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Treatment decision-making in acute myeloid leukemia: A qualitative study of older adults and community oncologists

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Abstract

Little is known about the characteristics of patients, physicians, and organizations that influence treatment decisions in older patients with AML. We conducted qualitative interviews with community oncologists and older patients with AML to elicit factors that influence their treatment decision-making. Recruitment was done via purposive sampling and continued until theoretical saturation was reached, resulting in the inclusion of 15 patients and 15 oncologists. Participants'

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Authorship Contributions:

Contribution: K.P.L., S.G.M., and H.D.K conceived and designed the study; K.P.L, M.A., S.K., and M.W. performed the analyses; S.G.M., and H.D.K supervised the study; K.P.L and M.A. wrote the manuscript; and all authors acquired, analyzed, or interpreted data and critically revised the manuscript.

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responses were analyzed using directed content analysis. Oncologists and patients considered comorbidities, functional status, emotional health, cognition, and social factors when deciding treatment; most oncologists evaluated these using clinical gestalt. Sixty-seven percent of patients perceived that treatment was their only option and that they had not been offered a choice. In conclusion, treatment decision-making is complex and influenced by patient-related factors. These factors can be assessed as part of a geriatric assessment which can help oncologists better determine fitness and guide treatment decision-making.

Keywords

treatment decision-making; acute myeloid leukemia; older adults; geriatric hematology

Introduction

Acute myeloid leukemia (AML) is primarily a disease of older adults, with sixty percent of cases diagnosed in patients 65 years and older [1]. Outcomes among older patients with AML are poor, with less than 20% of patients achieving two-year overall survival [1]. Multiple treatment options have been evaluated among this population. Some studies support the use of intensive therapy and allogeneic transplant in fit older patients [2,3] and other studies demonstrate the efficacy and safety of lower-intensity treatment options such as venetoclax, hypomethylating agents, and low-dose cytarabine in patients not considered fit enough for intensive therapy [4,5]. Despite this data, 40-50% of older patients do not receive any leukemia-directed therapy [6,7].

Several studies have been done to understand factors that influence decision-making in patients with AML. Findings from a qualitative study among patients with AML, their families, and their physicians suggest that factors considered when making decisions include relief of symptoms (especially pain and fatigue), survival, quality of life (QoL), ability to receive treatment at home, and treatment tolerability [8]. Notably, longer survival was only important if QoL was maintained or improved with treatment (i.e., maintaining hobbies and interests and time spent with family) [8]. In a discrete-choice experiment study conducted with 896 patients with AML, patients cited the following factors affecting their decision-making (in descending order of importance): complete remission, long-term side-effects, event-free survival, and short-term side effects [9].

Little is known about the characteristics of patients, physicians, and health care systems that influence treatment decisions in older patients with AML. Studies done in older adults with other cancer types have highlighted additional layers of complexity in treatment decision-making [10-12]. For example, in a qualitative study of older patients with multiple myeloma, factors considered during treatment selection included quality of life, convenience, insurance, cost, family opinion, age, comorbidities, and social support [10]. In older patients with diffuse large B-cell lymphoma, comorbidities and cognitive impairment influenced oncologists' recommendations to treat [11]. Community oncologists' also consider age, cognition, and physical function in their treatment recommendations for older patients with solid tumors [12]. Understanding current patterns of care in the US requires exploring

clinical decision-making in the community oncology setting since most patients are initially evaluated in community practices [13]. Identifying factors that influence decision-making may improve communication, thereby facilitating shared decision-making between oncologists and older patients with AML.

To our knowledge, no studies exploring decision-making in community oncologists and older patients with AML have been conducted. Therefore, the goal of this study was to elicit factors that influence community oncologists' treatment recommendations for older patients with AML, as well as older patients' decision to receive AML treatment. The secondary aim was to explore factors that influence community oncologists' and older patients' decisions to choose intensive vs. lower-intensity treatment.

