

Analysis of the development of quality indicators in a Central Hospital

AZEVEDO, B. F. G.¹; FONSECA, A.L. C. M.¹; MACHADO, L.G.N.¹; MAIA, R.M.¹; MARINHO, G.M.¹; SANTOS, J.R.N.M.¹; SOUSA, N.J.F.S.¹; TAVARES, P.F.¹
FREITAS, J.A.S.²

¹ Class 21, Introdução à Medicina, Faculdade de Medicina da Universidade do Porto

² Adviser, Introdução à Medicina, Faculdade de Medicina da Universidade do Porto

Ana Luísa Coelho Magalhães da Silva, analcmf@gmail.com
Bárbara Filipa Gomes Azevedo, barbarazevedo4@hotmail.com
Gonçalo Magalhães Marinho, marinhogoncalo@hotmail.com
Joana Raquel Neto Marques dos Santos, joaninha_rnms@hotmail.com
Nelson Joaquim Fortuna de Sousa, nelsonzizou@gmail.com
Pedro Filipe Tavares, pedro_f_tavares@hotmail.com
Rosana Magalhães Maia, rosana.8.maia@gmail.com
Tiago Luís Gonçalves Neves Machado, mimed08233@med.up.pt

José Alberto Silva Freitas, alberto@med.up.pt

ABSTRACT

The analysis of hospital quality and management indicators and their evolution through time is essential for a proper evaluation on the hospital services and has the aim of improving its efficiency maintaining the trust of its users. These indicators have been used in several studies concerning various countries all over the world. Because, as far as we know, there are no previous studies in Portugal which used this methodology, this paper aims to assess the Portuguese health care quality system. It also aims to analyze the development of quality and management indicators of Hospital S. João and to analyze each indicator in particular in order to understand their relation with different variables like age, sex and others.

This is an observational and retrospective study which used all inpatient admissions data, spanning from 1999 to 2008, from a nationwide acute care hospital database comprising 500000 records. We have been processing the database on patient admissions of Hospital S. João since 1999 to 2008 by using the statistical software SPSS, to analyze the data of each indicator following specific rules to each one. It seems to be some differences, among the evolution of each indicator. Although, we can conclude that the system is performing satisfactorily, which reveal an improvement of the quality of health care in the last ten years.

KEY-WORDS: *Quality Indicators, Health Care; Health Status Indicators; Diagnosis Related Groups (DRGs); Health Care Quality, Availability of health services; Primary Care; Delivery of Healthcare*

INTRODUCTION

Healthcare professionals are faced with the challenge of delivering improved care, and at the same time finding ways of cutting costs and reducing the length of hospital stays (1). Recently, the assessment of satisfaction with healthcare gained importance as a measure of quality in the provision of healthcare procedures, so that during the last decades, the activities of quality assurance and improvement have been seen as part of medical care procedures and even of political programs (2). The population, in general, as a result of new information technologies and high standards of life imposed by the dominant values, has also become more demanding about access to and better informed on services that are provided (3).

Prevention is one of the most important issues for healthcare providers. To fulfill this role competently, the medical community must obtain information regarding their services and needs to compare this information over time. For that, the Agency for Healthcare Research and Quality (AHRQ, United States) developed a set of quality indicator, which provides reliable data and tools, used to improve healthcare conditions.

Therefore, quality Indicators are used by national and local policy makers, healthcare leaders and clinicians to assess and evaluate the processes of care in a need to highlight potential quality concerns, identify areas needing further study and investigation and track changes over time through comparative information about healthcare quality (4).

The implementation of quality improvement interventions can reduce the high cost of medical care for individuals and the impact on national economies. Monitoring and improving the quality of health care has become a priority along with ensuring appropriate access to it. (5)

The indicators of quality allow an evaluation of the services such as prolonged hospitalization without complications and comorbidities, undue short-term hospitalization and surgical procedures nonspecific. Indicators of healthcare are responsible for an evaluation on how the services provided to patients while they are under medical care at the hospital have changed through time. The exceptional episodes of hospitalization, the surgical time of admission, the readmitted, the vaginal birth and medical complications in diagnosis related groups (DRGs) (6) are some examples of this type of indicators.

These indicators use information related to the patients available in the central hospital's database, which includes data such as the direct admissions or patient transfer, the status of the patient when being admitted and mortality.

Clinical care increasingly requires healthcare professionals to access patient record information that may be faster distributed, and across multiple sites, representing a wide range of information for all other healthcare professionals. In hospitals, information technologies tend to combine different modules or subsystems, resulting in a best-of-breed approach (7). Integration of healthcare information systems is essential to support shared

care in hospitals, to provide proper care to mobile individuals and to make regional healthcare systems more efficient (7). Thus, the Hospital S. João, the main Hospital of northern Portugal with over 1350 beds, record all the information of their patients in an electronic database (8). This informatics system allows healthcare professionals, from these hospitals, to providing quick access to important data, making it a key tool in monitoring and improving the quality of healthcare (8).

Therefore, the aim of this study was to analyze the evolution of quality indicators, in a central hospital in Portugal, and try to conclude if there is an improvement of health care over the past 10 years (since 1999). We will try to examine if these developments are independent or are likely to be related. However, our goal is not to propose any solution, regardless of the outcome, since it would require more information and analysis.

MATERIAL AND METHODS

Study and Participants

The data on the inpatient admissions was collected from an acute care hospital database, comprehending 500000 records.

In general, indicators are units of measurement for an activity which can be used as guides to monitor and evaluate the quality of care provided to patients (1) and to evaluate the efficiency and effectiveness of a hospital.

In order to fulfil the comparative purpose of our study, we decided to divide the indicators into three categories: activity/production, quality of data and quality of health care.

Indicators of activity/production are more likely to be discussed in quantitative terms, such as outpatient and newborns.

Indicators of quality of data allow an evaluation of the quality of the services such as prolonged hospitalization without complications and comorbidities (CC).

Indicators of health care quality are responsible for an evaluation on how the services provided to patients while they are under medical care at the hospital have changed through time. The exceptional episodes of hospitalization, the natural birth and medical complications in diagnosis related groups (DRGs) (6) are some examples of this type of indicators.

Considering that the analysis of basic healthcare comes from calculation of the admission rate and, being these calculated as a quotient between the numbers of cases which fulfill all the required criteria and the target population, the evaluation of the cases is done through the reading of its main diagnosis. If it meets the inclusion criteria and is not set aside by the exclusion criteria (as defined as AHRQ), it is taken into account to calculate the indicator. SPSS 15.0 program for Windows (9) and Microsoft Excel were used to assist all the statistical and mathematical calculations.

To fully understand exclusion criteria, it is necessary to understand the concept of threshold and of ceiling, as well as the inclusion criteria.

Inclusion criteria are specific to each quality indicator. It cannot be forgotten that all these criteria were established by AHRQ, so they are the product of extensive research and critical thinking (10).

The outcome of the aforementioned calculations is the product of our statistical analysis and will be the basis of the following analyze of healthcare quality evolution through the last ten years.

