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Upcoding in Medicare Population

Evolving frequencies of comorbidities among Medicare beneficiaries hospitalized for Chronic Obstructive Pulmonary Disease

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Upcoding in Medicare Population

Evolving frequencies of comorbidities among Medicare beneficiaries hospitalized for Chronic Obstructive Pulmonary Disease

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Contents

Tables:

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Abstract

Introduction: The economic impact of upcoding on health care system has been profound. Current data of how chronic obstructive pulmonary disease (COPD) patients' comorbidities have evolved over time are lacking.

Objective: To describe the trends in COPD patients' comorbidities over time and whether certain hospitals tend to report them more frequently than others.

Design. We used patient and hospital characteristics to build a two-level logistic regression model to predict mortality as a function of patients' comorbidities.

Settings: 5% Medicare database.

Participants: 336,856 COPD hospitalizations over six-year period, 07/01/2009-06/31/2015.

Methods: We divided comorbidities into three main categories based on their odds (ORs) of predicting mortality in the year prior to the study period. These were high-risk (OR>= 1.15), intermediate (0.85 =<OR<= 1.15) and low risk (OR<=0.85). We examined the yearly and interval changes (07/2013-06/2015 vs. 07/2009-06/2010) in comorbidities reporting. Then, we examined the interval changes in the average total number of comorbidities per patient. Finally, we examined variation in comorbidities reporting based on hospital characteristics.

Results: While the patient mortality adjusted OR was not statistically significant (0.965; 95% CI 0.927-1.005), the hospital and patient mortality adjusted OR was (0.961; 95% CI 0.922-0.999). Thirty out of forty-one comorbidities have increased over the study period and the rest have declined. The average total number of comorbidities increased amongst all three categories (low, intermediate and high-risk). While the absolute change was highest for intermediate-risk one (0.51) and similar for low and high-risk ones (0.18 and 0.17), the percent change for high (8.42%) and intermediate-risk (8.93%) comorbidities were almost twice the percent change in low-risk category (3.88%). Findings were similar when data were re-analyzed based on hospital characteristics.

Conclusion: The high-risk and intermediate-risk comorbidities had more than 8% increase and the low-risk comorbidities had almost 4% increase over the study period. Evaluation of other diagnoses and different time periods may shed light on whether patients are getting merely sick or there is upcoding in which hospitals and/or providers report high and intermediate-risk comorbidities more frequently.

Introduction

Physicians are not trained to code for the services that they provide to their patients. Lack of knowledge and appropriate training in such vital part of medicine can lead to coding inaccuracies.[1] Such inaccuracies have been referred to with terms like "Upcoding", "unbundling of codes" and "coding intensity". The first two of these usually happen at the provider level and the third one at the insurer level. The exact and agreed upon definitions of those terms are not clear.

In **upcoding**, per Centers for Medicare and Medicaid Services (CMS) at the Department of Health and Human Services (HHS), the provider uses an Evaluation and Management (E/M) code of a comprehensive new patient office visit instead of a follow-up office visit code to an established patient which results in a higher bill due to a higher-level E/M code.[2] This phenomenon is not limited to E/M codes but extends to diagnosis related groups (DRGs) where certain patient's DRGs yield a higher reimbursement from CMS.[3] To meet the requirements and to be considered as upcoding, these coding changes must occur in the absence of real services, worthless services, medical facts, medical necessity and/or provider's documentation.[2] In its purest form, upcoding implies no effect whatsoever on the amount of care received by patients, so actual treatment costs are unchanged.[4]

The coding inaccuracies appear in another form at the level of insurers and frequently referred to as "**Coding intensity**". In coding intensity, insurers try to report as many comorbidities as possible to increase their insured risk-scores, which are the basis by which CMS pays them to provide health coverage in the Medicare Advantage (MA) program. Higher risk scores make

beneficiaries look sicker than what they are. Consequently, the CMS is forced to pay insurers more money for each individual they do cover under their health plan.

Overall, **we define** such inaccuracies as fraudulent practices in which providers, hospitals, or insurers game the coding systems to generate financial gains.

History of laws and policies

To be able to understand the roots of the upcoding problem in Medicine, it is important to understand the history of laws and policies that may have shaped it in its current form.

First two decades**.** Since the Medicare was established in 1965, hospitals and providers were reimbursed based on whatever costs they have charged it for providing care for its beneficiaries.[5] Such reimbursement system may have inadvertently contributed to some of the health-care costs inflation over time.

Prospective Payment System**.** The health industry continued to have the upper hands for almost two decades[5] till the Prospective Payment System (PPS) came to place in 1983. The PPS started utilizing Diagnosis-Related Group (DRG) for hospital claims, Ambulatory Payment Classification (APC) for hospital outpatient claims and Current Procedural Terminology (CPT) for other outpatient claims.[6]

Medicare Advantage (MA) program. Around the same time, the Tax Equity and Fiscal Responsibility Act (TEFRA) was passed in 1982 and the Medicare Advantage (MA) program (known previously as Medicare Part C or Medicare + Choice) was created. Regulatory rules were not completed till the health Care Financing Administration (HCFA) came in 1985.[7,8]

In such program, beneficiaries continue to pay their premiums to Medicare but can opt to choose to receive their services through other health maintenance organizations (HMOs) under the MA program. At that time, HMOs received a fixed and **demographics adjusted** prepaid premiums from CMS. These premiums were equal to 95% of what CMS is estimated to spend on similar beneficiaries in the Fee-for-service -FFS- program. The objectives of HCFA included reduction of Medicare costs, providing more efficient healthcare systems as compared to FFS and provide beneficiaries with wider range of health care delivery systems to choose from.[8]

Inadvertently, HMOs were successful in attracting and providing care to healthier ones as compared to that delivered by the FFS providers while using lower resources.[8,9] For example, Brwon et al[10] report that prior reimbursements for a sample of nearly 100,000 new MA enrollees in 1987 and 1988 were about 20 percent lower than the risk-adjusted reimbursements for non-enrollees from the same market areas.[8] Since HMOs had to enroll any interested Medicare beneficiary, a self-selection process in which chronically sick beneficiaries are less likely to change doctors or give up their previous primary care providers when compared to those with better health.[8] The authors have estimated that Medicare have paid such HMOs almost 5% more than what those beneficiaries would have costed if they stayed in the FFS program.[8]

