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Impact of an Inpatient Geriatric Consultative Service on Outcomes for Cognitively Impaired Patients

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Abstract

Background—Impact of geriatric consultative services (GCS) on hospital readmission and mortality outcomes for cognitively impaired (CI) patients is not known.

Objective—Evaluate impact of GCS on hospital readmission and mortality among CI inpatients.

Design—Secondary data-analysis of a prospective trial of a computerized decision support system between July 1, 2006, and May 30, 2008.

Setting—Study conducted at XXXXX hospital, a 340-bed, public hospital with over 2,300 yearly admissions of 65 or older.

Patients—415 inpatients aged 65 and older with CI were enrolled from July 2006 to March 2008.

Measurements—30 day and one year mortality and hospital readmission following the index admission. Cox's proportional hazard models were used to determine the association between receiving GCS, re-admission or mortality while adjusting for demographics, discharge destination, delirium, Charlson Comorbidity Index, and prior hospitalizations. The propensity score method was used to adjust for the non-random assignment of GCS.

Results—Patients receiving GCS were older (79; 8.1 SD vs 76; 7.8 SD; p<.001 with higher incidence of delirium (49% vs. 29%; p<.001)). No significant differences were found between the groups for hospital readmission (Hazard Ratio (HR)=1.19; 95% CI = 0.89, 1.59) and mortality at 12 months of index admission (HR=.91 ; 95% CI = 0.59, 1.40). However, a significant increase in readmissions was observed for the GCS group (HR=1.75; 95% CI = 1.06–2.88) at 30 days post-discharge.

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Conclusion—One year post-discharge outcomes of CI patients that received GCS were not different from patients who did not receive the service. New models of care are needed to improve post-discharge readmission and mortality among hospitalized patients with CI.

Keywords

Cognitive impairment; Readmission rates; Geriatric consultation service

Introduction

Under the Patient Protection and Affordable Care Act of 2010 commonly referred to as the Affordable Care Act (ACA), hospitals face up to a 3% penalty in Medicare reimbursements for patients readmitted within 30 days of initial discharge and mortality measures have been proposed for modifying payments to hospitals based on their performance on this metric.[1] Cognitive impairment (CI) is considered a major risk factor for poor post discharge outcomes including mortality and hospital readmission.[2,3] Hospitals are seeking strategies to reduce post discharge mortality and re-hospitalization among patients with and without CI.[4] Such strategies include use of transitional care coaches, patient and caregiver education, post-discharge follow up and provision of geriatric consultative services for the care of complex patients in the hospital setting.[5–7]

Geriatric consultative services (GCS) utilize comprehensive geriatric assessments and multidisciplinary processes to recognize and modify risk factors that may lead to poor outcomes among hospitalized patients.[8–11] Implementation of GCS models including Acute Care for Elders and recently, the Mobile Acute Care of the Elderly services have shown many benefits among older patients including a reduction in the hospital length of stay and readmission rates.[12,13] The benefits of such services among hospitalized elders suffering from CI, however, are not well established. The objective of this paper is to evaluate the impact of GCS on the readmission and mortality rates of older adults with CI within 12 months of their hospitalization to an urban, public hospital. We hypothesize that GCS will reduce both 12 months hospital readmissions and mortality rates among this vulnerable group of older adults.

Methods

The study was approved by the XXXXXX Institutional Review Board, and informed consent for identifiable chart review was obtained from subjects or their legally authorized representatives.

Setting

The study was conducted at XXXX hospital, XXXXX, XX, a 340-bed, university-affiliated, public hospital with over 2,300 admissions of 65 or older patients every year.

Population

415 hospitalized patients aged 65 or older suffering from CI were enrolled into an original randomized controlled trial that evaluated the effect of a computerized decision support

system on their quality and outcome of care between July 1, 2006, and May 30, 2008.[14] The computerized decision support included reminders for physicians to reduce the prescription of 18 anticholinergics, minimize physical restraints and Foley catheterization, and increase referral to the local GCS.[15] That previous trial neither showed an impact on quality of care nor health utilization among older patients, including mortality and hospital readmission rates. The current study uses the data from the clinical trial cohort to evaluate the effect of GCS on the 12 months mortality and hospital readmission rates for hospitalized elders with CI (see figure).

