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Association Between Elder Self-Neglect and Hospice Utilization in a Community Population

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Abstract

Elder self-neglect is associated with substantial 1-year mortality. However, hospice utilization among those with self-neglect remain unclear. The objective of this study is to quantify the prospective relation between self-neglect and risk for hospice utilization in a community population of older adults. Prospective population-based study in a geographically-defined community in Chicago of older adults who participated in the Chicago Health and Aging Project. Of the 8,669 participants in the Chicago Health and Aging Project, a subset of 1,438 participants was reported to social services agency for suspected elder self-neglect. Outcome of interest was the hospice utilization obtained from the Center for Medicare and Medicaid System. Cox proportional hazard models were used to assess independent association of self-neglect with risk of hospice utilization using time-varying covariate analyses. After adjusting for potential confounding factors, elders who self-neglect was associated with increased risk for hospice utilization (HR, 2.43, 95% CI, 2.10-2.81). Greater self-neglect severity (Mild: (HR, 2.12 (1.61-2.79); Moderate: (HR, 2.36 (1.95-2.84); Severe: (HR, 4.66 (2.98-7.30)) were associated with increased risk for hospice utilization. Interaction term analyses suggest that the significant relationship between self-neglect and hospice utilization was not mediated through medical conditions, cognitive impairment and physical disability. Moreover, self-neglect was associated with shorter length of stay in hospice (PE, −0.27, SE, 0.12, $p<0.02$) and shorter time from hospice admission to death (PE, −0.32, SE, 0.13, $p<0.01$). Elder self-neglect was associated with increased

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risk of hospice use in this community population. Elder self-neglect is associated with shorter length of stay in hospice care and shorter time from hospice admission to death.

Keywords

elder self-neglect; hospice services utilization; population-based study

INTRODUCTION

Elder self-neglect is an important public health issue and has great relevance not only to health care professional and social services agency, but also to public health professionals, legal professionals, community organizations and other relevant disciplines. The National Centers on Elder Abuse defines elder self-neglect as "…as the behavior of an elderly person that threatens his/her own health and safety. Self-neglect generally manifests itself in an older person as a refusal or failure to provide himself/herself with adequate food, water, clothing, shelter, personal hygiene, medication (when indicated), and safety precautions"(1). Evidence suggest that self-neglect is associated with increased risk of premature mortality, and there is a gradient relationship between higher self-neglect severity and greater risk for mortality (2-4). Moreover, evidence suggests that self-neglect is associated with substantial (almost 6-fold) increased 1-year mortality, especially among those with severe self-neglect (15-fold). However, the mechanisms between self-neglect and adverse health outcomes remain unclear.

Utilization of health services has enormous implication to our health care system, especially near the end of life, during which medical expenditures is the higher than any time (5-9). Improved understanding of these relations can provide important implications to inform health policy and clinical practices at the national level (10;11). This could be especially the case for older adults who self-neglect and often manifest in behaviors that threatens their health and safety, which further predisposes their likelihood to have more encounters with the health care systems. Case reports (12-16) often describe self-neglectors presenting to the health care system with organ failure, severe nutritional deficiencies and metabolic abnormalities, and undiagnosed advanced cancer all associated with a high mortality risk. We are not aware of any epidemiological study that has examined the prospective association between self-neglect and risk for hospice utilization in community-dwelling population. Filling this gap will contribute to our understanding of the consequences of self-neglect and critical to educate the public on the consequences of self-neglect and provide data that could inform practice and policy at the local, state and national level.

At the same time, most previous studies have categorized self-neglect dichotomously as "self-neglect" or "no self-neglect". However, self-neglect, like many other geriatric syndromes, occurs along a continuum, rather than in two discrete categories (17). Evidences suggests that improved understanding of the full spectrum of self-neglect is just as important, and that there is a gradient association between the greater self-neglect severity and morbidity and mortality (2;3). However, we are not aware of any study that has systematically quantified the relations between the spectrum of self-neglect severity and hospice utilization in the community-dwelling populations.

Our overall objectives in this report are to quantify: 1) the relationship between reported self-neglect and the risk for hospice utilization within a prospective population-based study; and 2) the relationship between the continuum of self-neglect severity and risk for hospice utilization in the same population. We hypothesized that older adults with self-neglect have

increased risk for hospice services utilization, and that there is a gradient relationship between greater self-neglect severity and greater risk for hospice services utilization.

