

Original Article

Differences in managing urgent and elective admissions with regard to diagnosis related groups and patient age

E. Moreno Millán*, J. M. García Torrecillas**, M. C. Lea Pereira***

*DEPARTMENT OF APPLIED ECONOMICS. UNIVERSITY OF ALMERÍA. **CRITICAL CARE AND EMERGENCY UNIT. TORRECÁRDENAS HOSPITAL COMPLEX, ALMERÍA. ***DEPARTMENT OF INTERNAL MEDICINE. E. P. HOSPITAL DE PONIENTE. EL EJIDO. ALMERÍA.

ABSTRACT

Aims: To analyse the management behaviour differences between urgent and elective admissions (respectively, UA and EA) in the most frequent conditions in the Spanish hospital practise and their relation to the patients' age.

Methods: Observational, descriptive, cross-sectional study carried out in public acute-patient hospitals throughout Spain in the year 2002. the Diagnosis-Related Groups were further subgrouped as "high-prevalence" (HP-DRG, the 25 most frequent ones) and "remaining" (remaining-DRG). The parameters compared were mean duration of hospital admission, DRG weight, number of secondary diagnoses, number of procedures and mortality, as related to the type of admission (UA, EA), the DRG subgroup (HP-DRG or remaining-DRG) and the patients' age.

Results: HP-DRG cases encompass 33.5% of the case population. As compared to EA's, UA's are characterised by older age ($p<0.001$), a higher proportion of males, higher-weighted DRG's, and generating a longer mean duration of admission, a greater number of secondary diagnoses and a greater number of procedures ($p<0.001$ in all three cases). The severity, complexity, resource consumption and expense of UA's in the "remaining-DRG" subgroup reach their maximum in the 65-69-year age group and then decrease, while all three parameters increase uniformly with age among the HP-DRG.

Conclusions: These data highlight the potential relevance of the management role of health care professional in the emergency areas and the need for alternatives to conventional hospital admission for the more frequent conditions causing UA's, the grouping whereof should facilitate their clinical and economic management.

Key Words: Emergencias. Management. Case load. Admissions. Resources. Costs. Economy. DRG. Concentration.

RESUMEN

Diferencias de gestión entre los ingresos urgentes y los programados en función de los grupos relacionados de diagnóstico y la edad de los pacientes

Objetivos: Analizar las diferencias de comportamiento entre los ingresos urgentes (IU) y los programados (IP) de los procesos más habituales en la casuística hospitalaria española y su relación con la edad de los pacientes.

Métodos: Diseño observacional, descriptivo, transversal, en hospitales públicos de agudos de toda España durante el año 2002. Los grupos relacionados de diagnóstico (GRD) se agruparon en alta prevalencia (los 25 más frecuentes, GRD-AP) y el resto (GRD-resto). Se comparan la estancia media hospitalaria, el peso de los GRD, el número de diagnósticos secundarios, el de procedimientos y la mortalidad en función del tipo de ingreso (IU o IP), el subconjunto de GRD (GRD-AP o resto) y la edad.

Resultados: Los GRD-AP concentran el 33,5% de la casuística. Con respecto a los IP, los IU se caracterizan por una edad superior ($p<0,001$), tener una mayor proporción de varones, tener unos GRD con mayor peso y generar una estancia media hospitalaria ($p<0,001$), un número de diagnósticos secundarios ($p<0,001$) y un número de procedimientos ($p<0,001$) superiores. La gravedad, complejidad, consumo y gasto en los IU del subconjunto GRD-resto alcanza el máximo entre los 65-69 años para disminuir posteriormente con la edad, mientras que estos parámetros aumentan uniformemente con ella en los GRD-AP.

Conclusiones: Estos datos muestran la potencial relevancia del papel gestor de los profesionales de las áreas de urgencias, y la necesidad de programas alternativos a la hospitalización convencional en los procesos más frecuentes que motivan IU, cuya concentración debería facilitar la gestión clínica y económica.