Balanced Budget Act (BBA) and Benefits Improvement Protection Act (BIPA)**.** Since the demographics adjusted payment model proved to be unfair to Medicare, the **Balanced Budget Act (BBA)** of 1997 required the development of a health-status- based risk adjustment system that incorporated morbidity information. Subsequently, Medicare began using the diagnoses

from inpatient hospitalizations to adjust their payments to HMOs in 2000.[9] The same year marked the passage of the **Benefits Improvement Protection Act (BIPA)** which also required the use of ambulatory diagnoses in Medicare risk-adjustment, and Medicare implemented the **Centers for Medicare & Medicaid Services-Hierarchical Condition Categories (CMS-HCC)** risk adjustment model in 2004 and fully phased it in by 2007.[9] In these systems, CMS argued that sicker enrollees with higher risk scores are expected to have higher health-related costs and decided to pays insurers more for. Though these risk-scoring systems were created and calibrated to coding patterns in FFS and theoretically a beneficiary with a risk score of 1.0 in FFS should have a similar score and cost in MA program aiming for a cost neutral program. Unfortunately, this new system has encouraged insurers not only to attract sick beneficiaries but also incentivized them to report as many diagnoses as possible due to higher premiums and financial gains.[9] Insurers increased their enrollees risk scores based on whatever diagnoses they could find and report. This has resulted in **risk-score differential**, a risk-score that is higher under the MA plan as compared to the FFS program, and subsequent financial gains for insurers and loses for CMS. This risk score differential was referred to as "**Coding Intensity**" by Kronick and Welch.[9]

Deficit Reduction Act (DRA)**.** In 2005, the Deficit Reduction Act (DRA) directed CMS to measure such coding differential and adjust for it when paying MA plans. The government Accountability Office estimated these differentials to be 4.8-7.1% higher in MA as compared to FFS. The **Affordable Care Act (ACA)** have increased the estimated average of coding intensity from 3.41 in 2009 to 4.71 in 2014 and 5.71% in 2018. More recently the **American Taxpayer's Relief Act (ATRA)** of 2012 further increased the minimum coding intensity adjustment to 4.91% in 2014 and 5.91% in 2018.[9] These adjustments were done along with risk model adjustments in efforts to

decrease the overall scores for MA plan to a point where they are equivalent to their counterpart in the FFS plans.

Evidence and examples on upcoding

Dr. D.W. Simborg was probably the first one to warn about the possible failures in a billing system that depends on the discharge diagnoses and DRGs even before they were implemented by 2-3 years. He described a new hospital-acquired disease and called it "**DRG Creep**" where he defined it as "deliberate and systematic shift in Hospital's reported case mix in order to improve reimbursements".[11]

From his review, a DRG based system was implemented on the University of California at San Francisco (UCSF) Hospital's discharge data from 1978 and found that such system would be costlier. Changing the sequence of the first and second diagnoses to optimize discharge reporting system shifted 23% of all discharges to have a higher-cost DRG group.[11] These shifts did not only affect costs but affected the case-mix index, , which reflects the average of the weights of the DRGs of all hospitalized patients, for the hospital and increased it by 14% as well.[11]

Ironically enough, he imagined a sophisticated computer programs that can overcome the ethical objections to such unethical behavior where he states

> "*Minor diagnostic nuances and slight imprecisions of wording have little practical clinical importance, yet under DRG reimbursement they would have major financial consequences. The implications of tying reimbursement to the vagaries, uncertainties, subtleties, and errors of discharge diagnostic reporting are unprecedented. It is hoped that hospitals will refrain from disseminating the more virulent forms of DRG creep; however,*

the potential for a broad spectrum of manifestations certainly exists. This potential raises the possibility of serious adverse effects on the entire cost-containment effort. There will be incentives to look a little harder and to perform that extra test or procedure to make a diagnosis. It will certainly be profitable for a hospital to invest in more sophisticated data-processing and discharge-abstracting systems. In the ensuing technologic arms race between the regulators and the regulated, it may be difficult to distinguish the disease from the cure".[11]

In the following two sections, we will provide upcoding examples at the provider and hospital levels and list other areas of upcoding.

Upcoding at the provider/hospital level

Effects of PPS. After the implementation PPS, the hospitals were paid for the first time based on a DRG coding system. This has resulted in a DRG creep where there was a 6% net increase in the total costs (net increase of 2.4 billion dollars in one year)[12] while the length-of-stay (LOS) decreased.[12] For example, LOS for patients of medical illnesses decreased from 9.4 days to 7.2 days and from 11.1 days to 9.9 days for surgical patients over the period 1981-1986.[12] This suggested that patients are being reported to be more sick with a higher DRG but they are still spending less time in the hospitals.

Following the news reports on upcoding,[13] Silverman, E et al found tried to study the variations of upcoding in respiratory DRGs amongst Medicare population 1989-1998. They found higher Medicare spending in for-profit hospitals and hospitals transforming into for-profit.[14] For example, hospitals converting to for-profit had the highest percentage point increase (37%) towards pneumonia and respiratory DRGs with highest reimbursement as compared to 10%

increase in non-for-profit and 23% increase in for-profit hospitals in the period of 1989-1996 with subsequent decrease in the last year of the study.[3] While the reported disease severity (as judged by Charlson index of comorbidities) was increasing throughout the years studied, the one-month mortality continued to decline.[3] They further studied differential growth in rates of Charlson index by hospital ownership in what is called "diff-in-diff" approach and found no evidence to suggest that for-profit hospitals with most rapid growth in upcoding had the most rapid growth in their Charlson index.[3] This seems a bit counterintuitive as one would expect to find such relation! In the last two years of the study (1996-1998); the DRG upcoding decreased significantly while the Charlson index rose more slowly adding more evidence to the DRG creep/upcoding.[3]

In the 1990s, the federal government have accused hospitals for using elderly patient's DRG codes to yield higher re-imbursement from Medicare.[3] The most prominent case was that of Columbia/HCA -Health Corporations of America- which now called HCA. HCA was investigated by the Internal Revenue Services (IRS), the Federal Bureau of Investigation (FBI), and The Department of Health and Human Services (HHS). Eventually, HCA admitted to inflating the seriousness of diagnoses reported to Medicare, billing Medicare more than what they should, self-referrals, fraudulent home health care workers billing, giving kickbacks to providers in the form of partnerships or shares in the company's owned hospitals, and giving providers free "loans" and other financial incentives.[15] The case culminated in June 2003 with the government receiving a total of over $2 billion in criminal fines and civil penalties for systematically defrauding federal health care programs.[16] The HCA case by that time was the largest healthcare fraud settlement in US history.[17]

Other Settings. While others have suggested that for profit hospitals do upcode more frequently[18], this phenomenon is not limited to them as hospitals with financial distress were more likely to upcode than financially stable ones in another study.[4] More recently, Heese, J et al have found that beneficent hospitals providing charity care and graduate medical education had similar rates of upcoding but less fraudulent upcoding convictions when compared to their non-beneficent counterparts in the late 1990s.[19] This have signaled some law enforcement laxity towards such beneficent hospitals to offset some of the charity care and the education provide by them.[19] After these hospitals witnessed such law-enforcement leniency in the 1996-1998, they continued to upcode more aggressively in the second period of their study 1999-2007.[19] Upcoding phenomenon does occur in Medicaid and state health plans[20], skilled nursing facility re-imbursement,[21] different age groups[22], and in other countries as well.[22-25]

