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Geriatric Oncology

Geriatric Assessment of Older Adults With Cancer During Unplanned Hospitalizations: An Opportunity in Disguise

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Key Words. Geriatric oncology • Inpatient • Readmission • Geriatric assessment

Abstract

Background. Geriatric assessment (GA) is an important tool for management of older cancer patients; however, GA research has been performed primarily in the outpatient setting. The primary objective of this study was to determine feasibility of GA during an unplanned hospital stay. Secondary objectives were to describe deficits found with GA, to assess whether clinicians recognized and addressed deficits, and to determine 30-day readmission rates.

Materials and Methods. The study was designed as an extension of an existing registry, "Carolina Senior: Registry for Older Patients." Inclusion criteria were age 70 and older and biopsy-proven solid tumor, myeloma, or lymphoma. Patients had to complete the GA within 7 days of nonelective admission to University of North Carolina Hospital.

Results. A total of 142 patients were approached, and 90 (63%) consented to participation. All sections of GA had at least an 83% completion rate. Overall, 53% of patients reported problems with physical function, 63% had deficits in instrumental activities of daily living, 34% reported falls, 12% reported depression, 31% had ≥10% weight loss, and 12% had abnormalities in cognition. Physician documentation of each deficit ranged from 20% to 46%. Rates of referrals to allied health professionals were not significantly different between patients with and without deficits. The 30-day readmission rate was 29%.

Conclusion. GA was feasible in this population. Hospitalized older cancer patients have high levels of functional and psychosocial deficits; however, clinician recognition and management of deficits were poor. The use of GA instruments to guide referrals to appropriate services is a way to potentially improve outcomes in this vulnerable population. ***The Oncologist*** 2015;20:767–772

Implications for Practice: Geriatric assessment (GA) is an important tool in the management of older cancer patients; however, its primary clinical use has been in the outpatient setting. During an unplanned hospitalization, patients are extremely frail and are most likely to benefit from GA. This study demonstrates that hospitalized older adults with cancer have high levels of functional deficits on GA. These deficits are under-recognized and poorly managed by hospital-based clinicians in a tertiary care setting. Incorporation of GA measures during a hospital stay is a way to improve outcomes in this population.

Introduction

Cancer is a disease of the elderly. By 2030, nearly 70% of new cancer diagnoses will occur in patients older than 65 years [1]. These older patients are also living longer with significant comorbidities, and that poses additional challenges when trying to optimize cancer treatment. Geriatric assessment (GA) has proven to be a valuable tool in the management of older adults with cancer. Numerous studies have shown that GA can identify unknown geriatric problems, can be predictive of toxicity and survival, and potentially can alter treatment decisions [2, 3]. Furthermore, many deficits identified using GA may be modifiable with geriatric interventions such as medication review, referral to allied health professionals, and treatment of depression [4, 5].

The vast majority of GA studies have been done in the outpatient oncology setting, typically before the initiation of treatment. Several studies have shown that GA also has value when performed in the inpatient setting; however, these studies have primarily enrolled patients at the time of an initial, often planned admission for chemotherapy or surgery [6–10]. Cohorts of older oncology patients have also been assessed as part of specialized acute care for the elderly (ACE) hospital units and general geriatric care projects [11–13]. These studies

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have shown that older patients in the hospital have a high prevalence of geriatric syndromes and disability.

In everyday practice, older cancer patients are often admitted nonelectively for uncontrolled symptoms related to a cancer diagnosis, complications from treatment, or other comorbid conditions. These patients are admitted for various hospital services depending on their nursing needs, bed availability, and hospital patterns of practice. Furthermore, they often are not cared for directly by their primary oncology provider during their hospital stay. ACE units are not widely available and may not be able to serve the medical needs of cancer patients such as delivery of chemotherapy or management of complex surgical problems. Nonetheless, hospitalization in a tertiary care center allows easy access to allied health support and specialized services that are often difficult to access as an outpatient. Hospitalization also provides a more intense interaction with the health care system compared with a short clinic visit and thus presents the opportunity to address multiple problems.

