Volume and diagnosis: an approach to cross-border care in eight European countries

P Vallejo,1 R Suñol,2 B Van Beek,3 M J M H Lombarts,4 C Bruneau,5 F Vlček6

ABSTRACT

Objectives: Mobility of patients is a pertinent issue on the European Union’s agenda. This study aimed to estimate the volume and main diagnoses of cross-border care in eight European countries, in order to provide policy makers with background information about the nature of patient mobility in Europe.

Methods: This article reports the combined findings from three independent studies that compiled self-reported information on admissions data and main diagnoses from more than 200 hospitals in eight European countries.

Results: The average volume of cross-border patients accounted for less than 1% of total admissions in the hospitals studied here. Diseases of the circulatory system (mainly acute myocardial infarction) and fractures were the most common reasons for hospitalisation of European patients abroad. Deliveries and other diagnoses related to pregnancy, pneumonia, appendicitis and other diseases of the digestive system, aftercare procedures, and disorders of the eye and adnexa were also common diagnoses for this population.

Conclusions: Hospitals should reinforce their efforts to adapt the care provided to the needs of foreign patients in treatment areas that cover the most frequent pathologies identified in this population.

This study forms part of the Methods of Assessing Response to Quality Improvement Strategies (MARQuIS) project. The objectives of the MARQuIS project are to research and compare different quality improvement policies and strategies in healthcare systems across the member states of the European Union (EU), and to consider their potential use when patients cross borders to receive healthcare. This research was intended to enable an evaluation of the need for formal quality procedures at the EU level for healthcare services, and to support the development of such procedures.

Several studies have been published recently regarding cross-border care, some of them covering different aspects of patient mobility within the EU;3−8 regulations to access services in other member states,9 common cross-border cooperation involving hospitals from a European perspective;8,9 and specific agreements between two or more countries for some treatments.7−9 Although these studies have provided information to help understand the cross-border phenomenon, very few of them included data on the volume and type of care provided, and when such data has been provided it is mostly fragmentary. The few studies that have provided general data about volume considered that patient mobility is increasing, and stated that the current volume of patient mobility seemed to be relatively low (accounting for around 1% of overall public expenditure on healthcare).10−12 Despite these previous studies, we are still missing basic descriptive information about the characteristics of the cross-border care in Europe. The present study aimed to estimate the volume and type of cross-border care in some European countries, and the findings provide policy makers with background information about the nature of patient mobility.

MATERIALS AND METHODS

This article combines the findings from three independent studies, each with its own objectives, population, sampling criteria and data-gathering tool. Two of them, the purposive sample study and the Catalan case study, were conducted as exploratory studies in the beginning of 2005. The third one, the MARQuIS questionnaire study, was conducted during the summer of 2006 to gather more detailed information, and to verify the preliminary findings from the two previous studies.

We have operationally considered volume of care as the number of patients admitted to a hospital for a given period of time, and the number of patients treated in the emergency department for a given period. We studied type of care according to the patients’ main diagnosis, coded by the International Classification of Diseases (ICD) versions 9 or 10. When the ICD10 was used, the diagnoses were re-coded to ICD9 by the research team. For the analysis, single diagnoses were grouped using the ICD-9-CM list of three digit categories.13

Purposive sample study

The aim of this study was to estimate the most common diagnoses in European cross-border care. We analysed volume of admissions and diagnosis data for the year 2003 from hospitals in six of the countries involved in the MARQuIS field test: Belgium, Czech Republic, France, the Netherlands, Poland and Spain. Data were retrieved from the hospitals’ health information systems. The purposive sample procedure included 26 hospitals, selected by MARQuIS country coordinators (researchers from each country), who were asked to identify four hospitals known or assumed (based on available national data) to treat a large number of patients from other European countries. As a data-gathering tool, we developed and piloted the “Review of National Statistics on Health Services to Patients from other European Countries” questionnaire. The questionnaire collected information on hospitals’ activity and patients’ most frequent diagnoses, both for the total population and for foreign EU patients. It also collected activity data about the total population and European foreigners.
treated in the emergency department. Data were gathered during February and March, 2005.

