SPECIAL SERIES: CARING FOR OLDER ADULTS WITH CANCER

Decision Making in Older Adults With Cancer

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INTRODUCTION

Significant progress has been made toward improving the care of older adults with cancer. As described elsewhere in this Special Series, the evidence base in geriatric oncology has grown substantially since the early calls for prioritizing this growing population. Nonetheless, oncologists still face uncertainty when making management decisions for older adults. This uncertainty arises from the persistent gap between healthier patients who are enrolled in clinical trials and frailer older patients who are typically treated in community practices.[1,2] Adding to this complexity is the involvement in decision making of caregivers and other key persons, with varying influences on the decision structure and choice process.[3]

Our purpose in this review is to assist oncologists in navigating this complexity by summarizing what is known regarding shared decision making in older adults with cancer. Our goals are to synthesize the evidence, identify knowledge gaps, and provide a decision framework that incorporates current best practices. We will focus on decision making for older adults with cancer diagnoses that require a treatment decision. Decision making related to cancer screening in older adults is an important, well-studied, but separate topic covered elsewhere.[4] Our framework can be adapted to any cancer type or treatment modality, and we emphasize the role of the geriatric assessment (GA) in guiding the decision-making process. Throughout, we will illustrate our framework using two case examples that reflect notable uncertainty (Table 1).

It is important to distinguish our approach from other perspectives.[5] Our focus is on clinical decision making for individual patients, not decision analysis for populations. These individualized decisions follow the principles of bioethics in respecting patient autonomy, practicing nonmaleficence and beneficence, and seeking justice.[6] Decisions regarding populations rely on principles of resource allocation, cost-effectiveness, and policy making[7]—also separate topics that will not be discussed here. Our aim is to review the elements of sound, shared decision making in older adults with cancer considering cancer treatment to maximize benefits and minimize harms for each individual patient. In following this process for each older adult, we believe that allocation of cancer treatments within a population will more often be directed to those most likely to benefit.

FOUNDATION AND FRAMEWORK FOR DECISION MAKING IN OLDER ADULTS WITH CANCER

Our framework for clinical decision making in older adults with cancer is built on a foundation of evidence-based medicine (EBM). The core tenets of EBM best guide clinicians in translating empirical evidence into practice. These tenets comprise the need to consider the totality of evidence for a given question, the need to appraise the quality of the evidence, and the need to incorporate a patient's values and preferences—especially when the evidence is limited and uncertainty is highest.[8] A fundamental step in improving decision making in older adults with cancer is continuing to build the underlying evidence base, especially by including high-quality randomized controlled trials. Following years of exclusion of older adults from clinical trials, the National Institutes of Health's Inclusion Across the Lifespan policy now requires that funded clinical studies represent more of the older cancer population who are most likely to be candidates for therapies.[9] Complementing the expansion of trial eligibility is the need for rigorous observational studies investigating treatment effects in frailer patients who are excluded from trials but often receive novel therapies in practice.[10,11]

Meanwhile, oncologists must continue to make decisions in older adults with cancer on the basis of the available evidence. To optimize clinical decision making, we propose a framework (Fig 1) that synthesizes the available evidence and synergizes guidelines and recommendations espoused by ASCO,[12] the National Comprehensive Cancer Network,[13] the International Society of Geriatric Oncology,[14] and the American Geriatrics Society.[15] Our framework is based on three principles: (1) determining age-related vulnerability using the GA, (2) considering the benefits and harms of cancer treatments in light of this vulnerability, and (3) considering patient values, preferences, and trade-offs (balancing desirable but conflicting outcomes, eg, prolonging survival while minimizing treatment burden and toxicity).

The GA forms the core of this framework because it best identifies older adults who are resilient enough to tolerate intensive cancer treatments for the best chances of controlling their cancer. In addition, the GA can identify older adults who are frail and vulnerable and therefore at high risk of treatment toxicity.[16,17] Finally, the GA can be used to estimate life expectancy. We

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CONTEXT

Key Objective

This conceptual review on medical decision making in older adults with cancer synthesizes the evidence, identifies key knowledge gaps, and provides a decision framework that incorporates current best practices.

