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Drug changes at the interface between primary and secondary care

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Key words
drug utilization – continuity of patient care – hospitalization – family practice

Abstract. Objective: To analyze the frequency and factors associated with drug change in a sample of patients referred to hospital by their general practitioner. Methods: This observational study is based on a chart review of 100 consecutively recruited patients with a chronic disease who were referred to the general internal medicine wards in each of 3 district general hospitals in Germany (total 300 patients). The frequency of drug cancellation, replacement, dosage alteration, change in manufacturer and of commencing treatment with a new drug were recorded. Results: Half of the drugs used in chronic treatment (644/1,330) and prescribed by general practitioners were continued during hospitalization. The fraction canceled was 36%. In the rest of the drugs in this group, there were some minor changes carried out by the hospital. On the day of the drug survey, a total of 1,572 drugs were being taken by the patients and 724 of these drugs were newly prescribed by hospital. Only 13 patients experienced no change to their drug regimen during their stay in hospital. In more than 60% of patients (184/300), there were 3 or more changes made in their drug regimen. The rate of drug cancellation for antihypertensive and cardiac drugs in patients referred to hospital for cardiovascular and non-cardiovascular problems did not differ. Conclusion: During hospitalization, nearly every patient is confronted with some form of drug change. Of major concern is the high rate of drug change affecting drugs being taken for diseases other than that associated with the hospitalization. Hospital drug policy should encourage clinicians to continue drug regimens in newly admitted patients whenever medically appropriate and caution clinicians against making unnecessary changes to drug regimens prescribed by general practitioners.

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Introduction

Prescribing at the hospital-general practice interface is an important topic for patients, doctors and health administrators [Hampson et al. 1996, Jones and Rawlins 1992]. Up to now, procedures involving changes in drug regimens have been studied predominantly in university or teaching hospitals where clinical pharmacologists try to influence their hospital colleagues towards a more rational prescribing behavior [Harder et al. 1991]. These processes have been mostly studied in selected populations such as elderly patients, where polypharmacy is particularly common [Alexander et al. 1985, Beers et al. 1989, Cochrane et al. 1992]. Most authors have only been interested in whether a specific chemical substance was continued or discontinued. However, patients and their general practitioners (GPs) are affected by a much larger group of interventions constituting a drug change. Of interest here is whether a drug is

- canceled,
- replaced by another chemical substance,
- replaced by a similar substance (me-too drug),
- replaced by an identical substance from another manufacturer, typically a change from a generic to brand name status (or vice versa),
- changed in dose, or
- newly started at hospital.

A drug change may induce a conflict of trust between patient and GP [Katz et al. 2000], especially if the patient learns that a hospital prescription is more expensive and infers, rightly or wrongly, that the new prescription is "better" than that formerly prescribed by their family doctor [Jones et al. 2001].

The aim of our study was to analyze in detail the frequency and type of drug change in a sample of patients referred to district general hospitals. Since a change in drug treatment

may be justified or inevitable when hospital admission takes place because of an adverse drug reaction or when the aim of referral was to improve (pharmacological) treatment for a specific condition, we anticipated that drug change would be more frequent with those groups of drugs directly related to disease or ailment leading to referral. We tested this hypothesis in patients receiving drugs for cardiovascular diseases, diabetes and digestive disorders. It was not the aim if the study to judge the medical competence of hospitals – with regard to the changes in drug prescriptions documented.

Subjects and methods

Setting and participants

The study was carried out in the general internal medical wards of 3 medium-sized district general hospitals (200 – 300 beds) in the federal state of Thuringia, Germany. During days 3 – 8 of the hospital stay, the data of all adult patients were documented up to a total of n = 100 patients per hospital. Criteria for inclusion were a hospital stay of more than 2 days, the diagnosis of a chronic disease and previous ambulatory treatment of more than 3 months (both documented in the referral letter sent by the general practitioner).

Data collection

The analysis was based on a chart review and documented prescribed drugs in the referral letters from the GP to the hospital, the history taken by the hospital physician and hospital-prescribed drugs as documented in the patient chart.

The reasons for admission stated by the GP and documented in the patient chart were also recorded and coded according to the International Classification of Primary Care [WONCA 1998]. The medication prescribed to the patient before hospital admission and during hospitalization was coded according to the anatomical-therapeutic-chemical [ATC] classification [WHO 1999]. The trade name of the drug was also recorded so that a change of the manufacturer within the same ATC class could be recognized as well as a switch from brand name to generic drug and vice versa. Antibiotics newly prescribed in hospital were excluded from further analysis, since antimicrobial drugs are usually administered for a limited time only [Gonski et al. 1993].

