

Trends in Case-Mix in the Medicare Population

**Presented to:
American Hospital Association
Federation of American Hospitals
Association of American Medical Colleges**

July 15, 2010

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Executive summary

Is the Medicare population getting sicker over time? Common perception is that the population *is* getting sicker, in part because of its aging. But this perception is not reflected in the proposed CMS rule regarding Medicare payments in which it is suggested that US hospitals have seen a decline in real case-mix in the recent past.

In this study, we analyzed changes in Medicare case-mix over time to determine whether other data and tools to measure patient severity show an increase or decrease in case-mix. We used two different sources of data, with complementary strengths, both developed by the Agency for Healthcare Research and Quality (AHRQ). We used the most recent data available at the time of the study, and used alternative diagnosis-based indicators to measure case-mix.

Our main findings are:

1. Case-mix based on overall disease prevalence in the Medicare population has been steadily increasing from 2000-2007. This analysis was based on data from the Medical Expenditure Panel Survey which is a nationally representative sample and measures medical care from all healthcare providers. Case-mix was estimated from measures of disease indicators based on the Clinical Classification Software (CCS) system (Figure 1).
2. In-hospital case-mix in the Medicare population has been steadily increasing from 2000-2007. This analysis was based on data from the Healthcare Cost and Utilization Project database which is a nationally representative sample of hospital discharges. Case-mix was estimated from measures of disease indicators based on the CCS system (Figure 2).
3. An alternative measure of in-hospital case-mix in the Medicare population has been steadily increasing from 2002-2007. This measure, estimated using indicators from the Disease Staging (DS) system developed by Thomson-Reuters, was analyzed using data from the Healthcare Cost and Utilization Project database (Figure 3).

CMS' assertion that case-mix has declined in the recent past is inconsistent with our findings. Multiple data sets and different measurement tools indicate that the Medicare population is indeed getting sicker.

Figure 1
CMI Based on CCS in the MEPS data: Patients Are Getting Sicker Every Year

