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Title of Project: Payer-Partnered Approach to Community-Based Referral for Hematopoietic Cell Transplant Consultation

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Report

STRUCTURED ABSTRACT

Purpose: This study aimed to improve timely referral from hematology/oncology physicians in the United States for hematopoietic cell transplantation (HCT) for patients with acute myeloid leukemia (AML) using an innovative education intervention.

The objectives were: 1) Characterize reasons for lack of or delayed referral for HCT consultation among community hematologists/oncologists; 2) Develop and evaluate an educational intervention tailored to the unique needs of the referring hematology/oncology community identified by the needs assessment; and 3) Recommend educational programs focused on optimal referral timing.

Scope: HCT earlier in the disease course leads to better outcomes; hence, referral practices are critical to ensuring that patients for whom HCT is indicated are referred in a timely manner.

Methods: A mixed methods approach was utilized for a needs assessment that included a national survey and focus groups of community hematologists/oncologists. The educational intervention consisted of a series of three webinars that addressed identified knowledge gaps.

Results: Three major knowledge gaps were identified: 1) Proper classification of molecular/cytogenetic results for risk stratification and decisions making; 2) Disease stage at the time of HCT significantly impacts outcomes; 3) Use of chronological age alone to make decisions for HCT referral may exclude older HCT-eligible patients from considering curative therapy. The webinars met the educational needs of learners and improved knowledge gaps. Educational programs have been developed with external partners to continue to address learning needs and improve timely referral of patients with AML.

Key Words: Timely referral, hematopoietic cell transplantation, acute myeloid leukemia, hematology/oncology physicians, clinical knowledge gaps

PURPOSE

The objectives of this study were to:

1. Characterize reasons for lack of or delayed referral of patients diagnosed with acute myeloid leukemia (AML) for hematopoietic cell transplantation (HCT) consultation among community hematologists/oncologists, establish preferences for education on HCT, and obtain feedback on ways to build referral relationships.
2. Develop and evaluate an educational intervention tailored to meet the unique needs of the referring hematology/oncology community, including non-educational strategies, as identified by the needs assessment.
3. With the expertise of the National Marrow Donor Registry (NMDP) Board's Advisory Group on Financial Barriers to Transplant (AGFBT), devise recommendations for health insurance programs on the implementation of educational and potentially incentivized programs focused on optimal timing of referral for HCT consultation among hematologists/oncologists in contracted provider networks.

SCOPE

Background

Hematopoietic cell transplant (HCT) is an under-utilized therapy for patients with hematologic malignancies, including those with acute myeloid leukemia (AML).[1] Given that HCT is performed only at select hospitals in the United States (US), referral practices are critical to ensuring that patients with AML for whom HCT is the optimal therapy are referred in a timely manner to transplant centers.

Assessment of AML disease risk and referral for HCT consultation

Assessment of AML disease risk factors based on cytogenetic and molecular abnormalities permits stratification into risk groups in order to identify patients for whom HCT should be considered as a potentially curative therapy. The National Comprehensive Cancer Network (NCCN) Clinical Practice Guidelines for AML state that patients with intermediate-risk and poor-risk cytogenetics without favorable molecular markers should be assessed for referral to HCT after achievement of first complete remission (CR1). The NCCN guidelines for AML mirror recommendations published by the National Marrow Donor Program® (NMDP)/Be The Match® and the American Society for Blood and Marrow Transplantation (ASBMT) on optimal timing of referral for transplantation consultation.[2] Despite these guidelines, almost half of patients with AML who undergo HCT do so in second complete remission (CR2) or later (unpublished data, CIBMTR 2008-2016). For this study, 'late referral' refers to patients referred to consultation for HCT and/or transplanted in CR2 or later.

Outcomes based on transplant timing

For patients with intermediate-/poor-risk disease (approximately 75% of all patients newly diagnosed will have intermediate-/poor-risk disease), allogeneic HCT early in the disease course offers the best chance for long term disease-free survival and hence, is highly dependent on early referral to a transplant center[3]. Advances in HCT have led to improved outcomes in the last decade for HCT recipients, including for older patients.[4] The delay in timing of transplantation for appropriate HCT candidates may partly reflect clinical knowledge gaps and/or negative perceptions of HCT held by referring hematology/oncology physicians. We hypothesized that barriers to referral for HCT consultation for patients with AML include lack of knowledge about cytogenetic testing/interpretation and the perception that HCT outcomes for older patients are not as good as for younger patients. This project was built on baseline research conducted by NMDP/Be The Match in 2010 that identified new and persistent barriers to referral.

Criteria for successful education interventions

Continuing medical education (CME) is frequently used to address gaps in physician knowledge, skills, perceptions, behaviors and outcomes.[5] While a large amount of research exists regarding the use of educational interventions to address these gaps[6-11], there are still a number of inconsistencies and disagreements as to what an ideal educational intervention entails. A systematic review conducted for the Agency for Healthcare Research and Quality (AHRQ) to determine which methods of delivering CME are more effective and if desired outcomes persist over time found that CME can be successful at impacting physician knowledge, clinical skills, participant attitudes and overall clinical outcomes. The study suggested that live media, multimedia and multiple exposures were significantly associated with successful interventions. Additional key attributes of successful educational interventions were the type of delivery and the inclusion of CME credit.[5]

Payer-partnered initiatives

Since payers hold contracts with the physicians and hospitals a member/patient utilizes, they may be in the position to leverage those relationships in the delivery of education to promote referral pathways. Payer-partnered initiatives have demonstrated success in promoting referral for some medical services.[12, 13]

Participants and settings

Objective 1 - Educational needs assessment

We conducted a web-based survey of hematologists/oncologists who care for patients with AML from a national pool. Those who participated in the survey were also invited to participate in focus group interviews conducted by teleconference.

Objective 2 - Education intervention

The education intervention included a series of three web-based, interactive webinars. Paticipants included hematology/oncology physicians and other clinicians involved in the care of patients with AML, and who could potentially contribute to improved timing of referral for transplantation. Following live presentation of the webinars, they were turned into enduring materials accessed via the NMDP public website for continuing education credits.