Study Design

Our study can therefore be defined as observational and retrospective, since there is no intervention, longitudinal because it has a followed period (10 years) and analytical, since its purpose is to draw conclusions from the results.

Data Collection Methods

Research was done in search engines such as PubMed, some information was also provided after meeting with the assistant and we analyzed several articles in order to gather the information we need to understand each indicator, and to understand how to calculate them.

Variables Description

Indicators of Health Care Quality:

Natural/Caesarean childbirth:

- It measures the proportion of vaginal and caesarean births in all births assisted (Natural and Cesarean births), by analyzing the statements of live births in the central hospital in study.
- There are many codes for this indicator; they include V27x (in diagnosis) except those relating to cesarean births which are coded 74xx (in procedures).

Medical DRGs complications:

- Complications are situations whose presence, together with the primary diagnosis, leads to an extension of the internment of at least a day in 75 or more % of patients. As a result there is an increase of the time of hospitalization as well as the resources spent.
- Used in the system of classification of DRGs to distinguish pairs of groups that, with the same characteristics (primary diagnosis, procedures, secondary diagnosis, age, sex and destination after discharge), have one or more additional diagnosis.

Indicators of Activity/Production:

Newborns:

- The product of a pregnancy, a child that has just been born, a baby aged up to four weeks (28 days).
- They are defined by internment episodes where the code begins with the primary diagnosis “V3”, which means every code is represented as “V3x.xx”.

Indicators of Data Quality:

Long Term Hospitalizations:

Episodes whose time of hospitalization are at or above the maximum threshold of a certain DRG (twice the upper threshold minus the average delay of that DRG). (5. IGIF (Instituto de Gestão Informática e Financeira da Saúde)

Short Term Hospitalizations:

Episodes whose time of hospitalization are at or below the lower threshold for exclusion from its Diagnose Related Group, which corresponds to 1,96 Standard Deviations below the national average delay for the same DRG. (IGIF (Instituto de Gestão Informática e Financeira da Saúde)

The time of hospitalization could be substantially reduced in case of deceased patients, patients transferred to another hospital or those who left against medical advice.

Nonspecific surgery procedures:

- Includes all surgery procedures on operatory room that are not specific, because they haven’t relevance enough for being classified as that.

Statiscal Analysis

The statistical analysis is focused on the hospitalizations in Hospital de S. João in a period of ten Years (1990-2008) and our target population is the inpatient episodes in this Central Hospital.

RESULTS

The main characteristics of the inpatient database are shown on Table 1

Table 1 Characteristics of the analysed population

AGE		SEXO	
Mean	42,99	Male	47,7%
Minimum	0	Female	52,3%
Maximum	105	Total	100%

The analysis of quality and management indicators was conducted by year. The results for each indicator are shown in section Figures and Tables.

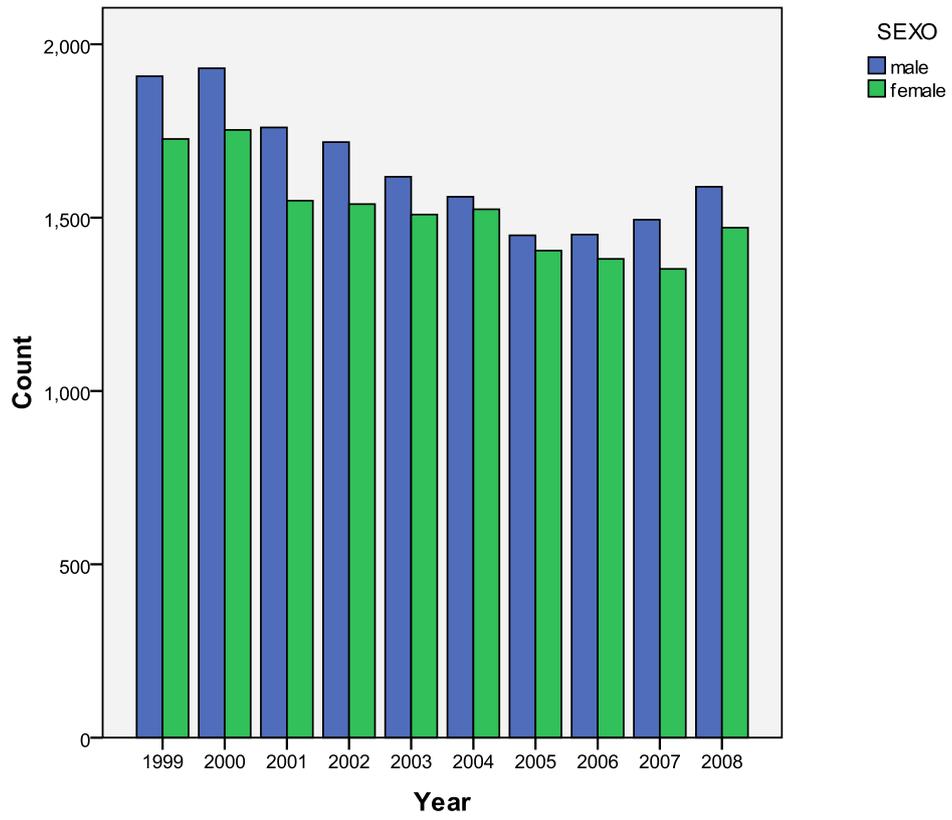


Fig 1. Newborns.

