Mild Cognitive Impairment and Receipt of Treatments for Acute Myocardial Infarction in Older Adults

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BACKGROUND: Older adults with mild cognitive impairment (MCI) should receive evidence-based treatments when indicated. Providers and patients may overestimate the risk of dementia in patients with MCI leading to potential under-treatment. However, the association between pre-existing MCI and receipt of evidence-based treatments is uncertain.

OBJECTIVE: To compare receipt of treatments for acute myocardial infarction (AMI) between older adults with pre-existing MCI and cognitively normal patients.

DESIGN: Prospective study using data from the nationally representative Health and Retirement Study, Medicare, and American Hospital Association.

PARTICIPANTS: Six hundred nine adults aged 65 or older hospitalized for AMI between 2000 and 2011 and followed through 2012 with pre-existing MCI (defined as modified Telephone Interview for Cognitive Status score of 7–11) and normal cognition (score of 12–27).

MAIN MEASURES: Receipt of cardiac catheterization and coronary revascularization within 30 days and cardiac rehabilitation within 1 year of AMI hospitalization.

KEY RESULTS: Among the survivors of AMI, 19.2% had pre-existing MCI (55.6% were women and 44.4% were male, with a mean [SD] age of 82.3 [7.5] years), and 80.8% had normal cognition (45.7% were women and 54.3% were male, with a mean age of 77.1 [7.1] years). Survivors of AMI with pre-existing MCI were significantly less likely than those with normal cognition to receive cardiac catheterization (50% vs 77%; $P < 0.001$), coronary revascularization (29% vs 63%; $P < 0.001$), and cardiac rehabilitation (9% vs 22%; $P = 0.001$) after AMI. After adjusting for patient and hospital factors, pre-existing MCI remained associated with lower use of cardiac catheterization (adjusted hazard ratio (aHR), 0.65; 95% CI,

0.48–0.89; $P = 0.007$) and coronary revascularization (aHR, 0.55; 95% CI, 0.37–0.81; $P = .003$), but not cardiac rehabilitation (aHR, 1.01; 95% CI, 0.49–2.07; $P = 0.98$).

CONCLUSIONS: Pre-existing MCI is associated with lower use of cardiac catheterization and coronary revascularization but not cardiac rehabilitation after AMI.

KEY WORDS: aging; Alzheimer's; cardiovascular disease; health services research.

J Gen Intern Med 35(1):28–35

DOI: 10.1007/s11606-019-05155-8

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INTRODUCTION

Up to 1 in 5 adults and more than 5.4 million Americans ≥ 65 have mild cognitive impairment (MCI),¹ and this number is projected to triple by 2050.² MCI, a symptomatic clinical stage on the continuum of cognitive decline between normal cognition and dementia, is characterized by measurable cognitive impairment that does not severely affect daily functioning.^{3, 4} Although dementia worsens over time in nearly all patients,^{5, 6} MCI does not inevitably progress to dementia,⁷ even after a decade.^{8, 9} Many older adults with MCI live years¹⁰—an average of 9 years in one community-based study¹¹—with good quality of life,^{12, 13} and so face competing health risks of aging, particularly cardiovascular disease (CVD).¹¹ CVD is the leading cause of death and serious morbidity in community-dwelling older adults with and without MCI.^{11, 14} Although it is known that patients with dementia are less likely than cognitively normal patients to receive established, effective treatments for CVD,^{15, 16} it is unknown whether patients with pre-existing MCI get fewer effective treatments for CVD.

Acute myocardial infarction (AMI) is the most common CVD event.^{14, 17} Several treatments after AMI reduce mortality, morbidity, and disability and increase quality of life.^{18, 19} Large, randomized, controlled trials and meta-analyses have shown that both early cardiac catheterization with appropriate

Prior presentations: This paper was presented as an oral abstract at the 2018 Society of General Internal Medicine Conference, April 12, 2018, Denver, CO.

Electronic supplementary material The online version of this article (<https://doi.org/10.1007/s11606-019-05155-8>) contains supplementary material, which is available to authorized users.