Upcoding at the insurer level

While DRG creep "Coding-up or upcoding" is being witnessed in the 1980s, studies started to show that MA plans are overpaid by approximately 11% above the 95% cost that Medicare have sat for HCFA projected costs for beneficiaries if they were enrolled in FFS program.[26] While initial studies have shown that low cost beneficiaries chose MA plans more frequently than the traditional FFS plan[27,28], a more recent one is skeptical of those findings.[29]

*Coding intensity and favorable selection***.** Following the implementation of the new risk-adjustment system that accounted for both inpatient and outpatient diagnostic information in 2004, called the Centers for Medicare and Medicaid Services Hierarchical Condition Categories (CMS-HCC) system, insurers were incentivized to take Medicare beneficiaries who had higher risk adjusted scores because of higher Medicare capitated reimbursement. The risk adjusted model aimed to

pay MA plans less for those with lower risk-adjusted score and more for beneficiaries with higher risk-adjusted scores. In response to these changes, MA plans could attract Medicare beneficiaries that had higher risk-adjusted scores as compared to stayers in FFS. However, those who switched to MA had lower baseline FFS spending as compared to FFS stayers after risk adjustment adding more evidence on possible intense selection by MA plans.[27,28] The authors estimated that Medicare continued to pay MA plans more than what they previously used to per beneficiary with a positive differential payment around 30 billion dollars in 2006 mainly due intensive coding of all medical comorbidities after they join MA plans resulting in faster growth of the beneficiaries risk scores than if they stayed in the FFS plan.[27,28]

Less coding intensity and favorable selection. Newhouse et al studied 20 percent random sample of traditional Medicare claims from the period 2003–08 and found that differences in adjusted mortality rates between FFS and MA beneficiaries narrowed between 1998 and 2008 by a factor of two.[29] Authors suggested that MA program started to show more or less similar mix of risks as compared to FFS program along with reduction in favorable selection of healthier beneficiaries into those MA plans.[29] Their findings and conclusion were opposite to Brown et al who conducted their study on Medicare Current Beneficiary Survey in the period 1995-2007.[27,28] Newhouse et al argue that their sample size is considerably larger, included one more year 2008 and have used Brown et al method on it and confirmed their own findings and conclusions.[29]

Though, the risk-adjustment has reduced favorable selection into MA plans but it did not abolish it completely as evidenced by multiple analyses by Newhouse and colleagues.[29-31] Most recently, Kronick et al report that MA enrollees might still be healthier, than demographically similar FFS Medicare beneficiaries.[32]

Electronic Medical Records (EMRs) and software facilitating upcoding

Adoption of electronic medical records that auto-populate templates, and allow "copy and paste" from previous medical record, known as Computerized Physician Order Entry (CPOE), has contributed to upcoding as demonstrated by increase in case mix index of hospitals and estimated inflation of 300 million dollars/year increase in costs[18]. Such findings were absent with other electronic Medical record systems (Physician Documentation, Clinical Data Repository, Clinical Decision Support System and Order Entry)[18].

Structure and components of coding processes were studied in Thailand with evidence suggesting that hospitals using software programs, medical statisticians and more experienced physicians were more likely to upcode compared to others.[23]

Consequences

Upcoding consequences can be studied in three dimensions; economic, epidemiologic and apparent mortality.

Economic dimension

We will discuss how upcoding have contributed to a huge economic burden. Both Providers/Hospitals and Insurers have contributed to this large burden.

At the provider/hospital level, it was estimated that upcoding in heart failure hospitalizations may have contributed to almost one billion dollars a year.[33] Another study suggests that Medicare has paid hospitals 330-425$ million annually in extra reimbursements due to upcoding of hospitalizations to a higher DRGs in the period 1985-1991.[4] Hospitals chose to upcode more in lucrative DRGs, the ones that have witnessed higher price differences between DRGs with

complications and DRGs without complications, and upcoded less in less lucrative DRGs with lower price differences. Unfortunately, these extra costs were not accompanied by higher intensity of provided care as measured by intensive care units utilization, length of stays, total costs, number of surgical procedures or in-hospital mortality.[4] Also, the changes in the intensity of care provided were actually small or even negative especially in for-profit hospitals when studied at a specific DRG level, suggesting that upcoding might be accompanied by either same or lower level of care intensity.[4]

At the insurer level, Geruso et al reports that in the absence of a coding correction, they estimated almost $7-10.5 billion excess payments to MA plans per annum which is equivalent to around $640 per MA enrollee per year[34]. To put things in perspective, such excess payments can be translated as if 6% of all enrollees in the market became paraplegic, 11% of all enrollees developed Parkinson's disease, or 39% become diabetics.[35] Some have estimated that coding intensity is expected cost Medicare $200 billion (between $ 67 billion- 273 billion dollars) over the next 10 years.[32] Some claim that the current reimbursements system and the incentive to upcode have contributed to some of the hospital administrative costs which reached almost 1.43% of the gross domestic product in 2011.[36]

Epidemiologic Dimension

Changes in disease prevalence over time should be interpreted with caution especially in the era of upcoding. More evidence suggests that the decline in some diseases is merely a consequence

of upcoding to more lucrative DRGs codes. In the following paragraphs we try to summarize some of these findings on changing disease prevalence.

Heart Failure. While the national trends of Medicare heart failure hospitalizations in the 1986-1993 period have grown by 27% (803,506 vs 631,306)[37], data from Olmsted county did not show significant increase between 1981 through 1991.[38] Furthermore, false positive rate of heart failure hospitalization in the Cardiovascular Health Study was reported to 4-37.5%[33,39].

Acute myocardial infarction (AMI). The hospitalization rates for patients with a primary diagnosis of AMI has declined by 36.4% over the period 2002-2011. At the same time, secondary AMI hospitalizations grew from 28% of all AMI hospitalizations to almost 40%.[40] The apparent decline in hospitalizations with AMI primary diagnosis might be due to discharge diagnoses position shifting. For example, congestive heart failure was the principal discharge diagnosis for more than 20% of hospitalizations in the early study period but declined to 3.3% of all principal discharge diagnoses in 2008 and disappeared from the top five for the remainder of the study period.[40] On the other side, septicemia, which was not in the top five diagnoses in the early study period, prevalence increased from 3.5% of all principal discharge diagnoses in 2006 to 9.7% in 2011.[40] The average costs of hospitalizations whether AMI was in a primary or secondary position were almost similar in 2002-2007. After that period, the mean costs for secondary AMI hospitalizations was higher than principal AMI hospitalizations and continued to grow till it was 16.4% higher

(Principal: $18,981 vs. secondary: $22,097).[40] Finally, assigning hospitalizations to the improper DRG groups may artificially alter the costs distribution within these groups.[24]

Mortality dimension

Currently, hospitals' mortality outcome gets tracked and reported to the public. The reported patient's comorbidities are used to calculate what is known as Hospital Standardized Mortality Rates (HSMR). There is evidence that hospitals with aggressive comorbidity coding had lower HSMR compared with hospitals with less aggressive one.[41] one would think that a lower mortality should be the outcome of the care that providers and hospital provide to their patients. However, it exerts pressure on providers and hospitals to reach that goal and has contributed to them gaming the data and the system.[42]

Current data of how chronic obstructive pulmonary disease (COPD) patients' comorbidities have evolved over time are lacking. We aim to describe the evolving frequencies of COPD patients' comorbidities over time amongst Medicare beneficiaries hospitalized for primarily for COPD diagnosis in the period 7/1/2009-6/31/2015, and whether certain hospitals tend to report them more frequently than others.

