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Hospitalizations Preventable by Timely and Effective Primary Health Care

J. Caminal Homar,[a] M. Morales Espinoza,[a] E. Sánchez Ruiz,[b] M.J. Cubells Larrosa[c] and M. Bustins Poblet[d]

Objective. To know the specific health problems referred as ambulatory care sensitive conditions (ACSC) and to identify the primordial interventions of primary health care (PHC) in reducing hospitalisations due to ACSC.
Design. Descriptive study of hospital discharges generated in Catalonia during 1998-1999, and a Delphi study to reach information about PHC primordial interventions.
Measures. Diagnostic codes of ACSC selected as markers of PHC effectiveness were used. We analysed hospital discharge distribution by age groups and overall, and hospitalisation rates with its 95% confidence intervals. Descriptive analysis of consensus reached by experts using self-administrated questionnaires was done.
Results. The 8.42% of total discharges were due to ACSC. The majority of these (86.9%) fell in 4 of the 13 diagnostic categories included in the ACSC list. A great variety of pathologies with different frequencies were identified.
Primary prevention and early diagnoses and treatment were considered as primordial interventions. Chronic health problems needed multimodal interventions.
Conclusions. Diagnostic codes included in each diagnostic category were congruent with the diseases identified. Interventions that could prevent hospitalisations due to ACSC are contemplated as role of PHC. Indicator validity to assess PHC effectiveness is maintained by both results.

Key words: Primary care. Hospitalisation. Ambulatory care sensitive conditions. Effectiveness.

HOSPITALIZACIONES PREVENIBLES MEDIANTE UNA ATENCIÓN PRIMARIA OPORTUNA Y EFECTIVA

Objetivo. Conocer los problemas de salud específicos a los que hacen referencia los *ambulatory care sensitive conditions* (ACSC) e identificar las intervenciones prioritarias de la atención primaria de salud (APS) que podrían reducir las hospitalizaciones por ACSC.
Diseño. Estudio descriptivo de las altas hospitalarias generadas por la población de Cataluña durante 1998-1999, y estudio Delphi para obtener la información sobre las intervenciones de la APS.
Mediciones principales. Se ha utilizado el listado de códigos de diagnóstico de ACSC considerados marcadores para evaluar la efectividad de la APS.
Análisis de la distribución de las altas por grupo de edad y total, y cálculo de las tasas de hospitalización y sus correspondientes intervalos de confianza del 95%.
Análisis descriptivo del consenso obtenido de un grupo de expertos mediante cuestionarios autoadministrados.
Resultados. El 8,42% del total de altas registradas se considera ACSC. De ellas, un 86,9% corresponde a 4 categorías diagnósticas de las 13 que conforman el listado de ACSC. Se identifica una gran variedad de patologías con frecuencias muy dispares.
La prevención primaria y el diagnóstico precoz y tratamiento constituyen las actividades prioritarias. La patología crónica requiere intervenciones multimodales.
Conclusiones. Los códigos de diagnóstico incluidos en cada categoría diagnóstica son coherentes con la patología que identifican. Las intervenciones que podrían prevenir las hospitalizaciones por ACSC se consideran hegemónicas de la APS. Estos resultados sustentan la validez del indicador para medir la efectividad de la APS.

Palabras clave: Atención primaria. Hospitalización. *Ambulatory care sensitive conditions*. Efectividad.

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A commentary follow this article (pág. 15)

[a]Universitat Autònoma de Barcelona, Spain.
[b]Agència d´Avaluació de Tecnologia i Recerca Mediques, Spain.
[c]ABS Sabadell-5 de l´Institut Català de la Salut, Spain.
[d]Servei Català de la Salut, Spain.

Correspondence:
Josefina Caminal Homar.
Universitat Autònoma de Barcelona.
Facultat de Medicina. Medicina Preventiva i Salut Pública.
Edifici M.
08193 Bellaterra. Cerdanyola del Vallès (Barcelona). España.

E-mail:
josefina.caminal@uab.es

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Introduction

The development of evaluation systems that facilitate monitoring and comparisons of primary health care (PHC) services at a reasonable cost should be one of the aims of all health systems. Thus far, most studies of the evaluation of PHC services have set out to validate this level of care as a key element in an effective, efficient health system,[1-4] and have been of great use in consolidating the health care reforms instituted in recent years.[5,6] However, most of these global evaluations do not always provide practical information regarding how to improve and increase the quality of available interventions and their capacity to deal appropriately and effectively with the patient´s problem. The complexity of the design of indicators for measuring multiple, diversified activities[7,8] and the lack of information from systematic studies of PHC systems that might be used to construct such indicators are two limitations that have curtailed the development of such evaluation systems thus far.

Despite these difficulties, recent studies have achieved progress in the design of indicators of the ability of PHC to deal with health problems by using secondary databases that make it possible to obtain precise information on the performance of this level of care. Hospitalizations for ambulatory-care-sensitive conditions (ACSC) are one such indicator. These conditions comprise a group of diagnostic codes for hospital discharges that have been proposed as an indirect indicator to measure the ability of PHC centers to deal effectively with the patient´s problem, and as a direct indicator of the volume of hospital activity potentially preventable by timely, effective care provided at the primary level.[9,10] Studies in the setting of the Spanish health care system have documented the usefulness of this indicator for evaluating certain elements of PHC.[11] For example, an association has been shown between reducing hospitalization rates and increased access to pediatric care,[12] and between the former and continuous care provided by reformed basic health areas.[13]

In approximately 15 years´ worth of ACSC studies, researchers have generated various lists of diagnostic codes for hospital discharges considered to arise from ACSC.[14] The differences between items in published lists, the amount of information in the indicator, and PHC physicians´ perceived lack of control over indicators constructed with hospital-based information,[15] make it necessary to revise the processes used to validate and disseminate these instruments.