Received October 15, 2018

Revised February 27, 2019

Accepted May 1, 2019

Published online August 13, 2019

coronary revascularization^{20–22} and cardiac rehabilitation^{23, 24} reduce mortality and improve physical function after AMI. Current clinical guidelines²⁵ recommend that all vulnerable elders, except those with advanced dementia or limited life expectancy, receive these effective treatments. It is unknown whether patients with pre-existing MCI are less likely than patients with normal cognition to receive invasive therapies like cardiac catheterization and revascularization, or post-acute, non-invasive services like cardiac rehabilitation, after AMI.

Leveraging a nationally representative sample of US older adults with repeated objective measures of cognition, we conducted an observational cohort study to determine the extent to which patients with pre-existing MCI were less likely than cognitively normal patients to receive established, effective treatments after AMI, and whether treatment differences persisted after adjusting for patient and hospital factors.

METHODS

Study Population

The Health and Retirement Study (HRS) is a nationally representative longitudinal study of 37,000 US adults ≥ 51 evaluating health and economic changes associated with aging.²⁶ The HRS samples from all contiguous US states, with oversampling of Blacks and Hispanics. Every 2 years since 1992, HRS participants have been interviewed using standard instruments. The interviews are conducted by trained survey interviewers at the Institute for Social Research at the University of Michigan. The HRS achieves a high follow-up rate, ranging 85–91% from 1998 to 2012 including proxies,²⁶ and follows participants into nursing homes. Utilization and dates of inpatient and outpatient medical services were available from the Centers for Medicare and Medicaid Services (CMS) (years 1991–2012) for HRS participants who are enrolled in Medicare fee-for-service (at age 65 or disability) and consent to this linkage (80–90% consent). The research protocol was approved by the University of Michigan Institutional Review Board and all human participants gave written informed consent.

We identified 1,119 HRS participants ≥ 65 hospitalized for AMI between January 1, 2000 and December 31, 2011 using valid International Classification of Diseases-Ninth (ICD-9) Revision-CM codes (410.xx except 410.x2 as the primary discharge diagnosis)¹⁸ and interviewed by HRS in 1995 or later. Of these, 510 were excluded because of ineligibility for process measures or incomplete information on hospital characteristics (Online Appendix 1 and 2). The study sample included 609 participants hospitalized for AMI, 117 (19.2%) of whom were classified as having pre-existing MCI.

Measurement of AMI Process Measures

We evaluated three process measures using valid ICD-9 and Current Procedural Terminology codes²⁷ to capture different aspects of post-AMI care: (1) cardiac catheterization ≤ 30 days to evaluate the threshold for invasive diagnostic testing; (2) coronary revascularization (percutaneous coronary intervention [PCI] or coronary artery bypass graft surgery [CABG]) ≤ 30 days to evaluate the threshold for invasive treatments; and (3) cardiac rehabilitation ≤ 365 days to evaluate the use of post-acute, non-invasive services (Online Appendix 3). Cardiac rehabilitation had a longer time window based on Medicare Part B coverage.²⁸

Measurement of Cognition and Other Study Variables

Trained HRS interviewers administered cognitive function tests biennially in-person or by telephone using the Modified Telephone Interview for Cognitive Status (TICS-m), a global cognition test patterned after the Mini-Mental State Examination.^{29, 30} The TICS-m assesses global cognition, learning, and memory (scores range, 0–27). Higher scores indicate better performance. Among older adults, telephone measurement of global cognition, learning, and memory, compared to in-person measurement, is comparable, reliable, and precise.^{31, 32} The TICS-m is validated as a cognitive screening instrument and designed for use in population-based studies.^{29, 30} Proxy respondents had separate assessments. At each interview, the HRS participant was classified as having normal cognition, MCI, or dementia using methods and validated cut-points^{33, 34} based on in-depth, in-home, neuropsychological, and clinical assessments as well as expert clinician adjudication from the Aging, Demographics, and Memory Study, an HRS dementia sub-study.³²

Patient and hospital factors were based on determinants affecting treatment of older patients with serious illness (Table 1)³⁵ and included functional limitations in basic and instrumental activities of daily living (ADL/IADL), depressive symptoms, and social support/structure.^{36–38} Dates of death were available for $>95\%$ of participants from the National Death Index and CMS. Hospital characteristics were available from the American Hospital Association (Online Appendix 1).