The current literature has not examined this everyday reality of older patients being admitted to the hospital, and we aimed to address this gap. We launched a pilot study to perform GA in older cancer patients who were admitted nonelectively to a large academic hospital.

Our primary objective was to evaluate the feasibility of GA in this frail, historically difficult-to-study population. Secondary objectives were to describe the level of deficits detected on GA, to assess whether hospital-based clinicians recognized and addressed these deficits, and to describe hospital-based outcomes including length of stay, discharge disposition, and 30-day readmission rates.

Materials and Methods

This study was completed as an extension of the LCCC 0916 "Carolina Senior: Registry for Older Patients" (protocol approved by the institutional review board [IRB] of the University of North Carolina; ClinicalTrials.gov identifier NCT01137825). Methodology was published previously [14]. The registry is used to collect GA data on patients aged 65 years and older and recruits through oncology clinics associated with a large academic medical center and several community sites across North Carolina. For this study, the protocol was revised, and the IRB approved inclusion of patients while admitted to hospital.

Inclusion Criteria

Inclusion criteria for this study were age 70 years and older, English speaking, and biopsy-proven solid tumor, myeloma, or lymphoma. Patients had to complete the GA within 7 days of a nonelective admission to University of North Carolina (UNC) Hospital. The electronic medical record allowed for identification of patients who presented through the emergency room or were admitted directly from an outpatient clinic, and these were defined as unplanned or nonelective admissions. Patients who had a bed requested for a planned surgery, scheduled chemotherapy, or other intervention were excluded.

The goal was to identify "active" cancer patients; therefore, we limited inclusion to patients who were newly diagnosed, on cancer-directed treatment, treated within the previous 6 months, or planned for treatment in the upcoming 6 months.

Other exclusion criteria were estimated life expectancy of less than 6 weeks, postoperative status within 24 hours, and admission to an intensive care setting. Patients with acute myeloid leukemia or other high-grade hematologic malignancy were also excluded.

GA Administration

Patients were identified using admission diagnosis and problem lists documented in electronic medical records. Medical admission lists screened included general medicine, hospitalist, family medicine, and geriatric medicine. Surgical admission lists screened included surgical oncology, urology, thoracic surgery, gastrointestinal surgery, and gynecology. UNC Hospital has a specialized oncology inpatient service, and consultation services for medical oncology and radiation oncology were also used to identify patients.

Patients were recruited and assessed by two study personnel (C.M. and G.W.). If patients were feeling unwell at the time they were approached, they were approached on repeated occasions, so long as GA could be completed within the first 7 days of admission. The GA tool in this study has been used extensively and shown to be feasible in outpatient academic and community oncology practices and co-operative group clinical trials [14–16]. In addition to data on basic demographics, living situation, and education level, the GA comprises validated and reliable measures of cognition, nutrition, comorbidity, physical, and psychosocial function. When applicable, these measures were dichotomized at clinically meaningful cut points validated in the literature. Although some elements are administered by a health professional (cognitive testing, Karnofsky performance status assessment, and Timed Up-and-Go [TUG]), the majority of the questionnaire can be self-administered by the patient. Patients were offered the choice of having study personnel administer the questionnaire or completing the questionnaire on their own either in hospital or at home and returning it by mail.

The established protocol allowed GA results to be released to the patients' primary outpatient oncologist only on request; however, if a significant cognitive deficit was identified, the treating oncologist was notified of this result. In our study, hospital-based physicians were neither routinely made aware of patients' participation in the study nor given the results of the GA.

