

## HEALTH SERVICES

# The role of primary care in preventing ambulatory care sensitive conditions

JOSEFINA CAMINAL, BARBARA STARFIELD, EMÍLIA SÁNCHEZ, CARMEN CASANOVA†, MARIANELA MORALES \*

**Background:** To examine the postulated relationship between Ambulatory Care Sensitive Conditions (ACSC) and Primary Health Care (PHC) in the US context for the European context, in order to develop an ACSC list as markers of PHC effectiveness and to specify which PHC activities are primarily responsible for reducing hospitalization rates. **Methods:** To apply the criteria proposed by Solberg and Weissman to obtain a list of codes of ACSC and to consider the PHC intervention according to a panel of experts. **Five selection criteria:** i) existence of prior studies; ii) hospitalization rate at least 1/10,000 or 'risky health problem'; iii) clarity in definition and coding; iv) potentially avoidable hospitalization through PHC; v) hospitalization necessary when health problem occurs. **Fulfilment of all criteria was required for developing the final ACSC list.** A sample of 248,050 discharges corresponding to 2,248,976 inhabitants of Catalonia in 1996 provided hospitalization rate data. A Delphi survey was performed with a group of 44 experts reviewing 113 ICD diagnostic codes (International Classification of Diseases, 9<sup>th</sup> Revision, Clinical Modification), previously considered to be ACSC. **Results:** The five criteria selected 61 ICD as a core list of ACSC codes and 90 ICD for an expanded list. **Conclusions:** A core list of ACSC as markers of PHC effectiveness identifies health conditions amenable to specific aspects of PHC and minimizes the limitations attributable to variations in hospital admission policies. An expanded list should be useful to evaluate global PHC performance and to analyse market responsibility for ACSC by PHC and Specialist Care.

**Keywords:** ambulatory care sensitive conditions (ACSC), Delphi technique, preventable hospitalizations, primary health care, trans-cultural adaptation

Timely and effective Primary Health Care (PHC) could reduce the risk of hospitalizations due to Ambulatory Care Sensitive Conditions (ACSC) although the magnitude of the effect differs according to specific clinical conditions.<sup>1</sup> The more removed from the intended purpose, the more likely the limitations. For example, admission rates may depend, at least in part, on hospital admission policies as well as on PHC effectiveness. Recent publications have emphasized the need to review carefully the choice of specific indicator when intended as a measure of performance of PHC.<sup>2</sup>

Variability in ACSC lists and in factors associated with hospitalization rates<sup>3–7</sup> raises questions as to the extent to which hospitalizations are actually preventable by PHC, especially under circumstances when hospital staff make the decision on the need for hospitalization and there is variability in admission criteria within and between hospitals.<sup>8–10</sup> Also relevant is the consideration of which specific PHC activities influence each of the selected health conditions.

Therefore, the selection of diagnoses to be considered as ACSC represents one of the most relevant parts of the methodology of these studies. Optimally, the list should be adapted to the context of each study to guarantee the validity, reliability and magnitude

of the hospitalization rates; particularly when health systems are different: US context where the indicator had its origin (individual health insurance and restricted public funding) and European context (publicly funded and universal coverage in most countries).<sup>11,12</sup> As part of the adaptation process for these lists, authors such as Solberg<sup>13</sup> and Weissman<sup>14</sup> developed criteria for considering appropriateness of diagnoses. The criteria proposed by these authors combine consensus criteria with objective criteria, which reduces the limitations<sup>15</sup> inherent in the consensus methodology used by other authors.<sup>16,17</sup>

The goal of this paper is to determine whether the theoretical relationship between ACSC and PHC is as useful in the European context (for Spanish general practitioners) as it appears to be in the US context.<sup>18–20</sup> It is achieved considering both the conceptual basis for relating a condition to the activities of PHC and for specifying which aspect of this level of care would be primarily responsible for reducing hospitalization rates.