The present study aims to contribute to the process of validation of the indicator designated *hospitalizations for ACSC* by fulfilling two objectives: *a)* describing which specific health problems are identified by different sets of diagnostic codes, and *b)* identifying PHC interventions that, on the basis of expert criteria, would reduce the number of hospitalization for ACSC.

Material and methods

Information to fulfil the two aims of the study was obtained from two separate studies, one centering on hospital discharges and the other designed to adapt the list of ACSC to the Spanish cultural setting.

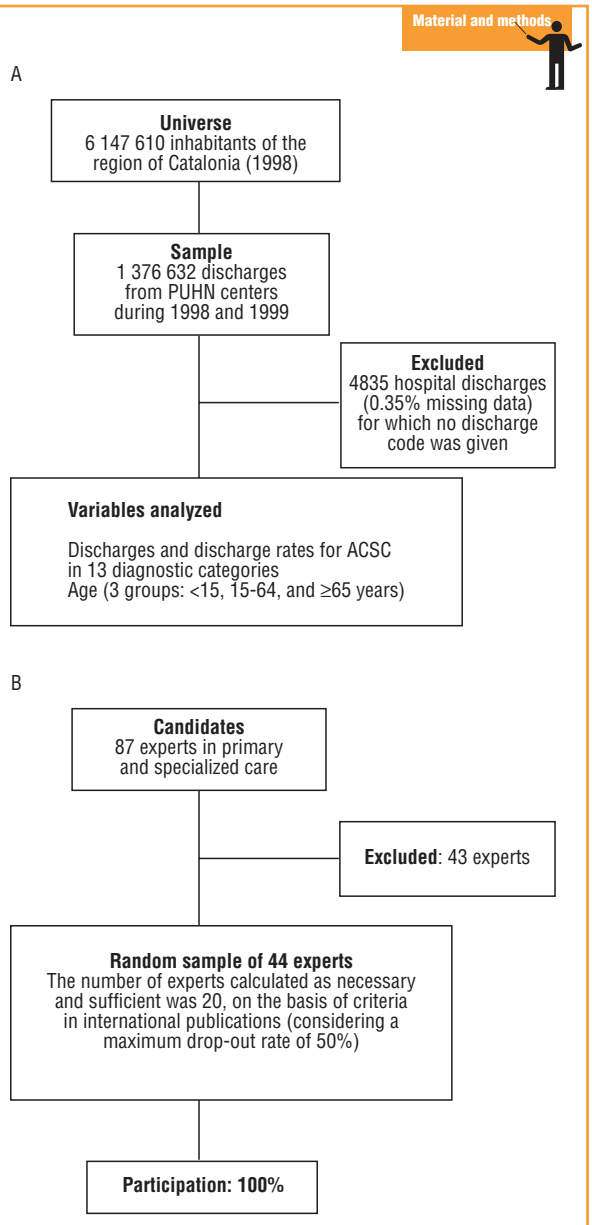
The first was a descriptive study of 1 376 632 hospital discharges generated by the resident population of the region of Catalonia (6 147 610 inhabitants according to the 1998 census of the National Institute of Statistics). Patients were seen at hospitals comprising the Public Use Hospital Network during 1998 and 1999. We studied all discharges attributable to all first admissions and readmissions, but excluded discharges for which no diagnostic code was recorded (0.35% missing data). All discharges with a diagnostic code included in the list of ACSC considered markers of the effectiveness of PHC were included.[14,16,17] This list was organized in 13 diagnostic categories, each comprising one or more diagnostic codes from the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)[18] (Tables 1 and 2).

Sources of information: the Minimum Basic Hospital Discharge Dataset of the Catalonian Health Service for the years 1998 and 1999, the demographic statistics database of the National Institute of Statistics for the years 1998 and 1999, and the ICD-9-CM.

The percent distribution of discharges under each diagnostic code was recorded for age group (<15, 15-64 and ≥65 years) and for the entire sample. Percent distributions per age group were calculated to reflect the distribution, in different population groups, of each diagnostic code (percent per age group across rows in the tables). Percent values for the entire sample were calculated to compare the distribution of diagnostic codes in each diagnostic category (percent of the total for each category in each column). Yearly hospitalization rates were calculated per 10 000 inhabitants, per age group and per diagnostic category, all with 95% confidence intervals.

The second study was designed to adapt the list of ACSC to the Spanish cultural setting. This was done by consensus with the Delphi technique, and yielded information on interventions considered high priority for PHC centers.[14] A self-administered questionnaire inquired about two of the most relevant aspects used to determine whether hospitalization for a given ACSC was preventable by appropriate primary care:[16,17] *a)* whether prevention, control and follow-up of health problems generated by ACSC was within the domain of primary care, and *b)* whether hospitalization was necessary for a given ACSC once the health care problem had arisen. This study reported here analyzed only the results for the first question (Table 2).

A total of 44 experts completed the questionnaire (57% in PHC centers and the remaining 43% in specialized (secondary) care or management, planning and research at health centers). The acceptable level of consensus was set at 75%, and three rounds were needed, which were completed by 95.5% of the participants. Descriptive statistics for interventions considered high priority for PHC centers were based on univariate analysis, and the Kappa test was used to evaluate agreement of the responses between the two groups of professionals.