Knowledge Generated

Although the evidence base in geriatric oncology is expanding, oncologists must continue to make treatment decisions under considerable uncertainty. Our decision framework helps optimize decision making on the basis of three principles: (1) determining age-related vulnerability using the geriatric assessment, (2) considering the overall benefits and harms of cancer treatments for older adults in light of this vulnerability, and (3) incorporating patient values and preferences.

Relevance

Using this framework matches treatment intensity with age-related vulnerability and aligns expected outcomes with preferences, thus minimizing undertreatment and overtreatment in older adults with cancer. This framework can be adapted to all cancer types and treatment modalities and will strengthen as the evidence in geriatric oncology continues to grow.

highlight below how the GA is essential for all three principles of shared decision making in older adults with cancer.

CONSIDERING BENEFITS OF CANCER TREATMENT IN OLDER ADULTS

To determine whether a cancer treatment is beneficial in an older patient, one must first estimate whether the patient's cancer will cause symptoms in their remaining lifetime. This determination involves evaluating the aggressiveness of the patient's malignancy and estimating their noncancer-specific life expectancy. Estimation of noncancer-specific life expectancy helps frame the probability of dying from another condition before one's cancer causes significant symptoms. For example, early-stage prostate cancer, although indolent, is still likely to affect a fit 55-year-old male with minimal comorbidities because of his long remaining life expectancy. It is less likely to affect a vulnerable 72-year-old with multiple comorbidities whose 5- and 10-year mortality risks are already high (Table 1).

To estimate noncancer-specific life expectancy, clinicians can use prognostic calculators such as those found on the ePrognosis website.[18] These calculators are derived from prognostic models that have been developed and validated in thousands of patients for use in a variety of settings—from older adults living in the community to those nearing end of life.[19,20] These calculators rely on variables from the GA, such as functional status, comorbidities, and cognition (of note, these models were derived from US populations).

If a cancer is likely to affect a patient during their remaining lifetime, then evidence must be appraised for beneficial treatments. For older adults, this appraisal includes the following: (1) Was my patient represented in the study of effectiveness in terms of age, comorbidities, and health status (generalizability)? (2) Does the treatment benefit vary by any one of these age-related factors (heterogeneity of treatment effect[21])? (3) Is the studied outcome important to the older patient in front of me? The generalizability of trial results is often limited in older adults treated in practice. Assessment of heterogeneity in treatment effects is also limited since even those older adults included in trials have less chronic conditions and better health status than most older adults treated in practice.[1–3,22] Nonetheless, one can reasonably assume that, in terms of controlling disease, the effectiveness of cancer therapies is similar by age.[23]

The third question, regarding whether the outcome investigated as a treatment benefit is relevant to the particular older adult, is often difficult to answer. Most outcomes studied in trials are survival, survival surrogates (eg, progression-free survival), or other disease-specific outcomes (eg, biomarkers and tumor response and/or regression).[24,25] Yet how tumor shrinkage or biomarker reduction translates to improvements in function, quality, or even quantity of life is often unclear.[26–29] This lack of relevant outcomes valued by older adults has led to efforts to encourage not only the inclusion of older patients in trials but also the incorporation of patient-centered outcomes such as function and quality of life (QOL).[11,30] These efforts will generate better evidence to inform not only whether an older patient is likely to experience a benefit from cancer treatment in their remaining lifetime, but also whether that benefit is meaningful. Without this evidence, oncologists must rely on their experience and judgment but should clearly communicate this uncertainty (ie, lack of data). Receiving input and comanagement from different specialties—especially multidisciplinary teams involving geriatricians, primary care physicians, palliative care experts, and/or allied health professionals—can improve patient-centered outcomes even when evidence is lacking.