Data Collection

Information concerning in-hospital complications, length of stay, and geriatric syndromes was collected from review of the medical record. Admission notes and all physician progress notes were reviewed for documentation of GA domains (activities of daily living [ADLs], instrumental activities of daily living [IADLs], nutrition, mood, cognition, and falls). A documentation event was noted if any element of the domain was mentioned (e.g., documentation of ambulation would count as documentation of ADLs). Referrals to allied health and medical subspecialty services were documented if a consultation note was entered into the medical record by the service or if referral was documented in the discharge summary. Appropriate referrals were defined as follows: for deficits in physical function or falls, appropriate referral included physical therapy and/or occupational therapy; for cognition, referrals included neurology and/or geriatrics; for mood, referrals included psychiatry,

chaplain, and/or psychosocial oncology services; for patients with weight loss, appropriate referral was to nutrition.

Readmission events were captured using chart review including review of outpatient clinic notes to capture documentation of admission to another facility. Elective or planned readmissions (e.g., for delivery for chemotherapy or scheduled surgery) were not counted as events.

Statistical Analysis

Descriptive statistics were used to describe baseline characteristics of the sample. Comparisons between the groups were made using two groups using Student *t* tests. Fisher's exact test was used to compare differences between those with and without readmission. SAS statistical software version 9.3 (SAS Institute Inc., Cary, NC, http://www.sas.com) was used for analyses.

Results

Feasibility

During the 6-month study period, a total of 157 patients were identified and screened. Of these, 142 were invited to participate. Ninety patients (63% of patients approached) consented to enroll and ultimately were included in the study sample (Fig. 1).

Only five patients chose to complete the questionnaire at home. Of those, only one patient mailed in the completed GA; therefore, this option was eliminated part of the way into the study. The majority of patients could not complete the TUG test because of medical equipment (intravenous poles, oxygen, catheters) that limited their mobility and test reliability. The mean time to complete the entire GA was 29 minutes.

Patient Characteristics

Patient baseline characteristics at time of assessment are summarized in Table 1. Mean age was 77 $\pm$ 6.3 years, and 56% of patients were female. The majority of patients were white, and 22% were black, similar to the population distribution in the state [17]. The most common tumor type was gynecologic, although a wide variety tumor types were seen. Most common reasons for hospital admission included workup of new diagnosis of cancer, infections, and complications from surgery or systemic therapy.

Geriatric Assessment Results

GA results are summarized in Table 2. All elements of the GA had completion rates of at least 83%. GA revealed high levels of deficits. Overall, 53% of patients reported problems in physical function, 63% had deficits in IADLs, and 34% of patients had falls. Using the five-item Mental Health Inventory (MHI-5) score, 14% of patients reported depression, and 12% of patients had abnormalities in cognition on the Blessed Orientation-Memory-Concentration test. Weight loss was common, with 31% of patients reporting unintentional weight loss of $>$10%.

Documentation and Referrals

We reviewed medical records for physician documentation of GA domains: ADLs, IADLs, nutrition, mood, cognition, and falls. In 48 patients (53%), there was physician documentation of one or more of these measures.

Overall, 48% of patients had referrals to allied health or specialized medical services during their hospitalization or at discharge. Moreover, 46% of patients were referred to physical therapy, 28% of patients were referred to occupational therapy (coupled with physical therapy referral in all but one instance), 18% of patients had a nutrition consultation, 10% of patients had referral for psychological support or evaluation (psychiatry, psychosocial oncology team or chaplain), and 3 patients had referrals to neurology or geriatrics.

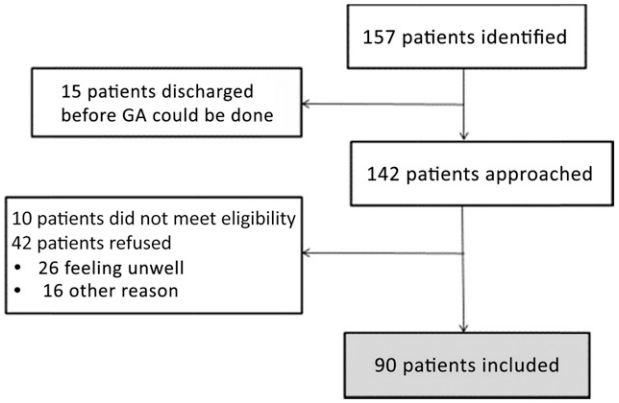

Figure 1. Study enrollment diagram.
Abbreviation: GA, geriatric assessment.

