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Health-Related Quality of Life among Older Related Hematopoietic Stem Cell Donors (>60 Years) Is Equivalent to That of Younger Related Donors (18 to 60 Years): A Related Donor Safety Study

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A B S T R A C T

The increasing number of older adults with blood-related disorders and the introduction of reduced-intensity conditioning regimens has led to increases in hematopoietic stem cell (HSC) transplantation among older adults and a corresponding increase in the age of siblings who donate HSCs to these patients. Data regarding the donation-related experiences of older donors are lacking. The Related Donor Safety Study aimed to examine/compare health-related quality of life (HRQoL) of older versus younger HSC donors. Sixty peripheral blood stem cell (PBSC) donors ages 18 to 60 years and 104 PBSC donors age >60 years completed validated questionnaires before donation and 4 weeks and 1 year after donation. Before donation, older donors had poorer general physical health ($t = -3.27$; $P = .001$) but better mental health ($t = 2.11$; $P < .05$). There were no age differences in multiple other donation-related factors. At 4 weeks after donation, there were no group differences in general physical/mental health, but older donors were less likely to report donation-related pain ($t = -2.26$; $P < .05$) and concerns ($t = -3.38$; $P = .001$). At both 4 weeks and 1 year after donation, there were no significant differences in the percentage of each age group feeling physically back to normal or in the number of days it took donors to feel completely well. There was no evidence that increasing age within the older donor group was associated with poorer donation-related HRQoL. Taken together, these data support the current practice of HSC donation by sibling donors above age 60, providing no evidence of worsening HRQoL up to 1 year after donation in individuals up to age 76.

INTRODUCTION

Hematopoietic stem cell (HSC) transplantation is increasingly used to treat leukemia and other blood-related diseases for which other forms of therapy are ineffective or would be less effective. Several factors, including the increasing number of older adults as a proportion of the population, the introduction of reduced-intensity conditioning regimens, and

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improved supportive care have made HSC transplantation an increasingly utilized therapy for older adults [1-3]. In the decade from 2000 to 2011, the number of HSC transplantations for patients >60 years of age quadrupled and continues to increase [1]. The increasing age of transplantation patients has led to a parallel increase in the average age of sibling HSC donors enlisted to help these patients [1]. This has raised questions about whether grafts from older donors are equally effective for patients as those from younger donors and whether the donation process is safe for this group of donors.

In terms of the effectiveness of HSCs from older donors, there is mounting evidence that older donors can produce high-quality grafts, and several studies have found that advanced donor age does not produce poorer outcomes for patients [4-7]. Rezvani found (1) no difference between donors <60 years and those ≥60 years in terms of HSC engraftment and the pace of neutrophil and platelet recovery and donor chimerism, and (2) no increased risk of donor-derived clonal disorders from stem cells of older donors [3].

Studies focused on the safety and donation-related experiences of older sibling donors are less common [1]. Some evidence that older donor age may be associated with an increased number of adverse events has lead most international registries to set upper age limits for unrelated donors of 60 years or younger [8,9]. Many of these registries have also recently revised the upper age limit for joining a registry downward to 40—although this is primarily because of better patient outcomes when younger donors are used rather than donor safety concerns [10-12]. No such guidelines exist for related donors, and an aging population, the increasing use of haploidentical transplantation, and improvements in transplantation-related regimens make it likely that the use of older sibling donors will continue to increase. Despite this, there are no existing large systematic investigations of health-related quality of life (HRQoL) in the context of older related HSC donation.

The goal of the current investigation was to examine and compare the donation-related experiences and HRQoL of older versus younger sibling HSC donors. This investigation was part of a larger study (National Heart, Lung and Blood–funded Related Donor Safety Study [RDSafe]), focused on the medical safety and HRQoL of related HSC donation. The specific aims of the substudy focused on HRQoL of older donors were to (1) longitudinally examine HRQoL among HSC donors >60 years of age from before donation through 1 year after donation, (2) compare HRQoL of older donors with those of their younger counterparts ages 18 to 60, and (3) to examine whether increasing age within the group of donors >60 was associated with poorer donation-related HRQoL.

MATERIALS AND METHODS

Human Subjects Research Protection

This investigation was approved by the institutional review boards at the University of Pittsburgh, the National Marrow Donor Program, and individual transplantation centers when required. All participants signed informed consent before completing the study interviews.