Catalan case study
In another exploratory study we recorded the number of admissions and diagnosis data for the year 2003 from the region of Catalonia (Spain). Data were retrieved from the Minimum Data Set (Conjunto Mínimo Básico de Datos, CMBD) of the healthcare information system of the Catalan Public Hospitals network. The analysis was based on all foreign admissions to all Catalan hospitals during 1 year. As a data-gathering tool we used the questionnaire developed for the purposive sample study, and data were obtained in February 2005.

For the purposive sample and the Catalan study we analysed the differences in type of care for cross-border versus the general population. The most common diagnoses from all hospitals were collated for two groups for each study: European foreigners and the remaining general population. The differences in the incidence of each of the most frequent diagnoses for these two subpopulations were analysed with a hypothesis test for two proportions from independent groups.

MARQuIS questionnaire study
The MARQuIS questionnaire study aimed to measure quality improvement strategies that hospitals in Europe apply, and how well these strategies satisfied cross-border care quality criteria. A total of 1531 hospitals from eight European countries were invited to participate in this study, the inclusion criteria being acute care hospitals with more than 100 beds, and delivering care for at least two of the three selected diagnoses. Hospitals were selected by random sampling, and were stratified into two groups: hospitals known to deliver cross-border care (according to country coordinators), and those that potentially delivered this type of care. Data were collected in 2006 through the web-based MARQuIS questionnaire, a 199-item data-gathering tool that also requested information on the 10 most common diagnoses for foreign European patients admitted to the hospital during 2004. The questionnaire also explored whether the hospitals had agreements in place to deliver care to cross-border patients.

Each hospital provided the list of the 10 most common diagnoses for foreign EU patients in rank order. To analyse this information, the research team weighted the rank of each hospital, so that the diagnosis ranked in position 1 (most frequent) in any hospital was multiplied by 10, the diagnosis ranked in position 2 was multiplied by 9, a rank of 3 was multiplied by 8, and so on until the rank position of 10, which was not multiplied by any factor. The products were summed for each diagnosis to produce total weighted ranks for the group of hospitals. The diagnoses were then ranked in descending order from the highest total weighted rank to the lowest.

RESULTS
In the purposive sample study we received 17 completed questionnaires from the hospitals, for a response rate of 70%. Six countries were represented: Belgium (2 hospitals), Czech Republic (4), France (2), the Netherlands (3), Poland (4) and Spain (2). Some of the hospitals that completed the questionnaire were not able to provide all the data requested, so the analysis included data from 17 hospitals for admissions, and from 11 for the emergency unit.
emergencies and the maternity unit). Fracture of the lower limb was one of the most common diagnoses, however, the research group decided to use appendicitis; although both require emergency care, appendicitis is a specific condition presenting low case variability and was therefore easier to study. The target group of patients with fractures was more heterogeneous owing to a variety of types of fracture (tibia and fibula, hip, etc.), and would have been more complex to analyse.

Regarding the MARQuIS questionnaire, we calculated the global rank for the group of 146 hospitals that provided data on the most frequent primary diagnoses for foreign European admissions. The 17 weighted rank positions are shown in table 3, which lists the 15 most common diagnoses plus two others, included because of their relevant positions in the preliminary rankings from the Catalan and purposive sample studies. According to the MARQuIS questionnaire ranking, ischaemic heart disease was the most frequent diagnosis among hospitalised European foreigners. In fact, including ischaemic heart disease, four diseases of the circulatory system were among the 10 most frequent diagnoses (the others were: other