## METHODS

We first applied the criteria proposed by Solberg<sup>13</sup> and Weissman<sup>14</sup> to obtain a list of codes. Second, we considered the PHC intervention most related to prevention of hospitalization according to a panel of experts. This Delphi survey was carried out between July 1998 and December 1998.

Criteria developed for considering appropriateness of diagnoses were: i) existence of prior studies; ii) hospitalization rate of at least 1/10,000 or a 'risky health problem' (an important health problem or a condition with a burden of co-morbidity worsening the prognosis); iii) clarity in the definition and coding of diagnoses; iv) hospitalization potentially avoidable through PHC, considering age, gender and type of care; and v) hospitalization necessary when the health problem occurs.

The first part of this study developed the procedure to select ICD codes for ACSC lists. This process involved three steps: the gathering of information from the literature, judgements concerning the suitability of each of the codes previously used, and the final selection.

\* J. Caminal<sup>1</sup>, B. Starfield<sup>2</sup>, E. Sánchez<sup>3</sup>, C. Casanova<sup>1,4</sup>, M. Morales<sup>1</sup>

† Sadly, Carmen Casanova passed away in October 2003.

1 Department of Preventive Medicine, Autonomous University of Barcelona, Catalonia, Spain

2 Department of Health Policy and Management and Paediatric, Johns Hopkins University, Baltimore, USA

3 Catalan Agency for Health Technology Assessment and Research, Catalonia, Spain

4 Department of Paediatric, Hospital de Sagunto, Valencia, Spain

**Correspondence:** Dra. Josefina Caminal, MD, PhD, Universitat Autònoma de Barcelona, Campus de Bellaterra, Edifici M, Medicina Preventiva i Salut Pública, 08193 Cerdanyola del Vallès, Barcelona, Spain, tel. +34 93 5813802, fax +34 93 5812344, e-mail: josefina.caminal@uab.es

The information related to each criterion was collected from the following sources:

- An extensive bibliographical search (Criterion 1).
- A pilot study on hospitalization rates using a sample of 248,050 discharges corresponding to 2,248,976 inhabitants of Catalonia<sup>21</sup> (Criterion 2).

Hospitalizations rates were derived from the Data Base Set of hospital discharges obtained from the Catalan Health Service, 1996. This data base included all discharges from all public hospitals belonging to the public utilization hospital network of Catalonia; completeness of the reporting form was 97,5%.<sup>22</sup>

- Judgement by experts of the characteristics of each ICD code regarding its relevance for PHC, using a Delphi technique (Criteria 3, 4, and 5).

The bibliographic search identified the existence of ACSC lists on studies published before 1998. A total of 16 papers was obtained from Medline searching by 'ACSC' and/or 'preventable or avoidable hospitalization' (Criterion 1; table 1).<sup>1,3-5,13,14,18-20,23-29</sup> The pilot study determined the codes with a hospitalization rate of at least 1/10,000 (Criterion 2, data on hospitalization rates are available from the author on request). To establish the fulfilment of clarity in the definition and coding of diagnoses (Criterion 3), three of the co-authors and six experts (co-ordinating team) considered the extent to which the code

was sufficiently clear and homogeneous to serve as the basis for making a judgement of suitability as an ACSC condition. Experts for the co-ordinating team were selected from among previous ACSC researchers and experts on consensus methodology. A consensus procedure, the Delphi technique, was used to ascertain the judgement of health professionals concerning the role of PHC as being responsible for avoiding hospitalization (criterion 4) and the need for hospitalization when the condition occurs (criterion 5).

Expert opinions were gathered through an anonymous survey containing two questions as follows:

Question A. Is there a role\* for PHC in avoiding hospitalization for the following conditions? Yes/No role for PHC in avoiding hospitalization [\* Having a role means applying one or more of the following interventions: 1) primary prevention; 2) early diagnoses (and treatment) of the condition or its precursor; 3) good ongoing control and management; or 4) other (please specify)].