Palabras clave: Urgencias. Gestión. Casuística. Ingresos. Recursos. Costes. Economía. GRD. Concentración.

Correspondence: E. Moreno Millán
Urb. Aljamar II, 6
41940 Tomares (Sevilla)

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INTRODUCTION

An increase in the use of hospital resources among people aged over 65 has been generally attributed to demographic growth and an ageing population^{1,3}. In particular, those who most frequently visit hospitals are patients over 80 who are more susceptible to disease, especially chronic illness and disability, compared to the rest of the population⁴. A significant increase in older patients who come to hospital emergency departments (ED) and are often admitted for treatment via this route⁵ has also been observed. The introduction of specific management programmes with strategic involvement in the main production control guidelines in health care could create important clinical, economic and social advantages for these older patients⁶. By focusing our activity on the main conditions in the case mix and identifying possible alternatives, can to improve the way hospitals are run⁶⁻⁸.

Different factors coexist within an unfavourable scenario caused by the medium and long term demographic projections that have been made⁹⁻¹¹ and a tendency to increase total health expenditure (HE)^{12,13}. This led us to study the differences in managing the most common type of patients in relation to their admission category (urgent or elective) and their age. The aim of this study was to analyse the use of hospital resources according to the type of patient admission as well as the seriousness, complexity and severity of the most frequent conditions dealt with in our national health system. These resources were measured as proxy variables; relative weight, the length of hospital stay, complications, associated comorbidities and mortality among the case-mix groups (diagnosis related groups, DRG)¹⁴⁻¹⁶, in relation to the duration of the admission and age.

METHOD

An observational, descriptive, cross-sectional study carried out in public hospitals offering acute patient services throughout Spain. The patient's admission type was chosen as the independent variable and this could be either urgent admission (UA) or elective admission (EA). To be included in the study patients had to be aged 45 or over. The clinical data was obtained from the minimum basic data set (MBDS) from 2002¹⁷ which was provided by the Ministry of Health and Consumer Affairs Institute of Health Information (IIS-MSI in Spanish). The demographic information comes from the National Institute of Statistics (INE in

Spanish)³. Pathologies were organised according to the DRG and were divided into those with a high prevalence (the 25 most common groups within the MBDS analysed, HP-DRG) and those which were not (the rest of the DRG, remaining-DRG).

Dependent variables such as age, length of the hospital stay, average DRG weight, number of secondary diagnoses (NSD), number of procedures (NP) and mortality were included. The results of the quantitative variables were expressed using averages and typical deviations (TD) and qualitative variables were expressed using proportions and frequency distributions. Quantitative and qualitative variables were compared using the ANOVA and Pearson's chi-square test, respectively. Significance of was considered to $p < 0.05$. The statistical software package used was SPSS version 12.0¹⁸.

RESULTS

We studied 2,010,177 cases of hospitalisation involving people aged over 45 years of age, representing 58.31% of the total 3,447,404 generic cases registered in 254 public health centres offering acute patient services in Spain during 2002. Table 1 identifies the HP-DRG and includes information on their relative weights and costs, the total number of patients in each group and the percentage that were UA and EA according to the information provided by the ISS-MSI. Table 2 shows the values of the independent variables of all patients as well as the separate values according to whether the patient belonged to a HP-DRG or one of the remaining-DRG. Figure 1 illustrates that the proportion of UA increases with patient age in both HP-DRG and remaining-DRG whereas the proportion of EA decreases.

Table 3 compares UA and EA. All the data in this table is statistically significant and shows that patients admitted for treatment via the emergency department are older and predominantly male, the DRG weight is greater, the duration of hospital stay is longer and the NSD and NP involved are also higher. These results do not change when the HP-DRG and remaining-DRG subgroups are analysed independently (Table 3).