METHODS

Setting

Chicago Health and Aging Project (CHAP) is a population-based longitudinal study that included residents of three adjacent neighborhoods on the south side of Chicago. More in depth details of the study design of CHAP have been previously published (18;19). Briefly, the study enrolled residents aged 65 years and older of three adjacent neighborhoods on the south side of Chicago. In 1993, the study began with a complete census of the community area. The census identified 7,813 age-eligible residents, 6,158 (78.9%) of whom were enrolled between 1993 and 1997. In 2000, CHAP began to enroll successive cohorts of participants from the study community who had turned 65 since inception of the study. Data collection occurs in three-year cycles, with each follow-up cycle beginning after the conclusion of the previous cycle. Follow-up participation rate averaged 80-85% of survivors at each cycle. Each data-collection cycle includes an in-person interview conducted in the participants' homes. The interviews include standardized questionnaires and tests for the assessment of health history, and environmental observations.

Participants

This study included participant who were enrolled between 1993 and 2005 and had data on Medicare claims data (N=8669) obtained from the Center for Medicare and Medicaid Services. From this cohort, we identified 1438 participants who were reported to social services agency for suspected elder self-neglect from 1993 to 2005. Suspected cases of elder self-neglect were reported by friends, neighbors, family, social workers, city workers, health care professionals, and others. The reports were usually initiated based on the concerns for the health and safety for the older adult, which in turn would initiate a wide array of social and legal services to help them. All participants received structured, standardized in-person interviews that included assessment of health history. Written informed consent was obtained, and the study was approved by the Institutional Review Board at Rush University Medical Center.

Reporting and Assessment of Self-Neglect

Elder self-neglect in this study was based on all suspected cases reported to social services agency. When a case was reported, a caseworker performed a home assessment, which rates the unmet needs in the domains of personal hygiene and grooming, household and environmental hazards, health needs and overall home safety concerns. A total of 15 items were used to rate the degree of unmet needs and each items were scored on the scale of 0 to 3, with higher number indicating greater danger to health and safety. The level of severity was rated by case workers based on their concerns for the client's personal health and safety, with the maximum cumulative score of 45. Confirmed self-neglect in this study was defined as anyone with a score of 1 or greater which are a subset of the reported cases of self-neglect to social services agency. Elder self-neglect severity refers to the scores 1 to 45, with higher scores within this range indicating greater levels of elder self-neglect severity. The details of this measure has been previously described (20-24). Available information from the social services agency internal report (25) showed that this measure had inter-rater reliability coefficients great than 0.70 and the internal consistencies were high with Cronbach's alpha of 0.95 (22). Both face and content validity were evaluated using qualitative data from case managers and agency administrators. In addition, external validity of the measure was assessed and shown to predict increased risk of premature mortality (2).

Hospice Services Utilization

Hospice utilization records were abstracted from the Medicare Standard Analytic Files (SAFs) obtained from the Centers for Medicare and Medicaid Services (CMS). CMS has approved the Study Protocol and Data Use Agreement with the CHAP study to obtain CMS data. CHAP study has successfully linked participants and their CMS claims data for the Medical Denominator Files and the SAF files which contains the record of hospitalization. For each participant, we have abstracted and summarized SAF files on their hospice use, length of stay in hospice and length of stay from hospice to death.

Covariates

Demographic variables include age (in years), gender (men or women), race (self-reported: non-Hispanic black versus non-Hispanic white), education (years of education completed), and income categories (1=$0-4,999; 2=$5,000-9,999; 3=$10,000-14,999; 4= $15,000-19,999; 5=$20,000-24,999; 6=$25,000-29,999; 7=$30,000-34,999; 8= $35,000-49,999; 9=$50,000-74,999; 10=$75,000 and over).. The parent CHAP study also collected self-reported medical conditions of hypertension, diabetes mellitus, stroke, coronary artery disease, hip fracture, and cancer.

A battery of four cognitive function tests was administered: the Mini-Mental State Examination (MMSE) (26), immediate and delayed recall of brief stories in the East Boston Memory Test (27) and the Symbol Digit Modalities Test (28). To assess global cognitive function with minimal floor and ceiling artifacts, we constructed a summary measure for global cognition based on all four tests. Individual test scores were summarized by first transforming a person's score on each individual test to a z-score, which was based on the mean and standard deviation of the distribution of the scores of all participants on that test, and then averaging z scores across tests to yield a composite score for global cognitive function. This procedure has the advantage of increasing power by reducing random variability present within tests, as well as reducing floor and ceiling effects of particular tests.