Question B. Is hospitalization necessary when the condition occurs? Yes/No.

The definitive level of consensus for both questions was established when at least 75% of participants agreed on each question, considering the level of questionnaire completion at 85% of total items submitted.

**Table 1** Process to select the ACSC core list

Codes fulfilling all five criteria		Codes failing any criteria			
Generic diagnosis	ICD-9-CM codes	ICD-9-CM codes	Criteria 2	Criteria 3	Criteria 5
Immunization and preventable infectious diseases <sup>4,14,19,20,23,24,27,29</sup>	032; 037; 045; 320.0; 390; 391	033	X		X
		055	X		X
		056	X		X
		072	X		X
Congenital syphilis <sup>4,20,29</sup>	090	-			
Tuberculosis <sup>4,20,25,27</sup>	012-018	011			X
Diabetes mellitus <sup>3,4,14,18-20,23-29</sup>	250.1; 250.2; 250.3; 251.0; 785.4+250.7	250.0			X
		250.7			X
		250.8			X
		250.9		X	X
		251.2		X	X
Nutritional deficiencies <sup>4,20,27</sup>		260	X		
		261	X		
		262	X		
		268.0	X		No consensus
		268.1	X		X
Disorders of hydro-electrolyte metabolism <sup>4,14,19,20,23,27,29</sup>	276.5; 276.8	-			
Iron-deficiency anemia <sup>4,20,27</sup>	280				X
Convulsions <sup>4,20,24,27,29</sup>		345			X
		780.3			X
		382			X
Diseases of the upper respiratory tract <sup>4,20,25-29</sup>	475	461	X		X
		462	X		X
		463			X
		465			X
		472.1	X		X
		401.9		X	X
Hypertensive heart disease <sup>3,4,14,18-20,23-29</sup>	401; 403; 404; 405; 410-414; 430; 431; 436; 437.2	402.00			No consensus
		402.10			X
		402.90	X	X	X
Heart failure <sup>3,4,14,18-20,23-25,27-29</sup>	402.01; 402.11; 402.91; 518.4	428			No consensus

The number of experts in the consensus phase was determined as the minimum necessary to guarantee that at least 20 would complete all possible rounds,<sup>16</sup> taking into account the potential losses in the Spanish healthcare context, which are said to be as high as 50%.<sup>30</sup> A mixed panel<sup>31</sup> of 44 experts was selected at random from the 88 participants proposed by the co-ordinating team. Most of the experts were physicians, approximately half of them were from PHC; the others were managers, specialists, and health services researchers, working in both rural and urban areas. Divergence of opinions due to different professional contexts<sup>32</sup> was examined by means of a Kappa test. Eventually, after obtaining information for the fulfilment of each criterion, a process of selection was executed by screening each ICD code with the five criteria to achieve final lists. The second part of this survey considered expert judgement of the relationship between PHC and ACSC in the Spanish context.

**RESULTS**

*The literature review (Criterion 1)*

All 113 ICD codes obtained from the literature were submitted to the experts for their judgements (table 1). All experts were

kept on through the three rounds before reaching consensus. Completion of the questionnaire reached the level established (85%), so no expert was excluded. Missing answers for particular ICD codes were occasionally observed (maximum missing answers for question A = 5 cases, and for question B = 9 cases of a total of 113 items). The Kappa test showed levels between 0.57 and 0.80 (good to excellent, according to Landis and Kock's scale<sup>33</sup>), indicating good agreement across professional contexts of the experts.

*Meeting criteria 2–5*

■ **Criterion 2**

Twenty codes did not meet the criterion of hospitalization rate of at least 1/10,000 inhabitants or considered as a 'risky health problem' (table 1).

■ **Criterion 3**

Five codes were not considered to have clarity in definition and coding (table 1).

