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Appropriateness of Hospital Admissions to a Pulmonology Department

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OBJECTIVES: To analyze the rate of inappropriate admissions to a pulmonology department over the period of a year and to establish the reasons for such admission and predictors.

PATIENTS AND METHODS: All 2004 admissions to the pulmonology department of the Hospital de Valme were analyzed using a version of the Appropriateness Evaluation Protocol (AEP) developed for concurrent review. Two physicians who were not directly involved in admitting the patients performed the review. A logistic regression analysis was performed in order to identify the independent predictors of inappropriate hospital admission.

RESULTS: Of the 633 admissions analyzed, 92.1% (n=583) were appropriate and 7.9% (n=50) were inappropriate. The main reason for considering an admission to be inappropriate was that the patients in question could have been managed as outpatients (70%), whereas appropriate admissions were most frequently justified by the need for parenteral treatment (76.3%) or respiratory therapy (62%). In the logistic regression analysis, the variables that were independently associated with inappropriate admission were nonurgent admission (odds ratio, 2.82; 95% confidence interval, 1.28-6.21; *P*=.01), and a neoplasia diagnosis as the reason for admission (odds ratio, 8.57; 95% confidence interval, 2.69-27.24; *P*<.0005).

CONCLUSIONS: The rate of inappropriate hospital admissions was lower than that reported in other studies. Most inappropriate admissions were of patients who could have been managed as outpatients. An admission diagnosis of neoplasm and nonurgent admission were independent predictors of inappropriateness.

Key words: *Appropriateness. Hospital admissions. Appropriateness evaluation protocol.*

Adecuación de los ingresos hospitalarios en un servicio de neumología

OBJETIVOS: Analizar la tasa de inadecuación de ingresos en un servicio de neumología a lo largo de un año y conocer las causas que motivan dicha inadecuación, así como las variables predictoras de ésta.

PACIENTES Y MÉTODOS: Se analizaron todos los ingresos del Servicio de Neumología del Hospital de Valme durante 2004 aplicando una versión concurrente del Appropriateness Evaluation Protocol (AEP). Realizaron la evaluación 2 facultativos no implicados en el ingreso de los pacientes. Se efectuó un análisis de regresión logística para determinar las variables que predecían la inadecuación de forma independiente.

RESULTADOS: Se analizaron 633 ingresos, de los que el 92,1% (n = 583) fueron adecuados y el 7,9% (n = 50) inadecuados. La causa principal de inadecuación fue el ingreso de pacientes que podrían haber sido manejados ambulatoriamente (70%), mientras que los criterios que con más frecuencia justificaron la adecuación del ingreso fueron la necesidad de tratamiento parenteral (76,3%) y las terapias respiratorias (62%). Las variables que se relacionaron de forma independiente con la inadecuación en la regresión logística fueron el ingreso no urgente (odds ratio = 2,82; intervalo de confianza del 95%, 1,28-6,21; p = 0,01) y el diagnóstico de neoplasia como motivo de ingreso (odds ratio = 8,57; intervalo de confianza del 95%, 2,69-27,24; p < 0,0005).

CONCLUSIONES: La tasa de inadecuación de ingresos fue baja en comparación con otros estudios y se debió sobre todo al ingreso de pacientes que podían haber sido manejados ambulatoriamente. La neoplasia como diagnóstico de ingreso y los ingresos no urgentes fueron predictores independientes de inadecuación.

Palabras clave: *Adecuación. Ingresos hospitalarios. Appropriateness Evaluation Protocol.*

Introduction

There is widespread agreement that hospital resources are not always used appropriately, whether because patients do not significantly benefit from hospital services or because these services could well be provided at a lower care level. Inappropriate use of hospitals increases health care costs, and this fact combined with restricted financial resources has stimulated an interest in identifying hospital resources

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TABLE 1
Appropriate and Inappropriate Admission Criteria*