| Table 1 Cross-border care collaboration between EU hospitals |
|-----------------------------------------------------------|
| **Cross-border care collaboration between hospitals and financiers** |
| | Formal collaboration exists | Collaboration is being considered | No collaboration | Formal financial arrangements with financiers |
| | % (absolute number) | % (absolute number) | % (absolute number) | % (absolute number) |
| France | 4.5 (3) | 7.5 (5) | 71.6 (48) | Yes = 3.0 (3) |
| Spain | 3.6 (4) | 18.9 (21) | 72.1 (80) | No = 85.1 (57) |
| Poland | 7.7 (6) | 48.7 (38) | 38.5 (30) | Yes = 26.0 (20) |
| Czech Rep | 7.7 (3) | 41 (16) | 51.3 (20) | No = 23.1 (9) |
| UK | 8.3 (1) | 16.7 (2) | 66.7 (8) | Yes = 16.7 |
| Ireland | 20.8 (5) | 8.3 (2) | 62.5 (15) | No = 58.3 |
| Belgium | 17.4 (4) | 21.7 (5) | 56.5 (13) | Yes = 26.1 (6) |
| The Netherlands | 22.2 (2) | 11.1 (1) | 66.7 (6) | No = 65.2 (15) |
| Total | 7.7 (28) | 24.8 (90) | 60.5 (220) | Yes = 24.2 (87) |

| Table 2 Preliminary studies of types of cross-border care |
|----------------------------------------------------------|
| **Purposive sample study** |
| **Main diagnosis** | **Number of patients** |
| 1 Ischaemic heart disease (410–414) | 789 |
| 2 Normal delivery, and other indications for care in pregnancy, labour, and delivery (650–659) | 433 |
| 3 Complications occurring mainly in the course of labour and delivery (660–669) | 296 |
| 4 Fracture of lower limb (820–829) | 239 |
| 5 Other forms of heart disease (420–429) | 215 |
| 6 Complications mainly related to pregnancy (640–648) | 165 |
| 7 Persons seeking health services for specific procedures and aftercare (V50–V59) | 153 |
| 8 Fracture of the upper limb (810–819) | 101 |
| 9 Appendicitis (540–543) | 100 |
| 10 Fracture of the skull (800–804) | 87 |
| **Number of patients included** | 3756 |
| **Catalan case study** |
| **Main diagnosis** | **Number of patients** |
| Fracture of the lower limb (820–829) | 102 |
| Ischemic heart disease (410–414) | 84 |
| Appendicitis (540–543) | 59 |
| Fracture of the upper limb (810–819) | 34 |
| Pneumonia and influenza (480–487) | 32 |
| Cerebrovascular disease (430–438) | 29 |
| Other forms of heart disease (420–429) | 27 |
| **Number of patients included** | 1503 |

*DN/NA, don’t know/no answer.*
forms of heart disease, hypertensive disease, and cerebrovascular disease. There were also four diagnoses from the injury and poisoning group in these rank positions, with three different types of fracture and superficial injuries. Two diagnoses for three other groups of pathologies were also included in the ranking: pregnancy, childbirth and puerperium (normal delivery was selected for the MARQuIS project); diseases of the digestive system (including appendicitis, also selected for this study); and diseases of the respiratory system.

Volume of European cross-border care

We defined the volume of EU foreign care as the proportion of European cross-border patients of all the patients treated in any given institution. For inpatient admissions, data were obtained from all three studies. In the purposive sample of 2003, the percentage of foreign European patients out of the entire population admitted to hospitals accounted for 2.4% of the total population hospitalised. In the Catalan case study, foreign European patients represented 0.21% of all admissions in 2003 (714,404 inpatient admissions). No data were available on the distribution of this population among the 69 hospitals included in the study. Of the 389 hospitals that completed the MARQuIS field test questionnaire, only 182 provided data on the volume of foreign EU patient admissions. This group of hospitals indicated that 0.64% of the total population admitted during 2004 was from another European country.

For the emergency department, data were available from a more limited number of hospitals in both the purposive sample and the MARQuIS questionnaire study. No data were available from the Catalan healthcare system on foreign patients treated in emergency departments. The percentage of foreign Europeans treated for emergency care during 2003 in the hospitals included in the purposive sample accounted for 8.55% of the total population treated in these hospitals. Of the 389 hospitals that completed the questionnaire from the main study, only 138 provided data on the volume of foreign EU patients treated in the emergency unit; 1.04% of the population treated in the emergency unit in these hospitals was from another EU country. Table 4 presents the most relevant data regarding the volume of European cross-border care for both inpatient admissions and emergencies.

