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BRIEF REPORT

Analysis of prescriptions given on discharge from the emergencies department. Economic impact

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KEYWORDS

Prescription when discharged;
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Generic product;
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Cost;
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Abstract

Objective: To analyse the characteristics and cost of medical prescriptions given upon discharge from the casualty department, as well as the savings made by making substitutions with generis drugs or other equivalent pharmaceutical products in a third level hospital.

Methods: Six hundred sixty-nine patients were chosen using a cluster sample with a sub-sample. The following variables were considered: *a*) analysis of the prescription (medication quantification, active ingredients and most prescribed therapeutic groups, and possibility of prescribing generis drugs); *b*) calculation of cost and saving estimate (price to public and equivalent products); and *c*) prescription quality (adherence to the guide and percentage of products of high therapeutic use.)

Results: Three hundred seventy of the 669 patients received medication when they were discharged, with an average of 1.7 per patient. Six hundred twenty-nine products were prescribed, 16% due to their active ingredient, with 37.53% generic products available. The main active ingredients prescribed were paracetamol, ibuprofen, and omeprazole amounting to 26.70% of the total prescribed and the therapeutic groups that were highlighted were locomotor apparatus, the nervous system, the digestive apparatus, and metabolism with 69.39% of the total. Ninety-two point eighty-four percent of the prescriptions adhered to the pharmacotherapeutic guide and 98.41% were of high therapeutic use. The annual cost of prescribed medication was €1 013 778 and the saving made by generic product substitution and a programme of therapeutic equivalents was €145 971.

Conclusions: A prescription based on its active ingredients and a therapeutic and generis substitution produce a significant saving both for the patient and for the hospital.

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PALABRAS CLAVE

Prescripción al alta;
 Urgencias;
 Especialidad genérica;
 Equivalente
 terapéutico;
 Coste;
 Ahorro

Análisis de la prescripción al alta en urgencias. Impacto económico**Resumen**

Objetivo: Analizar las características y coste de la prescripción medicamentosa al alta en urgencias, así como el ahorro que supondría la sustitución por su EFG u otra especialidad farmacéutica equivalente, en un hospital de nivel terciario.

Métodos: Se seleccionó a 669 pacientes mediante un muestreo de conglomerados con submuestreo. Las variables recogidas fueron: *a)* análisis de la prescripción (cuantificación de la medicación, principios activos y grupos terapéuticos más prescritos, y posibilidad de prescripción por especialidades farmacéuticas genéricas); *b)* cálculo de coste y estimación de ahorro (precio de venta al público y de especialidades equivalentes), y *c)* calidad de la prescripción (adherencia a la guía y porcentaje de especialidades de utilidad terapéutica alta).

Resultados: De los 669 pacientes, 370 recibieron medicación al alta, con una media de 1,7 por paciente. Se prescribieron 629 especialidades y un 16% fue por principio activo, habiendo disponibilidad de genéricos en un 37,53%. Los principios activos más prescritos fueron paracetamol, ibuprofeno y omeprazol, con un 26,7% del total y los grupos terapéuticos destacados fueron aparato locomotor, sistema nervioso, y aparato digestivo y metabolismo con 69,39% del total. Un 92,84% de las prescripciones perteneció a la guía farmacoterapéutica y un 98,41% fue de utilidad terapéutica alta. El coste anual de la medicación prescrita fue de 1.013.778 € y el ahorro con la sustitución genérica y un programa de equivalentes terapéuticos sería de 145.971 €.

Conclusiones: Una prescripción por principio activo y una sustitución terapéutica y genérica producen un ahorro significativo tanto para el paciente como para el hospital.

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Introduction

The prescription and substitution of drugs are subject to strict regulation in developing countries. The purpose is to guarantee adequate exchange of information between the prescribing doctor and the dispensing pharmacist, ensuring the precise identification of the drugs and respecting, in any case, the patient's right to information and privacy.^{1,2}

On December 31, 1996, the Spanish Drugs Law 25/1990, of 20th December, was changed, establishing a legal framework allowing the introduction of generic drugs and reference prices in Spain. Subsequently Spanish Order SCO/2958/2003, of 23 October,³ determined new presentations for generic drugs and approved the corresponding reference prices.

Many publications refer to the advantages and disadvantages of using generic drugs, which include low cost, since they do not include the costs of investigation or development and initial marketing, and safer identification of the drug, avoiding prescription and dispensing errors due to associations with similar drugs.⁴ Similarly, they also provide brief and clear information facilitating the search for information on interactions, dose, adverse effects and contraindications, etc. Pharmacy offices can maintain more rational stock and, finally, patients find it easier to identify the drug and relate it to allergies and simultaneous prescriptions, etc.