Analysis

Absolute and relative frequencies are reported. In the case of a drug change, the unit of analysis was the single drug. When considering the amount of drug change for single patients, the unit of analysis was the patient. To combine all information in 1 data set, array procedures were applied where appropriate. All analyses were performed with SAS, version 8.1 [SAS 1999].

Results

Data for a total of 300 patients were analyzed, 177 (59%) of whom were female. The average age of men was 67.7 years (range: 31 – 86) and women 72.0 years (19 – 97). The main reasons for admission were cardiovascular diseases (48%), digestive disorders (14%) and respiratory disorders (13%). All other reasons accounted for less than 5% each.

Drug change at the hospital

Before hospital admission, the 300 patients had received a total of 1,330 drugs from their GPs, mostly cardiac and antihypertensive drugs. Figure 1 depicts what happened with the 1,330 drugs during the first days of hospital stay; 36% were canceled. In 724 new prescriptions, patients were receiving 1,572 drugs at the hospital on the day of the drug survey. Of these 1,572 drugs, 644 (41.0%) had been previously prescribed by the GP, 7% were continued but changed in dosage and in 6.4% cases, the drug prescribed was from a different manufacturer. A total of 55 antibiotics were newly prescribed in hospital (but excluded from further analysis) (Figure 1).

The frequency and nature of the drug change in the 3 hospitals were compared. The overall rate of cancellation of medication ranged from 25 – 42%. There were marked

Table 1. Diuretics and ACE inhibitors – canceled, changed and newly prescribed in hospital.

	n	%
Diuretics		
Prescribed in general practice	113	(100)
Canceled	41	(36)
Drugs in hospitals	134	(100)
GP's prescriptions continued	50	(44)
Changed in dose and/or manufacturer	22	(16)
Canceled in hospital and substituted by another diuretic	17	(13)
Newly started in hospital	45	(34)
ACE inhibitors		
Prescribed in general practice	86	(100)
Canceled	30	(35)
Drugs in hospitals	87	(100)
GP's prescription continued	40	(46)
Changed in dosage and/or manufacturer	16	(19)
Canceled in hospital and substituted by another ACE inhibitor	9	(10)
Newly started in hospital	22	(25)

Table 2. Amount of drug change in individual patients.

Frequency of drug changes*	Patients	
n	n	(%)
0	13	(4)
1	28	(9)
2	29	(10)
3	46	(15)
4	50	(17)
5	33	(11)
6	36	(12)
7	25	(8)
8	15	(5)
9	13	(4)
> 9	12	(4)

* = Including cancelling of drugs, replacement, change in drug manufacturer, change from brand name to generic status (and vice versa), change in dose, starting of new drugs.

differences between the hospitals in drugs for respiratory disorders and antidiabetic drugs, but the differences were less marked in cardiovascular agents (data not shown).

Figure 2 compares the drug change in patients referred to hospital for various problems. There was only a minor difference in the rate of cancellation of antihypertensive/cardiac drugs between patients referred to hospital for cardiac problems (ICPC class K: diseases of the circulatory system) or for other reasons. For example, in patients referred to hospitals because of a cardiac problem, 34% of the cardiovascular drugs being prescribed were canceled. In patients referred to hospital because of other problems, the rate was 33%. New antihypertensive/cardiac drugs were more often prescribed to patients referred to hospital for cardiac problems than in noncardiac patients (42% vs. 24%).

In patients referred to hospital because of endocrinological problems (ICPC class T): endocrine and metabolic diseases half of the antidiabetic drugs remained unchanged but in patients referred to hospitals because of other reasons, 74% remained unchanged.

The rate at which drugs for gastrointestinal diseases were canceled in patients referred to hospital because of digestive disorders (ICPC class D) was lower than in patients referred for other reasons (53% vs. 29%). The rates at which drugs for gastrointestinal diseases were newly started in hospital in these 2 patient groups were identical (71%) (Figure 2).

