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Short Communications

Use of non-standard abbreviations and symbols in medical prescriptions: implications for patients' health

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ABSTRACT

The use of abbreviations, acronyms and non-standardized symbols for medical prescriptions is a known cause of errors. Our aim was to quantify the frequency of using these expressions in our discharge notes. Medical prescriptions were analyzed to find the frequency of the use of non-standard terms. The mean number of drugs prescribed in the discharge notes was 4.75 (SD=3.56). Only 42.07% of prescriptions was considered correct. We found a statistically significant association between the quality of the prescriptions and the hospital service responsible for emitting them. About 39 % of the prescriptions used non-recommended expressions. The most commonly used abbreviation was “comp” for “comprimido”. Except “cap” (for “cápsula”), which was used in 2.7% of the prescriptions, the use of symbols or abbreviations was negligible. Only 0.7% used non-standard decimals and zeros in the prescribed doses and in none of the 4,055 prescriptions analysed were abbreviations or initials used for chemical and pharmaceutical formulas or for the names of medicines. Almost 50% prescriptions contained an error, whether for the use of abbreviations and symbols to depict the dose, or because of non-recommended expressions to depict decimals and zeros in the dose. Urgent steps should be taken to raise the awareness of doctors concerning the importance of quality in prescribing and the need to take into consideration the future well-being of discharged patients, both of which should be reflected in their discharge notes and in correctly completed prescriptions.

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INTRODUCTION

A medication error is defined as an error in the medication process: ordering, transcription, dispensing and administration, and discharge summaries [1]. Errors can be corrected if documented and evaluated as a part of quality improvement. The prescription of drugs is the most frequent medical intervention at present. The use of non-standardised abbreviations, acronyms and symbols in medical prescriptions (for example, to indicate the drug's name, prescribed dose and way and frequency of administration) is a known source of confusion, since they may be wrongly

interpreted by health professionals unfamiliar with the same; furthermore, they may even have several meanings [2,3]. The Institute for Safe Medication Practices (ISMP) has published recommendations on numerous occasions concerning the need to avoid the use of abbreviations and symbols to indicate the names of drugs and to express the dose, both in prescriptions and in other documents intended for fellow-professionals, even though this may involve more time and effort [4,5].

In order to understand the role of doctor participation in patient safety interventions, we quantified the frequency of using non-standard abbreviations, symbols or expressions in the discharge notes of patients in a 330-bed teaching hospital. We chose this setting because of the influence teaching hospitals may have on trainees' attitudes toward error reporting and patient safety.

Our primary goal was to determine whether professionals could identify potential adverse events and near misses. Our secondary goals were to describe, characterize and improve the knowledge about error reporting in our hospital and to analyze the factors associated with error and injury reporting.

We hypothesized that analyzing the medical prescriptions included in the discharge notes, the medical staff would identify and prevent adverse events and near misses that affected the care of their patients

METHODS

The study was conducted in the teaching hospital 'Reina Sofia' in Murcia (south-eastern Spain) between 1 July 2010 and 30 June 2011, a period in which 11,331 patients were discharged after a hospital stay of more than 48 hours. The hospital provides care for a population of 190,956 inhabitants. The following prescriptions were excluded from the study: those carried out in internal discharge reports (transfers),

those in discharge reports of the emergency department (less than 48 hours admittance) and those in discharge reports corresponding to patients with a discharge report already selected for this study in the reference period. Reports that did not contain medical prescriptions were eliminated from the sample (2.98%) and were substituted by others taken from the preview oversample in the study design.

The intensive care unit (ICU) was not included in the survey since most discharge notes in this case are internal or intra-hospital documents. The study was a descriptive transversal observational study with analytical components. A stratified random sampling was made, taking into consideration the medical specialities of the hospital beds available (*Table 1*). The sample size was calculated according to the resultant parameter (proportion of generic prescriptions). A confidence level of 95 was selected and an estimated precision of $\pm 2\%$ ($e = 0.02$) with an error type I of 0.05 and a power of 0.80. Assuming that the expected proportion was 10% and that total population size was 11,331 discharge reports, it was necessary to have a sample of 804 discharge reports. An oversample of 10% was taken and the final sample was 854 discharge reports. The study analysed the medical prescriptions included in the discharge notes by the medical staff. We analysed the variables related with the service and doctor who made the prescription and variables related with the prescription: a) the number of drugs prescribed