Methods

Study Design, Population, and Setting

We performed a qualitative study of community oncologists and older patients with AML. We followed the Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines (see Appendix) [14,15]. We used in-depth semi-structured interviews to elicit oncologists' and patients' perspectives on their treatment selection. Community oncologists (N=15) who saw at least one older patient with AML in the previous 6 months were included. They were recruited via email communication and social media using purposive sampling based on practice location, allowing us to include oncologists from a broad geographic distribution. Non-participation rate could not be captured since only oncologists who volunteered to participate responded to recruitment emails. Patients aged ≥ 60 years with AML (N=15) were recruited from an academic tertiary cancer center in Upstate New York using purposive sampling based on treatment received (i.e., intensive vs. lower-intensity treatment) and stage of treatment (i.e., during induction treatment vs. post-remission treatment vs. post-transplant). Purposive sampling of patients ensured that we included patients who had received or were receiving different treatments. Participation rates were $>90\%$ for patients who were approached (those who did not consent reported being overwhelmed due to the disease and its complications). Although we recruited older patients from an academic tertiary cancer center, over 70% of our sample were initially evaluated and/or treated at community oncology practices. In the US, academic tertiary cancer centers and community oncology practices differ with regards to mission, governance, and revenue. For example, the mission of community oncology practices typically focuses on patient care while academic tertiary cancer centers may have multiple missions including patient care, teaching, research, and service [16]. Academic cancer centers are generally part of a hospital or medical teaching institution.

Theoretical Framework

We adapted the treatment decision-making framework by Zafar et al [17] which was used to guide our interviews and analyses. The framework categorizes potential factors that are involved in the decision-making process into patient and physician characteristics. For example, a patient's treatment preference may be influenced by four factors related to patient characteristics (e.g., socio-demographic, illness experience, quality of life, disease

status). These factors are further subdivided (i.e., socio-demographic factors include age, race, culture, gender). Similarly, a physician's treatment preference may be influenced by their knowledge of the patient's disease and their general disease knowledge and experience. Our interview questions were developed to probe participants' thoughts on these factors. During analysis, our provisional codebook included factors from this framework and was further expanded based on interviews conducted.

Study Procedure

Prior to interviews, we used an electronic survey, administered via REDCap [18], to collect oncologists' demographics, including their age, gender, race, years in practice since completion of fellowship, board certification, average number of patients seen by them, and availability of a bone marrow specialist and bone marrow transplant center. For patients, we collected information on their age, gender, race, treatment received prior to and at the time of interview, and whether they were initially evaluated and/or treated at a community oncology practice. Participants provided informed consent after the research goals and researchers' occupation were reviewed. Next, individual semi-structured in-depth interviews were conducted by KPL (female, hematologic and geriatric oncologist with qualitative research training and experience, MBBCh BAO, who is interested in improving outcomes in this population; she did not interview any patients that she personally cared for) or SK (female, fellow physician in hematology/oncology, MD; she did not personally care for any of the patients and she received training from KPL to conduct interviews) using a pre-tested interview guide (Supplemental Tables 1 and 2). Interviews were conducted remotely via telephone for oncologists and in-person at the cancer center for patients. Each interview lasted between 20 and 60 minutes. For oncologist interviews, no additional participants were present. For patient interviews, caregivers may be present (because of patient preference) but their responses were not analyzed. No repeat interviews were conducted. Recruitment and interviews continued until no new themes emerged from the revision and coding of successive interviews, implying that thematic saturation was achieved and thereby setting the sample size [19]. All oncologists and patients who participated were remunerated with a \$50 gift card. All interviews were audiotaped and transcribed verbatim by a professional transcription service. Transcripts were not returned to participants for comments.

Data analysis

All transcribed interviews were imported to Atlas.ti or MAXQDA qualitative data software analytic programs, based on coders' familiarity. We analyzed the data using directed content analysis, a qualitative content analysis method that allows the identification of patterns and themes through a systematic coding process [20]. For the first aim, based on the aforementioned theoretical framework, prior published studies [10-12], and the first transcript, KPL developed a provisional codebook, categories, and definitions. To ensure credibility of the findings, KPL and MW (health project coordinator with qualitative research training and experience, MPH) independently coded all remaining transcripts, adding new codes as indicated. Any discrepancies were resolved through discussion. These codes were categorized into patient, disease, and physician factors, guided by the aforementioned decision-making framework. We also added organization-related factors. For the second aim, KPL and MA (internal medicine resident, MD; she received training for

KPL to conduct qualitative analyses) repeated the same process. Participants did not provide feedback on the findings. The study was approved by the University of Rochester Medical Center Institutional Review Board.

Results

Fifteen community oncologists (from 11 states) and fifteen older patients with AML were recruited. Characteristics of the participants are shown in Table 1.

Oncologists' Demographics

Mean oncologist age was 43.5 years (range 33-64), 60% were female, 73% were white, 27% had practiced >15 years, and 73% treated <10 older patients with AML on average per year (Table 1). Eighty-seven percent were board certified in oncology, 80% were board-certified in hematology, and 33% reported that their practice was affiliated with a bone marrow transplant center.