CONSIDERING HARMS OF CANCER TREATMENT IN OLDER ADULTS

If a cancer treatment is found to provide patient-centered benefit, then the oncologist must weigh that benefit against

TABLE 1. Case Examples Demonstrating Our Framework for Decision Making in Older Adults With Cancer

Consideration	Example Patient 1		Example Patient 2	
Age and disease characteristics	*72-year-old male newly diagnosed with clinically localized, intermediate-risk (Gleason 3 + 4, T2a, PSA 14) prostate cancer*		*72-year-old female treated with hemicolectomy for stage III colon cancer (T4, N1a)*	
Age-related vulnerabilities from GA	BMI = 27 COPD, CHF, former smoker Mild cognitive impairment Dependent in some IADLs; independent in ADLs Has difficulty walking several city blocks		BMI = 24 Hypertension, DM, former smoker Cognitively intact Independent in IADLs and ADLs Uses a walking aid but has no difficulty walking one block	
Estimated noncancer-specific survival (Schonberg Index[31])	5-year: 48%-53% 10-year: 24%-26%		5-year: 71%-74% 10-year: 40%-47%	
Cancer treatment options and predicted survival benefits[32-36]	Definitive therapy[a] (surgery and/or radiotherapy) 10-year cancer-specific survival 99% Active surveillance 10-year cancer-specific survival 99% Higher risk of metastasis than definitive therapy Watchful waiting Risk of dying from prostate cancer 25%-30%		6 months of CAPOX or FOLFOX 5-year DFS 65.4% 3 months of CAPOX or FOLFOX 5-year DFS 63.4% Fluoropyrimidine monotherapy (5-FU or capecitabine) 5-year DFS 57.9% No adjuvant treatment 5-year DFS 45.8%	
Predicted treatment toxicity or adverse effects[12,37]	Incontinence[a] (6 years) Prostatectomy: 17% Radiotherapy: 4% Surveillance: 8% Erectile dysfunction (6 years) Prostatectomy: 83% Radiotherapy: 73% Surveillance: 70%		Grade 3-5 chemotherapy toxicity (CARG) Polychemotherapy: 59% Monochemotherapy: 44%	
Patient preferences and values	Length < QOL Wants to avoid burden of intensive treatment and/or treatment-related functional decline	Length > QOL Wants to live as long as possible and is willing to accept decline in function for a chance at complete remission	Length < QOL Burden of intensive treatment and/or treatment-related functional decline is unacceptable	Length > QOL Has fear of recurrence and is willing to accept toxicity and further loss of function for a chance at complete remission
Treatment decision	To balance minimizing the risk of genitourinary dysfunction with minimizing the risk of dying from prostate cancer, the patient chooses active surveillance. If he progresses, management will be reevaluated on the basis of a repeat GA	Risks of dying from prostate cancer and metastasis are unacceptably high for the patient. He elects for definitive radiation therapy.	After taking into account the toxicity risks of all options, the patient decides to receive adjuvant capecitabine.	The patient initially wants to receive 6 months of chemotherapy. After a discussion of options and toxicities, she decides on 3 months of adjuvant CAPOX.

Abbreviations: 5-FU, fluorouracil; ADLs, activities of daily living; BMI, body mass index; CAPOX, capecitabine plus oxaliplatin; CARG, Cancer and Aging Research Group; CHF, chronic heart failure; COPD, chronic obstructive pulmonary disease; DFS, disease-free survival; DM, diabetes mellitus; FOLFOX, fluorouracil plus oxaliplatin; GA, geriatric assessment; IADLs, instrumental activities of daily living; OS, overall survival; PSA, prostate-specific antigen; QOL, quality of life.

[a]Estimates of benefits and adverse events are mainly from the Prostate Testing for Cancer and Treatment trial (ProtecT); some differences exist between the active monitoring arm in the trial and current active surveillance protocols.

the risks of toxicities, ie, the harms. These harms vary across treatment intensity (high-risk surgery *v* stereotactic radiation) and patient health status (increased toxicity in patients with many geriatric syndromes). For example, consider a 72-year-old fit female with stage III colon cancer deciding among various adjuvant treatment options after hemicolectomy (Table 1). Each option offers improvement in disease-free survival compared with no adjuvant therapy, but these benefits must be weighed against the risk of severe toxicity.

Moreover, the burden of treatment adherence must also be considered as time spent in infusion clinics or in the hospital after surgery is time spent away from home and family.[38] Finally, the financial toxicity of cancer treatments is especially relevant in older adults.[39,40] The exorbitant and escalating costs of cancer treatments may significantly and unduly affect QOL for many patients.