In addition, the prescription of generic drugs does not have any negative influence on pharmaceutical investigation, since it is the countries with bigger markets and more

prescriptions of generic drugs which invest most in investigation and development.

The reason within the international field for allowing generic or therapeutic substitution is savings in healthcare expenditure. However, certain substitution policies in other countries can provide additional benefits, both for pharmacists who, in some cases, can reduce their stocks, and for consumers, who are given a choice when contributing to paying for drugs.^{5,6}

In the majority of countries which allow substitution in general, the doctor can prohibit this in specific cases, stating this explicitly in the prescription. Moreover, it is often the case that said doctors receive incentives or penalties depending on the generic prescriptions written.

The obligations of the pharmacist in terms of substitution vary from the need to consult the doctor and patient to an obligation to dispense the cheapest product without informing the prescribing doctor. Doctors are not normally obliged to inform the patient of the possibility of substitution.^{7,8}

The prescription of generics and the application of regulations relating to reference prices reduce, in large part, pharmaceutical expenditure. This article will look at the possibility of performing therapeutic substitution via a therapeutic exchange programme, substituting one drug for an alternative, when there is evidence that this is the best treatment option for the patient.⁹

The main objective of this study is to analyse prescriptions on discharge from the emergency department of a third level hospital and calculate the cost of the drugs prescribed,

as well as the savings involved when a drug is substituted for its generic form or other equivalent pharmaceutical product. A secondary objective will be to determine the quality of the prescription using the percentage of use of products of low/high therapeutic utility and the degree of adherence to the hospital's pharmacotherapeutic guide.

Methods

This is a descriptive transversal study, performed in a third level hospital, from April to November 2003 and forms part of an investigational project: problems relating to drugs among the users of hospital emergency services, a project financed by a FIS (Fondo de Investigación Sanitaria/healthcare investigation fund) grant.¹⁰ The study included all patients attending the general emergency department of a third level hospital who met the selection criteria.

Exclusion criteria included the following: patients presenting symptoms of acute voluntary drugs intoxication (suicide), patients who attended the emergency department 2 or more times on the same day with the same drug-related problem, in which case they were counted only once, patients who did not wait for medical consultation and patients from another hospital. The study did not include users of the maternity and infant emergency services to ensure uniformity in the results and data, as well as patients who did not have a doctor's report on discharge and patients lost to follow-up, or similar, and death.

To decide the size of the sample, a cluster sample with sub-sample was proposed, with equal probabilities and without replacement during the first stage and with systemic sampling in the second stage; the clusters were days and within each day a systemic sampling of patients attending the emergency department was selected. Within a specific study period, the size of the sample was determined according to the average of patients attending the emergency department in 2001, for a certain maximum allowable error and a 95% confidence interval. The main disadvantage of determining this size was in estimating variability within the clusters and variability between clusters, for each variable involved. Taking into account that the number of patients attending the emergency department this year was 176 108 (according to the selection criteria) with an error of 0.01 and a systemic pass of 3, it was decided that the number of patients included was 669.

The statistical analysis was performed using the SPSS v11.5 statistics package.

Study variables

Analysing the prescription. Patients given drugs on discharge were collected and these were quantified. The most prescribed active ingredients were counted and organised into treatment groups. Finally, the products prescribed were recorded, as well as the possibility of prescribing a generic drug and the actual prescription for the active ingredient. For the analysis, the Drugs Database of the General Council for Professional Associations of Pharmacists, in its multimedia version corresponding to 2003,¹¹ was used.

Calculating the cost and estimating savings. The retail price of all the pharmaceutical products prescribed was recorded, as were the retail price for products that had a generic drug on the market, the retail price of those whose price had changed due to the new regulations and the retail price of equivalent products after studying the possible changes within the therapeutic exchange programme. Similarly, the Drugs Database was used and the therapeutic equivalents programme at the Hospital Son Dureta was consulted.¹²

Quality of the prescription in the hospital. The percentage of drugs prescribed that were of high therapeutic use and the degree of adherence to the pharmacotherapeutic guide were calculated.

Results

A total of 669 patients were included, distributed as follows: 370 received at least 1 drug, representing 55.31%; 155 left without receiving any drugs (23.17%), and the remainder were lost patients since they did not meet the inclusion criteria.

Focusing on patients who received drugs following discharge from the emergency department, a total of 629 drugs were prescribed on discharge. The average number of drugs per patient who received drugs was 1.7 and the average number of drugs per patient included in the study (525) was 1.19. The distribution of drugs among patients who received a drug was: 197 (53.25%) patients received 1 drug; 113 (30.54%) received 2; 44 (11.9%), 3; 11 (2.97%), 4; 2 (0.54%), 5; 1 received 6; 1 received 7; and the other, 8 (0.27%).