Patients' Demographics

Mean age was 72.1 years (range 61-87), 33.3% were females, and all were Caucasian. Two-thirds had Eastern Cooperative Group Performance Status of 1. In terms of treatment, 10 had received or were receiving intensive induction therapy, 7 had received or were receiving low-intensity treatment, and 3 patients had received allogeneic hematopoietic stem cell transplant. In terms of disease status at the time of interview, 53.3% were in remission, 13.3% had relapsed disease, and the remaining were unable to be determined.

Initial treatment and transplant decision-making

First, we discuss the factors that were identified as affecting decision-making. We review trends and provide representative quotes to illustrate prominent themes. Figure 1 shows patient-, disease-, treatment-, physician, and organization-related factors that affected treatment decision-making among community oncologists and older patients with AML. We primarily focused on initial treatment and transplant decision-making. Overall, oncologists and patients considered similar factors when deciding on treatment. These included comorbidities, functional status, emotional health, cognition, and social factors.

Initial treatment and transplant decision-making – Oncologists

Two oncologists specifically mentioned the nuance of functional impairment (i.e., whether the impairment is at baseline or due to the leukemia).

Oncologist 04: *If it's disease-related potentially it might be a little bit more reversible so I am more willing to consider it [treatment] if they have been perfectly fine up until the diagnosis.*

Oncologists also considered disease severity and symptoms as well as treatment efficacy, burden, duration, toxicity, and tolerability. One oncologist stated that they would refer patients with a rare AML presentation to a tertiary center. Most oncologists described factoring in their patients' preference and motivation when recommending treatment, in general or when discussing various intensity options. Organizational factors that influenced

oncologists' recommendations included the ability to administer inpatient chemotherapy and clinical trial availability.

Oncologist 4: ... *sometimes we just send them in over to [De-identified] just because they get more options and studies and things like that*

Oncologist 14: *They don't have inpatient chemo at the community hospital so they need to be seen in a tertiary care center.*

Initial treatment and transplant decision-making – Patients

Notably, 10 of the 15 patients perceived that treatment was their only option and that they had not been offered a choice.

Interviewer: *Was there any discussion about any other treatment options?*

Patient 07: *No. Not that I know of. Anyway.*

Patient 09: *They never really discussed anything more than chemotherapy with Vyxeos... we weren't given an option.*

Patients considered several factors similar to oncologists (disease severity, symptoms, treatment efficacy, duration, burden, toxicity, and tolerability) as well as others that were distinct from the concerns of oncologists. For example, some of the patients emphasized the importance of quality of care and the treating facility, as well as recommendations from other physicians, friends, or family members when making decisions regarding their care or treatment.

Patient 10: *The minute I walked in here I looked around...I already know this is it.*

Patient 14: *This is the best... I didn't question it because again, I keep hearing this from people ... around the world...globally who have said positive things about this program.*

Patient 21: *...knowing how other people have fared before you is something that we need to hear.*

Initial treatment: Intensive vs. lower-intensity

After exploring the factors that influence initial treatment and transplant decision-making, we asked about factors that mattered to both oncologists and patients when choosing between intensive vs. lower-intensity treatment (Figure 2 and Table 2).

Initial treatment: Intensive vs. lower-intensity – Oncologists

Many oncologists felt that their treatment recommendations were impacted by local practice patterns (i.e., putting patients on clinical trials of less intensive treatment vs. offering more aggressive regimens and transplant) and other 'cultural' factors (i.e., offering lower-intensity treatment options since they perceived that older patients in their geographical areas were thought to value quality of life highly, possibly more so than longevity).

Most oncologists identified performance status, functional status, and perception of frailty as important factors affecting their treatment recommendations. When we probed how

community oncologists assess physical function and cognition, most reported using clinical gestalt or judgement. A few oncologists inquire about performance of daily activities (e.g., general hobbies or day-to-day activities, activities of daily living, instrumental activities of daily living). The most common objective method used was the Karnofsky or Eastern Cooperative Group Performance Status scale. None mentioned using other validated objective tests to assess physical function in their routine clinical practice (e.g., gait speed). The presence of comorbidities was equated with functional status; for example, as physician 5 explained:

You're not going to have a patient with a performance status of 2 without comorbidity. To me they're actually synonymous.

Some assessed patients' mobility in the office, for instance by observing patients climbing up to the examination table or getting up from the bed, as gauges of fitness. A few oncologists performed or referred their patient to a geriatrician for a cognitive assessment if there were readily apparent concerns during the clinical encounter (e.g., patients repeating themselves, not able to recall information provided, or not able to fill out paperwork) or if family members voiced concerns. Otherwise, objective cognitive assessments were generally not incorporated in routine clinical practice.