To estimate the harms from a given cancer treatment in an older adult, clinicians should apply the same three

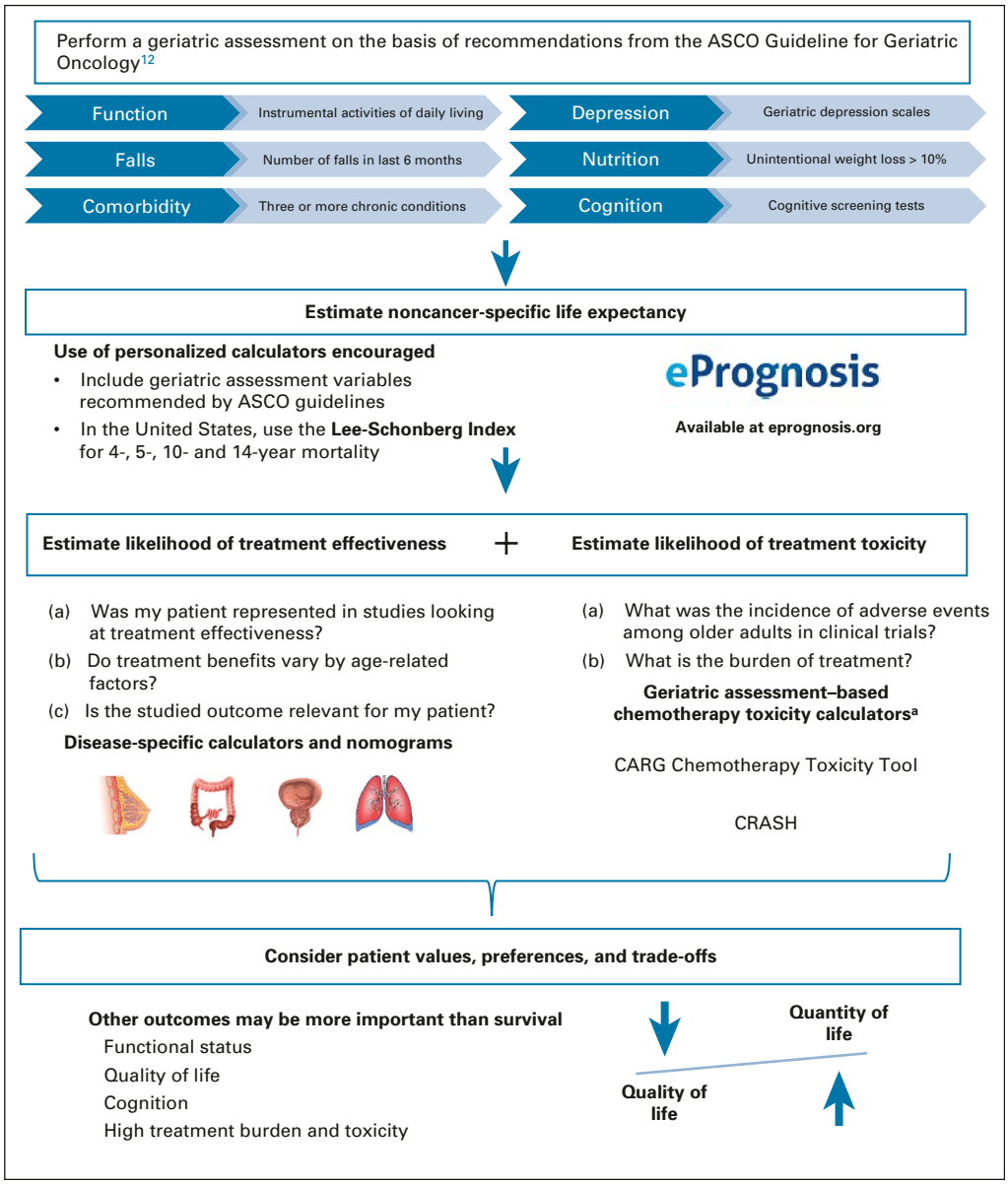

FIG 1. Framework for decision making in older adults with cancer. [a]Current toxicity calculators exist for chemotherapy only. For surgical risks, consider the ACS NSQIP Surgical Risk Calculator, which was recently updated to include outcomes for older adults.[41] ACS, American College of Surgeons; CARG, Cancer and Aging Research Group; CRASH, Chemotherapy Risk Assessment Scale for High-Age Patients; NSQIP, National Surgical Quality Improvement Program.

appraisal questions as when estimating treatment benefit: (1) generalizability, (2) heterogeneity of treatment effect, and (3) relevance of outcomes measured. Even if there is little difference in the likelihood of cancer control by a given treatment between older and younger adults, harms may vary significantly by age group.