Table 1 shows the most frequently used treatment groups, of which the most used was that of the musculoskeletal system, with 26.87%, and in Table 2 showing the active ingredients, the most frequently prescribed was paracetamol, with 10.17% of cases.

In total, the number of drugs prescribed was 629, and the proportion of generics was low (37.52%), representing 236 products of the 629 prescribed. The prescription of these products based on active ingredients was also low; only 101 prescriptions of the total of 629 were prescribed by their official Spanish non-proprietary name, representing only 16% of the total.

Of all the different products prescribed (120), 97 were included in the hospital's pharmacotherapeutic guide and 23 were not. Of those that were included in the pharmacotherapeutic guide, 93 were of high therapeutic use and 4 of low therapeutic use; however, of those that were not included in the pharmacotherapeutic guide, 18 were of high therapeutic use and 5 of low therapeutic use. Table 3 shows the distribution per treatment group.

Following an analysis of the cost of all the prescriptions in the emergency department for the 669 patients included in the study, it was observed that the value of said medication amounted to €4228.30, compared to €3979.40 when substituted for the generic drug and the reference price regulations applied. Finally, following the application of a therapeutic exchange programme, a cost of €3620.70 was obtained.

On studying the cost of the prescription per patient, a total of €6.32 was obtained, and this was reduced to €5.94

Table 1 Most frequently used treatment subgroups

Treatment group	Frequency	No.	%
<i>M. Musculoskeletal system</i>			
M01AE	Anti-inflammatories: propionic acid derivatives	74	43.79
M01AB	Anti-inflammatories: acetic acid and acetamide derivatives	65	38.46
<i>N. Nervous system</i>			
N02BE	Analgesics and antipyretics: anilides	66	47.14
N05BA	Anxiolytics: benzodiazepines	29	20.71
N02BB	Analgesics and antipyretics: pyrazolones	28	20
<i>A. Digestive system and metabolism</i>			
A02BC	Proton-pump inhibitors	52	37.68
A03BB	Semisynthetic alkaloids, belladonna, quaternary amines	31	22.46
<i>J. Systemic anti-infective therapy</i>			
J01CR	Combinations of penicillin, including beta-lactamase inhibitors	59	9.4
<i>S. Sensory organs</i>			
S01AA	Anti-infective ophthalmologics: antibiotics	20	33.9
S01FA	Mydriatics and cycloplegics: anticholinergics	10	16.95
<i>R. Respiratory system</i>			
R06AB	Antihistamines, systemic use: substituted alkylamines	4	17.39
R03CC	Antiasthmatics: selective beta2-adrenergic agonists	4	17.39
<i>B. Blood and haematopoietic organs</i>			
B01AC	Platelet antiaggregation agents (excluding heparin)	13	2.07
<i>C. Cardiovascular system</i>			
C09CA	Angiotensin II receptor antagonists, only	3	27.27
C03CA	High ceiling diuretics: sulphonamides, only	3	27.27
<i>H. Hormone therapy</i>			
H02AB	Systemic corticosteroids, only: glucocorticoids	7	63.63
<i>D Dermatological treatment</i>			
D06AX	Other topical antibiotics	4	0.63
<i>G. Genitourinary treatment, including sex hormones</i>			
G04CA	Alpha-adrenergic blockers	1	0.16
Total		629	100

and €5.41 on substitution for the respective generic drug or via a therapeutic exchange programme.

On extrapolating the costs to 1 year, the expenditure of the emergency department would be €1 013 778.50 compared to €952 823.50 or €867 807.20 following application of the therapeutic exchange programme.

As a result, the savings resulting from the substitution for the generic drug and the application of the regulations relating to reference prices would be €60 995 and €4971.30 if an adequate therapeutic exchange policy was followed.

Table 4 details the prescription per treatment group, indicating in each case the clinical and economic impact.

Discussion

The number of prescriptions for active ingredients in this third level general hospital is low, representing only 16% in the emergency department. Since this hospital does not provide prescriptions on discharge, regardless of whether it

is hospital admissions, the emergency department or outpatient consultations, it is the GP who has the final say when prescribing drugs, however greater consumption of generic drugs could be obtained if the hospital prescribed active ingredients rather than the brand name.

