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National Survey of Hematopoietic Cell Transplantation Center Personnel, Infrastructure, and Models of Care Delivery

Navneet S. Majhail [1,*], Lih-Wen Mau [2], Pintip Chitphakdithai [3], Tammy Payton [2], Michael Eckrich [4], Steven Joffe [5], Stephanie J. Lee [6], Charles F. LeMaistre [7], Jennifer LeRademacher [8], Fausto Loberiza [9], Brent Logan [8], Susan K. Parsons [10], Ramona Repaczki-Jones [11], Pam Robinett [2], J. Douglas Rizzo [12], Elizabeth Murphy [2], Ellen M. Denzen [2]

[1] *Blood and Marrow Transplant Program, Cleveland Clinic, Cleveland, Ohio*
[2] *National Marrow Donor Program, Minneapolis, Minnesota*
[3] *Center for International Blood and Marrow Transplant Research, Minneapolis, Minnesota*
[4] *Division of Pediatric Blood and Marrow Transplant, Levine Children's Hospital, Charlotte, North Carolina*
[5] *Department of Medical Ethics & Health Policy, University of Pennsylvania Perelman School of Medicine, Philadelphia, Pennsylvania*
[6] *Clinical Research Division, Fred Hutchinson Cancer Research Center, Seattle, Washington*
[7] *Sarah Cannon Cancer Institute, Nashville, Tennessee*
[8] *Division of Biostatistics, Medical College of Wisconsin, Milwaukee, Wisconsin*
[9] *Pfizer Oncology, Omaha, Nebraska*
[10] *Center for Health Solutions, Tufts Medical Center, Boston, Massachusetts*
[11] *Blood and Marrow Transplant Program, Moffitt Cancer Center, Tampa, Florida*
[12] *Center for International Blood and Marrow Transplant Research, Milwaukee, Wisconsin*

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A B S T R A C T

Hematopoietic cell transplantation (HCT) is a complex procedure that requires availability of adequate infrastructure, personnel, and resources at transplantation centers. We conducted a national survey of transplantation centers in the United States to obtain data on their personnel, infrastructure, and care delivery models. A 42-item web-based survey was administered to medical directors of transplantation centers in the United States that reported any allogeneic HCT to the Center for International Blood and Marrow Transplant Research in 2011. The response rate for the survey was 79% for adult programs (85 of 108 centers) and 82% for pediatric programs (54 of 66 centers). For describing results, we categorized centers into groups with similar volumes based on 2010 total HCT activity (adult centers, 9 categories; pediatric centers, 6 categories). We observed considerable variation in available resources, infrastructure, personnel, and care delivery models among adult and pediatric transplantation centers. Characteristics varied substantially among centers with comparable transplantation volumes. Transplantation centers may find these data helpful in assessing their present capacity and use them to evaluate potential resource needs for personnel, infrastructure, and care delivery and in planning for growth.

INTRODUCTION

Approximately 20,000 patients receive autologous or allogeneic hematopoietic cell transplantation (HCT) in the United States each year. This number is expected to steadily increase because of advances in transplantation technology and supportive care, increasing donor availability, expanding indications, and growth in the overall number of patients with hematologic cancers because of an aging population [1-4]. In the present era, the majority of patients who need HCT can find a suitable donor. Hence, human resources, structural constraints, and patient access barriers have emerged as critical system capacity barriers to the anticipated need for HCT. Human resource constraints include a projected shortage of physicians, physician assistants, nurse practitioners, nurses, pharmacists, and other health care professionals who make up the HCT workforce [1,5-7]. Structural constraints include availability of adequate facilities, efficient

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* Correspondence and reprint requests: Navneet S. Majhail, MD, MS, Blood and Marrow Transplant Program, Cleveland Clinic, Taussig Cancer Institute, 9500 Euclid Avenue R35, Cleveland, OH 44195.
E-mail address: majhain@ccf.org (N.S. Majhail).

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and safe care delivery models, and the infrastructure required to meet the demand for HCT. Key patient access barriers include health disparities for underserved, minority, low-income and rural populations, transportation and financial burdens, lack of caregiver support, and limited access to transplantation-related patient information [1,6,8]. The increasing number of transplantation survivors will add to the resource constraints faced by transplantation centers [9].

HCT is a complex procedure that is available through select institutions that have the necessary expertise and resources. However, infrastructure and resources available at transplantation centers can vary. Centers with similar transplantation volume may differ substantially in resources and personnel. A better understanding of center characteristics will help transplantation centers identify opportunities for optimizing their care delivery models and will assist centers and policy makers in planning for the projected increase in the need for HCT. To facilitate this, we conducted a national survey of United States transplantation centers to obtain data on their personnel, infrastructure, and care delivery models. This manuscript presents the methods for the survey and highlights from the report. The complete report is available at www.cibmtr.org/ReferenceCenter/SlidesReports/Pages/Index.aspx.

METHODS

Survey Development and Administration

The survey was developed in consultation with content experts in HCT and health services research. The final instrument was a 42-item web-based survey. Transplantation center medical directors were the primary audience for the survey. The survey was piloted with medical directors of 5 transplantation programs (3 adult centers, 1 combined center, and 1 pediatric center) to evaluate its content validity and to obtain an estimate of the time needed to complete the survey. The final survey was administered through web-based survey software (SurveyGizmo). Survey respondents were offered a $50 Visa gift card as incentive to complete the survey. The study was conducted under guidance of the National Marrow Donor Program's institutional review board. The survey was administered in 2012.