Inclusion and exclusion criteria

Individuals were eligible for enrollment if they were aged 65 or older, hospitalized on a medical ward, able to speak English, and had evidence of CI within 48 hours of hospital admission. Individuals were excluded if they were previously enrolled, were aphasic, or unresponsive. The presence of CI was based on the Short Portable Mental Status Questionnaire (SPMSQ),[16] a brief 10-item screening test with a sensitivity of 86% and specificity of 99.0% for dementia using a score of 7 or less (maximum possible score of 10).[16] The SPMSQ scoring process adjusts for participant educational and racial status, which was a benefit to its use given the urban setting of our hospital serving a large proportion of minority and low education patients. A physician-trained research assistant administered the SPMSQ within 48 hours of hospital admission.

Geriatric Consultative Services (GCS)

GCS is an interdisciplinary team of a geriatrician, a geriatric pharmacist, a case manager nurse, a social worker, a medical assistant, physical therapists, and a representative of the local Area Agency on Aging. There may be a geriatric fellow and/or medicine resident available to the team based on their rotation structure. Team-based bedside rounds are performed on new consults only, but all patients are seen individually by the team clinicians. The team emphasizes prevention of functional decline and polypharmacy, recognition and treatment of geriatric syndromes including dementia and delirium, and early discharge/transition planning. Consensus recommendations are prepared and documented in the consult notes section of the electronic medical records. Recommendations deemed critical are discussed directly with the primary teams but no orders are placed by the GCS team. The GCS team is available on all weekdays but not on weekends or major holidays.

Study Outcomes

For this secondary analysis, we used the XXXX Medical Record System (RMRS) to measure two outcomes: hospital readmission and mortality rates up to one year from discharge following index hospitalization defined as the first admission in the original clinical trial. The RMRS is the primary instrument for processing data and monitoring patient and physician activity for XXXXX Hospital.[17,18] RMRS is linked with a state - wide health information exchange to capture data on hospitalization outside XXXXX hospital. RMRS also contains death certificate information from the XXXXX Board of Health for all registered patients who die in, or outside XXXXX.

Other Data collections

Delirium was assessed at screening and then every week day using the Confusion Assessment Method by a trained research assistant.[19] It evaluates ten symptoms of delirium specified in the DSM-III-R: acute onset, fluctuating course, inattention, disorganized thinking, altered level of consciousness, disorientation, memory impairment, perceptual disturbances, psychomotor agitation or retardation, and sleep/wake disturbance. Participant demographic characteristics, including age, sex, ethnicity, and years of education were collected from the RMRS and from interviews performed at the time of cognitive screening. Information on length of hospital stay, and discharge destination; home vs facility (including skilled nursing and acute rehabilitation facilities) were also obtained from the RMRS. Charlson Comorbidity Index score was calculated using International Classification of Diseases, Ninth Revision, codes gathered from 1 year before admission until the time of each participant's discharge from the hospital.[20] The Acute Physiology Score (APS) from the Acute Physiology and Chronic Health Evaluation (APACHE) III was derived from data available in the RMRS to measure the severity of illness.[21] Although the APACHE III was developed in the intensive care unit using data from the first 24 hours after admission, for our study we used the worst laboratory test value during the entire hospital stay to calculate the APS.[22]

Statistical Analysis

Baseline variables are presented as means and standard deviations for continuous variables, and percentages for binary categorical variables. Comparisons between patients receiving GCS and those who did not were performed using Chi-square tests for categorical variables and using Kruskall-Wallis test for continuous variables. Cox's proportional hazard models were used to determine the association between receiving GCS and time to hospital re-admission or mortality within 30 days or one year post index admission while adjusting for other covariates. For the models using time to re-admission, patients without readmission were censored either at the endpoint (30 days or 1 year) or at time of death for those who died within the time frame in each model. Since GCS was not randomly assigned, we also conducted a propensity score analysis.[23] A logistic model for the probability of receiving GCS was conducted using patient demographic variables and information collected before and at the time of GCS. Stratified Cox proportional models using quintiles of predicted probability of receiving GCS were used in propensity adjusted Cox model. All data analyses were performed using SAS version 9.3 (SAS Institute, Inc., Cary, NC).