Table 1. Randomized stratified sampling carried out in proportion to the discharge volume in each hospital service

DISCHARGE REPORTS (JULY 2010- JUNE 2011)					
	Discharges	Deceases	Internal	External	Sample size
General Surgery	1712	34	90	1588	115
Digestive	461	14	42	405	29
Internal Medicine	2087	183	129	1775	131
Gynecology	389	0	11	378	30
Urology	817	6	23	788	64
Traumatology	948	17	23	908	72
Cardiology	1201	22	56	1123	79
Short Stay Unit	1338	4	42	1292	98
Intensive Care Unit	638	74	455	109	0
Psychiatry	363	1	6	356	28
Pneumology	527	25	33	469	35
Neurology	879	28	38	813	68
Infectious diseases	550	32	21	497	38
Detox Unit	155	0	2	153	11
Otorhinolaryngology	389	0	8	381	31
Ophthalmology	24	0	0	24	9
Dermatology	6	0	0	6	
maxillofacial surgery	78	0	4	74	
Rheumatology	54	3	2	49	16
Endocrinology	53	0	6	47	
Allergy	4	0	1	3	
Nephrology	105	4	8	93	
	12778	447	1000	11331	854

in the discharge notes, b) The number, distribution and characteristics of complete and non-complete prescriptions. The prescription was considered complete when it correctly expressed the dose, manner, frequency and duration of treatment, c) the service prescribing the medication, d) the proportion of prescriptions with non-standard abbreviations or symbols, non-standard expressions with decimals and zeros to prescribe the dose, abbreviations or initials of chemical and pharmaceutical formulas, and the use of abbreviations and initials to denominate medicines in the discharge report

The source for obtaining data for the investigation was a clinical-administrative database of all the patients admitted to the hospital and for the evaluation of the prescription of medications carried out in the hospital discharge report, a review was made of the clinical histories of the patients in the sample.

Descriptive statistical analysis has been carried out calculating the frequencies and the percentages for the qualitative variables, and the means, standard or typical deviation, maximum and minimum values for quantitative measures. 95% confidence intervals were calculated for means as well as proportions. Inferential statistical tests were carried out for comparing variables using bivariate analysis and all the results were considered statistically significant at p levels of <0.05 . The data were analyzed using SPSS 15.0 (SPSS Inc., Chicago, IL USA).

The current study has been carried out with a commitment to fulfill the ethical research rules and the legal requirements following current legislation guaranteeing confidentiality of data of a personal nature and its automated treatment according to current legislation about data protection of a personal nature (Organic Law 15/99, of the 13th December, of the Protection of Data of a Personal Nature, Royal Decree 994/1999, of the 11th June).

RESULTS

The study population consisted of a total of 854 discharge reports containing a total of 4,055 medical prescriptions. The mean age of the patients of the discharge reports was 58.56 years (SD= 21) and 54% of these were males. Mean hospital stay of the patients with discharge reports who were the object of the study was 9.17 days (SD=12.86). The mean number of drugs prescribed in the discharge notes was 4.75 (SD=3.56; range 1-20). Only 42.07% of prescriptions could be considered correct.

We found a statistically significant association between the quality of the prescription and the service prescribing the medication. The proportion of complete

prescriptions (70% doing so correctly) was significantly higher in the Urology and Traumatology ($P<0.001$). On the other hand, almost 80% of the prescriptions in the discharge notes written by the psychiatric and neurological services lacked some type of information, related with the dose, manner, frequency or duration of treatment. When the errors were related with the type of drugs prescribed (according to the therapeutic groups to which they belonged), about 66% of prescriptions in the following groups were incomplete: digestive apparatus and metabolism, cardiovascular apparatus, dermatology, ophthalmology and neurology.

The drug dose was not specified in 7.87% of the prescriptions described in the discharge notes. The way of administration was not specified in 32.9% of cases. Two percent did not mention the frequency of administration and 31.6% percent did not mention the length of treatment.