When asked about barriers to performing objective assessments of physical function and cognition, the following themes were identified:

1) Do not add much to routine assessments

Oncologist 05: *I think a rough understanding, which is obtainable through a good history and physical examination, is all that I need in that particular situation.*

2) Lack of time, resources, and expertise

Oncologist 10: *I think it's too time consuming to be able to do in our clinic, and it would require training by the person doing it.*

3) Lack of awareness of the tools or the evidence to support its use

Oncologist 06: *I'm not even aware of what's a good standard of care tool in assessing fitness for greater than 60 years old.*

4) Dementia and other impairments are not subtle, so nuanced assessments are unnecessary

Oncologist 13: *It becomes very apparent if there is a memory issue or if there is a dementia issue. It becomes apparent pretty quickly'. Oncologist 5: 'It is [physical or cognitive impairment] not that subtle, I don't think.*

5) Impairments are assessed by other team members

Oncologist 8: *A lot of times if the patients are admitted to the hospital, PT and OT are doing them for me. So I don't really have to do them if that makes sense.*

6) Do not want to rely on scores

Oncologist 02: *I think there's almost too much of a reliance on scoring for everything and not clinical impressions.*

Initial treatment: Intensive vs. lower-intensity – Patients

Many patients did not recall having a conversation where they were offered the choice between intensive, lower-intensity, or no treatment to choose from. In other words, not only did patient perceive a lack of choice regarding whether or not they should be treated (see ‘Initial treatment and transplant decision-making – Patients’) but they also perceived a lack of treatment intensity choice once the providers had recommended treatment.

For those patients who perceived having a choice when considering selecting intensive vs. lower intensive treatment, distance to the treatment cancer center mattered. One patient commented on the long travel distance, noting that driving on a daily basis to the cancer center for outpatient therapy would quickly tire them out, promoting them to choose intensive inpatient therapy instead. Another patient commented that because of frequent long-distance drives involved with outpatient treatment, they preferred receiving inpatient treatment in a more ‘controlled’ environment, with easy access to doctors (Table 3).

Discussion

In this qualitative analysis, we identified several factors that older patients and community oncologists incorporated into AML treatment decision-making. Deciding between intensive, lower-intensity, or no treatment is a complex process that is usually made when patients are acutely ill and when they are likely shocked by the suddenness of the diagnosis [21,22], especially among those with *de novo* AML. Our aim was to elicit factors that community oncologists and older patients consider when making AML treatment decisions. We broadly classified these factors into 4 categories: patient-, disease/treatment-, physician-, and organization-related. Several of the factors affecting physicians’ decision-making process were similar to those that older adults with AML valued. Interestingly, most patients felt that they had not been offered a treatment choice.

Oncologists’ treatment recommendations were influenced by patients’ chronological age and comorbidities as well as oncologists’ beliefs about patients’ cognition and their perception of frailty. These beliefs and perceptions were rarely informed by objective data. Most oncologists we interviewed evaluated these factors through subjective clinical gestalt. Standardized tools are available to assess frailty, cognitive impairment, and functional impairment, and they can be helpful in particular when functional status is not at an extreme, i.e. excellent or very poor [23,24]. Standardized frailty assessments or a geriatric assessment have been shown to assist providers in predicting outcomes of hematologic malignancies [23,25,26]. A geriatric assessment is a systematic evaluation of older patients’ health including cognitive and physical function, comorbidities, medications, nutritional status, and social support [25]. Many of the factors measured by a geriatric assessment are perceived by oncologists and patients to be important in their decision-making but not formally evaluated. A geriatric assessment may help define fitness and assist both oncologists and patients in making informed treatment decisions (e.g., intensive vs. lower-intensity treatments, treatment vs. no treatment). Furthermore, a geriatric assessment may improve communication, predict treatment toxicity, and guide supportive care interventions [25,27-31]. Time constraints are cited as limiting the feasibility of standardized assessments due to the current reimbursement models in the US. Fortunately, many abbreviated versions

of geriatric assessment exist, including ones that are embedded within an electronic device [32,33].

