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Models of Care in Geriatric Oncology

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Abstract

Cancer is common in older adults and the approach to cancer treatment and supportive measures in this age group is continuously evolving. Incorporating geriatric assessment (GA) into the care of the older patient with cancer has been shown to be feasible and predictive of outcomes, and there are unique aspects of the traditional geriatric domains that can be considered in this population. Geriatric assessment-guided interventions can also be developed to support patients during their treatment course. There are several existing models of incorporating geriatrics into oncology care, including a consultative geriatric assessment, geriatrician "embedded" within an oncology clinic and primary management by a dual-trained geriatric oncologist. Although a geriatrician or geriatric oncologist leads the geriatric assessment, is it truly a multidisciplinary assessment, and often includes evaluation by a physical therapist, occupational therapist, pharmacist, social worker and nutritionist.

Keywords

Geriatric Oncology; Models of care; Geriatric assessment-guided interventions

Introduction

Approximately 70% of deaths from cancer occur in patients age 65 and over[1], however the majority of clinical trial research in cancer care is conducted in younger patients.[2] This discrepancy creates uncertainty for oncologists when extrapolating available data to treat their older patients. Additionally, many outcomes that are of interest to older patients, such as functional impairment and independence, are not evaluated in traditional clinical trials.[3]

Caring for an older individual with cancer requires knowledge and expertise in both oncologic and geriatric issues. However, the goals of these two disciplines vary significantly. Oncologists focus on assessment of cancer variables, such as tumor biology and stage, and develop cancer-specific treatment plans. On the other hand, geriatricians assess physiologic age and functional status, and focus on optimizing an individual's independence. Integration of these two skill-sets into one individualized care plan can improve outcomes of the older patient with cancer. Additionally, knowledge of geriatric-

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specific issues, such as falls or cognitive impairment, can help providers to anticipate potential complications[4] and intervene to minimize treatment-related toxicity.[5]

The field of geriatric oncology has evolved to merge these two unique disciplines and focus research efforts to understand the optimal approach to treatment of older adults with cancer.[6] However, there are relatively few dual-trained geriatric oncologists and even fewer clinics devoted specifically to geriatric oncology assessment. Therefore it is essential that oncologists are trained in basic principles of geriatrics and geriatricians are educated on cancer-specific considerations for GA and empowered to address potential geriatric issues to optimize their patient's cancer care.

Feasibility and Impact of Geriatric Assessment (GA) in the Oncology Setting

Geriatric oncologists endorse the use of GA in the development of a treatment plan for older adults with cancer.[7] Prior research has demonstrated that a geriatric-focused assessment is feasible to incorporate into routine oncology practice.[8] Hurria and colleagues developed a cancer-specific GA consisting mainly of self-administered questionnaires addressing the various geriatric assessment domains.[9] They determined that 78% of patients were able to complete the assessment without assistance and that the mean time to completion was 27 minutes. The vast majority of patients (90%) were satisfied with the length of the questionnaire. The cancer-specific GA has also been shown to be feasible when incorporated into clinical trials investigating new treatments for older adults with cancer.[10]

Numerous studies have demonstrated that older patients with cancer frequently have impairments on GA domains. Hurria and colleagues demonstrated that 43% of patients had impairment in instrumental activities of daily living (IADL).[4] Multiple other studies have demonstrated similar rates of functional dependence.[9,11] Cognitive impairments are also commonly detected, and multiple studies have demonstrated that approximately 20% of older patients with cancer screen positive for cognitive impairment.[12,13] Several analyses from nationally representative population-based databases show that having a previous diagnosis of cancer is independently associated with functional impairment, geriatric syndromes and frailty.[14,15]

GA has been shown to add information beyond traditional oncology performance measures.[16] Additional studies have evaluated the ability of the GA to predict chemotherapy toxicity.[4,17] The Cancer and Aging Research Group (CARG) evaluated 500 patients prospectively with comprehensive geriatric assessment and identified eleven factors that were independently associated with chemotherapy toxicity.[4] These included advanced age (>72), gastrointestinal or genitourinary malignancy type, standard chemotherapy dosing, polychemotherapy regimen, anemia, renal insufficiency, hearing impairment, history of falls, needing assistance with medication administration, limited ability walking one block and decreased social activities due to health status. A risk stratification tool was developed that was predictive of the incidence of chemotherapy toxicity and found this model to be superior to the Karnofsky performance status, the existing standard use by oncologists for fitness assessment.

