Peer reviewed article

Patients' knowledge of drug treatments after hospitalisation: the key role of information

Philippe Micheli[a, b], *Michel P. Kossovsky*[a, b, c], *Eric Gerstel*[a, b], *Martine Louis-Simonet*[a, b], *Philippe Sigaud*[a, b], *Thomas V. Perneger*[b, d], *Jean-Michel Gaspoz*[b, c]

[a] Service of General Internal Medicine, Department of Internal Medicine, University Hospitals, Geneva, Switzerland
[b] Groupe de Recherche et d'Analyse en Systèmes et Soins Hospitaliers (GRASSH), University Hospitals, Geneva, Switzerland
[c] Division of Primary Care Medicine, Department of Community Medicine and Primary Care, University Hospitals, Geneva, Switzerland
[d] Quality of Care Service, University Hospitals, Geneva, Switzerland

Summary

Question under study: Patients often do not know the reasons for taking their medications after hospital discharge. We investigated whether lack of such knowledge was associated with patients' report of not having received information about their medications while hospitalised.

Methods: Patients with at least one long-term drug (ie, prescribed for more than 30 days) discharged from the wards of general internal medicine of a teaching hospital were included in the study. Patients' knowledge of the reasons for taking these drugs and their report of having received information while hospitalised were assessed by phone one week after discharge.

Results: 362 (98.6%) of 367 enrolled patients could be interviewed and provided data on 1693/1871 (90.5%) long-term drugs prescribed at discharge. Patients knew the reasons for taking 1382 (81.6%) drugs and reported having received information about 259 (15.3%) of them. In the adjusted analysis, the reason for taking a drug was less likely to be known when introduced during hospitalisation (OR: 0.7; 95%CI: 0.5 to 0.9), among older patients (OR for ≥80 years of age v/s 20–59: 0.41; 95%CI: 0.22 to 0.76) and among those staying longer (OR per additional hospital day: 0.96; 95%CI: 0.94 to 0.99); such knowledge was strongly and positively associated with the report of having received information during hospitalisation (OR: 7.3; 95%CI: 3.2 to 16.1).

Conclusion: Patients' report of having received information about their long-term drugs during hospitalisation was associated with a significantly higher knowledge of the reasons for taking them. However, receipt of such information was only infrequently reported.

Key words: long-term drug treatment; patients' knowledge; drug indications; information; hospital stay

Introduction

Patients' knowledge about their medications is a prerequisite for avoiding dosage errors, drug interactions and limited compliance [1–6]. Poor compliance, in turn, has been linked with adverse events [6, 7] and hospital readmissions [8].

However, a substantial proportion of patients do not know the reasons for taking their medications after hospitalisation [1, 9–12], which often leads to modifications in their long-term drug treatments [13–17]. Studies on patients' knowledge about their medications after hospitalisation have been performed mostly in elderly patients [9, 13, 18–20], or have examined the influence on medication knowledge of changes made during hospitalisation [13, 17]; they have not clearly established an association between medication knowledge and receipt of information during hospitalisation, except for one study which correlated receipt of information with the percentage of patients who demonstrated knowledge for all their discharge medications [16]. Thus, the purpose of our study was to assess how often patients reported having received information about each of their medications during a stay in an acute care hospital, and whether this report was associated with a better knowledge of the reasons for taking each specific medication.

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Subjects and methods

Study design

Prospective observational study.

Setting and participants

The study was conducted in a 107-bed general internal medicine ward of the Department of internal medicine of the University Hospitals of Geneva, Switzerland, from May 1st to October 30th, 1999. This 1100-bed hospital is the main public and teaching hospital of the area, serving a large community as well as a referral population.

Patients were eligible for the study if they were taking at least one long-term medication, defined as a drug prescribed for more than one month before admission, if they stayed more than 24 hours on the wards, and were discharged home or transferred to a nursing home. Patients without long term medications were excluded in order to obtain a study group as homogeneous as possible regarding the type and the amount of information they could be exposed to. They also had to live in the Geneva area, to speak French, to be able to answer questions and to give informed consent. Patients could be included in the study only once. The hospital research ethics committee approved the study and all patients gave their informed consent to participate.

