Chapter 6
The Evolution of Comorbidities in Hospital Administrative Databases:
A 15-Year Analysis

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ABSTRACT

The analysis of inpatient comorbidities is important for hospital management, epidemiological studies, and health services research and planning. This paper aims to study the evolution of coded comorbidities in a nationwide administrative database. Specifically, data from Portuguese hospitals over the period 2000-2014 was used. Secondary diagnoses, coded with ICD-9-CM, were used to identify comorbidities in 9,613,563 inpatient episodes, using both the Elixhauser and the Charslon/Deyo methods. A description of comorbidities evolution over years, including an analysis of the associated principal diagnosis, was carried out. Results clearly evidence a positive association between the number of secondary diagnoses and coded comorbidities. It can be argued that the increased number of comorbidities over time is mostly related to an increase in the quality of coded data, and not so much to an increase in the severity of treated patients. Data analysts, researchers and decision makers should be alert to possible data quality bias, such as completeness, when using administrative databases.

INTRODUCTION

Comorbidity is a secondary diagnosis, i.e., a disease condition, other than the principal diagnosis, already present at the time patient is admitted. The presence of comorbidities may have consequences at various levels as, for instance, mortality, quality of life, utilization of health resources and treatment strategies.

Several studies showed that there is a relation between specific patient comorbidities and an increase (or decrease) in hospital costs, hospital mortality and length-of-stay (Deyo, Cherkin, & Ciol, 1992; Elixhauser, Steiner, Harris, & Coffey, 1998; Zhu & Hill, 2008). In fact, due to this association with health outcomes, the study, and assessment of comorbidities assumes particular importance for health services research, for epidemiological and clinical studies, and also for financing and health care planning.

Comorbidities are patient preexisting conditions that should be controlled when using administrative data (Deyo et al., 1992; Kuwabara et al., 2008). In administrative databases, comorbidities can be identified using ICD-9-CM (International Classification of Diseases, Ninth Revision, Clinical Modification) codes associated with secondary diagnoses (Southern, Quan, & Ghali, 2004).

In this context, the quality and the volume of the data coded can naturally have influence in the proportion of identified comorbidity conditions. That is especially important for the study of trends or any analysis over time. Comorbidities should also be used in risk-adjustment of health outcomes (e.g., mortality) to induce, for instance, a fairer comparison between health institutions.

The study of the number of coded secondary diagnoses is critical to understand the evolution in the proportion of identified comorbidities (Iezzoni et al., 1992). This number is increasing over years, and consequently, the number of identified comorbidities is also continuously increasing. This evolution is not necessarily related to an increase in the severity of patients treated.

This paper aims to study the evolution of comorbidities over time using administrative data, and was carried out under the CUTEheart project, Comparative use of technologies for coronary heart disease, an international partnership between the Harvard Medical School and the Faculties of Medicine from the Universities of Lisbon and Porto in Portugal. This paper extends authors' previous work (Freitas, Lema, & Costa-Pereira, 2016) with an update of the inclusion criteria and the inclusion of new analyses over a larger, updated, dataset.

Administrative Data

Administrative data (also known as billing or claims data) is routinely collected, commonly available, relatively inexpensive, and involves large amounts of data. Although with some data quality problems (Freitas et al., 2012; Peabody, Luck, Jain, Bertenthal, & Glassman, 2004), administrative data is a valuable source for measuring the quality of care. It has a standard format and can be used for many purposes, such as research or public reporting (Price, Estrada, & Thompson, 2003). This dataset typically contains demographic data (e.g., age, gender), "administrative data" (length of stay, type of admission, payer, discharge status, Diagnosis-Related Group – DRG) and ICD-9-CM codes for clinical data (diagnostics, procedures, external causes) (Iezzoni, 1997).

Comorbidity Classification Systems

Comorbidity scores are often used for epidemiological studies and health service research (de Groot, Beckerman, Lankhorst, & Bouter, 2003). These scores can be calculated using different data sources,

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