

# New Policies, New Sources of Error: Impact of Recent Medicare Policies on Database Research

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## Introduction

- ◆ Medicare recently instituted new rules and provider incentives that may affect how information is captured in data.
- ◆ Researchers should understand the potential biases introduced by these changes so that they can be appropriately addressed in the design and/or analysis stage when conducting non-experimental research.

## Objectives

- ◆ To describe potential sources of error introduced by 1) changes in the number of available fields for capturing diagnosis claims, and 2) end-of-year claims processing, where hospitalizations that bridge two calendar years are not adjudicated until the subsequent year.

## Methods

- ◆ Using Parts A/B Medicare files (2005-2013) for patients receiving maintenance dialysis, we defined annual cohorts of patients who were alive on January 1 of each calendar year, had been receiving dialysis for  $\geq 9$  months and had Medicare as their primary payer.
- ◆ To illustrate the effect of an increase in the available number of diagnosis code fields, coronary atherosclerosis-related hospitalization rates were calculated using 2 methods: all available IP diagnosis fields (9 fields through 2009; 25 fields from 2010 onward) and limited to a fixed number (9) throughout all years.
- ◆ Hospitalizations that bridge two calendar years (admission in one calendar year and discharge in the subsequent) are not adjudicated until the subsequent year; to illustrate the magnitude of ignoring these claims, we estimated annual hospitalization rates in 2012 for major CV outcomes including myocardial infarction (MI), stroke and congestive heart failure (CHF) based on inpatient (IP) claims.

## Results

- ◆ There were ~250,000 patients in each cohort (table 1).
- ◆ Patient characteristics were relatively stable over time; mean BMI and dialysis vintage increased slightly.
- ◆ The mean number of diagnosis codes per inpatient claim increased gradually between 1995 and 2010, and then increased to 14.9, 15.6 and 16.3 in 2011, 2012 and 2013, respectively (figure 1).
- ◆ Using only the first 9 codes, the percent of IP claims that included a coronary atherosclerosis-related diagnosis code, as an example, decreased gradually from 19.0-17.4 from 2010-2012; using all codes, rates increased from 2010-2012 (19.0, 19.8, and 21.9% for 2010, 2011 and 2012, respectively, figure 2).
- ◆ For hospital admissions occurring in December, final adjudication of the event did not occur until the following calendar year in ~20% of cases.
- ◆ For example, not accounting for subsequent year adjudications led to an underestimation of event rates of myocardial infarction: 7/100 patient-years in Dec 2012 vs 9.3/100 when accounting for events adjudicated in the subsequent year. Results for stroke and chronic heart failure were similar (figure 3).

