The Association Between Mild Cognitive Impairment Diagnosis and Patient Treatment Preferences: a Survey of Older Adults

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BACKGROUND: Older patients (65+) with mild cognitive impairment (MCI) receive less guideline-concordant care for cardiovascular disease (CVD) and other conditions than patients with normal cognition (NC). One potential explanation is that patients with MCI want less treatment than patients with NC; however, the treatment preferences of patients with MCI have not been studied.

OBJECTIVE: To determine whether patients with MCI have different treatment preferences than patients with NC.

DESIGN: Cross-sectional survey conducted at two academic medical centers from February to December 2019

PARTICIPANTS: Dyads of older outpatients with MCI and NC and patient-designated surrogates.

MAIN MEASURES: The modified Life-Support Preferences-Predictions Questionnaire score measured patients' preferences for life-sustaining treatment decisions in six health scenarios including stroke and acute myocardial infarction (range, 0–24 treatments rejected with greater scores indicating lower desire for treatment).

KEY RESULTS: The survey response rate was 73.4%. Of 136 recruited dyads, 127 (93.4%) completed the survey (66 MCI and 61 NC). The median number of life-sustaining treatments rejected across health scenarios did not differ significantly between patients with MCI and patients with NC (4.5 vs 6.0; P=0.55). Most patients with MCI (80%) and NC (80%) desired life-sustaining treatments in their current health (P=0.99). After adjusting for patient and surrogate factors, the difference in mean counts of rejected treatments between patients with MCI and patients with NC was not statistically significant (adjusted ratio, 1.08, 95% CI, 0.80–1.44; P=0.63).

CONCLUSION: We did not find evidence that patients with MCI want less treatment than patients with NC. These findings suggest that other provider and system factors might contribute to patients with MCI getting less guideline-concordant care.

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

INTRODUCTION

More than 5.4 million Americans—up to 20% of older adults (65+)—have mild cognitive impairment (MCI),[1] and this number might triple by 2050.[2] MCI is characterized by measurable cognitive impairment that does not significantly impair daily functioning.[3] Dementia is not inevitable in patients with MCI.[4] While some patients diagnosed with MCI develop dementia (3–15% per year), others remain stable or revert to normal cognition (NC) (14–55%).[5–8] Many patients with MCI live up to a decade on average,[9,10] with good quality of life,[11,12] and face aging health risks including cardiovascular disease (CVD), the leading cause of death and disability in patients with MCI and NC.[10,13] Clinical practice guidelines recommend that all older patients receive guideline-concordant care for CVD unless they have advanced dementia or limited life expectancy.[14–16] Nevertheless, evidence suggests patients with MCI receive fewer guideline-concordant

treatments for CVD and other conditions than patients with NC.[17–20]

The reasons that patients with MCI get fewer guideline-concordant treatments are unclear though some physicians believe patients with MCI, compared with patients with NC, want less intensive care.[21,22] The extent to which treatment preferences differ between patients with MCI and NC is unknown. Exploring the association between patient MCI diagnosis and treatment preferences in Black and White patients is important because Black patients, compared with White patients, are more likely to have MCI.[1] However, some studies have suggested Black patients tend to have less understanding of dementia and perceive themselves as having a lower dementia risk.[23–25]

We conducted a multi-center survey study of older patients to determine how patient MCI diagnosis influences treatment preferences in several clinical scenarios, including two CVD events, acute myocardial infarction (AMI) and stroke. We hypothesized that patients with MCI would prefer less treatment than patients with NC because patients with MCI might overestimate their dementia risk. We based this hypothesis on research showing people tend to overestimate the risk of rare events and underestimate the risk of common events,[26] and patients with lower cognitive function have greater worry about dementia.[27]

METHODS

Study Population

We recruited patients and their self-designated surrogates by mail and telephone at two academic medical centers (University of Michigan [U-M] and Duke University [Duke]). The Online Appendix 1 has details. We included surrogates defined as a friend or family member involved in the patients' medical care because patients with MCI and NC frequently involve friends or family members in their care. We contacted participants from the available rosters with a goal of recruiting a sample that had approximately equal numbers of Black and White dyads by cognitive status group within each site.

We recruited patients with MCI and surrogates from cognitive/memory disorders clinics, geriatric clinics, medical records, and/or active cognition studies. We recruited patients with NC and their surrogates from established registries and active studies at U-M and Duke. Eligible patients were required to be 65 or older, have a diagnosis of MCI or NC within the past 12 months, read and speak English, self-identify as having Black or White race, and have a self-designated surrogate 18 or older who reads and speaks English. At both sites, the diagnosis of MCI was based on cognitive testing, clinical examinations, and expert clinician diagnosis following the 2011 National Institute on Aging—Alzheimer's Association (NIA-AA) diagnostic guidelines for MCI.[28] We aimed to recruit 100 patient-surrogate dyads (50 dyads per site) based on pre-survey power calculations (Online Appendix 1).