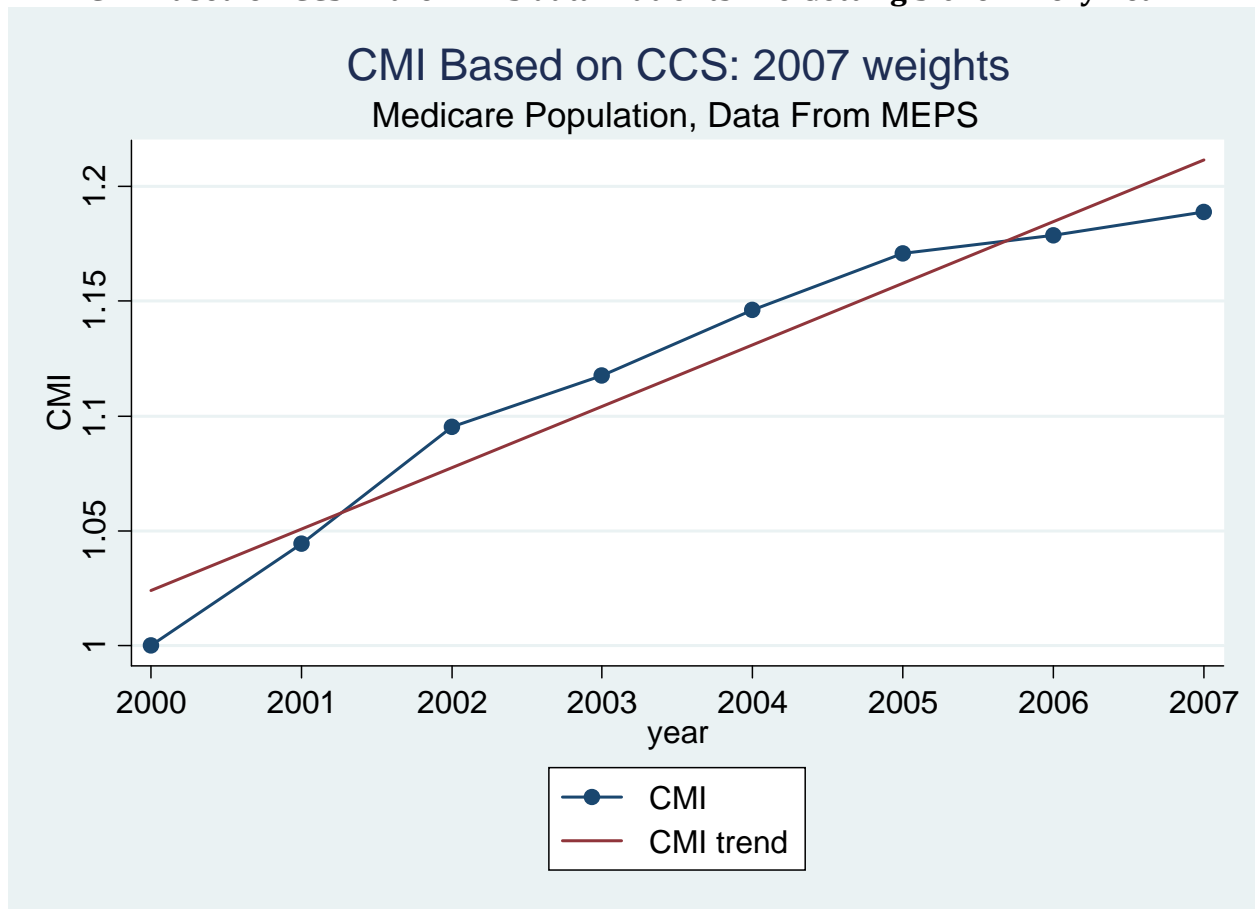


Figure 2
CMI Based on CCS in the HCUP data: Patients Are Getting Sicker Every Year