25% (336/1,330) of the prescriptions prescribed by GPs were for generic drugs. Apart from 38 prescriptions where there was a change to brand name drugs, these drugs were prescribed as generics after hospital admission. In 14 cases, the hospital doctors changed a brand name drug prescribed by the GP to a generic. The overall rate of generic drugs prescribed in the hospital was 22% (339/1,572).

The drug changes made in the antihypertensives, ACE inhibitors and diuretics, were analyzed in more detail. Table 1 shows the frequency with which these drugs were stopped or newly started in hospital. The Table also shows that an ACE inhibitor and a diuretic were exchanged for another drug within the same class in 10% and 15% of cases, respectively. Within the same ATC class, changes to both more expensive and less expensive drugs occurred. In some cases, drugs were exchanged to similar drugs (e.g. piretanide/furosemide, benazepril/ramipril). To reach a judgment as to whether a drug modification was medically indicated or possibly inappropriate, would, in most cases, have required a detailed case audit.

Table 2 summarizes the extent of drug change in individual patients. Only 13 patients experienced no drug changes during

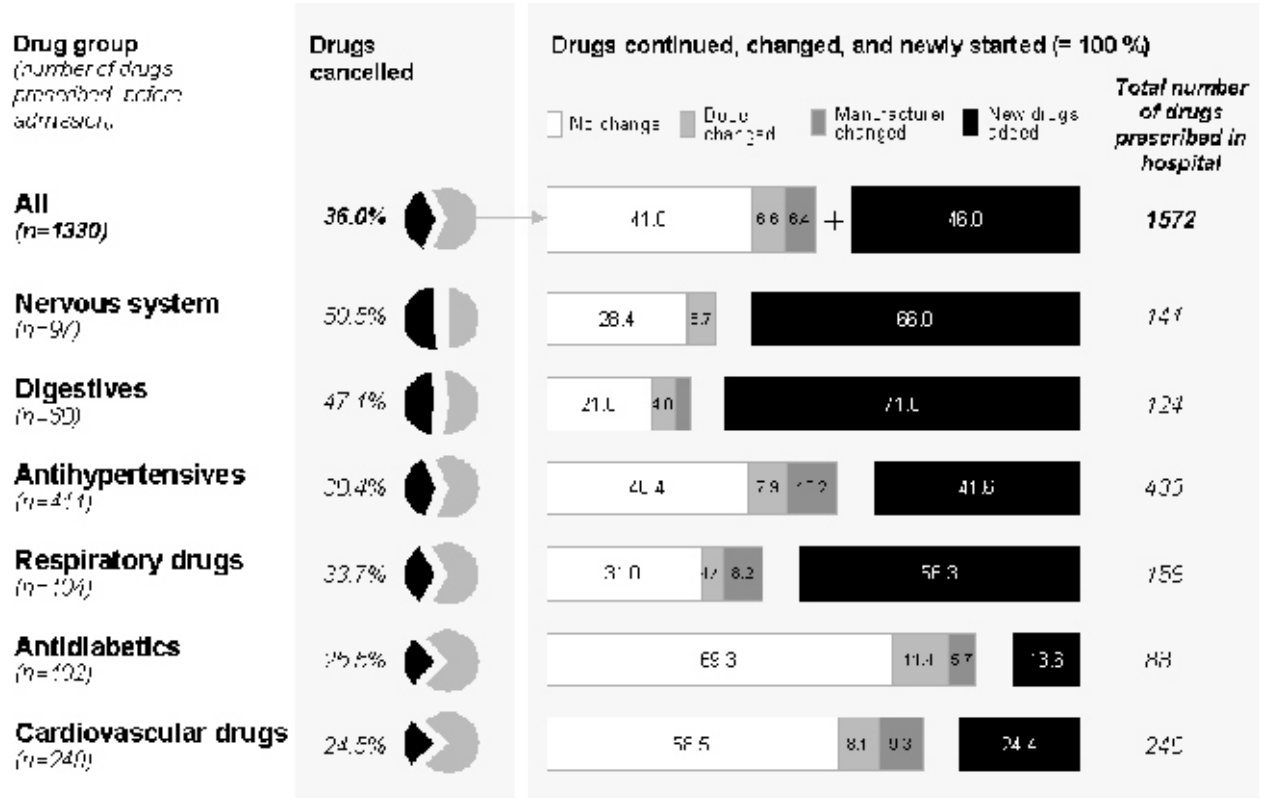

Figure 1. Drug change in hospitals.