Patients and surrogates provided written consent before completing the paper survey and received a $50 incentive. The U-M and Duke institutional review boards approved this study.

Survey Data Collection

We refined surveys based on two rounds of cognitive interviews with 28 individuals (8 with MCI) to ensure understanding in the target population. Online Appendices 2 and 3 have the full surveys. We obtained missing survey data by telephone, as possible.[29]

Primary Outcome. The primary outcome was the Life-Support Preferences-Predictions Questionnaire (LSPQ).[30] The LSPQ is a validated measure of treatment preferences in patients and surrogates across a broad spectrum of realistic life-sustaining treatment decisions.[30,31] We used a modified version of the LSPQ that had six health scenarios: (1) the patient's current health; (2) emphysema; (3) stroke; (4) metastatic colon cancer; (5) heart attack with heart failure; and (6) dementia (Online Appendix 1). Patients were asked to imagine themselves in each scenario and indicate their preference for receiving each of 4 life-sustaining medical treatments chosen to vary in invasiveness: (1) antibiotics for life-threatening pneumonia; (2) cardiopulmonary resuscitation for cardiac arrest; (3) emergency gall bladder surgery for life-threatening gallbladder infection; and (4) artificial nutrition and hydration for inability to take food or water. The modified LSPQ had high reliability (Cronbach's alpha of 0.96 in patients with MCI and NC and their surrogates), comparable to the previous LSPQ version.[32]

Patients indicated their treatment preferences using a 5-point Likert scale (probably want treatment, definitely want treatment, unsure, probably do not want treatment, and definitely do not want treatment).[30] Surrogates imagined the patient in each illness scenario and indicated the treatments they would want for the patient using the same scale. To calculate LSPQ total scores, we summed the probably/definitely "do not want treatment" responses across the 24 questions (6 health scenarios times 4 life-sustaining treatments/scenario) resulting in values ranging from zero to 24. Based on previous research,[30,33] we categorized "unsure" responses with "want treatment" because the clinical default in most scenarios is to provide treatment unless specifically refused.

Secondary Outcomes. We assessed patients' and surrogates' preferences for shared decision-making (SDM) with clinicians in general using the Control Preferences Scale.[34] We also assessed patients' SDM preferences for specific AMI and ischemic stroke treatments varying in invasiveness and settings across the treatment spectrum from acute treatment to rehabilitation to secondary prevention using a 5-point Likert scale ranging from "definitely do not want to be involved" to "definitely want to be involved." The four treatments after AMI included coronary angioplasty, coronary artery bypass graft surgery, outpatient cardiac rehabilitation, and cholesterol

medicine. The four treatments after ischemic stroke included intravenous tissue plasminogen activator (IV t-PA), carotid endarterectomy, inpatient rehabilitation, and anticoagulation for atrial fibrillation. Surrogates imagined the patient in each AMI and stroke scenario and indicated their own preferences for being involved in the treatment decisions using the same scale.

Covariates. Patients and surrogates self-reported covariates. Demographic variables included age, gender, race, marital status, and education level. Health experience variables included health status, medical history (stroke, heart disease, chronic lung disease, cancer, and arthritis),[35] depressive symptoms,[36] functional limitations in basic activities of daily living (ADLs),[35] presence of a close family member/friend with dementia, AMI, and stroke,[35] and social support/structure.[37–39] To adjust for patients' global cognitive performance, patients with MCI and NC completed the Montreal Cognitive Assessment (MoCA) test at a routine clinic or research study visit during the 12 months before the survey. Surrogates separately reported patient's functional abilities using the Dementia Severity Rating Scale (DSRS),[40] relationship to the patient, duration of the relationship, and type/frequency of contact with the patient.

Statistical Analysis

We compared descriptive characteristics by patient cognitive status (MCI vs. NC) using Mood's median tests for continuous variables and χ^2 tests or Fisher's exact tests for categorical variables. A high proportion of patients and surrogates had LSPQ scores of 0, indicating they would reject zero life-sustaining treatments and want every life-sustaining treatment in every scenario. We examined associations between LSPQ score (dependent variable) and patient cognitive status using zero-inflated negative binomial (ZINB) regression, a method used to model over-dispersed count data with excessive zeros.

