

Discontinuities in drug use upon hospital discharge

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Key words

Discontinuity
Hospital discharge
Hospital formulary
Outpatient pharmacy
Prescriptions
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Abstract

Objective: To investigate the nature and frequency of changes in drug treatment upon discharge from hospital.

Method: All drugs of discharged patients, dispensed by an outpatient pharmacy were compared with the latest clinical medication and discontinuities were classified.

Results: Of all prescriptions dispensed by the outpatient pharmacy, 40% had some discontinuity; most frequent were product substitution (27%) and new prescriptions, starting at the moment of discharge (11%).

Conclusion: There is a gap in the conformity between drugs used in the hospital and the drugs dispensed by the outpatient pharmacy at the moment of discharge.

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Introduction

Medical errors are a major cause of harm to patients¹. Medication errors and adverse drug reactions have recently received a lot of attention in the professional and lay press^{2,3}. Many of these drug-related problems seem to be systematic in origin and preventable. A transition between different echelons in health care (e.g., from hospital to home care) may be a risk factor in such problems, especially if changes in prescribed drug regimen occur during such transitions⁴. Continuity of care (seamless care) is the desired end-product of the hospital discharge process and is essential to the optimisation of drug-related outcomes. Inconsistencies can result in patient confusion and the supply of misinformation to the community. Interventions that improve continuity of care between hospital pharmacies and community pharmacies have been associated with improved clinical outcomes and avoidance of drug-related problems⁵.

Previously published research has demonstrated that drug use several weeks after discharge often deviates from the drug treatment at the moment of discharge^{6,7}. Drug–drug interactions with combinations that potentially may result in major clinical consequences at discharge are frequently the result of changes of the prescription medication during hospitalisation⁸. Little research, however, has been conducted on the conformity of drug use in the hospital and the drugs delivered at the moment of discharge.

Hospital drug formularies are often different from community drug formularies within a certain region. These formularies differ not only with respect to the choice of the active substances but also with respect

to the choice of type of brand for the same active substance. Generally speaking, in the Netherlands, original brands are more frequently used inside the hospital because of the price discounts on these products and because of the availability of a larger spectrum of product forms, whereas outside the hospital, generic prescribing and dispensing is encouraged by government policy. Such discrepancies in drug policy between the hospital and the outpatient setting may contribute to discontinuities in the patient's drug use.

The aim of the present study was to investigate the nature and frequency of discontinuities in drug treatment in a cohort of patients discharged from the hospital and characteristics associated with it.

Method

Setting

This study was conducted in the Hilversum Hospital, a 489-bed general hospital.

The Hilversum Hospital has two pharmacies; a hospital pharmacy and an outpatient one. The hospital pharmacy delivers the medicines only for hospitalised patients, whereas the outpatient pharmacy is comparable with a community pharmacy.

All patients discharged from the hospital have the opportunity to choose to receive their prescribed drugs from the outpatient pharmacy located inside the hospital or from a community pharmacy.

Study design

Included were all patients discharged from the hospital during the month of May 2001 and who presented one or more prescriptions from the medical specialist in the hospital's outpatient pharmacy. Excluded from the study were patients who had been in the hospital for one day only.

All drugs dispensed by the outpatient pharmacy were compared with the patient's latest clinical medication to establish discontinuities in prescribing. Discontinuities were classified either as therapeutic switch, product substitution, or start of a new drug (Table 1).

All medicines were classified into therapeutic groups using the Anatomical Therapeutic Chemical Classification system (ATC) of the WHO Collaborating Centre for Drug Statistics. In addition, all discharge medicines dispensed by the outpatient pharmacy were classified as prescriptions in conformity with the hospital drug formulary (HDF). Non-adherence to the drug formulary could exist on two levels: the active substance was in the HDF but in the form of a different product, or the active substance was not in the HDF at all. The HDF used in the Hilversum Hospital, can be regarded as 'restrictive', meaning that non-formulary prescriptions are not honoured in principle⁹.