Incidence/prevalence

The incidence of AML increases with age, with a median age at diagnosis of 67 years.[14] AML accounts for 31% of all leukemia cases in adults 20 years of age and older. There will be an estimated 19,520 new cases in the US in 2018, and an estimated 10,671 people will die. Only 27.4% of patients with AML survive 5 years.[14]

METHODS (Study design, Data sources/collection, Interventions, Measures, Limitations)

Objective 1 - Educational needs assessment

Study design: A mixed-methods design was utilized and included primary survey data and qualitative focus group interviews. **Payer stakeholders were engaged through the NMDP**

Board's AGFBT that is comprised of payers who represent approximately 90% of covered lives in the US. This volunteer group provided input on the design of the study, interpretation of results and recommendations for the educational intervention

Educational needs assessment survey:

Survey development

The objectives of the survey were to learn about: 1) barriers and motivators to referral for HCT, 2) education preferences, and 3) how clinical decisions are made with respect to AML. The survey was developed by a team that convened and deliberated via conference calls. Factors previously shown to affect referral overall were included plus new items determined to be of relevance. The survey instrument was piloted by 5 community hematologists/oncologists. Feedback was solicited on the content and face validity of the survey, presentation of information, ability of the respondent to interpret essential information as well as the time required to read, comprehend, and complete the survey. The survey instrument and its web-interface were finalized based on the pilot survey feedback. Physicians who participated in the pilot were not eligible to complete the final survey. Survey completion time was 30 minutes.

Survey inclusion and exclusion criteria

Inclusion criteria:

- Physicians board certified in hematology, oncology or hematology/oncology.
- Physicians had to have seen at least 10 patients with any hematologic malignancy or aplastic anemia in the US within the past year.
- No more than 50 participants were to be included who had seen less than 2 patients with AML in the last 12 months.

Exclusion criteria:

- Physicians could not personally perform HCT, and not treat only pediatric patients.

Survey domains

The survey inquired about four broad domains of clinical practice patterns and decision-making (see Figure 1, page 6). Many factors were not mutually independent. For instance, physicians in small, community-based practices may be less likely to have access to information on HCT, be located near a transplant center, or have ancillary resources. However, there may be substantial variation in clinical practice within a single state. The goal was to identify modifiable factors that could be addressed to improve referral practice patterns.

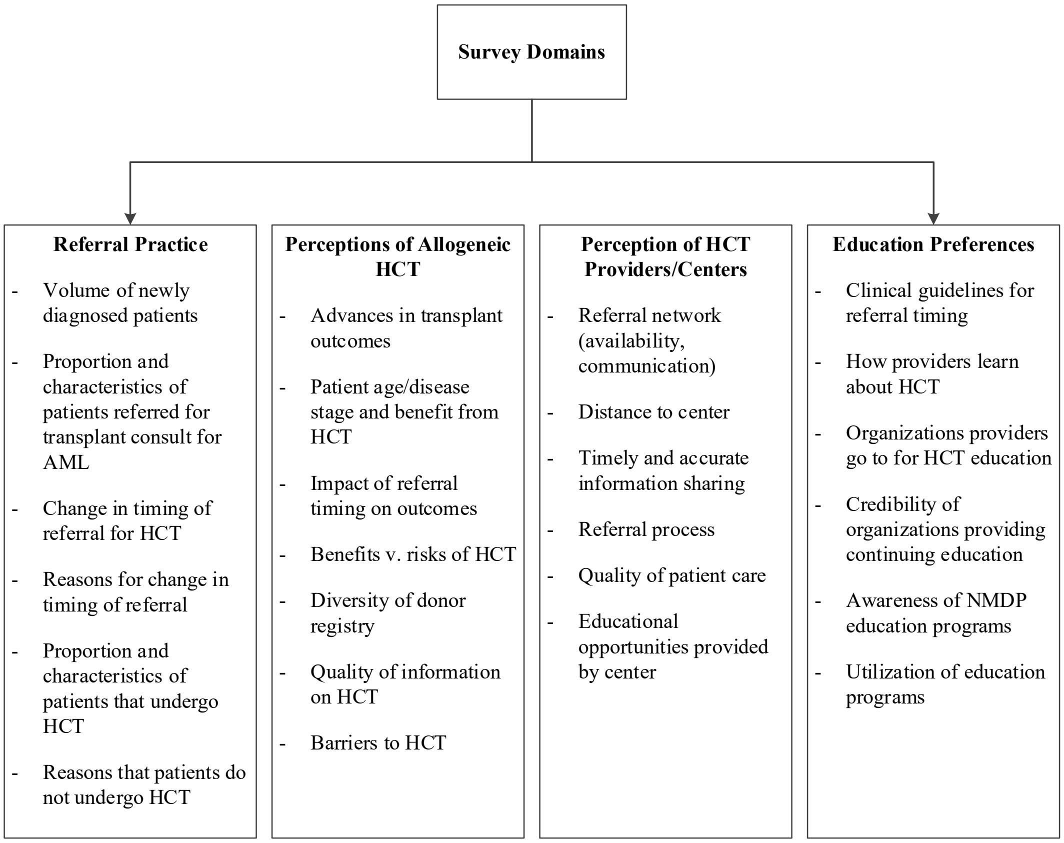
Survey recruitment and administration

The survey was conducted June-July 2015. Participants were recruited from a panel via a contracted vendor specializing in physician-focused surveys and focus group research. Community hematologists/oncologists were screened by the vendor to ensure that the sample met eligibility criteria and was representative.

Data collection/management

Survey responses were collected via a web-based survey tool. The response database was stored in a confidential, password-protected file on a secure server accessible only to the analysts, downloaded to Microsoft Excel and exported to SAS Enterprise Guide 4.3 for statistical analysis.

Figure 1. Representative survey domains



Measures and statistical analysis

Descriptive (frequency, median, range, standard deviation [SD]) and comparative analyses (Chi-square, Fisher's exact test, Z-test and T-test) were conducted by likelihood of referral (high likelihood ≥ mean referral rates; low likelihood < mean), referral timing (early referrer <50% of AML patients referred in CR2 or later; late referrer >=50% AML patients referred in CR2 or later) and by time period (2010 versus 2014). Factor analysis and correspondence analysis was applied to identify the attributes that significantly explain the variations in how referring physicians think about HCT. Individual physicians were not identified; only aggregate data will be presented in study reports and manuscripts. Results were compared to findings from similar research conducted in 2010 NMDP/Be The Match to determine whether there had been change in rates of referral and perception of transplant. The survey was designed with 80% power to detect effect size = 0.2 (rate of referral) at 95% confidence interval, targeting **150 responses**.

