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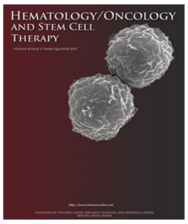

ORIGINAL RESEARCH REPORT

Impact of hospital hospitality house programs on quality of life and mood of patients and caregivers after hematopoietic stem cell transplant

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Abstract

Objective/background: The quality of life (QOL) of hematopoietic stem cell transplant (HSCT) patients and their caregivers decreases during the first 8 days after HSCT.

Methods: This prospective pilot study collected preliminary data on the impact of posttransplant living arrangements (hospital hospitality house [HHH] vs. hotel, apartment, or house [''hotel'']) and other factors on the QOL of HSCT patients and their caregivers. The predefined primary end point was QOL of patients and their caregivers on Day 30 (QOL30) as measured by the linear analog self-assessment (LASA).

Results: Forty-four HSCT patients participated (HHH 23, hotel 21; allogeneic 18, autologous 26). No significant differences in QOL30 (mean LASA score) were noted between patient groups (55.6 [HHH] vs. 72.2 [hotel], $p = .06$) or between caregiver groups (77.8 [HHH] vs. 88.9 [hotel],

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$p = .20$). Multivariate analysis for QOL30 showed that baseline QOL ($p = .006$) and age ($p = .049$) were significant predictors of QOL30 after adjustment for sex, post-HSCT living place, and transplant type. Older patients ($\geq$60 years) had a significantly lower QOL30 than younger patients (mean score, 51.6 vs. 75.3; $p = .02$).

Conclusion: Efforts to improve QOL30 of HSCT patients and caregivers in the confined environment of an HHH should focus on patients with low baseline QOL and older patients.

Introduction

After hematopoietic stem cell transplant (HSCT), the quality of life (QOL) for patients and their caregivers decreases considerably during the first 8 days after stem cell infusion [1]. Furthermore, patients and their caregivers report worsening depression during this time, and the presence of depression and anxiety before transplant correlates with worsening QOL after transplant [2]. Studies have shown that QOL tends to improve over the years after transplant, and many patients return to work even when physical and psychological symptoms persist [3]. In addition to addressing the needs of patients, physicians must also address the unique needs of caregivers during the several days after HSCT [4].

An approach that might help prevent the observed decrease in the QOL of patients and caregivers is to develop programs in the confined environment of the hospital hospitality house (HHH). After HSCT, patients are discharged from the hospital and may need to be housed nearby for up to 100 days. Many patients stay at hotels or rental apartments or houses (hereafter, simply hotels), and others stay at an HHH. Although previous studies have examined QOL and mood of patients during hospitalization for HSCT, none have studied the effects that post-HSCT living arrangements and their programs, including an HHH, may have on QOL and mood of patients and caregivers. For example, the financial burden of lodging for HSCT patients and their caregivers can be overwhelming [5], but an HHH charges a fraction of what a typical hotel charges.

The aim of this pilot study was to gather data and evaluate whether staying in an HHH, with its different environment and support systems and programs, had a positive impact on the QOL and mood of HSCT patients and their caregivers. These preliminary data may be useful in the future for identifying specific factors that affect overall QOL of patients and caregivers. By identifying these factors early, it may be possible to incorporate social support programs to improve the health, QOL, and overall well-being of transplant patients.

Materials and methods

Participants

We recruited patients undergoing HSCT, including autologous and allogeneic transplants, at our institution, from July 2016 through January 2017. Eligibility criteria included being 18 years or older, being able to read and understand questions in English, having a caregiver, lodging at an HHH or a nearby hotel, and being willing, along with the caregiver, to complete all the required forms.