Finally, Figure 2 shows variations in the DRG, the average length of a hospital stay and the NP in the different subgroups (HP-DRG, remaining-DRG, UA and EA) according to the different 5-year groupings. The increased complexity of cases in the UA patient subgroups was practically constant in this study.

TABLE 1. Definition, relative weight, cost, number of patients and percentage in relation to the different aspects of the 25 high prevalence DRG

GRD	Definition	Weight	Cost (euros)	Number of patients	% del total	Cumulative % of total	% of total UA	Cumulative % of total UA	% of total EA	Cumulative % of total EA
541	Respiratory disorders except infections, bronchitis, asthma with increased CC	1.2744	3801.67	80230	3.99	3.99	5.99	5.99	0.60	0.60
127	Heart failure and shock	1.1846	3525.52	53857	2.68	6.67	4.07	10.06	0.32	0.92
39	Crystalline lens procedures, involving a vitrectomy or not	0.3390	1008.94	41616	2.42	9.09	0.12	10.18	5.47	6.39
88	Chronic obstructive pulmonary disease	0.9205	2739.50	38383	1.91	11.00	2.89	13.07	0.24	6.63
14	Specific cerebrovascular disorders, except TIA/intracranial haemorrhaging	1.1243	3346.24	35557	1.77	12.77	2.73	15.80	0.15	6.78
162	Inguinal and femoral hernia procedures, age >17 no CC	0.5641	1678.90	31248	1.55	14.32	0.32	16.12	3.64	10.42
140	Chest angina	0.7671	2283.10	29361	1.46	15.78	2.24	18.36	0.14	10.56
818	Hip replacement not caused by CC	2.0662	6149.36	26635	1.33	17.11	0.93	19.29	2.03	12.59
359	Procedures involving the uterus and surrounding area because of carcinoma in situ and benign procedures, no CC	1.0198	3035.14	26127	1.30	18.41	0.14	19.44	3.27	15.86
209	Upper joint and lower leg reimplantation excluding the hip, no CC	2.0289	6038.22	25728	1.28	19.69	0.03	19.47	3.47	19.33
15	Transient ischaemic attack and occlusion of the precebral arteries	0.7613	2265.98	23444	1.17	20.86	1.71	21.18	0.26	19.59
544	Congestive heart failure and cardiac arrhythmia with increased CC	1.8504	5507.15	22331	1.11	21.97	1.67	22.85	0.17	19.76
410	Chemotherapy	1.0283	3060.46	22063	1.10	23.07	0.35	23.20	2.39	22.15
89	Simple pneumonia and pleurisy, age>17 with CC	1.1151	3318.70	20202	1.00	24.07	1.53	24.73	0.08	22.23
122	Circulatory disorders with AMI without increased CC, discharged alive	1.3175	3921.21	19168	0.95	25.02	1.44	26.17	0.12	22.35
82	Respiratory neoplasms	1.2601	3750.36	18269	0.91	25.93	1.05	27.22	0.66	23.01
112	Percutaneous cardiovascular procedures	1.4300	4255.92	18144	0.90	26.83	0.69	27.91	1.27	24.28
175	Gastrointestinal haemorrhaging, no CC	0.6094	1859.92	17860	0.89	27.72	1.38	29.29	0.05	24.33
125	Circulatory disorders except AMI with catheterism and no complex diagnosis	0.8816	2623.90	17688	0.88	28.60	0.45	29.74	1.62	25.95
143	Chest pain	0.6249	1859.92	17388	0.86	29.46	1.34	31.08	0.12	26.07
211	Hip and femur procedures excluding upper joints, age >17, no CC	1.6977	5052.64	17316	0.86	30.32	1.31	32.39	0.12	26.19
311	Transurethral procedures	0.6447	1918.70	16841	0.84	31.16	0.13	32.52	2.07	28.26
139	Cardiac arrhythmias and conduction disorders, no CC	0.5490	1643.03	16007	0.80	31.96	1.03	33.55	0.40	28.66
208	Bile duct disorders, no CC	0.8099	2410.59	15619	0.78	32.74	0.98	34.53	0.43	29.09
494	Laparoscopic cholecystectomy, no exploration of the bile duct, no CC	1.0567	3145.11	15578	0.77	33.51	0.18	34.71	1.81	30.89

CC=complications and comorbidities, TIA=transient ischaemic attack, AMI=acute myocardial infarction.