Physical function was also assessed by direct performance testing, which provided a comprehensive objective and detailed assessment of certain abilities. Lower-extremity performance tests consisted of measures of tandem stand, timed walk, tandem walk, and ability to rise to a standing position from a chair. The tests requiring walking performance were quantified in terms of both the number of seconds to complete the task. Other tests were measured in terms of the number of trials completed within a specified time period. Summary measures of these above tests were created as physical performance test scores. Lower score indicate impairment in these above activities and tasks, which are often needed for independent living and may contribute toward physical disability.

Psychosocial factors included assessment of depressive symptoms, social network and social engagement. Symptoms of depression were measured using a modified version (29) of the Center for Epidemiologic Studies of Depression Scale (CES-D) (30). Social network was summarized as the total number of children, relatives, and friends seen at least monthly (31). Social engagement was assessed by asking how often older adults participate in social activities

Analytic Approach

Univariate analyses were provided for the reported and no reported self-neglect groups across the age, gender, race, education, income, medical commorbidities, and levels of cognitive function, physical function and psychosocial factors. Our independent variables of interest were reported self-neglect, confirmed self-neglect, and self-neglect severity. Our

outcome of interest was hospice utilization. In addition, we repeated above analyses for the different severities of elder self-neglect (Mild = score of 1-15; Moderate = score of 16-30; and Severe = score of 31-45).

In this study, as elder self-neglect report occurred throughout the study period of 1993 to 2005, reports of self-neglect were modeled as a time-varying covariate (32) in a series of Cox proportional hazards models (33) which were used to examine the relationship between self-neglect and risk for hospice services utilization, adjusting for covariates. We used a series of models to consider these relationships, taking into consideration the potential confounders. In our core model (Model A), we included age, gender, and race to quantify the association of elder self-neglect and hospice utilization outcome. In addition, we added to the prior model socioeconomic status of education and income (Model B). Next, we added to the prior model common medical comorbidities of hypertension, coronary artery disease, stroke, hip fracture, cancer, and diabetes and the levels of cognitive function and physical function (Model C). Finally, models were repeated controlling for additional psychological and social factors, namely depressive symptoms, social network and social engagement (Model D). We also repeated the prior models A-D to examine the association between confirmed elder self-neglect and risk for hospice utilization.

Then, we examined the relationship between elder self-neglect severity as a continuous variable and multichotomous variables (Mild = 1-15; Moderate = 16-30; and Severe = 31-45) and risk for hospice services utilization by repeating Models A-D. Moreover, we conducted interaction term analyses for the same models to examine the effect of health-related factors and self-neglect, with respect to the risk for hospice utilization (i.e., medical conditions x self-neglect, cognitive function x self-neglect and physical function x self-neglect). Lastly, we repeated the above models to examine the relationship between elder self-neglect and length of stay in hospice and length of time between hospice admissions to death in this population. Hazard Ratio (RR), 95% Confidence Interval (CI), Standardized-Parameter Estimates (PE), Standard Error (SE) and P values were reported for the regression models. Analyses were carried out using SAS®, Version 9.2 (SAS Institute Inc., Cary, NC).

RESULTS

Baseline Characteristics

Of the 8,669 CHAP participants in this study, a subset of 1,438 participants were identified by social services agency for suspected elder self-neglect from 1993 to 2005. Of those identified for self-neglect, 290 (20%) were enrolled in hospice and of those without self-neglect 1133 (15.7%) were enrolled in hospice (Table 1). Mean time to hospice admission was 2.4 (SD, 2.3) years for those with self-neglect and 7.4 (4.3) years for those without self-neglect. In addition, self-neglecting older adults who were enrolled in hospice had shorter number of days spent in hospice and shorter number of days from hospice admission to death.