Table 3 outlines the rates of physician documentation of patient deficits and referrals among patients who had documented functional deficits on GA. Rates of documentation of deficits and referrals were not increased in these patients. Compared with patients without deficits, there was no difference in frequency of referrals for patients with falls ($p = .70$), physical function deficits ($p = .96$), IADL deficits ($p = .08$), or weight loss ($p = .07$).

Hospital Course and Readmissions

Average length of stay was 6.3 days (range: 1–37 days), with a median of 4 days. There were 88 of 90 patients living independently at home prior to admission. Of those, 71 (81%) returned home, with 34% referred for home nursing support. Five patients were discharged on home hospice, and 12 patients (14%) previously living at home were discharged to a skilled nursing facility.

On average, patients were admitted on a total of 9 medications (including as-needed medications, supplements, and vitamins) and discharged on 11 medications (range: 1–23). Overall, 53% of patients were discharged on 10 or more medications.

The 30-day readmission rate was 29% for the study population, approximately double the overall hospital readmission rate of 17.6% for Medicare recipients [18]. Among patients who were screened and met eligibility criteria for this study but did not participate, the readmission rate to UNC hospitals was 21% (12 of 57 patients).

We performed an exploratory analysis to see if GA deficits predicted readmission in this sample, but these were not statistically significant. Readmission was not associated with physical function deficits, dependence on IADLs, cognitive impairment, weight loss, falls, or mental health dysfunction. Patients aged $<$80 years ($p = .04$) and those with metastatic disease ($p = .04$) were more likely to be readmitted.

Discussion

This unique study demonstrated that GA is feasible in a frail population of older cancer patients during unplanned admission to a tertiary care hospital. This population clearly

Table 1. Baseline characteristics at time of assessment

Characteristic	Result
Total patients, *N*	90
Age, years, mean (range)	77 (70–96)
Sex, *n* (%)	
Male	40 (44)
Female	50 (56)
Education level, *n* (%)	
Less than high school	20 (22)
High school graduate	42 (47)
Associate/bachelor degree	12 (13)
Advanced degree	12 (13)
Unknown	4 (4)
Race, *n* (%)	
White	70 (78)
Black	20 (22)
Living situation, *n* (%)	
Lives alone	28 (31)
Spouse	40 (44)
Adult children	12 (13)
Other	7 (8)
Tumor type, *n* (%)	
Gynecologic	22 (24)
Hematologic	13 (14)
Lung	12 (13)
Genitourinary	11 (12)
Other gastrointestinal	10 (11)
Colorectal	7 (8)
Breast	4 (4)
Other	11 (12)
Stage, *n* (%)	
Metastatic	53 (59)
Nonmetastatic	30 (33)
Unknown	7 (8)
Treatment status, *n* (%)	
Before treatment	25 (28)
During treatment	41 (46)
After treatment	24 (27)
Admission unit, *n* (%)	
Surgical	37 (41)
Oncology	30 (33)
Medicine	23 (26)
Reason for admission, *n* (%)	
Infection	18 (20)
New diagnosis	15 (17)
Surgical complications	10 (11)
Disease progression	9 (10)
Complications of systemic therapy	9(10)
Hematologic complications	5 (6)
Fall	4 (4)
Bowel obstruction	4 (4)
Other	16 (18)

warrants such an assessment because of the high frequency of deficits, lack of appropriate documentation, and inadequate referral for management of GA deficits by treating physicians.

Despite well-defined inclusion criteria and few study personnel, we were able to recruit a relatively large number of patients over a 6-month time period. Patients during hospitalization often have more time to complete the GA instrument than they might at an outpatient visit and were generally receptive to participation.