Study variables

The main dependent variable was patients' knowledge of the reasons for taking their long-term drugs, assessed during the week following hospital discharge. Among medications prescribed at discharge, only long-term treatments (prescribed for more than 30 days) still taken at the time of the interview were considered. The main independent variable was patients' report of having received information about their medications during the hospital stay, irrespective of who provided such information (mainly physicians or nurses; physiotherapists and clinical pharmacists are usually not involved in such tasks in our hospital). Other independent variables were patients' age and sex, hospital length of stay, number of medications at discharge, whether the drug had been newly introduced during the hospital stay, and assistance by nurses or family members with medications at home.

Data collection

Demographic and clinical data, as well as social characteristics, were collected from medical charts. Drug regimens and principal diagnoses upon admission were collected from physicians' admission notes, and the duration of treatments was confirmed by patients. The drug regimen prescribed at discharge was abstracted from discharge summaries.

Data concerning knowledge and information were obtained by calling patients at home during the week after discharge. The calls were made by a research nurse who used a standardised, pilot tested, questionnaire and followed a script from which he was not allowed to deviate. Specifically, patients were asked to specify which medications they used at that time (name, dose, frequency), and to explain the reasons for which their medications were taken ("For what health problem do you take this medication?"). Concerning information, the question was: "Did you receive any information about this drug during the hospital stay?" If patients did not understand questions, these were repeated, but not rephrased. No other process was used to obtain answers. Patients' answers were recorded verbatim by the investigator. The interviewer verified the accuracy of patients' answers concerning their medications and their diagnoses using medical discharge summaries. A pharmacist reviewed all questionnaires. For each medication, answers about knowledge of the reasons for taking it was rated as either correct or incorrect; patients' answers were rated as correct whether they identified the disease for which it was prescribed (eg, asthma or heart failure), the target organ (eg, for the lung or the heart) or the expected effect (eg, improved breathing, improved heart function). Patients' inability to give an answer, or an incorrect answer, was coded as a lack of knowledge. In similar studies, [21] which used two raters for such an assessment, a satisfactory agreement was obtained (kappa 0.83).

Statistical analysis

The principal unit of analysis was the drug itself, for which we determined if its indication was known by the patient. Thus, the main analysis consisted in testing the association between independent variables and whether a drug was known or not. The main independent variable tested was patients' report of having received information about that drug during hospital stay. Associations between knowledge of the reasons for taking a drug and several other covariates, such as age, gender, comorbidity, or number of drugs introduced during hospitalisation, were tested as well. We also performed an analysis looking at associations between reports of having received information about a drug during hospital stay and several patient and medication characteristics: since many patients received more than one medication, standard errors were estimated using methods taking clustering into account, ie, General Estimating Equation (GEE) [22] modelling in which a binomial distribution, a logit link and an exchangeable correlation structure, are applied. In this type of analysis, odds-ratios estimate the association between dependent and independent variables as in a regular logistic regression. However, even though point estimates are equivalent in both types of analysis, GEE takes into account the lack of independence between observations inside a defined cluster (ie, all drugs taken by the same patient). Therefore, standard error is generally larger in this type of analysis than in a regular logistic regression. Associations were analysed by means of unadjusted models and multivariable models adjusting for possible confounding factors Analyses were run on Stata 7.0 software.

Results

During the study period, 639 patients were screened. Of these, 234 were excluded, while 38 other eligible patients could not be included (figure 1). Only 5 of the remaining 367 (1.4%) patients were lost to follow up. Therefore, 362 patients were included into the final study group. Their characteristics are listed in table 1. Reasons for hospital admission included the following: cardiovascular diseases (31%); respiratory diseases (23%); onco-haematological disorders (12%);