Similarly, the Chemotherapy Risk Assessment Scale for High-Age Patients (CRASH) model was developed to predict severe hematologic and nonhematologic toxicity.[17] This model was constructed and validated in over 500 patients age 70 and older with cancer. Authors determined that 64% of patients experienced severe treatment-related toxicity. Geriatric-specific predictors of toxicity in the CRASH model included instrumental activity of daily living (IADL) dependence, self-rated health status, Mini-Mental status score and Mini-Nutritional Assessment score.

Geriatric Assessment in the Oncology Setting: Specific Considerations

The GA can be applied in the oncology setting to identify potential areas of concern in the older patient with cancer. Each domain within the GA focuses on a specific area, such cognition or social support, and are not typically assessed by an oncologist during a routine evaluation, yet there is growing information that geriatric domains impact outcomes in older patients with cancer. [18] The various GA domains are discussed below, with specific considerations for the older oncology population.

Physical function

Activities of Daily Living (ADL)[19] and Instrumental Activities of Daily Living (IADL)[20] are standardly assessed within a GA, as well as history of falls. Objective physical performance is also measured, using standardized tools such as Short Performance Physical Battery (SPPB)[21] or Get up and Go test.[22] As previously outlined, particular elements of physical function assessment including fall history and IADL dependence, have been shown to be predictive of chemotherapy toxicity within the CARG and CRASH models.[4,17]

Comorbidity

Evaluation of competing comorbid conditions is an important consideration in assessing an older patient with cancer and developing a personalized cancer treatment plan.[23] Particular comorbid conditions may increase the likelihood of side effects of treatment. For example, patients with diabetes mellitus and peripheral neuropathy are at increased risk of developing accelerated neuropathy with certain types of chemotherapy, such as taxanes.[24] Progressive neuropathy can further increase a patient's risk of falls as well, and fall history should be evaluated when considering any chemotherapy agents which are known to cause neuropathy.[25] When evaluating a patient for adjuvant chemotherapy, estimated life expectancy should also be considered. Occasionally, because of competing serious comorbid conditions, patients will not live long enough to derive benefit from adjuvant chemotherapy and treatment exposes them to potential side effects and complications with limited estimated benefits.[26]

Polypharmacy

A medication review should be conducted in all patients anticipated to initiate cancer treatment. Particularly in the older patient, potential complications and side effects should be anticipated.[27] For example, in an older patient on antihypertensive treatment who will be initiating chemotherapy, their nutrition and hydration may become compromised during treatment. This can predispose them to developing hypotension and place them at increased

risk of falls. Older patients with cancer receive numerous new medications (chemotherapy and supportive care) that may interact with ongoing medications.[28]

Nutrition

In the general cancer population, pre-existing weight loss has been shown to be a risk factor for chemotherapy toxicity.[29] Poor nutritional status (≥10% weight loss or low body mass index) has consistently been shown to be associated with early mortality in older patients with cancer.[14,30,31] Additionally, in the CRASH toxicity profile specific for older adults, the Mini-Nutritional Assessment score was a risk factor for non-hematologic toxicity.[17]

Cognition

Often cancer treatment regimens are complex, requiring frequent appointments and multi-step directions for home medication management. An understanding of baseline cognitive status is critical to anticipate if a patient will be able to comply with the proposed treatment plan. Additionally, cognitive impairment defined by the Mini-Mental Status score, was predictive of non-hematologic toxicity in the CRASH toxicity profile.[17] Furthermore, patients with more severe cognitive impairment may have difficulty identifying and reporting side effects from treatment. These patients may require a modification of their treatment regimen or increased supervision during their treatment course.[32-34] Limited data exists on the impact of chemotherapy on cognitive status in patients with pre-existing cognitive impairment. However, limited experiential data suggests that chemotherapy can accelerate cognitive impairment. Patients and families should be educated on the risks of delirium.

Social Support

Assessment of social support is critical in evaluating an older patient initiating cancer treatment. The majority of cancer treatments are administered on an outpatient basis and patients often require transportation assistance for treatment sessions due to side effect profiles. Additionally, the majority of side effects are experienced several hours to days after treatment, while patients are no longer in a medically supervised setting. The most common side effect of chemotherapy in general is fatigue, and this can impact an older patients functional status and ability to perform IADLs and ADLs.[35] Occasionally, patients who live alone will require alternative living arrangements temporarily during their treatment course for assistance managing side effects and functional impairment. In appropriate situations, these options should be explored prior to initiation of therapy.