	No.	%
Reasons for appropriate admissions	583	92.1
Patient criteria		
1. Sudden loss of consciousness, disorientation, acute confusional state	18	3.0
2. Heart rate >140 beats/min or <50 beats/min	12	2.0
3. Systolic BP>200 mm Hg or <90 mm Hg/Diastolic BP>120 mm Hg or <60 mm Hg	14	2.4
4. Sudden loss of vision or hearing	–	–
5. Sudden paralysis in any body part	–	–
6. Temperature >38°C for >5 days	21	3.6
7. Active bleeding	12	2.0
8. Severe acid-base or electrolyte imbalance†	241	38.0
9. Electrocardiographic evidence of acute ischemia	2	0.3
10. Wound dehiscence or evisceration	–	–
Medical care intensity criteria		
11. Intravenous medication/fluid replacement	483	76.3
12. Surgery or special technique within 24 h requiring local/general anesthetic and hospital equipment/facilities	32	5.4
13. Monitoring of vital signs at least every 2 h	49	7.7
14. Chemotherapy requiring continuous observation for toxic reaction	–	–
15. Intramuscular antibiotherapy at least 3 times daily	–	–
16. Respiratory therapies (continuous or intermittent) at least every 8 h	393	62.0
Reasons for inappropriate admissions	50	7.9
a) Diagnostic tests/treatment could be performed in outpatient setting	35	70
b) Admission necessary but at a lower care level than acute care (chronic care hospital, convalescence centre, etc)	6	12
c) Premature admission 1 or more days prior to testing	6	12
d) No documented diagnostic or treatment plan	3	6

*BP indicates blood pressure.
†Na<123 or >156 mEq/L; K<2.5 or >6 mEq/L; pH<7.30 or >7.45; HCO_2<20 or >36 mEq/L.

that could be more optimally used so as to ensure, in turn, more efficient management.[1-4] Inappropriate hospitalizations also have a negative impact on patients, in terms of the inconvenience of a stay in hospital and the social and family adjustments required, as also in terms of iatrogenic risk.

The drive for efficiency has led to the implementation of studies that analyze the appropriateness of both hospital admissions and stays, as also to the development of a range of methods for measuring admission appropriateness.[5-18] It has been demonstrated that studies of inappropriate admissions and their causes, and subsequent feedback to health care staff, reduce inappropriate admission rates, improve the quality of care offered to patients, and lead to better management of available resources.[8,19,20]

Of the instruments designed to evaluate the appropriateness of hospital admissions, the best known and most widely used is the Appropriateness Evaluation Protocol (AEP), developed at the end of the 1970s by Gertman and Restuccia.[21] This protocol, which was revised in the 1980s, has been validated in a large number of studies, including some performed in Spain.[22] Given that the AEP has been demonstrated to have good sensitivity, specificity, and reproducibility, it can be considered to be a reliable tool for evaluating the appropriateness of hospital admissions.

Almost all the studies published in Spain that have used the AEP refer to internal medicine departments,[4,6,10-12,14,16] with few making specific mention of pulmonology departments.[15,23] The aims of this study, therefore, were to analyze the rate and causes of inappropriate pulmonology admissions to an acute care hospital over the period of a year and to determine predictors of inappropriate admission.

Patients and Methods

Study Population

The Hospital de Valme of Seville, Spain, is an acute care hospital attached to the public health service of Andalusia. With a reference population of 360 000 inhabitants, its capacity is 513 hospital beds, 23 of which are allocated to the hospital's pulmonology department. Our study, which was approved by the Hospital de Valme ethics committee, included all patients admitted by the pulmonology department between January 1 and December 31, 2004.

Evaluation Procedure

Two researchers evaluated the appropriateness of admissions by jointly reviewing the medical records of hospitalized patients using a version of the AEP developed for concurrent review. Both these researchers had been trained to use the AEP and neither had been involved in the admissions procedure for the patients included in the study. Two other expert researchers–one from the quality and clinical documentation department and the other from the research and training unit of the Hospital de Valme–resolved cases for which there was disagreement and identified the reasons for inappropriate admissions. Admission was considered appropriate if on the day of admission at least 1 of the 16 specific AEP appropriateness criteria was met (Table 1). Analyzed in order to determine the appropriateness of admission were patient medical records, which included admission and follow-up reports, nursing reports, treatment records, and test results. If no AEP criterion was satisfied, the admission was considered inappropriate and the reason was recorded. No extraordinary criteria were considered in this study.

