formulary category				
Central nervous system	4	(23.5%)	2	(13.3%)
Infection	2	(11.8%)	2	(13.3%)
Cardiovascular system	4	(23.5%)	5	(33.3%)
Respiratory	2	(11.8%)	2	(13.3%)
Gastrointestinal	3	(17.6%)	3	(20.0%)
Miscellaneous	2	(11.8%)	1	(6.6%)
Total	17		15	
Type of general practitioner				
Single handed	2	(11.8%)	3	(20.0%)
Group practice	15	(88.2%)	12	(80.0%)
Total	17		15	

omission. Intentional discrepancies were observed in 29.8 per cent of prescribed drug supplies (n=28) and included prescribing of low molecular weight heparins for treatment or prophylaxis of deep vein thromboses, antibiotics, "when required" analgesia, and short-term treatment for asthma with salbutamol nebulas or corticosteroids. In a few cases, withdrawal of cardiovascular drugs was observed in order to exclude adverse drug effects. Of the unintentional discrepancies, 31 (46.0 per cent) were attributed to omission of drugs. Of these, 11 (17.0 per cent) were due to incorrect, inappropriate or omitted doses on the drug chart. Respiratory and cardiovascular medicines accounted for most problems. Omissions were highest with cardiovascular drugs whereas dose discrepancies were highest with respiratory drugs.

The effect of the intervention on follow up was a reduction of unintentional drug discrepancies occurring on discharge. Within the trial group 110 drugs were involved at discharge of which 11.8 per cent were associated with unintentional discrepancies, significantly lower than the proportion (70.2 per cent) of unintentional discrepancies in the trial group on admission ($\chi^2 = 20.25$, $P < 0.001$, $df=1$).

being 62). The figure for the control group was similar to the average number of unintentional drug discrepancies observed in the trial group on admission of 4.4. The mean number of prescribed drugs on discharge observed was similar in both cohorts but, as expected, the mean number of unintentional discrepancies was lower in the intervention cohort than the comparison cohort.

With respect to recall of medicines, before intervention patients recalled 37.4 per cent of the names of their drugs, 40.4 per cent of the indications, 24.2 per cent of the doses and 43.4 per cent of the frequencies of their drugs. Following intervention the trial group could recall 80.0 per cent of the names of their drugs, 87.3 per cent of the indications, 81.8 per cent of the doses and 87.3 per cent of the frequencies of their drugs. The average score was compared before and after intervention in patients in the trial group. The average score of these scores before intervention was calculated as 0.40. This had doubled to 0.84 following intervention.

The results for the control patients where no intervention occurred were 35.9 per cent name, 35.0 per cent indication, 31.1 per cent dose and 43.7 per cent frequency. Upon follow up the numbers of drugs on

In contrast, of 103 drugs prescribed on discharge in the control group, 60.1 per cent were involved in an unintentional discrepancy, significantly higher than 11.8 per cent in the trial group at discharge ($\chi^2 = 19.27$, $P < 0.001$, $df=1$). The average number of unintentional discrepancies occurring per patient in the trial group on follow up was 0.86. Whereas this figure was 3.7 in the control group on follow-up (total number

discharge involved 110 in the trial group compared with 103 in the control group. The average of these scores was calculated as 0.36. This value is comparable to that of the intervention cohort on admission.

DISCUSSION

Although this was a small study, the overall effect of the intervention on admission to hospital was a reduction in the number of unintentional discrepancies observed in the trial group. It has been well documented that pharmacist-acquired medication histories are more complete than those acquired by other disciplines.¹⁶⁻¹⁸ Other studies have shown that drug histories obtained by pharmacists may be more accurate and complete than those obtained by junior medical staff.¹⁹⁻²¹ The benefits of this are obvious: pharmacists are experts in medicines management and have the skills and knowledge about drugs to take accurate drug histories. This is an appropriate use of health care professionals' time and increases the philosophy of teamwork in the NHS.