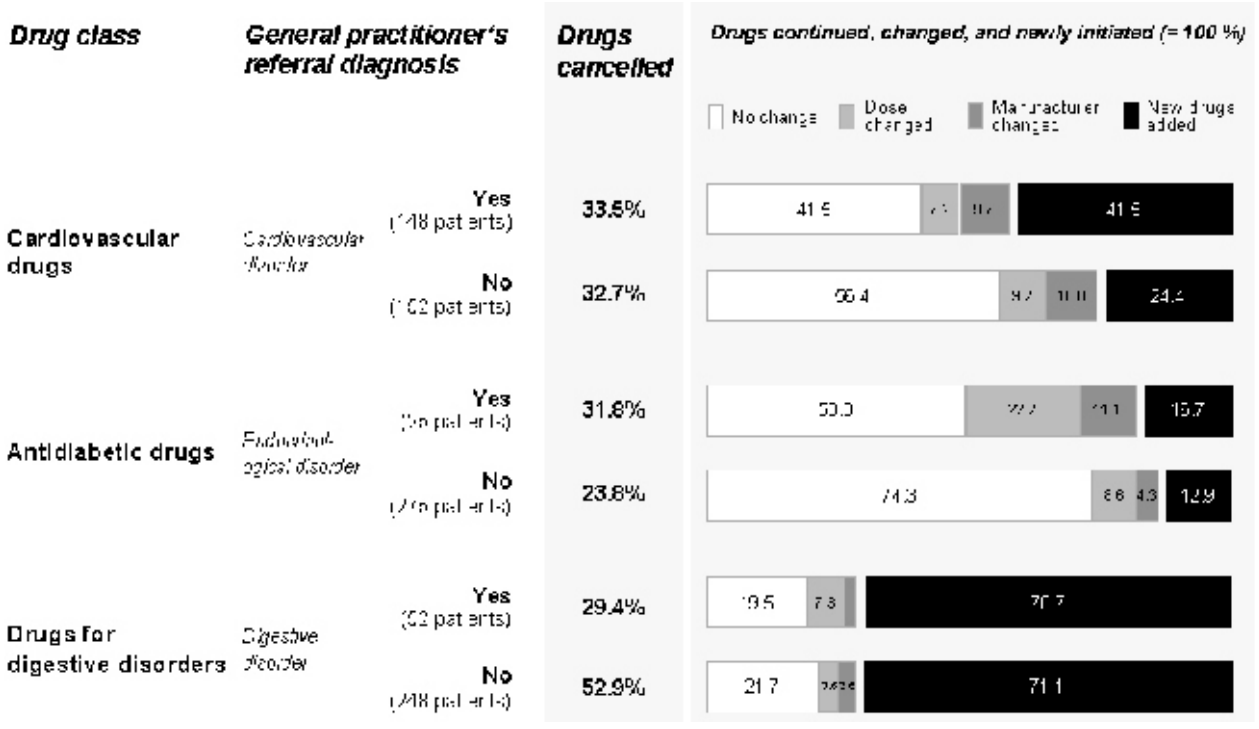

Figure 2. Referral diagnosis and drug change.

their hospital stay. In more than 60% of patients (184/300), 3 or more changes occurred which included a change in dosage, cancelling of 1 or more drugs, prescription of 1 or more new drugs or a change in the manufacturer of the drug; 101 patients (34%) experienced 6 or more changes (Table 2).

Discussion

According to this study, patients referred to hospital may experience considerable modification in their drug treatment regimen during hospitalization, involving, in particular, cancellation of drugs prescribed by their GPs, prescription of new drugs, etc. Nearly every patient will experience at least 1 modification, and more than 75% will experience 3 or more changes in their drug regimen. In many instances, change was not limited to drugs for those conditions that had been the reason for referral.

Limitations and strengths of study

Whether the drug changes in this study were medically indicated and appropriate, can not be assessed on the basis of the present data.

Since the drug survey was restricted to 1 point in time during hospitalization, we do not know how many of the new drugs started at the hospital will be recommended for continuation on an ambulatory basis. On the other hand, a return to the original medication at or after discharge seems unlikely. For example, 2/3 of cardiovascular drugs prescribed by GPs in the northeast of The Netherlands, were initiated by specialists [de Vries et al. 1996].

The study involved 3 non-university hospitals and included all patients, irrespective of age, with chronic diseases who were referred to hospital during the study period. The data can be considered as valid and representative.