Results

Between July 1, 2006 and May 30, 2008, 415 CI patients were enrolled in the original trial with 176 receiving the GCS. As seen in table 1 the GCS and non-GCS groups differed significantly. The GCS group was older (79.2 years; 8.1 SD vs. 75.8 years; 7.8 SD; p=<. 001); scored lower on the SPMSQ (4.7 ; 2.7 SD vs. 5.5; 2.7 SD; p=0.002); had fewer chronic conditions with a lower mean Charlson Comorbidity Index Score (2.1; 1.86 SD vs. 2.8; 2.6 SD; p=0.023), but a higher percentage of delirium (48.9% vs 29.3%), a lower percentage of being discharged home (37.5% vs 56.1%), and a higher mean length of stay (6.4 days; 6.4 SD vs. 5.6 days; 5.9 SD; p=.004). They also had a lower malignancy rate

(6.2% vs. 14.6%; p=0.007) and a lower number of hospitalizations in the previous year (0.5 admission; 0.9 SD vs. 0.7 admission; 1.1 SD; p=0.035). No differences were observed in regards to gender, ethnicity, history of myocardial infarctions, COPD, cerebrovascular disease, peripheral vascular disease, diabetes and use of anticholinergic medicines.

Table 2 describes the association of various factors with receiving the GCS. Patients who were positive for delirium (OR = 1.65; 95% CI = 0.98–2.77) and were older (OR = 1.04; 95% CI = 1.01–1.08) had a higher propensity to receive the GCS, whereas, presence of metastatic cancer resulted in a lower propensity (OR=0.15; 95% CI = 0.02–1.16) of receiving the GCS. The logistic model estimated area under the ROC curve was 0.707.

Table 3 provides results from the Cox's models for receiving GCS on readmission and mortality outcomes adjusting for various sets of covariates and with the propensity score adjustment. Model 1 presents unadjusted hazard ratio (HR). Model 2 presents hazard ratios adjusting for a common set of covariates that were significantly associated with at least one of the outcomes while model 3 presents the results adjusting for all covariates. All four models yielded similar results. As evident from this table, propensity adjusted HR for 30-day readmission was still significantly higher among patients receiving the GCS (HR=1.75; 95% CI = 1.06–2.88) but not at one year (HR=1.19; 95% CI = 0.89–1.59). There was a trend for decreased mortality for the GCS group at 30 days (HR 0.35; 95% CI = 0.09–1.35), but it disappeared at 1 year (HR=0.91; 95% CI = 0.59–1.40). A composite outcome of readmissions and mortality did not show any difference between the GCS and no GCS groups.

Discussion

To our knowledge this is the first study to analyze the impact of a GCS on hospital readmission and mortality rates of CI patients. Our results did not show any short-term or long-term benefits for GCS. Recent studies exploring cost benefits of the GCS have found trends towards lower readmission, but none focused on patients with CI.[6,24,25] It is important to note that our study did not use random allocation to assigning the patient into the GCS or control group, thus raising the possibility that patients who received GCS were sicker and were medically and socially more complex than those who did not receive the consult. Moreover, GCS consultation is preferentially sought for and completed for patients with CI and functional limitations, consistent with our finding that GCS patients more often have delirium and are less often discharged home.

The nature of the GCS team is another important consideration. Our GCS model did not include unit cohorting of patients, an important component of other proposed GCS models.[26] A recent meta-analysis found that the GCS models without unit cohorting of patients did not have impact on one or 12 months readmission rates.[27] Low adherence to consultant recommendations (less than 33%) was thought to be one of the reasons for such results. Importance of cohorting with regards to accomplishing recommendations by primary teams, importance of unit staff expertise in geriatric principles, and impact of a "unit" model on team work has also been highlighted by another review.[28] These findings lend to the

hypothesis that unit cohorting and direct order placement by the GCS team may improve outcomes among CI patients, including a reduction in readmission rates.

Although readmissions rates were not statistically different between GCS and control groups at one year post-discharge, 30-day readmission rates were higher among the GCS group. Previous research among older heart failure patients found that a comprehensive transitional care intervention at the time of hospital discharge significantly shortened the time to readmission in the intervention group. ($p = 0.026$).[29] The factors identified by the study authors included enhanced supervision by the transitional healthcare teams along with improved awareness and education among treated patients that may have facilitated early recognition of clinical deterioration.[29] A recent study with intensive outpatient care resulted in increased admissions among chronically ill adults, provided a similar conclusion.[30]

GCS patients showed a trend towards decreased mortality as did patients enrolled in previous studies evaluating GCS models in the inpatient setting, as suggested by a recent review.[27] A caveat to note that these trends favored “ward” styled GCS services as compared to our “open” GCS model,[27,28] although the factors cited in these dedicated units affecting mortality included prompt attention to early rehabilitation, delirium management and prevention of pressure ulcers are also frequently implemented for patients in our GCS service model and hence may have produced similar results.