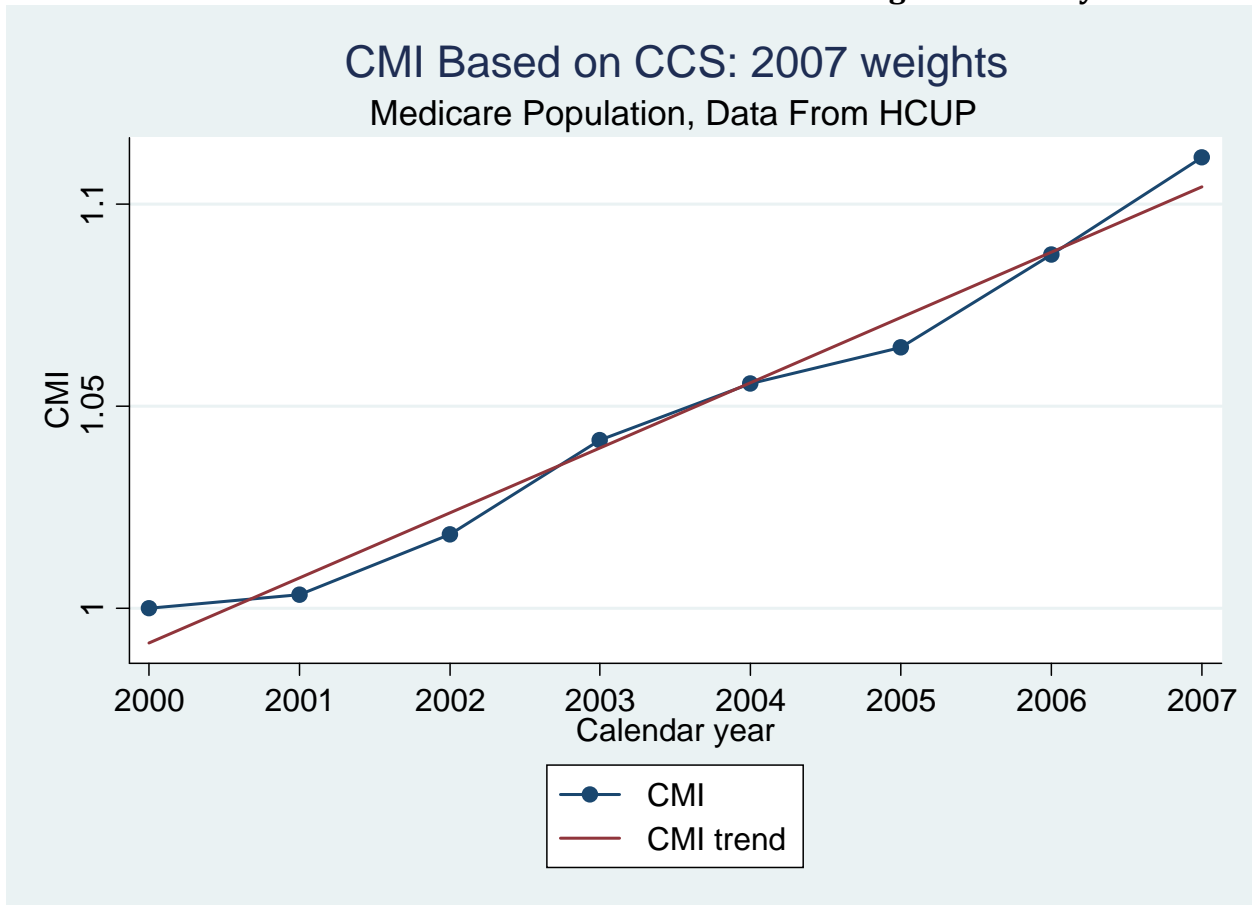
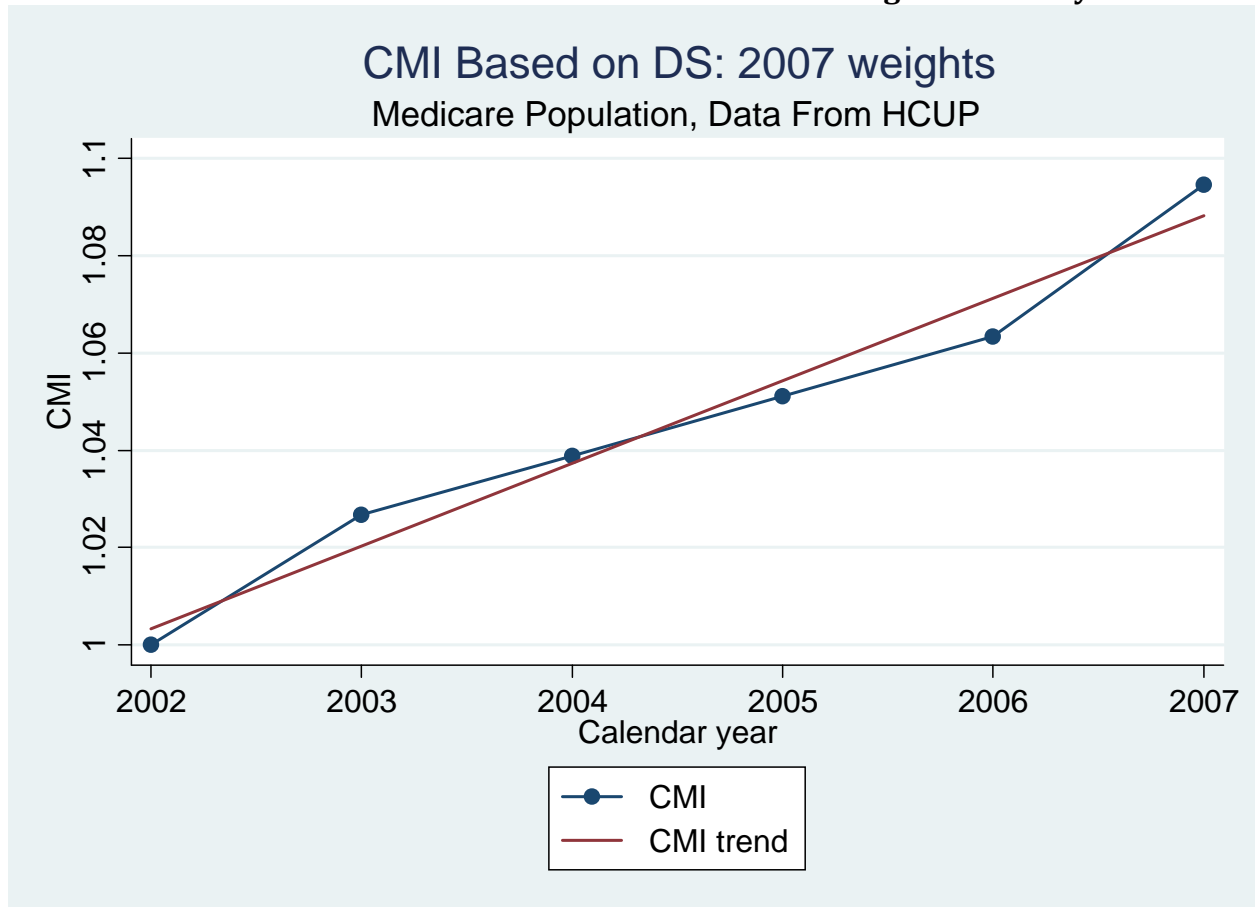


Figure 3
CMI Based on DS in the HCUP data: Patients Are Getting Sicker Every Year



Study in detail

We analyzed changes in Medicare case-mix over time to determine whether other data and tools to measure patient severity show an increase or decrease in case-mix. We used two different sources of data, the Medical Expenditure Panel Survey and the Health Care Utilization Project databases developed by the Agency for Healthcare Research and Quality (AHRQ) for our analysis. The datasets have complementary strengths, and we used alternative diagnosis-based indicators to measure case-mix to strengthen our findings.