■ **Criterion 4**

All 113 ICD codes were considered amenable to PHC intervention (table 1). Consensus was reached for all groups of diagnostic codes, with values between 79.5 and 100%. In the first

**Table 1 continued** Process to select the ACSC core list

Codes fulfilling all five criteria		Codes failing any criteria			
Generic diagnosis	ICD-9-CM codes	ICD-9-CM codes	Criteria 2	Criteria 3	Criteria 5
Pneumonia <sup>3,4,14,19,20,23–29</sup>	482.2; 482.3; 483; 485; 486	481			X
		482.9			No consensus
Bronchitis / Chronic obstructive pulmonary disease <sup>4,18,20,23,24,26–29</sup>		466.0			X
		491			X
		496			X
		490			X
		492			X
		494			X
Asthma <sup>3,4,14,18–20,23–25,27–29</sup>		493			X
Bleeding or perforating ulcer <sup>14,19,23</sup>	531.0; 531.2; 531.4; 531.6; 532.0; 532.2; 532.4; 532.6; 533.0; 533.2; 533.4; 533.6	–			
Appendicitis with complication <sup>14,19,23,28</sup>	540.0; 540.1	–			
Dental conditions <sup>4,20,27,29</sup>	–	521	X		X
		522	X		X
		523	X		X
		525	X		X
		528	X		X
Disease of the skin and subcutaneous tissue <sup>4,14,19,20,23,25–29</sup>	–	681			X
		682			X
		683			X
		686			X
Gastroenteritis <sup>4,20,25,27,29</sup>	–	558.9			X
Urinary tract infections <sup>4,14,19,20,23–25,27,29</sup>	590.1	590.0			X
		590.8			No consensus
		599.0			X
		599.9	X	X	X
Pelvic inflammatory disease <sup>4,20,27</sup>	614	–			
Growth deficiencies <sup>4,20</sup>		783.4	X		X

Criterion 1 = Existence of prior studies. References of authors reviewed as super-index (no code was excluded).

Criterion 2 = Hospitalization rate of at least 1/10,000 or 'Risky health problem' (an important health problem or a condition with a burden of co-morbidity worsening the prognosis).

Criterion 3 = Clarity in the definition and coding of diagnoses.

Criterion 4 = Hospitalization potentially avoidable through PHC (no code was excluded).

Criterion 5 = Hospitalization necessary when the health problem occurs.

X = Criterion not met.

round, 95 ICD codes (84.1%) reached consensus, of which 35 reached the highest level (100%) (data for individual codes available on request).

■ Criterion 5

After the Delphi survey, consensus was reached for 108 codes: 63 of these were considered as 'hospitalization needed' and 45 as 'hospitalization not needed'. The remaining five (ICD codes 268.0; 402.00; 428; 482.9; and, 590.8) did not reach the minimum level of required consensus. Of those that reached the required consensus, consensus values varied between 75% and 100% for either possibility ('hospitalization is necessary' or 'hospitalization is not necessary').

Final selection was carried out by the co-ordinating team, which reviewed each selected code against the five selection criteria. There were no cases excluded on the basis of Criteria 1 and 4 (table 1). Those codes only failing to meet the criterion 'hospitalization needed' were subjected to a second reconsideration concerning the fulfilment of criterion 1 (prior studies) when the ICD code was referred by at least 90% of the authors and, in addition, taking into consideration a high consensus reached for the rest of the ICD codes included in the diagnostic group. Codes 402.00, 428, 482.9 and 590.8 were re-captured by this final scrutiny.

In the same way, the definition of hypertensive heart disease was reviewed. Two groups of diagnostic codes, ICD 410–414 +[401–405] (acute myocardial infarction + hypertension) and ICD 430; 431; 437.2 +[401–405] (cerebral infarction + hypertension), were conditioned on the presence of hypertension as a secondary diagnosis. Almost all reviewed studies (14 out of 16) included cardiovascular diseases without an additional condition. The code set was resolved by the decision to include ICD 410–414 (ischemic heart disease) and ICD 430; 431; 436; 437.2 (cerebrovascular disease).