Statistical Analysis

We followed a pre-specified analysis plan (Online Appendix 1). We performed descriptive and bivariate statistics. To estimate the relationship of pre-existing MCI to time-to-receipt of the process measures, we used Cox proportional regression models (M0). Results are presented as hazard ratios before and after adjustment for patient and hospital factors.

We also examined whether receipt of coronary revascularization (primary process measure) reduced the association between MCI and death (main outcome of interest). First, we fitted two additional multivariable Cox models for

Table 1 Participant and Hospital Characteristics by Cognitive Status: Health and Retirement Study-Medicare, 2000–2012

	Participants with normal cognition (n = 492)	Participants with pre-existing MCI (n = 117)	P value
Participant characteristics			
Age at AMI, mean (SD), years	77.1 (7)	82.3 (7)	< 0.001
Women	225 (46)	65 (56)	0.056
Race/ethnicity			0.001
Non-Hispanic White	435 (88)	86 (74)	
Non-Hispanic Black	29 (6)	16 (14)	
Hispanic	20 (4)	12 (10)	
Other	8 (2)	3 (3)	
Marital status/living arrangement			0.07
Married/partner	293 (60)	56 (48)	
Unmarried/living with other	60 (12)	19 (16)	
Unmarried/living alone	139 (28)	42 (36)	
Education			< 0.001
< 12 years	114 (23)	67 (57)	
12 years	207 (42)	34 (29)	
13–15 years	92 (19)	12 (10)	
≥ 16 years	79 (16)	4 (3)	
Net wealth (quartiles)			0.003
≤ \$51,200	115 (23)	43 (37)	
\$51,201–\$147,000	115 (23)	33 (28)	
\$147,001–\$356,000	135 (27)	19 (16)	
> \$356,000	127 (26)	22 (19)	
Income (quartiles)			0.001
≤ \$15,580	110 (22)	44 (38)	
\$15,581–\$26,760	127 (26)	31 (27)	
\$26,761–\$45,980	124 (25)	26 (22)	
> \$45,980	131 (27)	16 (14)	
Charlson comorbidity index score, mean (SD), points	2.9 (2)	3.0 (2)	0.69
CES-D depressive symptoms			< 0.001
0	192 (39)	31 (27)	
1–4	267 (54)	66 (56)	
5–8	33 (7)	20 (17)	
Functional limitations, mean (SD), number	0.7 (1)	1.7 (2)	< 0.001
Geographic proximity to adult children			
No children or missing	36 (7)	16 (14)	
Co-residence	88 (18)	21 (18)	
Within 10 miles	214 (44)	56 (48)	
Greater than 10 miles	154 (31)	24 (21)	
Have an adult daughter	395 (80)	84 (72)	0.04
Hospital characteristics			
Medical school affiliate or teaching hospital	225 (46)	48 (41)	0.36
Region			0.47
Northeast	81 (16)	19 (16)	
Midwest	214 (44)	58 (50)	
South	132 (27)	30 (26)	
West	65 (13)	10 (9)	
Bed size			0.012
< 200 beds	126 (26)	46 (39)	
200–399 beds	183 (37)	36 (31)	
≥ 400 beds	183 (37)	35 (30)	
Authority type			0.72
Government nonfederal	34 (7)	6 (5)	
Not for profit	372 (76)	92 (79)	
For profit	86 (17)	19 (16)	