The ZINB model consisted of two complementary sub-models. The regression sub-model had a dichotomous outcome with categories LSPQ=0 and LSPQ>0 pertaining to a hypothetical (latent) subpopulation of patients "at risk" of having an LSPQ score equal to 0. The negative binomial regression sub-model had a continuous outcome of LSPQ score with values ranging from 0 to 24 pertaining to a hypothetical subpopulation of patients "not at risk" of having an LSPQ score equal to 0. To allow for direct interpretation of the model coefficients in terms of overall effects associated with the entire population, we assumed that the probability of belonging to the first subpopulation did not depend on any covariates.[41] Consequently, we present the ZINB model results in terms of regression coefficients obtained from the negative binomial regression sub-model. We present and interpret the ZINB model coefficients in terms of ratios of mean counts representing a relative increase/decrease of patient-surrogate responses expressing *no desire* for life-sustaining

treatments attributed to a one-unit increase in a value of a corresponding covariate. We found no significant association between a race * MCI interaction term and the patient- or surrogate-reported LSPQ scores. We examined differences in secondary outcomes by patient cognitive status; however, insufficient cell sizes in some response categories precluded significance testing. The analytic code is publicly available (https://github.com/deblevine/MCI-DeM_LSPQ).

RESULTS

Figure 1 presents a flow diagram. Of 190 screened dyads, 173 dyads were eligible. Of the 173 eligible dyads, we recruited 136 dyads, and 127 dyads (66 MCI, 61 NC) completed the surveys (final analytic sample). The response rate was 73.4% (127/173). The completion rate was 93.4% (127/136).

Table 1 presents descriptive characteristics by patient cognitive status. Patients with MCI (42.4% Black, 60.6% female, median [IQR] age: 74.0 [69.0, 78.0] years), compared to patients with NC (47.5% Black, 62.3% female, median [IQR] age: 71.0 [69.0, 76.0] years), had lower cognitive performance (median MoCA scores, 23 vs 27 points; *P*<0.001), higher functional dependence due to cognitive impairment (median DSRS scores, 5.5 vs 1 points; *P*<0.001), greater indication of depression (40.9% vs 19.7%; *P*=0.01), and longer relationships with their surrogates (52 vs 43 years; *P*=0.04).

Primary Outcome: Patients' Preferences For life-Sustaining Treatments

The median number of life-sustaining treatments rejected across the six health scenarios was not significantly different between patients with MCI and those with NC (rejected treatments, 4.5 vs 6.0; *P*=0.55) (Table 2). Figure 2 presents the proportion of desired life-sustaining treatments by patients' cognitive status and health scenario. Differences in the proportions of patients with MCI and NC who desired life-sustaining treatments in individual health scenarios were not statistically significant, except patients with MCI desired *more* life-sustaining treatments than patients with NC in the Alzheimer's disease scenario (*P*=0.03) (Fig. 2). Most patients with MCI (80%) and NC (80%) desired life-sustaining treatments in their current health (*P*=0.99).