Participants and Study Design

This prospective longitudinal investigation included adult related HSC donors ages 18 to 76, enrolled in the parent RDSafe investigation, who donated peripheral blood stem cells (PBSC) at 1 of 41 geographically diverse, US transplantation centers between March 2010 and April 2013 (see Supplemental Table for a list of contributing centers). The number of donors contributed by center ranged from 1 to 20, with a median of 3 donors per center.

To be eligible, potential participants were required to meet the requirements for donation at each transplantation center and consent to participate in both the parent RDSafe study and the donor HRQoL substudy. Potential participants were excluded from the study if they did not read, write, and speak English, were unable to complete a telephone interview because of cognitive or linguistic difficulties, or if they did not have access to a telephone.

Individual transplantation centers obtained consent from the participants for the study and passed contact information of enrolled donors to University of Pittsburgh staff. Interviewers from the University of Pittsburgh contacted participants by telephone to complete data collection. Within 4 weeks before initiation of granulocyte colony–stimulating factor administration for PBSC donors, participants completed a baseline interview. All donors were interviewed again 4 weeks and 1 year after donation. The interviews required approximately 20 minutes to complete and participants received a $25 honorarium after completing each interview. A computer-assisted telephone interview system was used to collect and enter interview data. Data were stored on a secure server in an encrypted data file.

Study Measures

Three categories of participant characteristics were assessed, as follows: (1) socio-demographic, (2) general physical and psychological status, and (3) donation-related. Measures were previously validated scales/items with established measurement properties either created for or used in other donation-related settings. Recipient status at 1 year after donation was collected directly from transplantation center records.

Socio-demographic characteristics

Socio-demographic characteristics included sex, age, race/ethnicity, education level, employment status, income, marital status, whether the donor had children, and whether he/she had ever donated blood or apheresis. For the analysis examining HRQoL by age groupings within the older donor group, age was trichotomized from 61 to 64, 65 to 69, and ≥ 70.

General physical and psychological status

Overall/general physical and psychological status were assessed with the physical and mental health summary scales of the SF12v2 [13]. Scores range from 0 to 100, with higher scores indicating better physical/mental health. Anxiety and depression were assessed with the anxiety and depression subscales of the Brief Symptom Inventory. Each subscale consisted of 6 items, which were averaged to create a score ranging from 0 to 4. Higher scores indicate greater emotional distress [14,15].

Donation-related Characteristics

At All Interview Time Points. Ambivalence about the decision of whether or not to donate was assessed with the 7-item ambivalence scale [16-19]. Items were averaged and a higher score indicates greater uncertainty/reluctance about donation. Satisfaction with the donation decision was assessed with 2 items asking about overall satisfaction and happiness with the decision (1 = not at all; 4 = extremely) [20]. Perceived risk of donation was assessed with 3 items asking about the likelihood of a serious donation-related complication (1 = not at all likely; 4 = very likely), likelihood that a donor could feel sad or let down following donation (1 = not at all likely; 4 = very likely), and the likelihood that a donor could feel responsible if the recipient did not survive (1 = strongly disagree; 4 = strongly agree) [20].

Before Donation and Four Weeks after Donation. Concerns about donation were assessed with 11 concerns summed across 3 categories—medical, work/family, and other (yes/no) [19-21]. Interactions with others was assessed with 4 items asking whether donors consulted family/friends or professionals about donation and whether they had been encouraged/discouraged from donating (yes/no) [19,20].

Four Weeks and One Year after Donation. Physical effects of donation were assessed with 5 items asking about the physical experience of donation including donation-related pain (1 = a lot less painful than expected; 5 = much more painful than expected), whether the donor had a fever (yes/no), whether the donor currently felt back to normal following donation (yes/no), the number of days following donation until they felt completely well, and their use of prescription and nonprescription medications (yes/no) [19]. Current symptoms assessed as present/absent in the previous 48 hours included tiredness, problems sleeping, muscle aches, bone pain, difficulty walking, light headedness, bleeding, pain where the needles were inserted, chills, fainting, nausea, and infection [21]. Psychological effects of donation were assessed with 3 items including stressfulness of donation (1 = not at all stressful; 4 = very stressful), concern about their own current health as a result of donation (1 = not at all worried; 4 = very worried), or the longer-term effects of donation (1 = definitely will not have impact; 4 = definitely will have impact) [19,21].

One Year after Donation. Recipient status for each related donor (alive/deceased) was assessed 1 year after donation.

Statistical Analysis

Data were cleaned and exported from the computer-assisted telephone interview system to IBM SPSS Statistics for Windows, Version 22.0 (IBM Corporation, Armonk, NY) for analysis. Cross-sectional differences in