We also identified several organizational factors such as infrastructure (e.g., ability to administer induction chemotherapy), transplant and clinical trial availability, and location of treatment centers that influence both patients' and oncologists' treatment decisions. Although these factors may not be easily modifiable by the treating provider or patient, the importance of these factors should be recognized. To reduce under- and over-treatment of older adults with AML, it is important to improve access to both clinical trials and novel treatments. Many older adults reside in rural areas, and innovative care delivery models such as the use of technologies and telehealth as well as 'at-home' programs for intensive therapy and allogeneic stem cell transplantation should be investigated [34,35]. We also found that local practice norms may influence providers' decision-making. Implementation of multidisciplinary tumor boards may increase adherence to practice guidelines, encourage consideration of patient-related information, and promote consistency of diagnostic work-up and management, which may lead to improved quality and continuity of care [36,37]. Multidisciplinary tumor boards are underutilized in community-based institutions, particularly smaller centers in rural areas, and in certain malignancy types, including hematologic malignancies [38]. Multidisciplinary tumor boards are routinely incorporated in academic cancer centers to facilitate communication between various physician specialists and other healthcare providers, often for patients with newly diagnosed cancer or for those with complex management issues [39]. Innovative approaches including virtual tumor boards have been studied to improve implementation in community settings, yet several barriers exist (including cost and timing) necessitating further research in this area [38].

Interestingly, we noticed a difference in perception of choices offered to older patients and by oncologists. Most physicians reported having offered patients the choice of whether to be treated or not, and in some cases even discussing intensive vs. lower-intensity treatment. Nevertheless, most patients did not feel that they were given an option or that they 'had no option'. Our findings mirror results of a prior study of patients with AML where patients reported not being offered other treatment options despite documentation that these discussions were held [21]. There are several possible explanations for this discrepancy. First, alternative options may not have been discussed by the oncologist. Second, options may have been discussed, but patients may not have retained the information; studies have shown that patients with newly diagnosed cancer retain less than half of information presented, and older patients retain less than younger patients [40,41]. In addition, patients with lower health literacy and worse prognoses (both of which are more common among older adults) have poorer recall [42]. Third, options may have been discussed but they were not delivered in a structured format [43] or a way that helps the patients understand (e.g., use of jargon) [44]. Fourth, options may have been discussed, but patients may perceive themselves as not having a true choice, since the alternatives do not seem viable to them. Studies have shown that patients who felt that they had a choice of treatment have better psychological well-being and greater satisfaction with treatment and care received [45,46]. Lastly, by sampling patients at a tertiary cancer center, many of whom were referred from community practices, we may have excluded patients who perceived that they had the choice to refuse treatment in the community setting and were therefore possibly not referred to us.

The treatment paradigm for patients with AML has rapidly evolved in the past few years [47,48]. Several novel therapies have been approved for use in the front-line setting. However, data are lacking in terms of which therapy is superior in older patients with AML. Therefore, shared decision-making is particularly important in preference-sensitive situations such as the treatment of older patients with AML whereby a clear “best” therapeutic strategy has not been established. Strategies are needed to improve shared decision-making and communication between oncologists and older patients with AML. Such strategies may include communication training for healthcare professionals. For example, the three-talk model of shared decision-making may be used [43]. Additionally, communication may be facilitated using patient decision aids or decision-making tools. One example would be the use of conjoint analysis to assess the relative importance that patients place on different aspects of care by asking them to make a series of trade-offs between competing options. In the context of AML, conjoint analysis can clarify treatment options to patients and enrich discussion while revealing their priorities to their oncologists [49,50]. Incorporating conjoint analysis into a communication tool may empower patients to communicate better with their oncologists, ultimately promoting shared decision-making and care that is concordant with patient wishes.

Our findings offer many insights into the complex decision-making process older patients and their oncologists must undergo. First, we explored decision-making with older adults who have been evaluated at both community and academic cancer centers. Second, we included community oncologists who are involved in the initial evaluation of many older adults with AML. There are limitations to our study. We recruited patients at various stages of their treatment, and their recall may have been influenced by their treatment experiences. Second, we recruited older patients from a single academic center who received or were receiving treatment. Older patients who did not receive AML-directed therapy and those who were treated only in community oncology practices were not included. Third, multiple novel agents were approved after the study was completed, including venetoclax-based regimens [51,52]. As a result, practice pattern may have changed. Additionally, two-thirds of the oncologists included had 1-10 years of experience since fellowship and oncologists’ experience affects decision-making [53]. Future studies are needed to understand treatment decision-making in real-time to minimize recall biases and in broader settings to minimize selection biases (including more patients diagnosed in community settings as well as more experienced oncologists). Studies understanding how the widespread use of novel agents affect this already complex decision-making process are also warranted.