Study design and procedures

This nonrandomized clinical trial of patients undergoing HSCT was approved by the Institutional Review Board at our institution, and patients were enrolled though verbal consent. Patients were identified weekly, and before transplant they were asked to participate. Patients and caregivers who agreed to participate signed a Health Insurance Portability and Accountability Act form and were assigned a numerical and alphabetical code for deidentification. Both the patients and the caregivers were given baseline questionnaires, including the linear analog self-assessment [6] (LASA) to measure overall QOL; the Hospital Anxiety and Depression Scale [7] (HADS) and the 8-item Patient Health Questionnaire [8] (PHQ-8) to measure depression; and the Patient-Reported Outcomes Measurement Information System [9] (PROMIS) Social Isolation 8a and Emotional Support instruments to measure social and emotional health. In addition, patients were given the bone marrow transplant (BMT) subscale for the Functional Assessment of Cancer Therapy (FACT) scale [10] (FACT-BMT) to assess QOL, including physical, social and family, emotional, and functional well-being. Similarly, caregivers were given the 12-Item Short Form Health Survey [11] (SF-12) to assess caregiver QOL, including overall health status and components of physical health, social health, emotional health, bodily pain, general health, mental health, and vitality. Patients and caregivers were asked to complete the LASA, FACT-BMT (patients only), HADS, PHQ-8, PROMIS, and SF-12 (caregivers only) questionnaires at enrollment and on posttransplant Day 1, Day 8, and Day 30. On Day 30, patients and caregivers were given additional questions to measure differences in posttransplant living arrangements and satisfaction with their living arrangements. Questionnaire responses were entered into Research Electronic Data Capture (REDCap), a secure web application for managing surveys and databases.

Statistical analysis

For comparing patients and caregivers staying in hotels and HHHs, the primary end point was overall QOL at posttransplant Day 30 (QOL30) as measured by the single-item LASA and compared with a two-sample *t* test. A total of 44 patients and 44 caregivers would provide 80% power to detect a moderate effect size (2 points on the LASA scale, which ranges from 0 to 10 points) between the two groups, assuming a one-sided comparison. Supplementary analysis was done with a one-way analysis of variance (ANOVA) model. Secondary end points included FACT-BMT, SF-12, HADS, and PHQ-8 results, which were compared with two-sample *t* tests.

Differences in patient and caregiver scores were calculated for each dyad and similarly analyzed with two-sample *t* tests and ANOVA models. Supplementary analysis of differences between patients and caregivers was performed with Bland-Altman analysis [12]. Longitudinal analyses of various QOL assessments were conducted with generalized linear mixed models (GLMMs) to adjust for baseline covariates [13]. Overall QOL of the autologous HSCT patients at each time point and the change from baseline scores were compared between hotel and HHH groups and between younger (<60 years) and older (≥60 years) patients with two-sample *t* tests.

Results

Patients

We enrolled 44 patients (32 men; 11 women; missing data for 1 patient) and their caregivers, with 21 in the hotel group and 23 in the HHH group. In the hotel group, the mean (standard deviation [SD]) age of patients was 49.9 (16.2) years; in the HHH group, 59.3 (10.9) years ($p = .03$). Twenty-six patients received an autologous transplant, and 18 received an allogeneic transplant (Table 1).

Primary end point

Overall QOL30, as indicated by the mean single-item LASA score, was not significantly different for patients in the HHH group (55.6) compared with patients in the hotel group (72.2) ($p = .06$). The GLMM showed a difference in overall QOL between the HHH and hotel groups ($p = .003$) and over time ($p = .005$). HHH patients were older, and multivariate analysis (GLMM) showed that baseline QOL ($p = .006$) and older age (≥60 years) were significant predictors for QOL30 ($p = .049$) even after adjustment for sex, living place after HSCT, and transplant type. Older patients (≥60 years) also had a significantly lower QOL30 (51.6 vs. 75.3, $p = .02$) (Fig. 1). Analysis of the autologous HSCT subset showed no differences in the QOL of patients and caregivers in either group.