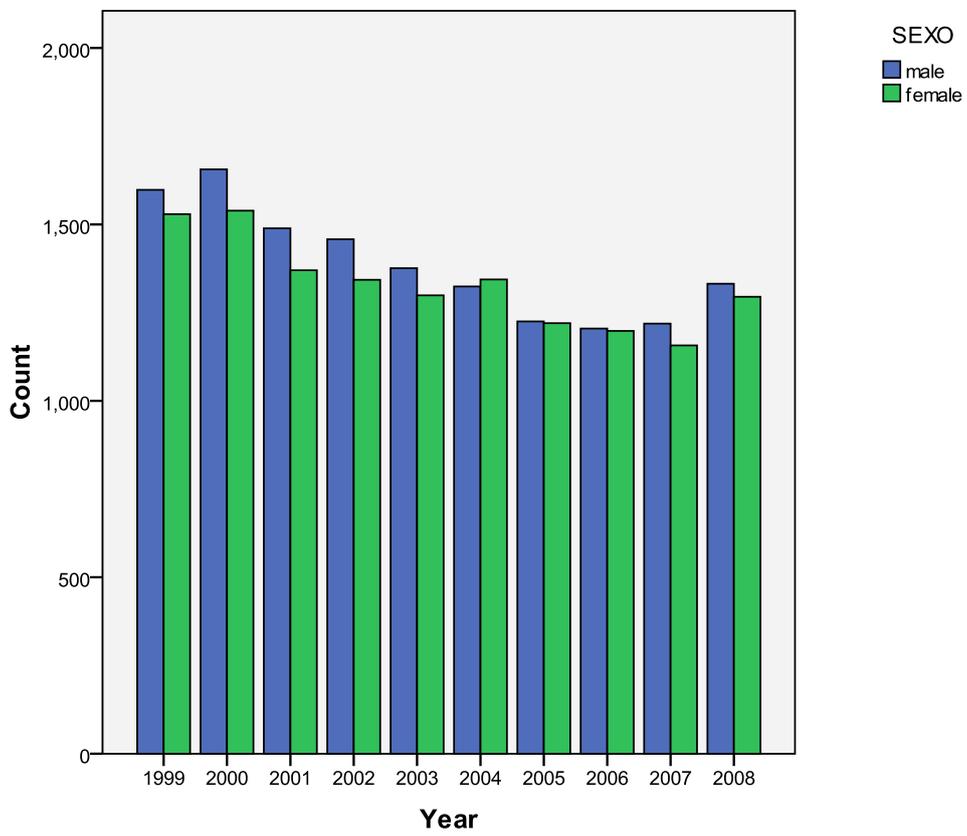


Fig 2. Newborns without CC per year.

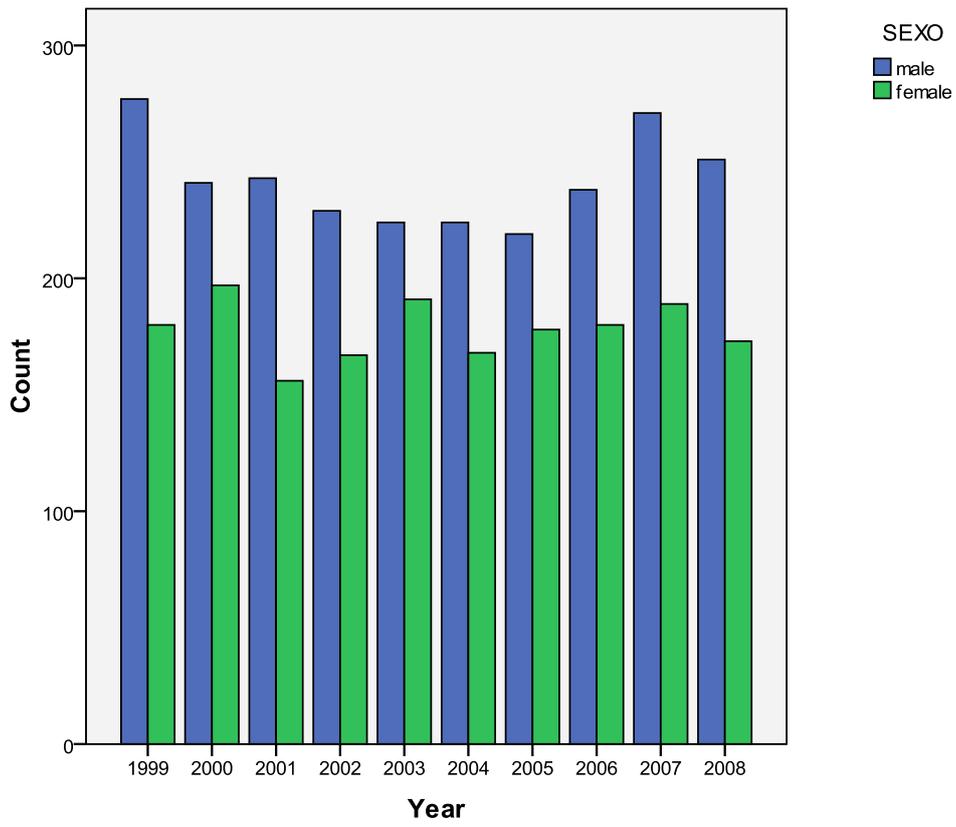


Fig 3. Newborns with CC per year.

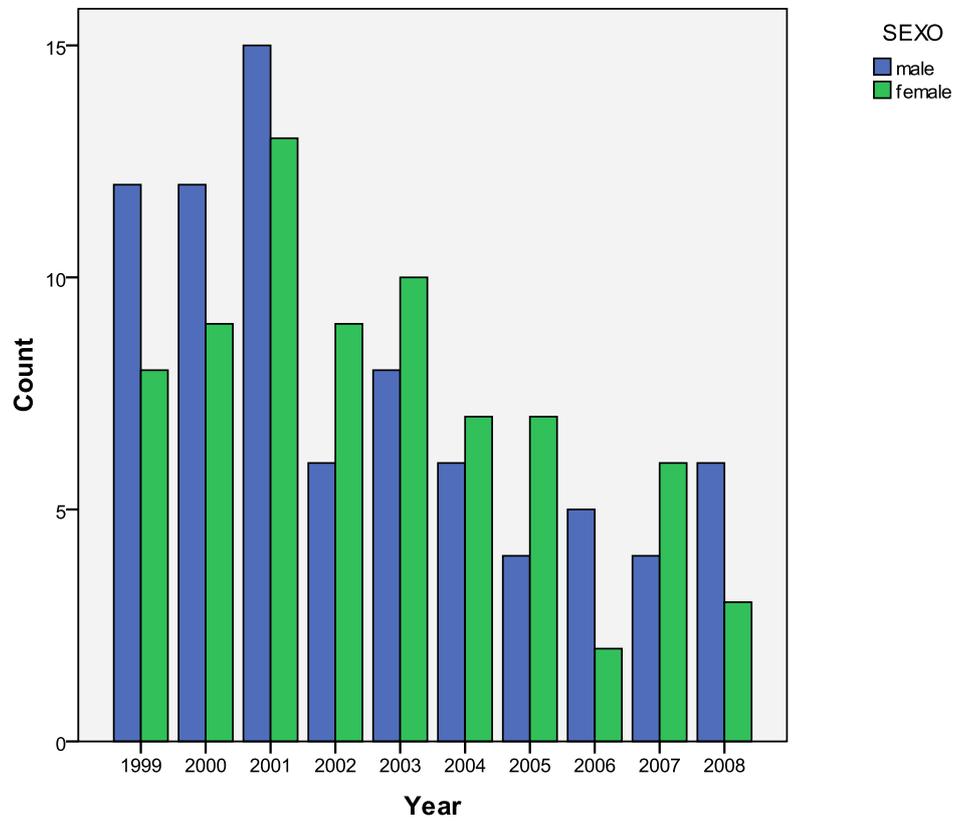


Fig 4. Newborns death per year.