Elder Self-Neglect and Risk for Hospice Services Utilization

In the initial regression model adjusting for age, gender, race, we found that reported elder self-neglect is associated with increased risk for hospice utilization (HR, 2.63, 95%CI, 2.28-3.02) (Table 2, Model A). After addition of education and income (Model B), the association change minimally. After adding common chronic medical conditions of hypertension, diabetes, stroke, cancer, thyroid disease, and heart disease, cognitive function and physical function to the model (Model C), the strength of the association between self-neglect and hospice utilization decreased slightly (HR, 2.43, 95%CI, 2.10-2.81). In the last model (Model D), after adjusting for psychological and social factors, reported elder self-

neglect remained an independent predictor of increased utilization of hospice services (HR, 2.43, 95%CI, 2.10-2.81). For confirmed elder self-neglect, the associations were similar.

Elder Self-Neglect Severity and Hospice Services Utilization

To quantify the relation between elder self-neglect severity and risk for hospice services utilization, we repeated the above models. In the fully-adjusted model D, every one point increase in self-neglect severity was associated with increased risk for hospice services utilization (PE = 0.04, SE, 0.01, HR, 1.04, 95% CI, 1.03-1.05). We quantified the relation between categorically defined levels of self-neglect severity and risk for hospice services utilization (Table 3). In the fully-adjusted model (Model D), mild self-neglect (PE, 0.75, SE, 0.14, HR, 2.12, 95%, 1.61-2.79), moderate self-neglect (PE, 0.85, SE, 0.09, HR, 2.36, 95% CI, 1.95-2.84) and severe self-neglect (PE, 1.54, SE, 0.23, HR, 4.66, 95% CI, 2.98-7.30) were all independent associated with the increased risk for hospice utilization.

Interaction Term Analyses between Self-Neglect and Health-Related Factors

Moreover, we examine the interaction effect of self-neglect with health related factors with respect to the risk for hospice utilization (Table 4). For medical conditions, interaction term (medical conditions x self-neglect) was not statistically significant, suggesting medical conditions did not modify the relationship between self-neglect and risk for hospice utilization. Similar results were found for interaction term analyses between cognitive function, physical function and social wellbeing with self-neglect with respect to the risk of hospice services utilization outcomes. For those with severe self-neglect, we found that those with greater depressive symptoms had greater increased risk for hospice utilization (PE, 0.28, SE, 0.10, p=0.008).

Lastly, we examine the association between self-neglect and length of stay in hospice and length of time between hospice admission to death. In the fully-adjusted analyses (Table 5), elder self-neglect was associated with increased risk for shorter length of stay in hospice (PE, −0.27, SE, 0.12, p=0.02) and shorter time from hospice admission to death (PE, −0.32, SE, 0.13, p=0.01).

DISCUSSION

We found that elder self-neglect independently associated with the increased risk for hospice utilization. In addition, greater severity of elder self-neglect was associated with the greater risk for hospice utilization. Moreover, the significant relationship between self-neglect and hospice utilization was not mediated through the presence of health-related factors. Furthermore, self-neglect is associated with shorter length of stay in hospice and shorter time between hospice admissions to death.

Our findings build on the results of prior studies and contribute to the field of elder self-neglect and health services utilizations. First, our study systematically examined the prospective association between self-neglect and hospice utilization; demonstrating a significant association. The study population is socio-demographically and socioeconomically diverse and has been well characterized for more than 17 years, which contribute toward the generalizability in community populations of older adults.

Second, our study considered the wide range of potential confounders in the relationship between elder self-neglect and risk for hospice utilization. Older age, lower levels of socioeconomic status, more medical commorbidities, and lower levels of cognitive and physical health, and psychosocial factors have been associated with increased risk for health services utilization. However, adjusting for these factors did not significantly reduce the relationship between self-neglect and risk for hospice utilization.

Third, our study examined the full spectrum of elder self-neglect as a continuum with respect to risk for hospice utilization, rather than strictly categorically defined self-neglect. Our study findings contribute to the apparent linear gradient associations between self-neglect severity and risk for hospice utilization. This information provides an important step to the better understanding of the potential causal association between self-neglect and hospice utilization. With recent biomedical and technological advances, it is critical for professionals, social services agencies and other relevant disciplines to identify older adults at risk for self-neglect and intervene before self-neglecting behaviors become more severe. Improved understanding of factors that increases hospice utilization and then devise targeted intervention could also have significant implications for practice and policy.