Patients' preferences for life-sustaining treatments did not differ significantly by patient MCI diagnosis before and after adjustment for patient and surrogate factors (Table 3). After adjustment, the difference in mean counts of rejected treatments between patients with MCI and patients with NC was not statistically significant (adjusted ratio, 1.00, 95% CI, 0.71–1.41; *P*=0.99). Mean counts of rejected treatments across health scenarios were lower in Black patients (adjusted ratio, 0.33, 95% CI, 0.20–0.55, *P*<0.001), male patients (ratio, 0.58, 95% CI, 0.39–0.84; *P*=0.005), and male surrogates (adjusted ratio, 0.55, 95% CI, 0.36–0.84; *P*=0.005). Patients having a
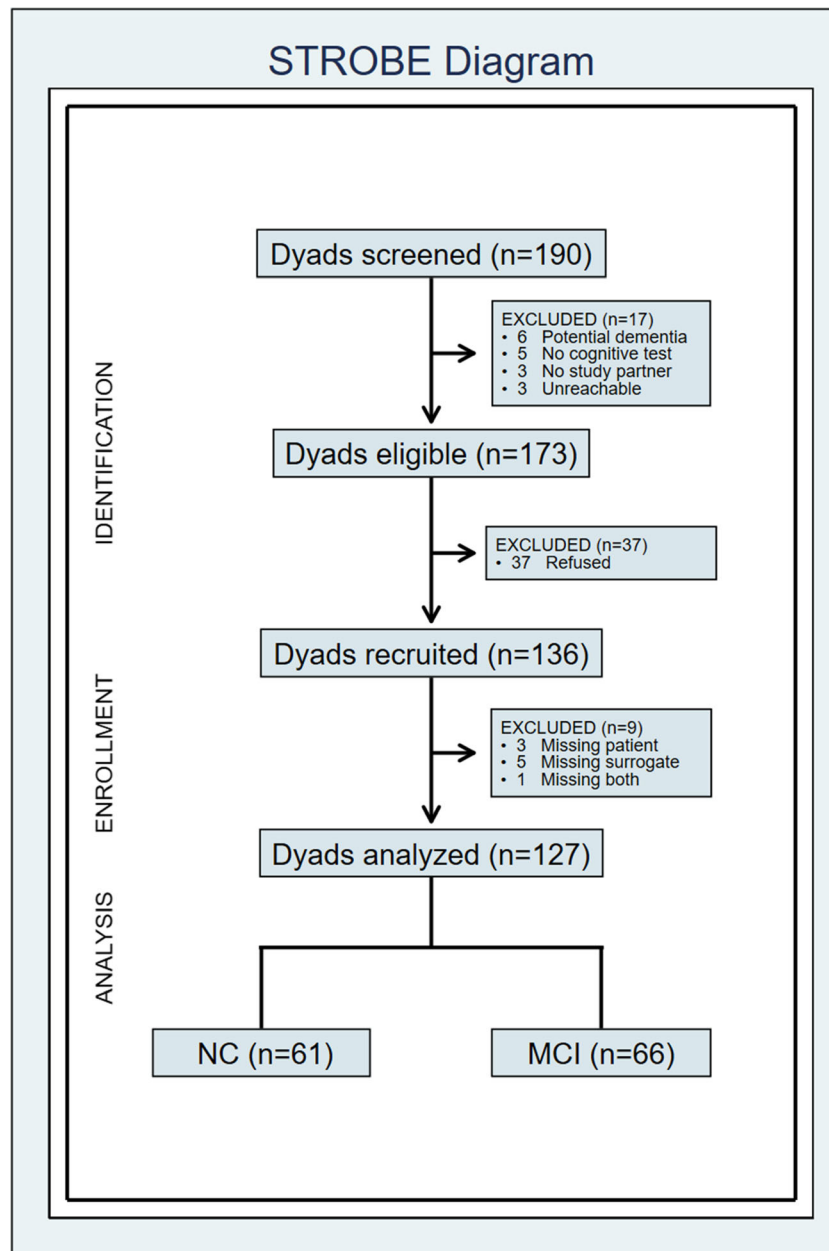
Figure 1 STROBE diagram. Abbreviations: MCI, mild cognitive impairment; NC, normal cognition.

family member or friend with stroke had higher counts of rejected treatments across health scenarios (adjusted ratio, 1.41, 95% CI, 1.01–1.95; P=0.04).

Secondary Outcomes

Surrogates' preferences for the patients to receive life-sustaining treatments across health scenarios did not differ significantly by patient MCI diagnosis, before and after adjustment for patient and surrogate factors. There was no statistically significant difference in the median number of life-sustaining treatments rejected between surrogates of patients with MCI and surrogates of those with NC (rejected treatments, 0.0 vs 1.0; P=0.12) (Table 2). After adjusting for patient and surrogate factors, the difference in mean counts

of rejected life-sustaining treatments on the LSPQ between surrogates of patients with MCI and surrogates of patients with NC was not significantly different (adjusted ratio, 1.06, 95% CI, 0.71=1.57, P=0.77) (Table 4). Mean counts of rejected treatments across health scenarios were lower in Black surrogates (adjusted ratio, 0.52, 95% CI, 0.30–0.92; P=0.02). Surrogates having a history of stroke had higher counts of rejected treatments across health scenarios (adjusted ratio, 2.80, 95% CI, 1.68–4.68; P<0.001).

Based on the Control Preferences Scale responses, the majority of patients wanted to make final or all medical decisions for themselves; fewer patients wanted SDM. Patients' preferences for SDM for specific AMI and stroke treatments did not differ significantly by patient MCI diagnosis (Table 2). Most patients (92.4–100%) wanted to be