Methods

Overview

We identified acute hospitalizations who had COPD as their primary discharge diagnosis during the time 07/1/2009-06/30/2015. We used Medicare data from the year prior to this period (07/1/2008-06/30/2009) to determine comorbidities that are associated with mortality. Then we

divided those into three categories based on their odds of predicting mortality into high-risk if Odds Ratio (OR) >= 1.15, intermediate if 0.85 <OR< 1.15 and low-risk if OR<=0.85.

We used patient characteristics/comorbidities and hospital characteristics to build a two-level logistic regression model to calculate adjusted mortality risk. We examined the **yearly and interval changes** (07/2013-06/2015 vs. 07/2009-06/2010) in comorbidities reporting. Then, we examined the interval changes in the average total number of comorbidities per patient. Finally, we examined variation in comorbidities reporting based on hospital characteristics.

Data source

We used a 5% national sample of Medicare data for 07/1/2009-06/30/2015. These include the Medicare Denominator File for demographic and enrollment information, the Carrier File for physician services claims, the Outpatient Statistical Analysis File (OUTSAF) for outpatient services claims, the Medicare Provider Analysis and Review (MEDPAR) File for inpatient claims and the Provider of Service (POS) file for hospital characteristics[43].

Study subjects

To be included in our cohort, an acute hospitalization had to meet the following criteria: (1) the associated patient aged 66 years or more (2) the associated patient had continuous Medicare Part A and B coverage with no health maintenance organization (HMO) enrollment in the 12 months before the acute hospitalization and (3) The primary discharge diagnosis is COPD. To identify the number of comorbidities in the prior year we used the age of 66 years (given that patients can assume Medicare coverage at the age of 65). If the patient had more than one

hospitalization for the same diagnoses in a single year, one of those hospitalizations will be randomly selected to be included in the analyses and the others will be excluded.

Exclusion criteria include: (1) against medical advice discharges, (2) missing demographic data, (3) hospitalization of a patient who had a history of less than 12 months of Medicare enrollment prior to the index hospitalization, (4) any hospice care in the 12 months prior to the index hospitalization and (5) July hospitalization of a patient who had a hospitalization in June that was included in the analysis to avoid counting a single mortality outcome twice during two different years.

Measures

Baseline characteristics (Patient and Hospital)

Beneficiary's age and sex were extracted from the Medicare Denominator File. Comorbidities will be identified by reviewing all diagnoses associated with MedPAR hospital claims, physician services and outpatient claims for the patient associated with the index hospitalization over the prior 12 months -further description below-.[44] Finally, information on location (Urban or Rural), type (for profit, nonprofit, government), bed size (<=500, or > 500 beds), and medical school affiliation (major, limited, graduate, no affiliation) will be extracted from the Provider of Service (POS) file.

The socioeconomic status baseline measures were not included or adjusted for in the current analyses. A recent analyses have shown that hospitals providing care for lower socioeconomic status patients do perform similarly to other hospitals providing care for non-lower socioeconomic status patients.[45]

Comorbidities

Elixhauser's comorbidities were considered part of the patient characteristics.[44] Patient characteristics were the first level in the two-level logistic regression model. Since some comorbidities might be associated with lower odds of death in the 30-days following an acute hospitalization, then we referred to those as "low-risk comorbidities". Others include "intermediate-risk comorbidities" if their presence or absence had little effect on the mortality outcome, and "high-risk comorbidities" when they were associated with higher odds of mortality. Medicare data from the year, 7/1/2008-6/31/2009, prior to our study period used to categorize these comorbidities into one of the these three categories based on their ORs. An "X" comorbidity will be considered a high-risk one if the adjusted 30-day mortality OR >= 1.15, intermediate if 0.85=<aOR<= 1.15 and low-risk if aOR<=0.85.

Study outcomes

Our primary aim was to assess the evolution of comorbidities' frequencies over the study period and in between the end and beginning of this period.

Secondary outcomes included the variation in the average total number of comorbidities based on specific hospital characteristics and the association between comorbidities and hospital characteristics with crude and adjusted 30-day mortality.

Statistical analysis

Descriptive analysis will be used to summarize patient and hospital characteristics and 30-day post admission mortality. We will use a multilevel logistic regression modeling,[46] in which

hospitalizations are nested in hospitals, to evaluate the association between patient and hospital characteristics and 30-day post admission crude and adjusted mortality over 6 years period June, 2009-July, 2015. Patient characteristics included age, sex and comorbidities[47]. Hospital characteristics included hospital bed size, location, type, and medical school affiliation. Association between hospital characteristics and adjusted mortality at the end of the study period (June, 2013-July, 2015) was compared to the first year (June, 2009-July, 2010).

We examined the **yearly and interval changes** (07/2013-06/2015 vs. 07/2009-06/2010) in comorbidities reporting. Then, we examined the interval changes in the average total number of comorbidities per patient. Finally, we examined variation in comorbidities reporting based on hospital characteristics. SAS version 9.4 (SAS Institute, Cary, NC) was used for all statistical analyses.

Results

Study Cohort

All hospitalizations with COPD primary discharge diagnosis in the period July, 1st 2009 and through June 30th 2015 were selected for initial inclusion (N=437,402). Almost 1% of all hospitalizations -hospitalizations of patients who left against medical advice, with unreliable demographic data, and hospice enrollees in the last 12 months- were excluded (N=433,211). Since many hospitalizations were recurrent admissions for the same patient, we randomly selected one index hospitalization per patient per year (N337,553). Finally, if a randomly selected

hospitalization was in July was for a patient who had another selected hospitalization in June of the prior year, we excluded his July hospitalization (N336,856) -see **Figure 1** for attrition diagram-

Baseline Characteristics and Comorbidities trends

Average age for patients hospitalized with COPD diagnosis was 77.5 years. Of all selected hospitalizations 37.7% were males, 18.4% admitted to large hospitals, 15.9% were for-profit hospitals, 76.8% in urban location and almost two thirds were in hospitals with no academic affiliation (63.3%) -**Table 1**-.