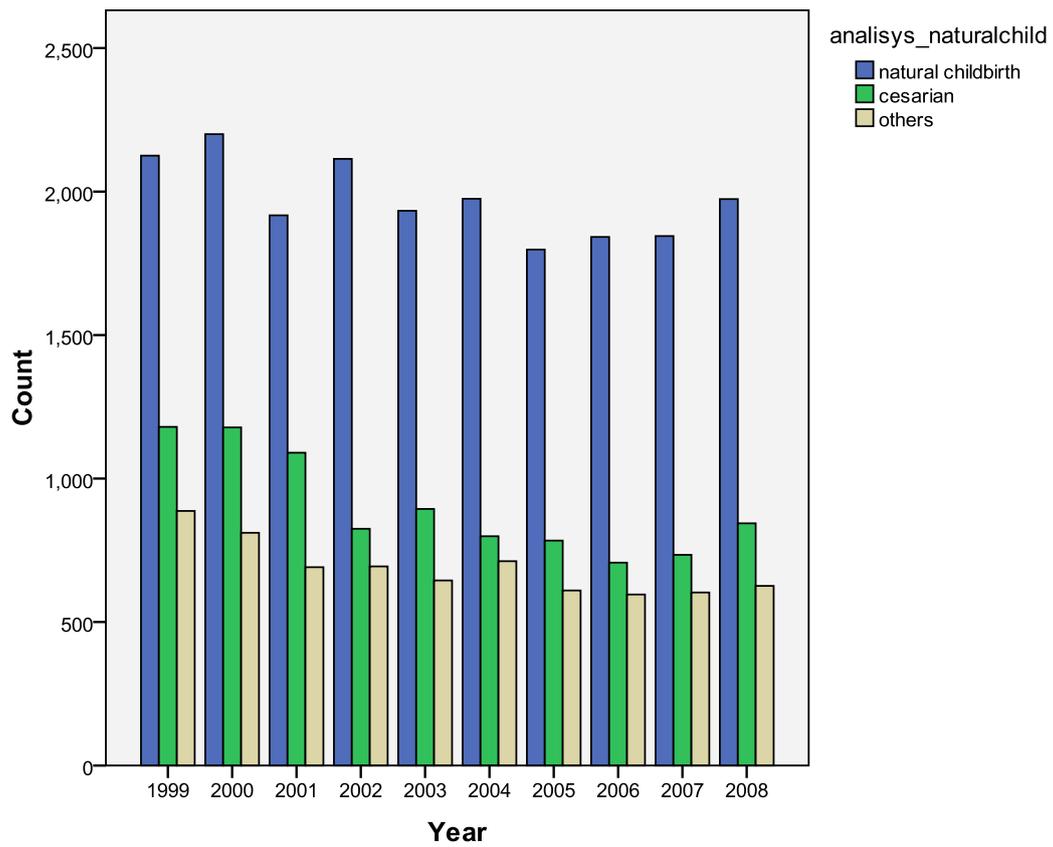


Fig 5. Natural/Caesarean childbirth.

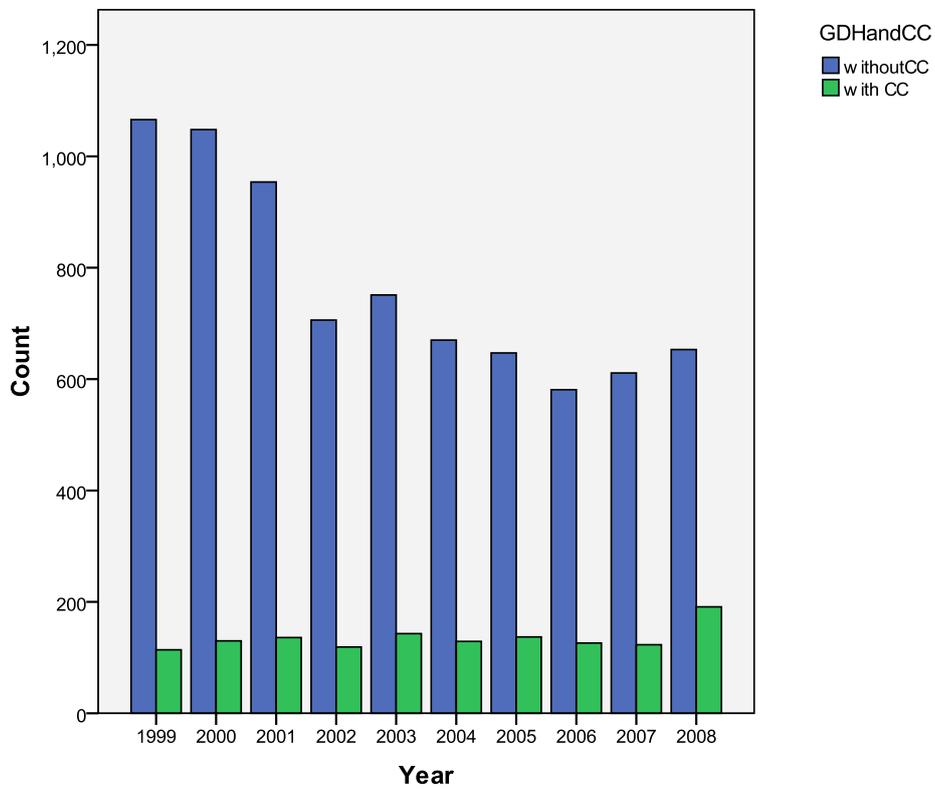


Fig 6. Caesarean birth with and without CC.

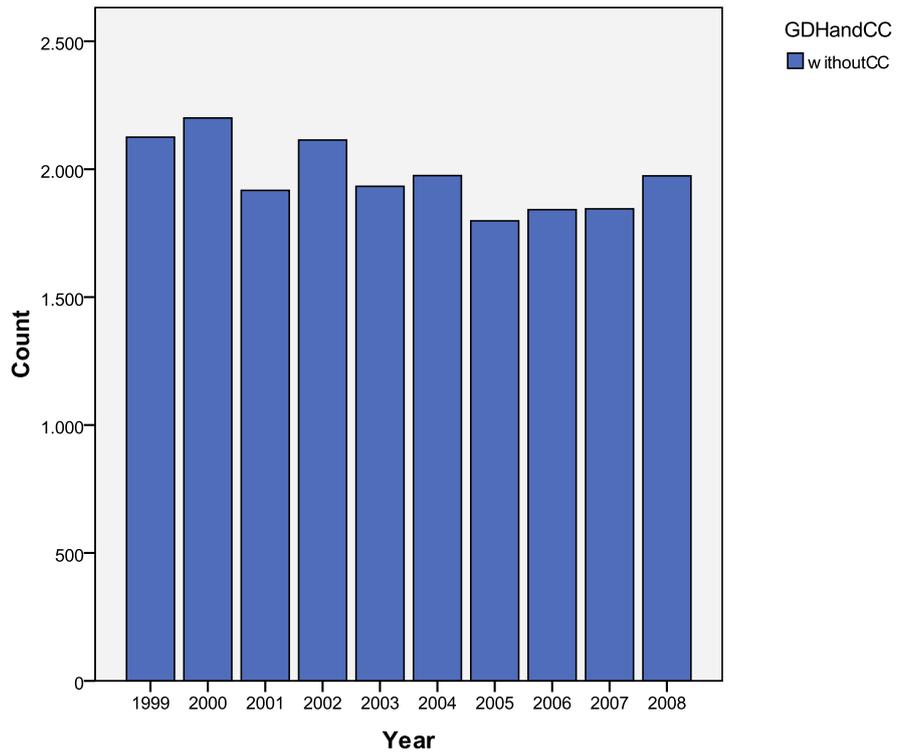


Fig 7. Natural childbirth with and without CC.