Two separate code lists resulted. Fulfilment of all five criteria was required for eventual inclusion of each diagnosis in a study of PHC effectiveness (Core ACSC list; 61 ICD codes [table 2]). Those codes excluded only by criteria 5 (hospitalization needed) were also considered sensitive to PHC services (Expanded ACSC list; 90 ICD codes [table 2]). Codes not fulfilling criterion 2 or 3,

or a combination of more than one criterion (criterion 2, 3 and/or 5) were excluded (table 3).

Experts' opinions on which aspect of PHCs was responsible for reducing ACSC hospitalizations

The 61 ICD diagnosis codes in which hospitalization was considered needed were subjected to final judgements for the specific role played by PHC. Most health problems or conditions, either chronic or acute, were considered to be sensitive to more than one type of PHC intervention. However, in some cases a single priority intervention was identified (e.g. primary prevention for infectious diseases preventable by immunisation). For other conditions, the opinion of experts showed the importance of multimodal interventions in the delivery of care (e.g. good ongoing control and early diagnosis and treatment for diabetes) (table 4). Experts did not identify primary prevention for the hypertensive heart diseases due to the initial particular definition we used. Consensus was derived when hypertension was included as a secondary diagnosis, but this condition was removed in developing the final list. The reason for this change

Table 3 Excluded ACSC codes

Group of diagnosis codes	ICD-9-CM codes
Immunization and preventable infectious diseases	033, 055, 056, 072
Diabetes mellitus	250.9, 251.2
Nutritional deficiencies	260, 261, 262, 268.0, 268.1
Diseases of the upper respiratory tract	461, 462, 472.1
Hypertensive heart disease	401.9, 402.90
Dental conditions	521, 522, 523, 525, 528
Urinary tract infections	599.9
Growth deficiencies	783.4

Table 2 Core ACSC list<sup>a</sup> (italic codes) and expanded ACSC list<sup>b</sup>

Group of diagnosis codes	ICD-9-CM codes	Group of diagnosis codes	ICD-9-CM codes
Immunization and preventable infectious diseases	032, 037, 045, 320.0, 390, 391	Pneumonia	481, 482.2, 482.3, 482.9, 483, 485, 486
Congenital syphilis	090	Bronchitis / Chronic obstructive pulmonary disease (COAD)	466.0, 490, 491, 492, 494, 496
Tuberculosis	011, 012–018	Asthma	493
Diabetes mellitus	250.0, 250.1, 250.2, 250.3, 250.7, 250.8, 251.0, 785.4+250.7	Bleeding or perforating ulcer	531.0, 531.2, 531.4, 531.6, 532.0, 532.2, 532.4, 532.6, 533.0, 533.2, 533.4, 533.6
Disorders of hydro-electrolyte metabolism	276.5, 276.8	Appendicitis with complication	540.0, 540.1
Iron-deficiency anemia	280	Disease of the skin and subcutaneous tissue	681, 682, 683, 686
Convulsions	345, 780.3	Gastroenteritis	558.9
Diseases of the upper respiratory tract	382, 463, 465, 475	Urinary tract infections	590.0, 590.1, 599.0, 590.8
Hypertensive heart disease	401, 402.00, 402.10, 403–405, 410–414, 430, 431, 436, 437.2	Pelvic inflammatory disease	614
Heart failure	428, 402.01, 402.11, 402.91, 518.4		

a: Core ACSC list: To assess effectiveness and quality of PHC.

b: Expanded ACSC list: To assess global PHC performance and marked responsibility for ACSC amongst PHC and Specialist Care.

is that most prior authors did not require it, and because of evidence of the benefit of primary prevention for hypertension as well as other related risk factors. Moreover, the hospitalization rate of this ACSC group increased by 40% when hypertensive heart diseases were considered without an additional condition.