The temporal relations between elder self-neglect and hospice utilization needs further investigation. We considered a series of sociodemographic, socioeconomic characteristic, medical commorbidities, cognitive function, physical function and psychosocial factors. However, adjustments for these factors did not significantly reduce the relationship between self-neglect and hospice utilization. Advanced cancer diagnosis, other terminal conditions, systemic infections, injuries or trauma may be other factors that account for the association between elder self-neglect and risk for hospice utilization, but these factors were not considered in this analysis. Severity of medical commorbidities could another important factor in determining the causal mechanisms between self-neglect and hospice utilization. It is conceivable that self-neglect could exacerbate the terminal medical conditions, which could predispose a higher risk for hospice utilization. However, we do not have measures in our existing data to further elucidate these relations.

While self-neglect is associated with increased for hospice use, yet has shorter length of stay prior to death requires future exploration. Clinical experience suggests that those who self-neglect often may not recognize or refuse to recognize the dangers of their self-neglectful behaviors and often only encounter the health care system after a catastrophic event has occurred. Case reports (12-16) often describe self-neglectors presenting to the health care system with organ failure, severe nutritional deficiencies and metabolic abnormalities, and undiagnosed advanced cancer all associated with a high mortality risk. It is possible that within these contexts that self-neglector are more likely to be enrolled into hospice, at the same time, carries substantial mortality risk, consistent with our findings of shorter time between hospice admission to death. Future studies are needed to systematically examine these relationships.

Our study also has limitations. First, ascertainment of hospice utilization may not be complete. A limitation of using CMS data is selective under-detection of some services including use of Veterans Administration facilities and some managed care episodes. This under-detection of our outcomes of interest tends to underestimate the strength of association between self-neglect and hospice utilization. Second, this study could not examine the relation between specific indicators/behaviors of self-neglect and risk for hospice utilization, as the precise understanding of self-neglect phenotypes (i.e., environmental neglect vs. personal hygiene, etc) could improve our understanding of the causal mechanism. Future studies are needed to elucidate the relation between specific phenotypes of elder self-neglect and hospice utilization.

Fourth, we do not have information on the client's social support system, their willingness to accept or refuse social services agency intervention or the social context of the self-neglecting behaviors that might contribute to the risk of hospice utilization. Future studies are needed to examine these relations. Fifth, we have neither data on Medicaid status or duo-eligible status of the participants, nor data on admission diagnosis for hospice enrollment, or the types of potential terminal illness for those who self-neglect. This data could be

important to consider as additional confounders or mediators in our analyses, which may in-part account for the findings in this report. However, this study sets the foundation for future study of self-neglect to systematically examine these issues.

Our findings have significant clinical implications in the prevention, detection, and management of elder self-neglect. Health care professionals should also be educated on the importance of screening self-neglect and could be integrated into the routine history taking for older patients in clinical settings. Close monitoring of older adults who self-neglect could help clinicians to more closely monitor the patients and set the basis for future intervention study to examine the effectiveness of screening for self-neglect in the community population. Our findings could have important implications not only for geriatricians, but also across multiple disciplines, which work with older adults with self-neglect. Other relevant medical disciplines, legal professionals, nursing, social workers, social services agencies who work with elders who self-neglect or who are at risk for self-neglect, could be in unique positions to identify and intervene self-neglectful behaviors. Our finding has implications for legal and law enforcement professionals, especially relating to guardianship proceedings for older adults who have the most severe form of self-neglecting behaviors.

In addition, it is important for all relevant disciplines to monitor the severity or the progression of self-neglecting behaviors in older adults. Early identification of milder forms of self-neglect and devising targeted prevention and intervention strategies could prevent deterioration of self-neglect into more severe forms. Vigorous monitoring and betters understanding of factors that might aggravate self-neglect to greater severity could also help clinicians to work closely with concerned family members, social workers, legal professionals, health professionals, and public health and community organizations to create a multi-disciplinary approach to care for this vulnerable population.

Future research is needed to explore temporal associations of targeted risk/protective factors associated with self-neglect in community populations (34). Future studies are needed to explore the longitudinal association between self-neglect to the rate and the intensity of other forms of health services utilization. Future studies are needed to examine the effectiveness of current prevention and intervention strategies for elder self-neglect with respect to health services utilization outcomes in community populations. Future studies are needed to explore the racial/ethnic differences in elder self-neglect and health services utilization in socioeconomically diverse populations (35).