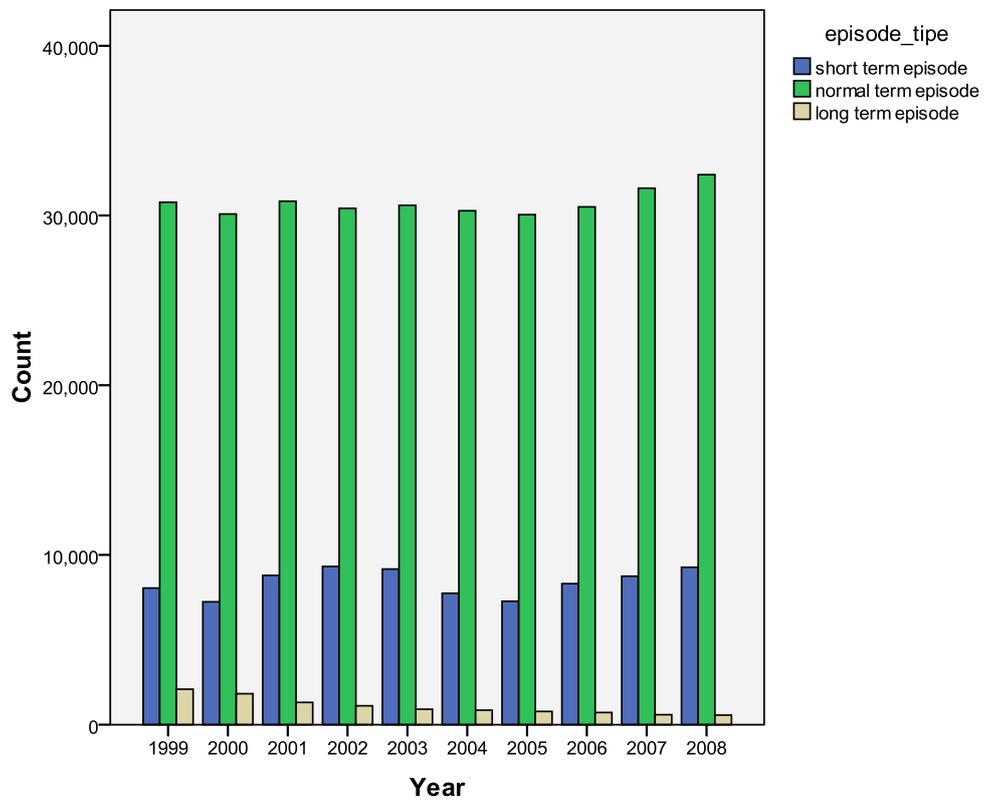


Fig 8. Types of episodes.

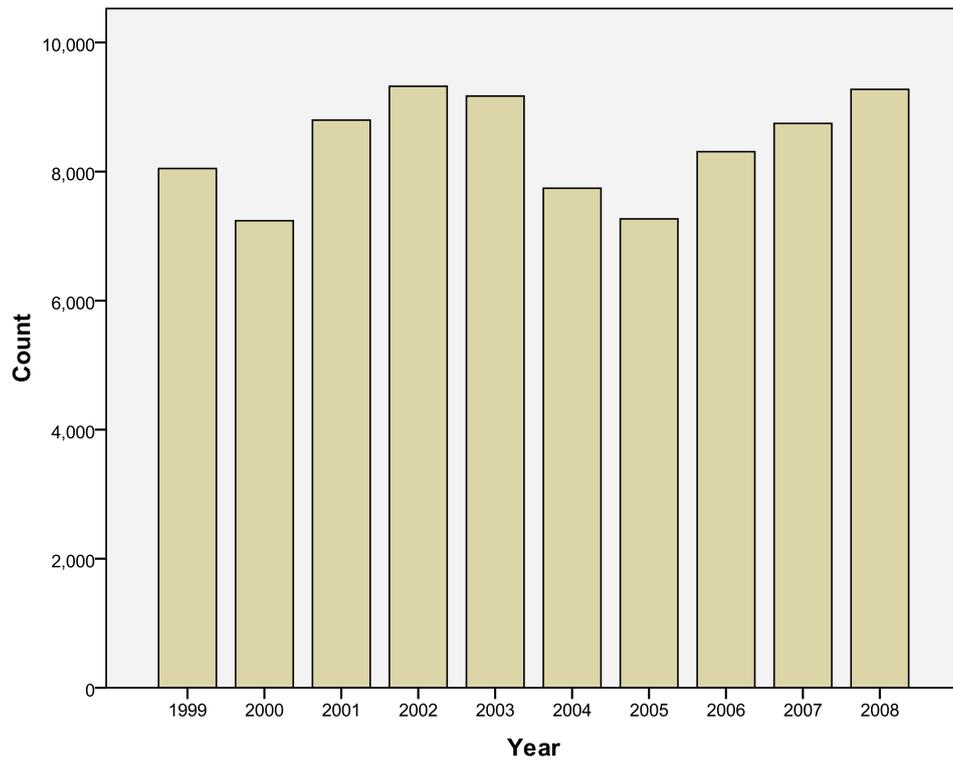


Fig 9. Short term hospitalization.

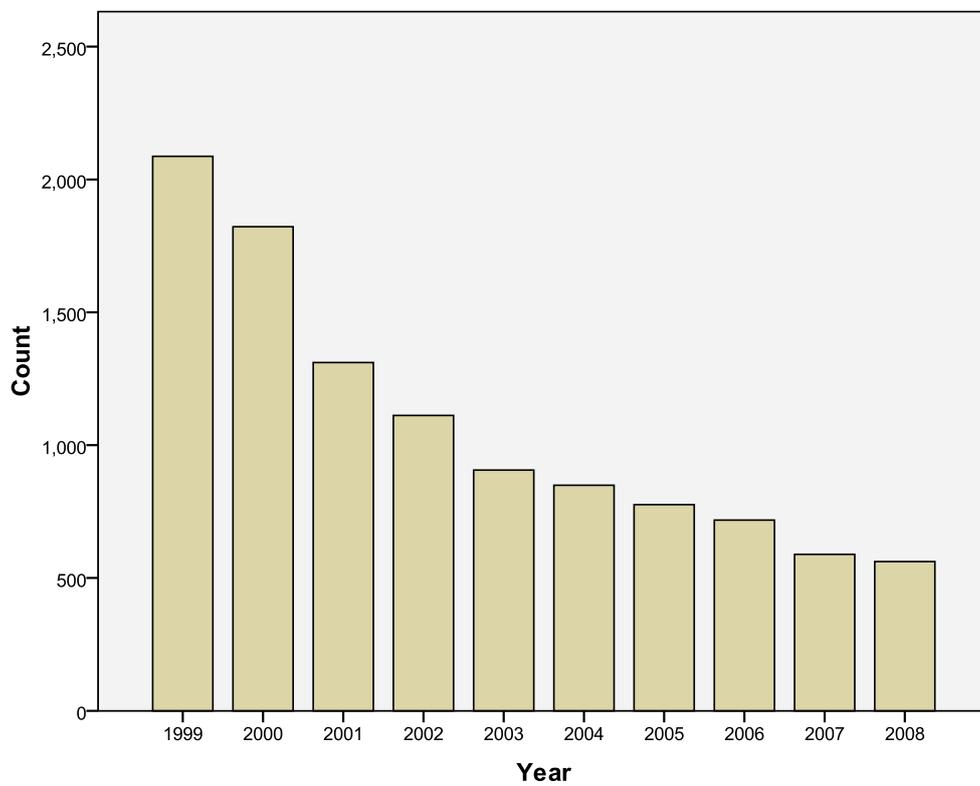


Fig 10. Long term hospitalization.