Data analysis

Data were compiled from each patient's pharmaceutical record as well as the record from the hospital phar-

Table 1 *Classification of discontinuities*

<i>Classification</i>	<i>Definition</i>
Therapeutic switch	Another therapeutic substance in the same group; the first four characters of the ATC classification are the same, e.g., amitriptyline instead of citalopram or fluoxetine instead of citalopram
Product substitution	Same active substance, e.g., atenolol instead of Tenormin®, and same active substance but different in strength or formulation, e.g., ciprofloxacin 250 mg tablets instead of 500 mg tablets
New drug	The first prescription of the drug is upon discharge from the hospital

macy and the record from the outpatient pharmacy. These data were entered in a Microsoft Access database and statistically analysed with SPSS for Windows version 9.0 (SPSS, Inc., Chicago, Illinois).

Results

During the study period (May 2001), 954 patients were discharged from the hospital, of whom 227 (24%) received their drugs from the outpatient pharmacy and thereby constituted the study population. Mean age was 61 year (range 1 month–95 year); 50.7% were female. The total number of prescriptions dispensed was 684; the average number for each discharged patient was 3 prescriptions (range 1–13).

The vast majority of prescriptions originated for patients discharged from internal medicine (27.5%), cardiology (16.7%), pulmonology (14.5%) and orthopaedics (9.9%). The medication dispensed at discharge was in conformity with the latest clinical medication in 412 of the 684 prescriptions (60.2%), i.e., no discontinuity (Table 2). The most frequently observed discontinuity was product substitution (27%; $n = 185$), of which 137 (74.1%) prescriptions concerned generic substitution (e.g., from a brand name drug to a generic drug). A few products were responsible for the majority of the generic substitutions. The most frequently observed substitutions were Sintromitis® to acenocoumarol and Ascal® to carbasalatum-calcium. Of the drugs, 77 (11.3%) concerned a new prescription, i.e., starting with discharge from the hospital.

Overall, 66.2% of the drugs dispensed by the outpatient pharmacy were conform with the HDF; 5.7% concerned an active substance not listed in the HDF, 28.1% concerned a different product for an active substance listed in the HDF. The dispensing of active substances not listed in the HDF was more frequently observed in newly started prescriptions (10.4%) than in patients with another discontinuity (4.1%) ($P = 0.047$; chi-square).

Table 2 *Frequency and classification of prescriptions ($n = 684$)*

<i>Classification of discontinuity</i>	<i>Number</i>	<i>(%)</i>
No discontinuity	412	(60.2)
Therapeutic switch	10	(1.5)
Product substitution	185	(27.0)
New drug	77	(11.3)

Discussion

Hospital discharge may be associated with relevant changes in patient care. Our study showed that at the moment of discharge a substantial number of discontinuities in drug use occur in comparison with drug use during hospitalisation. Most discontinuities seem minor changes from a treatment point of view. There seems to be no link between local outpatient prescribing or delivery policy and hospital drug formulary and government policy with respect to reimbursement between the inpatient and outpatient setting.

Recently, much attention has been given to drug-related problems and it has been suggested that sub-optimal communication between different health care providers may be a contributing factor. In the Netherlands it is government policy to encourage the dispensing of generic products. Pharmacists are permitted to dispense the often cheaper generic product, even if the physician prescribes a brand name. Inside the hospital, brand-name products are more frequently used than generic products. Drug companies sell their drugs to the hospitals at discount prices to ensure the drug will be placed in the Hospital Drug Formulary. The impact of hospital prescribing on prescribing in general practice is substantial and has been documented¹⁰.

In contrast to dispensing patterns in the hospital, our outpatient pharmacy mostly dispenses a generic drug, when available. In this study, upon discharge from hospital we found a 20.0% generic substitution of the last clinical medication, half of which is due to two drugs. Although the brand-name product and a generic product contain the same active substance, they may appear completely different to the patient, which, without adequate information, can lead to sub-optimal use by the patient.

As result of this study and anticipating the development of a regional drug formulary, in the Hilversum Hospital we replaced some brand name drugs by generic drugs.