Functional limitations were measured by summing the number of difficulties with 6 activities of daily living (walking, dressing, bathing, eating, getting in/out of bed, using toilet), and 5 instrumental activities of daily living (managing money, taking medication, preparing hot meals, using phones, and shopping for groceries) (range, 0–11). Depressive symptoms were measured by the 8-item Center for Epidemiological Studies Depression Scales. Social support/structure was measured by marital status/living arrangement, having a daughter, and geographic proximity of adult children. P values were calculated using chi-square test for categorical variables and t test for continuous variables. Patient characteristics were available from the Health and Retirement Study. Hospital characteristics were available from the American Hospital Association. MCI mild cognitive impairment, AMI acute myocardial infarction, CES-D Center for Epidemiological Studies Depression Scale, SD standard deviation

time to death (M1 and M2). Both models included the same set of patient and hospital factors as covariates. The only difference between the two models is that the *receipt of process measure* covariate is included in model M2. We then assessed the reduction of the MCI *direct effect* by adding receipt of the process measure covariate in model

M2 relative to the *total effect* in model M1. Such reduction of the total effect implies that the effect of MCI on mortality is partially mediated by receipt of the process measure. We also performed formal mediation analysis^{39, 40} to confirm that receipt of coronary revascularization mediates the association between MCI and death.

Figure 1 Differences in receipt of process measures for acute myocardial infarction in older adults by cognitive status: Health and Retirement Study-Medicare, 2000–2012. All $P \leq 0.001$. Data sources: Health and Retirement Study, Medicare, American Hospital Association, 2000 to 2012. The percentages of receipt of process measures by cognitive status are unadjusted. Please see Table 2 for the unadjusted and adjusted hazard ratios for receipt of process measures by pre-existing cognitive status.

We used multiple imputation for missing depressive symptoms ($n=37$) using all available prior depressive symptom scores. An analyst (MK) performed analyses under the supervision of the biostatistician (AG). MK had full access to all the data in the study and takes responsibility for its integrity and the data analysis. All statistical analyses were performed with the STATA software, version 15.0.

Sensitivity Analysis

We examined receipt of the process measures at different time intervals (30 days, 90 days, and 365 days). To test the robustness of our findings, we repeated analyses after excluding

Table 2 Unadjusted and Adjusted Hazard Ratios and 95% Confidence Intervals for Receipt of Process Measures for Acute Myocardial Infarction by Pre-existing Cognitive Status (Mild Cognitive Impairment Versus Normal Cognition) in Older Adults ($n=609$): Health and Retirement Study-Medicare, 2000–2012

Process measures	Unadjusted hazard ratios (95% CI) for MCI vs. normal cognition	P value	Adjusted hazard ratios (95% CI) for MCI vs. normal cognition	P value
Cardiac catheterization within 30 days	0.45 (0.34–0.59)	< 0.001	0.65 (0.48–0.89)	0.007
Coronary revascularization within 30 days	0.35 (0.24–0.50)	< 0.001	0.55 (0.37–0.81)	0.003
Cardiac rehabilitation within 365 days	0.36 (0.19–0.69)	0.002	1.01 (0.49–2.07)	0.98

Adjusted for patient factors (age, sex, ethnicity, marital status, education, income, wealth, functional limitations, comorbidity score, depressive symptoms, social support) and hospital factors (teaching status, region, bed size, and hospital type)
MCI mild cognitive impairment

individuals classified as MCI by the HRS but having dementia/Alzheimer's disease based on Medicare claims and also after excluding individuals classified as MCI and having ≥ 2 IADLs because these people may have more severe cognitive impairment or dementia. To determine the effect of mortality on the association between pre-existing MCI and receipt of the process measures, we repeated analyses after excluding individuals who died during the time interval for receipt of process measures and adding those who died ≤ 7 days of hospital discharge. To examine whether AMI type (ST-elevation MI versus non-ST-elevation MI) modified the effect of pre-existing MCI on receipt of the process measures, we introduced AMI type and a pre-existing MCI-by-AMI type interaction term to the fully adjusted models (ICD-9 code for NSTEMI 410.71 and remaining codes for STEMI).^{18, 41} To control for possible temporal decreases in coronary revascularization for AMI,⁴² we repeated the analysis adding year of AMI hospitalization to the regression models.