The MARQuIS questionnaire also explored the volume of foreign Europeans hospitalised for the three pathologies selected for this study because they appeared to be among the most prevalent for this population. Although the overall percentage of foreign Europeans among total admissions in participating hospitals was 0.64%, this percentage was higher for the three pathologies selected for individual analysis: 1.97% for acute

| Table 3 | Ranking of the most common diagnoses for European cross-border hospitalisations |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| Most common diagnostic groups   | Rank position in MARQuIS questionnaire | Rank position in purposive sample | Rank position in Catalan case study |
| Ischaemic heart disease (410–414) | 1 | 1 | 2 |
| Other forms of heart disease (420–429) | 2 | 5 | 7 |
| Fracture of the skull (800–804) | 3 | 10 | 10 |
| Fracture of the lower limb (820–829) | 4 | 4 | 1 |
| Other diseases of the digestive system (570–579) | 5 | | |
| Hypertensive disease (401–405) | 6 | | |
| Persons seeking health services for specific procedures and aftercare (V50–V59) | 7 | 7 | |
| Superficial injury (910–919) | 8 | | |
| Disorders of the eye and adnexa (360–379) | 9 | | |
| Cerebrovascular disease (430–438) | 10 | 6 | |
| Normal delivery, and other indications for care in pregnancy, labour, and delivery (650–659) | 11 | 2 | |
| Chronic obstructive pulmonary disease and allied conditions (490–496) | 12 | | |
| Diseases of other endocrine glands (250–259) | 13 | | |
| Appendicitis (540–543) | 14 | 9 | 3 |
| Pneumonia and influenza (480–487) | 15 | 8 | 5 |
| Complications mainly related to pregnancy (640–648) | 16 | 6 | |
| Fracture of the upper limb (810–819) | 17 | 4 | |
| Complications occurring mainly in the course of labour and delivery (660–669) | 3 | | |

| Table 4 | Estimated volume of European cross-border care for inpatient admissions and emergency care |
|---------------------------------|---------------------------------|
| Inpatient admissions | Emergencies |
| Purposive sample study | Catalan case study | MARQuIS questionnaire study | Purposive sample study | MARQuIS questionnaire study |
| Number of hospitals that provided data | 17 | 69 | 182 | 11 | 138 |
| Number of EU foreigners hospitalised | 12,584 | 1,503 | 30,731 | 18,184 | 56,012 |
| Total number of patients hospitalised | 526,540 | 714,404 | 481,156 | 212,686 | 5,396,435 |
| Percentage of EU patients out of the total number of admissions to the hospital | 2.39% | 0.21% | 0.64% | 8.55% | 1.04% |
| Number of hospitals with no EU foreign admissions | 0 | No data | 19 | 0 | 19 |
| Number of hospitals with >0 to <1% of EU foreign admissions | 10 | No data | 139 | 2 | 96 |
| Number of hospitals with >1 to <5% of EU foreign admissions | 3 | No data | 17 | 6 | 20 |
| Number of hospitals with >5% of EU foreign admissions | 4 | No data | 7 | 3 | 3 |
| Range of percentage of EU patients out of the total number of admissions | 0.01–22.3% | No data | 0–88.24% | 0.1%–9% | 0–11.38% |

Qual Saf Health Care 2009;18(Suppl I):i8–i14. doi:10.1136/qshc.2008.029553
Table 5  Preliminary studies of the main diagnoses for foreign admissions compared with the total population