Secondary end points

Overall QOL, as measured with the LASA mean score, was significantly lower on posttransplant Day 1 for HHH patients compared with hotel patients (46.9 vs. 67.6, $p = .007$) (Figs. 2 and 3). Differences in QOL were not significant on posttransplant Day 8 (44.4 [HHH] vs. 66.7 [hotel], $p = .11$). When the two age groups (<60 years and ≥60 years) were analyzed separately, differences between the HHH and hotel groups were not evident. The LASA QOL tool also showed that, compared with hotel patients, HHH patients had significantly lower mean scores for overall mental (intellectual) well-being (56.8 vs. 74.1, $p = .02$); overall physical well-being (36.6 vs. 67.6, $p < .001$); overall

Table 1 Characteristics of patients and caregivers.

Characteristic	Hotel (*n* = 21)	HHH (*n* = 23)	Total (*N* = 44)	*p*
Patient's age on July 1, 2016				.03[a]
Missing data	2	0	2	
Mean (y), (SD)	49.9 (16.2)	59.3 (10.9)	55.0 (14.2)	
Median (y)	55.4	63.2	59.9	
Q1, Q3 (y)	35.6, 63.3	58.8, 64.6	50.5, 63.8	
Range (y)	20.3–71.4	30.9–74.0	20.3–74.0	
Patient's sex				.03[b]
Missing data	1	0	1	.04[b]
Female, *n* (%)	2 (10.0)	9 (39.1)	11 (25.6)	
Male, *n* (%)	18 (90.0)	14 (60.9)	32 (74.4)	
Caregiver's sex				
Missing data	1	3	4	
Female, *n* (%)	19 (95.0)	14 (70.0)	33 (82.5)	
Male, *n* (%)	1 (5.0)	6 (30.0)	7 (17.5)	
Transplant type, *n* (%)				.16[b]
Allogeneic				
Myeloablative	6 (28.6)	3 (13.0)	9 (20.5)	
Nonmyeloablative	2 (9.5)	7 (30.4)	9 (20.5)	
Autologous	13 (61.9)	13 (56.5)	26 (59.1)	

Note. HHH = hospital hospitality house; Q = quartile; SD = standard deviation.

[a] Wilcoxon signed rank test.

[b] Chi-square test.

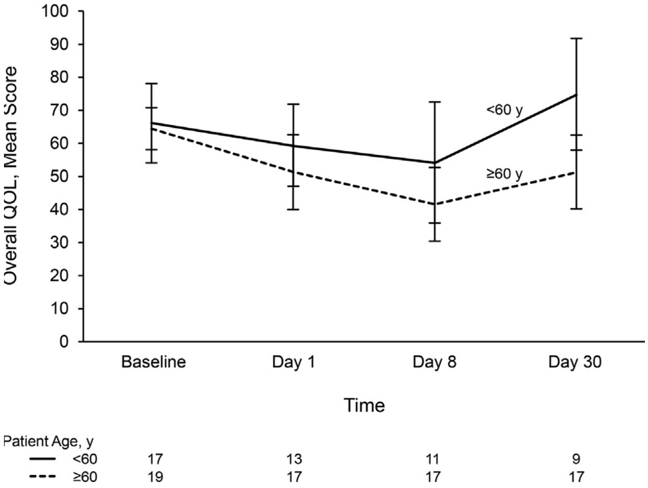

Fig. 1 Overall Quality of Life (QOL) by age group. Mean scores are shown for patients younger than 60 years and patients 60 years or older (on July 1, 2016) at baseline and at Day 1, Day 8, and Day 30 after transplant. A higher score indicates better QOL. Error bars indicate standard deviation (SD).