Consider the following examples. For patients with early-stage breast cancer, surgical resection is considered first-line therapy on the basis of consensus guidelines and trial data.[42–44] However, Tang et al[45] reported that frail older nursing home residents who underwent breast cancer surgery experienced 30%-40% 1-year mortality; among survivors, 56-60% experienced functional decline. For patients with primary CNS lymphoma, high-dose methotrexate-based chemotherapy is considered first-line therapy on the basis of trial outcomes,[46] but patients treated in real-world settings are significantly older, have worse performance status, and experience worse outcomes[47]; Houillier et al[48] reported that a subgroup of 239 adults with a median age of 73 years had 25% mortality within 6 months that was largely attributed to complications of comorbidities and treatment toxicity. For acute myeloid leukemia (AML), intensive multiagent chemotherapy regimens have historically been considered first-line on the basis of trials in younger, fitter

patients,[49] but older patients treated in practice with intensive regimens have significantly worse outcomes; Kantarjian et al[50] reported that patients age ≥ 70 years demonstrated 35% mortality at 8 weeks despite reasonable cancer response rates. The last example reinforces the need for caution when generalizing treatment benefits founded on cancer-specific response criteria in a fitter population to frailer adults treated in practice. Cancer response, progression-free survival, and cancer-specific survival may not always correlate with overall survival; the latter is also influenced by treatment toxicity, comorbidities, and other age-related factors.[24–26,51]

Results of the last study[50] also reinforce the need to better estimate the likelihood of treatment toxicity in older adults, identifying those at increased risk of harm. The GA performs better at discriminating this risk than traditional performance status measures used in oncology (Eastern Cooperative Oncology Group and Karnofsky).[17] Considering chemotherapy toxicity, ASCO recommends the Cancer and Aging Research Group (CARG) and the Chemotherapy Risk Assessment Scale for High-Age Patients risk scores.[12,52] More cancer-specific prediction models are being developed with the promise of more accurate and precise predictions of toxicity in comparison with the general CARG toxicity tools.[53]

After estimating toxicity risk through the identification of age-related vulnerabilities, oncologists can decide to (1) adjust treatment decisions (eg, up-front dose reduction for chemotherapy) and/or (2) prescribe appropriate interventions for modifiable GA deficits.[54,55] Recent trials in older adults with cancer suggest that, through these two mechanisms, GA-guided care can mitigate toxicity and unplanned healthcare utilization without sacrificing treatment benefit.[56–58] Further work is needed to better assess how novel cancer treatments affect relevant patient-centered outcomes in older adults such as function and QOL (appraisal question 3). As with treatment benefits, oncologists should be honest about the uncertainty regarding potential harms to patient-centered outcomes, and engagement with multidisciplinary teams can help minimize losses to function and QOL.

CONSIDERING VALUES, PREFERENCES, AND TRADE-OFFS IN OLDER ADULTS

Once benefits and harms are estimated, the oncologist must balance trade-offs in the context of an older adult's values and preferences. Treatment benefits, harms, and their relative importance may be perceived differently by older versus younger patients. Younger adults, with a long noncancer life expectancy, are more often willing to tolerate the risks and burdens of intensive therapies to preserve life expectancy.[59] In contrast, older patients are less often willing to sacrifice QOL in exchange for quantity.[60–62]

To determine the relative importance of treatment benefits and harms, oncologists must elicit the patient's values and preferences regarding their health. Several validated tools can elicit preferences. The Patient Priorities Care website[63] provides conversation guides for both clinicians and patients and caregivers.[64] The Prepare for Your Care website[65] provides handouts and interactive modules that help a patient list specific priorities (eg, participating in hobbies) and specific fears (eg, not being able to feed, bathe, or take care of one's self) and gauge whether quality and quantity of life are more or equally important compared with each other.[66] Once elicited, values and preferences can help determine which treatment benefits are most desired, which harms are unacceptable, and whether a given treatment constitutes a net benefit or net harm. Comparing the time to benefits with the time to harms must also be considered within an older adult's remaining life expectancy.[67,68]