| Purposive sample study | EU foreign admissions incidence (CI) | Total hospitalisations excluding EU incidence (CI) | p | Catalan case study | EU foreign admissions incidence (CI) | Total hospitalisations excluding EU incidence (CI) | p |
|------------------------|-------------------------------------|---------------------------------------------------|---|---------------------|-------------------------------------|---------------------------------------------------|---|
| **Most frequent diagnoses** |                                      |                                                   |   | **Most frequent diagnoses** |                                      |                                                   |   |
| Fracture of the lower limb (820–829) | 9.05% (7.83% to 10.81%) | 2.00% (1.96% to 2.02%) | <0.05 | Normal delivery and other indications for care in pregnancy, labour and delivery (500–599) | 9.15% (8.58% to 9.73%) | 4.64% (4.58% to 4.69%) | <0.05 |
| Ischaemic heart disease (410–414) | 5.59% (4.48% to 6.83%) | 1.22% (1.19% to 1.24%) | <0.05 | Ischaemic heart disease (410–414) | 8.02% (7.49% to 8.57%) | 3.03% (2.98% to 3.07%) | <0.05 |
| Appendicitis (540–543) | 3.93% (3.00% to 5.03%) | 0.75% (0.73% to 0.77%) | <0.05 | Fracture of the lower limb (820–829) | 2.42% (2.12% to 2.74%) | 0.03% (0.02% to 0.03%) | <0.05 |
| Pneumonia and influenza (480–487) | 2.13% (1.48% to 2.99%) | 1.37% (1.34% to 1.39%) | <0.05 | Other forms of heart disease (420–429) | 1.25% (1.04% to 1.49%) | 0.22% (0.21% to 0.23%) | <0.05 |
| Normal delivery, and other indications for care in pregnancy, labour and delivery (650–659) | 2.00% (1.35% to 2.83%) | 1.81% (1.77% to 1.83%) | 0.289 | Radiotherapy and chemotherapy | 1.21% (1.00–1.44%) | – | – |
| Cerebrovascular disease (430–438) | 1.93% (1.29% to 2.75%) | 0.96% (0.93% to 0.98%) | <0.05 | Appendicitis (540–543) | 1.02% (0.82% to 1.23%) | 0.03% (0.03% to 0.03%) | <0.05 |
| Other forms of heart disease (420–429) | 1.80% (1.18% to 2.60%) | 1.93% (1.90% to 1.96%) | 0.351 | Cerebrovascular disease (430–438) | 0.78% (0.61% to 0.97%) | – | – |
| Disorders of the eye and adnexa (360–379) | 0.13% (0.01% to 0.44%) | 6.86% (6.79% to 6.91%) | <0.05 | Fracture of the upper limb (810–819) | 0.70% (0.54% to 0.88%) | – | – |
| Chronic obstructive pulmonary disease and allied conditions (490–496) | 1.26% (0.76% to 1.96%) | 2.24% (2.20% to 2.27%) | <0.05 | Malignant neoplasm of bone, connective tissue, skin and breast (170–176) | 0.47% (0.34% to 0.62%) | 0.58% (0.55% to 0.59%) | 0.0763 |
| Hernia of the abdominal cavity (550–553) | 0.7% (0.00% to 0.37%) | 1.83% (1.80% to 1.86%) | <0.05 | Other diseases of respiratory system (510–519) | 0.45% (0.32% to 0.60%) | 1.13% (1.10% to 1.15%) | <0.05 |
| General symptoms (780–789) | 1.60% (1.02% to 2.36%) | 1.78% (1.74% to 1.80%) | 0.299 | Diseases of the veins and lymphatics, and other diseases of the circulatory system (451–459) | 0.44% (0.31% to 0.58%) | 0.65% (0.63% to 0.67%) | <0.05 |
| Acute respiratory infections (460–466) | 1.06% (0.61% to 1.72%) | 1.59% (1.55% to 1.61%) | 0.052 | Neoplasms of unspecified nature (239) | 0.42% (0.29% to 0.56%) | 0.82% (0.79% to 0.84%) | <0.05 |
| Arthropathies and related disorders (710–719) | – | 1.53% (1.50% to 1.56%) | 0.01 | Persons seeking health services for specific procedures and aftercare (V50–V59) | 0.35% (0.24% to 0.48%) | 0.57% (0.55% to 0.59%) | <0.05 |
| Other diseases of the digestive system (570–579) | 0.79% (0.41% to 1.35%) | 1.52% (1.49% to 1.55%) | <0.05 | Symptoms (780–789) | – | 0.75% (0.73% to 0.77%) | – |
| Diseases of veins and lymphatics, and other diseases of the circulatory system (451–459) | 0.07% (0.00% to 0.37%) | 1.52% (1.4% to 1.54%) | <0.05 | Disorders of the eye and adnexa (360–379) | – | 0.69% (0.66% to 0.70%) | – |
| Total patients included in these diagnoses | 31.40% | 30.56% | | Total patients included in these diagnoses | 38.19% | 17.78% | |
| Total patients (2003) | 1503 | 712,901 | | Total patients (2003) | 9835 | 630,577 | |
myocardial infarction, 1.70% for appendicitis and 1.62% for deliveries.