The frequencies of 41 comorbidities for all patients admitted for COPD were tracked yearly over the study period -**Table 1**-. The changes between the end of the study period (07/2013 – 06/2015) and the first year of the study (07/2009-06/2010) are shown in **Table 2**. There was significant percentage increase in most of the comorbidities recorded. Psychiatric disorders, cardiorespiratory failure and shock, sleep apnea, endocrine (non-diabetic)/metabolic/ nutritional disorders, drug and alcohol abuse, gastrointestinal disorders and renal failure have seen more than absolute 5%-point increase over the study period. Also, history of mechanical ventilation and protein-calorie malnutrition have seen more than 10% relative point percent increase -**Table 2**-. Of all these, only three had an adjusted ORs >1.15 which are history of mechanical ventilation, cardiorespiratory failure and shock and malnutrition and two had an adjusted ORs <0.85 -**Table 2**-.

Over the same period, pneumonia, lung fibrosis, other lung disorders, and stroke were recorded less frequently either by more than absolute 1%-point (for the first three comorbidities) or more than relative 5%-point decrease -**Table 2**-.

30-day Mortality

The unadjusted mortality has remained somewhat stable around 7.5-7.9% over the study period -**Table 3**-. After adjusting for age and all comorbidities, the 30-day mortality ORs were significantly lower in 2011 and 2014, 0.932 (0.891-0.975) and 0.955(0.912-0.999) respectively, when compared to 2009 -**Table 3**-.

Also, we studied interval changes over the study period where the last two years (July, 2013-June, 2015) were compared to the first year (July, 2009-June, 2010). In the two-level model, adjusted OR was not statistically significant (0.965; 95% CI 0.927-1.005) when patient characteristics were only included in the first level (Patient-level), but the adjusted OR adjusted OR was significantly less in the last period of the study (0.961; 95% CI 0.922-0.999) when hospital characteristics (Hospital-level) were added to the model that has patient-level data-**Table not shown**-.

Adjusted mortality was significantly lower at the end of the study period as compared to the first year in hospitals that were large 0.945 (0.898-0.995), urban 0.948 (0.905-0.992) and non-profit 0.926 (0.882-0.973) -**Table 4**-.

Comorbidities classes.

Overall, the interval-increase in the average number of high-risk comorbidities (OR >= 1.15) was 8.4% (2.19 vs. 2.02) when we compared the last two years of the study period (July, 2013-June, 2015) to the first year (July, 2009-June, 2010). Though, the absolute increase in low-risk comorbidities (OR =<0.85) was similar to the high-risk ones (0.18 vs. 0.17), the percentage increase was 3.88% -**Table 5**-. Moderate risk comorbidities (0.85<OR<1.15) had the highest absolute increase (0.51) but similar percentage increase 8.9% to the high-risk comorbidities -

Table 5-. Overall, the percentage increase in moderate and high-risk comorbidities was twice the percentage increase in the low-risk class.

The variation in average number of comorbidities in each comorbidity class based on hospital characteristics are detailed in **Table 6.** All hospitals showed increase in the average number of high and moderate-risk comorbidities with a percentage increase that is double their counterpart of the low-risk comorbidities -**Table 6**-. The highest increases were amongst hospitals that are small, rural, non-profit and had no-major academic affiliation.

Discussion

In this study, we have shown that (1) crude 30-day mortality has fluctuated over the study period, (2) patient and hospital adjusted mortality was lower at lower at the end of the study period (OR 0.961; 95% CI 0.922-0.999), (3) three quarters of all comorbidities studies have increased over and the rest have declined, (4) the average total number of comorbidities increased amongst all three comorbidities classes (low, intermediate and high-risk) with higher percentage increase in the high and moderate-risk comorbidities classes, and (5) hospitals that had no major academic affiliation, were small, not for profit and in rural areas appeared to have the highest percentage increase in high-risk comorbidities reporting.

Our findings suggest that 30-day mortality rate of Medicare beneficiaries hospitalized for COPD have remained similar or slightly lower over the study period. Theoretically speaking, one would expect that when total number of comorbidities reported for COPD Medicare

beneficiaries rises, at least their crude 30-day mortality should rise. In our study, hospitals continued to report patients' comorbidities more aggressively, but we did not find such parallel increase in their crude or adjusted mortality. Also, when we adjusted for these comorbidities we did not find any significant impact on the patient-level adjusted OR of 30-day mortality 0.965(0.927-1.005) suggesting that patients' comorbidities may have had less influence on overall mortality than hospitals in which they do get admitted. Such result could have two possible explanations; either we are providing better care for beneficiaries admitted for COPD diagnosis or we are merely more aggressive in reporting their comorbidities.

Kronick, R et al found that comorbidities reporting was more aggressive in Medicare advantage program as compared with Fee-For-Service program without palpable and parallel increase in the reported mortality and suggested that this is a manifestation of upcoding/coding intensity by insurrers[9]. On the provider/hospital level, Silverman et al found that upcoding in pneumonia DRGs was not a result of sicker patients. In their study between 1989 and 1998, they found a gradual yearly decline in mortality among different hospital types. They further studied differential growth in upcoding and Charlson index "diff-in-diff" approach and did not find that upcoding of pneumonia DRGs paralleled the growth in the Charlson index. These findings argued against the possibility of better care in such patients.[3]

In our study, we did look at the evolving frequencies of different comorbidities over 6-year period. The majority of these have increased over time. We argued that there might be a

differential growth in more severe comorbidities that are associated with higher odds of mortality and that lower risk comorbidities are either reported less frequently or had lower growth. In COPD Medicare beneficiaries, the overall number of high and intermediate-risk comorbidities grew by 0.17 and 0.51 respectively as compared to 0.18 for low-risk comorbidities. These absolute changes reflect a percentage increase of 8.42% and 8.93% for high and intermediate-risk comorbidities as compared to 3.88% for low risk comorbidities. In other words, those patients are reported to be getting sicker over the study period without a reflection on their 30-day mortality.

Since the addition of hospital characteristics to the multi-level logistic regression model has resulted in significantly lower adjusted 30-day mortality OR 0.961 (0.922-0.999). A breakdown of these characteristics shows that large size, urban and non-profit hospitals had the most significant impact on mortality outcome. Finally, we studied the variation in the comorbidities reporting and found that comorbidities reporting grew more rapidly in small, rural, non-profit and non-major academic affiliation -**Table 6**-.

The study has several limitations. First of all, it is subject to selection bias like any other observational study. As noted in our methodology, we have tried minimize those biases by selecting one admission per patient per year and dropping a July admission if a June one was included. It is not clear if those results apply to other diagnoses, other time periods or younger population.

Conclusion

The high-risk and intermediate-risk comorbidities had more than 8% increase and the low-risk comorbidities had almost 4% increase over the study period. Evaluation of other diagnoses and different time periods may shed light on whether patients are getting merely sick or there is upcoding in which hospitals and/or providers report high and intermediate-risk comorbidities more frequently.