TABLE 2. Characteristics of hospitalisation cases and a comparison of high prevalence DRG (HP-DRG) and the rest of the DRG (remaining-DRG)

Variables	All patients (n = 2,010,177)	HP-DRG (n = 673,715)	Remaining-DRG (n = 1,336,462)	p
Sex M/F (%)	53.4 / 46.6	55.3 / 44.7	52.4 / 47.6	<0.0001
Age in years (SD)	68.7 (12.05)	70.9 (11.4)	67.5 (12.2)	<0.0001
Weight of DRG (SD)	1.23 (1.06)	1.08 (0.45)	1.30 (1.25)	<0.0001
Duration of stay in days (CI 95%)	9.07 (9.02-9.12)	7.71 (7.67-7.77)	9.76 (9.71-9.81)	<0.0001
NSD	4.07 (2.37)	4.11 (2.32)	4.05 (2.39)	<0.01
NP	2.11 (1.77)	2.06 (1.66)	2.14 (1.82)	<0.01
Mortality (%)	6.2	5.0	6.9	<0.0001

M: Male; F: Female; CD: Standard deviation; NSD: Number of secondary diagnoses; NP: Number of procedures.

DISCUSSION

Concentrating production lines improves the organisation of a business, reduces the need for resources and facilitates economic management. In order to do this, understanding the differences and the characteristics of hospital output, in relation to each grouping, contributes to an improvement in quality, effectiveness and system efficiency given that, in the case of the public health system, the level of service should satisfy the level of patient demand, especially in emergency access. According to our results, 33.5% of national health system hospital production was concentrated in the 25 HP-DRG during the year the study was carried out which highlights the importance of these groups.

Despite the fact that we had already begun to observe a growing proportion of elderly patients seen in Spanish emergency departments and admitted for treatment via this rou-

te^{5,19,20}, the findings of this study confirm the preference for obtaining access via the emergency department (63.3%) compared to elective admission (36.7%), especially in this age bracket and among men. The main characteristics of UA patients are: elderly, predominantly male, admitted for more serious and complex procedures which double the duration of their hospital stay (direct cost) compared to EA patients. When we compare subsets of age brackets we notice that the distribution of cases shows a progressive use of the emergency department, both for HP-DRG and the remaining DRG by patients and this is directly linked to age. At the same time elective admission also decreased. We have also seen that emergency admission, has more serious, clinical and economical implications as the age of the patient increases, reaching its peak between 70 and 80 years old.

Of particular relevance is the fact the HP-DRG contain 20 elements with specific urgent criteria and 16 exclusively use