The amount of reimbursement for drugs in the Netherlands is fixed by the government. There is the strange phenomenon that one dosage form of a drug can be excluded from full reimbursement, while another dosage form is not excluded. This will be the main reason for changing the dosage form when the outpatient pharmacy does the dispensing. This way the patient gets the drug free of charge, but in the transition between hospital and home care this change may be a risk factor for errors. Early study showed that in the Hilversum Hospital the Hospital Drug Formulary is largely followed in the outpatient clinic¹¹. In this study we found that 19 of 20 prescrip-

tions are in accordance with the hospital drug formulary with respect to the active substance.

Our results are not necessarily representative of the overall Dutch situation. The small scale of this study, involving only the prescription pattern of the physicians of one hospital and the dispensing pattern in one outpatient pharmacy, limits the generalizability of the results. However, recent study conducted in Germany showed similar results¹². Nevertheless, the present results demonstrate the importance of closer communication between all health care professionals to ensure the continuity of treatment.

Conclusions

In conclusion, our study highlights the changes in treatment that can occur at discharge from the hospital into the community. Preventing medication errors is a major topic; the key issue is to have the right information about actual drug use at the moment of admission or discharge from the hospital. There is therefore a strong need to get the availability of one electronic medical file of each patient, including relevant information with respect to drug use. Nevertheless, the adequate information, the development of a regional drug formulary has to be stimulated, so that there is not only conformity on the level of the active substance, but also on the level of the dispensed brand name or generic name drugs.

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References

- 1 Kohn LT, Corrigan JM, Donaldson MS. To err is human: building a safer health system. Committee on Quality of Health Care in America, Institute of Medicine. Washington: National Academy Press, 2000.
- 2 van den Bemt PMLA, Egberts ACG, de Jong-van den Berg LTW, Brouwers JRB. Drug related problems in hospitalised patients. *Drug Safety* 2000; 22: 321–33.
- 3 Fijn R, van den Bemt PMLA, Chow M, de Blaey CJ, de Jong-van den Berg LTW, Brouwers JRB. Hospital prescribing errors: epidemiological assessment of predictors. *Br J Clin Pharmacol* 2002; 53: 326–31.
- 4 Forster AJ, Murff HJ, Peterson JF, Gandhi TK, Bates DW. The incidence and severity of adverse events affecting patients after discharge from the hospital. *Ann Intern Med* 2003; 138: 161–7.
- 5 Cameron B. The impact of pharmacy discharge planning on continuity of care. *Can J Hosp Pharm* 1994; 47(3): 101–9.
- 6 Cochrane RA, Mandal AR, Ledger-Scott M, Walker R. Changes in drug treatment after discharge from hospital in geriatric patients. *BMJ* 1992; 305: 694–6.
- 7 Himmel W, Tabache M, Kochen MM. What happens to long-term medication when general practice patients are referred to hospital? *Eur J Clin Pharmacol* 1996; 50: 253–7.
- 8 Egger SS, Drewe J, Schlienger RG. Potential drug-drug interactions in the medication of medical patients at hospital discharge. *Eur J Clin Pharmacol* 2003; 58: 773–8.
- 9 Fijn R, Lenderink AW, Egberts ACG, Brouwers JRB, de Jong-van den Berg LTW. Assessment of indicators for hospital drug formulary non-adherence. *Eur J Clin Pharmacol* 2001; 57: 677–84.
- 10 Bijl D, van Sonderen E, Haaijer-Ruskamp FM. Prescription changes and drug costs at the interface between primary and specialist care. *Eur J Clin Pharmacol* 1998; 54: 333–6.
- 11 Stufken R, Egberts ACG, van Schaik BAM. Insight in specialistic prescription writing. Registration of outpatient medication and discharge medication. *Pharm Weekbl* 2001; 136(11): 390–4.
- 12 Taxis K, Schneeweiss S. Frequency and predictors of drug therapy interruptions after hospital discharge under physician drug budgets in Germany. *Int J Clin Pharmacol Ther* 2003; 41: 77–82.