## DISCUSSION

The criteria proposed by Solberg<sup>13</sup> and Weissman<sup>14</sup> proved very useful in this study to identify a core set of ACSC codes. All initial diagnostic codes obtained from the literature were considered conditions for which evidence exists that specific PHC modalities reduce hospitalization rates. However, for many codes, non-fulfilment of the criterion of the need for hospitalization was considered as a main confounding determinant by different authors.<sup>2,8-10</sup> In the case of comparing small areas dependent on different hospitals or for assessing PHC quality, the use of the *core ACSC list* is proposed. This core list reduces significantly the limitations that stem from hospital admission criteria due to patient clinical characteristics, variation in hospital medical practice and hospital admission policies. In contrast, the *expanded ACSC list* should be useful to evaluate global PHC performance or to analyse market responsibility for ACSC among PHC and Specialist Care.<sup>21</sup>

This study added to the literature considering which aspects of PHC were responsible for preventing hospitalization. These included primary prevention (protection of health by personal and community-wide effects by means of interventions addressed to prevent the condition from occurring, for example immunizing against infectious diseases, physical fitness, etc.), early detection and monitoring of acute episodes, and follow-up and monitoring of chronic conditions. However, a single most important intervention for some of health problems could not always be identified, consistent with the notion that clinical interventions often have multiple impacts, as in the case of diabetes or cardiovascular diseases. One possible limitation to the study was the multiple options allowed to the experts for amenability to PHC. This slightly diluted the information obtained and limited identification of the priority intervention. In most chronic health problems with no unique causal factor known, medical interventions should be aimed at reducing or avoiding known trigger or associated factors: early detection of symptoms related to the onset of disease, appropriate treatment once the disease is diagnosed, and adequate monitoring to avoid or delay, whenever possible, the occurrence of acute and chronic complications (*table 4*). Furthermore, it is apparent from the experts' comments that the need for hospitalization is very dependent on other factors, such as age and co-morbidity, in

particular for conditions such as COPD.<sup>34</sup> So hospitalization rates due to ACSC in elderly needs to be controlled by co-morbidities.

The use of each proposed indicator can be a measure of PHC's capability to solve health problems, although the expected effect on potentially avoidable hospitalizations will differ depending on the conditions being treated. Hospitalizations should be essentially eliminated for infectious diseases amenable to primary prevention through immunization (e.g. diphtheria). Or for those that can be prevented either by early diagnosis and treatment of the disease precursor (e.g. rheumatic fever) or at the early stages of the natural course of the disease (e.g. pelvic inflammatory disease); except for populations deprived of medical care (such as recent immigrants from poor countries). On the other hand, for non-infectious diseases the most immediate result should be decline of the occurrence of acute complications (e.g. coma in diabetic patients) and the reduction in hospital re-admissions and their length of stay (e.g. in heart failure).

Little is known about the frequency of hospitalizations for ACSC in different countries, in particular for Europe. Differences in the relative frequency of the different conditions might be evidence of differences in coding or diagnostic practices, in the absence of other plausible reasons. Moreover, the extent to which differences in overall rates of ACSC hospitalizations is associated with differences in the strength of the PHC systems in the different countries<sup>35</sup> appears to be worth exploring, since these hospitalizations have been considered a sensitive marker for the quality of PHC received.

In conclusion, the fulfilment of criteria defining the internal validity of ACSC provides a group of ACSC as markers of PHC effectiveness because they establish health conditions amenable to PHC while minimizing hospital confounder factors. This study has also demonstrated the value of a systematic approach to identifying conditions that are amenable to particular types of PHC interventions to reduce hospitalizations. The methodology would appear to be adequate for trans-cultural adaptation.

Partially funded by a grant of Fondo de Investigaciones Sanitarias (FIS 97/1112) [Health Research Fund]. Sponsored by the Departament de Sanitat i Seguretat Social de Catalunya [Catalan Department of Health and Social Security] and the Universitat Autònoma de Barcelona [Autonomous University of Barcelona]. The authors wish to thank the experts participating in the Delphi study. They are also indebted to Genoveva Barba, Margarita Bou, Montse Bustins, Carmen Cabezas, Lluís Franch and Xavier Mundet for their involvement and contributions to the project, and to Josep M Doménech for his suggestions regarding the methodology.