The survey was sent to transplantation centers in the United States that reported any allogeneic HCT to the Center for International Blood and Marrow Transplant Research (CIBMTR) in calendar year 2011. The CIBMTR is a voluntary working group of more than 500 transplantation centers worldwide that contribute detailed data on all consecutive HCTs to a statistical center at the Medical College of Wisconsin in Milwaukee and the National Marrow Donor Program in Minneapolis. The CIBMTR also administers the Stem Cell Therapeutic Outcomes Database part of the C.W. Bill Young Transplantation Program through a contract with the Health Resources and Services Administration. Under the purview of this law, transplantation centers in the United States are required to report outcomes for all allogeneic HCT recipients to the CIBMTR. Hence, the CIBMTR captures nearly all allogeneic HCT activity and the majority of autologous HCT activity in the United States.

Some centers report data on both adult and pediatric HCT recipients to the CIBMTR (n = 41 centers in 2011). We established multiple processes to determine whether these centers had integrated pediatric-adult programs or separate adult and pediatric programs. Center characterization was based on the age distribution of HCT recipients reported by these centers and a survey of transplantation center data personnel and center medical directors to inquire about program organization. Centers with 1 medical director for both pediatric and adult programs were classified as integrated programs. For centers with separate medical directors for the pediatric and adult programs, we invited the medical director of each program to participate in the survey.

In 2011, 172 transplantation centers in the United States reported allogeneic HCT to the CIBMTR and were eligible to participate in the survey. Among these centers, 89 reported allogeneic transplantations on adult recipients, 42 on pediatric recipients and, as noted above, 41 reported data on both pediatric and adult recipients. From the latter, using the process described above, we identified 26 centers with separate medical directors for the adult and pediatric programs and 15 integrated pediatric-adult programs. Based on this assignment, the survey was administered to a total of 198 United States transplantation centers (115 adult programs [89 + 26], 68 pediatric programs [42 + 26], and 15 combined pediatric-adult programs). Integrated pediatric-adult programs are not reported in this analysis given their small number and large variability in transplantation volume.

Survey Domains

The survey inquired about 4 domains of provider and center characteristics:

1. Physician and health care provider characteristics (eg, number of transplantation physicians, number of advanced practice providers [APP], inpatient nurse staffing ratio, and other personnel). Of note, the survey inquired about mid-level providers, but we use the preferred term *APPs* instead in this report.
2. Transplantation unit structure and resources (eg, availability of a dedicated inpatient unit, number of beds for HCT, outpatient clinic facilities, stem cell processing facilities, Foundation for the Accreditation of Cellular Therapies [FACT] accreditation status, emergency call structure, and research participation).
3. Medical care team structure and processes (eg, structure of inpatient and outpatient medical teams, role of trainees, APPs, and other healthcare providers, models of care for inpatients and outpatients, critical care support, and transition of care).
4. Medical center characteristics (eg, center location, teaching status, ownership status, hospital size, National Cancer Institute Comprehensive Cancer Center [NCI CCC] designation, patient population treated).

Survey Response

Center medical directors were invited to participate in the survey via e-mail. Three reminders were sent to invitees who did not responded to the initial invite. The study team subsequently made a phone attempt to reach the survey invitees.

From the 183 adult and pediatric centers invited to participate in the survey, 9 centers were deemed ineligible for analysis because they were inactive at the time of survey administration (n = 2), were part of a larger program but reported data separately to CIBMTR (n = 1), or had performed no allogeneic HCT in the preceding 3 years (n = 6). Hence, the response rate for the survey was 79% for adult programs (85 of 108 centers) and 82% for pediatric programs (54 of 66 centers). Nonresponding centers reported lower HCT than responding centers (median total HCT volume in 2010 was 46 versus 101 transplantations for adult responding centers and 16 versus 25 for responding pediatric centers).

Some centers do not routinely report all autologous HCT activity to the CIBMTR. From such centers that responded to the survey, we requested confirmation of their autologous HCT volumes for 2010. We excluded 2 centers (1 adult, 1 pediatric) whose autologous HCT volumes could not be verified. Hence, the final report describes characteristics of 84 adult and 53 pediatric programs.

Statistical Analysis

Based on their total autologous and allogeneic HCT volume reported to the CIBMTR in 2010, adult centers were classified into 9 categories and pediatric centers into 6 categories. Such categorization of similar-sized centers together allows centers to compare themselves with peer programs and allows us to meaningfully describe center characteristics. This paper presents the descriptive results of centers that responded to the survey and were included in the final analysis. Results are presented as median and range or as count and proportion, as applicable.

RESULTS: ADULT CENTERS

Center Characteristics

The 84 adult transplantation programs that were included in the analysis represented 11,837 transplant recipients in 2010. Table 1 describes the characteristics of patients who underwent transplantation at these centers. Centers were mostly located in privately owned institutions (n = 62, 74%; nonprofit 92% and for-profit 8%) and were affiliated with a teaching hospital (n = 67, 80%). Thirty-seven (44%) centers were affiliated with a NCI CCC; this varied by center size as none of the very low volume centers (≤30 HCT/year) and 88% of the very high volume centers (>300 HCT/year) had NCI CCC affiliation. Most centers (n = 75, 89%) had