General scheme of the study

A) **Descriptive study of hospital discharges for ambulatory-care-sensitive conditions (ACSC) in Catalonia during 1998 and 1999.** ***B)*** **Analysis with the Delphi technique to adapt the list of ACSC to the Spanish cultural setting.**

Results

Of a total of 1 376 632 hospital discharges generated by the resident population of Catalonia during 1998 and 1999, 116 006 (8.42%) were for diagnostic codes considered ACSC. Four diagnostic categories accounted for 86.9% of the ACSC: *cardiovascular disease and hypertension* (40.7%), *cardiac insufficiency* (24.8%), *pneumonia* (15.0%) and *acute pyelonephritis* (6.4%). These diagnoses accounted respectively for 37.5, 22.7, 14.1 and 6.1 hospital discharges per 10 000. Of the remaining ACSC, 13.1% corresponded to eight low-frequency diseases (Table 1).

Health problems specifically considered ACSC (Table 1)

The list of ACSC contains 13 diagnostic categories, four with a single diagnostic code and nine comprising several codes. The former were *congenital syphilis*, *peritonsillar abscess*, *acute pyelonephritis* and *inflammatory disease of the female pelvic organs*. The number of cases varied: although only one discharge coded as congenital syphilis was recorded in two years, the other three health problems contributed 8.3% of all hospitalizations for ACSC.

Of the diagnostic categories that comprise more than one diagnostic code, two types can be distinguished: those that group together different health problems, and those that refer to a single disease or disorder but record different locations or forms of presentation of the health problem or causal agent. The former included the category *preventable infectious disease*. This category includes several diseases, all of which are preventable by vaccination (such as diphtheria, tetanus, poliomyelitis and meningitis due to *Haemophilus influenzae*) or by antibiotic treatment (such as rheumatic fever). In this group the number of cases (71) reported during the 2-year study period was low.

The other diagnostic categories, that designate a single health problem for which different diagnostic codes specify location or form of presentation, were *tuberculosis*, *diabetes*, *disorders of amino acid transport and metabolism*, *cardiovascular disease and hypertension*, *cardiac insufficiency*, *ulcer with hemorrhage* and *acute complicated appendicitis*. By way of example we describe below *cardiovascular disease and hypertension*, the most complex group. The category *cardiovascular disease and hypertension* contains a large amount of information centering on problems attributable to hypertension involving different organs of the cardiovascular system, among other known factors. For «ischemic heart disease» and «cerebrovascular disease» the codes specify the location involved, the mode of manifestation, or both. Thus «ischemic heart disease», which contributed 85.1% of all cases in this group, included «acute myocardial infarction» (ICD-9-CM: 410) in all presentations (ranging from anterolateral wall—code 410.1—to «unspecified site» — code 410.9), and all «other acute and subacute forms of ischemic heart disease» (code 411), «old myocardial infarct» (code 412), «angina pectoris» (code 413) and «other forms of chronic ischemic heart disease» (code 414). As an example of the categories that contain codes which specify the causal agent, our list of ACSC contained the category *pneumonia*.

Diagnostic category, disease and ICD-9-CM Code

TABLE 1 **Hospital discharges and hospitalization rates for ACSC in the resident population of Catalonia during 1998 and 1999 (No.=116 006)**

Diagnostic category, disease and ICD-9-CM code	Age group			Total
	<15 N.° (%)[a]	15-64 N.° (%)[a]	≥65 N.° (%)[a]	N (%)[b]
Infectious disease preventable by vaccination				
Diphtheria 032	1 (100.0)	0	0	1 (1.4)
Tetanus 037	1 (7.1)	5 (35.7)	8 (57.1)	14 (19.7)
(Acute poliomyelitis 045	–	–	–	–
Meningitis due to Haemophilus influenzae 320.0	9 (37.5)	7 (29.2)	8 (33.3)	24 (33.8)
Rheumatic fever 390; 391	2 (6.3)	17 (53.1)	13 (40.6)	32 (45.1)
Total	13 (18.3)	29 (40.9)	29 (40.9)	71 (100.0)
Rate[3] (95% CI)	0.08 (0.07-0.08)	0.03 (0.02-0.05)	0.14 (0.13-0.15)	0.06 (0.04-0.08)
Congenital syphilis				
Congenital syphilis 090	1 (100.0)	0	0	1 (100.0)
Tuberculosis (TBC)				
Other respiratory TBC 012	8 (2.4)	247 (74.2)	78 (23.4)	333 (41.5)
Tuberculosis of meninges and CNS 013	7 (10.5)	41 (63.1)	17 (26.2)	65 (8.1)
Tuberculosis of intestines, peritoneum and mesenteric glands 014	0	26 (68.4)	12 (31.6)	38 (4.7)
Bone and joint TBC 015	1 (1.1)	40 (44.4)	49 (54.4)	90 (11.2)
Genitourinary system TBC 016	0	33 (67.4)	16 (32.7)	49 (6.1)
TBC of other organs 017	15 (12.0)	75 (60.0)	35 (28.0)	125 (15.6)
Miliary TBC 018	8 (7.8)	46 (44.7)	49 (47.6)	103 (12.8)
Total	39 (4.9)	508 (63.3)	256 (31.9)	803 (100.0)
Rate[3] (95% CI)	0.23 (0.21-0.24)	0.60 (0.55-0.65)	1.23 (1.20-1.27)	0.64 (0.58-0.71)
Diabetes				
Diabetes with ketoacidosis 250.1	278 (12.6)	1443 (65.6)	480 (21.8)	2201 (71.2)
Diabetes with hyperosmolar coma 250.2	1 (0.2)	114 (21.0)	429 (78.9)	544 (17.6)
Diabetes with other coma 250.3	4 (2.3)	63 (35.6)	110 (62.2)	177 (5.7)
Diabetes with hypoglycemic coma 251.0	5 (4.2)	30 (25.0)	85 (70.8)	120 (3.9)
Diabetes with peripheral circulatory disorders 785.4 + 250.7	0	9 (17.7)	42 (82.4)	51 (1.7)
Total	288 (9.3)	1659 (53.6)	1146 (37.1)	3093 (100.0)
Rate[c] (95% CI)	1.69 (1.65-1.73)	1.95 (1.86-2.04)	5.53 (5.45-5.60)	2.49 (2.37-2.62)
Disorders of amino acid transport and metabolism				
Volume depletion disorde 276.5	128 (15.6)	52 (6.3)	643 (78.1)	823 (84.2)
Hypopotassemia 276.8	7 (4.6)	69 (44.8)	78 (50.7)	154 (15.8)
Total	135 (13.8)	121 (12.4)	721 (73.8)	977 (100.0)
Rate[c] (95% CI)	0.79 (0.76-0.82)	0.14 (0.12-0.17)	3.48 (3.42-3.54)	0.78 (0.71-0.85)
Peritonsillar abscess				
Peritonsillar abscess 475	89 (10.1)	750 (85.4)	39 (4.4)	878 (100.0)
Rate[c] (95% CI)	0.52 (0.50-0.54)	0.88 (0.82-0.94)	0.19 (0.17-0.20)	0.71 (0.65-0.78)
Cardiovascular disease and hypertension (HT)				
Malignant essential HT 401.0	2 (2.5)	48 (60.0)	30 (37.5)	80 (0.2)
Malignant hypertensive renal disease 403.0	2 (9.5)	17 (81.0)	2 (9.5)	21 (0.0)
Malignant hypertensive heart and renal disease 404.0	0	14 (77.8)	4 (22.2)	18 (0.0)
Malignant secondary HT 405.0	0	8 (66.7)	4 (33.3)	12 (0.0)
Ischemic heart disease 410-414	14 (0.0)	14 896 (37.0)	25 316 (62.9)	40 226 (85.1)
Cerebrovascular disease 430; 431; 436; 437.2	30 (0.4)	1998 (29.0)	4866 (70.6)	6894 (14.6)
Total	48 (0.1)	16 981 (35.9)	30 222 (64.0)	47 251 (100.0)
Rate[c] (95% CI)	0.28 (0.26-0.30)	19.94 (19.64-20.23)	145.79 (145.42-146.17)	37.49 (37.02-37.97)