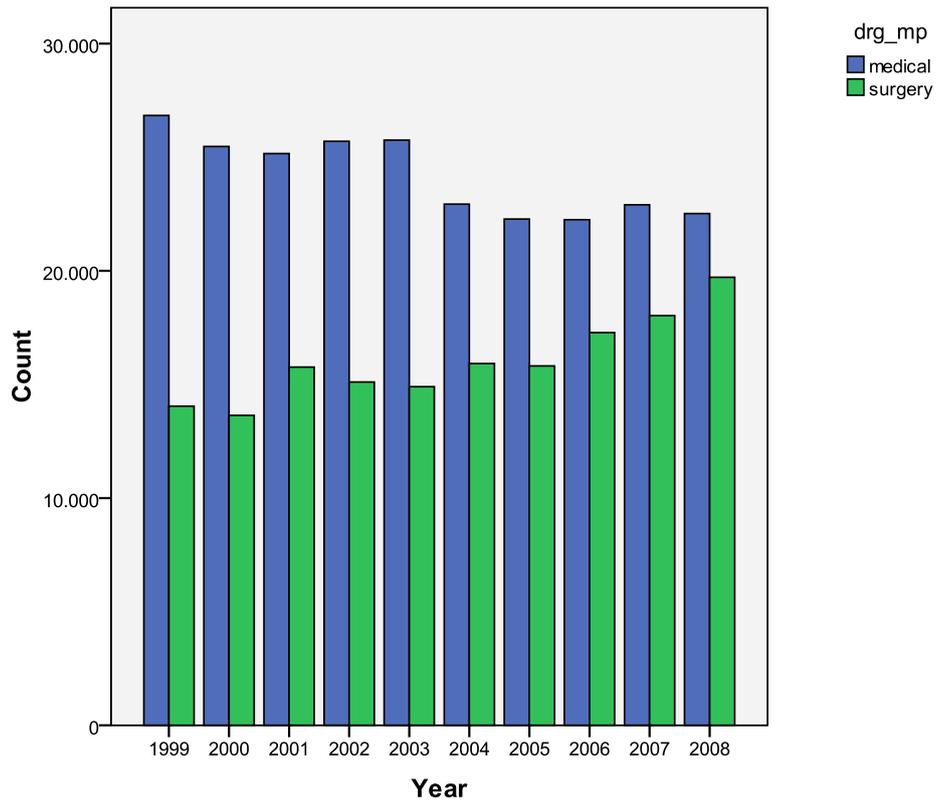


Fig 11. Medical vs surgery Drg's.

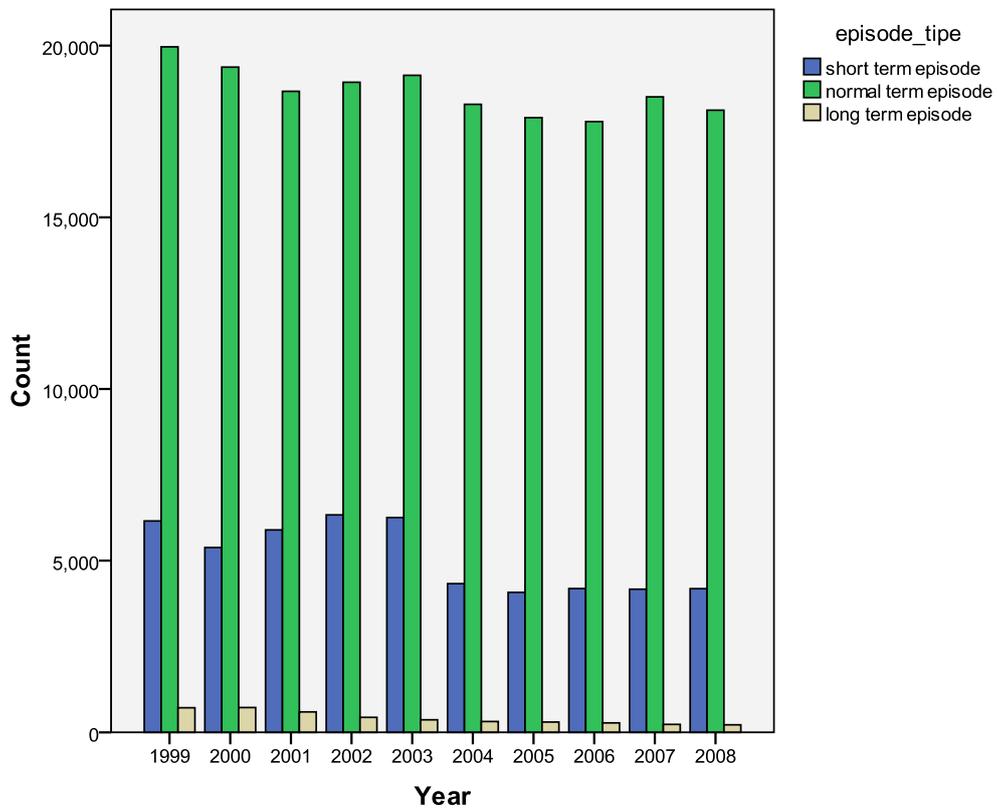


Fig 12. Medical Drg's.