Psychological Status

Depression is common among older adults with cancer.[9] Untreated depression can exacerbate potential chemotherapy side effects such as fatigue and anorexia[36], impact quality of life[36] and has been shown to impact overall survival in older adults with cancer as well.[30]

Incorporating The Geriatric Assessment Into Oncology Care

Several models of care exist that incorporate GA into oncology practice. Most frequently GA is performed in the outpatient setting in an attempt to minimize the impact of acute illness on functional and cognitive measures. However, occasionally inpatient evaluation may be necessary depending on the setting of diagnosis and treatment, and is more common for evaluation of patients with acute hematologic malignancies. GA is typically performed by a multidisciplinary team, and can be led by a geriatrician or geriatric oncologist.

The ELCAPA study evaluated the impact of GA on treatment decisions in a consultative clinic design.[37] Patients were evaluated by a medical oncologist and an initial treatment plan was developed. They were then referred for GA with a multidisciplinary team lead by a geriatrician. Authors found that the initial treatment plan was modified in 20.8% of patients based upon GA results.

Similarly, a study by Horgan et al., explored the impact of GA in a consultative clinic format.[38] Patients aged 70 and older were evaluated by their primary oncologists and referred for geriatric assessment. Changes in initial treatment plan were recorded as the primary endpoint. Authors found that the majority of eligible patients were not referred for GA (71%). Of the 30 patients who did undergo GA, findings influenced treatment decisions in only six patients. The majority of these (83%) occurred in patients where the initial treatment plan by the primary oncologist was not established prior to the consultation

In the consultative clinic design, potential drawbacks include that the final treatment plan will be determined by the primary oncologists and may not reflect the recommendations made by the geriatric consultant. Additionally, the consultative geriatric team may not continue to follow the patient during active treatment and may not be available for guidance if further geriatric-related issues develop. However, in the consultative design, the geriatric team is typically able to evaluate a larger number of patients and influence care for more patients given their consultative role. Several cancer centers have adapted a consultative clinic design by “embedding” a geriatrician into their existing oncology clinic. Geriatricians function as a member of the multidisciplinary team and are available to assist with geriatrics-related issues as they arise. Some centers have utilized a geriatrics-trained nurse practitioner or physician's assistant in this role. Given the limited number of geriatricians, this is a feasible potential alternative to enhancing the geriatrics influence in the oncology setting.

Alternative models incorporate a geriatric oncologist as the primary provider for patients. Geriatric oncologists are dual trained in hematology and/or medical oncology as well as geriatric medicine. In the primary provider model, a geriatric oncologist performs the initial assessment, develops the oncology treatment plan and follows the patient throughout their course of treatment, managing any potential adverse side effects. The primary provider model is limited due to the relatively few number of dual-trained geriatric oncologists to perform this role.

Role of the screening tool in geriatric oncology

When the geriatrician or geriatric oncologist operates as a consultant, a screening tool may be helpful to identify patients for referral who are most likely to benefit from GA. With the increasing number of older patients with cancer and the limited availability of geriatric-trained providers, screening tools are an appealing option for selecting those older patients who are most likely to derive benefit from referral to a geriatrician or geriatric oncologist. A variety of screening tools exist, and thus far there is no “gold standard” with regard to the optimal screening tool to use. There are numerous studies evaluating the potential screening tool options in geriatric oncology, with the VES-13, Groningen Frailty Index (GFI) and G-8 tool being the most commonly used. These tools are described further in Table 1. The majority of these studies evaluated the ability of the screening tool to predict deficits on the gold standard GA. It is important to note that the screening tool is not intended to replace geriatric evaluation and cannot provide a thorough assessment of an older individuals health status. In addition, more information is needed on how screening tools are related to outcomes, including chemotherapy toxicity, functional decline, and survival.

Geriatric Assessment-Guided Interventions

In community-dwelling older adults, geriatricians utilize interventions to address impairments identified on GA. A moderate amount of data exists to support the use of various interventions in this population. At present, there are no studies evaluating the impact of GA-guided interventions in older patients with cancer. Standard interventions are extrapolated from data derived from community-dwelling older patients (usually without cancer) to the oncology setting with particular considerations. Table 2 outlines potential GA-guided interventions that can be utilized in the care of the older patient with cancer.