Table 1. Patient Characteristics

	2005	2006	2007	2008	2009	2010	2011	2012
N	235,883	238,052	241,437	248,198	251,805	263,500	275,527	285,433
Mean Age (yrs)	62.2	62.2	62.2	62.2	62.1	62.1	62.3	62.3
Gender (%)								
Female	46.7	46.4	46.2	45.9	45.8	45.8	45.7	45.7
Male	53.3	53.6	53.8	54.1	54.2	54.2	54.3	54.3
Race (%)								
White	43.2	42.4	42.1	41.7	41.2	40.8	40.6	40.2
Black	38.2	38.7	38.7	38.6	38.6	38.8	38.8	38.6
Other Race	18.6	18.9	19.2	19.7	20.2	20.4	20.7	21.2
ESRD Cause (%)								
Diabetes	43.1	43.4	43.7	43.9	44.1	44.3	44.3	44.4
Hypertension	29.2	29.2	29.1	29.1	29.0	29.2	29.4	29.5
GN	11.7	11.3	11.0	10.7	10.4	10.1	9.8	9.7
Other	16.0	16.1	16.3	16.4	16.4	16.4	16.5	16.4
BMI (%)								
<18.5	4.0	3.8	3.6	3.4	3.2	3.1	3.0	2.8
18.5-<25	31.8	31.2	30.5	29.8	29.1	28.3	27.6	26.9
25-<30	26.4	26.8	27.1	27.3	27.3	27.3	27.1	27.1
>=30	29.4	31.3	33.1	34.6	36.0	37.4	38.6	39.6
Dialysis Vintage (%)								
<2 years	37.7	36.9	36.3	35.3	34.1	33.5	33.0	32.1
2-<5 years	34.7	34.8	34.6	34.7	35.0	34.8	34.4	34.4
>=5 years	27.6	28.3	29.1	29.9	30.9	31.7	32.5	33.6
Modality (%)								
Hemodialysis	92.2	92.3	92.7	92.8	92.9	92.8	92.5	92.0
Peritoneal dialysis	7.8	7.7	7.3	7.2	7.1	7.2	7.5	8.0
Comorbidity (%)								
Arrhythmia	32.1	33.1	33.9	34.8	35.5	36.1	36.7	37.1
Atrial Fibrillation	24.6	25.4	26.0	26.7	27.0	27.5	28.3	29.1
CAD Atherosclerosis	72.9	74.0	74.4	74.9	75.2	75.3	75.4	75.0
Cancer	20.6	21.1	21.5	21.6	21.8	22.0	22.3	22.5
Cardiomyopathy	25.7	26.6	27.2	27.7	28.1	28.1	28.4	28.4
CHF	71.9	72.9	73.6	74.0	74.0	74.0	74.0	73.7
COPD	39.1	40.7	42.1	42.9	43.5	44.2	44.9	45.4
CVD	98.4	98.5	98.6	98.7	98.8	98.9	98.9	98.9
Diabetes	74.2	76.1	77.7	79.3	80.3	81.3	82.0	82.5
GI Bleeding	32.0	32.5	32.6	32.7	32.8	32.5	32.7	33.1
Left ventricular hypertrop	42.9	44.2	45.0	45.6	46.3	46.3	46.1	45.6
Liver Disease	23.8	24.2	24.2	24.3	24.2	24.0	24.7	25.1
MI/Acute coronary syndro	29.9	30.2	30.1	30.2	30.2	29.9	29.8	29.9
Other Cardiac Disease	74.4	75.3	75.8	76.2	76.6	76.4	76.6	76.8
PVD	71.3	73.3	75.1	76.7	77.9	78.8	79.8	80.6
Stroke	39.2	40.5	41.6	42.8	43.6	44.3	44.9	45.5
Transient ischemic attack	18.6	19.4	20.0	20.5	20.8	21.1	21.6	22.1
Valvular disease	47.0	48.8	50.2	51.4	51.9	51.8	52.1	52.6

Figure 1. Mean Number of Diagnosis Codes Per Inpatient Claim

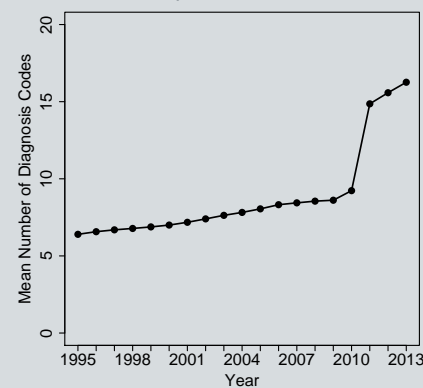


Figure 2. Coronary Atherosclerosis-related Hospitalizations; All Codes vs. 9 Codes

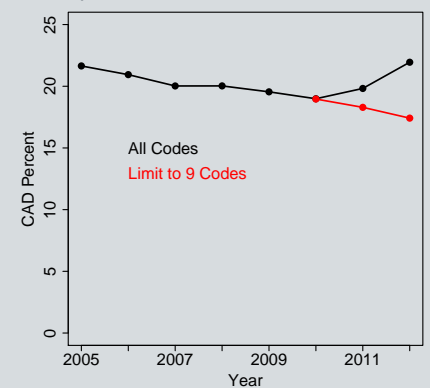
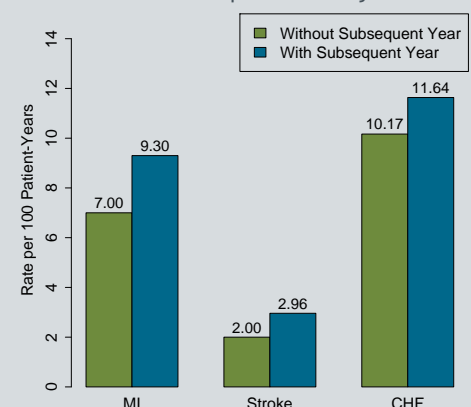


Figure 3. Hospitalization Rates With/Without Subsequent Year Adjudication



## Conclusions

- ◆ Trend analyses using all inpatient diagnosis positions may show spurious increases in cause-specific hospitalizations due to the increased number of available diagnosis fields beginning in 2010.
- ◆ Annual hospitalization rates will likely be underestimated if bridge hospitalizations are not appropriately included in previous year estimates.
- ◆ Failure to understand and account for how data are coded and structured over time may bias results and lead to invalid conclusions.