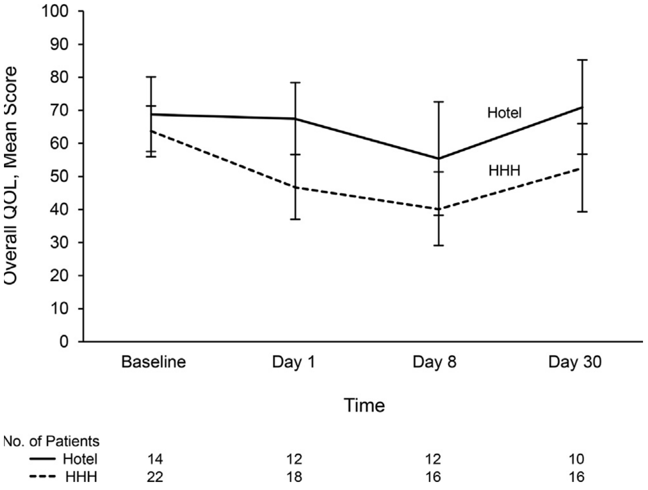

Fig. 2 Overall Quality of Life (QOL). Mean scores are shown for patients in the hotel group and the hospital hospitality house (HHH) group at baseline and at Day 1, Day 8, and Day 30 after transplant. A higher score indicates better QOL. Error bars indicate standard deviation (SD).

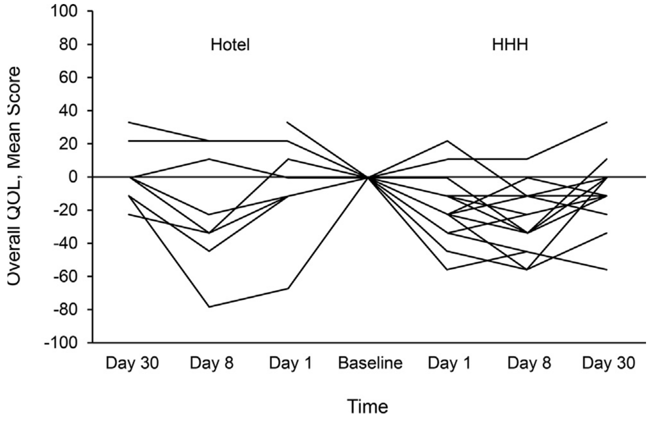

Fig. 3 Overall Quality of Life (QOL) as change from baseline. Mean scores are shown for patients in the hotel group and the hospital hospitality house (HHH) group at baseline and at Day 1, Day 8, and Day 30 after transplant. Each line represents an individual patient. A higher score indicates better QOL.

emotional well-being (50.6 vs. 72.2, $p = .004$); level of social activity (37.0 vs. 62.0, $p = .01$); and overall spiritual well-being (53.6 vs 79.6, $p = .003$) on posttransplant Day 1 and overall spiritual well-being (43.8 vs. 76.9, $p = .001$) on Day 8 and a significantly higher score for level of fatigue (50.6 vs. 25.9, $p = .02$) on Day 1. The GLMMs for posttransplant Day 30 showed that the baseline scores were significant predictors for overall emotional well-being ($p = .008$), spiritual well-being ($p = .03$), financial concerns ($p = .002$), and legal concerns ($p = .004$) at Day 30 even after adjustment for age, sex, living place post HSCT, and transplant type.

Compared with hotel patients, HHH patients had significantly lower mean scores on posttransplant Day 1 for FACT-BMT functional well-being subscale scores (12.8 vs. 17.6, $p = .01$); FACT general subscale total scores (67.6 vs. 80.7, $p = .02$); FACT-BMT total scores (93.2 vs. 109.3, $p = .02$); and FACT-BMT trial outcome index scores (53.7 vs. 66.1, $p = .03$) and on posttransplant Day 30 for FACT-BMT physical well-being subscale scores (16.7 vs. 20.8, $p = .04$). The change in mean score from baseline to Day 1 was significantly different for the FACT-BMT emotional well-being subscale scores between HHH patients (−0.6) and hotel patients (2.2) ($p = .009$). The GLMMs for Day 30 post HSCT showed that baseline scores were significant predictors for all FACT-BMT total scores ($p < .001$) and all subscale scores except for physical well-being (from $p < .001$ to $p = .005$) even after adjustment for age, sex, living place post HSCT, and transplant type.