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TABLE 1 **Hospital discharges and hospitalization rates for ACSC in the resident population of Catalonia during 1998 and 1999 (No.=116 006) (continuation)**

Categoría diagnóstica, patología y código CIE-9-CM	Grupo de edad (años)			Total
	<15 N (%)[a]	15-64 N (%)[a]	≥65 N (%)[a]	N (%)[b]
Cardiac insufficiency (CI)				
Malignant hypertensive heart disease with CI 402.01	0	3 (21.4)	11 (78.6)	14 (0.1)
Benign hypertensive heart disease with CI 402.11	0	8 (13.1)	53 (86.9)	61 (0.2)
Unspecified hypertensive heart disease with CI 402.91	0	289 (13.5)	1.858 (86.5)	2.147 (7.5)
Heart failure 428	20 (0.1)	3250 (12.7)	22 343 (87.2)	25 613 (89.0)
Acute edema of the lung unspecified 518.4	9 (1.0)	158 (16.8)	774 (82.3)	941 (3.3)
Total	29 (0.1)	3708 (12.9)	25 039 (87.0)	28 776 (100.0)
Rate[c] (95% CI)	0.17 (0.16-0.18)	4.35 (4.22-4.49)	120.79 (120.45-121.13)	22.72 (22.35-23.09)
Pneumonia				
Pneumonia due to *Haemophilus influenzae* 482.2	9 (4.2)	83 (38.3)	125 (57.6)	217 (1.3)
Pneumonia due to *Streptococcus* 482.3	10 (12.4)	29 (35.8)	42 (51.9)	81 (0.5)
Pneumonia due to other specified organism 483	28 (6.4)	243 (55.2)	169 (38.4)	440 (2.5)
Bronchopneumonia due to unspecified organism 485	474 (47.4)	131 (13.1)	395 (39.5)	1.000 (5.8)
Pneumonia due to unspecified organism 486	2533 (16.2)	3685 (23.6)	9422 (60.2)	15 640 (90.0)
Total	3054 (17.6)	4171 (24.0)	10 153 (58.4)	17 378 (100.0)
Rate[c] (95% CI)	17.92 (17.78-18.05)	4.90 (4.75-5.04)	48.98 (48.76-49.20)	14.06 (13.77-14.36)
Perforated ulcer with hemorrhage				
Acute, chronic or unspecified gastric ulcer with hemorrhage or with hemorrhage and perforation 531.0; 531.2; 531.4; 531.6	3 (0.1)	974 (35.7)	1748 (64.2)	2725 (45.0)
Acute, chronic or unspecified duodenal ulcer with hemorrhage or with hemorrhage and perforation 532.0; 532.2; 532.4; 532.6	4 (0.1)	1511 (47.0)	1701 (52.9)	3216 (53.2)
Acute, chronic or unspecified peptic ulcer with hemorrhage or with hemorrhage and perforation 533.0; 533.2; 533.4; 533.6	0	46 (42.2)	63 (57.8)	109 (1.8)
Total	7 (0.1)	2531 (41.8)	3512 (58.1)	6050 (100.0)
Rate[c] (95% CI)	0.04 (0.03-0.05)	2.97 (2.86-3.08)	16.94 (16.81-17.07)	4.81 (4.64-4.98)
Acute complicated appendicitis				
Acute appendicitis with generalized peritonitis 540.0	298 (21.7)	832 (60.7)	241 (17.6)	1371 (69.5)
Acute appendicitis with peritoneal abscess 540.1	96 (15.9)	383 (63.5)	124 (20.6)	603 (30.6)
Total	394 (20.0)	1215 (61.6)	365 (18.5)	1974 (100.0)
Tasa[c] (IC del 95%)	2.31 (2.26-2.36)	1.43 (1.35-1.50)	1.76 (1.72-1.80)	1.6 (1.51-1.72)
Acute pyelonphritis				
Acute pyelonephritis 590.1	1489 (20.1)	3875 (52.3)	2051 (27.7)	7415 (100.0)
Rate[c] (95% CI)	8.74 (8.64-8.83)	4.55 (4.41-4.69)	9.89 (9.79-9.99)	6.06 (5.86-6.25)
Inflammatory disease of female pelvic organs				
Inflammatory disease of the female pelvic organs 614	6 (0.5)	1306 (97.5)	27 (2.0)	1339 (100.0)
Rate[c,d] (95% CI)	0.03 (0.03-0.04)	1.53 (1.45-1.61)	0.13 (0.12-0.14)	1.08 (1.00-1.16)