The University of Rochester experience

At the University of Rochester, a consultative geriatric oncology assessment clinic has been developed for clinical and research purposes. Partnering with University of Chicago, the Specialized Oncology Care And Research in the Elderly (SOCARE) clinic evaluates patents age 65 and over with cancer who are referred for GA. The clinic receives referrals from surgical oncologists, medical oncologists, and radiation oncologists if they feel GA would be beneficial in helping to develop a treatment plan for their particular patient. The SOCARE clinic is comprised of a multidisciplinary team including a geriatric oncologist, geriatric oncology fellow, nurse practitioner, geriatric-trained clinic nurse, physical therapist, occupational therapist, social worker and clinic coordinator.

At the SOCARE clinic, all patients are asked to complete a self-administered questionnaire prior to arrival for their appointment which includes activities of daily living (ADL) and instrumental activities of daily living (IADL) inventory, fall history, sarcopenia questionnaire, comorbidity screen, medication list, social support inventory, nutritional screen, geriatric depression screen (GDS) and worry scale. The assessment tool is 20 pages long and is mailed to a new patient one week prior to the scheduled appointment. The majority of patients are able to complete the questionnaire independently, consistent with previously published evidence.[39] If assistance is required, the clinic coordinator is available

to help patients complete their packet upon arrival for their appointment. The clinic coordinator also completes objective physical performance assessment with the SPPB and a cognitive screen with the Blessed Orientation-Memory-Concentration Scale (BOMC).[40] If there is evidence of weight loss or low BMI, a mini-nutritional assessment (MNA) is also performed by the clinic coordinator. The team reviews results of the GA and identifies areas of potential deficit. They also review cancer specific details and proposed treatment options from the patient's primary oncologist. Suggestions regarding treatment regimen preferences or potential modifications are made and GA-guided interventions are developed based upon deficits identified. A geriatric and oncology trained clinic RN is available for patient and family teaching, with a particular focus on geriatric-specific issues that can occur more commonly during cancer treatment (ie. falls, delirium). A physical therapist is available to see patients with any identified physical function impairments or history of falls to educate on fall prevention, ambulatory assist device training, develop an exercise program for strength, conditioning and balance and need for outpatient physical therapy referral. An occupational therapist (OT) is available to see patients to address upper extremity strength and conditioning, ADL and IADL optimization, counsel patients on energy conservation techniques and evaluate for need for outpatient occupational therapy referral. The OT has also received additional training on cognitive evaluation and is available to perform additional cognitive assessments (ie. Montreal Cognitive Assessment[41]), when the preliminary cognitive screen is positive or there is a clinical concern for cognitive impairment. A social worker experienced in oncology and geriatrics meets with patients requiring social support interventions such as those that require referral for meals-on-wheels or home care agencies, those patients requiring personal emergency response system devices, patients requiring transportation assistance, or to discuss alternative living arrangement options, health care proxy and advanced directives. A clinical pharmacist is available when necessary to review specific medication interactions and dosage modifications. A clinical nutritionist is available for patients with impairment on nutritional screen to provide nutritional counseling and intervention recommendations.

The SOCARE clinic is a resource for clinicians and patients at a variety of time points during the treatment course. Geriatric assessment can aid in clinical decision making in various clinical situations, including:

- Pre-operative setting – evaluation prior to cancer surgery to assess for surgical fitness and review the potential for functional impairment post-operatively
- Adjuvant setting – quantify risks and benefits of adjuvant therapy, including consideration of additional comorbidities and geriatric syndromes with life expectancy estimation
- Pre-treatment assessment – evaluate and weigh the risks and benefits of multiple treatment options (ie. sequential versus concurrent chemoradiotherapy, single agent versus doublet chemotherapy regimen)
- Survivorship – assist with management of geriatric-related conditions that may develop as a consequence of cancer-directed therapy

Developing a geriatric oncology clinic

Development of a geriatric oncology clinic can require resources and support from department administration. Unfortunately, at present time there is no evidence that geriatric oncology clinics reduce cost, health-care utilization or improve outcomes for patients. Current studies are underway evaluating these outcomes. However, other rationale for developing a geriatric oncology clinic include:

1. Identification of patients at increased risk of chemotherapy toxicity: Using the predictive models discussed above, geriatric oncology clinics can help identify those patients at increased risk of complications and potentially utilize these models to more appropriately select treatments for patients.
2. Reduce the time required by the medical oncologist to manage the complexity of the older patients: Geriatric oncology clinics develop expertise in managing the complexities of older patients, including comorbidities, geriatric syndromes, complex social situations, physical impairments and cognitive issues.
3. Fellow, resident and medical student education: The Accreditation Council for Graduate Medical Education (ACGME) requires fellows in hematology/oncology to demonstrate an understanding of the interface between cancer and aging. A dedicated geriatric oncology clinic would support educational goals in this area.
4. Marketing value: Cancer centers with “expertise” in a specific area, such as geriatric oncology, allow marketing advantages in a community with multiple providers.
5. Provides patient-centered care: GA provides a complete health assessment as well an understanding of a patient's values and social support network. This allows for a tailored treatment approach for each individual patient.