Our neutral results in regards to the readmissions need to be interpreted with caution. First, this study was conducted in a hospital that supports expert geriatric and palliative care teams both in the inpatient and the ambulatory settings that provide consultative services, and train medicine teams and hospital nursing staff. On the outpatient side the presence of a robust geriatrics house-calls program and the Geriatric Resources for Assessment and Care of Elders team results in above-average care for the “control” group and thus may also impact apparent outcomes.[31,32] Second, 30-day readmissions represent a complex outcome. Two recent reviews of hospital-initiated interventions have shown that evidence regarding best strategies to decrease 30-day readmits is unclear.[33] Neither review included studies that targeted patients with CI only. The two programs that reduced 30-day readmissions were multifaceted and included personnel that provide “bridging” between the hospital and the outpatient setting.[34] The GCS does include a focus on post-discharge resources, but does that on case-by-case basis and no formal post-hospital follow-ups are provided. Moreover, the value of 30-day readmission rates as a marker of quality, even though used by policymakers as an indicator of hospital quality, remains controversial.[35,36] Broadening the outcomes of interest to include patient-centered outcomes including satisfaction with care, that have shown to impact other health outcomes, may help improve understanding the benefits of GCS in hospitals.[37] Other comprehensive transitional care models that failed to show a benefit on 30-day readmissions in older patients still resulted in higher satisfaction among patients.[38] Unfortunately, our evaluation did not include an assessment of patient satisfaction and/or quality of transitions.

Since the study period the GCS at our hospital now has incorporated a more robust focus on Advance Care Planning and execution of Physician Orders for Scope of Treatment that were legislated in the State in July 2013. The GCS team members are expert in carrying out

complex ACP discussions and also partner with the inpatient palliative Care team. It is quite possible that a study of more recent outcomes will yield more positive results for the selected outcomes. Thus, for future trials that aim to study impact of GCS in the inpatient settings it may be advisable to include important quality markers such as implementation of ACP and patient satisfaction along with the health utilization outcomes.

Limitations

As mentioned prior, it is possible that our risk adjustment was insufficient to account for all the medical and psychosocial differences among groups. For example, the overall anticholinergic impact of various medications such as antipsychotic medications and H2-blockers was assessed via the Anticholinergic Burden Scale on admission, but we did not have information on medication prescribing during the stay. We were further limited by lack of baseline functional status and socio-economic details, both of which are related to 30-day readmissions. For example, living alone, prior use of assist devices, and belonging to lower socioeconomic status are correlated with higher readmission rates.[39,40] Patients with available social support may receive more intense supervision and may seek medical attention sooner. On the other hand, worsening health among CI patients without any approximate social support may be unnoticed for days. Absence of details of inpatient interventions may have resulted in unmeasurable confounders that could have impacted our study outcomes. Lack of information on the uptake of GCS recommendations by the primary teams is another limitation of this analysis. Future trials should include strategies to address these information gaps.

Conclusion

Our results comparing inpatient geriatrics consultative services with usual care in hospitalized elders having cognitive impairment failed to demonstrate an impact on re-admissions and mortality. A clinical lesson learned though is that much work is still required to reduce readmission and mortality rates in this especially vulnerable patient population.

