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Transplant center practices for psychosocial assessment and management of pediatric hematopoietic stem cell donors

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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Abstract

Understanding the potential emotional and psychological risks of pediatric sibling HSC donation is an area of research that remains in its infancy. A cross-sectional survey was distributed electronically to directors at all CIBMTR and EBMT centers to describe current transplant center practices for obtaining assent, preparation for the physical/emotional experiences of donation, and monitoring the post-donation well-being of pediatric donors (<18 years of age). Respondents were 45/91 (49%) and 66/144 (46%) of CIBMTR and EBMT centers, respectively. Although 78% of centers reported having a mechanism in place to ensure donor free assent, centers also reported only limited assessment of psychosocial suitability to manage the emotional risks of donation. More than half of centers reported no psychosocial follow-up assessment post-donation. Few centers have policies in place to address donor psychological needs. Future investigations should include medical and psychosocial outcomes following full integration of comprehensive psychosocial screening and surveillance of pediatric donors.

Background

Hematopoietic stem cell transplantation (HSCT) is an established standard treatment for children and youth with certain malignant and non-malignant conditions. In 2015, centers offering bone marrow and stem cell transplants within the United States (US) performed approximately 1300 pediatric allogeneic stem cell transplants [1] and European centers performed more than 3000 pediatric transplants [2].

Allogeneic HSCT cannot be performed without a hematopoietic stem cell (HSC) donor. In approximately one-third of pediatric HSC transplants performed in the US, the donor is under the age of 18 and a sibling of the recipient [3]. Human leukocyte antigen-matched siblings are generally the preferred donor over matched unrelated donors due to lower risks of graft rejection and graft-versus-host disease, the fact that younger donors generally produce better recipient outcomes, and the availability of the donor for future therapeutic interventions—e.g., prophylactic donor lymphocyte infusion—if needed [4, 5]. Pediatric donation of bone marrow or stem cells is considered to be medically safe for the donor but does potentially hold some risk for complications. Donors may experience complications related to anesthesia, have bone pain related to the administration of granulocyte colony stimulating factor prior to the collection of stem cells, pain associated with a central venous catheter insertion or a bone marrow harvest, require blood transfusions, acquire infections, or suffer from fatigue, nausea, and vomiting [3, 6].

There is no medical benefit to the donor; however, there is the potential for psychological benefit, as well as harm. In 2010, the Bioethics Committee of the American Academy of Pediatrics (AAP) published recommendations regarding the conditions under which it is acceptable for a minor sibling donor to donate for HSC transplantation [7]. They include when

(1) there is no medically equivalent histo-compatible adult relative who is willing and able to donate; (2) there is a strong personal and emotionally positive relationship between the donor and recipient; (3) there is some likelihood that the recipient will benefit from transplantation; (4) the clinical, emotional, and psychosocial risks to the donor can be minimized and are reasonable in relation to the benefits expected to accrue to the donor and to the recipient; and (5) parental permission, and when appropriate, child assent have been obtained. The AAP also recommended the appointment of a donor advocate whose role would be to help parents and donors understand the medical procedure the donor would undergo as well as to independently “protect and promote the interests and well-being of the donor” as separate from the recipient [7].

Understanding the emotional and psychological experience (and potential risks and benefits) of pediatric donors is an area of research that is growing but remains in its infancy, with some of the earliest work completed in the mid to late 1990s [8]. Most studies involving sibling donors are retrospective and involved semi-structured interviews along with the use of standardized tools. Findings from these studies shed insight into the wide range of positive emotions sibling donors experience, including bringing the family closer together, improved relationships with their ill sibling, improved self-esteem, a sense of pride, and feelings of having “saved a life”. However, negative experiences were also identified, including loneliness, separation from parents, anger, guilt, blame, anxiety, depression, somatization, withdrawal, psychological distress, heightened responsibility for the recipient’s outcome, and coercion to donate [9–19]. The complexity associated with perceived donor benefit and harm associated with the effects of the donation have also been identified, with the donors’ reporting both positive and negative effects and parents less able to see some of the more troubling effects of donation [20].

In the largest systematic investigation of pediatric donor health-related quality-of-life (HRQoL) to date, 20% of donors at 4 weeks and 1-year post donation had very poor HRQoL, with self-reported HRQoL being significantly lower than parent proxy-reported HRQoL and significantly lower than that of healthy normative comparison children [21]. Younger children (ages 5–7) were at particular risk of poor HRQoL [21]. The majority of parents interviewed (70%) linked their child’s positive and negative experiences with their child’s ability to understand the donation process [22].