Conclusions

Geriatric assessment of the older patient with cancer can provide additional information about an individual's overall health status when considering cancer treatment options. GA has been demonstrated to be feasible to incorporate into an oncology practice and is predictive of chemotherapy toxicity. Assessment of an older patient's physiologic age and functional status in conjunction with cancer-specific variables helps to develop an overall treatment plan that is ideal for each patient. Although more research is needed to determine the effect of GA-guided interventions on outcomes of older patients with cancer, a geriatric oncology model of care can be feasible and improve cancer treatment decision-making for the most complex of our older patients with cancer.

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Table 1

Validated screening tools in geriatric oncology

Screening Tool	Components	Data in Community-dwelling older adults	Data in older oncology patients
VES-13[42,43]	•Age •Self-rated health status •Functional capacity •Physical performance	Predictive of increased risk of death or functional decline in next two[44,45] years	Demonstrated high predictive value for identifying impairment on more comprehensive geriatric assessment[13,46]
GFI[47]	•Physical fitness •Vision and hearing •Weight loss •Polypharmacy •Self-reported memory loss •Psychosocial functioning	GFI score correlated with results of more comprehensive geriatric[48,49] assessment	Patients with higher baseline GFI scores had increased mortality rate after initiating treatment with chemotherapy[50]
G8	•Nutrition •Mobility •Cognition •Polypharmacy •Self-rated health status	None	Predictive of deficits on more comprehensive geriatric assessment (sensitivity=76.6%)[51]

VES-13 – Vulnerable Elders Survey-13; GFI – Groningen Frailty Indicator

Table 2

Geriatric Assessment-Guided Interventions for Older Patients With Cancer

Geriatric Assessment (GA) Measure With examples of potential deficits	**Potential GA-guided Interventions**
PHYSICAL FUNCTION DOMAIN	
Impaired objective physical performance measures, such as: Short Performance Physical Battery (SPPB) <9 OR Timed Up and Go (TUG) >13.5 seconds	-Consider Physical Therapy (PT) /Occupational Therapy (OT) referral -Fall counseling handout -Home safety evaluation -Check vitamin D and repletion as indicated -Consider initial dose reduction
History of falls	-Consider PT/OT referral -Fall counseling handout -Home safety evaluation -Check vitamin D level and repletion as indicated -Medication review - minimize psychoactive meds -Personal Emergency Response System (PERS) if spend significant time alone -Consider initial dose reduction
Activities of daily living (ADL) and/or Instrumental Activities of Daily Living (IADL) impairment	Visiting nurse service and home health aide referral Consider initial dose reduction
NUTRITION DOMAIN	
Weight loss >10% Mini-Nutritional Assessment (MNA) <23.5 Symptoms of appetite loss	-Nutrition counseling -Nutrition referral -Consider meals-on-wheels
Symptoms of nausea	-Consider more aggressive antiemetic regimen
SOCIAL SUPPORT DOMAIN	
Social Support Impaired	-Visiting nurse service and/or home health aide -Ride assistance programs -Social work involvement -Consider meals-on-wheels if nutrition a concern
COGNITIVE DOMAIN	
Cognitive testing impairment (ie. Using Mini-Mental Status Exam or Montreal Cognitive Assessment)	-Identification of health care proxy -Co-sign for treatment consents -Delirium risk counseling for patient and family -Pillbox for medication administration -Medication review - minimize medications with higher risk of delirium -Social work involvement -Consider initial dose reduction
POLYPHARMACY DOMAIN	
Polypharmacy	-Pillbox
High risk medications based on BEERS criteria	-Medication reduction recommendations
COMORBIDITY DOMAIN	
Comorbidity considerations	-Consider initial dose reduction -Specific disease considerations, for example: -Diabetes - avoid neurotoxic agents -Heart failure/disease - minimize volume, slower rate -Kidney disease - avoid nephrotoxic agents
Geriatric Depression Screen (GDS) >5	-Consider pharmacologic therapy -Consider referral for psychotherapy/psychiatry -Social work involvement
Distress screen positive (using National Comprehensive Cancer Network Distress Thermometer)	-Support group information -Social work involvement -Consider referral to chaplain/spiritual counseling