Limitations

In addition to the national survey, we had originally planned to also survey physicians who were part of one closed and one open payer network. The surveys were placed into the field; however, the response rate was so low, despite offering a $150 honorarium and multiple contacts, that we were unable to complete those surveys.

Educational Needs Assessment Focus Groups:

The **primary objective of the focus groups was to better understand perceptions of HCT as a treatment option**. Secondary objectives included a deeper understanding of referral practice patterns and clinical decision-making, barriers to referral, educational preferences, and clarification of any unexpected survey findings.

Development

The study protocol team deliberated via conference calls to develop screener instruments and a semi-structured discussion guide.

Focus group recruitment and administration

Participants were selected by the vendor from the survey respondent pool with an emphasis placed on selecting a body of participants that was representative of demographic (practice setting, years in practice, etc.) distribution. A subset of N=20 respondents from the survey were selected to participate in the focus groups. A total of four virtual telephone focus groups were conducted, comprised of five participants each (N=20). The focus groups were conducted by the vendor via double-blinded conference calls August 27-September 9, 2015.

Data collection/management

An experienced moderator with background knowledge of hematologist/oncologist referral practice and HCT guided the discussion utilizing the semi-structured discussion guide to obtain qualitative data in a systematic and reliable manner. Audio recordings were converted to written transcripts for use in conducting qualitative analysis. Verbatim transcripts were sanitized in accordance with CASRO standards and saved in a secure folder.

Measures and analysis

Transcript-based analysis was utilized concurrently with data collection to identify saturation of themes across the data.[15] Two experienced reviewers familiar with the area of study and preliminary research analyzed the data.[16] Rigorous qualitative analysis was based primarily on verbatim transcripts of focus groups and subsequent moderator review. Responses were pulled from each line of questioning in the discussion guide. Moderators then collaborated on reviewing the transcripts and summarizing the interviews and responses.

Limitations

There were no limitations in the development, collection or analysis of the focus group results.

Objective 2 - Educational intervention

The results of the quantitative surveys and the qualitative focus groups informed the identification of knowledge gaps and the development and implementation of the educational intervention.

Study design of the educational intervention

Three web based webinars of 1-hour duration each were developed to address three knowledge gaps:

1. Proper classification of molecular/cytogenetic results for risk stratification and decisions making.
2. Disease stage at the time of HCT significantly impacts overall survival and mortality risks.
3. Use of chronological age alone to make decisions for HCT referral may exclude older HCT-eligible patients from considering curative therapy.

The three web-based webinars were held from September – November 2016.

A **planning committee** composed of academic-based hematologists/oncologists/HCT physicians, a community hematologist/oncologist, nurses, educations and communication specialists was established. The committee convened and deliberated via conference calls to develop the webinar topics and content. International experts were recruited as moderators and as presenters/discussants. The webinars incorporated case studies with participant engagement to access and apply knowledge. A polling feature was used to identify clinical choices during participation in the activity. Learners had the option to view the slides or download the materials for the 1-hour webinar.

Target audience: The target audience included hematologists, oncologists, nurse practitioners, physician assistants, and other health care professionals who treat patients with AML.

Webinar 1: AML risk stratification: Influence of emerging cytogenetics and molecular markers on treatment decisions

Description: Emerging molecular markers and cytogenetic alterations are changing the landscape of treatment decision-making in AML. Using an interactive, case study-based format, speakers discuss the prognostic importance of cytogenetic and molecular marker testing and how results are used to develop risk-adapted treatment choices to achieve optimal outcomes for patients. Speakers also discuss recommended standards of care for patients with intermediate- and high-risk AML.

Objectives:

1. Describe which cytogenetic and molecular marker testing should be completed for patients newly diagnosed with AML.
2. Cite latest research that revises categorization for intermediate- or high-risk disease.
3. Apply cytogenetic and molecular marker risk stratification to inform prognosis and guide therapeutic options.

Webinar 2: Making AML therapy decisions at first remission: Is timing everything?

Description: Panelists use case studies to present the latest research on key areas affecting clinical decision-making for patients with AML. Increase your knowledge regarding the prognostic impact of genetic mutations on survival, which is changing therapeutic decision-making for patients with AML in first complete remission (CR1). View research on disease status and the timing of therapy has shown a significant impact on patient outcomes. Presenters use an interactive, case study-based format to identify patient- and disease-specific factors used to assess the risks and benefits of post-induction therapy, including HCT) versus non-transplant therapies.

Objectives:

1. Utilize cytogenetic and molecular marker-based risk stratification for prognostic and therapeutic decisions for AML in CR1.
2. Identify the risks and benefits of available therapeutic options and how timing affects patient outcomes of HCT.
3. Cite recent clinical trial results and the impact of patient- and disease-specific factors on outcomes.
4. Utilize patient education resources to support the needs of patients and caregivers in understanding treatment choices.

Webinar 3 AML in older adults: Are outcomes age dependent?

Description: Panelists use case studies to present the latest research on key areas affecting clinical decision-making for patients with AML. AML disease heterogeneity and diverse patient fitness levels have led to debate over therapeutic options for older adults. New research is clarifying the risks and benefits of treatment choices for the increasing number of patients over age 60 years who are considering induction therapy and consolidative HCT. Using an interactive, case study-based format, presenters discuss patient comorbidities, disease factors and assessment tools that influence treatment decision-making.

Objectives:

1. Apply evidence-based patient- and disease-specific prognostic factors at diagnosis to identify potential treatment options for patients with AML.
2. Compare the risks and benefits of therapeutic options, including hematopoietic cell transplantation, for older patients with AML.
3. Cite recent clinical trial results and the impact of treatment timing and disease status on outcomes for older patients.
4. Utilize patient education resources to support the needs of patients and caregivers in understanding treatment choices for older patients.

Data Sources/Collection

A post evaluation survey was conducted using SurveyGizmo. Participants were required to complete the evaluation in order to receive continuing education credits.

Measures and statistical analysis

The measures for the webinars included attendance, intent to implement knowledge into their clinical practice, satisfaction with the speakers, overall rating of the activity, change in knowledge of participants post-participation compared with pre, Descriptive analysis was performed; chi-square test was utilized to assess for differences in change in knowledge.