In fact, recurrent themes in much of the previous research has been siblings’ sense of not being adequately prepared for what to expect during and after donation [18, 23], limited communication within the family around transplant decisions [21], and concern that they were not given a choice about whether to donate [11, 14, 18, 19]. One pro-spective, longitudinal study involving 119 immediate and extended family members of 33 pediatric HSCT patients found most family members did not view sibling typing and donation as a choice but felt positive about the experience. Only one donor expressed regret post donation [18]. However, several areas requiring improvement in donor education, preparation, and follow-up were identified. These studies have been a catalyst for a call to standardize how pediatric [24] donors are assessed and prepared for donation, how they cope with the collection procedures, and how they are monitored following donation [25–27].

The Foundation for the Accreditation of Cellular Therapy (FACT) and JACIE, the Joint Accreditation Committee for the International Society for Cellular Therapy (ISCT) and European Society for Blood and Marrow Transplantation (EBMT) have published standards regarding the collection, clinical care, and processing facility procedures for cellular therapies [28]. The section of the standards dedicated to donor selection, evaluation, and management sets forth guidelines around principles of risks/benefits, procedures and tests, methods of collection, consent and withdrawal of consent, and donor advocate assignment to assist with donor understanding. There is also a provision that disallows donors to be evaluated by the same licensed healthcare providers who are overseeing the care of the recipients. However, the only reference to pediatric donation is with regard to consent; the donor's legal guardian or authorized representative has the right to provide consent for the pediatric donor in accordance with applicable regulations and laws. Furthermore, the standards document does not address donor psychological preparation, outcomes, or follow-up. This current study was established to describe current transplant center practices for psychosocial evaluation and management of pediatric donors (<18 years of age), and to examine differences in practices by numbers of harvests (volume), FACT and JACIE accreditation status, and organizational affiliation (Center for International Blood and Marrow Donation Program (CIBMTR/EBMT)).

Materials and methods

Study review and approval

This investigation was reviewed and approved by the Institutional Review Boards at the University of Pittsburgh and the National Marrow Donor Program and by the NIH Office of Human Subjects Research Protections (OHSRP) who determined the study to be exempt from further Institutional Review Board review. It was determined that the organizational level nature of the data collected did not require signed informed consent from participating center directors.

Participants and study design

A cross-sectional questionnaire was distributed electronically to directors at all CIBMTR and EBMT centers between 18 September 2017 and 20 November 2017. Data were collected via a secure website and center identifying information was used solely for tracking and reminder purposes. Identifying information was de-linked from the survey at the end of data collection. An initial email was sent to all transplant center directors that explained the purpose and scope of the study. An individualized link was provided for each center. Up to eight reminder emails were sent to centers that did not respond to the initial request.

Study measures

The Assessment and Surveillance of Pediatric Hematopoietic Stem Cell Donor Questionnaire was developed via an iterative process by manuscript co-authors who are experts in HSC donation, pediatric transplantation, and survey development. The questionnaire gathered basic information about center characteristics including (1) pediatric related-donor transplant volume in the past 3 years (coded as 0–5, 6–20, and ≥21), (2)

organizational affiliation (CIBMTR, EBMT), and (3) FACT/JACIE accreditation status in calendar year 2016 (accredited versus not). In addition, we collected detailed information on center practices in the evaluation, management and surveillance follow-up of pediatric HSC donors, including items focused on how the assent/consent process is managed and by whom, how donors are screened and prepared psychosocially for donation, and whether/how centers provide psychosocial follow-up after donation.

Statistical analysis

Data were exported from Qualtrics into PASW Statistic 24 (IBM) and cleaned for analysis. Initial analyses were univariate and descriptive and are reported as percentages of participants endorsing each item. Subsequent analyses compared responses based on (a) center pediatric transplant volume, (b) organizational affiliation, and (c) accreditation status using chi-squared tests. For these comparisons, we conducted a series of chi-squared analyses and provided either standard or exact *p*-values when cell sizes are ≥ 5 (see Table 1). For analyses that involved subsets of the full sample where multiple cell sizes became very small—e.g., barriers to having a donor advocate among only those centers who never used a donor advocate ($n = 27$) and background of donor advocate ($n = 64$)—we have pre-sented the cell percentages but did not perform significance testing. For the qualitative data that form the basis for the second table, open-ended responses were analyzed by content analysis. Themes were identified, discussed, and agreed upon by two experienced, independent coders. A coding dictionary was created. The responses were then independently coded and checked for accuracy by the two investigators who met regularly to review the coding process. Discrepancies in coding were reviewed and resolved by a manuscript author (LW).