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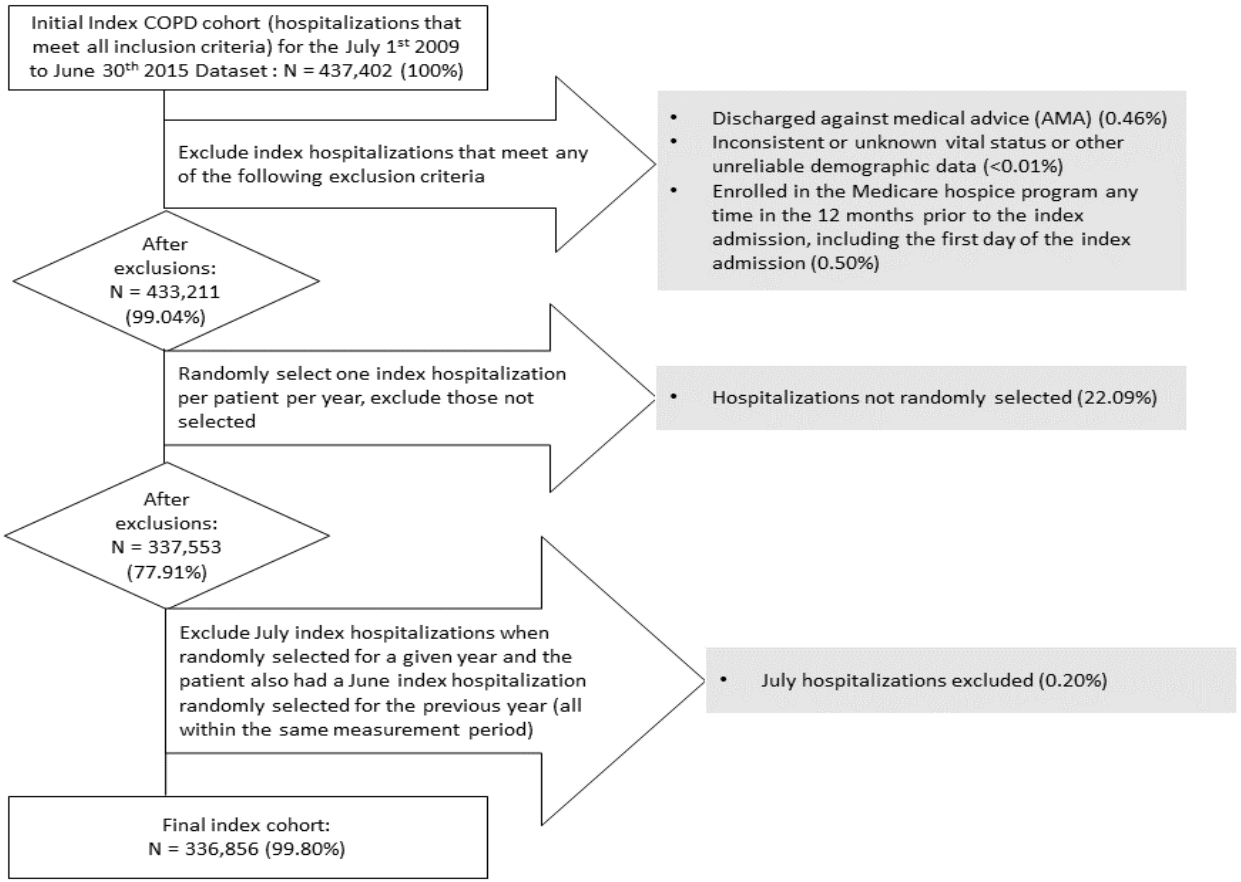

Figure 1Attrition diagram for study cohort

Table 1. Comorbidities frequency yearly trends over the study period (07/2009-06/2015).

Variable	Year						All cohort
	07/2009-06/2010	07/2010-06/2011	07/2011-06/2012	07/2012-06/2013	07/2013-06/2014	07/2014-06/2015	
Total N	59,607	61,409	56,036	58,731	49,776	51,297	336,856
Observed mortality rate (%)	7.92	7.66	7.52	7.85	7.81	7.79	7.76
Mean age (SD)	77.51 (7.52)	77.53 (7.58)	77.56 (7.64)	77.61 (7.67)	77.28 (7.73)	77.52 (7.79)	77.50 (7.65)
Male (%)	37.43	37.55	37.77	37.88	37.97	37.90	37.74
Bed Size (Large: >=500, %)	17.46	18.39	18.23	18.33	19.13	19.04	18.40
Profit hospital (%)	15.27	15.39	16.00	16.53	16.36	16.19	15.94
Urban hospital (%)	77.94	76.63	76.29	76.20	76.84	76.79	76.78
Academic affiliation (Major/limited/graduate/none)	14.80/16.21/4.90/64.09	15.44/16.50/4.55/63.51	15.29/16.59/4.31/63.81	15.43/17.06/4.06/63.45	15.63/17.80/3.87/62.70	15.57/18.36/3.80/62.27	15.35/17.04/4.27/63.34
Sleep apnea	13.19	15.37	18.04	19.08	20.49	21.54	17.77
History of mechanical ventilation	6.96	7.08	7.91	7.73	8.95	8.83	7.85
Respirator dependence/respiratory failure	2.12	2.14	2.30	2.21	2.29	2.27	2.22
Cardio-respiratory failure and shock	38.39	39.72	41.41	42.11	45.83	47.08	42.21
Congestive heart failure	50.14	49.85	50.70	49.14	49.68	49.18	49.79
Coronary atherosclerosis or angina	55.63	56.26	57.08	56.25	55.70	54.92	56.00
Specified arrhythmias and other heart rhythm disorders	43.94	44.29	46.38	46.72	47.33	47.00	45.86
Vascular or circulatory disease	50.91	51.43	52.95	52.30	52.63	52.84	52.13
Fibrosis of lung or other chronic lung disorders	21.18	21.14	20.69	18.61	17.86	17.37	19.57
Asthma	23.05	23.34	22.87	22.46	22.54	22.03	22.74
Pneumonia	43.45	42.71	43.43	42.16	42.83	42.02	42.78
Pleural effusion/pneumothorax	16.77	17.48	17.09	17.39	15.46	15.81	17.16
Other lung disorders	63.28	62.54	61.62	60.16	59.22	59.06	61.08
Metastatic cancer or acute leukemia	3.24	3.27	3.37	3.44	3.32	3.36	3.33
Lung, upper digestive tract, and other severe cancers	7.00	6.90	7.28	7.19	7.36	7.31	7.16
Lymphatic, head and neck, brain, and other major cancers; breast, colorectal and other cancers and tumors; other respiratory and heart neoplasms	17.04	17.08	17.10	16.80	16.64	16.81	16.92
Other digestive and urinary neoplasms	8.72	8.58	8.76	8.61	8.40	8.21	8.56
Diabetes mellitus (DM) or DM complications	44.10	44.29	45.52	44.88	44.84	44.55	44.69
Protein-calorie malnutrition	9.76	10.24	10.70	10.82	11.40	11.05	10.63