Measurements

Apart from an evaluation of compliance with the AEP, the following variables were extracted from patient medical records: age; sex; main diagnosis that led to the admission according to the International Classification of Diseases, Ninth Revision, Clinical Modification; day of the week admitted; season of the year admitted; source of the order for admission; admitting physician; length of hospital stay; and finally, rehospitalization (at least 2 admissions in the previous 12 months, or 3 in the previous 5 years). In all cases, the medical record was the sole source of information for these variables.

Hypoxemia-Hypercapnia Criteria

Although our study did not include extraordinary criteria, we were of the opinion that it was potentially interesting to evaluate a criterion not included in the AEP. A patient was considered to satisfy the hypoxemia-hypercapnia criterion if, on the day of admission, he or she presented with a PaO_2 of less than 60 mm Hg and/or a $PaCO_2$ of greater than 50 mm Hg, irrespective of pH and bicarbonate values. This analysis was performed separately from the AEP analysis and was not taken into account in deciding whether or not an admission was appropriate.

Statistical Analysis

Version 13.0 of the SPSS statistical package was used to process the data and to perform the statistical analysis. The results were expressed either as percentages or means (SD), depending on whether the data were qualitative or quantitative. Means were compared using the Student *t* test if data distribution was normal; otherwise the nonparametric Mann-Whitney test was used. For the comparison of the qualitative variables the χ^2 test with the Yates correction was used and, when necessary, the 2-tailed Fisher exact test. A value of $P<.05$ was considered significant.

A univariate analysis was first performed to establish the relationship between the dependent variable–inappropriate admission–and each of the following independent variables: sex; age (older or younger than 65 years); day of the week admitted (working day or nonworking day); season of the year admitted (spring-summer or autumn-winter); admission source (emergency or nonemergency department); admitting physician (pulmonologist or emergency department); hospitalization for more/fewer than 12 days (mean of the series); rehospitalization; and main diagnosis. The variables that were statistically significant ($P\leq.10$) were included in a stepwise feedforward multivariate logistic regression analysis, with the aim being to establish whether any of these variables were independently associated with admission inappropriateness.

Results

Series Characteristics

A total of 633 patients were admitted by the pulmonology department in 2004. Mean stay by discharge was 12.1 (9.5) days, mean age of the patients was 63.3 (15.6) years, and men represented 71.7% of the total. The general characteristics of the series are summarized in Table 2.

Admission Appropriateness

A total of 583 admissions (92.1% of the series) were rated as appropriate, whereas 50 admissions (7.9%) were rated as inappropriate. A mean of 2.1 (0.8) appropriateness criteria were satisfied by the patients, with 78.7% of cases rated as having 2 or more reasons for admission. Appropriate circumstances that most frequently justified admission were a need for parenteral treatment (76.3%), a need for respiratory therapies (62%), and acid-base imbalances (38%) (Table 1).

As for the reasons for inappropriate admission, the most important was that diagnostic and/or therapeutic measures could have been implemented in an outpatient setting (35 cases, 70%). Less important reasons for inappropriate admission were the need for admission but at a lower care level (6 cases), premature admission 1 or more days prior to testing (6 cases), and the absence of a treatment plan (3 cases) (Table 1).

Hypoxemia-Hypercapnia Criteria

On the day of admission, a total of 273 patients (43.1%) presented with a PaO_2 value of less than 60 mm Hg and/or a $PaCO_2$ value of greater than 50 mm Hg. The vast majority of these cases (266/273) fulfilled AEP admission criteria; only 7 were inappropriate admissions according to the AEP. Had the arterial gas pressure relationship been included as an extraordinary criterion the inappropriate admissions rate would have been lower, although to a nonsignificant degree (50/633 compared to 43/633 cases; odds ratio [OR], 0.85; 95% confidence interval [CI], 0.54-1.32; $P=.51$).