Results

Participants

Ninety-one CIBMTR and 144 EBMT centers who had performed pediatric transplants in the past year were approached for the study. Participation rates—defined as a completed questionnaire—were 45/91 (49%) for CIBMTR centers and 66/144 (46%) for EBMT centers.

Overall characteristics

Table 1 presents both the statistics for all centers considered together and center characteristics differentiated by transplant volume, organizational affiliation, and accreditation status. Nearly half of centers always/often (44%) had the same physician managing the donor and recipient. Most centers (78%) reported having a mechanism to ensure that donors were freely assenting to donation and an HSCT physician/oncologist was most frequently ensuring free assent (61%). More than half of centers (56%) always/often provided a donor advocate for donors and a third (32%) never provided an advocate. Among centers providing a donor advocate, the advocate was most often the HSCT physician/oncologist (38%) and the most often cited barrier to having a donor advocate among centers who never provided one was lack of support from the administration (59%). Table 2 presents a description of the mechanisms centers identified using to ensure donors are freely

assenting and findings are based on an open-ended question asking those who reported having a mechanism to ensure free assent to describe that mechanism—70 respondents completed the open-ended question.

In terms of psychosocial management characteristics specifically, centers reported that the person who most often prepared donors for the psychosocial aspects of donation was a psychologist (63%), followed by HSCT physician/oncologist (50%), pediatric nurse/nurse practitioner (49%), and child life specialist (40%). Most centers (69%) always/often performed psychosocial screening/assessment of donors. Among the minority of centers that never performed screening ($n = 9$), the most commonly cited reason for screening was lack of staff or resources (67%). A minority of centers had written policies related to donor screening/assessment (30%), psychosocial care before (14%), during (11%), or following (16%) donation and a third of centers (33%) had no written policies for donor psychosocial care. Forty-one percent of centers provided follow-up psychosocial care for donors and among all centers, most (86%) indicated that they would find guidelines for psychosocial follow-up care very/somewhat useful.

Center characteristics by transplant volume

There were no significant differences in general donor management characteristics by transplant center volume. The sole significant differences among psychosocial management characteristics were that lower and medium volume centers were less likely than their larger counterparts to have written guidelines specifically for psychosocial screening/assessment (18% and 21 versus 69%; $P = 0.001$), psychosocial follow-up (9% and 12 versus 38%; $P = 0.032$), and more likely to have no written policies at all for psychosocial care of donors (73% and 77% versus 31%; $P = 0.003$).

Center characteristics by organizational affiliation

There were multiple differences in center management practices by center organizational affiliation (CIBMTR versus EBMT). CIBMTR centers were less likely to always/often have the same physician managing the donor and recipient (23% versus 60%; $P = 0.001$). CIBMTR centers were more likely to have a mechanism to ensure that donors are freely assenting (90% versus 69%; $P = 0.022$), more likely to have a social worker (44% versus 5%; $P < 0.000$) or child life specialist (36% versus 8%; $P = 0.003$), and less likely to have an HSCT physician/oncologist (44% versus 76%; $P = 0.005$) determining free assent. CIBMTR centers were more likely to always/often/sometimes assign a donor advocate (90% versus 52%; $P = 0.001$) and more likely to have a social worker as a donor advocate; EBMT centers were more likely to identify the HSCT physician/oncologist as the donor advocate. Among centers who never provided a donor advocate, CIBMTR centers were more likely to report being unsure if there was a need for an advocate, cost, and time constraints as barriers to having an advocate, and EBMT centers were more likely to cite lack of support from the administration. When asked about donor psychosocial management specifically, CIBMTR centers were more likely than EBMT centers to report that the person preparing donors psychosocially was a child life specialist (85% versus 6%; $P < 0.000$), social worker (54% versus 10%; $P < 0.000$), or donor advocate (33% versus 8%; $P = 0.002$), and less likely to report that this role was filled by a psychologist (50% versus 73%; $P = 0.029$), or HSCT

physician/oncologist (36% versus 61%; $P=0.019$). CIBMTR centers were more likely to have written policies for psychosocial assessment/screening (47% versus 14%; $P=0.001$).