[a]Percent within each row: percent distribution of discharges per age group (percentages rounded to one decimal place).
[b]Percent within each column: percent distribution of all discharges per diagnostic code (percentages rounded to one decimal place).
[c]Annual rate per 10 000 inhabitants.
[d]Annual rate per 10 000 women.
95%: 95% confidence interval.

TABLE 2 **Interventions in the domain of primary health care (PHC), as determined with the Delphi technique**

Disease and ICD-9-CM code	Question 1: PHC services can prevent hospitalization for the following health problemas with one or more of the following interventions				This is the role of PHC (consolidated from all 4 options)
	1. Primary prevention	2. Early diagnosis and timely treatment	3. Appropriate control and follow-up	4. Other	
	No.'[1] (%)[a]	No.'[1] (%)[a]	No.'[1] (%)[a]	No.'[1] (%)[a]	No.'[1] (%)
Diphtheria 032	44 (100)	1 (2.3)	– –	– –	44 (100)
Tetanus 037	44 (100)	– –	– –	– –	44 (100)
Acute poliomyelitis 045	43 (97.7)	1 (2.3)	– –	– –	44 (100)
Meningitis due to *Hemophilus influenzae* 320.0	37 (86.0)	7 (16.3)	– –	– –	42 (97.7)[b]
Rheumatic fever 390; 391	26 (59.1)	18 (40.9)	3 (6.8)	2 (4.5)	44 (100)
Congenital syphilis 090	27 (61.4)	19 (43.2)	2 (4.5)	– –	44 (100)
Other tuberculosis 012; 013; 014; 015; 016; 017; 018	7 (15.9)	32 (72.7)	11 (25.0)	– –	38 (86.4)
Diabetes with ketoacidosis 250.1	4 (9.1)	21 (47.7)	26 (59.1)	2 (4.5)	42 (95.5)
Diabetes with hyperosmolar coma 250.2	4 (9.1)	21 (47.7)	26 (59.1)	2 (4.5)	42 (95.5)
Diabetes other type of coma 250.3	4 (9.1)	21 (47.7)	26 (59.1)	2 (4.5)	42 (95.5)
Diabetes with hypoglycemic coma 251.0	5 (11.9)	15 (35.7)	25 (59.5)	2 (4.8)	40 (95.2)[b]
Diabetes with peripheral circulatory disorder 785.4 +250.7	6 (14.3)	13 (31.0)	29 (69.0)	– –	40 (95.2)[b]
Volume depletion disorder 276.5	7 (15.9)	36 (81.8)	12 (27.3)	1 (2.3)	44 (100)
Hypopotassemia 276.8	8 (18.6)	29 (67.4)	14 (32.6)	1 (2.3)	41 (95.3)[b]
Peritonsillar abscess 475	2 (4.5)	33 (43.2)	7 (65.9)	1 (2.3)	41 (95.3)[b]
Malignant essential HT 401.0	4 (9.1)	24 (54.5)	22 (50.0)	1 (2.3)	42 (95.5)
Malignant hypertensive renal disease 403.0	5 (11.6)	19 (44.2)	26 (60.5)	– –	41 (95.3)[b]
Malignant hypertensive heart and renal disease 404.0	4 (9.5)	18 (42.9)	25 (59.5)	1 (2.4)	40 (95.2)[b]
Malignant secondary HT 405.0	2 (4.7)	21 (48.8)	22 (51.2)	– –	38 (88.4)[b]
Ischemic heart disease 410; 411; 412; 413; 414	2 (4.5)	15 (34.1)	22 (50.0)	– –	39 (88.6)
Cerebrovascular disease 430; 431; 436; 437.2	1 (2.3)	13 (30.2)	24 (55.8)	– –	38 (88.4)[b]
Malignant hypertensive heart disease with CI 402.01	3 (6.8)	21 (47.8)	26 (59.1)	2 (4.5)	40 (90.9)
Benign hypertensive heart disease with CI 402.11	3 (6.8)	20 (45.4)	29 (65.9)	2 (4.5)	43 (97.7)
Unspecified hypertensive heart disease with CI 402.91	3 (6.8)	22 (50.0)	26 (59.1)	2 (4.5)	41 (93.2)
Heart failure 428	2 (4.5)	26 (59.1)	25 (56.8)	1 (2.3)	43 (97.7)
Unspecified acute edema of the lung 518.4	– –	14 (31.8)	21 (47.7)	– –	35 (79.5)
Pneumonia due to *Hemophilus influenzae* 482.2	4 (9.1)	29 (65.9)	12 (27.3)	2 (4.5)	39 (88.6)
Pneumonia due to *Streptococcus* 482.3	1 (2.3)	39 (88.6)	4 (9.1)	– –	44 (100)
Pneumonia due to other specified organism 483	– –	39 (88.6)	3 (6.8)	2 (4.5)	44 (100)
Bronchopneumonia due to unspecified organism 485	– –	38 (86.4)	3 (6.8)	3 (6.8)	44 (100)
Pneumonia due to unspecified organism 486	– –	38 (86.4)	3 (6.8)	3 (6.8)	44 (100)
Acute, chronic or unspecified gastric ulcer with hemorrhage or hemorrhage and perforation 531.0; 531.2; 531.4; 531.6	4 (9.1)	28 (63.6)	15 (34.1)	3 (6.8)	39 (88.6)
Acute, chronic or unspecified duodenal ulcer with hemorrhage or hemorrhage and perforation 532.0; 532.2; 532.4; 532.6	3 (6.8)	28 (63.6)	15 (34.1)	3 (6.8)	39 (88.6)
Acute, chronic or unspecified peptic ulcer with hemorrhage or hemorrhage and perforation 533.0; 533.2; 533.4; 533.6	4 (9.1)	28 (63.6)	15 (34.1)	3 (6.8)	39 (88.6)
Acute appendicitis with generalized peritonitisd[c] 540.0	– –	– –	– –	– –	39 (97.5)[b]
Acute appendicitis with peritoneal abscesse[c] 540.1	– –	– –	– –	– –	39 (97.5)[b]
Acute pyelonephritis 590.1	3 (6.8)	34 (77.3)	5 (11.4)	– –	42 (95.5)
Inflammatory disease of the female pelvic organs 614	– –	36 (81.8)	4 (9.1)	4 (9.1)	44 (100)