Controlling pharmaceutical expenditure¹³ is a concern in all European Union countries, and a series of measures has been established which are common to several countries. As part of this, the inclusion of drugs in negative lists (the Netherlands, Ireland, the United Kingdom and Germany) or exclusion from positive ones (Belgium, Denmark, France, Greece, Italy, and Portugal). Other measures applied are: variation in the contribution of the user; promotion of the prescription of generic drugs (Denmark, the Netherlands, and the United Kingdom), price control (Belgium, France, Italy, Portugal, and Greece), fixing of reference prices above which the drug will not be refundable (Germany, the Netherlands, and Sweden); agreements with the pharmaceutical industry with respect to percentages destined for the advertising of drugs and control of

Table 2 Most frequently prescribed active ingredients

Active ingredient	Frequency	%	% accumulated
Paracetamol	64	10.17	10.17
Ibuprofen	57	9.06	19.23
Omeprazole	47	7.47	26.7
Ketorolac	34	5.4	32.1
Amoxicilin/clavulanic	30	4.77	36.87
Butylscopolamine	29	4.61	41.48
Metamizol	26	4.13	45.61
Diclofenac	22	3.5	49.11
Diazepam	17	2.7	51.81
Ciprofloxacin	17	2.7	54.51
Metoclopramide	16	2.54	57.05
Rifampicin	15	2.38	59.43
Tetrazepam	14	2.22	61.65
Aceclofenac	13	2.07	63.72
Lornoxicam	11	1.75	65.47
Carmellose	10	1.59	67.06
Ranitidine	9	1.43	68.49
Others	198	31.47	100
Total			100

Table 3 Distribution per treatment group according to therapeutic use and adherence to the pharmacotherapeutic guide

Treatment group	PTG		Therapeutic use	
	Tes	No	H	L
Group A	134	4	134	4
Group B	13	0	13	0
Group C	11	0	11	0
Group D	3	1	4	0
Group G	0	1	1	0
Group H	9	2	10	1
Group J	56	3	59	0
Group M	152	17	169	0
Group N	140	0	140	0
Group R	19	4	21	2
Group S	46	13	56	3
Others	1	0	1	0
	584	45	619	10
	92.84%	7.15%	98.41%	1.59%

H indicates high; L, low; PTG, pharmacotherapeutic guide.

companies' profits (United Kingdom), and measures aimed at persuading doctors to not prescribe above certain limits, as is the case in the United Kingdom and Germany.¹⁴

The main problem of implementing generics in any significant form in Spain is the lack of tradition in the use of

such drugs, due in large part to the lack of information for healthcare professionals and the fact that there is no official list of generic drugs.^{15,16}

In a study performed in health centres in Barcelona, Valles et al¹⁷ evaluated the degree of patient acceptance

Table 4 Prescriptions per treatment group

Treatment group	Total drugs, %	In PTG, %	H, %	L, %	Total RP, €	RP (GD, ref.), €
A. Digestive system and metabolism	138 (21.94)	134 (97.1)	134 (97.1)	4 (2.9)	168 212	168 192
B. Blood and haematopoietic organs	13 (2.07)	13 (100)	13 (100)	0 (0)	81 402	81 402
C. Cardiovascular system	11 (1.75)	11 (100)	11 (100)	0 (0)	21 230	20 525
D. Dermatological treatment	4 (0.63)	3 (75)	4 (100)	0 (0)	3782	3782
G. Genitourinary treatment, including sex hormones	1 (0.16)	0 (0)	1 (100)	0 (0)	6779	6779
H. Hormone therapy	11 (1.75)	9 (81.8)	10 (90.9)	1 (9.1)	34.95	34.95
J. Systemic anti-infective therapy	59 (9.4)	56 (94.91)	59 (100)	0 (0)	170 475	145 584
M. Musculoskeletal system	169 (26.87)	152 (89.94)	169 (100)	0 (0)	233 894	218 987
N. Nervous system	140 (22.26)	140 (100)	140 (100)	0 (0)	173 792	168 579
R. Respiratory system	23 (3.66)	19 (82.6)	21 (91.3)	2 (8.7)	80 532	66 545
S. Sensory organs	59 (9.4)	46 (77.9)	56 (94.9)	3 (5.1)	37 856	37 856

AI indicates active ingredient; GD, generic drug; H, high; L, low; PTG, pharmacotherapeutic guide; ref. RP, reference price; RP, retail price; TE, therapeutic exchange.

regarding the substitution of branded drugs for their respective generics. A total of 98.9% of these patients accepted the change and of those who rejected this, 40% did so on the advice of other doctors (specialists and private doctors, etc). In another study, Casado et al¹⁸ concluded that 71% of patients involved accepted the change to the generic drug. Of the remaining 29%, 67% preferred to consult with their doctor beforehand, and half of these knew what a generic drug was. Therapeutic sessions on the use of generics improved prescriptions.