Center characteristics by accreditation status

Accredited centers by FACT or JACIE were less likely to always/often have the same physician managing the donor and recipient (33% versus 65%; $P=0.016$). Accredited centers were more likely to have a mechanism to ensure that donors are freely assenting (86% versus 65%; $P=0.016$) and more likely to have a donor advocate (31% versus 5%; $P=0.014$) determining free assent. Accredited centers were more likely to always/often/sometimes assign a donor advocate (79% versus 48%; $P=0.015$). Among centers who never provided a donor advocate, accredited centers were more likely to report being unsure if there was a need for an advocate, cost, and time constraints as barriers to having an advocate, and non-accredited centers were more likely to cite lack of support from their administration. When asked about donor psychosocial management specifically, accredited centers were more likely than non-accredited centers to report that the person preparing donors psychosocially was a child life specialist (54% versus 15%; $P<0.000$) or donor advocate (26% versus 6%; $P=0.018$), and less likely to report that this role was filled by an HSCT physician/oncologist (40% versus 67%; $P=0.016$). Accredited centers were more likely to always/often perform psychosocial screening/assessment (74% versus 60%; $P=0.009$). There was a trend for accredited centers to be more likely to have written policies for psychosocial assessment/screening (36% versus 15%; $P=0.054$).

Discussion

Despite the prevalence of pediatric HSC donation, there is limited research focused on the assessment and surveillance practices of centers that work with these children. The current investigation represents the first comprehensive look at how transplant centers obtain assent, prepare donors for the physical and emotional experiences of donation, and monitor donor well-being post-donation.

While there is a clear directive that, when appropriate, there should be a mechanism in place to assess for donor assent [7, 29, 30], it is troubling that we found 22% of centers have no process in place and could be utilizing unwilling or reluctant donors. Previous research has addressed this topic and has consistently demonstrated that donors want to be more involved in the decision to donate [11, 14, 17, 18, 31], do not feel that they have been given the opportunity to choose donation [18, 31], and feel compelled to donate due to external influence and limited understanding of alternative options [14]. It is unclear if limited involvement in the decision to donate is related to risk of poor psychosocial outcomes [32]. This is an area of future investigation.

The AAP recommendation that a donor be assigned a donor advocate was offered to mitigate concerns about coercion and to assure that the focus on donor well-being was prioritized [7]. Nearly a decade after the recommendation was made, just more than half of the centers in the current study report consistent use of a donor advocate to ensure that a potential donor is willing to donate. The most consistently reported barriers include cost and uncertainty about the need for an advocate. Ross et al. [33] acknowledged similar barriers

and suggested that a workaround for smaller or less resource-rich institutions might include looking for a donor advocate at a different practice location or training a non-transplant provider, such a pediatrician, to understand relevant donation issues. Unfortunately, there are no known easily accessible training programs available to someone interested in becoming a donor advocate.

In solid organ donation, the role of donor advocate is similar to that suggested by the AAP. To support the role of donor advocate and eliminate inconsistencies in training and implementation, the American Society of Transplantation Live Donor Community of Practice created a webinar series to provide education to potential donor advocates (<https://www.myast.org/education/webinars/ILDA>). Commitment to the consistent use of donor advocates and offering easy to access training with a focus on standardizing the content of psychosocial assessments, introducing time points for surveillance, and procedures for appropriate documentation may benefit donors without unduly burdening individual transplant centers. Establishing standards of care around pediatric HSC donation was desired by almost all of the responding centers and is an area over-looked in the Standards for the Psychosocial Care of Children with Cancer and Their Families [34].

We also found dramatic differences in how pediatric donors are prepared for and supported through HSC donation by organizational affiliation. Centers that reported data to the CIBMTR were much more likely to assess for free assent and to utilize psychosocial providers than those reporting to the EBMT. The Working Group on Ethics of the European Network of Paediatric Research at the European Medicines Agency collected legal requirements of consent and assent across the European Economic Area [35]. Across the 27 countries, there was significant heterogeneity in assent requirements, which may contribute to the much lower rates of European centers ensuring that donors are freely assenting. Additionally, while the European Standards of Care for Children with Cancer include access to psychosocial care for children and families as a standard [36], less than half of European countries have a budget to support psychosocial care [37]. Similar budgetary and staffing barriers may explain why the non-FACT accredited centers were less likely to utilize trained psychosocial providers to examine the psychosocial preparation of pediatric donors. A standardized psychosocial assessment tool would ensure consistent, high-quality assessment and appropriate triage.