Limitations

Only participants of the live webinars were able to be followed from pre- to post- test. Therefore, only those individuals were included in the analysis of change in knowledge. Although we had planned to assess for long-term retention of knowledge at 3-months, the small number who completed the 3-month post-webinar evaluation precluded analysis.

RESULTS

Objective 1 - Educational needs

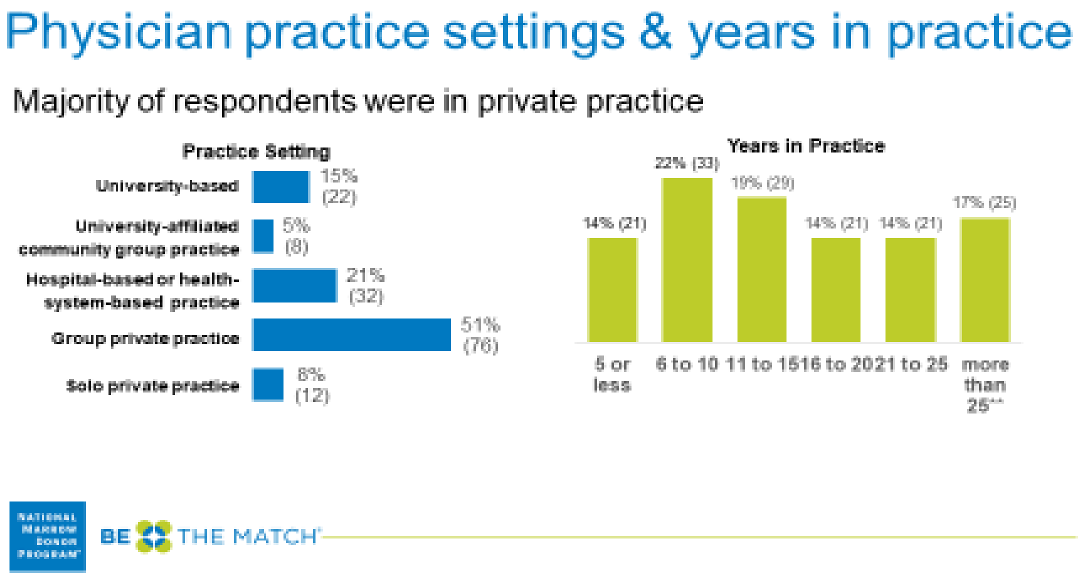
Principal Findings of the National Survey

The anonymous national survey conducted by the external vendor received 150 responses (100% of the targeted number). The respondents were divided into high and low referrers based on the mean referral rate of 24.0% of patients (High referrers, 24% or more, n = 68; Low referrers, <24%, n=82).

Physician demographics (n=150) (See Figure 2)

Demographics and results for the entire pool of 150 responding physicians are included as supplemental information and summarized here. Of the 150 respondents, 136 (91%) were hematologists; 86% cared for an adult only population with 14% both adult and pediatric populations. The majority of respondents were in private practice (group practice, 51%; solo private practice 8%). An additional 21% were in hospital-based or health-system-based practice; 20% were in a University-based or –affiliated practice. In terms of years in practice, 22% had been in practice 6 to 10 years; 17% more than 25 years (maximum was 32 years). Respondents in university or hospital practice were more likely to be high referrers; respondents in private practice were more likely to be low referrers. There was no relationship between practice location (rural/small town versus urban/suburban) and referral status. The mean time in practice for low referrers (17.5) years was significantly longer than for high referrers (12.6 years). This was also true in the 2010 survey conducted by NMDP. **The mean number of patients with AML seen in the previous 12 months was 14.6 (median 10) with the percentage of newly diagnosed and existing patients referred for HCT consultation being 5 (37%).** The vast majority of respondents (90%) spent >75% of their time in patient care.

Figure 2. Physicina practice settings and years in practice



Physician practice settings & years in practice

Majority of respondents were in private practice

Referral rate and timing

A mean of 40% of respondents had personally referred newly diagnosed and existing patients with AML for transplant consultation (n=150); 110 respondents had referred a total of 865 patients with AML (respondents with no AML referrals were excluded). The key driver analysis showed that information/knowledge about HCT as a therapy option was a significant factor in physicians referring patients for HCT consultation. When asked how the timing of referral for transplant consultation within the past 12 months compared with previous years, 32% of respondents stated that they were referring earlier in the disease course compared with 23% in 2010. While the majority of patients were referred in CR1 (by respondent, 61%; by aggregate patient volume, 52%); the remaining patients (over 1/3) were referred later in the diseases course (CR2 or later). The primary reason for late referral or non-referral was that patient cytogenetic or molecular abnormalities did not warrant referral in CR1; other reasons included rapid disease progression, relapse post initial response, co-morbidities, older age, and patient declined referral.

Knowledge gaps

There was substantial variation in recognition of good- intermediate- and poor-risk factors that should not (good-risk disease) or should (intermediate- and poor- risk disease) prompt referral for HCT.

The survey asked: "For patients with AML who have the following molecular/cytogenetic abnormalities, please indicate if you would refer the patient for transplant consultation in CR1 (assume no other patient barriers)." **Table 1** shows selected examples; bold indicates knowledge gaps.

Table 1. Respondents indicating referral for HCT by molecular/genetic findings

Cytogenetic and Molecular Data	Disease risk per NCCN guidelines	Guidelines recommend referral	Yes (would refer for HCT)	No (would not refer for HCT	Not sure
Normal karyotype with NPM1 mutation (without FLT3-ITD mutation)	Favorable risk	No	**57 (38%)**	55 (37%)	**32 (21%)**
Good risk karyotype (t (8;21); inv 16; t(16;16) with C-KIT mutation	Intermediate risk	Yes	41 (27%)	**84 (56%)**	**24 (16%)**
Monosomal karyotype on cytogenetics (e.g., -5, -7)	Poor risk	Yes	109 (73%)	**13 (9%)**	**27 (18%)**

Perception of HCT for AML

We asked a number of questions about perceptions of HCT for patients with AML in order to gain insights into potential drivers of referral behavior. As examples: 1) Just over half agreed that HLA typing should be performed for all patients at time of diagnosis with AML as recommended by guidelines; 2) Only 45% agreed that HCT outcomes for AML are usually better if the patient receives HCT early in the disease; 3) Despite advances in HCT that have led to older age alone no longer being a contraindication to HCT, the mean upper age limit for which respondents would refer their patients was 62 years (related donor available) and 65 years (unrelated donor needed), with little change compared to 2010 data. Only 29% of respondents felt that patients 60 years of age and older with AML can usually benefit from transplant.