Table 1 Patient, Surrogate, and Dyad Characteristics, by Patient's MCI Status

Variable	Patient MCI status		P
	No MCI (*n*=61)	**MCI (*n*=66)**	
Patient characteristics			
Age, years: median (IQR)	71.0 (69.0, 76.0)	74.0 (69.0, 78.0)	0.66
MoCA, points: median (IQR)	27.0 (26.0, 28.0)	23.0 (21.0, 25.0)	<0.001
DSRS*, points: median (IQR)	1.0 (0.0, 2.0)	5.5 (1.0, 10.0)	<0.001
Race, Black: no. (%)	29 (47.5)	28 (42.4)	0.56
Gender, female: no. (%)	38 (62.3)	40 (60.6)	0.85
Education: no. (%)			0.09
No college	3 (4.9)	11 (16.7)	
Some college	23 (37.7)	17 (25.8)	
4-Year degree	9 (14.8)	14 (21.2)	
Graduate degree	26 (42.6)	24 (36.4)	
Marital status: no. (%)			0.27
Single	28 (45.9)	24 (36.4)	
Married/partner	33 (54.1)	42 (63.6)	
Has children: no. (%)	56 (91.8)	62 (93.9)	0.74
Lives with child: no. (%)	9 (14.8)	5 (7.7)	0.26
Child within 30 miles: no. (%)	34 (55.7)	43 (68.3)	0.15
Self-rated health: no. (%)			0.43
Fair	3 (4.9)	9 (13.6)	
Good	31 (50.8)	30 (45.5)	
Very good	21 (34.4)	21 (31.8)	
Excellent	6 (9.8)	6 (9.1)	
Depression: no. (%)			0.010
No indication	49 (80.3)	39 (59.1)	
Some indication	12 (19.7)	27 (40.9)	
Difficulty with ADLs: no. (%)	14 (23.0)	13 (19.7)	0.65
Disease history: no. (%)			
Stroke	4 (6.6)	6 (9.1)	0.75
Lung disease	9 (14.8)	3 (4.5)	0.07
Heart disease	15 (24.6)	15 (22.7)	0.80
Cancer	14 (23.0)	18 (27.3)	0.58
Arthritis	47 (77.0)	43 (65.2)	0.14
Contact history: no. (%)			
Dementia	39 (63.9)	49 (74.2)	0.21
Stroke	41 (67.2)	38 (57.6)	0.26
Heart attack	42 (68.9)	36 (54.5)	0.10
Surrogate characteristics			
Age, years: median (IQR)	69.0 (62.0, 72.0)	70.0 (64.0, 77.0)	0.61
Race, Black: no. (%)	30 (49.2)	28 (42.4)	0.45
Gender, female: no. (%)	42 (68.9)	43 (65.2)	0.66
Education: no. (%)			0.31
No college	4 (6.6)	9 (13.6)	
Some college	26 (42.6)	19 (28.8)	
4-Year degree	10 (16.4)	11 (16.7)	
Graduate degree	21 (34.4)	27 (40.9)	
Marital status: no. (%)			0.06
Single	21 (34.4)	13 (19.7)	
Married/partner	40 (65.6)	53 (80.3)	
Self-rated health: no. (%)			0.88
Fair	4 (6.6)	7 (10.6)	
Good	20 (32.8)	22 (33.3)	
Very good	29 (47.5)	29 (43.9)	
Excellent	8 (13.1)	8 (12.1)	
Depression: no. (%)			0.58
No indication	47 (77.0)	48 (72.7)	
Some indication	14 (23.0)	18 (27.3)	
Difficulty with ADLs: no. (%)	12 (19.7)	13 (19.7)	0.99
Disease history: no. (%)			
Stroke	1 (1.6)	3 (4.5)	0.62
Lung disease	6 (9.8)	5 (7.6)	0.76
Heart disease	10 (16.4)	15 (22.7)	0.37
Cancer	12 (19.7)	18 (27.3)	0.31
Arthritis	29 (47.5)	37 (56.1)	0.34
Contact history: no. (%)			
Dementia	39 (63.9)	43 (65.2)	0.89
Stroke	37 (60.7)	39 (59.1)	0.86
Heart attack	45 (73.8)	41 (62.1)	0.16
Dyad characteristics			
Relationship length, years: median (IQR)	43.0 (28.0, 53.0)	51.5 (40.0, 60.0)	0.04
Site: no. (%)			0.72
U-M	36 (59.0)	41 (62.1)	

Table 1. (continued)

Variable	Patient MCI status		P
	No MCI (*n*=61)	MCI (*n*=66)	
DU	25 (41.0)	25 (37.9)	
Relationship type: no. (%)			0.19
Spouse	33 (54.1)	40 (60.6)	
Child	10 (16.4)	8 (12.1)	
Friend	14 (23.0)	8 (12.1)	
Other	4 (6.6)	10 (15.2)	
Physical interaction: no. (%)			0.66
Daily	38 (62.3)	45 (68.2)	
Several times per week	10 (16.4)	11 (16.7)	
Once per week or less	13 (21.3)	10 (15.2)	
Verbal interaction: no. (%)			0.39
Daily	42 (68.9)	47 (71.2)	
Several times per week	11 (18.0)	15 (22.7)	
Once per week or less	8 (13.1)	4 (6.1)	

