Temporal Trends in Myocardial Infarction Incidence and 30-Day Mortality in U.S. Dialysis Patients

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Introduction

- Myocardial infarction (MI) is a catastrophic event in dialysis patients.
- Two year mortality for US dialysis patients with MI in 1990-1995 was 74%[1].
- In-hospital mortality and two year mortality among dialysis patients with MI has declined from 1993 to 2008, but only among patients with ST-elevation MI [STEMI][2].
- Few data exist on MI hospitalization rates or 30 day mortality in the recent treatment era.

Objectives

- We assessed trends in type of MI (ST-elevation MI, non-ST-elevation MI [NSTEMI], and unspecified MI [unspec.]), and death rates by type of MI in 2005-2011.
- Based on our recent publication where we found an increase in the proportion of NSTEMIs between 1993-2008[2], we hypothesized that we would find a continuing trend in the increase in the number of dialysis patients hospitalized for MI due to non-ST elevation MI (NSTEMI).

1. Herzog C, Ma J, Collins A. Poor long-term survival after acute myocardial infarction among patients on long-term dialysis. NEJM, 1998 Sep 17;339(12):799-805.
2. Shroff G, Li S, Herzog C. Trends in Mortality Following Acute Myocardial Infarction Among Dialysis Patients in the United States Over 15 Years. J Am Heart Assoc., 2015 Oct 12;4(10).

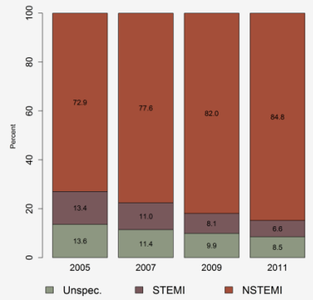
Methods

- Using Medicare claims data, we created yearly cohorts of dialysis patients point prevalent on January 1st of each year 2005-2011.
- Patients were at least 18 years old, had received in-center hemodialysis or peritoneal dialysis for at least 9 months, and had Medicare as primary payer for at least 6 months as of January 1st of each year.
- Patients were followed from January 1st to December 31st of each year for MI, censoring at death, kidney transplantation, modality switch, recovery of renal function, loss of Medicare as primary payer, or lost to follow-up.
- STEMI was defined by ICD-9 diagnosis codes 410.0, 410.1, 410,2, 410.3, 410.4, 410.5, 410.6, and 410.8.
- NSTEMI was defined by ICD-9 diagnosis code 410.7.
- Unspecified MI was defined by ICD-9 diagnosis code 410.9.
- We assessed STEMI, NSTEMI, and unspecified MI hospitalization rates, and calculated 30-day mortality following MI admission.
- Rates were estimated by dividing total number of events by total follow-up time. Time spent hospitalized was not included in the denominator.

Results

- The yearly cohort sizes increased slightly, from 235,883 in 2005 to 275,527 in 2011.
- In 2005 there were 10,275 NSTEMI, 1,892 STEMI, and 1,918 unspecified MI. In 2011 there were 16,235 NSTEMI, 1,269 STEMI, and 1,634 unspecified MI (Figure 1).
- Demographics combining years: mean age 67 (5% <45, and 6% >84) yrs; 47% female; 48% white, 32% black; 55% ESRD from diabetes.
- While the overall MI rate increased slightly from 2005-2011 (8.1/100 PY in 2005 vs 9.1/100 PY in 2011), STEMI and unspecified MI decreased by 44% and 29%, respectively, while NSTEMI increased by 31% (Figure 2, panel A).
- Short term mortality remained relatively unchanged for NSTEMI (24%), increased slightly for STEMI (40% in 2005 to 46% in 2011), and was highest following unspecified MI (72% in 2005 and 75% in 2011) (Figure 2, panel B).

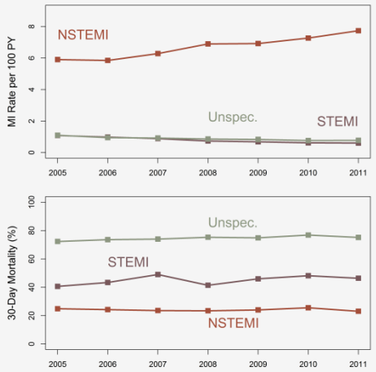
Figure 1. MI Type by Year



Patient Characteristics among 2005-2011 Dialysis Patients Who had an MI Hospitalization (%)

	2005	2006	2007	2008	2009	2010	2011
Age group							
18-44 years	5.4	4.9	4.9	5.4	5.1	4.6	4.6
45-64 years	34.3	35.2	35.2	35.7	37.4	38.0	38.0
65-74 years	30.4	30.0	30.4	29.8	29.6	29.9	29.2
75-84 years	24.5	24.0	23.7	23.3	21.7	21.5	21.4
85+ years	5.5	5.9	5.8	5.8	6.2	6.0	6.8
Sex							
Female	46.9	47.3	47.6	46.7	46.8	46.2	45.6
Male	53.1	52.7	52.4	53.3	53.2	53.8	54.5
Race							
White	50.2	48.2	48.3	47.6	47.7	48.0	48.1
Black	31.7	33.0	32.2	32.8	32.0	31.7	31.5
Other Race	18.1	18.8	19.5	19.7	20.3	20.3	20.5
ESRD Cause							
Diabetes	54.1	54.9	54.4	55.5	55.9	57.0	55.8
Hypertension	28.2	27.4	28.2	27.5	27.7	27.0	27.6
GN	7.2	6.9	6.5	6.5	6.0	5.6	5.9
Other	10.6	10.8	10.9	10.5	10.5	10.3	10.7
Modality							
In center HD	93.5	93.4	93.8	94.0	93.9	93.9	93.5
PD	6.5	6.6	6.2	6.0	6.1	6.1	6.5

Figure 2. MI and 30-Day Post-MI Mortality, by MI Type



Conclusions

- In the recent treatment era there has been little change in either rates of overall MI hospitalization or 30-day mortality.
- The majority of MIs were NSTEMI.
- The observed increase in NSTEMI rates may be due to greater utilization of more sensitive cardiac biomarkers (cardiac troponins) for MI diagnosis. Despite this increase, the overall death rate for the patients has not changed.
- MI remains a catastrophic event for dialysis patients.
- Aggressive interventions to reduce the burden of ischemic heart disease and to improve its prognosis in dialysis patients are warranted.
- Limitations:
  - MI diagnosis and classification based on claims data (i.e., no formal adjudication).
  - MI classification does not account for some types of confounding related to etiology (e.g. "secondary" MI's in the setting of sepsis).

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