Referral relationships

Consistently high transplant center quality metrics had not changed significantly since 2010. Both high and low referring physicians felt that the transplant centers where they referred their patients (typically 1-2 and within 50 miles of their practice) provided them with advice on which patients were the best candidates for HCT and were prompt in responding to questions before and after a patient's transplant.

Educational resources

Only 38% of respondents felt they had the information needed to understand when a patient with AML should be referred for transplant consultation, including the prognostic impact of cytogenetic and molecular markers. Low referring physicians were more likely to not have adequate knowledge. **The most commonly used guidelines for management of patients were the NCCN guidelines**. To better understand how to best deliver such information, we asked the respondents how they wished to receive information about HCT and what were credible sources of information. Case-based (not transplant specific, but broad, disease based) educational programs on-line or at a national meeting led by experts were preferred; the least preferred method of delivery was by a health care organization (payer). The American Society of Hematology (ASH), American Society of Clinical Oncology (ASCO), NCCN, American Society of Blood and Marrow Transplantation (ASBMT), Center for International Blood and Marrow Transplant Research (CIBMTR), Leukemia and Lymphoma Society (LLS) and the NMDP/Be The Match were all felt to be credible organizations for information.

Principal Findings of the Focus Groups

Physician demographics (n=20)

- Medical specialty: hematology/oncology (n=19); oncology only (n=1)
- Patients cared for: Adult (n=18); Adult/pediatric (n=2)
- Practice Setting: University-based/affiliated (n=4); Hospital based/health-system based (n=4); Group/solo practice (n=12)
- Years in practice: 0-5 (n=2); 6-10 (n=6); 11-15 (n=4); 16-20 (n=4); 21-25 (n=3); 25+ (n=4)

Themes

Referral patterns

Comments confirmed a divergence of perspectives regarding referral patterns. Some respondents indicate that referrals were now appropriate earlier and for more patients.

- "I think that actually the referrals have been earlier now than they might've been five years ago. I think the indication for transplant has broadened. I think the age range and the amount of comorbidities that will be allowed…have broadened as they've gotten better at doing things like mini transplants and lower intensity transplants."
- "We keep on pushing the envelope and move the age up. And, of course, there's also more public awareness, patient demand…and possibly there is the feedback from the referring physician. So all these factors led to, I guess, more acceptance and a wider

use of transplant."

Impact of patient age on referral

Even though maximum referral age does not differ by referral status, attitudes about transplant in older patients were different. Most respondents expressed no "hard and fast" rule about age, but rather opined that age and performance status both need to be taken into account. **Perceived outcomes in patients over age 60 was the sole attitudinal metric significantly associated with referral status**.

- "I disagree with the 65. I think now 65 is relatively young. What I really look at is not so much their real age or their developmental age, but really, really how fit they are. You really could have somebody who's 60 and he's really sick and you could have somebody who's 70 and is perfectly healthy."
- The folks we refer to have chosen age 75 as a cut-off for their allogeneic transplants. So for that purpose, I would not consider anybody over that, but I would consider anybody up until that."

Educational resources

ASH, ASCO and NCCN were the most cited organizations for education/practice guidelines; participants stated that payer networks were not credible sources and they preferred not to use payer-directed pathways of care. Consistent with the survey data, focus group participants voiced appreciation of case-based, web-based activities with subject matter experts that offer CME.

Objective 1 - Outcomes

The needs assessment of hematology/oncology clinicians found that only 38% of participating physicians stated they felt they had the knowledge needed to determine when patients should be referred for HCT consultation The results also indicated varying levels of recognition of the risk level associated with common intermediate/high risk cytogenetic and molecular markers, according to the guidelines issued by the NCCN. In addition, the age of a patient was inaccurately used to select therapeutic options. Findings of the needs assessment informed the development and implementation of educational intervention(s) specific to the clinical practice gaps among community hematologists/oncologists.

Objective 2 - Educational intervention

Three case-based webinars of 1-hour duration each, with 3 international subject matter experts/webinar) were developed to address the three major knowledge gaps identified in the needs assessment:

- Proper classification of molecular/cytogenetic results for risk stratification and decisions making. (**Webinar 1: AML risk stratification: Influence of emerging cytogenetics and molecular markers on treatment decision)**
- Disease stage at the time of HCT significantly impacts overall survival and mortality risks. **(Webinar 2: Making AML therapy decisions at first remission: Is timing everything?)**
- Use of chronological age alone to make decisions for HCT referral may exclude older HCT-eligible patients from considering curative therapy. (**Webinar 3 AML in older adults: Are outcomes age dependent?)**

Since the NCCN guidelines were used by most participants for treatment decision making, we used them for educational purposes for treatment decision/disease risk stratification.

Principal Findings

The live webinars were held September-November 2016. Subsequently, the webinars were developed into a self-directed enduring learning activity made available on the NMDP website until January 25, 2018. CME or continuing nursing education (CNE) was provided for those who completed a pre- and post-test. A certificate of attendance was offered to all others.

Attendance

Combining the live and enduring activities for all 3 webinars, the total number of health care professionals participating was 1,098 (Table 2). Based on survey data that showed that each participating physician had seen approximately 15 patients with AML in the preceding 12 months, a conservative estimate is that >1000 patients were impacted by this project.

Table 2: Attendance by webinar format

	Webinar 1	Webinar 2	Webinar 3
Webinar Format	N (%)	N (%)	N (%)
Live	153 (47%)	137 (28%)	116 (41%)
Enduring	173 (53%)	350 (72%)	169 (59%)
Total	**326**	**487**	**285**

Evaluation

We requested that webinar participants (learners) complete an evaluation of the webinars. **Table 3** shows the number of evaluators by webinar format and learner type. We also requested a 3-month post evaluation; unfortunately, that time point had a very low response rate (5-7%) that precluded further analysis. Across the three webinars, participants were highly satisfied with the content discussed in the webinars, appreciated the generous time the clinicians allowed for the question and answer sessions, and found the webinars easy to access.