Figure 1
Patients' flow

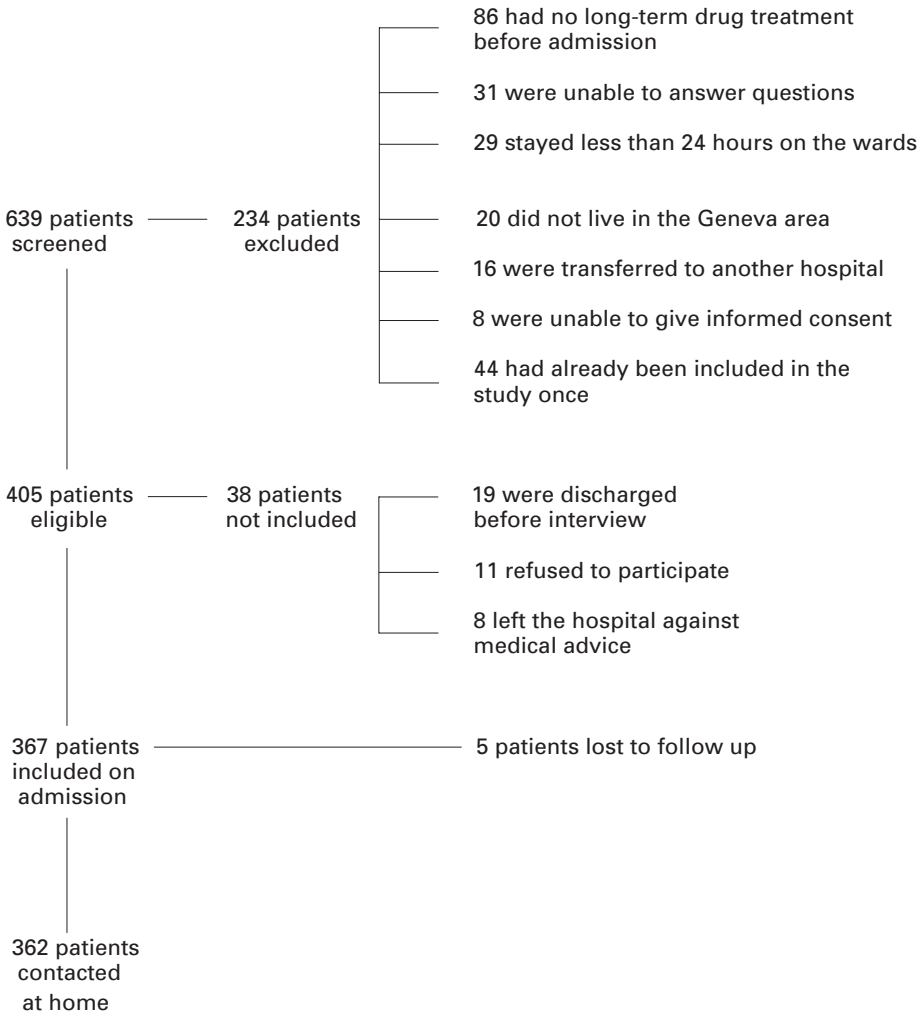

Table 1
Patients' characteristics (n = 362). Median, interquartile range (IQR) and range are displayed for continuous variables. Count and proportions are provided for categorical variables.

	Median	IQR	Range
Age (years)	68	54 to 77	19 to 94
Men: number (%)	183 (50.6%)		
Patients who needed assistance for medication at home: number (%)	62 (17.3%)		
Length of hospital stay (days)	9	5 to 13	1 to 45
Number of drugs on admission	4	3 to 6	1 to 17
Number of drugs at discharge	5	4 to 7	1 to 15

gastro-intestinal diseases (11%); infectious diseases (7%); neurological and psychiatric disorders (5%); and endocrine and metabolic diseases (5%). Other diagnoses represented 7% of the admissions.

Patients were taking a median of 4 drugs upon admission and were discharged with a median of 5 drugs (table 1). Thus, a median of 1 drug was added to each patient's regimen during the hospital stay (range: –7 to +7; IQR: 0 to 2). One drug, or more, was added in 278 patients (76%) and one drug, or more, was discontinued in 229 patients (63%).

The median delay between discharge and follow-up phone calls was 5 days (range 2 to 16 days; IQR: 5 to 6). Of the 1871 drugs prescribed at discharge, data concerning knowledge of the reasons for taking them and report of having received information were collected for 1693 (91%): drugs that were discontinued by patients themselves (155/1871; 8%), or for which patients declined to give an answer (23/1871; 1%), were not included in further analyses. Of these 1693 drugs, 588 (36%) had been introduced during the hospital stay, in 245 patients (68%).

Patients' knowledge why drug is taken

Patients knew the reasons for taking 1382/1693 (82%) drugs. Such knowledge was significantly worse for drugs newly introduced during the hospital stay (438/588; 75%), compared to drugs taken before admission (944/1105; 85%). There was an important difference in knowledge according to drug class: knowledge of indications was the highest for drugs prescribed for diabetes mellitus (57/59; 97%), followed by analgesics (53/56; 96%) and drugs prescribed for respiratory diseases (156/166; 94%). In contrast, indication knowledge was the lowest for vitamins and minerals (109/179; 61%) followed by corticoids (38/57; 67%) and anti-hypertensive medications, ie, ACE inhibitors, beta-blockers and calcium channel blockers (142/196; 73%).