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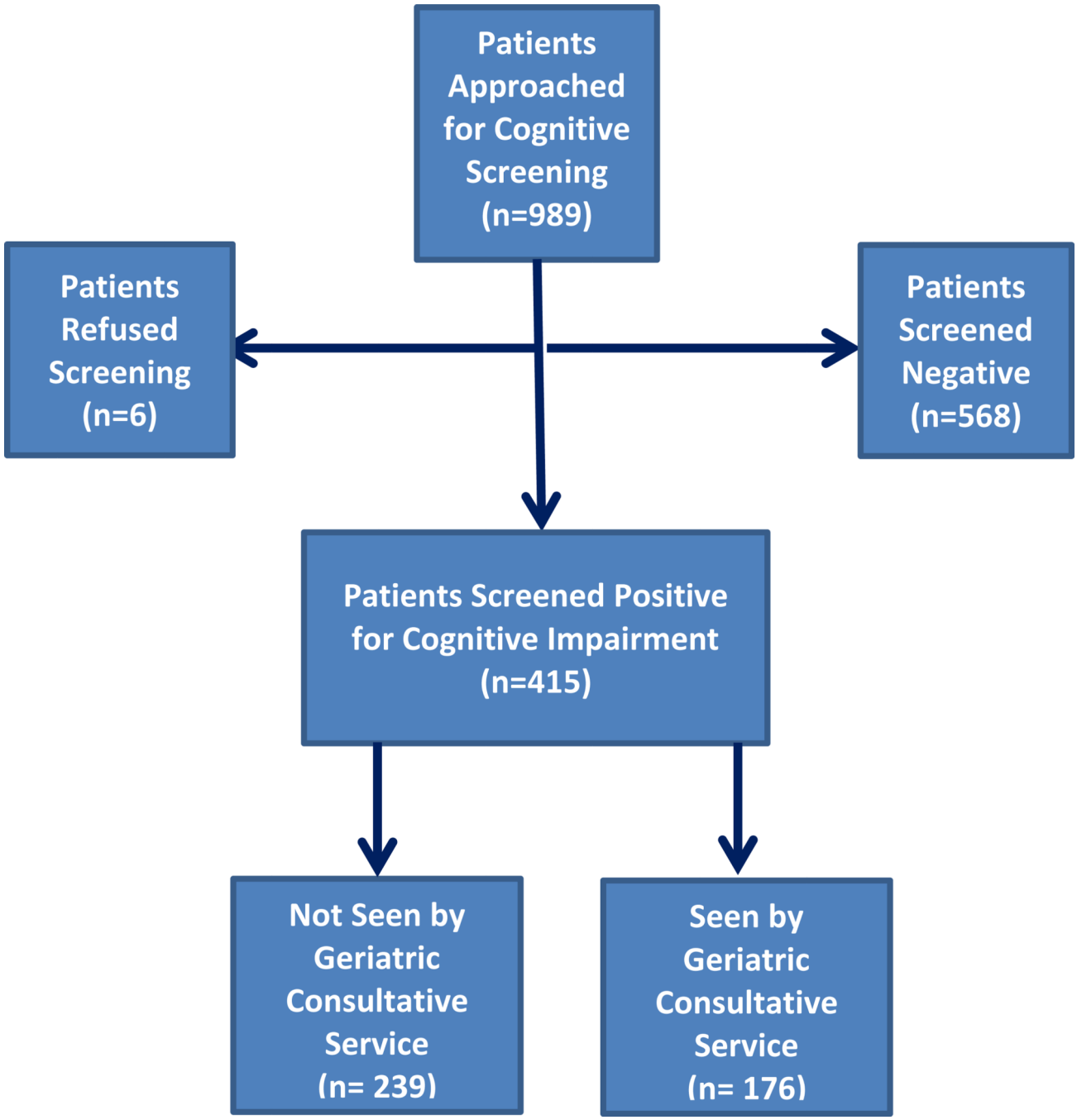

Figure.
Flow Chart Depicting Patients that Received Intervention

Table 1

Baseline characteristics and summary outcomes within one-year of hospital discharge based on exposure to Geriatric Consult Services (GCS)

	No GCS (n=239)	GCS (n=176)	*p*-value*
Baseline Characteristics			
Mean Age (SD)	75.8 (7.8)	79.2 (8.1)	<0.001
% Female	66.1 (n=158)	68.2 (n=120)	0.657
% African American	54.8 (n=131)	63.6 (n=112)	0.071
Mean SPMSQ score (SD)	5.5 (2.7)	4.7 (2.7)	0.002
Admission Diagnoses			
MI	15.5 (n=37)	13.6 (n=24)	0.675
CHF	38.1 (n=91)	34.7 (n=61)	0.475
PVD	7.1 (n=17)	9.7 (n=17)	0.370
Cerebrovascular	13.8 (n=33)	19.3 (n=34)	0.140
COPD	41.0 (n=98)	33.0 (n=58)	0.094
Diabetes	47.7 (n=114)	40.9 (n=72)	0.169
Malignancy	14.6 (n=35)	6.2 (n=11)	0.007
Metastatic Cancer	8.8 (n=21)	1.7 (n=3)	0.002
Mean Charlson Comorbidity (SD)	2.8 (2.6)	2.1 (1.8)	0.023
Mean APS (SD)	24.5 (13.8)	25.9 (13.5)	0.231
Definite ACB Use	35.2 (n=84)	27.8 (n=49)	0.136
Length of Stay	5.6 (5.9)	6.4 (6.4)	0.004
% Any Delirium	29.3 (n=70)	48.9 (n=156)	<0.001
% Discharged home	56.1 (n=134)	37.5 (n=66)	<0.001
# Inpatient stays prior year	0.7 (1.1)	0.5 (0.9)	0.035
Follow-up Outcomes			
% Re-Admission within 30 days	15.1 (n=36)	22.7 (n=40)	0.054
% Re-Admission within 1 year	54.4 (n=130)	56.3 (n=99)	0.765
% Death within 30 days	4.2 (n=10)	1.7 (n=3)	0.253
% Death within 1 year	26.8 (n=64)	23.9 (n=42)	0.569
% Re-Admission or Death within 30 days	18.0 (n=43)	24.4 (n=43)	0.113
% Re-Admission or Death within 1 year	64.8 (n=155)	63.1 (n=111)	0.708