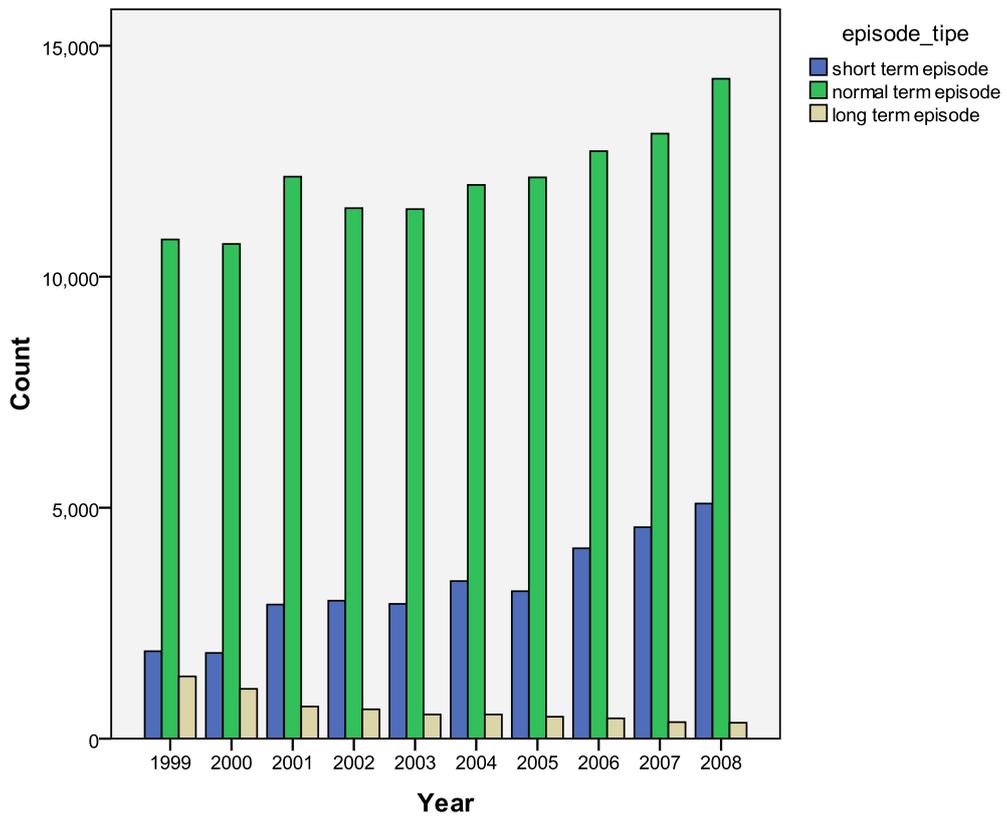


Fig 13. Surgery Drg's.

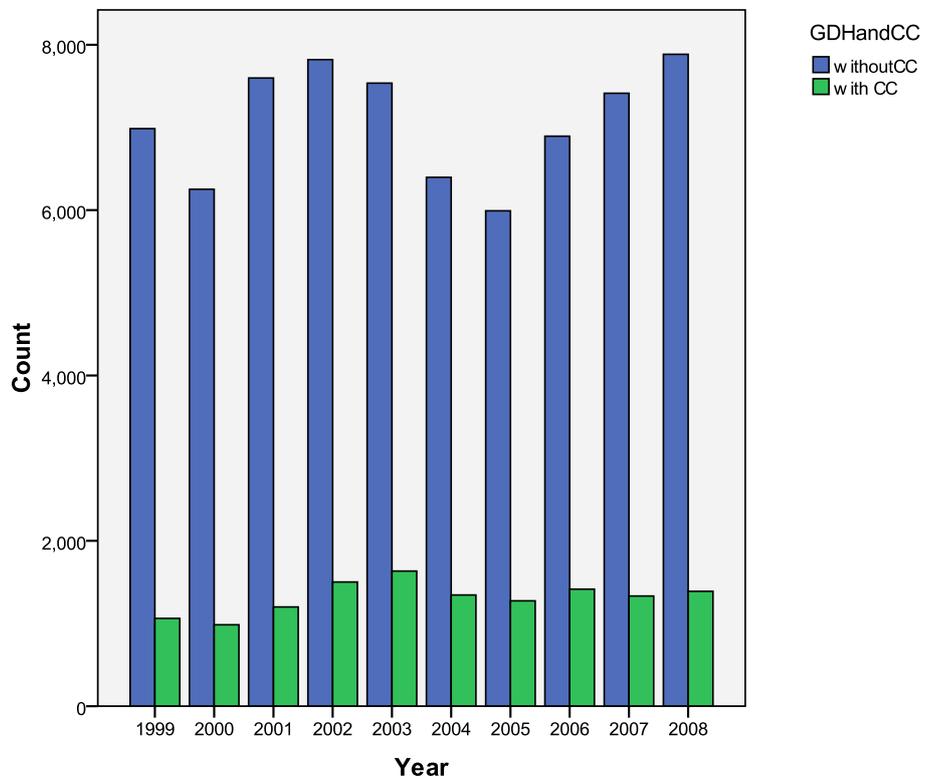


Fig 14. Short Episodes with and without CC.

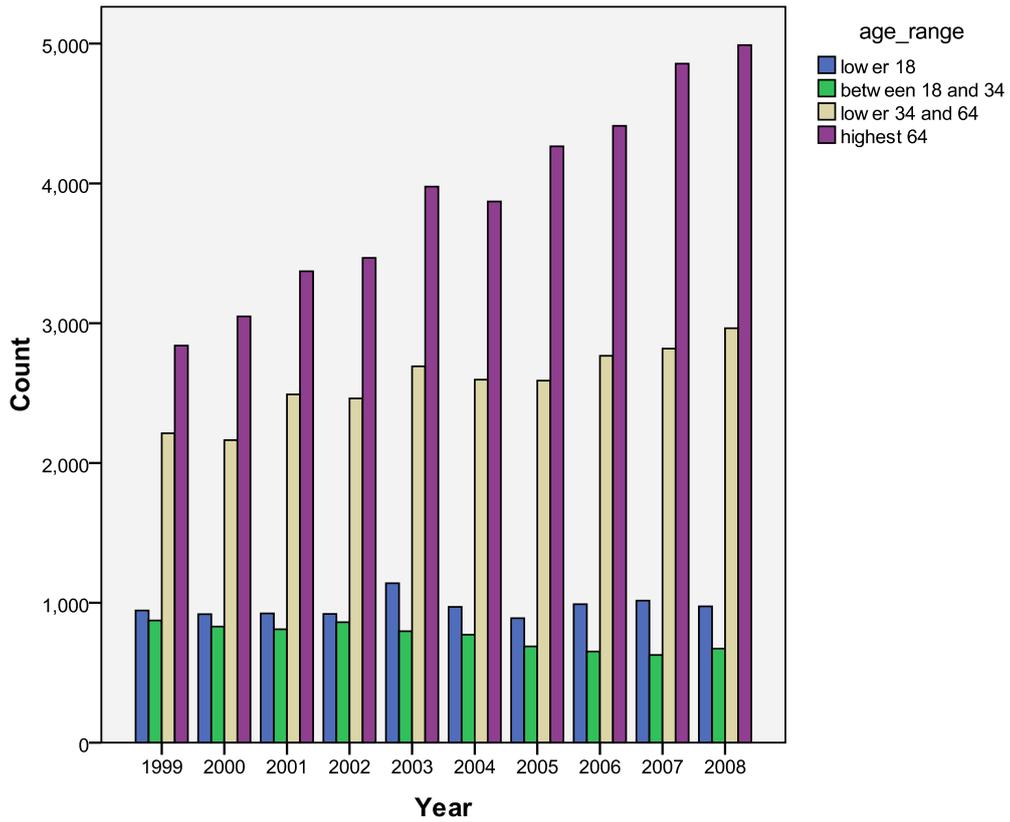


Fig 15. DRG's with CC by age.