Conclusion

In sum, elder self-neglect is independently associated with increased risk for hospice utilization in a community-dwelling population of older adults. In addition, there is a gradient association between greater self-neglect severity and higher risk for hospice utilization. Moreover, after enrolling in hospice, self-neglectors had shorter length of stay and shorter time between admissions to death. Future longitudinal investigations are needed to examine the temporal relations between specific self-neglect behaviors and hospice utilization. Future studies are needed to systematically quantify the temporal relations between self-neglect and other forms of health services utilizations across different sociodemographic and socioeconomic subgroups.

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Table 1

Characteristics of Elders with Self-Neglect and without Self-Neglect

	Self-Neglect (N=1438)	No Self-Neglect (N=7231)
Age, years, mean, (SD)	73.3 (6.5)	73.2 (7.1)
Men, number (%)	496 (34.5)	2997 (41.5)
Blacks, number (%)	1265 (87.9)	4169 (57.7)
Education, years, mean, (SD)	11.1 (3.4)	12.4 (3.6)
Income Categories, mean (SD)	4.0 (2.1)	5.5 (2.6)
Medical Conditions, number (SD)	1.2 (0.9)	0.9 (0.9)
Coronary Artery Disease, number (%)	236 (16.5)	955 (13.2)
Stroke, number (%)	170 (11.8)	661 (9.2)
Cancer, number (%)	263 (18.3)	1342 (18.6)
Hypertension, number (%)	789 (55.2)	3551 (49.4)
Diabetes, number (%)	186 (12.9)	460 (6.4)
Hip Fracture, number (%)	47 (3.3)	246 (3.4)
Global Cognitive Function, mean (SD)	-0.07 (0.82)	0.21 (0.82)
Physical Performance Testing, mean (SD)	9.03 (3.78)	10.4 (3.7)
Depressive Symptoms, mean (SD)	2.0 (2.3)	1.5 (1.9)
Social Network, mean (SD)	6.9 (6.0)	7.5 (6.5)
Social Engagement, mean (SD)	2.1 (1.6)	2.4 (1.7)
Participant Utilized Hospice, number (%)	290 (20.2)	1133 (15.7)
Time to Hospice (yr), mean (SD)	2.37 (2.29)	7.44 (4.27)
Days Spent in Hospice, mean (SD)	57.2 (139.0)	65.5 (145.2)
Hospice to Death (days), mean (SD)	91.7 (270.3)	96.4 (241.2)
Expired at Home, number, (%)	149 (51.4)	629 (55.5)
Expired in Medical Facility, number (%)	83 (28.6)	305 (26.9)
Expired Place Unknown, number (%)	8 (2.8)	10 (0.9)
Discharged to Home/Self care, number (%)	42 (14.5)	153 (13.5)

Table 2

Reported Elder Self-Neglect and the Risk of Hospice Care Utilization

	Relative Risk (RR), 95% Confidence Intervals			
	Model A	**Model B**	**Model C**	**Model D**
Age	1.10 (1.09-1.11)	1.10 (1.09-1.11)	1.08 (1.07-1.09)	1.08 (1.07-1.09)
Men	1.39 (1.26-1.56)	1.41 (1.26-1.58)	1.45 (1.29-1.64)	1.42 (1.26-1.60)
Black	0.71 (0.64-0.79)	0.66 (0.58-0.75)	0.53 (0.46-0.61)	0.54 (0.46-0.62)
Education		0.98 (0.97-1.02)	1.01 (0.99-1.03)	1.01 (0.99-1.03)
Income		0.99 (0.97-1.02)	1.02 (0.99-1.05)	1.02 (0.99-1.05)
Medical Conditions			1.14 (1.07-1.21)	1.14 (1.07-1.21)
Cognitive Function			0.69 (0.63-0.75)	0.70 (0.64-0.77)
Physical Function			0.94 (0.92-0.95)	0.94 (0.93-0.96)
Depressive Symptoms				1.01 (0.98-1.03)
Social Network				1.00 (0.99-1.01)
Social Engagement				0.94 (0.91-0.98)
Reported Self-Neglect	2.63 (2.28-3.02)	2.61 (2.27-3.00)	2.43 (2.10-2.81)	2.43 (2.10-2.81)