- **>74%** indicated they would apply the knowledge gained in their clinical practice
- **>93%** felt that the content was well organized and clear, the presenters' style was very good/good, and that the presenters demonstrated subject matter expertise
- **>82%** strongly agreed/agreed that the educational objectives were met
- **>94%** rated the education activity overall as being very good/good

Table 3. Webinar evaluations completed by format and learner type

Immediate Post-Webinar Evaluation			
Webinar Format	N (%)	N (%)	N (%)
Live	92 (48%)	67 (23.9%)	64 (33.5%)
Enduring	101 (52%)	213 (76.1%)	127 (66.5%)
Total	**193**	**280**	**191**
Learner Type			
Physician	33 (17%)	42 (15%)	35 (18.3%)

Nurse	63 (33%)	91 (33%)	61 (31.9%)
Nurse Practitioner	48 (25%)	79 (28%)	49 (25.7%)
Physician Assistant	17 (9%)	30 (11%)	15 (7.9%)
Advanced Practice Nurse	6 (3%)	11 (4%)	7 (3.7%)
Pharmacist	7 (4%)	12 (4%)	10 (5.2%)
Physician (fellow/ resident)	2 (1%)	1 (0%)	4 (2.1%)
Researcher	5 (3%)	1 (0%)	4 (2.1%)
Other	12 (6%)	13 (5%)	6 (3.1%)

Knowledge gaps

We assessed improvement in knowledge gaps for individual participants who completed both the pre- and post-test for each live webinar (see Figures 3-5) and demonstrated:

- Webinar 1: Trend in improvement identifying the correct answer from 48% to 60% (p=0.12, not statistically significant)
- Webinar 2: Improvement in identifying 2 of the correct answers (51-70%, p=0.05; 42-62%, p=0.03)
- Webinar 3: Trend in improvement identifying the correct answer from 66-81% (p=0.07)

A comparison of all live-webinar participants as a group who took the pre- and post-tests are included in supplementary materials (Webinar Attendance and Evaluation).

Figure 3. Comparison of pre- and post- test results for Webinar 1. The correct answer is t(8:21) with c-KIT mutation

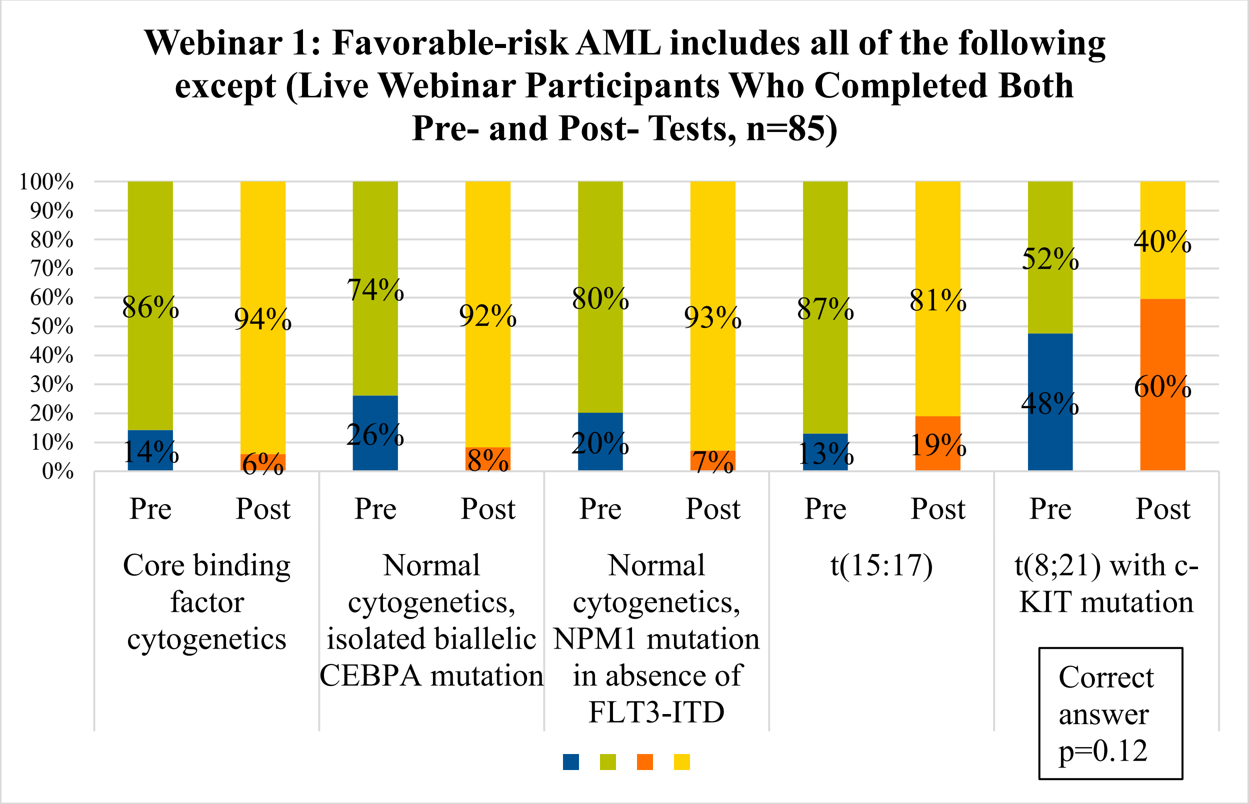


Figure 4. Comparison of pre- and post-test results for Webinar 2. The correct answers are t(9;11), -7, and TP53 mutation