More than half of centers reported no psychosocial follow-up assessment post-donation. This is particularly worrisome considering the poor HRQoL reported by approximately 20% of donors [21] and retrospective reports of psychological distress in the months following donation [9–20]. This period frequently coincides with a reduction in parental availability related to the needs of the recipient, making it more challenging for parents to adequately evaluate the emotional needs of the donor and underscoring the need for transplant centers to establish plans to surveil the psychosocial health of donors. We recommend that consent for donation include direct psychosocial follow-up at appropriate intervals with donors over the age of 12 and with parents of younger donors.

This study has notable limitations. Our response rate was <50%, limiting our ability to fully generalize findings. Given the design of the study, we were not able to identify which

centers completed the survey, nor were we able to compare responding to non-responding centers. Finally, given the breadth of topics covered in this survey, we were not able to investigate some of the practices as fully as we would have liked. Despite these limitations, this study represents a first examination of the current assessment and surveillance practices of centers that care for pediatric HSC donors.

Our findings raise several concerns, including the frequency with which potential donors proceed to donation without being asked about their willingness to donate or assessed for psychosocial suitability to manage the emotional risks of donation. This reflects a lack of guidance and accountability in the form of a psychosocial standard of care, informed by previous research and infused with expert opinion. Training for providers should include key elements of donor informed consent, how to navigate common ethical challenges faced by donor advocates, key domains of a psychosocial assessment, time points for surveillance, and procedures for appropriate documentation. Requiring high-quality training of donor advocates could improve practice and reduce inconsistencies across centers and there is a likely role for HSCT accreditation bodies as well as the FDA, Health Canada and European equivalents in ensuring published standards of practice are met and developing new standards based upon these findings. These findings will be presented to the relevant European and US-based pediatric working and oversight committees so that new guidelines or better enforcement of current guidelines can be considered. Future investigations should include medical and psychosocial outcomes following full integration of comprehensive psychosocial screening and surveillance of pediatric donors.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

1. D'Souza A, Lee S, Zhu X, Pasquini M. Current use and trends in hematopoietic cell transplantation in the United States. *Biol Blood Marrow Transplant* 2017; 23:1417–21. [PubMed: 28606646]
2. Passweg JR, Baldomero H, Bader P, Bonini C, Duarte RF, Dufour C, et al. Use of haploidentical stem cell transplantation continues to rise: the 2015 European Society for Blood and Marrow Transplant activity survey report. *Bone Marrow Transplant* 2017; 52:811–7. [PubMed: 28287639]
3. Shah NN, Wayne AS, Grady C, Fry T, Wendler D. Children as hematopoietic cell donors in research: when is it approvable? *Bone Marrow Transplant* 2014; 50:15–19. [PubMed: 25330224]
4. Bollard CM, Krance RA, Heslop HE. Hematopoietic stem cell transplantation in pediatric oncology. In: Pizzo PA, Poplack DG, (Eds.) *Principles and practice of pediatric oncology* Vol. 6 Philadelphia, PA: Lippincott Williams & Wilkins; 2011 p. 467–9.
5. Wang Y, Wu D-P, Xu L-P, Liu K-Y, Zhang X-H, Xu Y, et al. Donor and recipient age, gender and ABO incompatibility regardless of donor source: validated criteria for donor selection for haematopoietic transplants. *Leukemia* 2018; 32:492–8. [PubMed: 28642591]
6. Pulsipher MA, Levine JE, Hayashi RJ, Chan KW, Anderson P, Duerst R, et al. Safety and efficacy of allogeneic PBSC collection in normal pediatric donors: the pediatric blood and marrow consortium experience (PBMTTC) 1996–2003. *Bone Marrow Transplant* 2005; 35:361–7. [PubMed: 15608659]
7. American Academy of Pediatrics Committee on Bioethics. Children as hematopoietic stem cell donors. *Pediatrics* 2010; 125:392–404. [PubMed: 20100753]
8. American Academy of Pediatrics Policy statement. Children as hematopoietic stem cell donors. *Pediatrics* 2010; 125:392–404. [PubMed: 20100753]
9. Bauk K, D'Auria JP, Andrews A, Presler CM. The pediatric sibling donor experience in hematopoietic stem cell transplant: an integrative review of the literature. *J Pediatr Nurs* 2013; 28:235–42. [PubMed: 23122760]
10. Pot-Mees C, Zeitlin H. Psychosocial consequences of bone marrow transplantation in children. *J Psychosoc Oncol* 1987; 5:73–81.
11. Shama W The experience and preparation of pediatric sibling bone marrow donors. *Soc Work Health Care* 1998; 27:89–99. [PubMed: 9579018]
12. Packman WL, Crittenden MR, Rieger Fischer JB, Schaeffer E, Bongar B, et al. Siblings' perceptions of the bone marrow transplantation process. *J Psychosoc Oncol* 1997; 15:81–105.
13. Packman WL, Gong K, Van Zutphen K, Shaffer T, Crittenden M. Psychosocial adjustment of adolescent siblings of hematopoietic stem cell transplant patients. *J Pediatr Oncol Nurs* 2004; 21:233–48. [PubMed: 15490868]
14. Packman WL, Weber S, Wallace J, Bugescu N. Psychological effects of hematopoietic SCT on pediatric patients, siblings, and parents: a review. *Bone Marrow Transplant* 2010; 45:1134–46. [PubMed: 20383219]
15. Macleod KD, Whitsett SF, Mash EJ, Pelletier W. Pediatric sibling donors of successful and unsuccessful hematopoietic stem cell transplants (HSCT): A qualitative study of their psychosocial experience. *J Pediatr Psychol* 2003; 28:223–31. [PubMed: 12730279]
16. Wilkins KL, Woodgate RL. Supporting siblings through the pediatric bone marrow transplant trajectory: Perspectives of siblings of bone marrow transplant recipients. *Cancer Nurs* 2007; 30:E29–E34. [PubMed: 17876175]
17. Wiener LS, Steffen-Smith E, Battles HB, Love CP, Fry T. Sibling stem cell donor experiences at a single institution. *Psychooncology* 2008; 17:304–7. [PubMed: 17534868]
18. Pentz RD, Alderfer MA, Pelletier W, Stegenga K, Haight AE, Hendershot KA, et al. Unmet needs of siblings of pediatric stem cell transplant recipients. *Pediatrics* 2014; 133:e1156–1162. [PubMed: 24777206]
19. D'Auria JP, Fitzgerald TM, Presler CM, Kasow KA. Through the eyes of young sibling donors: The hematopoietic stem cell donation experience. *J Pediatr Nurs* 2015; 30:447–53. [PubMed: 25579158]
20. Hutt D, Nehari M, Munitz-Shenkar D, Alkalay Y, Toren A, Bielorai B. Hematopoietic stem cell donation: psychological perspectives of pediatric sibling donors and their parents. *Bone Marrow Transplant* 2015; 50:1337–42. [PubMed: 26146807]