With regard to prescription errors, it has been found that 38.8% of the medical prescriptions for the discharge report contained abbreviations and symbols in the expression of the dose. The most commonly used abbreviation for expressing dose (in near 33% of prescriptions) was “*comp*” used in reference to “*comprimido*” (tablet in English). Except “*cap*” (for “*cápsula*”, capsule), which was used in 2.7% of prescription, the use of the remaining symbols and abbreviations was negligible. The use of these expressions was not homogeneous in individual services or sections. The Gynaecology service produced such errors in 98% of prescription, while Infectious Diseases and Pneumology services used non-recommended abbreviations, symbols and expressions in 605 of prescriptions forming part of the discharge notes. In contrast, only 23% of prescriptions from the Psychiatry service committed such errors ($p<0.05$) therefore we can conclude that those variables were interrelated.

Only 0.7% of all prescriptions used non-standard decimals and zeros in the prescribed doses and none of the 4,055 analysed prescriptions contained abbreviations or initials used for chemical and pharmaceutical formulas or for the names of medicines. Nearly 50% of prescriptions showed an error, whether for the use of abbreviations and symbols to depict the dose, or because of non-recommended expressions to depict decimals and zeros in the dose.

DISCUSSION

The World Health Organization (WHO) defines the rational use of medicine as the prescription of the correct medicine, available at affordable prices, correctly dispensed and administer in the correct dose

for the most appropriate time [6]. The prescription should specify the dose, the frequency and way of administration and the time that treatment should be followed meanings [7].

Prescription errors are the most frequent cause of "adverse effects" associated with medication, as borne out by several epidemiological studies [8,9]. According to the taxonomy proposed by Otero [10], the causes of error can be divided into:

1. problems associated with the interpretation of prescriptions
2. problems associated with the identification of patients
3. difficulties with the names of medicines
4. confusion with the labelling, packaging and of the medicines
5. problems in the dispensing and administration of the medicines
6. human factors

Lisby et al. [11], in 2005 published a study on the frequency, type and consequences of errors arising in all stages of the medication process, including hospital discharge notes. The authors found a total of 1075 errors in 2467 opportunities (43%), of which 20 to 30% were qualified as potentially adverse effects through medication. As many as 76% of prescriptions in the discharge notes contained a prescription error, such as the formulation of the medicine, its dose and duration of the treatment. However, this study did not specify whether the prescription errors involved the omission of data or incorrect data.

The National Quality Forum (NQF) [5] included as one of its thirty basic practices to be given priority to improve clinical security the use of standard abbreviations and expressions of dosification, specifying that institutions should establish explicit norms and procedures, and should keep a list of abbreviations and expressions that should never be used in relation with doses. In the same way, the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO) in its National Patient Safety Goals [12], directed at specific aspects of preventing errors, included practices that should be cost-effective and easy to apply.

In 2008, the Spanish Health Ministry published its "Construction and validation of good practices concerning patient safety" [13]. This paper studied and validated processes, among which the fitting transfer of information between doctor and patient was mentioned, and constructed a prescription quality indicator, measuring the frequency with which non-recommended

abbreviations and expressions were used for medicine doses for the treatment recommended during both admission and discharge:

1. *Percentage of prescriptions without abbreviations, symbols or non-recommended dose expressions* = $\text{Number of medical prescriptions without mistakes} \times 100 / \text{Number of revised prescriptions}$;
2. *Pro-mean of abbreviations, symbols or prohibited dose expressions that have been used. Number of erroneous expressions / Number of prescriptions revised.* Mean type of composed indicator

CONCLUSIONS

There were errors in about half of the prescriptions, through the use of erroneous abbreviations and symbols or non-standard expressions (for example, in the use of decimals and zeros). Urgent steps should be taken to raise the awareness of health professionals concerning the importance of quality in prescribing and of the need to take into consideration the future well-being of discharged patients, both of which should be reflected in their discharge notes and in correctly completed prescriptions.

Although specialized medical prescription represents a minimum of total prescriptions in a healthcare area, measures intended to improve quality will have a positive impact on primary care prescriptions. These measures include information to physicians on the most frequent prescription errors, plus the design of a List of Error-Prone Abbreviations, symbols and Dose Designations to unify criteria about the medical prescriptions included in the discharge notes in the Area.

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