Cross-border versus general care

Table 5 summarises the results of the analysis of differences in the incidence of each of the most frequent diagnoses in the local versus foreign populations in the purposive sample and the Catalan study. In the latter, European foreign patients and the general population shared only two of the 10 most common diagnoses (deliveries and ischaemic heart disease). There were differences between groups that were statistically significant (p<0.05) for almost all diagnoses analysed except malignant neoplasm of the female breast. In the purposive case study, four diagnoses (fracture of the lower limb, deliveries, other forms of heart disease and general symptoms) were on the list of most frequent diagnoses for both groups. The differences between groups were statistically significant (p<0.05) for all diagnoses analysed except for these four. This comparison needs to be viewed with caution since data for only the top 10 diagnoses from each hospital were available, and a valid comparison would have required data from the complete database.

The results also showed that the type of care provided to the cross-border population was more homogeneous than the care provided to the general population. In the purposive sample, the 10 most frequent diagnoses accounted for 38.19% of the cross-border population, whereas for general population the 10 main diagnoses accounted for only 18.09% of the total. Similarly, in the Catalan case study 26.08% of cross-border patients were covered by the 10 most common diagnoses, whereas only 15.73% of the general population was accounted for by the top 10 diagnoses.

DISCUSSION

In this study we used different methods and types of data which when aggregated provide an estimate of the volume and type of cross-border care provided within Europe, based on information reported by more than 200 hospitals. The main limitation of this study is that the data were retrieved from hospital healthcare information systems, so the validity of the data is dependent on the limitations of these systems.

Some of the limitations we identified were the inability to independently identify foreign patients in the hospitals’ databases, low validity of information in some cases, and the use of different coding systems. Previous studies of cross-border care have also experienced some of these problems. Other limitations were related to the methods used (such as the fact that one of the two preliminary studies was based on a purposive sample), the limitations inherent in the use of self-reported questionnaires, and possible bias due to the moderately small sample size. However, even in the light of these limitations, the data fulfilled the objectives of the study, since our aim was to provide an estimate of the most common types of patients moving across borders, and of the volume of hospital care these patients represent. Given that this is one of the few studies conducted on volume and type of cross-border care at the European level, the information obtained provides a relevant estimate of this phenomenon, which can inform further studies.

The Catalan case study identified 0.21% of all patients hospitalised as European foreigners. The MARQuIS questionnaire study identified 0.64% of the total admissions in 182 hospitals as European foreign patients. These results are consistent with earlier findings that although the movement of patients across borders has been a reality in Europe for more than 30 years, in terms of numbers it has never been great.

However, it is likely that the numbers in these studies were underestimated. Because our data cover only 1 year, we were unable to investigate changes in these numbers with time. A previous study in Belgium has provided data about the changes in this phenomenon: the number of foreign patients treated in Belgium under the E112 system increased from 10,773 in 1998 to 22,477 in 2003, a change that suggested a major increase in the number of cross-border episodes. The results for volume of cross-border care in the purposive sample studied here were not representative, due to biases inherent in the selection criteria. However, it is interesting to note that the percentage of European patients treated in the emergency services referred to the total population treated was almost double the percentage of elective hospitalisations. As expected, this finding was corroborated by the results of the MARQuIS questionnaire, which adds weight to the construct validity of these studies.