Disorders of fluid/electrolyte/acid-base	39.31	40.33	42.34	42.07	42.90	42.94	41.57
Other endocrine/metabolic/nutritional disorders	80.88	83.87	86.35	87.22	88.19	88.89	85.74
Other gastrointestinal disorders	65.40	67.92	70.65	70.80	71.00	71.25	69.39
Osteoarthritis of hip or knee	12.31	13.10	13.69	13.88	13.84	14.31	13.49
Other musculoskeletal and connective tissue disorders	76.55	78.06	79.46	79.44	79.68	80.32	78.85
Iron deficiency or other unspecified anemias and blood disease	52.35	55.32	57.65	56.87	57.65	57.01	56.05
Dementia or other specified brain disorders	31.29	32.21	32.90	32.68	31.80	30.99	32.00
Drug/alcohol abuse, without dependence	24.09	26.63	29.33	30.00	31.73	31.14	28.66
Other psychiatric disorders	24.20	26.87	31.49	33.96	36.34	37.48	31.42
Hemiplegia, paraplegia, paralysis, functional disability	7.71	7.71	8.18	8.32	8.28	8.24	8.06
Mononeuropathy, other neurological conditions/injuries	15.38	16.68	18.09	18.79	19.91	20.38	18.10
Hypertension and hypertensive disease	88.27	89.43	89.97	90.20	90.05	90.24	89.66
Stroke	10.11	9.62	9.71	9.26	9.09	9.39	9.55
Retinal disorders, except detachment and vascular retinopathies	15.53	15.80	16.51	16.75	16.50	17.19	16.35
Other eye disorders	32.00	32.73	33.43	34.07	34.36	35.33	33.59
Other ear, nose, throat and mouth disorders	45.59	46.52	47.54	48.31	48.64	48.50	47.45
Renal failure	24.17	26.82	28.99	29.64	30.83	31.90	28.57
Decubitus ulcer or chronic skin ulcer	9.52	9.69	9.80	9.45	9.48	9.54	9.58
Other dermatological disorders	37.41	37.86	38.75	39.36	39.32	39.95	38.72
Trauma	11.50	11.76	12.33	12.13	12.19	12.94	12.11
Vertebral fractures	6.05	5.79	5.82	5.56	5.64	5.88	5.79
Major complications of medical care and trauma	6.93	7.01	6.97	7.16	7.00	6.95	7.01

Table 2. Comorbidities frequency interval changes between the end (2013 and 2014) and the beginning (2009) of the study period. The associated adjusted 30-day mortality for each of the comorbidities is reported in Odds ratios with95% confidence intervals.

Variable	07/2009-06/2010	07/2013-06/2015	P value	ORs
Total N	59,607	101,073		
Observed mortality rate (%)	7.92	7.79		
Mean age (SD)	77.51 (7.53)	77.40 (7.76)	0.0043	1.033 (1.030-1.036)
Sleep apnea	13.19	21.00	<.0001	0.87 (0.82-0.92)
History of mechanical ventilation	6.96	8.86	<.0001	1.28 (1.20-1.37)
Respirator dependence/respiratory failure	2.12	2.27	0.0603	0.96 (0.86-1.07)
Cardio-respiratory failure and shock	38.39	46.38	<.0001	1.57 (1.50-1.64)
Congestive heart failure	50.14	49.38	0.0031	1.30 (1.24-1.36)
Coronary atherosclerosis or angina	55.63	55.28	0.1750	0.96 (0.92-0.99)
Specified arrhythmias and other heart rhythm disorders	43.94	47.12	<.0001	1.12 (1.08-1.17)
Vascular or circulatory disease	50.91	52.71	<.0001	1.03 (0.99-1.08)
Fibrosis of lung or other chronic lung disorders	21.18	17.59	<.0001	1.14 (1.09-1.20)
Asthma	23.05	22.28	0.0003	0.70 (0.67-0.74)
Pneumonia	43.45	42.35	<.0001	1.03 (0.98-1.08)
Pleural effusion/pneumothorax	16.30	17.85	<.0001	1.27 (1.21-1.34)
Other lung disorders	63.28	59.10	<.0001	0.81 (0.77-0.84)
Metastatic cancer or acute leukemia	3.24	3.35	0.2530	2.26 (2.08-2.47)
Lung, upper digestive tract, and other severe cancers	7.00	7.33	0.0130	1.73 (1.62-1.85)
Lymphatic, head and neck, brain, and other major cancers; breast, colorectal and other cancers and tumors; other respiratory and heart neoplasms	17.04	16.71	0.0913	1.04 (0.98-1.09)
Other digestive and urinary neoplasms	8.72	8.31	0.0037	0.78 (0.72-0.84)
Diabetes mellitus (DM) or DM complications	44.10	44.68	0.0228	0.93 (0.89-0.97)
Protein-calorie malnutrition	9.76	11.20	<.0001	2.08 (1.98-2.18)
Disorders of fluid/electrolyte/acid-base	39.31	42.87	<.0001	1.14 (1.09-1.19)
Other endocrine/metabolic/nutritional disorders	80.88	88.54	<.0001	0.80 (0.76-0.85)
Other gastrointestinal disorders	65.40	71.11	<.0001	0.84 (0.80-0.88)
Osteoarthritis of hip or knee	12.31	14.07	<.0001	0.78 (0.73-0.83)
Other musculoskeletal and connective tissue disorders	76.55	80.00	<.0001	0.85 (0.81-0.89)
Iron deficiency or other unspecified anemias and blood disease	52.35	57.29	<.0001	1.19 (1.14-1.25)
Dementia or other specified brain disorders	31.29	31.39	0.6595	1.14 (1.09-1.19)
Drug/alcohol abuse, without dependence	24.09	31.41	<.0001	0.86 (0.82-0.90)

Other psychiatric disorders	24.20	36.88	<.0001	1.12 (1.07-1.17)
Hemiplegia, paraplegia, paralysis, functional disability	7.71	8.26	<.0001	0..98 (0.91-1.05)
Mononeuropathy, other neurological conditions/injuries	15.38	20.14	<.0001	0.90 (0.85-0.95)
Hypertension and hypertensive disease	88.27	90.14	<.0001	0.83 (0.78-0.89)
Stroke	10.11	9.24	<.0001	0.98 (0.91-1.05)
Retinal disorders, except detachment and vascular retinopathies	15.53	16.86	<.0001	0.92 (0.87-0.98)
Other eye disorders	32.00	34.86	<.0001	0.89 (0.85-0.93)
Other ear, nose, throat and mouth disorders	45.59	48.56	<.0001	0.78 (0.75-0.81)
Renal failure	24.17	31.35	<.0001	1.10 (1.05-1.15)
Decubitus ulcer or chronic skin ulcer	9.52	9.50	0.9092	1.36 (1.28-1.44)
Other dermatological disorders	37.41	39.64	<.0001	0.93 (0.89-0.97)
Trauma	11.50	12.57	<.0001	0.98 (0.93-1.04)
Vertebral fractures	6.05	5.76	0.0197	1.24 (1.16-1.33)
Major complications of medical care and trauma	6.93	6.97	0.5759	0.88 (0.82-0.95)

Table 3. Unadjusted and adjusted 30-day mortality yearly trends over the study period. Adjusted ORs are for both patient and hospital characteristics with their 95% confidence intervals.