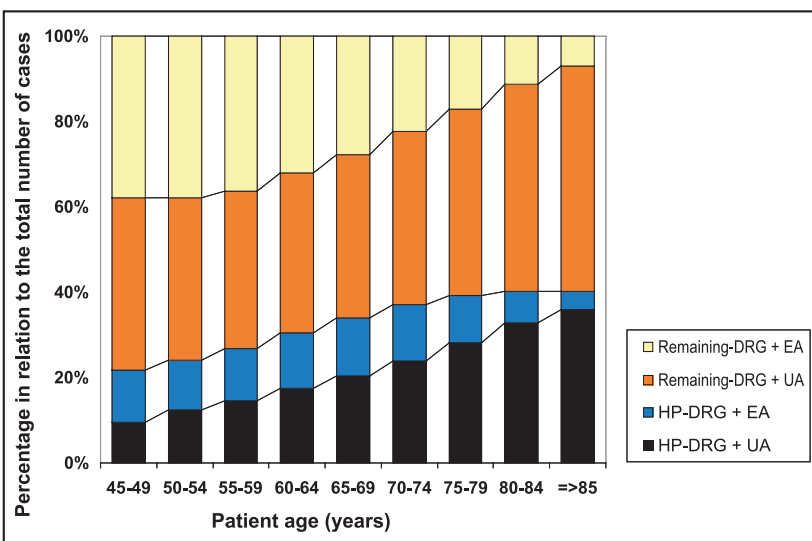


Figure 1. The distribution of cases according to the DRG prevalence of DRG, type of admission and age group.

TABLE 3. Characteristics associated with each type of admission

	Urgent admission	Elective admission	P
All DRG	1,261,927 (63.3%)	731,460 (36.7%)	
Age	70.9 (12.1)	64.9 (11.0)	<.0001
Sex	54.6% M / 45.4% F	51.4% M / 48.6% F	<.0001
Relative weight	1.2545 (1.0566)	1.1972 (1.0643)	<.0001
Average stay	10.59	6.60	<.0001
Number of secondary diagnoses	4.67 (2.36)	3.08 (2.02)	<.0001
Number of procedures	2.26 (1.94)	1.86 (1.41)	<.0001
High prevalence DRG	438,808 (66.0%)	226,013 (33.9%)	
Age	73.0 (11.1)	66.9 (10.8)	<.0001
Sex	58.3% M / 41.7% F	49.9% M / 50.1% F	<.0001
Relative weight	1.1193 (0.3582)	1.0214 (0.5692)	<.0001
Average stay	9.2	5.1	<.0001
Number of secondary diagnoses	4.82 (2.24)	2.82 (1.85)	<.0001
Number of procedures	2.18 (1.85)	1.82 (1.22)	<.0001
Remaining-DRG	823,119 (61.9%)	505,447 (38.1%)	
Age	69.8 (12.4)	64.0 (10.9)	<.0001
Sex	52.6% M / 47.3% F	52.0% M / 47.9% F	<.0001
Relative weight	1.3266 (1.2760)	1.2758 (1.2142)	<.0001
Average stay	11.3	7.2	<.0001
Number of secondary diagnoses	4.59 (2.42)	3.19 (2.08)	<.0001
Number of procedures	2.31 (1.99)	1.88 (1.49)	<.0001

the emergency route to gain access to treatment, thereby consolidating on figure of 32.3% of patients who gain access via

the emergency department and belong to the five highest diagnostic categories (HDC) which include circulatory (8 DRG)