Comparison to previous studies

The extent of drug change seen in our study essentially confirms the findings reported in former studies. According to a chart review of 130 patients in a German general practice, hospital doctors canceled or replaced 45% of drugs on admission [Himmel et al. 1996b]. According to a study in a large US Veterans Hospital [Beers et al. 1989], 40% of all medications being taken on admission were discontinued by the time of discharge and 45% of medications at discharge had been newly started during hospitalization. Similarly, Gonski et al. [1993] also reported a high rate of change in prescribing with 85% of 115 elderly patients experiencing a drug change when admitted to an Australian hospital.

There is evidence that hospital-initiated prescriptions are more expensive than those handed out in general practice and could increase the economic burden carried by GPs [Bijl et al. 1998, Hakansson et al. 2001, Horne et al. 2001]. The prescription of brand-named drugs instead of generics, for example, is one form of drug change that has frequently given rise to dissatisfaction among GPs [Himmel et al. 1996a]. Our data suggest that this is less of a problem nowadays since the rate at which generics are prescribed in general practice (25%) and in hospital (22%) are nearly the same. This study provided evidence that hospital clinicians are conscious of the need to limit costs in prescribing.

Meaning of study

The results of our study on drug change may be categorized in 4 topics.

- Unnecessary changes: some changes or modifications to drug prescriptions may be due the physicians' obligation to comply with the hospital formulary [Harder and Thürmann 1994]. This is especially true for changes involving a different manufacturer which accounted for 6% of all drug changes (nearly 10% in the case of cardiovascular drugs). Changes to more expensive (brand name) and less expensive (generic) drugs occurred within a group of me-too drugs, as seen with ACE inhibitors and diuretics. From a pharmacological point of view, these changes are of little relevance but may be as confusing to the patient as a change in active substance [Cochrane et al. 1992].
- Changes due to specific factors in the hospital: some drug changes, such as those associated with the high rate of newly prescribed drugs acting on the digestive tract, seem to be motivated by typical hospital-based problems.
- Changes apparently motivated by pharmacological considerations: according to Beers and colleagues [1989], hospital physicians tend to regard drugs cancelled after admission to be either unnecessary,

ineffective or contributing to toxicity. However, it should be noted that cancelling a drug or changing the active ingredient in a drug during hospitalization does not necessarily contribute to a more rational prescribing. According to a study in asthma patients referred to hospital [Hummers-Pradier et al. 2000], drug therapy was changed in 71% of cases, the majority of which, according to evidence-based criteria, did not improve the pharmacotherapy.

– GPs usually emphasize that their knowledge of the patient and his or her drug history establishes a close association between the GP and the therapeutic needs of the patient [Putnam et al. 2002, Sackett et al. 2000]. This does not seem to be fully appreciated by hospital clinicians. The far-reaching changes to drug prescriptions made by hospital doctors may reflect an attitude of superiority over family doctors in regard to drug prescribing and do not reflect malpractice on the part of the GPs per se. Further research may help to better understand how these 2 groups of doctors regard each other and whether these differences have a negative effect on the doctor-patient relationship.
– Drug change for reasons not associated with the cause of hospital admission: a drug change frequently involved drugs which had nothing, or only little, to do with the reason for hospitalization. Antihypertensive and cardiac drugs, in particular, were often canceled in patients referred to hospital by their GPs for reasons other than cardiovascular problems. Only in a few instances was a change in these classes of drugs indicated, e.g. because of drug interactions. In the remaining cases, these changes would have led to reactions of frustration on the part of patients and GPs [Vallès I Callol 1999].

Conclusion

According to recent recommendations for improving the interface between primary and secondary care, the use of drugs by patients moving from primary to secondary care (and vice versa) should be a continuum. For example, a shared list of drugs prescribed for common diseases seen in both general and hospital practice may be helpful [Hakansson et al. 2001]. The results of our study underline the necessity of such a list.

Some quality indicators are needed to monitor prescribing at the hospital-general practice interface. One criterion might be to recognize continuity of (pharmaceutical) care, if medically appropriate, as an important and valid treatment goal [Duerden and Walley 1999, Kvamme et al. 2001]. This could be monitored in drug surveys similar to the one performed here – with special attention to unnecessary drug modifications and changes in drug regimens not associated directly with the cause of hospital admission.

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