P values were obtained using the following[1]: Mood's median tests, for continuous variables[2]; χ^2 tests, for categorical variables with expected cell counts >5; and[3] Fisher's exact tests, for categorical variables with expected cell counts ≤5. Abbreviations: MCI, mild cognitive impairment; NC, normal cognition; IQR, interquartile range; MoCA, Montreal Cognitive Assessment; DSRS, Dementia Severity Rating Scale; ADL, activity of daily living; U-M, University of Michigan; DU, Duke University
*Provided by the surrogate

involved in making specific AMI and stroke treatment decisions. The majority of surrogates preferred to make final or all medical decisions for themselves based on the Control Preferences Scale. Most surrogates wanted to be involved in making AMI and stroke treatment decisions for the patient.

DISCUSSION

We found no evidence that older patients with MCI, compared to those with NC, have different preferences for life-sustaining treatments except they desire more treatment in Alzheimer's disease. Similar to patients with NC, most patients with MCI (80%) desired life-sustaining treatments in their current health. We also found no evidence that patients' preferences for SDM generally and in AMI and stroke treatment decisions differed significantly by patient MCI diagnosis. In general, the majority of patients with MCI and NC wanted to make final medical decisions themselves. In the event of the patient having an AMI or stroke, most patients with MCI and NC wanted to participate in treatment decision-making.

**Table 2 Medical Decision-making Preferences, by Patient's MCI Status**

Variable	Patient responses			Surrogate responses*		
	Patient MCI status			Patient MCI status		
	NC (*n*=61)	MCI (*n*=66)	P	NC (*n*=61)	MCI (*n*=66)	P
LSPQ score[†]						
Number of rejected treatments: median (IQR)	6.0 (1.0, 13.0)	4.5 (0.0, 13.0)	0.55	0.0 (0.0, 5.0)	1.0 (0.0, 7.0)	0.12
Zero treatments rejected: no. (%)	13 (21.3)	21 (31.8)	0.18	38 (62.3)	32 (48.5)	0.12
Control Preferences Scale: no. (%)			0.76			0.94
I make all medical decisions	5 (8.2)	6 (9.1)		4 (6.6)	4 (6.1)	
I make final medical decisions	36 (59.0)	36 (54.5)		38 (62.3)	37 (56.1)	
My doctor and I make joint medical decisions	18 (29.5)	18 (27.3)		17 (27.9)	22 (33.3)	
My doctor makes final medical decisions	2 (3.3)	4 (6.1)		1 (1.6)	2 (3.0)	
My doctor makes all medical decisions	0 (0.0)	2 (3.0)		1 (1.6)	1 (1.5)	
Desired involvement in treatment decisions						
Scenario: acute MI: no. (%)[‡]						
Coronary angioplasty	59 (96.7)	63 (95.5)	0.99	56 (91.8)	63 (95.5)	0.48
Coronary artery bypass graft surgery	60 (98.4)	64 (97.0)	0.99	56 (91.8)	64 (97.0)	0.26
Cardiac rehabilitation	60 (98.4)	62 (93.9)	0.37	59 (96.7)	65 (98.5)	0.61
Cholesterol medication	60 (98.4)	63 (95.5)	0.62	54 (88.5)	63 (95.5)	0.19
Scenario: stroke: no. (%)[‡]						
Intravenous tissue plasminogen activator	57 (93.4)	61 (92.4)	0.99	58 (95.1)	60 (90.9)	0.49
Carotid endarterectomy	58 (95.1)	62 (93.9)	0.99	58 (95.1)	61 (92.4)	0.72
Inpatient stroke rehabilitation	61 (100.0)	64 (97.0)	0.50	59 (96.7)	62 (93.9)	0.37
Anticoagulation for atrial fibrillation	59 (96.7)	64 (97.0)	0.99	56 (91.8)	62 (93.9)	0.99