Analysis of 110 drugs involved on admission revealed a discrepancy in 85.5 per cent of all drug cases, of which 60.0 per cent were classified as unintentional. This is comparable to findings of a previous study¹¹ whereby analysis of 496 drug cases revealed a discrepancy in information in 69.2 per cent of all drug cases, 58.1 per cent classified as unintentional. The commonest form of drug discrepancy occurring on admission was the omission of drugs and discrepancies involving the dose.

A large number of problems were observed with drugs used for respiratory and cardiovascular conditions. This is not surprising given the proportions of patients with these conditions on the wards sampled. However, it may be appropriate to offer pharmaceutical care that is specific and more intensive to this population of patients who are at increased risk of unintentional discrepancies. The effect of the intervention on follow up resulted in a reduction of unintentional drug discrepancies occurring on discharge. Within the trial group, 11.8 per cent of the drugs were involved in unintentional discrepancies. In contrast, in the control group, of 103 drugs prescribed on discharge 60.2 per cent was involved in an unintentional discrepancy.

The high proportion of unintentional discrepancies occurring in the control group may be due to poor drug history taking by the physician on admission of the patient, and subsequent transfer of inaccurate information to discharge summaries from the current drug chart. Discrepancies may go unnoticed until follow up visits with the GP. If poor communication links exist across the primary-secondary care interface then the GP may assume that certain drugs have been stopped in hospital intentionally. Unintentional discrepancies in the supplies of prescribed drugs obtained in the community post discharge have been observed previously.¹² These accounted for 32.2 per cent of drug supplies in the intervention group (where a copy of the discharge medication

TABLE 2: DISCREPANCIES IN THE TRIAL (BEFORE AND AFTER) AND CONTROL (AFTER) GROUPS

	Trial		Control	
	Admission	Discharge	Admission	Discharge
Intentional discrepancies	28/10 (29.8%)	31/110 (28.2%)	-	27/103 (26.2%)
Unintentional discrepancies	*66/110 (70.2%)	*†13/110 (11.8%)	-	†62/103 (60.1%)
Total number of discrepancies	94/110 (85.5%)	44/110 (40.0%)	-	89/103 (86.4%)
Mean number of unintentional discrepancies	4.4	0.86	-	3.7
Mean number of drugs (range)	7.3 (4-13)	7.3 (2-12)	6.7 (4-15)	6.1 (4-10)
Total number of drugs	110	110	114	103

* Difference between unintentional discrepancies in trial group on admission and trial group on discharge: $\chi^2 = 20.25$, $P < 0.001$, $df=1$.

† Difference between unintentional discrepancies in trial group and control group on discharge: $\chi^2 = 19.27$, $P < 0.001$, $df=1$.

was given to the patient to present to their community pharmacist) compared with 52.7 per cent in the comparison group. It may have been appropriate to combine provision of information with the care package given in this study to ensure seamless care and increased patient benefit.

Further studies should include home visits to incorporate measures of patient recall and patient compliance. It should be remembered that patient recall and patient knowledge are not the same. Follow-up for patients' recall of drugs was only made two weeks post discharge date. It may prove difficult for patients to recall their drugs after

six months simply because they have forgotten information that was communicated to them six months previously. Therefore it is necessary to counsel patients at each supply of drugs. It is not known whether improved recall led to intentional or unintentional drug discrepancies. In this study, unintentional discrepancies that may have occurred between a patient's admission and the charting of their drugs for their inpatient stay were not recorded, which could have resulted in under-reporting.

This study shows that a pharmacist's intervention improved the patient's ability to recall their medication regimen and

reduces the number of unintentional drug discrepancies. Although these results support previous research, constant evaluation of current care provision is necessary to ensure continuous improvements. Further work is also necessary to test the effect of this standard of pharmaceutical care on a large, representative population throughout the UK. There is a clear need to ensure improved pharmaceutical care is delivered to patients.

This article has been dedicated by the authors to Professor Mike Newton on the occasion of his 65th birthday.

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