Univariate and Multivariate Analyses

The results of the univariate analysis are shown in Table 3. Appropriateness of admission was independent

TABLE 2
General Characteristics for the Series of 633 Admissions*

Mean age, y	63.6 (15.6)
Males	454 (71.7%)
Mean stay, d	12.1 (9.50)
Nonworking day admissions	144 (22.7%)
Admission season	
Spring-summer	269 (42.5%)
Autumn-winter	364 (57.5%)
Urgent admissions	580 (91.6%)
Pulmonologist admissions	430 (67.9%)
Rehospitalizations	133 (21.1%)
Admission diagnosis (ICD-9-CM)	
COPD	135 (21.3%)
Pneumonia	135 (21.3%)
Neoplasm	67 (10.5%)
ECRF unrelated to COPD	63 (9.9%)
Pleural effusion	45 (7.1%)
Asthma	32 (5.0%)
Pneumothorax	25 (3.9%)
Bronchiectasis	24 (3.7%)
Other	107 (16.9%)

*Age and length of hospital stay are expressed as mean (SD); other data are expressed as number of patients (percentage). ICD-9-CM indicates International Classification of Diseases, Ninth Revision, Clinical Modification; COPD, chronic obstructive pulmonary disease; ECRF, exacerbated chronic respiratory failure.

TABLE 3
Univariate Analysis*

Variables	Appropriate Admission	Inappropriate Admission	*P*	OR (95% CI)
Age				
>65 years	353/379 (93.1%)	26/379 (6.9%)	.30	0.71 (0.38-1.32)
<65 years	230/254 (90.5%)	24/254 (9.5%)		
Sex				
Male	416/454 (91.6%)	38/454 (8.3%)	.59	0.79 (0.38-1.62)
Female	167/179 (93.2%)	12/179 (6.8%)		
Admission day				
Nonworking day	132/144 (91.6%)	12/144 (8.4%)	.96	0.93 (0.45-1.95)
Working day	451/489 (92.2%)	38/489 (7.8%)		
Admission season				
Autumn-winter	330/364 (90.6%)	34/364 (9.4%)	.15	1.63 (0.84-3.18)
Spring-summer	253/269 (94.0%)	16/269 (6.0%)		
Admission source				
Emergency	541/580 (93.2%)	39/580 (6.8%)	.0007	0.28 (0.12-0.62)
Scheduled	42/53 (79.2%)	11/53 (20.8%)		
Admitting physician				
Pulmonologist	400/430 (93.0%)	30/430 (7.0%)	.27	1.46 (0.77-2.75)
Nonpulmonologist	183/203 (90.1%)	20/203 (9.9%)		
Length of hospital stay				
>12 days	203/222 (91.4%)	19/222 (8.6%)	.76	1.15 (0.60-2.17)
<12 days	380/411 (92.4%)	31/411 (7.6%)		
Rehospitalization				
Yes	122/133 (91.7%)	11/133 (8.3%)	.97	0.95 (0.45-2.04)
No	457/496 (92.1%)	39/496 (7.9%)		
Admission diagnosis				
COPD	131/135 (97.0%)	4/135 (3.0%)	<.0005	
Pneumonia	131/135 (97.0%)	4/135 (3.0%)		
Neoplasm	52/67 (77.5%)	15/67 (22.5%)		
ECRF unrelated to COPD	55/63 (87.3%)	8/63 (12.7%)		
Pleural effusion	40/45 (88.8%)	5/45 (11.2%)		
Other	174/188 (92.5%)	14/188 (7.5%)		

*COPD indicates chronic obstructive pulmonary disease; CI, confidence interval; ECRF, exacerbated chronic respiratory failure; OR, odds ratio.

of sex, age, admitting physician, the season of the year, the day of the week, and the fact that the patient had been previously hospitalized. A higher rate of inappropriateness was observed in relation to admission diagnosis (*P*<.0005) and the source of the admission (*P*=.0007). A logistic regression analysis (Table 4) revealed nonurgent admission (OR, 2.82; 95% CI, 1.28-6.21; *P*=.01) and a neoplasm diagnosis (OR, 8.57; 95% CI, 2.69-27.24; *P*<.0005) to be independently associated with inappropriate admission.

Discussion

Our study revealed a rate of inappropriate admissions of 7.9% for our department during 2004; this rate was lower than others in the literature. Inappropriate admissions were generally motivated by hospitalization for diagnostic procedures that could have been implemented in an outpatient setting. The variables that were independently associated with inappropriate admission were neoplasm as an admission diagnosis, and admissions ordered by nonemergency departments.