Compared with patients in our existing outpatient database [14], which uses the same GA measures, the inpatient population was more diverse and included more black patients, patients with lower education levels, and fewer breast cancer patients. Inpatients reported higher levels of deficits in all domains compared with the outpatient database. Our study calls attention to the fact that outpatient GA results, which have been published extensively in the literature, may be representative of only a more fit segment of the older cancer population. Furthermore, a patient's functional status may change rapidly around the time of a hospital stay, at which GA and directed interventions may be most crucial.

Not surprisingly, documentation of patients' functional status during their hospital stay was poor. This result was consistent with our observations from the outpatient setting [19]. Although functional assessment has become the cornerstone of geriatrics and geriatric-oncology practice, increased education is needed for all providers who care for older patients with cancer. Incorporating GA into routine clinical practice using abbreviated instruments that do not require physician administration, such as the one in this study, is an efficient way to address this need.

Although patients in the hospital accessed allied health services at a higher rate than would be seen in the outpatient setting [20], referral patterns were not reflective of patients' levels of deficits. Referrals more likely occur because of ingrained patterns of practice, including referrals primarily for discharge planning. It is impractical to propose that all patients in this population have routine multidisciplinary evaluation in hospital; however, our data suggest that such resources may be better distributed to focus on patients with the greatest needs and potential benefits. In particular, nutrition and psychosocial support services were greatly underutilized in our study population.

Polypharmacy is a major problem in this population, and the risk of adverse reactions escalates with an increasing number of medications [21]. Polypharmacy has also been documented to increase risk of falls, adverse drug events, hospitalization, and health care utilization [22, 23]. Our data suggest that the number of medications increases after an unplanned hospital stay. Although patients in our study had access to a clinical pharmacist, comprehensive medication review may have been limited by other clinical priorities and the lack of a single prescriber in the case of patients with multiple treating physicians. This study supports existing literature showing that discontinuation of nonessential medications is still not standard practice for older cancer patients [24, 25]. Furthermore, data suggest that geriatric oncology patients often have multiple, potentially inappropriate medications prescribed [26, 27]. Improved utilization of pharmacy support and better communication among providers may help address this problem in the hospital. Many tools have been developed to address

Table 2. Geriatric assessment results

Measures	Range of scores	Dichotomized	Results, *n* (%)
Comorbid conditions			
Comorbidities	0–13	<4	40 (44)
		≥4	40 (44)
		Missing	10 (11)
Vision	Blind to excellent	Fair or better	83 (92)
		Poor/blind	3 (3)
		Missing	4 (4)
Hearing	Deaf to excellent	Fair or better	81 (90)
		Poor/deaf	4 (4)
		Missing	5 (6)
Renal function (eGFR)	0 to >60 mL/min	>60	48 (53)
		30–59	34 (38)
		<30	8 (9)
MOS physical function (ref)	0–100, higher score indicates better functioning	≥70	32 (36)
		<70	48 (53)
		Missing	10 (11)
Functional status			
IADLs (ref)	0–14, lower score indicates more deficits	14	28 (31)
		<14	57 (63)
		Missing	5 (6)
KPS, physician reported	0–100, higher score indicates better functioning	≥80	39 (43)
		<80	50 (56)
		Missing	1
KPS, patient reported	0–100, higher score indicates better functioning	≥80	52 (58)
		<80	33 (36)
		Missing	5 (6)
Self-reported falls in last 6 months		None	54 (60)
		1	14 (16)
		≥2	17 (19)
		Missing	5 (6)
Psychological status			
Five-item Mental Health Index (MHI-5) (ref)	0–100, high score indicates better mood	>76	70 (77)
		≤76	13 (14)
		Missing	7 (8)
Cognition: Blessed Orientation-Memory-Concentration test	0–28, higher score indicates lower cognition	<11	68 (76)
		≥11	11 (12)
		Incomplete	11 (12)
Psychosocial status			
MOS social activity limitation (ref)	0–100, high score indicates more active	≥50	51 (57)
		<50	30 (33)
		Missing	9 (10)
Social support	0–100, high score indicates more support)	≥50	74 (82)
		<50	1 (1)
		Missing	15 (17)
Nutritional status			
Unintentional weight loss, %	0–100	<5%	42 (47)
		≥5%–10%	17 (19)
		>10%	28 (31)
		Missing	3 (3)
BMI	0 to unlimited	<20	14 (16)
		20–30	52 (58)
		>30	21 (23)
		Missing	3 (0.3)
Albumin at admission	0–50 g/L	≥35	24 (27)
		<35	43 (48)
		Missing	23 (26)