P values were obtained using Mood's median tests, for continuous variables, and Fisher's exact tests, for categorical variables. Abbreviations: MCI, mild cognitive impairment; NC, normal cognition; LSPQ, Life-Support Preferences-Predictions Questionnaire; IQR, inter quartile range
*All surrogate responses are provided in reference to the patient's treatment, with the exception of control preferences
[†]Life-Support Preferences-Predictions Questionnaire scores are counts of subject responses expressing no desire for life-sustaining treatment and range 0 to 24. Higher scores indicate a lower desire for treatment. Zero treatments rejected means the participant would want all life-sustaining treatments in all health scenarios
[‡]Representing participants who prefer to be involved in treatment decisions, compared with those who do not
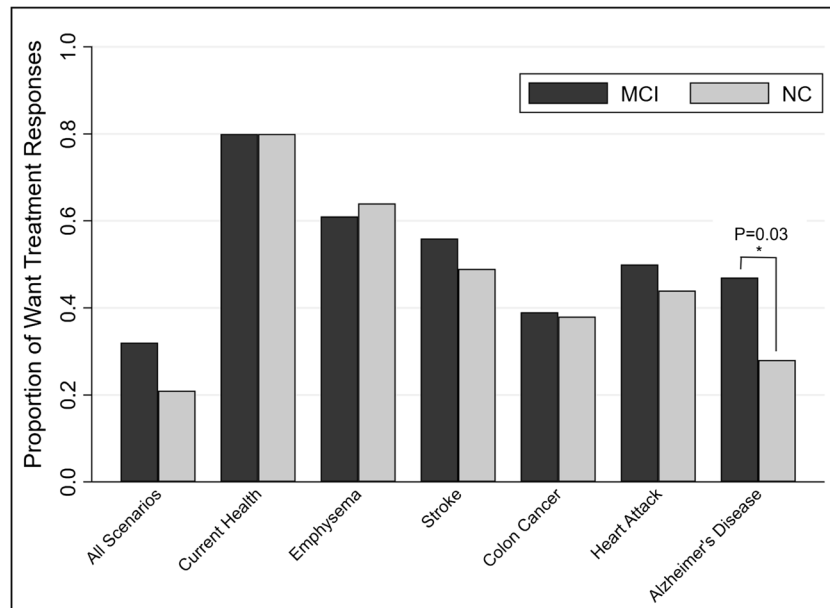
Figure 2 Patient preferences for medical treatment, by patient's MCI status and health scenario. Differences between MCI and NC patients: all scenarios (P=0.23), current health (P=0.99), emphysema (P=0.72), stroke (P=0.48), colon cancer (P=0.86), heart attack (P=0.60), Alzheimer's disease (P=0.03). Abbreviations: MCI, mild cognitive impairment; NC, normal cognition.

Little research has compared patients' treatment preferences between patients with MCI and NC. Prior studies suggest that physicians assume that patients with MCI, compared to patients with NC, prefer less treatment.[21,22] Yet, we found no evidence that patients with MCI prefer less life-sustaining treatment than patients with NC in our study, contrary to our hypothesis. There was no evidence that patient MCI diagnosis modified the differences in treatment preferences between Black and White individuals, though our results show that Black patients and surrogates desired more treatment than White patients and surrogates, consistent with previous studies.[42] We also found evidence that patients with a close family member/friend with stroke and surrogates with stroke

were more likely to reject life-sustaining treatments in the health scenarios suggesting that stroke disability would decrease the desire for life-sustaining treatment.

Few studies have compared SDM preferences between patients with MCI and NC. A hypothetical scenario study suggested that older patients prefer increased family involvement in cancer treatment decision-making as their cognitive function worsens.[43] We found no evidence that patients with MCI and NC have different patient-clinician SDM preferences generally and for specific AMI and stroke treatments. We were surprised that, in general, patients with MCI and NC preferred to make decisions (patient-driven decision-making) more frequently than patient-clinician SDM. We expected patient-clinician SDM to be the most common response. For that

Table 3 Unadjusted and Adjusted Analysis of Patient-Reported Number of Treatments Rejected Across Health Scenarios

Covariate	Ratio of average counts of rejecting treatment across health scenarios		
	Ratio	**95% CI**	**P**
Unadjusted model			
Patient: MCI vs NC	1.06	0.79, 1.42	0.69
Adjusted model			
Patient: MCI vs NC	1.00	0.71, 1.41	0.99
Patient: age, per 1-year increase	1.00	0.98, 1.03	0.76
Patient: Black vs White	0.33	0.20, 0.55	<0.001
Patient: education			
Some college vs no college	1.17	0.64, 2.13	0.61
4-year degree vs no college	1.42	0.71, 2.84	0.32
Graduate degree vs no college	1.54	0.86, 2.76	0.15
Patient: male vs female	0.58	0.39, 0.84	0.005
Surrogate: male vs female	0.55	0.36, 0.84	0.005
Patient: contact vs no contact with stroke[*]	1.41	1.01, 1.95	0.04