**Table 4** Role of PHC in preventing ACSC hospitalizations core ACSC list

Type of intervention	Infectious diseases	Non infectious diseases
1 Primary prevention	Infectious diseases susceptible to prevention through immunization	Hypertensive heart disease
2 Early diagnosis and treatment	Rheumatic fever Congenital syphilis Other tuberculosis Peritonsillar abscess Pneumonia Appendicitis with complications Acute pyelonephritis Pelvic inflammatory disease	Diabetes mellitus Disorders of hydro-electrolyte metabolism Hypertensive heart disease Heart failure Bleeding or perforating ulcer
3 Good ongoing, control and management		Diabetes mellitus Hypertensive heart disease Heart failure Bleeding or perforating ulcer

REFERENCES

- 1 Fleming ST. Primary care, avoidable hospitalization, and outcomes of care: a literature review and methodological approach. *Med Care* 1995;52(1):88-108.
- 2 Giuffrida A, Gravelle H, Roland M. Measuring quality of care with routine data: avoiding confusion between performance indicators and health outcomes. *BMJ* 1999;319(7202):94-8.
- 3 Parchman ML, Culler S. Primary care physicians and avoidable hospitalizations. *J Fam Pract* 1994;39(2):123-8.
- 4 Casanova C, Starfield B. Hospitalizations of children and access to primary care: a cross-national comparison. *Int J Health Serv* 1995;25(2):283-94.
- 5 Billings J, Anderson GM, Newman LS. Recent findings on preventable hospitalizations. *Health Aff (Millwood)* 1996;15(3):239-49.
- 6 Friedman B, Jee J, Steiner C, Bierman A. Tracking the State Children's Health Insurance Program with hospital data: national baselines, state variations, and some cautions. *Med Care Res Rev* 1999;56(4):440-55.
- 7 Shi L, Lu N. Individual sociodemographic characteristics associated with hospitalization for pediatric ambulatory care sensitive conditions. *J Health Care Poor Underserved* 2000;11(4):373-84.
- 8 Camberg L, Smith N, Beaudet M, Daley J, Cagan M, Thibault G. Discharge destination and repeat hospitalizations. *Med Care* 1997;35(8):756-67.
- 9 Culler SD, Parchman ML, Przybylski M. Factors related to potentially preventable hospitalizations among the elderly. *Med Care* 1998;36(6):804-17.
- 10 Elixhauser A, Steiner C, Harris DR, Coffey RM. Comorbidity measures for use with administrative data. *Med Care* 1998;36(1):8-27.
- 11 Gervas J, Pérez M, Starfield B. Primary care, financing and gatekeeping in western Europe. *Fam Pract* 1994;11:307-17.
- 12 Groenewegen P, Calnan M. Changes in the control of health care systems in Europe. *Eur J Public Health* 1995;5:240-4.
- 13 Solberg LI, Peterson KE, Ellis RW, et al. The Minnesota Project: a focused approach to ambulatory quality assessment. *Inquiry* 1990;27(4):359-67.
- 14 Weissman JS, Gatsonis C, Epstein AM. Rates of avoidable hospitalization by insurance status in Massachusetts and Maryland. *JAMA* 1992;268(17):2388-94.
- 15 Varela J. Los métodos de consenso en el sector sanitario (Consensus methodology in health services research). *Gac Sanitaria* 1991;5(24):114-6.
- 16 Pill J. The Delphi method: substance, context, a critique and an annotated bibliography. *Soc Econ Plan Sci* 1971;5:57-71.
- 17 Fink A, Kosecoff J, Chassin M, Brook R. Consensus methods: characteristics and guidelines for use. *Am J Public Health* 1984;74(9):979-83.
- 18 Bindman AB, Grumbach K, Osmond D, et al. Preventable hospitalizations and access to health care. *JAMA* 1995;274(4):305-11.