Data and Methods

One of the two datasets used for the analysis was constructed from the event-level health care utilization files from the household component of the Medical Expenditure Panel Survey (MEPS) from 2000-2007. In addition to inpatient hospital events, MEPS has separate files for 1. office-based medical provider visits, 2. outpatient visits, 3. emergency room visits, 4. prescribed medicines and 5. home health care visits. The data contain up to four ICD-9-CM diagnosis codes for each medical care event and also up to four AHRQ Clinical Classification Software (CCS) codes.

The Clinical Classifications Software (CCS) for ICD-9-CM is a diagnosis and procedure categorization scheme that takes ICD-9-CM's multitude of codes—over 14,000 diagnosis codes and 3,900 procedure codes—and collapses them into a much smaller number of clinically meaningful categories. CCS can be used to identify populations for disease- or procedure-specific studies or to develop statistical reports providing information about relatively specific conditions. We used it to develop a measure of disease case-mix for the Medicare population.

The other dataset used for the analysis was constructed from the National Inpatient Sample (NIS) event-level files of the Health Care Utilization Project (HCUP) from 2000-2007. The NIS is nationally representative of hospital discharges and covers all payers, not just Medicare. The NIS contains clinical and resource use information included in a typical discharge abstract. In addition to up to nine ICD-9-CM codes available uniformly across all states, the datasets include up to nine AHRQ CCS codes for each year which we use to construct measures of case-mix. In addition, from 2002 onwards, the HCUP data also include the Disease Staging (DS) classification system groups developed by MedStat (Thomson Reuters). Disease Staging is similar to DRGs in that it that uses diagnostic findings to produce clusters of patients who require similar treatment and have similar expected outcomes. It can serve as the basis for clustering of clinically homogeneous patients to assess quality of care, analyze clinical outcomes, review utilization of resources, assess efficacy of alternative treatments, and analyze resource utilization. We calculated case-mix based on DS to provide additional evidence of changes in case-mix over time in US hospitals.

The formula used to estimate the case-mix index is a standard index number formula and is used in a wide variety of areas including in the calculation of price indices. Calculation of the index requires the derivation of importance weights. We calculated importance weights using total expenditures in the case of MEPS and charges in the case of HCUP. For each dataset and for each base year, we estimated the “price” or importance weight for a diagnosis related indicator as the coefficient from a regression of expenditures or charges on the set of indicators.

Results and discussion

Figure 1 shows the values of the case mix indices (CMIs) for the Medicare population from 2000 – 2007 calculated using data from MEPS, denoted by the dots joined by line segments, along with the best-fit linear trend. The weights for the calculation of the CMI are based on data from 2007. For ease of comparison, the values of CMI have been rescaled so that $CMI(2000) = 1$. The figure shows that the CMI calculated using diagnosis related indicators and expenditure weights derived using the CCS system increases continuously from CYs 2000 through 2007.

Figure 2 displays measures of CMI for the Medicare population based on inpatient records from HCUP databases and with CMI calculated from diagnosis related indicators based on the CCS. As with the figures based on data from the MEPS, the values of CMI have been rescaled so that $CMI(2000) = 1$ in each of the panels. The figure shows that the CMI calculated using diagnosis related indicators and charge weights derived using the CCS system increases continuously from 2000 through 2007.

In Figure 3, we display values of CMI for the Medicare population from 2002 – 2007 using measures of CMI calculated from diagnosis related indicators based on the DS system. Thus the results that we observed in Figure 2 are robust to the choice of systems by which diagnosis related indicators are constructed and used to estimate the CMI. Once again, the CMI increases continuously from 2002 through 2007.

Conclusion

In conclusion, a steadily increasing disease and severity burden among Medicare enrollees is evident across datasets and measures. CMS' assertion that case mix has declined in the recent past is inconsistent with our findings.