This study analyzed the appropriateness of hospital admissions to the pulmonology department of an acute-care hospital. A full year of admissions was evaluated in order to avoid any possible seasonal bias and to use the largest population possible for the statistical calculations (that is, to analyze all admissions rather than a representative sample). A concurrent version of the AEP which had been validated in other studies[11] was used; it had the advantages of facilitating data collection during the admissions procedure, minimizing data loss due to a lack of medical records, and requiring little time to implement. It should be pointed out that any inherent bias that may exist in the AEP will be common to all studies based on this protocol. For example, the fact that the AEP is rather old, or that it does not provide for an analysis of whether measures justifying admission (such as intravenous medication, oxygen therapy, etc) are genuinely indicated, may lead to an underestimation of the inappropriate admissions rate.

TABLE 4
Logistic Regression Analysis: Final Model*

Variables	OR	95% CI	*P*
Nonurgent admission	2.82	1.28-6.21	.01
Admission diagnosis			
Pneumonia	1		
COPD	0.97	0.23-3.99	.97
ECRF unrelated to COPD	3.52	0.95-14.13	.08
Neoplasm	8.57	2.69-27.24	<.0005
Pleural effusion	3.23	0.97-12.96	.07
Other diagnoses	2.63	0.84-8.20	.09

*COPD indicates chronic obstructive pulmonary disease; CI, confidence interval; ECRF, exacerbated chronic respiratory failure; OR, odds ratio.

A comparison of our results with those of other studies is difficult, as there are hardly any studies in the Spanish literature that refer specifically to pulmonology patients. Bañeres et al,[15] who compared patients with chronic obstructive pulmonary disease (COPD) to patients with neoplasms over the period of a year, observed rates of inappropriateness of 4.8% and 14%, respectively. In both cases, the underlying motivation for inappropriate admissions was to speed up diagnosis or treatment procedures that could well have been implemented in an outpatient setting. On comparing our study with that of Bañeres et al, we observed a similar inappropriate admission rate for patients with COPD (3%), but a higher rate for patients with neoplasms (22.5%). That said, it should be pointed out that we included no extraordinary criteria, whereas 27% of appropriate neoplasm admissions in the study by Bañeres et al were based on such additional criteria. A further difference between the 2 studies was that Bañeres et al used a modified version of the AEP that included PaO_2 and $PaCO_2$ measured on admission as appropriateness criteria. In their study, Antolín García et al[23] found that 14.5% of 103 pulmonology admissions were inappropriate. The main reason for inappropriate admission was that the patients could have been treated as outpatients. Neoplasms once again represented the highest level of inappropriateness (30.8%), and there were no inappropriate COPD admissions. Other studies have reported results for specific illnesses; Gotor Lázaro and colleagues, for example, found inappropriate admission rates of 54% and 0%, respectively, for a series of 63 community-acquired pneumonia admissions,[17] and for 54 COPD admissions.[18]

Other published data for Spain, which generally refer to internal medicine departments, report inappropriate admission rates ranging between 17% (Matorras Galán et al[10]) and 8.5% (San Román Terán et al[16]). Our particular study, therefore, reports a lower level of inappropriate admissions, although the differences between our study and the others mentioned should be borne in mind. Villalta et al[5] reported the lowest rate of inappropriate admissions, at less than 1% of 352 patients with diagnoses of COPD, pneumonia, and cardiac failure. However, admissions were to a short-stay unit, which has characteristics that are different from those of a conventional hospital ward. That said, the first 2 diseases mentioned (COPD and pneumonia) also had the lowest rates of inappropriate admission in our series–3% for each disease, far lower than the rate for the series as a whole.

In our study, the main category of inappropriate admission was of patients who could have been treated as outpatients, and, in general, the reason for admission was a desire to speed up diagnostic test procedures (35/50). Our study findings in this respect are thus consistent with those of a number of other studies.[7,9,11,12,14-16] The large percentage (70%) of inappropriate admissions of patients who could have been managed as outpatients would alone justify special attention being paid to improving both internal departmental organization and coordination between levels and specialties, as a way of reducing the number of inappropriate admissions. The distribution of the remaining 30% of cases would indicate a need for care provision for chronic patients at lower levels and for physicians to exercise greater care in avoiding premature admissions.