For example, to the vulnerable older male with prostate cancer, fear of metastasis in the future may drive an up-front desire for definitive treatment, accepting the immediate risks to genitourinary functioning within his remaining lifetime (Table 1). Conversely, if he values maintaining genitourinary functioning for as long as possible—accepting a higher risk of future metastasis or even prostate-related death—then active surveillance or watchful waiting likely provides the greatest net benefit. Similarly, to the fit older woman with stage III colon cancer following hemicolectomy, the desire to extend life without recurrence for as long as possible may drive more intensive adjuvant therapy (Table 1). On the other hand, if she values QOL more than quantity, then a less intensive option balances gains in disease-free survival with risk of severe toxicity that threatens her function and QOL.

The Patient Priorities Care[63] and Prepare for Your Care[65] websites are examples of decision aids that have shown usefulness in engaging patients with cancer in the decision-making process.[69] Another example gaining popularity in oncology is the Best Case/Worst Case tool, which was originally developed for high-stakes decisions regarding surgery[70] but has been increasingly used in scenarios involving other forms of cancer treatment. To illustrate, Kiely et al[71] used data from 36 randomized trials of breast cancer to devise the best-case and worst-case scenarios for survival benefits in patients starting first-line chemotherapy. These scenarios may help patients visualize more concretely the best and worst outcomes to balance trade-offs in light of their preferences.

CAREGIVERS AND CULTURE

A comprehensive understanding of aging and decision making must go beyond individual patient characteristics and consider contextual factors. Real-life decision making is embedded in a social context, in which other individuals, especially family members, caregivers, and members of the healthcare team, provide input on behalf of patients.[72] Conversely, family members may attempt to shield their

older relatives from pain by withholding information about prognosis and treatment. The influence of family members on decision making is higher among older individuals and especially among those from underrepresented racial and ethnic groups.[73]

Unfortunately, few studies of shared decision making in cancer treatment have focused on patients from underrepresented populations. A systematic review found that most studies exploring shared decision making included mainly non-Hispanic White participants.[74] Models developed from such studies may not be appropriate for generalizing to patients from underrepresented populations, who in some instances have been shown to be more likely to make decisions with input from family members.[73] Additionally, patients from racial and ethnic groups who have experienced discrimination within the healthcare system may be more likely to hold negative beliefs and mistrust.[75] However, it is important to note that although decisional control and communication preferences may be influenced by race or language, stereotyping patients on the basis of their cultural or ethnic backgrounds should never be done. Instead, physicians should actively engage the patient and their caregivers in the decision-making process,[76] develop and improve their communication skills,[77] and build trust.

A helpful way to frame the multiple contextual factors that influence those involved in the decision-making process (patients, caregivers, community members, and clinicians) is that of the decision-making unit. This concept, initially developed for policy decision making, attempts to categorize the way in which groups of individuals work together in times of crisis to reach a common decision.[78] In general, three types of decision-making units are recognized: those with a predominant leader, where a single individual has the power to make decisions alone if necessary; those acting as a single group, where all members collectively select a course of action in consultation with each other; and coalitions, in which all members act as separate individuals and provide input, with no single member having the power to decide for the others.[79] Understanding the type of decision-making dynamics of older patients with cancer and identifying the prevailing values (egalitarianism, individualism, and fatalism) within the decision-making unit can be useful for guiding the shared decision-making process to reach an outcome that is satisfactory to all.