Abbreviations: BMI, body mass index; eGFR, estimated glomerular filtration rate; IADLs, instrumental activities of daily living; KPS, Karnofsky performance status; MOS, Medical Outcomes Survey.

Table 3. Documentation and appropriate referrals for patients with deficits documented on geriatric assessment

Deficit	Patients with deficit, *n*	Physician documentation of deficit, *n* (%)	Referral,[a] *n* (%)
ADL/physical function	48	17 (35)	22 (46)
IADLs	57	11(20)	30 (52)
Falls, ≥1	31	6 (20)	15 (50)
Cognition	11	5 (45)	2 (18)
Depression	13	6 (46)	1 (8)
>10% weight loss	28	6 (21)	7 (25)

[a]For ADLs, physical function, IADLs, and falls, referral includes physical therapy and/or occupational therapy; for cognition, referrals include neurology and/or geriatrics; for depression, referrals include psychiatry, chaplain, and/or psychosocial support team; for patients with weight loss, referral includes nutritionist.
Abbreviations: ADL, activity of daily living; IADLs, instrumental activities of daily living.

potentially inappropriate medication use in geriatric patients [28–31], and this represents another area for improvement in care and cost savings.

This study is the first, to our knowledge, to document 30-day hospital readmission rates in a broad geriatric oncology population. Rates of readmission in this setting were very high (29%) and likely were underestimated because we were unable to fully capture admissions to outside facilities. Readmission rates in this study were significantly higher than the rate in our hospital (17.6%) and population-level rates among Medicare recipients, which average 17%–23% for patients with chronic diseases [18]. This problem is critical because hospitalization in older adults can cause a significant decline in functional status and health-related quality of life [32, 33]. Unplanned readmission is also a common target for hospital administrative quality improvement; however, no single intervention has been shown to decrease readmission rates [34]. We were not able to identify deficits that predict readmission in this small sample, but our data imply that better utilization of GA tools and allied health support might be a way to decrease readmission in this population. Although not specifically addressed in this study, our observations from chart review and patient feedback suggested that discussion of goals of care in the hospital was poor and rarely was there direct communication with a patient's primary care provider prior to discharge. Small studies have shown that increased communication within the care team may be another way to address readmission among oncology patients [35]. Furthermore, routine discussions of goals of care may result in more referrals to hospice (which were low in our study) and ultimately decrease readmission rates.

Conclusion

Our study was not able to prove that GA can significantly improve outcomes in older cancer patients, and this remains a major limitation in the geriatric oncology literature [2, 3]. We plan to expand this study to include a quality-improvement intervention based on GA results and assess the impact on referrals and readmissions.

Despite a small sample size, this study demonstrated several potential areas for improvement in the care for hospitalized older adults with cancer. We targeted a frail population that would greatly benefit from resources available to oncology patients. Although tremendous strides have been made in access to geriatric oncology care worldwide, there is clearly a need for education about the needs of this patient population for all practitioners. Although unplanned hospitalizations represent a negative outcome, we believe a hospital stay can provide an opportunity to provide high-quality care to this vulnerable cancer population.

Author Contributions

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Disclosures

Hyman B. Muss: Pfizer (C/A). The other authors indicated no financial relationships.

(C/A) Consulting/advisory relationship; (RF) Research funding; (E) Employment; (ET) Expert testimony; (H) Honoraria received; (OI) Ownership interests; (IP) Intellectual property rights/inventor/patent holder; (SAB) Scientific advisory board

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