RESULTS

Table 1 presents patient characteristics. Among the patients with pre-existing MCI, the median time between the cognitive assessment of MCI and the AMI hospitalization was 403 days (interquartile range, 205–628 days). We compared characteristics between included and excluded participants (Online Appendix 4). Most patients received cardiac catheterization (70%) and coronary revascularization (54%) ≤ 1 week of their

Table 3 Effects of Pre-existing Mild Cognitive Impairment on 1-Year Mortality (Primary Clinical Outcome) and Mediation (Indirect) Effect of Receipt of Coronary Revascularization Within 30 Days (Primary Process Measure) on the Relationship Between Pre-existing Mild Cognitive Impairment and 1-Year Mortality in Older Adults with Acute Myocardial Infarction ($n=609$) Using Cox Regression: Health and Retirement Study-Medicare, 2000–2012

Dependent variable (model label)	Main predictor(s)	Adjusted hazard ratio (95% CI)	P value
Time to death (M1)	MCI	2.45 (1.55–3.85)	< 0.001
Time to coronary revascularization within 30 days (M0)	MCI	0.55 (0.37–0.81)	0.003
Time to death (M2)	MCI	2.14 (1.36–3.37)	0.001
	Coronary revascularization within 30 days	0.42 (0.26–0.68)	< 0.001

Adjusted for patient factors (age, sex, ethnicity, marital status, education, income, wealth, functional limitations, comorbidity score, depressive symptoms, social support) and hospital factors (teaching status, region, bed size, and hospital type). Model M0 is a Cox proportional regression model for time to receipt of coronary revascularization within 30 days after adjusting for pre-existing cognitive status, patient factors, and hospital factors. Model M1 is a Cox proportional regression model with for time to death after adjusting for pre-existing cognitive status, patient factors, and hospital factors. Model M2 added receipt of coronary revascularization within 30 days to model M1
MCI mild cognitive impairment

hospitalization. The median time to initiation of cardiac rehabilitation was 47 days (interquartile range, 30–87).

Older adults with pre-existing MCI were less likely than those with normal cognition to receive cardiac catheterization (50% vs. 77%; $P < 0.001$; unadjusted hazard ratio [HR], 0.45 [95% CI, 0.34–0.59]) and coronary revascularization (29% vs. 63%; $P < 0.001$; HR, 0.35 [95% CI, 0.24–0.50]) within 30 days, and cardiac rehabilitation within 365 days following AMI (9% vs. 22%; $P = 0.001$; HR, 0.36 [95% CI, 0.19–0.69]) (Fig. 1 and Table 2).

After adjusting for patient and hospital factors, patients with pre-existing MCI, compared to those with normal cognition, were significantly less likely to receive cardiac catheterization (adjusted HR [aHR], 0.65; 95% CI, 0.48–0.89) and coronary revascularization (aHR, 0.55; 95% CI, 0.37–0.81), but not cardiac rehabilitation (aHR, 1.01; 95% CI, 0.49–2.07) after AMI (Table 2). Results were similar in analyses that measured process measures ≤ 90 days after AMI hospitalization (Online Appendix 5).

We also examined whether receipt of coronary revascularization reduced the association between MCI and death. Of the 609 individuals, 114 (18.7%) died ≤ 1 year after AMI hospitalization. There were 45 deaths in 117 patients with MCI (38.5%) and 69 deaths in 492 patients with normal cognition (14%) within 1 year after AMI hospitalization. Pre-existing MCI was associated with increased risk of mortality (aHR, 2.45; 95% CI, 1.55–3.85) (model M1, Table 3). With further adjustment for receipt of coronary revascularization, the risk of mortality associated with MCI decreased (aHR, 2.14; 95% CI, 1.36–3.37) (model M2, Table 3). Formal mediation analysis confirmed that receipt of coronary revascularization mediated the positive association between pre-existing MCI and mortality (the effect tested using the Sobel test was significant [$P = 0.02$]) (Online Appendix 6).