21. Switzer GE, Bruce J, Kiefer DM, Kobusingye H, Drexler R, Besser RM, et al. Health-related quality of life among pediatric hematopoietic stem cell donors. *J Pediatr* 2016; 178:164–70. [PubMed: 27522440]
22. Switzer GE, Bruce J, Pastorek G, Kiefer DM, Kobusingye H, Drexler R, et al. Parent versus child donor perceptions of the bone marrow donation experience. *Bone Marrow Transplant* 2017; 52:1338–41. [PubMed: 28650449]
23. Pentz RD, Pelletier W, Alderfer MA, Stegenga K, Fairclough DL, Hinds PS. Shared decision-making in pediatric allogeneic blood and marrow transplantation: what if there is no decision to make? *Oncologist* 2012; 17:881–5. [PubMed: 22615217]
24. White TE, Hendershot KA, Dixon MD, Pelletier W, Haight A, Stegenga K, et al. Family strategies to support siblings of pediatric hematopoietic stem cell transplant patients. *Pediatrics* 2017; 139: e20161057. [PubMed: 28119426]
25. van Walraven SM, Straathof LM, Switzer GE, Lankester A, Korthof ET, Brand A, et al. Immediate and long-term somatic effects, and health-related quality of life of BM donation during early childhood. A single-center report in 210 donors. *Bone Marrow Transplant* 2013; 48:40–45. [PubMed: 22705802]
26. Pelletier W, Schulte F, Guilcher GM. Pediatric hematopoietic stem cell donors: Need for longitudinal medical and psychosocial surveillance. *Pediatric Blood & Cancer* 2015; 62:737–8. [PubMed: 25641913]
27. Anthias C, O'Donnell PV, Kiefer DM, Yared J, Norkin M, Anderlini P, et al. European Group for Blood and Marrow Transplantation Centers with FACT-JACIE Accreditation have significantly better compliance with related donor standards. *Biol Blood Marrow Transplant* 2016; 22:514–9. [PubMed: 26597079]
28. FACT-JACIE International Standards for Hematopoietic Cell Therapy Product Collection, Processing, and Administration Seventh Edition (2017). University of Nebraska Medical Center.
29. Bendorf A, Kerridge IH. Ethical issues in bone marrow transplantation in children. *J Pediatr Child Health* 2011; 47:614–9.
30. Bitan M, van Walraven SM, Worel N, Ball LM, Styczynski J, Torrabadella M, et al. Determination of eligibility in related pediatric hematopoietic cell donors: Ethical and clinical considerations. Recommendations for a working group of the Worldwide Network for Blood & Marrow Transplantation Association. *Biol Blood Marrow Transplant* 2016; 22:96–103. [PubMed: 26307344]
31. Hoag J, Igler E, Karst J, Bingen K, Kupst MJ Decision-making, knowledge, and psychosocial outcomes in pediatric siblings identified to donate hematopoietic stem cells. *J Psychosoc Oncol* 2018:1–16. [Epub ahead of print] [PubMed: 28786762]
32. Stegenga K, Pentz RD, Alderfer MA, Pelletier W, Fairclough D, Hinds PS Child and parent access to transplant information and involvement in treatment decision making. *West J Nurs Res* 2018; 1–6.
33. Ross LF, Antommaria AH. The need to promote all pediatric stem cell donors' understanding and interests. *Pediatrics* 2014; 133: e1356–1357. [PubMed: 24777208]
34. Wiener L, Kazak AE, Noll RB, Patenaude AF, Kupst MJ. Standards for the psychosocial care of children with cancer and their families: An introduction to the special issue. *Pediatr Blood Cancer* 2015; 62:S419–S424. [PubMed: 26397836]
35. Lepola P, Needham A, Mendum J, Sallabank P, Neubauer D, de Wildt S. Informed consent for paediatric clinical trials in Europe. *Arch Dis Child* 2016; 101:1017–25. [PubMed: 27226526]
36. Kowalczyk JR, Samardakiewicz M, Fitzgerald E, Essiaf S, Ladenstein R, Vassal G, et al. Towards reducing inequalities: European Standards of Care for Children with Cancer. *Eur J Cancer* 2014; 50:481–5. [PubMed: 24300454]
37. Travado L, Reis JC, Watson M, Borrás J. Psychosocial oncology care resources in Europe: A study under the European Partnership for Action Against Cancer (EPAAC). *Psychooncology* 2017; 26:523–30. [PubMed: 26685870]