In unadjusted analyses, the reasons for taking medications were less likely to be known among patients receiving assistance with medications at home, among those staying longer in the hospital, and when a drug had been introduced during the hospital stay (table 2); such knowledge was more likely when patients reported having received information during hospitalisation, and was not significantly associated with gender or number of medications at discharge. The association between knowledge and age was not linear but presented with different slopes for 20 to 59 years of age, 60 to 79, and ≥80. In other words, older patients tended to remember drug indication less than younger ones. Thus, results were presented using these age categories to better translate different levels of association.

In the adjusted analysis, reasons for taking medications were significantly less likely to be known when medications had been introduced during hospital stay, among older patients and among those staying longer in hospital; such knowledge remained strongly and positively associated with the report of having received information during hospitalisation (table 2).

Table 2

Association between patients' and medications' characteristics and knowledge of the reasons for taking medications (unadjusted and adjusted analyses)

	Correct knowledge (Unadjusted analyses) n = 1693 drugs taken by 362 patients		Correct knowledge (Adjusted analysis) n = 1693 drugs taken by 362 patients	
Variable	**Odds ratio (95%CI)**	**p**	**Odds ratio (95%CI)**	**p**
Patient age*				
20 to 59	1	<0.001	1	0. 01
60 to 79	0.51 (0.28–0.95)	0.03	0.66 (0.36–1.23)	0.19
80 and over	0.34 (0.19–0.62)	<0.001	0.41 (0.22–0.76)	0.004
Female gender	1.4 (0.9–2.1)	0.13	1.5 (0.9–2.3)	0.08
Hospital length of stay (per additional day)	0.96 (0.94–0.99)	0.007	0.97 (0.94–0.99)	0.009
Number of medications at discharge (per additional drug)	0.98 (0.9–1.1)	0.51	1.0 (0.9–1.1)	0.99
New medication	0.73 (0.56–0.95)	0.021	0.68 (0.52–0.89)	0.006
Assistance with medication at home	0.51 (0.31–0.84)	0.008	0.71 (0.42–1.20)	0.20
Information received during the stay	6.5 (3.3–12.7)	<0.001	7.2 (3.2–16.1)	<0.001

(CI: confidence interval)

* patients'distribution among age categories: 20–59 years: 94 patients; 60–79 years: 151 patients; >80 years: 117 patients.

Patients' reporting having received information about drug

Overall, patients reported having received information during the hospital stay for only 15% of their medications (259/1693): that percentage was significantly higher (19%) for drugs introduced during the hospital stay than for those taken before admission (13%).

Variables associated with receipt of information about medications are listed in table 3. In unadjusted analyses, the odds of patients reporting receipt of information about medications during the hospital stay were higher if the drug was introduced during the hospital stay. They were lower if help for medication management was provided at home, and with older age.

In the adjusted analysis, drugs introduced during hospital stay were more likely to be associated with patients' reporting receipt of information than drugs already taken before admission. Patients who received help with drug management at home reported less frequently having received information during the stay than patients who did not need help with their medications (table 3).

Table 3

Association between patients' and medications' characteristics and report of having received information (unadjusted and adjusted analyses)

	Report of having received information (Unadjusted analyses) n=1693 drugs taken by 362 patients		Report of having received information (Adjusted analysis) n=1693 drugs taken by 362 patients	
Variable	**Odds ratio (95%CI)**	**p**	**Odds ratio (95%CI)**	**p**
Patient age				
20 to 59	1	0.09	1	0.34
60 to 79	0.7 (0.4–1.1)	0.13	0.70 (0.39–1.26)	0.24
80 and over	0.5 (0.3–1.0)	0.03	0.63 (0.32–1.23)	0.18
Female gender	1.1 (0.7–1.9)	0.58	1.2 (0.7–1.9)	0.53
Hospital length of stay (per additional day)	0.98 (0.95–1.02)	0.39	0.98 (0.94–1.02)	0.29
Number of medications at discharge (per additional drug)	0.93 (0.85–1.01)	0.07	0.95 (0.87–1.03)	0.20
New medication	1.5 (1.2–1.9)	0.001	1.5 (1.2–2.0)	0.001
Assistance with medication at home	0.34 (0.15–0.79)	0.012	0.43 (0.19–0.98)	0.05

(CI: confidence interval)

Discussion

Our study showed that patients' report of having received information about their long-term medications during hospitalisation was associated with a significantly better knowledge of the reasons for taking their drugs. Nevertheless, patients reported having received such information only infrequently.