Year	Number of hospitalizations	Unadjusted 30-day Mortality	Unadjusted ORs	Adjusted ORs
2009	59,607	7.92%	Reference	Reference
2010	61,566	7.66%	0.964 (0.925-1.006)	0.965 (0.924-1.008)
2011	56,190	7.52%	0.946 (0.906-0.988)	0.932 (0.891-0.975)
2012	58,885	7.85%	0.991 (0.950-1.034)	0.986 (0.943-1.030)
2013	49,899	7.81%	0.986 (0.943-1.030)	0.965 (0.921-1.011)
2014	51,406	7.79%	0.983 (0.941-1.027)	0.955 (0.912-0.999)

Table 4. 30-Day Mortality unadjusted and adjusted OR based on hospital characteristics.

Hospital characteristics		Year	Number of hospitalizations	Unadjusted 30 day Mortality	Unadjusted ORs	Adjusted ORs
Bed Size	Large	2009	35,776	8.28%	Reference	Reference
		2013-2014	63,765	7.96%	0.959 (0.914-1.005)	0.945 (0.898-0.995)
	Small	2009	23,182	7.37%	Reference	Reference
		2013-2014	37,276	7.49%	1.018 (0.956-1.083)	0.999 (0.934-1.069)
Profit vs. non-profit	Profit	2009	9003	7.21%	Reference	Reference
		2013-2014	16,264	7.80%	1.088 (0.987-1.201)	1.067 (0.959-1.186)
	Non-profit	2009	40,780	8.15%	Reference	Reference
		2013-2014	69,630	7.71%	0.942 (0.900-0.985)	0.926 (0.882-0.973)
Hospital Location	Urban	2009	45,953	8.06%	Reference	Reference
		2013-2014	77,611	7.75%	0.958 (0.918-1.000)	0.948 (0.905-0.992)
	Rural	2009	13,005	7.40%	Reference	Reference
		2013-2014	23,426	7.89%	1.072 (0.988-1.162)	1.017 (0.932-1.109)
Academic affiliation	Major	2009	8,723	8.44%	Reference	Reference
		2013-2014	15,763	7.49%	0.878 (0.798-0.967)	0.901 (0.812-1.001)
	Limited	2009	9,558	8.47%	Reference	Reference
		2013-2014	18,272	8.24%	0.969 (0.887-1.060)	0.935 (0.849-1.030)
	Graduate	2009	2,889	9.07%	Reference	Reference
		2013-2014	3,887	7.76%	0.844 (0.710-1.004)	0.859 (0.711-1.038)
	No affiliation	2009	37,788	7.57%	Reference	Reference

		2013-2014	63,129	7.73%	1.023 (0.975-1.073)	0.999 (0.949-1.053)

Table 5. Average number of comorbidities per patient hospitalized at the beginning (07/2009-06/2010) and the end of the study period (07/2013-06/2015).

Comorbidities class	Average number of comorbidities per patient hospitalized			
	07/2009-06/2010	07/2013-06/2015	Percentage increase	Absolute increase
Variables with ORs <= 0.85	4.64	4.82	3.88	0.17
Variables with ORs > 0.85 and < 1.15	5.71	6.22	8.93	0.18
Variables with ORs >= 1.15	2.02	2.19	8.42	0.51

Table 6. Average number of comorbidities at the beginning (07/2009-06/2010) and the end of the study period (07/2013-06/2015) based on hospital characteristics.

Hospital Characteristics		Comorbidities Class	Average number of variables per patient			
			07/2009-06/2010	07/2013-06/2015	Percentage increase	Absolute increase
Bed Size	Large	Variables with ORs <= 0.85	4.69	4.92	4.90	0.23
		Variables with ORs > 0.85 and < 1.15	5.89	6.48	10.02	0.59
		Variables with ORs >= 1.15	2.17	2.34	7.83	0.17
	Small	Variables with ORs <= 0.85	4.62	4.8	3.90	0.18
		Variables with ORs > 0.85 and < 1.15	5.67	6.16	8.64	0.49
		Variables with ORs >= 1.15	1.98	2.16	9.09	0.18
Hospital Location	Urban	Variables with ORs <= 0.85	4.68	4.87	4.06	0.19
		Variables with ORs > 0.85 and < 1.15	5.81	6.33	8.95	0.52
		Variables with ORs >= 1.15	2.09	2.26	8.13	0.17
	Rural	Variables with ORs <= 0.85	4.48	4.65	3.79	0.17

		Variables with ORs > 0.85 and < 1.15	5.32	5.87	10.34	0.55
		Variables with ORs >= 1.15	1.76	1.98	12.50	0.22
Profit vs. non-profit	Profit	Variables with ORs <= 0.85	4.71	4.92	4.46	0.21
		Variables with ORs > 0.85 and < 1.15	5.79	6.31	8.98	0.52
		Variables with ORs >= 1.15	1.99	2.19	10.05	0.2
	Non-profit	Variables with ORs <= 0.85	4.62	4.81	4.11	0.19
		Variables with ORs > 0.85 and < 1.15	5.68	6.25	10.04	0.57
		Variables with ORs >= 1.15	1.99	2.21	11.06	0.22
Academic affiliation	Major	Variables with ORs <= 0.85	4.7	4.91	4.47	0.21
		Variables with ORs > 0.85 and < 1.15	5.98	6.46	8.03	0.48
		Variables with ORs >= 1.15	2.19	2.35	7.31	0.16
	Limited	Variables with ORs <= 0.85	4.68	4.84	3.42	0.16
		Variables with ORs > 0.85 and < 1.15	5.75	6.28	9.22	0.53
		Variables with ORs >= 1.15	2.07	2.24	8.21	0.17
	Graduate	Variables with ORs <= 0.85	4.63	4.84	4.54	0.21
		Variables with ORs > 0.85 and < 1.15	5.81	6.27	7.92	0.46
		Variables with ORs >= 1.15	2.09	2.29	9.57	0.2
	No affiliation	Variables with ORs <= 0.85	4.61	4.79	3.90	0.18
		Variables with ORs > 0.85 and < 1.15	5.62	6.14	9.25	0.52
		Variables with ORs >= 1.15	1.95	2.13	9.23	0.18