PSYCHOLOGY, COGNITIVE BIASES, AND INFORMED CONSENT

Oncologists should be aware of the various biases by which both they and their older patients can be influenced during the decision-making process (Table 2). At the heart of these biases is a failure to balance type 1 thinking, or intuitive and fast reasoning, with type 2 thinking, or deliberative and slow thinking.[80] Too much of the former can occur when too little time is dedicated to the decision process, as in acute scenarios where time-sensitive decisions must be made. In such scenarios, emotions can cloud sound reasoning and judgment (ie, affect heuristic).[81] Patient anxiety or depression can override EBM choices about treatment options in cancer.[82] Anxiety can influence oncologists as well. An oncologist's fear of a patient's cancer spreading or recurring after choosing to withhold treatment may encourage more intensive treatment up front—even if limited evidence supports it.[83] Conversely, erring on the side of pure, calculated reasoning can remove the humanistic component of decision making. Although there is debate about normative versus accurate decisions that are either too emotionally laden or too bare, experts in decision making generally agree that a healthy mix of both type 1 and type 2 thinking helps arrive at the best decisions.[80]

A special bias affecting decision making in older adults is ageism: negative attitudes and stereotypes associated with aging.[84] Ageism among clinicians may lead to foregoing beneficial therapies, poor access to therapeutic options, poor communication about competing outcomes, and a paternalistic approach to decision making (see Minimizing Undertreatment and Overtreatment, below).[85] Furthermore, older adults may hold biases or assumptions about themselves (self-ageism), which lead to a lower likelihood to seek treatment for unmet medical needs.[84] Ageism may also occur among caregivers, leading to an inappropriate reduction in patient autonomy.[86] Decisions should never be made on the basis of chronologic age alone.

To facilitate informed consent in decision making, it is important to promote disease and treatment understanding (eg, treatment options, outcomes, and prognosis) with older patients and their caregivers. Assessment of prognostic understanding may occur in the forms of treatment goal or intent, illness perception, curability, and survival.[87–90] Studies have demonstrated that 50%-73% of older adults with advanced cancer have poor prognostic understanding or that their prognostic understanding differs from that of their oncologist.[87,89,91] In addition, 48%-52% of caregivers of older adults with advanced cancer have differing prognostic understanding from that of the patients and their oncologists.[88,89] Poor patient prognostic understanding is associated with receipt of more aggressive care such as chemotherapy at the end of life.[92] In addition, differing prognostic understanding between patients and their caregivers may be associated with lower utilization of hospice services.[93] To date, few interventions, other than palliative care, have been shown to improve disease understanding.[94]

Inherent in the above discussion is the need to confirm decision-making capacity in an older patient, which requires (1) understanding, (2) expressing a choice, (3) appreciation, and (4) reasoning.[95] This determination is made clinically (*v* legally in the courts, ie, competency) and concerns specific treatment decisions (*v* decision-making

TABLE 2. Selected Biases to Avoid in Decision Making Involving Older Adults With Cancer

Bias Name	Definition	Example
Affect heuristic[96]	A decision overly influenced by emotion and not logic can occur in scenarios with time-sensitive decisions	An older patient anxious over new diagnosis of AML immediately opts for intensive treatment, fearing the effects of the cancer without carefully evaluating treatment benefits and harms
Ageism[84]	Attitudes or stereotypes on the basis of a person's age	Not recommending a beneficial treatment for an older patient on the basis of age alone (a form of undertreatment)
Anchoring[97]	Adhering to an initial choice despite new evidence supporting an alternative	Continuing to recommend intensive chemotherapy in a frail older adult despite minimal response and evidence of toxicity
Availability[97]	Estimating the probability of an event on the basis of a readily available case that may not be representative	Recommending radical prostatectomy in all older adults with prostate cancer because of one case of early metastasis in a patient who chose active surveillance
Framing[98]	Decision is influenced by the way facts are presented, not by the facts themselves	Selectively emphasizing the harms of a treatment and minimizing its benefits

Abbreviation: AML, acute myeloid leukemia.

ability as a whole). Determination of capacity is especially important in the older population, given the increased prevalence of cognitive impairment. However, although the presence of cognitive impairment increases the chances of being impaired in one or more of the four abilities mentioned above, cognitive impairment by itself is insufficient to deem a patient incapacitated. If an older patient is deemed to lack capacity for a particular treatment decision, then their healthcare proxy should be involved in making the final decision as a surrogate representing the patient's values. If no proxy is available, then institutional and state policies regarding identification of a surrogate decision maker should be followed.[99]