Unadjusted and adjusted models were tested using zero-inflated negative binomial regression. Abbreviations: CI, confidence interval; MCI, mild cognitive impairment; NC, normal cognition
*Close family member or friend has history of stroke

Table 4 Unadjusted and Adjusted Analysis of Surrogate-Reported Number of Treatments Rejected Across Health Scenarios

Covariate	Ratio of average counts of rejecting treatment across health scenarios		
	Ratio	95% CI	P
Unadjusted model			
Patient: MCI vs NC	1.20	0.79, 1.82	0.40
Adjusted model			
Patient: MCI vs NC	1.06	0.71, 1.57	0.77
Surrogate: age, years	1.00	0.97, 1.02	0.69
Surrogate: Black vs White	0.52	0.30, 0.92	0.02
Surrogate: male vs female	0.92	0.59, 1.43	0.70
Surrogate: education			
Some college vs no college	0.56	0.28, 1.13	0.11
4-year degree vs no college	1.08	0.51, 2.28	0.85
Graduate degree vs no college	0.79	0.41, 1.53	0.49
Surrogate: history vs no history of stroke	2.80	1.68, 4.68	<0.001

Unadjusted and adjusted models were tested using zero-inflated negative binomial regression. Abbreviations: CI, confidence interval; MCI, mild cognitive impairment; NC, normal cognition

reason, we did not give the option of patients making the decisions for the AMI and stroke treatments. When having an AMI or stroke, most MCI and NC patients would prefer patient-clinician SDM to clinician-driven decision-making. Our results are consistent with research showing that people with MCI frequently want to participate in making medical decisions for themselves.[44]

We found surrogates' preferences for patients' treatment and SDM (generally and for AMI and stroke treatments) did not differ between patients with MCI and NC. Surrogates frequently participate in clinical visits of older adults with MCI, though their involvement can create communication challenges.[45] Physicians also report more frequently involving surrogates in treatment decisions in patients with MCI than in those with NC.[22] Some physicians assume that patients with MCI, compared to patients with NC, have impaired independent decision-making and cannot communicate their treatment preferences.[21,22] Our results suggest that many patients with MCI can communicate their treatment preferences. Studies also show that many patients with MCI can participate in treatment decision-making.[44] Research is needed to identify effective communication strategies and decision aids for clinicians, patients with MCI, and their surrogates.[46]

Our study had several strengths. The survey had a high response rate. We used validated measures of patient and surrogate treatment preferences and SDM. We confirmed that patients with MCI and NC and their surrogates could understand the survey using cognitive interviews. We included Black and White individuals in two different geographic regions of the country. Patients received MCI and NC diagnosis based on cognitive testing within 12 months, so it is unlikely that their cognitive status changed.

Our study had potential limitations. Results might not be generalizable to other populations, e.g., non-academic settings and non-volunteer populations. The LSPQ has hypothetical clinical scenarios, and how treatment preferences in hypothetical situations correlate to those in real-life situations including CVD events is unclear. We did not examine patient-surrogate concordance in treatment decision-making because studies[43] have found low patient-surrogate concordance in treatment

decision-making in patients with cognitive impairment. We did not assess religious beliefs or how respondents interpreted the impact of treatment decisions on survival and quality of life, factors that may be important to consider in future work. It is possible we were underpowered to detect clinically meaningful differences in LSPQ score between patients with MCI and NC.

Our study has clinical and policy implications. Patients with MCI should receive the guideline-concordant care they would want if adequately informed. Nevertheless, evidence suggests that patients with MCI get less guideline-concordant care for CVD and other conditions than patients with NC.[17–19] We found no evidence that patients with MCI want less life-sustaining care than patients with NC. Our findings suggest that other provider and system factors (e.g., disparities and access to care issues) might contribute to patients with MCI getting less guideline-concordant care. Some preliminary evidence suggests that physicians recommend less care for CVD and other conditions to patients with MCI than to patients with NC.[21,47] We are now performing a larger-scale national survey of physicians' recommendations for CVD treatments in patients with NC, MCI, and dementia. In the meantime, our results suggest that clinicians should know that patients with MCI want the same treatment as patients with NC and patients are more likely to prefer patient-driven decision-making than patient-clinician SDM.

CONCLUSIONS

We did not find evidence that patients with MCI and their surrogates have different treatment preferences than patients with NC and their surrogates. These findings suggest that other provider and system factors rather than patient and surrogate treatment preferences might contribute to patients with MCI getting less guideline-concordant care than patients with NC.

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Declarations:

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