Although surprising, these findings are in accordance with previous publications: in the study by Cochrane R.A. et al., [19] 41 out of 50 (82%) elderly patients in the U.K. did not recall being given any information about the purpose of their drug treatment by physicians or nurses while in the hospital, as did 20 out of 40 (51%) elderly patients in Canada [9]; in the U.S, 86% of the patients from a geriatric clinic could not recall receiving verbal or written information about their medications [23]. More recent studies showed similar results [24]. Thus, patient information about medications at hospital discharge seems problematic irrespective of institutions and of who is supposed to provide such information (mainly physicians or nurses at our institution; physiotherapists and clinical pharmacists as well at others). Like their primary care colleagues [25], hospital physicians tend to overestimate the understanding patients have about their medications [26], even though patients would like to be better informed about the indications and the side effects of their medications [26, 27].

Even when treatment was changed during hospitalisation, only 19% of the new drugs were reported by our patients as having been explained. Changes in long-term drug regimens during hospitalisation may not be avoidable, because patients are often admitted in hospitals with unstable conditions that require changes in treatments. However, when such changes occur, hospital teams should be particularly careful to provide information to patients about their treatments because of a potentially negative impact of such changes [13]. In our study, the increase in information rates reported for new medications did not compensate for the deleterious effect of new drugs on medication knowledge.

Compared with previous publications [28, 29], we found more drugs for which patients knew the reasons for taking them (82% versus 72 to 78%). One explanation may be that we tested a relatively simple type of knowledge, which concerned only the general reason for taking each drug. Like ours, several studies have shown decreasing drug knowledge with advancing age [17, 21]; thus, the lower mean age in our study compared to previous studies might have accounted for part of the observed differences. Finally, the relatively short delay between hospital discharge and patients' interview may also have accounted for a better knowledge, because of an easier recall. Nevertheless, 10–14 days after an outpatient clinic visit, around 14% of patients lacked knowledge of the indication for at least one of their prescription medications [21]. Of particular concern is the relative lack of knowledge concerning definite classes of drugs. Since knowledge of indication is known to be related with compliance, supplementary efforts should be made in explaining reasons for administration and risks of discontinuation for drugs likely to cause acute problems in case of sudden discontinuation, such as corticosteroids.

The inverse relationship that we found between knowledge about medications and length of hospital stay, as well as help with drug management at home, could reflect confounding by a worse functional or cognitive status, leading to longer length of stay, greater need for help, and worse understanding of medication regimens. We did not confirm a previous observation [16] that patients' knowledge of the reasons for taking their medications decreased with the number of drugs taken. This may have been due to the fact that we

focused on long-term medications only, which have significant and longstanding impact on patients' lives. However, our data suggest that explanation efforts should be enhanced for drugs newly introduced during hospital stay. These drugs are clearly less well remembered than those already prescribed before hospitalisation. This concern is particularly important for older patients since age is negatively associated with indication knowledge.

The main limitation of our study is that we obtained data from patients' interviews, which may entail recall bias. Even though patients with important cognitive disorders were excluded, it is possible that some patients did not remember having received information about their drugs. The relationship between information and knowledge may therefore have been confounded by cognitive status. There are many other reasons why patients may not remember having received information about their medications, including poor health, information overload, short and unstructured interactions with those who provided the information, or mistrust in the health care team. Since patients' charts at our institution do not include a formal recording of information given to patients, these hypotheses cannot be verified. Thus, the present study should be viewed as a starting point for future projects that should analyse associations between the type and the content of the information provided to patients and their understanding of drug treatments.

In spite of these potential biases, our finding of a strong association between patients' report of having received information during the hospital stay and their knowledge about their medications may have important implications: 5.7% of hospital admissions are drug related of which 27% are caused by patients' non-compliance [2]. Patient information significantly improves drug compliance [1] and may reduce hospital readmissions [30]. These findings justify the growing interest in innovative approaches aiming at improving patients' knowledge of their drugs, such as self-medication programs [20], and structured discharge interviews [31, 32].

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Correspondence:
Jean-Michel Gaspoz, MD,
Division of Primary Care Medicine
Department of Community Medicine
and Primary Care
Hôpitaux Universitaires
CH-1211 Geneva 14
Switzerland
E-Mail: Jean-Michel.Gaspoz@hcuge.ch

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