In conclusion, treatment decision-making is complex, and we identified many factors that influence older patients’ and community oncologists’ treatment decision-making process as it relates to AML. A geriatric assessment may help oncologists better assess fitness and other patient-related factors that influence decision-making, thereby facilitating communication and the complex decision-making process. In addition, strategies such as communication training and decision aids are needed to improve communication between oncologists and older patients with AML.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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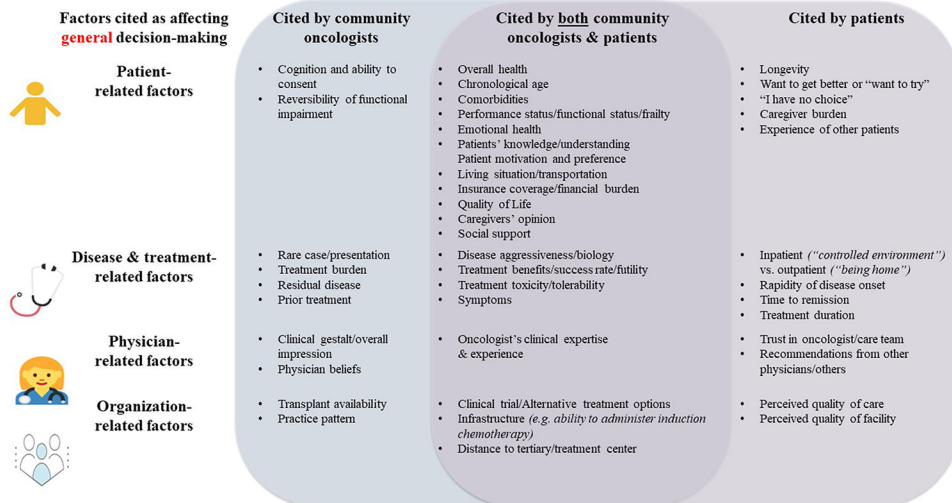


Figure 1: Factors affecting treatment decision-making among community oncologists and older patients with acute myeloid leukemia

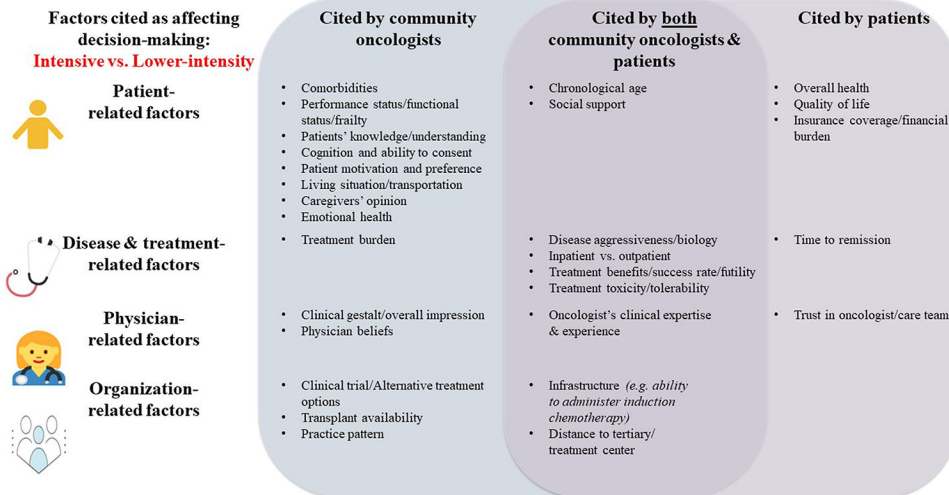


Figure 2: Factors affecting decisions for intensive vs. lower-intensity treatments among community oncologists and older patients with acute myeloid leukemia

Table 1:

Demographics of participants

	Physicians N=15 (%)	Patients N=15 (%)
Mean age in years (SD, range)	43.5 (11.9, 33-64)	72.1 (7.3, 61-87)
Female (%)	9 (60.0%)	5 (33.3%)
Race		
White	11 (73.3%)	15 (100%)
Asian	4 (26.7%)	0
Years in practice		
0-10 years	10 (66.7%)	-
11-15 years	1 (6.7%)	-
>15 years	4 (26.6%)	-
Board certified in oncology	13 (86.7%)	-
Board certified in hematology	12 (80.0%)	-
Average number of patients seen per week	72 (23, 40-120)	-
Average number of patients with hematologic malignancies seen per year		
21-30	2 (13.3%)	-
31-40	2 (13.3%)	-
41-50	2 (13.3%)	-
>50	9 (60.0%)	-
Average number of patients with acute myeloid leukemia seen per year		
<5	4 (26.6%)	-
6-10	7 (46.7%)	-
11-15	2 (13.3%)	-
>20	2 (13.3%)	-
Average number of older patients with acute myeloid leukemia seen per year		
<5	6 (40.0%)	-
6-10	8 (53.3%)	-
16-20	1 (6.7%)	-
Dedicated oncologist who treats AML at the practice	1 (6.7%)	-
Dedicated bone marrow specialist at the practice	1 (6.7%)	-
Affiliation with bone marrow transplant center	5 (33.3%)	-
Closest bone marrow transplant center (average miles)	54.6 (51.4, 3-150)	-
Initially evaluated by a community oncologist	-	11 (73.3%)
Initially received treatment in a community oncology practice	-	6 (40.0%)
Eastern Cooperative Group Performance Status scale		
1	-	10/15 (66.7%)
2	-	5/15 (33.3%)
Had received or were receiving intensive treatment	-	10 (66.7%)