The 2 variables in our study that were independently associated with inappropriate admission were a neoplasm diagnosis as the main reason for admission, and nonurgent (scheduled) admission. The association of a neoplasm diagnosis with inappropriate admission is consistent with the fact that testing could have been performed in an outpatient setting; in our study, this was the reason for 15 inappropriate neoplasm admissions (of a total of 67 patients with neoplasms). Inappropriate admissions in our series were largely due to the physician's desire to speed up the diagnostic procedures for a probable neoplasm (tests might be delayed if requested via an outpatient unit). The other predictive variable was nonurgent admission, that is, admissions scheduled by outpatient clinics. This variable has also been found to be predictive of inappropriate admission in other studies[9,12] and has been interpreted as the admission of patients in order to speed up diagnosis of certain diseases. However, our findings do not lead to the same conclusion. Of the 11 inappropriate admissions detected among the 53 nonurgent admissions in our study, only 2 cases were attributable to tests that could have been performed in an outpatient setting; of the remaining 9 cases, 4 were inappropriately admitted due to the fact that there was no lower level centre available for admission, and 5 were premature admissions or admissions due to the lack of a treatment plan.

In this study we also evaluated the appropriateness of hypoxemia and/or hypercapnia independent of pH and bicarbonate as criteria for admission. Physicians habitually use these parameters to assess the need for admission, and one group included them among the admission criteria in their modified version of the AEP.[15] In that study, it was observed that 43.1% of admissions satisfied the arterial gas criteria–a fact which would have converted blood gas abnormalities into the third most frequent reason for admission. However, almost all the cases in that study also presented with a standard AEP criterion that justified admission (266/273); the most frequent of these were a need for parenteral treatment (238 cases), a need for respiratory therapies (163 cases), and acid-base imbalances (156 cases). Only 7 of the 273 admissions in that study were inappropriate according to the AEP. Given that the application of these extraordinary criteria would not have reduced the inappropriate admissions rate to any significant degree, we are of the opinion that there are no well-grounded arguments for their inclusion as criteria for pulmonology patient admissions in a modified version of the AEP.

In conclusion, despite the fact that our study reports a lower rate of inappropriate admissions than other studies, we consider that there is still room for improvement, firstly, by reducing diagnostic test

waiting lists for patients suspected of having pulmonary neoplasms (thus avoiding unnecessary admissions), and secondly, by paying particular attention to nonurgent cases. As far as such cases are concerned, physicians need to be encouraged to avoid premature admissions, and the health care system should provide for admissions to lower level hospitals.