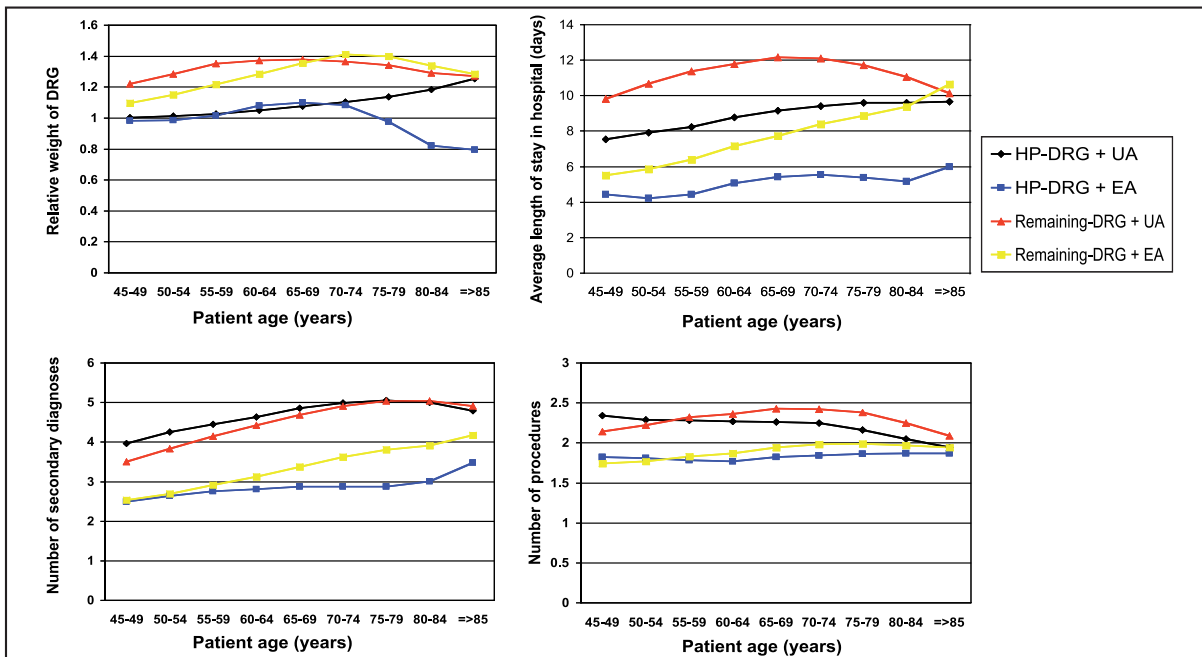


Figure 2. Changes in the relative DRG weight, hospital stay duration, number of secondary diagnoses and the number of procedures in relation to the age of the patients in each of the four defined subgroups (HP-DRG + UA: high prevalence DRG and urgent admission, HP-DRG + EA: high prevalence DRG and elective admission, remaining-DRG + UA: the rest of the DRG and urgent admission, remaining-DRG + EA: the rest of the DRG and elective admission).



and respiratory (4 DRG) which contribute to 9.64% and 12.93% of urgent admissions, respectively.

These data highlight the need for HP-DRG to give more importance to an in-depth understanding of these conditions, the way they are managed in the emergency department and possible alternatives which are equally as effective but more efficient, than resources currently used, particularly in patients with a higher average age. Priority should be given to introducing strategic management measures that focus on older patients in particular (such as authorisation, short stay units, observation and interdisciplinary publications) in emergency hospitals. If the whole MBDS were taken into consideration, some of the 14 HDC would occupy the top positions among HP-DRG (pregnancy, birth and puerperium) which are almost exclusively use emergency admission.

Therefore, despite the particular problems related to these conditions²³⁻²⁵, model introduced for DRG (127) and heart failure (544) in some emergency departments, representing 3.79% of the prevalent case mix and 5.74% of urgent cases is encouraging. Indeed, according to our results, hospital admission have reduced up to 49%, with higher patient satisfaction levels and lower mortality rates^{7,21,22}. Thanks to similar strategies and programmes, there has also been a drop in different management approaches for chronically ill patients who make to more frequent visits to hospital and even admission via the emergency department route²⁶.

Economic evaluation of emergency departments shows that its resources have high direct costs, especially with regard to personnel and additional testing. Huge demands and have inability to improve on their strengths or create new opportunities have led, many hospitals in the United States to close in the last ten years²⁷⁻³¹. The fact that the marginal cost of a non urgent visit was thought to be lower than that of a genuine emergency visit has mistakenly converted emergency departments over the last decade into economies of scale³²⁻³³. Moreover, recent studies have rejected these calculated costs³⁴⁻³⁶.

We have presented the possible strategies which emergency departments and their staff may consider from a clinical and economic management point of view, taking into account the important role played by the demographic factor of an ageing population²⁸⁻³². One author in particular maintains that procedures involving patients admitted via the emergency and not elective route are more profitable³⁷. Therefore, programmes and strategies which lead to a better understanding of the characteristics of management are being established. Moreover, effective, efficient, high quality alternatives are also being sought. Although the results of this study are generic and refer to a group of Spanish hospitals, each hospital should evaluate and get to know their own case mix and socio-demographic characteristics in order to provide balanced and effective and efficient services.

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