	Physicians N=15 (%)	Patients N=15 (%)
Had received or were lower-intensity treatment	-	7 (46.7%)
Had received an allogeneic stem cell transplant	-	3 (20.0%)
Disease status at time of interview		
In remission	-	8 (53.3%)
Relapse	-	2 (13.3%)
Unable to be determined	-	5 (33.3%)

Abbreviations: *AML*, Acute Myeloid Leukemia

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Table 2:

Factors influencing oncologists' decision to choose intensive vs. lower-intensity treatment

Factors	Exemplar quote
Patient factors	
Comorbidities	Oncologist 01: <i>...they don't have major comorbid conditions. Particularly if they don't have advanced kidney or liver disease or heart disease then it does make sense to consider induction.</i>
Chronological age	Oncologist 06: <i>...then just because of his age and I think we decided to do a hypomethylating agent.</i>
Performance status/ functional status/frailty	Oncologist 09: <i>...if you have somebody who is bedridden or nonfunctional at home and they are coming in the hospital and they're the same that would be the last person you want to offer 7+3 to. You are just setting them up for infection or stroke or a blood clot or something bad to happen. It's not a good plan.</i>
Emotional health	Oncologist 08: <i>She's also got I think some sort of a mental disorder however it's not really proven.</i>
Cognition and ability to consent	Oncologist 07: <i>I think someone who has mild cognitive impairment but an excellent physical functional status maybe I would consider, but I think when you start getting mild cognitive impairment and a worsening physical performance status then I would probably not give that person intensive therapy.</i>
Patients' knowledge/ understanding	Oncologist 08: <i>So she actually is the one who kind of tilted and said you know, really I would like to go with the other agents as an outpatient knowing full well that we weren't going to cure her of her AML.</i>
Patient motivation and preference	Oncologist 07: <i>The patient's value system and if they are even wanting to pursue treatment.</i>
Living situation/ transportation/lodging	Oncologist 13: <i>...is she gonna be able to come in if she needed it. You know, if there is no running water how is this neutropenic precautions gonna work out.</i>
Social support	Oncologist 08: <i>We also look at what type of support that he has in terms of who lives with them and how much care they are able to provide.</i>
Caregivers' opinion	Oncologist 04: <i>It's a matter of how motivated the family is to pursue this.</i>
Disease/Treatment factors	
Disease aggressiveness/ biology	Oncologist 04: <i>The white count was increasing very quickly so it seemed it was more of a, once again, a ruling it was an acute myeloid leukemia more so than a dysplasia. So the hypomethylating agents I didn't think would work that well.</i>
Inpatient vs. outpatient	Oncologist 09: <i>...she would have to be in the hospital for some period of time she was not interested at all.</i>
Treatment benefits/ success rate/futility	Oncologist 04: <i>I've seen maybe a couple of people that have had some benefit from it.</i>
Treatment burden	Oncologist 04: <i>I found them [hypomethylating agents] burdensome with not a lot of reward. Once in a while maybe one out of five people I've found it helps them. Most of them I've found it's just burdensome. The people come in and get a lot of drug and end up cytopenic and then still need a lot of transfusions and things like that. We just had a lady that I don't take care of but one of my partners did, that was on one of these drugs and ended up with a huge retro perineal bleed, trauma cytopenia.</i>
Treatment toxicity/ tolerability	Oncologist 08: <i>...you have to first decide are they going to survive 7+3 or whatever high dose medication you try to give them for induction.</i>
Physician factors	
Clinical gestalt/Overall impression	Oncologist 01: <i>Basically we based it on, you know, we don't use a formal scoring system though there are scoring systems available, but it's based on my clinical experience and gestalt that this person is, you know, someone who is, if they are elderly, if they are at least five years less than their stated ages physiologically and they don't have major comorbid conditions.</i>
Clinical expertise and experience	Oncologist 03: <i>If they're healthy enough for induction chemotherapy, I leave the decision-making process to the people who understand this better.</i>
Physician beliefs	Oncologist 15: <i>I think I am somewhere in the middle. We have people who sort of will not consider induction at all. We have people who, like the bone marrow transplant physician, will be more aggressive. And so I think I am somewhere in the middle.</i>
Organizational factors	
Transplant availability	Oncologist 08: <i>And then the question is, is this patient going to ever go to transplant, too? Because the purpose of doing this is to put them in remission and then send them for a transplant potentially. And so you really have to weigh those decisions.</i>