- 19 Pappas G, Hadden WC, Kozak LJ, Fisher GF. Potentially avoidable hospitalizations: inequalities in rates between US socioeconomic groups. *Am J Public Health* 1997;87(5):811-6.
- 20 Lambrew JM, DeFriesse GH, Carey TS, Ricketts TC, Biddle AK. The effects of having a regular doctor on access to primary care. *Med Care* 1996;34(2):138-51.
- 21 Caminal J, Starfield B, Sánchez E, Hermsilla E, Martín M. Primary Health Care and hospitalizations due to ambulatory care sensitive conditions in Catalonia [La atención primaria de salud y las hospitalizaciones por Ambulatory Care Sensitive Conditions en Cataluña, Spanish]. *Rev Clin Esp* 2001;201(9):501-7.
- 22 Catalan Health Service. Discharges from acute care hospitals in Catalonia. Report from the Database set of hospital discharges [Altes dels hospitals d'aguts de Catalunya 1996. Informe del registre del conjunt mínim bàsic de dades d'alta hospitalaria (CMBDAH), Catalan]. Generalitat de Catalunya. Barcelona: Departament de Sanitat i Seguretat Social, 1997.
- 23 Generalitat de Catalunya. Departament de Sanitat i Seguretat Social. The Health Plan at your fingertips (Health Plan for Catalonia 1996-1998). Barcelona: Servei Català de la Salut, 1997.
- 24 Begley CE, Slater CH, Engel MJ, Reynolds TF. Avoidable hospitalizations and socio-economic status in Galveston County, Texas. *J Community Health* 1994;19(5):377-87.
- 25 Billings J, Zeitel L, Lukomnik J, Carey TS, Blank AE, Newman L. Impact of socioeconomic status on hospital use in New York City. *Health Aff (Millwood)* 1993;12(1):162-73.
- 26 Hrdy SA, Hoppe PM, Bouda DW. Nebraska outpatient care quality assessment. *Nebr Med J* 1993;78(2):36-41.
- 27 The Codman Research Group. Background on diagnostic coding taxonomy for Ambulatory Care Access Project. The Codman Research Group, Inc., Lyme: New Hampshire, 1989.
- 28 Billings J, Hasselblad V. A preliminary study: use of small area analysis to assess the performance of the outpatient delivery system in New York City. The Codman Research Group. New York Systems Agency, New York, 1989.
- 29 Committee on Monitoring Access to Personal Health Care Services. Institute of Medicine. Access to health care in America. National Academy Press. Washington DC, 1993.
- 30 Cabezas C, Nebot M, GEPs. Priorities on prevention and health promotion in Primary Health Care: practitioners perspectives [Prioridades en prevención y promoción de la salud desde la atención primaria: la perspectiva de los profesionales, Spanish]. *Atención Primaria* 1991;8(2):99-102.
- 31 Sanderson C, Dixon J. Conditions for which onset or hospital admissions is potentially preventable by timely and effective ambulatory care. *J Health Serv Res Policy* 2000;5(4):222-30.
- 32 Campbell S, Hann M, Roland M, Quayle J, Shekelle P. The effect of panel membership and feedback on ratings in a two-round Delphi survey: results of a randomized controlled trial. *Med Care* 1999;37(9):964-8.
- 33 Fleiss JL. Statistical methods for rates and proportions. 2<sup>nd</sup> edn. New York: John Wiley, 1981.
- 34 Almagro P, Calbo E, Ochoa de Echaguen A, et al. Mortality after hospitalization for COPD. *Chest* 2002;121(5):1441-8.
- 35 Starfield B, Shi L. Policy relevant determinants of health: an international perspective. *Health Policy* 2002;60(3):201-18.

Received 30 August 2002, accepted 12 May 2003