No.' number of responses; No. number experts. [b]Because more than one option was possible, ∑ENo.'#=No. [a]Percentage calculated for each type of intervention %=No.'/No. [b]Responses were missing for some codes. Therefore the percentage was calculated from all valid responses. [a]The question as rephrased did not offer the choice of the four intervention options. HT indicates hypertension; CI, cardiac insufficiency.

TABLE 3 **Multimodal interventions in primary health care to prevent hospitalizations for ACSC**

Type of intervention	Infectious disease	Nom Infectious disease
1. Primary prevention	Infectious disease preventable by vaccination	
2. Early diagnosis and timely treatment	Rheumatic fever	Diabetes
	Congenital syphilis	Disorders of amino acid transport and metabolism
	Tuberculosis	Cardiovascular disease and hypertension
	Peritonsillar abscess	Cardiac insufficiency
	Pneumonia	Perforated ulcer with hemorrhage
	Acute complicated appendicitis	
	Acute pyelonephritis	
	Inflammatory disease of the female pelvic organs	
3. Appropriate control and follow-up		Diabetes
		Cardiovascular disease and hypertension
		Cardiac insufficiency
		Perforated ulcer with hemorrhage

Analysis of the distribution of cases in different population groups revealed the diverse types of information the indicator provided. In other words, the indicator allowed us to identify health problems with high rates of occurrence (37.49 discharges per 10 000 inhabitants per year for *cardiovascular disease and hypertension*) along with infrequently occurring diseases (0.71 per 10 000 inhabitants per year for *peritonsillar abscess*). We also noted marked differences in distributions by age group. For example, 87.0% of all cases of *cardiac insufficiency* occurred in persons 65 years of age or more, 85.4% of all cases of *peritonsillar abscess* were recorded in the 15-to-64-year-old group, and nearly half (47.4%) of the cases of *bronchopneumonia* were recorded in residents younger than 15 years.

High-priority interventions for primary care centers to reduce the number of hospitalizations for ACSC (Table 2)

All health problems, whether acute or chronic, were considered sensitive to one or more interventions at the primary care level. In some cases a high-priority intervention could be readily identified, such as primary prevention through vaccination for a specific infectious disease. However, in most cases the experts agreed on the importance of multimodal interventions such as early diagnosis together with timely treatment, and adequate control of and follow-up for diabetes (Table 3).

The expert panel failed to identify any primary care intervention for the group of cardiovascular diseases because the initial definition of this group included hypertension as a selection criterion for cases, whereas hypertension was excluded from the lists of ACSC proposed at the conclusion of the process of transcultural adaptation of the instrument.[14] Another relevant aspect of the process of compiling responses to the questionnaire was the difficulty in identifying which primary care intervention might prevent hospitalizations for *acute complicated appendicitis*. This disease made it necessary to rephrase the questionnaire item to clarify that the task of the primary care center was not to treat complicated appendicitis, but to reach a differential diagnosis between diffuse abdominal pain and early diagnosis of acute appendicitis. As a result no responses were obtained for this disease in any of the four options the questionnaire provided for primary care intervention (Table 2).[14] Combining the information from the two studies allowed us to identify population groups for whom the suggested interventions should be considered high priority (Tables 1 and 2). For example, almost all cases of tetanus occurred in the population of persons older than 15 years, making this the target population for potential interventions aimed at improving primary care.

Discussion

The list of ACSC used in the present study was arrived at through a process of selection and transcultural adaptation which identified diagnostic codes valid for the evaluation of the effectiveness of PHC in Spain. This process enhanced the internal validity of the indicator by selecting diagnostic codes that minimized the limitations arising from the influence of the patients´ clinical characteristics or from variability in hospital clinical practices or admission policies.[14] For example, *tuberculosis* includes tuberculosis of the meninges, miliary tuberculosis and genitourinary system tuberculosis among other complications of pulmonary tuberculosis (Table 1). Most of these cases resulted

Discussion
Key points

What is known about the subject

- Timely, effective primary health care (PHC) can reduce hospitalizations for health problems defined as *ambulatory-care-sensitive conditions* (ACSC).
- Differences between published lists of ACSC and in the diagnostic codes included in this indicator, and the remoteness of the instrument perceived by primary health care professionals (who see it as an «alien» indicator constructed from hospital-based information), are obstacles to the understanding and acceptance of this indicator for evaluating the effectiveness of primary health care.