Table 3

Elder Self-Neglect Severity and Risk of Hospice Services Utilization

	Models	Parameter Estimates	Standard Errors	HR	95% CI	P value
Mild	A	0.79	0.14	2.21	1.69-2.89	<0.001
	B	0.79	0.14	2.22	1.70-2.91	<0.001
	C	0.75	0.14	2.11	1.61-2.78	<0.001
	D	0.75	0.14	2.12	1.61-2.79	<0.001
Moderate	A	0.94	0.09	2.58	2.15-3.09	<0.001
	B	0.95	0.09	2.57	2.15-3.08	<0.001
	C	0.86	0.09	2.36	1.95-2.84	<0.001
	D	0.85	0.09	2.36	1.95-2.84	<0.001
Severe	A	1.83	0.21	6.26	4.13-9.49	<0.001
	B	1.83	0.21	6.25	4.12-9.48	<0.001
	C	1.54	0.23	4.68	2.98-7.32	<0.001
	D	1.54	0.23	4.66	2.98-7.30	<0.001

Note: Models: A: Adjusted for age, sex, and race

B: Adjusted for A + education and income

C: Adjusted for B + hypertension, diabetes, stroke, cancer, hip fracture, coronary artery disease, MMSE, East Boston Memory Test, East Boston Delayed Recall, and Symbol Digit Modality Test + physical performance testing

D: Adjusted for C + depressive symptoms, social network and social engagement

Table 4

Interactions Terms Analyses of Elder Self-Neglect and Health Related Factors and Hospice Services Utilization

	Parameter Estimate	Standard Error	P value
Reported Self Neglect			
Medical Conditions x	−0.04	0.08	0.56
Cognitive Function x	−0.08	0.09	0.37
Physical Function x	0.02	0.02	0.28
Depressive Symptoms x	−0.01	0.03	0.67
Social Network x	−0.01	0.01	0.79
Social Engagement x	−0.06	0.04	0.12
Confirmed Self-Neglect			
Medical Conditions x	−0.03	0.09	0.75
Cognitive Function x	−0.03	0.10	0.80
Physical Function x	0.04	0.02	0.06
Depressive Symptoms x	0.01	0.03	0.79
Social Network x	−0.01	0.01	0.46
Self-Neglect Mild			
Medical Conditions x	0.14	0.16	0.35
Cognitive Function x	−0.21	0.18	0.25
Physical Function x	0.04	0.04	0.39
Depressive Symptoms x	−0.01	0.07	0.95
Social Network x	−0.01	0.03	0.93
Social Engagement x	−0.08	0.08	0.35
Self-Neglect Moderate			
Medical Conditions x	−0.09	0.11	0.36
Cognitive Function x	0.06	0.12	0.63
Physical Function x	0.04	0.02	0.10
Depressive Symptoms x	−0.01	0.04	0.79
Social Network x	−0.10	0.01	0.48
Social Engagement x	0.01	0.05	0.83
Self-Neglect Severe			
Medical Conditions x	−0.21	0.28	0.45
Cognitive Function x	−0.17	0.31	0.59
Physical Function x	0.06	0.05	0.18
Depressive Symptoms x	0.28	0.10	0.008
Social Network x	0.01	0.05	0.77
Social Engagement x	−0.09	0.15	0.55

Models Adjusted for age, sex, and race, education and income, hypertension, diabetes, stroke, cancer, hip fracture, coronary artery disease, MMSE, East Boston Memory Test, East Boston Delayed Recall, Symbol Digit Modality Test, physical performance testing, depressive symptoms, social network and social engagement

Table 5

Association between Elder Self-Neglect and Length of Stay in Hospice and Time from Hospice Admission to Death

	Parameter Estimate	Standard Error	P value
Length of Stay in Hospice			
Reported Self-Neglect	−0.19	0.11	0.08
Confirmed Self-Neglect	−0.27	0.12	0.02
Mild Self-Neglect	−0.08	0.21	0.69
Moderate Self-Neglect	−0.33	0.14	0.02
Severe Self-Neglect	−0.33	0.35	0.33
Time from Hospice to Death			
Reported Self Neglect	−0.27	0.12	0.02
Confirmed Self-Neglect	−0.32	0.13	0.01
Mild Self-Neglect	−0.09	0.23	0.69
Moderate Self-Neglect	−0.42	0.16	0.01
Severe Self-Neglect	−0.32	0.38	0.39

Models Adjusted for age, sex, and race, education and income, hypertension, diabetes, stroke, cancer, hip fracture, coronary artery disease, MMSE, East Boston Memory Test, East Boston Delayed Recall, Symbol Digit Modality Test, physical performance testing, depressive symptoms, social network and social engagement