Torralba et al¹⁹ performed a study to analyse the degree to which generics had been implanted in Spain and Catalonia, and to determine the actual savings generated by such products, as well as the maximum theoretical saving that may be generated from the generics available. The study concluded that, despite the lack of tradition, efforts are being made for rapid implantation in terms of the prescription of generics.

In our study, the most frequently prescribed treatment groups were, in particular, drugs belonging to group M (musculoskeletal system) with 26.87% of prescriptions, group N (nervous system) with 22.26% and group A (digestive system and metabolism) with 20.26%. The high number of patients in traumatology is to be noted, which explains the high number of anti-inflammatories and associated drugs prescribed. These 3 groups represent almost 70% of the total prescriptions and therefore it is important to concentrate on these groups for future efforts. The prescription of drugs related to groups R and S is also to be noted (respiratory and the sensory organs) since this is one of the few hospitals with duty pulmonologists and otorhinolaryngologists.

Focusing on the 20 active ingredients, the most frequent were: paracetamol (10.17%), ibuprofen (9.06%), omeprazole (7.47%), ketorolac (5.06%), and amoxicillin/clavulanic acid (4.77%), with the possibility of a prescription for the generic drug in 50% of cases.

Continuing with the description, the correct prescription of drugs with a high/low therapeutic use was found. In this respect, prescriptions within the hospital are quite good, since only 1.59% were prescriptions for drugs of low therapeutic use in the emergency department.

Another tool used to control the rational use of drugs is the hospital's pharmacotherapeutic guide, which is collected and studied by the pharmaceutical and therapeutics commission. A total of 92.84% of doctors use this document for more rational use of drugs.

In the emergency department, the total cost of drugs was €1 013 778 and a saving of €145 971 in 1 year is expected by applying the different substitutions. On analysing the drugs prescribed and classifying them according to the corresponding treatment group, 3 groups produced greater savings in the hospital's pharmaceutical expenditure. Group M (musculoskeletal system), which has the greatest weighting in terms of prescription costs in the emergency department (23.07%), is the one in which a possible therapeutic exchange could be implemented prescribing generics in the majority of cases (such as generic ibuprofen, generic diclofenac, and diazepam), which would generate a total saving of 48.62% for this group of drugs. In addition, group J (systemic anti-infective therapy) is a group which, although not one of the most frequently prescribed, has significant economic weighting, both in terms of cost (16.81%) and the savings (17.05%) it would generate. This

TE RP, €	Total saving, €	Substitutions	AI with GD
158 048	10 164	Magaldrate for almagate; pantoprazole for omeprazole; clebopride, domperidone for metoclopramide. Respective GDs	Ranitidine and omeprazole
81 402	0		
19 672	1558	Candesartan for losartan. Respective GPs	Spironolactone, enalapril, captopril, simvastatin, and furosemide
3782	0		
6779			
16 029	18 919	Deflazacort, prednisone, methylprednisolone for prednisone	
145 584	24 891	Moxifloxacin for levofloxacin. Respective GDs	Amoxicilin/clavulanic acid, norfloxacin, clarithromycin and ciprofloxacin
162 919	70 975	Aceclofenac, diclofenac, lornoxicam, ketoprofen, naproxen, meloxicam, ketorolac and dexketoprofen for diclofenac GP. Tetracepam for diazepam. Respective GDs	Diclofenac and ibuprofen
168 579	5033	Bromazepam for lorazepam; biperiden for dexchlorpheniramine. Respective GDs	Tramadol, paracetamol, alprazolam, lorazepam, and metamizol
66 545	13 987	Respective GDs	Salbutamol, budesonide, and acetylcysteine
37 856			

saving is mainly due to the fact that the most frequently prescribed antibiotics have a generic form. Thirdly, the influence of group N (the nervous system) is to be noted, this represents 17.4% of pharmaceutical expenditure due to the high number of prescriptions.

Finally, it is to be noted that within group H (hormone therapy), the prescription of prednisone instead of other equivalent products could generate a saving of 12.96%.

The correct prescription in certain groups, such as group M, J, and H, would generate significant savings (approximately 78%) within pharmaceutical expenditure.

Pharmaceutical expenditure has been rapidly increasing in recent years; however there are currently several tools to achieve rational use of drugs. An ideal prescription on the part of the doctor would be one in which the patient's discharge report includes all the medication listed by active ingredient for greater familiarity and to facilitate the prescription of the corresponding generics if these exist. We therefore propose the publication of updated lists of generics on a regular basis and the use of therapeutic exchange programmes as measures to improve medical prescriptions and control pharmaceutical expenditure.

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