What this study contributes

- The diagnostic codes included in each diagnostic category are congruent with the diseases they identify.
- Interventions that could prevent hospitalizations for ACSC (primary prevention, early diagnosis and timely treatment, appropriate control and follow-up) are within the domain of primary health care.
- The common denominator of primary health care interventions is their use at the appropriate time during the natural course of the disease.
- Analyses to enhance the specificity of the indicator should be done for each disease individually.

from postprimary, early or late hematogenous dissemination, or from direct progression of a subpleural focus of tuberculosis, which might have been prevented by early diagnosis and appropriate treatment of pulmonary tuberculosis.[19] Pulmonary tuberculosis is not included in our list because we consider hospitalization unnecessary for most cases.

The variety of diseases included in the indicator makes it advisable to analyze each code individually to increase specificity. For example, interventions aimed at reducing hospitalizations for coma in patients with diabetes are completely different from interventions aimed at reducing hospitalizations for perforated bleeding ulcer. Nevertheless, not all diseases can be analyzed individually at the level of the basic health area, because of the low numbers of cases (<1/10 000 per year). However, the seriousness of these diseases, the role of PHC centers in controlling them, and the cost-effectiveness of health interventions[8,20-22] justify their inclusion as diseases that can be used to trace the effectiveness of PHC. We therefore propose that initially, low-frequency diseases should be analyzed as a group to diagnose the overall ability of PHC centers to deal appropriately with these health problems. Then individual diseases can be identified as intervention strategies are established. By way of example, most of the 14 cases of tetanus (92.8%) occurred in the adult population, which suggests the need to promote and ensure systematic vaccination in this population group.[23-26] Vaccination targeted specifically to this group should be considered a high priority in basic health areas where cases have been reported.

Regarding the ability of PHC centers to reduce this type of hospitalization, all diagnostic codes were considered sensitive to interventions at the primary care level, although the type of intervention and the potential volume of hospitalizations that might be prevented vary depending on the health problem. For example, primary prevention was considered fundamental for infectious diseases such as *diphtheria* (preventable by immunization), *rheumatic fever* (preventable by early diagnosis and treatment of the disease precursor), or *inflammatory disease of the female pelvic organs* (preventable by treating the disease in the initial stages of its course). For most such cases we would expect to prevent all hospitalizations except those for disadvantaged population groups for which health care is still in its incipient stages, ie, immigrants from developing countries. On the other hand, the most immediate foreseeable result for chronic diseases is not their elimination, but a decrease in acute and chronic complications[27,28] or a reduction in hospital readmissions and mean lengths of stay (e.g., for cardiac insufficiency).[29] The summary of activities proposed here reflects the importance of primary and secondary prevention as roles within the domain of PHC. The common denominator of these interventions is their timely use in accordance with the patient´s biological age (primary prevention), or the natural history of the disease (early diagnosis and appropriate treatment).

With regard to the limitations of the coding system, we note the internal consistency of the diagnostic categories as shown by the present findings. Because the goal of diagnostic categories is to ensure that all cases of a given disease are recorded accurately, we considered problems with the quality and definition of some diagnostic codes to be of secondary importance. Questions relating to the quality of the record and the need to develop a common coding language for all levels of care[30] are challenges the health care system is now dealing with.

In conclusion, the diagnostic codes considered ACSC were congruent with the diseases they identify, and interventions that could reduce hospitalizations for ACSC are within the domain of the primary level of care. Both findings help support the validity of the indicator for measuring the effectiveness of primary health care.

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COMMENTARY

Inappropriate Hospitalizations: A New Challenge for Primary Care

G. Tamborero Cao
Director de Planificación y Coordinación Asistencial, Servei de Salud de les Illes Balears (IB-Salut), Spain.

In recent years, studies that examine reforms in the use of health care resources have proliferated in Spain their aim being to identify and reduce the inappropriate use of health care services. Inappropriate or inadequate use is understood to mean types of use that, with the knowledge and means currently available, do not meet ideally desirable goals. Although there are many aspects of inappropriate use that are amenable to analysis (for example, prescribing practices or complementary tests, among others), most research has centered on the inappropriate use of hospital resources.[1-4]

Efforts to identify when hospital admission is and is not appropriate aim to favor the most efficient use of hospitals by identifying and reducing inappropriate admissions and stays. These are defined as acute care admissions and stays that occur when the problem, from a strictly clinical point of view, could have been dealt with at other more appropriate levels of care (day hospital, home hospitalization, long-stay hospital, primary care, etc.) or in less time (shorter stay). This definition assumes that the care provided is always pertinent in clinical terms; the only things that are being questioned are the level of service that provides the care, and the duration of care.[3,5]

Inappropriate use has important negative effects (increased costs, increased risk of nosocomial infection and unnecessary diagnostic tests or treatments, etc.) that lead to inefficient administration and lowered quality of care.[3,4]

The first studies of inappropriate hospitalization were done in the 1970s. Several objective methods based on explicit criteria are currently available to identify inappropriate admissions (Table 1). These methods are usually developed by reviewing the medical records (retrospectively in most cases), the patient´s clinical status, and the intensity of medical and nursing services required.[2,3,5,6] The main advantage of efforts to ensure efficiency based on determinations of appropriate use is their selectivity for unnecessary hospitalization, in contrast with other types of intervention (such as productivity and performance audits, special programs, and co-payment) that might reduce both inappropriate and appropriate care indiscriminately.[3]

Despite considerable differences in methods, published studies have documented a variable but large proportion of unnecessary hospital use, ranging from 12 to 60% for stays and from 6 to 54% for admissions. Moreover, the proportion of inappropriate pediatric admissions is reportedly one out of every four or five hospitalizations.[1,3,6]

Inappropriate hospitalization is a multicausal phenomenon that depends on decisions made by the physician; these decisions in turn are related to (among other things) the availability of diagnostic and therapeutic resources, the characteristics of primary care, and the sociosanitary resources in the area.[1] However, delays in diagnostic tests comprise one of the main reasons for inappropriate admissions.