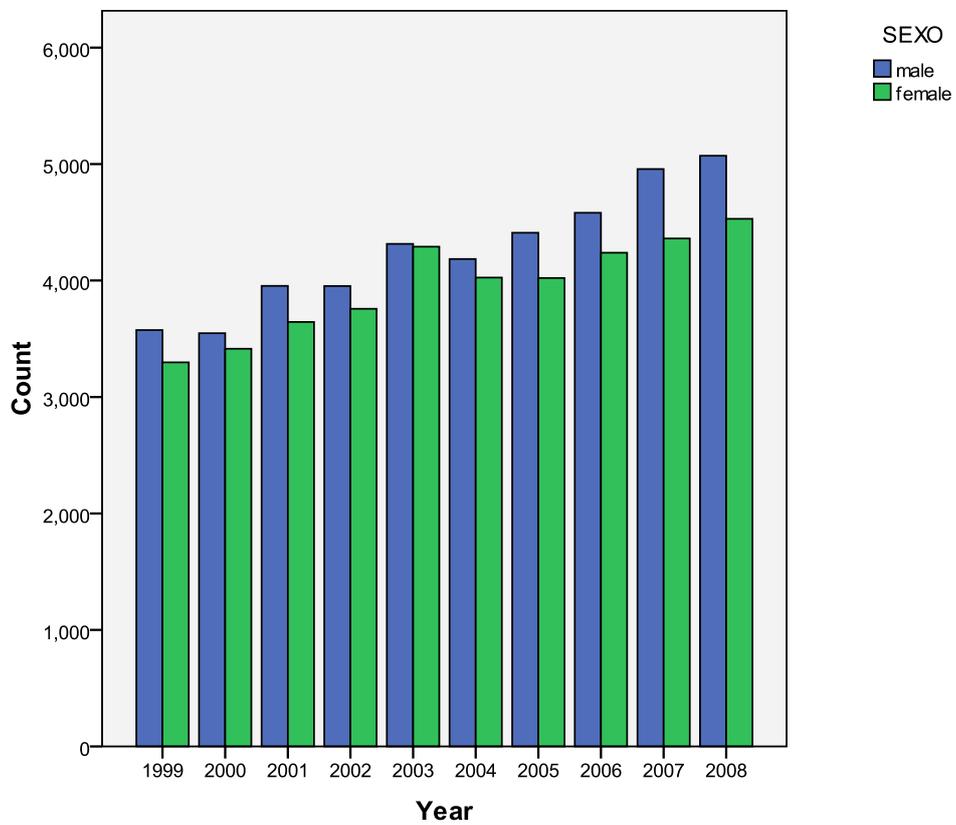


Fig 16. DRG's with CC by sex.

DISCUSSION

The development of a condition and its prevalence in the population are influenced by a wide range of factors, termed confounding, which not depend directly on the system quality.

The analysis of the Portuguese primary healthcare system showed clear differences among the years, which explanation is different in each indicator:

Newborns

The number of newborns has decreased during the considered period of time (which shows the tendency in the industrialized countries), with a slight increase in 2008.

In Portugal, in 2007 after it has been an historic minimum in the birth rate (the rate achieved for the first time a negative balance of minus 0.01 per cent) there was a small increase in 2008, "a tendency that will not be maintained in 2009 because of the economic crisis, despite the incentives recently introduced to the birth in Portugal, such as financial support to pregnant women, or the extension of the license of parenting" , said the High-Commissary for Health Care, Maria do Céu Machado.

Natural/Caesarean childbirth

A third of births were cesarean sections. This percentage is far from the targets listed in the National Health Plan, which states that by 2010 the percentage of births using this technique is 24.8%.

Portugal is the second EU country with highest rate of cesarean sections, according to the report of the project Euro-Peristat only supplanted by Italy. Slovenia and the Netherlands are the countries using less this technique.

The increase in pregnancies of risk due to the postponement of motherhood and the increased use of techniques of medically assisted procreation, or the fear of legal proceedings due to a birth that goes wrong are some of the reasons given by the experts.

Hospitalization episodes of short term hospitalizations:

The evolution of the short term hospitalizations has been irregular although the number of these episodes in the last three years is significantly lower than the previous years.

The time of an hospitalization could be substantially reduced in case of deceased patients, patients transferred to another hospital or those who left against medical advice.

Hospitalization episodes of long term hospitalizations:

The number of long term hospitalizations has decreased continuously over the years. This result is useful because it can indicate that the hospital has reduced costs, possibly with better care and better hospital management. This reduction was achieved without an increase in the number of short term hospitalizations.

The long term hospitalizations are associated with hospital costs and therefore should be considered in the funding of hospitals. It is important to have this type of information in policy and planning of hospitals.

Multivariate analysis of associations should be done, in order to ascertain which factors truly influence this results.

REFERENCES

1. Geraedts M, Schwartz D, Molzahn T. Hospital quality reports in Germany: patient and physician opinion of the reported quality indicators. *BMC Health Serv Res.* 2007, Sep 28; 7:157.
2. Renholm M, Leino-Kilpi H, Suominen T. Critical Pathways. A Systematic Review. *JONA*, 2002, 32(4): 196-202.
3. Bazzoli GJ, Harmata R and Chan, C. Community-Based Trauma Systems In The United States: An Examination Of Structural Development, *Soc. Sci. Med.* 1998, 46(9): 1137-1149
4. Farquhar, M. *AHRQ Quality Indicators* [slides]. Rockville (MD): Agency for Healthcare Research and Quality; 2005. 20 slides colour.
5. Mattke S, Epstein AM, Leatherman S. The OECD Health Care Quality Indicators Project: history and background. OECD, *Int J Qual Health Care.* 2006;18 Suppl 1:1-4.
6. Dimick JB, Welch HG, Birkmeyer JD. Surgical mortality as an indicator of hospital quality: the problem with small sample size. *JAMA.* 2004 18; 292(7): 847-51.
7. Leinonen T, Leino-Kilpi H, Ståhlberg M-R and Lertola, K. Comparing Patient and Nurse Perceptions of Perioperative Care Quality. *Applied Nursing Research*, 2003, 16(1): 29-37
8. Cruz-Correia R, Vieira-Marques P, Ferreira A, Oliveira-Palhares E, Costa P, Costa-Pereira A. Monitoring the integration of hospital information systems: How it may ensure and improve the quality of data. *Stud Health Technol Inform.* 2006, 121:176-82
9. SPSS for Windows, Rel. 15.0.0.2006. Chicago (IL): SPSS Inc.
10. Agency of Healthcare Research and Quality. *Guide to Prevention Quality Indicators: Hospital Admission for Ambulatory Care Sensitive Conditions.* Version 3.1. Rockville (MD): Agency for Healthcare Research and Quality; March 2007.