Table 1

Center donor management characteristics

Donor management characteristics	Total percent	Transplant volume, # transplants in past 3 years				Organizational affiliation			2016 JACIE/FACT accreditation status		
		0-5	6-20	21	P ^a	CIBMTR	EBMT	P ^a	No	Yes	P ^a
General donor management											
Same physician manages donor and recipient	18	8	22	21	0.089	5	28	0.001	27	14	0.016
	26	46	16	26		18	32		38	19	
	12	4	18	5		13	11		12	12	
	44	42	44	47		65	28		24	56	
Center has mechanism to ensure donors are freely assenting					0.708			0.022			0.016
Yes	78	79	76	84		90	69		65	86	
(if Yes) Background of person determining free assent (check all that apply; N = 74)											
HSCT physician/oncologist	61	63	61	59	0.964	44	76	0.005	68	58	0.398
Psychologist	39	47	37	35	0.694	36	42	0.640	15	35	0.215
Social worker	24	37	18	24	0.310	44	5	0.000	23	25	0.835
Donor advocate	23	26	26	12	0.457	31	16	0.131	5	31	0.014
Child life specialist	22	21	24	18	0.879	36	8	0.003	14	25	0.278
Pediatric nurse/nurse practitioner	20	26	18	18	0.747	28	13	0.153	14	23	0.356
Other	19	10	18	30	0.336	20	19	0.919	18	19	0.898
Donors assigned a donor advocate					0.751			0.001			0.015
Always	52	48	60	42		69	40		31	64	
Often	4	4	4	5		5	5		7	3	
Sometimes	12	13	7	21		15	8		10	12	
Never	32	35	29	32		10	48		52	21	
(if always/often/sometimes) Background of donor advocate (check all that apply; N = 64)					0.156			0.000			0.052
HSCT physician/oncologist	38	13	51	31		26	52		33	39	
Social worker	16	38	9	8		29	0		11	17	
Other	14	13	11	23		17	10		6	17	