REFERENCES

1. Peiró Moreno S, Portella E. Identificación del uso inapropiado de la hospitalización: la búsqueda de la eficiencia. Med Clin (Barc). 1994;103:65-71.
2. Lorenzo S. Métodos de revisión de utilización de recursos: limitaciones. Med Clin (Barc). 1996;107:22-5.
3. Ollero M. Adecuación y utilidad del ingreso hospitalario. Med Clin (Barc). 2001;116:655-7.
4. Lorenzo S, Sunol R. An overview of Spanish studies on appropriateness of hospital use. Int J Qual Health Care. 1995;7: 213-8.
5. Villalta J, Siso A, Cereijo AC, Sequeira E, de la Sierra A. Adecuación de la hospitalización en una unidad de estancia corta de un hospital universitario. Un estudio controlado. Med Clin (Barc). 2004;122:454-6.
6. Rodríguez-Vera FJ, Marín Fernández Y, Sánchez A, Borrachero C, Pujol de la Llave E. Adecuación de los ingresos y estancias en un Servicio de Medicina Interna de un hospital de segundo nivel utilizando la versión concurrente del AEP. An Med Interna. 2003; 20:297-300.
7. Ochoa-Gómez J, Villar Arias A, Ramalle-Gomara E, Carpintero Escudero JM, Bragado Blas L, Ruiz Aspiazu JI. Adecuación de los ingresos hospitalarios urgentes. An Med Intern. 2002;19:446-8.
8. Navarro G, Prat-Marín A, Asenjo M, Menacho A, Trilla A, Salleras L. Review of the utilization of a university hospital in Barcelona (Spain): evolution 1992-1996. Eur J Epidemiol. 2001; 17:679-84.
9. Perneger TV, Chopard P, Sarasin P, Gaspoz JM, Lovis C, Unger PF, et al. Risk factors for a medically inappropriate admission to a department of internal medicine. Arch Intern Med. 1997;157: 1495-500.
10. Matorras Galán P, de Pablo Casas M, Otero García L, Alonso López F, Daroca Pérez R, Díaz-Caneja Rodríguez N. Adecuación de los ingresos en un servicio de medicina interna de un hospital de tercer nivel. Med Clin (Barc). 1990;94:290-3.
11. Rodríguez-Vera FJ, Alcoucer Díaz MR, Rodríguez Gómez FJ, Camacho Martínez T, Colchero Fernández J, Pujol de la Llave E. Adecuación de los ingresos en un servicio de medicina interna de un hospital de segundo nivel. An Med Interna. 1999;16:277-80.
12. Zambrana García JL, Delgado Fernández M, Cruz Caparrós G, Díez García F, Martín Escalante MD, Salas Coronas J. Factores asociados a ingresos inadecuados en un servicio de medicina interna. Med Clin (Barc) 2001;116:652-654.
13. Zambrana García JL, Delgado Fernández M, Cruz Caparrós G, Martín Escalante MD, Díez García F, Ruiz Bailén M. Factores predictivos de estancias no adecuadas en un servicio de medicina interna. Med Clin (Barc). 2001;117:90-2.
14. Mirón Canelo JA, Orosco Pedemonte JA, Alonso Sardón M, Sáenz González MC. Estimación de ingresos y estancias inadecuadas en un hospital comarcal. Rev Clin Esp. 2000;200: 654-8.
15. Bañeres J, Alonso J, Broquetas J, Antó JM. Ingresos hospitalarios inadecuados y días de estancia inactivos en pacientes con enfermedad pulmonar obstructiva crónica y neoplasia pulmonar. Med Clin (Barc). 1993;100:407-11.
16. San Román Terán C, Guil García M, Fernández Sepúlveda S, Lorca Gómez J. Ingresos y estancias inadecuadas en medicina interna. Med Clin (Barc). 2002;118:157.
17. Gotor Lázaro MA, Gordo Blanco I, Rodrigo Pérez MM, Batanero Hernán T, Suárez Beneitez M, Guerrero Navarro L. Estudio de adecuación de ingresos y días de estancia hospitalaria por neumonía adquirida en la comunidad en un hospital comarcal. Arch Bronconeumol. 2002;38 Supl 2:173.
18. Gotor Lázaro MA, Celorrio J, Vaqué P, Cabistani A, Velilla A. Adecuación de los ingresos y días de estancia de los pacientes con enfermedad pulmonar obstructiva crónica. Arch Bronconeumol. 2003;39 Supl 2:21.
19. Moya-Ruiz C, Peiro S, Meneu R. Effectiveness of feedback to physicians in reducing inappropriate use of hospitalisation: a study in a Spanish hospital. Int J Qual Health Care. 2002;14:305-12.
20. Kossovsky MP, Chopard P, Bolla F, Sarasin FP, Louis-Simonet M, Allaz AF, et al. Evaluation of quality improvement interventions to reduce inappropriate hospital use. Int J Qual Health Care. 2002;14:227-32.
21. Gertman PM, Restuccia JD. The appropriateness evaluation protocol: a technique for assessing unnecessary days of hospital care. Med Care. 1981;19:855-71.
22. Peiró S, Meneu R, Roselló ML, Portella E, Carbonell-Sanchis R, Fernández C, et al. Validez del protocolo de evaluación del uso inapropiado de la hospitalización. Med Clin (Barc). 1996;107: 124-9.
23. Antolín García MT, Izquierdo Patrón M, Ferreras de la Fuente AM. Gestión de la hospitalización en neumología mediante la aplicación de un protocolo de adecuación. Arch Bronconeumol. 2000;36:422-3.