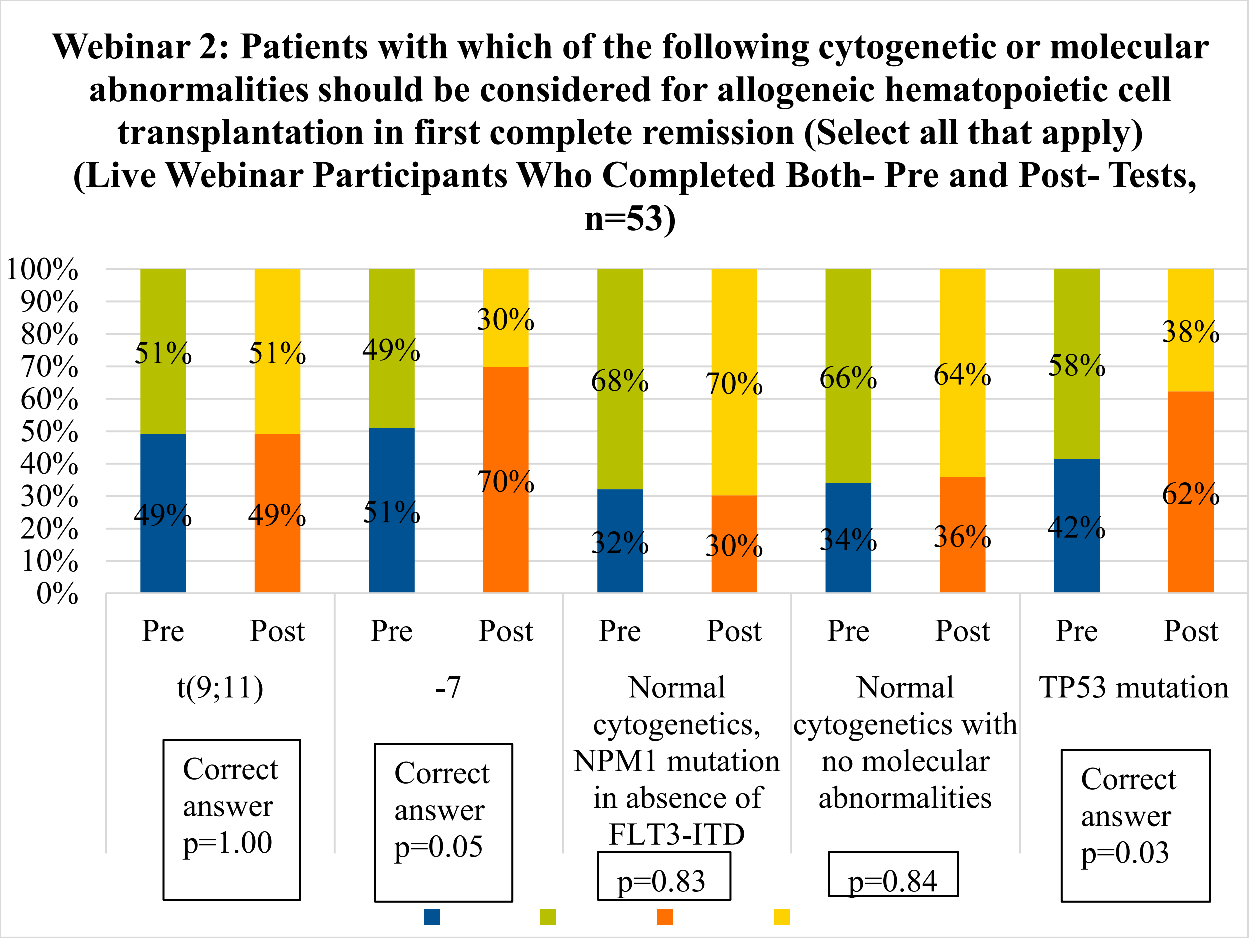
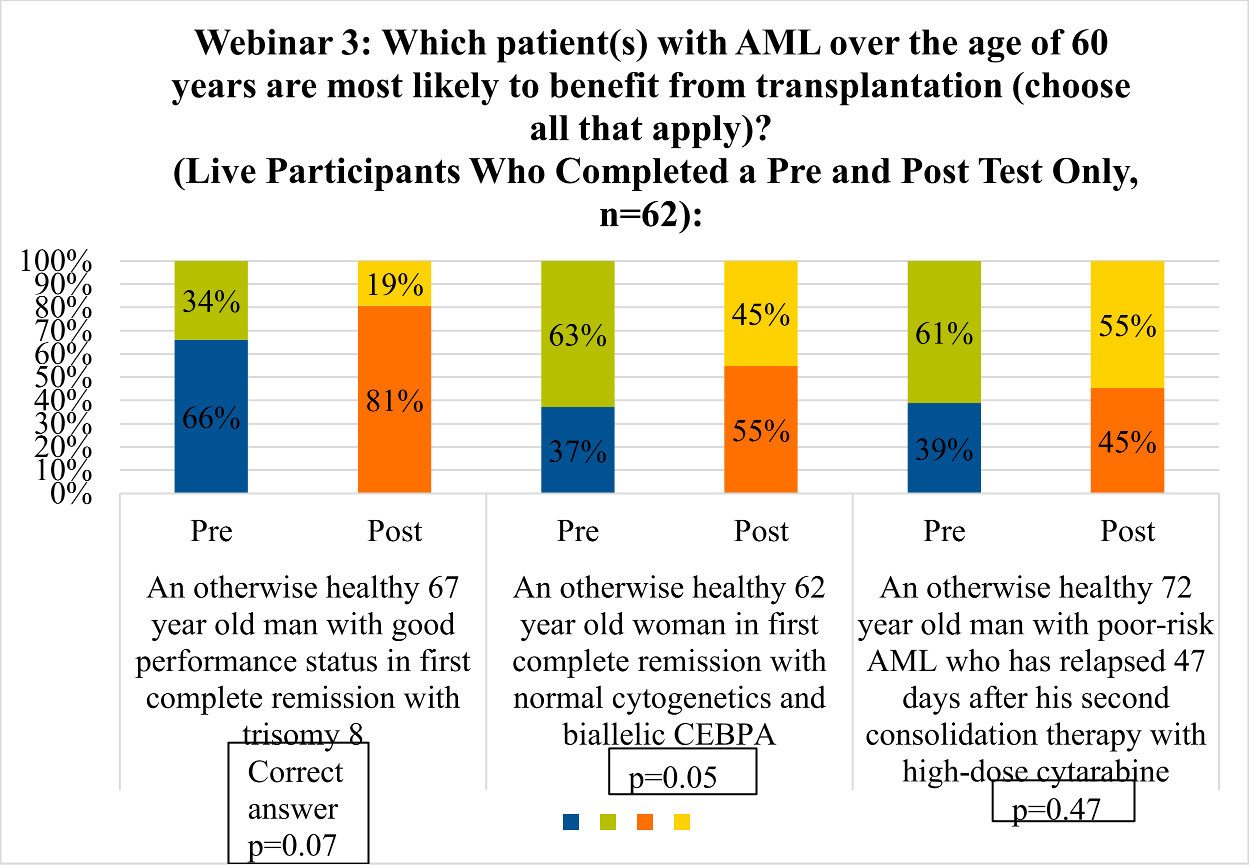


Figure 5. Comparison of pre- and post-test results for Webinar 3 in which the correct answer is trisomy 8



Objective 3 - With the expertise of the NMDP Board's AGFBT, devise recommendations for health insurance programs on the implementation of educational and potentially incentivized programs focused on optimal timing of referral for HCT consultation among hematologists/oncologists in contracted provider networks.