Key points

- Inappropriate hospitalizations are admissions to acute care centers that occur when the problem, from a strictly clinical point of view, could have been dealt with at other more appropriate levels of care (day hospital, home hospitalization, long-stay hospital, primary care, etc.) or in less time (shorter stay).
- Inappropriate use has important negative effects (increased costs, increased risk of nosocomial infection and unnecessary diagnostic tests or treatments, etc.) that lead to inefficient administration and lower quality of care.
- Published studies report a variable but large proportion of unnecessary hospital use ranging from 12 to 60% for stays and from 6 to 54% for admissions.
- Appropriate primary care can reduce hospitalizations for certain problems. Indicators of inappropriate hospitalization such as *ambulatory-care-sensitive conditions* can serve as an indirect but relevant measure of the ability of primary care to deal appropriately and efficiently with health problems.

TABLE 1 **Main instruments for the identification of inappropriate hospitalization**

Method/Instrument	Characteristics
Appropriateness Evaluation Protocol (AEP)	Developed at the end of the 1970s, this is the best known and most widely used instrument to identify inappropriate use. Its has been shown to be valid and reliable. It aims to identify inappropriate admissions and stays in adult nonpsychiatric patients, although adaptations for pediatric care have been developed. It consists of: *a)* inappropriate admissions criteria, which examine the severity of the patient´s status (10 items) and the intensity of services needed (6 items); and *b)* inappropriate stay criteria (after the first day of the hospital stay), which evaluate medical services provided (11 items), nursing services (7 items) and the patient´s clinical status (9 items) Noteworthy limitations of this instrument are its failure to consider variability in medical practice, the lack of social support, the distance traveled to the center, the availability of resources in the area, and the expectations of patients and their relatives
Ambulatory-care-sensitive conditions (ACSC)	These conditions are a group of diagnostic codes recorded upon hospital discharge, obtained from the hospital morbidity database (Minimum Basic Hospital Discharge Dataset). These lists have been proposed as an indirect indicator of the capacity of primary care to deal appropriately with health problems, and as a direct indictor of the volume of hospital activity potentially preventable by timely primary care interventions Lists of ACSC were introduced in the USA to analyze access of the indigent population to medical care. They were subsequently used to identify other variables related with problems of access and the availability of health resources, and have been used in comparative analyses of health care models involving different types of primary care. In the 1990s, ACSC were proposed by the National Health Service to analyze the quality of primary care. Different lists of diagnostic codes have been proposed as ACSC. Some of the limitations of these lists are differences in the items each instrument includes, the amount of information the indicator contains, and the reluctance of primary care practitioners to be evaluated with an indicator constructed from hospital-based information
Intensity Severity Discharge Criteria Set (ISD)	This instrument was developed to evaluate the appropriateness of admissions and stays in medical, surgical, obstetric and pediatric services. The instrument has been adapted for psychiatric services
Standardized Medreview Instrument (SMI)	This instrument can be used to evaluate the use by adult patients of medical, surgical, psychiatric, intensive care, coronary and burn services, and other services
Delay Tool (DTO)	This 166-criteria instrument differs substantially from those described above in that it does not judge the need for hospital admission or stay, but rather attempts to detect unnecessary days of stay
Oxford Bed Study Instrument	Developed at the end of the 1980s from the AEP, the DTO is a structured interview for health care staff responsible for patients which aims to evaluate the use of hospital beds

Adapted from references 2, 3 and 6.

Among the measures proposed to reduce inappropriate use are the development of clinical guidelines, increases in the effectiveness of central hospital services, greater availability of alternatives to acute care hospitals (such as short-stay high-performance units, home hospitalization and day hospitals), and fomenting self-care. Although given insufficient attention in most studies, a key element in reducing the problem is the timely involvement of primary care services.[5]

On occasions there is no scientific evidence for the usefulness of hospitalization for certain diseases. In contrast, a number of studies have found that primary care of the appropriate type, location, intensity and timeliness can reduce hospital admissions for certain causes, mainly by acting as a filter that allows access only for persons who will actually benefit from a higher level of care.[6]

Nevertheless, it is hard to say precisely how many of these hospitalizations are truly avoidable by interventions at the primary care level. It is important to distinguish, in this connection, between two concepts: hospitalizations that can be avoided (by the use of other care alternatives) and diseases sensitive to primary care (which, through effective interventions, can reduce the risk of hospitalization).[6]

Within the context of this line of research, the excellent article by Caminal and colleagues contributes to our knowledge of health problems linked to ambulatory-care-sensitive conditions (ACSC), and sheds light on primary care interventions that might reduce these problems.

Although there may be some resistance to evaluating the quality of primary care with indicators of hospital activity such as those discussed here – particularly when these indicators are influenced by criteria that are not under the control of primary care practitioners–indicators of inappropriate hospitalization, especially ACSC, can be used as an indirect but nonetheless relevant measure of the ability of primary care to deal appropriately and effectively with the patient´s problem.

If we really want to reduce inappropriate hospitalizations from primary care referrals, we should demand the necessary means to optimize the capacity of practitioners to deal with their patients´ problems by providing training and adequate technological resources. In addition, these actions should be accompanied by the allocation of budgetary resources where problems are solved effectively; to li-

mit inefficiency, financial resources should be adjusted where inappropriate use is detected.[3]

Only in this way will we create a new environment for primary and specialized care in which each level of care must prove that it is ideally situated to respond effectively to most of the health problems of our citizens.

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