Sensitivity Analyses

Results were similar in analyses including AMI type (STEMI vs NSTEMI), and AMI type did not modify the effect of pre-existing MCI on receipt of process measures (P for MCI-by-AMI type interaction term was 0.62 for cardiac catheterization, 0.80 for coronary revascularization, and 0.82 for cardiac rehabilitation) (Online Appendix 7). Results were similar in analyses that controlled for temporal trends in coronary revascularization, excluded individuals who died during the time interval for receipt of process measures, excluded individuals classified as MCI based on HRS data but having dementia/Alzheimer's disease based on CMS data, and excluded individuals classified as MCI and having ≥ 2 IADL limitations (Online Appendix 8). Patients in the study sample, compared to those who died ≤ 7 days of AMI hospitalization ($n = 79$), had less MCI (19% vs. 29%; $P = 0.04$) and were more likely to receive cardiac catheterization (70% vs. 34%; $P < 0.001$) and

coronary revascularization ≤ 7 days (54% vs. 22%; $P < 0.001$). Results were consistent after adding the patients who died ≤ 7 days of hospital discharge (Online Appendix 9).

DISCUSSION

We found that patients with pre-existing MCI were less likely than cognitively normal patients to receive three process measures following AMI. The effect sizes were large with absolute differences of 27% for cardiac catheterization, 34% for coronary revascularization, and 13% for cardiac rehabilitation. After adjusting for patient and hospital factors, older adults with pre-existing MCI, compared to those with normal cognition, were significantly less likely to receive cardiac catheterization—35% less likely—and coronary revascularization—45% less likely. In contrast, our results suggest that differences in patient (age, comorbidity, and functional limitations) and hospital factors explain differences in receipt of cardiac rehabilitation between patients with MCI and cognitively normal patients. Results were similar in analyses that accounted for AMI type (STEMI vs NSTEMI) and there was no evidence that AMI type modified the association between pre-existing MCI and receipt of the process measures for AMI.

Compared to the elderly with dementia, less is known about the quality of AMI care in the larger population of older adults with MCI. Not only are patients with dementia less likely to be treated intensively for AMI^{15, 16} but even among patients with dementia, older age and lower cognitive status are associated with reduced use of invasive procedures (cardiac catheterization and PCI) for AMI.⁴³ To our knowledge, our study is the first investigation to extend these findings to those with pre-existing MCI. A previous study found that older adults with MCI measured 1 month after AMI were less likely to receive AMI process measures; however, results were not adjusted for confounding factors (e.g., patient and hospital factors) and MCI might not have preceded the AMI (i.e., the AMI might have caused or contributed to the MCI).⁴⁴

It is unknown whether patients with MCI get fewer invasive treatments for AMI because of patient and care partner preferences or physician recommendations for less invasive treatment, or a combination of both. We speculate a few reasons why this might be happening. Older patients with MCI might receive fewer treatments for AMI because physicians and patients overestimate their risk of dementia and underestimate their risk of CVD events, consistent with prior research showing that people tend to overestimate the likelihood of rare events and underestimate the likelihood of common events.⁴⁵ In a community-based study of older adults with MCI, CVD caused 38% of deaths and dementia caused only 3% of deaths.¹¹ Physicians and patients might conflate MCI with dementia,^{5, 6} and assume that a patient with MCI has a poor prognosis and limited life expectancy.

Physicians might recommend emergent, invasive treatments less frequently to patients with MCI owing to concerns

about increased risk of treatment complications (e.g., delirium after CABG) and decreased ability to understand invasive treatments, provide informed consent, and adhere to complex treatment regimens (e.g., dual antiplatelet therapy after PCI). Physicians might be unaware that a patient has MCI because MCI is underdiagnosed and poorly documented.⁴⁶ So the HRS measure of MCI might be serving as a proxy for other patient factors (e.g., cognitive impairment, frailty, low health literacy) that, in turn, decrease physicians' recommendations for high intensity care. Our results suggest a scientific need to better understand decision-making for invasive but effective AMI treatments in older patients with MCI, the reasons for treatment differences, and methods to identify patients with MCI most likely to benefit from treatments.