Regarding type of care, diseases of the circulatory system have been identified as the most common reason why European patients are hospitalised abroad. Ischaemic heart disease (mainly acute myocardial infarction) was the most frequent diagnosis in this population. Fractures also ranked near the top of the list of diagnoses for cross-border hospitalisations, and fractures of the lower limbs and skull were the most frequent types. These two ICD groups—diseases of the circulatory systems, and injury and poisoning—were the most important ones for this population. Other common diagnoses identified were deliveries and other diagnoses related to pregnancy, which accounted for completely different group of patients with very specific characteristics and needs. Other acute pathologies such as appendicitis or pneumonia ranked high, as did other diseases of the digestive system, aftercare procedures and disorders of the eye and adnexa.

Other studies that have focused on treatment provided in a specific region yielded findings not unlike ours. Hospitals in the Grand Duchy of Luxembourg recorded the main causes of hospitalisation of foreign patients in 2002 as injuries (16%); disorders of the osteoarticular system, muscles and conjunctival tissue (12.9%); and cases related to pregnancy and birth (11.4%). In a Belgian case study with data from the year 2002, the main ICD diagnoses for European foreign admissions were chemotherapy, procreative management, coronary atherosclerosis and follow-up examination after surgery. The type of care identified in the Belgian study seems to differ clearly from the results of the present study, and many factors might have influenced these differences. Comparing Belgium with Catalonia (both studies are based on the total population), Belgium had more than 14 cross-border agreements for the treatment of patients in 2003, whereas Catalonia only had one.
Summary of findings

Based on data from hospitals in this study:

- Less than 10% of the hospitals have an agreement for cross-border care
- The main conditions that accounted for cross-border hospitalisation were: diseases of the circulatory system (ischaemic heart disease), injury (fractures) and poisoning, and pregnancy, childbirth and puerperium (normal delivery)
- Cross-border patients were admitted to hospitals with more acute pathologies than the general population (more chronic)
- EU cross-border admissions accounted for less than 1% of all hospitalisations (around 0.07%)
- The volume of cross-border patients seen in emergency departments was almost double that for hospital admissions

and Catalonia received 20.4 million foreign visitors (6.8 million population) that year, whereas Belgium had 6.6 million foreign visitors (10.4 million population). Although more variables could be included in the analysis, it appears that two different categories of cross-border care were investigated in these studies. Further research on this topic should independently address the characteristics of each category of cross-border care, since the diagnoses in each category seem to be different, and therefore the circumstances and needs of patients in different groups would be expected to differ.

Our analysis of the differences in cross-border versus general care confirms the hypothesis that the type of care provided to hospitalised cross-border patients seems to be more homogenous than the care provided to the general population. The data also showed that cross-border patients were hospitalised for more acute pathologies than the general population, which was characterised by a greater mix of chronic and acute diagnoses upon hospital admission. These differences have economic implications, as in most cases payment is based on admission and not on the type of care provided. Because cross-border patients are hospitalised mainly for more acute pathologies than the general population, and the former are likely to consume more staff time for information and support, the real cost of treatment for cross-border patients may well be higher than the cost of treatment for the general population. Possible differences in costs according to different diagnoses should be taken into account by European policy makers.

The information provided by this study could be used by policy makers in efforts to regulate cross-border care. Our findings concerning type of care may also be helpful for hospitals in their efforts to adapt the care provided to the needs of foreign patients, specifically for the management of the pathologies we have identified as being encountered most frequently.

Acknowledgements: This project would not have been possible without the efforts and contributions of the participating hospitals. We gratefully acknowledge the support of the Servei Catala de la Salut, which provided us with data from the Catalan Joint Minimum Basic of Data. The advice and collaboration of country coordinators, partners, and researchers of the MARQuIS team are also gratefully acknowledged: P. Doets, H. Beard, A. Jacquerye, A. Vleugels, I. Stanek, E. O’Connor, B. Kutyba, N. Kizhanga, P. Garell, C. Shaw, K. Waliche, P. Poletti, C. Cucic, A. Thompson, I. Rupp, O. Groene, K. Hanslik, E. Spencer and G. Escaramís.

Funding: This study was conducted within the Methods of Assessing Response to Quality Improvement Strategies (MARQuIS) research project (SP21-CT2004-513712). This research is funded by the European Commission through its Scientific Support to Policies action under the Sixth Framework Programme for Research.

Competing interests: None.