The results from the needs assessment provided strong evidence that contracted provider networks are not felt by community hematologists/oncologists to be credible sources for providing physician education on HCT and/or hematologic malignancies. Of the 150 survey participants, 55% indicated they were not credible, 26% were neutral, and only 19% stated they were credible. ASH and ASCO, closely followed by NCCN, were felt to be the most credible organizations (77%, 77% and 68% credibility, respectively). This information was shared with the NMDP Advisory Group on Financial Barriers to Transplant (AGFBT) that is comprised of payers who represent approximately 90% of covered lives in the US. The AGFBT met in August 2017 to specifically discuss the results of this project and opportunities for NMDP and payers to connect with community healthcare professionals with regards to AML treatment decision making and referral for HCT consultation. We have also have partnered with payers to provide education to insurance company case managers on AML.

We have also established collaborations with those organizations felt to be most credible by participants in this project. As one example, we are in the second year of a collaboration with ASH and other partner organization (Oncology Nursing Society, American Society of Clinical Pathologists, and The France Foundation) on a nation-wide program: AML MATTERS, a **M**ultidisciplinary **A**pproach **T**o **T**esting and Diagnosis, **E**valuation of **R**isk and Personalized Treatment **S**election. The program includes 4 regional summits each year, a special education program at the ASH annual meeting, and both live and online learning opportunities. In 2017 we reached **over 3,000 clinicians** estimated to have **cared for over 10,000 patients with AML** in the preceding year. Over **90% of learners reported gain of new knowledge**, and **78% planned to implement practice changes** as a result of the education. We have also collaborated with the LLS on webinars on AML for health professionals. We also recognize that patients question their providers about therapeutic options, including HCT. We now sponsor the NCCN's AML patient guidelines, and have established the NMDP Jason Carter Clinical Trials Program for patients and health professionals to easily identify clinical trials in AML and other hematologic malignancies encompassing both non-HCT and HCT therapies. A dedicated nurse provides personal service.

DISCUSSION

We demonstrated significant knowledge gaps among participants, consistent with our hypothesis that barriers to referral to HCT consultation for patients with AML include a lack of knowledge about cytogenetic and molecular testing and interpretation, as well as the perception that HCT outcomes for older patients are not as good as for younger patients. Interestingly, referral rate and self-perception of having adequate knowledge correlated with years in practice, suggesting that once finishing formal training it is becomes difficult for community hematologists to "keep up" with the rapid advances that are taking place in the diagnosis, risk stratification, and management of patients with AML.

Respondents generally report a positive working relationship with their primary transplant centers that was confirmed by the focus group participants. Therefore, relationships with the transplant centers do not appear to be a barrier to timely referral for transplantation, suggesting that knowledge gaps are the primary barrier.

The survey data and the focus group discussions informed the planning committee in identifying the major knowledge gaps to address in an educational intervention, and also suggested the optimal format of the intervention. The data/discussions suggested that it would be more effective to combine transplant information with other information about AML in an educational intervention. Educational programs that are case-based, assessable on-line and include outside experts of relevance to the community practice setting are preferred. We used this information to develop our educational intervention on AML that included 3 case-based webinars with both non-HCT and HCT topics, were assessable in a live-format as well as on-line for self-learning, included internationally recognized subject matter experts in AML not affiliated with NMDP, and offered an additional learning opportunity for continuing medical education (CME), continuing nursing education (CNE) and case manager continuing education (CMCE) credit.

The webinars reached over 1000 learners who participate in multidisciplinary care teams. Encouragingly, we were able to demonstrate statistically significant improvement in interpretation of molecular/cytogenetic data for proper risk stratification based on the NCCN guidelines for some areas. However, we were unable to demonstrate improvement for all areas. This may be reflective of the many types of learners in the activity who had varying levels of baseline knowledge of AML, the smaller number of respondents for the post-test than the pre-test, and/or that more education in various types of formats and repetition are required for optimal learning. An advantage of the enduring materials was that learners could assess the material and review at their own pace, and as frequently as they wished. The CME materials were also case-based, and designed to both reinforce and extend knowledge gained.

While we did not experience any barriers in project completion, there were some limitations to the work. We were unable to determine change in knowledge gap for the individual participant in the enduring webinars due to system issues. We were also unable to determine if sustained learning occurred due to the small number of evaluations returned at the 3-month post-webinar time point. Despite these limitations, the results of the project provided novel insights into the learning needs of community clinicians who care for patients with AML, and provided a roadmap for future educational interventions.

CONCLUSIONS

This project found that barriers to physician referral to HCT consultation for patients with AML include a lack of knowledge about molecular/cytogenetic testing and interpretation, as well as the perception that HCT outcomes for older patients are not as good as for younger patients. Lack of knowledge increased with more years spent in clinical practice. Educational interventions addressing knowledge gaps of community hematologists/oncologists must be developed and implemented to ensure that patients receive optimal care. These educational interventions must be from resources community physicians perceive to be credible, and in their preferred format, in order to close knowledge gaps.

SIGNIFICANCE

Hematopoietic cell transplant (HCT) is an under-utilized therapy for patients with AML. Outcomes of HCT are better when HCT is performed early in the disease course. Given that HCT is performed only at transplant centers that provide this highly complex, potentially curative therapy, it is critical that patients with AML for whom HCT is the optimal therapy are referred by community physicians to transplant centers in a timely manner. Barriers to referral to HCT consultation for patients with AML must be addressed in order to improve outcomes for patients with AML.

IMPLICATIONS

The results of this project should be used by all organizations committed to providing quality education in order to ensure that patients with AML receive optimal care. Scientific advances are rapidly changing the ability to diagnose and risk-stratify AML such that it is increasingly difficult for all physicians, but particularly physicians in the community setting, to remain up-to-date. Therefore, there will be an ongoing need for reliable and quality educational interventions.

LIST OF PUBLICATIONS AND PRODUCTS

- Manuscript in development describing the findings from the needs assessment and evaluation (combined in single paper);
- Three webinars (PowerPoint presentations)

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