More evidence on benefits and risks of AMI treatments in patients with MCI is also needed. However, it is important to note that we found no evidence that patients with MCI derive less survival benefit from coronary revascularization than cognitively normal patients. Our results show that pre-existing MCI is associated with an increased risk of mortality and that receipt of coronary revascularization reduced this mortality risk, consistent with findings in patients with pre-existing dementia.⁴³ Studies also suggest that the risks and outcomes (cognition, mental functioning, physical functioning, and disease-specific quality of life) of AMI treatments, including revascularization, are similar between patients with MCI and cognitively normal patients.^{44, 47}

Our study has several strengths. The HRS is a nationally representative study with rigorously collected data. The HRS's longitudinal, objective measurements of cognition²⁶ before AMI hospitalization are a unique strength because cognitive function is not routinely collected in clinical practice and MCI is under-documented in administrative data.⁴⁶ AMI has an identifiable time of diagnosis that is advantageous for studying serious illnesses in the elderly.³⁵ We used a pre-specified analysis plan.

Our study has limitations. Our definition of MCI is based on a limited set of cognitive tests or proxy assessments without a full clinical evaluation, so misclassification is possible. The HRS is designed to measure MCI and dementia as accurately as possible with large-scale, nationally representative population surveys. The HRS approaches accurately classify 80–85% of HRS participants as having dementia versus no dementia (MCI or normal cognition) compared to the detailed neuropsychological and clinical assessments performed in the ADAMS study, the HRS dementia sub-study.^{33, 48} Although misclassifying patients with dementia as having MCI could bias our results away from the null, sensitivity analyses that further restricted the definition of MCI and excluded patients with potential dementia, based on CMS administrative data and IADL limitations, confirmed the robustness of our findings. The HRS method also accurately classifies 85–90% of HRS self-respondents as having normal cognition versus any cognitive impairment (MCI or dementia).^{33, 34} Misclassifying cognitively normal patients

as having MCI would reduce our ability to detect treatment differences by MCI status. Although we were unable to account for frailty⁴⁹ because these data were unavailable for most patients (60%), HRS participants classified as frail do not have greater prevalence of MCI compared to the overall study population,⁵⁰ and we adjusted for functional limitations. We did not have information on AMI severity, delirium, or the appropriateness of the use of AMI treatments. It is possible that the effect size is exaggerated due to unmeasured confounding and small sample size.

The number of people diagnosed with MCI is expected to increase because the Affordable Care Act mandated coverage of an assessment of cognitive impairment as part of the annual wellness benefit for all Medicare beneficiaries.⁵¹ Older patients with MCI, their care partners, and their physicians must weigh the risks and benefits of CVD treatments alongside competing risks (e.g., death and dementia). The care of CVD in older patients with MCI is crucial for elders ≥ 85 because they comprise the fastest-growing segment of the US population,⁵² they are most likely to have MCI,¹ and their incidence of AMI has increased.⁵³ The critical issue is that patients with MCI receive the care that they would want if properly informed. Despite clinical practice guidelines²⁵ and the benefits on mortality and physical function, our results suggest that patients with MCI get coronary revascularization less often. Our results also suggest that cardiac rehabilitation remains underused in older adults with normal cognition or MCI. Given its benefits on mortality as well as physical function, efforts to improve the use of cardiac rehabilitation in both groups of older adults are warranted.

CONCLUSIONS

Pre-existing MCI was associated with lower likelihood of receiving cardiac catheterization and coronary revascularization but not cardiac rehabilitation after AMI.

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Funding This work was supported by NIH/NIA grant R01 AG051827 (Levine DA, PI). The Health and Retirement Study is funded by the NIH/NIA (U01 AG009740) and performed at the Institute for Social Research, University of Michigan, Ann Arbor.

Dr. Levine was also supported by NINDS R01 NS102715 (PI) and was consultant/advisory board UCSF (event adjudicator for POINT trial). Dr. Langa received funding support from NIH/NIA grants P30 AG053760 and P30 AG024824. Dr. Galecki and M. Kabeto also received funding support from NIH/NIA grant P30 AG024824.

Compliance with Ethical Standards:

Conflict of Interest: The authors declare that they do not have a conflict of interest.

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