Factors	Exemplar quote
Clinical trial/Alternative treatment options	Oncologist 06: <i>...they have any clinical – specifically for clinical trials and stuff is when I would strongly consider referring those patients to a tertiary center.</i>
Infrastructure (e.g. ability to administer induction chemotherapy)	Oncologist 07: <i>Our center does not do induction, no. It would be done at the referral center. We don't have - our blood bank services are very limited and we don't have a lot of these support services that I feel you should have in order to really safely or as safe as possible give induction therapy.</i>
Distance to tertiary or treatment center	Oncologist 05: <i>It depends on how far they are willing to travel also. Some people are willing to travel down to [place], which is one hour away, but are not willing to travel down to [place]... And if they are more willing to go down there they also do induction.</i>
Practice pattern	Oncologist 10: <i>I'm just saying that it's definitely something I noticed taking care of patients there for almost a decade difference from here. Here it seems like the older patients more often get put on clinical trials of less intense regimens, less intense treatments, non-transplant pathways.</i>

Table 3:

Factors influencing older patients' decision to choose intensive vs. lower-intensity treatment

Factors	Exemplar quote
Patient factors	
Social support	Patient 01: <i>I think so. You need somebody ... now, we've been married 50 years. Good, you know, we have a good marriage and everything. But she has her opinions, I have my opinions. My friends have different opinions. And sometimes that different opinion, not right or wrong, can change your attitude, the patient's attitude or the spouse, you almost think they are trying to influence for the patient who is trying to be a friend – or not the patient, the friend who is trying to be your friend. So it's a different type of influence as far as what goes on.</i>
Quality of life	Patient 08: <i>I need to be able to see my kids, spend time with my grandchildren. Get out. I like to shoot. I have to be able to do my ... work.</i>
Patient beliefs and preference	Patient 02: <i>So, being a person that likes to have an objective I wanted to pursue and see if the transplant was possible.</i>
Insurance coverage/ financial burden	Interviewer: <i>How did you finally decide whether you should get the inpatient treatment versus the outpatient treatment? What were the things that you were thinking at that time?</i> Patient 01: <i>Insurance.</i>
Disease/Treatment factors	
Inpatient vs. outpatient	Patient 01: <i>It just would bring me down. So I said just come in, we're in here, we're in a more controlled environment. We have much better care than running back and forth. Yeah, we go back to [De-identified], that's fine. We get back there, all of a sudden we get some kind of a crisis, we've got to run back to [De-identified]. And if we are in [De-identified] and there's a crisis no matter which we – a couple of minor things came up – within ten, fifteen, twenty minutes it was – there was somebody there within a few minutes but there usually within 15 minutes there was a doctor and some other people that were okay, let's do this and this and so on.</i>
Treatment benefits/ success rate	Patient 08: <i>If there is a reasonable chance that I can get back to a relatively normal life then I'll try to do what I can do to do that. If the outlook is 90% of the rest of my life is this then I have no interest in continuing</i>
Treatment toxicity/ tolerability	Patient 02: <i>They felt that it was a, the chemotherapy was a, that particular one was a drug that I could take.</i>
Time to remission	Patient 01: <i>And a longer time period of trying to get something...</i> Interviewer: <i>You were very persistent you wanted the treatment quicker and then get the leukemia under control.</i> Patient 01: <i>Throw it back there over my shoulder and let me get back.</i>
Physician factors	
Trust in oncologist/care team	Patient 05: <i>But as soon as I met her there was just something there that I trusted her.</i>
Oncologist's expertise and experience	Patient 02: <i>But they do have experience with it and apparently some good experience.</i>
Organizational factors	
Infrastructure	Patient 03: <i>Yeah. They don't have the facilities. It's really just a – it's an infusion center in [De-identified]. You know, you can down there for outpatient treatment. They don't do any inpatient treatment there for this type of disease.</i>
Distance to the treatment center	Patient 01: <i>It's enough, the treatment is enough to tire you out. The ride is enough to tire you out. The treatment and ride will kill you. Not literally but you know.</i>