APS: Acute Physiology Score; SPMSQ: Short Portable Mental Status Questionnaire; ACB: Anticholinergic Burden Scale; MI: Myocardial Infarction; CHF: Congestive Heart Failure; PVD: Peripheral Vascular Disease; COPD: Chronic Obstructive Pulmonary Disease

* *p*-value was calculated using Chi-square tests for categorical variables and Kruskall-Wallis test for continuous variables.

Table 2

Results of logistic regression model for receiving a Geriatric Consult Service consult based on patients' demographic and hospital variables.

	Adjusted OR (95% CI)	P-value
Age	1.04 (1.01, 1.08)	0.006
Female	1.02 (0.64, 1.63)	0.942
African-American	1.11 (0.71, 1.72)	0.657
Short Portable Mental Status Questionnaire (SPMSQ) Score	1.00 (0.91, 1.10)	0.990
Acute Physiology Score	1.00 (0.98, 1.02)	0.769
Charlson Comorbidity Score	1.11 (0.84, 1.46)	0.471
Length of hospital stay	1.02 (0.98, 1.07)	0.299
Definite Anticholinergic use*	0.74 (0.46, 1.20)	0.219
Any Delirium during hospital stay	1.65 (0.98, 2.77)	0.061
Diabetes Mellitus	0.72 (0.41, 1.26)	0.253
Myocardial Infarction	0.83 (0.41, 1.66)	0.593
Congestive Heart Failure	0.83 (0.47, 1.47)	0.524
Peripheral Vascular Disease	1.39 (0.61, 3.18)	0.433
Cerebrovascular Disease	1.30 (0.65, 2.59)	0.464
Malignancy	0.45 (0.17, 1.21)	0.113
Metastatic Cancer	0.15 (0.02, 1.16)	0.069
Chronic Obstructive Pulmonary Disease	0.91 (0.53, 1.55)	0.727

*Based on Anticholinergic Burden Scale

Table 3

Adjusted Hazard Ratios (HR) for Geriatric Consult Service Consult estimated using Cox's proportional hazard models and propensity-adjusted models.

Outcome Variables	Model 1		Model 2		Model 3		Propensity Adjusted	
	HR (95% CI)	P-value	HR (95% CI)	P-value	HR (95% CI)	P-value	HR (95% CI)	P-value
Re-Admission within 30 days	1.65 (1.05, 2.59)	0.030	1.73 (1.08, 2.78)	0.024	1.84 (1.13, 3.00)	0.015	1.75 (1.06, 2.88)	0.029
Re-Admission within 1 year	1.13 (0.87, 1.46)	0.373	1.24 (0.94, 1.63)	0.125	1.26 (0.94, 1.68)	0.117	1.19 (0.89, 1.59)	0.245
Death within 30 days	0.43 (0.12, 1.56)	0.199	0.34 (0.09, 1.28)	0.110	0.25 (0.06, 1.02)	0.053	0.35 (0.09, 1.35)	0.126
Death within 1 year	0.95 (0.65, 1.45)	0.806	0.87 (0.58 1.31)	0.506	0.93 (0.60, 1.42)	0.724	0.91 (0.59, 1.40)	0.669
Re-admission or Death within 30 days	1.48 (0.97, 2.26)	0.070	1.49 (0.96, 2.33)	0.078	1.56 (0.98, 2.47)	0.061	1.55 (0.97, 2.48)	0.069
Re-admission or Death within 1 year	1.05 (0.82, 1.34)	0.699	1.11 (0.86, 1.43)	0.412	1.15 (0.88, 1.50)	0.318	1.08 (0.83, 1.42)	0.569

Model 1: unadjusted; Model 2: adjusting for age, Charlson Comorbidity Score, Acute Physiology Scale, disposition status, congestive heart failure, and peripheral vascular disease; Model 3: adjusting for all demographic and hospital variables.