Donor management characteristics	Total percent	Transplant volume, # transplants in past 3 years				Organizational affiliation			2016 JACIE/FACT accreditation status	
		0-5	6-20	21	<i>P</i> ^a	CIBMTR	EBMT	<i>P</i> ^a	No	Yes
Psychologist	11	19	9	8		9	14		11	11
Nurse	8	6	6	15		6	10		11	7
Clergy	8	6	6	15		14	0		6	6
(if never) Barriers to having a donor advocate (check all that apply; <i>N</i> = 27)										
No support from administration	59	25	69	83		50	61		67	50
Not sure there is a need	33	50	31	17		75	26		27	42
Cost	19	0	23	33		50	13		7	33
Time constraints	11	0	15	17		50	4		7	17
Other	11	25	0	17		0	13		13	8
Psychosocial donor management										
Background of person who prepares donors for psychosocial aspects of donation (check all that apply)										
Psychologist	63	71	61	58	0.627	50	73	0.029	64	63
HSCCT physician/oncologist	50	50	51	47	0.964	36	61	0.019	67	40
Pediatric nurse/nurse practitioner	49	63	47	39	0.277	51	48	0.759	52	48
Child life specialist	40	42	38	42	0.942	85	6	0.000	15	54
Social worker	29	38	21	37	0.249	54	10	0.000	18	35
Donor advocate	19	25	15	21	0.568	33	8	0.002	6	26
Psychiatrist	6	8	6	0	0.465	5	6	1.000	9	4
Other	6	4	6	5	1.000	5	6	1.000	6	5
Center performs donor psychosocial screening/assessment					0.446			0.128		0.009
Always	58	54	53	74		64	53		42	67
Often	11	13	15	0		8	14		18	7
Sometimes	21	25	23	11		26	17		18	23
Never	10	8	9	16		2	16		22	4
(if never) Reasons for not performing psychosocial assessment										
Lack of staff/resources	67	50	75	67		0	75		71	50
Lack of expertise	22	50	25	0		0	25		29	0
Info from parents is sufficient	22	50	0	33		0	25		29	0

Donor management characteristics	Total percent	Transplant volume, # transplants in past 3 years				Organizational affiliation			2016 JACIE/FACT accreditation status	
		0-5	6-20	21	P^a	CIBMTR	EBMT	P^a	No	Yes
Donor advocate performs screening	11	0	25	0		100	0		0	50
Center has written policies for aspects of donor psychosocial management (% endorsed)										
Psychosocial screening/assessment	30	18	21	69	0.001	47	14	0.001	15	36
Psychosocial care before donation	14	9	14	19	0.695	16	12	0.585	4	18
Psychosocial care during donation	11	14	9	13	0.898	13	9	0.582	8	13
Psychosocial care following donation	16	9	12	38	0.032	21	12	0.249	8	20
No written policies for donor psychosocial care	33	73	77	31	0.003	53	79	0.012	81	60
Center provides psychosocial follow-up										
Yes	41	54	64	53	0.608	69	51	0.081	36	44
Center would find psychosocial follow-up guidelines helpful					0.461			0.064		
Very	37	42	32	42		46	29		33	39
Somewhat	49	46	51	47		33	61		55	46
A little	10	12	13	0		13	8		9	10
Not at all	4	0	4	11		8	2		3	5

^aExact P -values are presented for variables with cell sizes 5. P -Values for significance levels 0.000 are listed as 0.000

Table 2

Descriptions of the mechanisms used to ensure donors are freely assenting ($N = 70$ who responded to the open-ended question)

Mechanisms	%	Quotes
The use of a donor advocate/assessor independent of the hospital	27	"An independent national accredited assessor will see all donors and families and confirm BMT is indicated, no coercion and family/patient is informed".
Providing education	4	"Using independent multilevel education and verification"
Utilizing informed consent	10	"Either the donor or the parents are fully informed about the benefits and risks of the procedure. Any pediatric donor age 12–17 signs assent on the donation consent form".
Donor assessment by a person on staff independent to the team	40	"Consent is done by a physician not involved with the recipient's care".
Donor assessment by a member of the transplant team	27	"If the child is small, we give the best medical information possible to the parents, what a donation will mean to the donor If the donor is old enough. The donor gets the best possible explanation of the procedure by the physician and if needed by a SCT psychologist".
Donor assessment by both a person independent of the team OR a donor advocate AND a member of the transplant team	17	"Children are seen by two teams. Transplant team and an independent team of pediatricians Independent pediatrician and psychologist, report is submitted to a judge"

Some responses included more than one mechanism used at their center