REFERENCES

1. Suiol R, Garell P, Jacquerye A. Cross-border care and healthcare quality improvement in Europe: the MARQuIS research project. Qual Saf Health Care 2009;18(Suppl 1):3–7.
2. Rosenmüller M, McKee M, Baeten R. Patient mobility in the European Union. Learning from experience. Copenhagen: World Health Organization, 2006, on behalf of the Europe 4 Patients project and the European Observatory on Health Systems and Policies.
3. Glinos IA, Baeten R. A literature review of cross-border patient mobility in the European Union. Observatoire social européen, 2006. http://www.osse.be/files/health/ WP12_lit_review_final.pdf (accessed 11 December 2008).
4. Sellers C. Cross border access to healthcare services within the European Union. World Hosp Health Serv 2006;42:23–5.
5. Standing Committee of the Hospitals of the European Union. Hospital co-operation in border regions in Europe. Brussels, June 2003.
6. Standing Committee of the Hospitals of the European Union. Hope conference and workshop: free movement and cross-border cooperation in Europe: the role of hospitals & practical experiences in hospitals. Luxembourg: Entente des Hopitaux Luxembourgoises (EHL), June 2003.
7. Post GB. Building the Tower of Babel: cross-border urgent medical assistance in Belgium, Germany and The Netherlands. Pneumohospital Disaster Med 2004;19:235–44.
8. Hermans HE, den Exter A. Cross-border alliances in health care: international cooperation between health insurers and providers in the Euregio Meuse-Rhine. Croat Med J 1999;40:266–72.
9. Boten G, Greppend S, Nerland SM. Trading patients. Lessons from Scandinavia. Health Policy 2004;69:317–27.
10. Sylvest J, Beale A. Briefing note: The impact of the European Court of Justice. Case Law on National Systems for Cross-Border Health Service. DG INTERNAL POLICIES OF THE UNION. Policy Department Economic and Scientific Policy http://www.europarl. europa.eu/compar/imzx/studies/0701_healththev_briefingnote_en.pdf (accessed 11 December 2008).
11. American Medical Association. International classification of diseases, Ninth Revision, Clinical Modification (ICD-9-CM). Volumes 1–3. Hyattsville, MD: US Department of Health and Human Services, Centers for Disease Control and Prevention, 2004.
12. Lombarts MJHM, Rupp I, Vallejo P, et al. Application of quality improvement strategies in 389 European hospitals: results of the MARQuIS project. Qual Saf Health Care 2009;18(Suppl 1):28–37.
13. Busse R. Border crossing patients in the EU. Eurohealth 2002;8 Special Issue:19–21.
14. Mckee M, Mossialos E, Beaten R, eds. The impact of EU law on health care systems. European Observatory on Health Systems and Policies series. Brussels: P.I.E. Lang, 2002.
15. Palm W, Nickless J, Llewalle H, et al. Implications of recent jurisprudence on the co-ordination of health care protection systems—general report produced for the directorate general for employment and social affairs of the European Commission. Brussels: Association International de la Mutualité, 2000.
16. Luxdorsan. Offre de soins et mobilité à l’intérieur de l’espace transfrontalier Lorraine. Grand-Duché of Luxembourg, Province of Luxembourg, Groupement Européen d’Intérêt Economique (GEE), 2004.
17. Movimientos Turísticos en Fronteras (Frontour). Instituto de Estudios Turísticos. Área de Estudios e Investigación. Servicio de Estudios. Ministerio de Industria, comercio y turismo, 2003 [In Spanish]. http://www.iet.tourpain.es/informes/documentacion/fronter/MovimientosTuristicosEnFronteras2003.pdf (accessed 11 December 2008).
18. Tourism statistics. 2007 edition. Eurostat pocketbooks. Luxembourg: Office for Official Publications of the European Communities, 2007. http://epp.eurostat.ec. europa.eu/cache/ITY_OFFPUB/KS-DS-07-001/EN/KS-DS-07-001-EN.PDF (accessed 11 December 2008).

Qual Saf Health Care 2009; 18(Suppl 1):i8–i14. doi:10.1136/qshc.2008.029553