There is also debate regarding the degree to which a clinician should be involved in assisting the patient with making the final decision. Consider in older adults with AML the choice between intensive induction chemotherapy versus lower-intensity outpatient treatments. Practice patterns vary widely, from physicians recommending a decision (with or without accounting for patient preferences) to patients making the final decision by themselves.[100] Only limited evidence is available on what approach is best, but the extremes should be avoided: a fully clinician-determined decision without considering patient preference is paternalistic, and patients demanding treatments that are of no benefit is futility.[6] It is a patient's right, however, to request that the physician make a recommendation for them, and in such circumstances the physician should do so on the basis of the patient's values. Some have even argued that stronger clinician-driven recommendations are the preferred approach when uncertainty regarding harms and benefits of treatment is highest, as it is unreasonable to believe the patient can navigate the complexity of knowing and interpreting all available evidence.[101]

MINIMIZING UNDERTREATMENT AND OVERTREATMENT

In an older patient with cancer, biased and uninformed decision making too often leads to one of the two adverse outcomes: undertreatment or overtreatment.[102] One of ASCO's research priorities in 2021 is to investigate the use of personalized care guided by the GA to minimize undertreatment and overtreatment. Unfortunately, bias and imprecision exist in the very use of these terms that could paradoxically lead to overtreatment when trying to avoid undertreatment, and vice versa.[102] Undertreatment of an older adult is often used to denote the prescription of less

TABLE 3. Newly Proposed Definitions of Undertreatment and Overtreatment in Older Adults With Cancer[101]

Term	Definition
Undertreatment	Use of less intensive[a] cancer treatment in a fit[b] older adult who would otherwise derive a greater net benefit[c] from more intensive cancer treatment AND/OR Not providing nononcologic interventions to deficits in geriatric domains[b] regardless of what cancer therapy is chosen
Overtreatment	Treatment of a cancer in an older patient that would not likely lead to symptoms in their remaining lifetime OR Intensive treatment of a cancer in a vulnerable[b] older patient in whom there would be a greater net benefit[c] from less intensive therapy

[a]Some reduction in a recommended or standard treatment regimen normally used in younger fit patients.
[b]Assessment and management of geriatric domains in accordance with ASCO's Guideline for Geriatric Oncology.[12]
[c]Benefits outweigh harms in light of patient's preferences.

than a recommended or guideline therapy, not accounting for the underrepresentation of older adults in the evidence underlying guidelines and relevant GA measures. Overtreatment is variably used to denote either the prescription of an intensive treatment in a frail older adult or an intensive treatment of a cancer not expected to affect an older adult in their remaining lifetime. Only half of all articles advocated for use of the GA to aid in risk stratification for treatment intensity, and only a quarter advocated for its use to identify age-related vulnerabilities for supportive care alongside whatever cancer treatment was chosen.

Sound, shared decision making is essential to minimizing under- and overtreatment, but bias and imprecision in the use of these terms may affect the decision-making process. Our review found an overemphasis on disease-specific survival measures that neglects other risk factors and outcomes important in older adults, and an underemphasis on patient preferences and QOL that neglects their indispensability in determining the very goals of treatment by which under- and overtreatment should be judged. To help overcome this bias and imprecision, we propose new definitions of undertreatment and overtreatment (Table 3). These definitions shift disease-centric criteria to patient-centered criteria, with a broader focus on not only survival but also function and QOL. Incorporating these elements in the decision-making process will best minimize undertreatment and overtreatment in older adults with cancer.

In conclusion, given the complexity of cancer in older patients, the uncertainty in the face of incomplete evidence, and the potential for bias leading to under- or overtreatment, best practice for decision making in these patients requires a principled approach. We believe that use of our framework (Fig 1) will optimize decisions, best matching treatment intensity with age-related vulnerability and aligning expected outcomes with patient preferences. We stress the importance of focus on a process, informed by the GA, that actively engages the patient and their caregiver and allows for emotions, intuition (type 1 reasoning), and deliberative reasoning (type 2 reasoning). Strong evidence suggests that regardless of its impact on survival and function, such a decision-making process improves communication and satisfaction with care[103]—outcomes important in and of themselves. As the evidence accumulates regarding the benefits and harms of cancer treatment in older adults, it can be applied using this framework and evaluated across different scenarios to optimize decision making.

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AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

Decision Making in Older Adults With Cancer

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