In comparisons between HHH patients and hotel patients, the HADS assessment scores at baseline indicated that 65% of HHH patients felt that they were slowed down very often or nearly all the time compared with 20% of hotel patients ($p = .003$), and on Day 1 post HSCT, mean scores for HHH patients indicated a higher level of depression (7.8 vs. 3.5, $p = .005$). A larger percentage of HHH patients, compared with hotel patients, on Day 1 post HSCT indicated that they enjoyed only a little or hardly at all the things they used to enjoy (35.3% vs. 0%, $p = .01$); they felt that they were slowed down very often or nearly all the time (64.7% vs. 16.7%, $p = .007$); and replied either "I don't take so much care as I should" or "definitely" in response to the statement "I have lost interest in my appearance" (58.8% vs. 0%, $p = .01$). On Day 8 post HSCT, 50% of HHH patients and 8.3% of hotel patients ($p = .02$) indicated that they either "definitely less than" they used to or "hardly at all" look forward with enjoyment to things. On Day 30 post HSCT, 31.3% of HHH patients and 0% of hotel patients ($p = .03$) indicated that they either "definitely less than" they used to or "hardly at all" look forward with enjoyment to things. The GLMMs showed that the baseline scores were significant predictors for HADS anxiety ($p < .001$) and depression subscale scores on Day 30 ($p < .001$), even after adjustment for baseline characteristics, and transplant type was also a predictor for depression subscale scores ($p = .04$).

According to the mean values from the PHQ-8 assessment, HHH patients, compared with hotel patients, reported more severe depression on Day 8 post HSCT (9.6 vs. 6.3, $p = .04$), with 46.7% (vs. 8.3%) reporting major depression ($p = .04$); 53.3% of HHH patients and 8.3% of hotel patients ($p = .03$) had little interest or pleasure in doing things more than half the days or nearly every day on Day 8; and 56.3% of HHH patients versus 0% of hotel patients ($p = .04$) reported having poor appetite or overeating more than half the days or nearly every day on Day 30. PROMIS Social Isolation T-scores and individual item scores were not significantly different between the two groups post HSCT.

At baseline, the mean PROMIS Emotional Support T-scores were lower for HHH patients compared with hotel patients (55.0 vs. 60.4, $p = .04$). Less than 50% of HHH patients (compared with about 80% of hotel patients) reported that they always have someone to confide in or talk to about themselves and their problems ($p = .009$), to share their most private worries and fears ($p = .04$), and to make them feel appreciated ($p = .04$). At baseline, only 55% of HHH patients, compared with 86.7% of hotel patients ($p = .048$), always had someone they trust to talk with about their problems. The change from baseline to Day 8 post HSCT in mean PROMIS Emotional Support T-scores was significantly different between HHH patients (1.2) and hotel patients (−2.6) ($p = .02$). The GLMMs for Day 30 post HSCT showed that the baseline scores were significant predictors for the PHQ-8 total scores ($p = .02$), PROMIS Social Isolation T-scores ($p < .001$), and PROMIS Emotional Support T-scores ($p < .001$) even after adjustment for baseline characteristics.

Caregivers

We enrolled 44 caregivers (21 in the hotel group; 23 in the HHH group). Seven were men and 33 were women (4 did not specify) (Table 1).

Primary end point

The primary end point for comparing caregivers in the hotel group and the HHH group was overall QOL as measured by the mean single-item LASA score. The difference in overall QOL between the two groups post HSCT was not significantly different. The GLMM for overall QOL30 showed that baseline overall QOL was a significant predictor ($p = .009$) even after adjustment for sex, living place post HSCT, and transplant type.

Secondary end points

Results for other LASA subset items were not significantly different between the two groups post HSCT. According to the SF-12 results, on Day 30 post HSCT, 31.3% of HHH caregivers (vs. 66.7% in the hotel group, $p = .01$) indicated that most of the time during the past 4 weeks they felt calm and peaceful and reported a smaller mean decrease in physical component scores since baseline (−3.6 vs. −11.8, $p = .07$; effect size = 1.06).

HADS assessment results showed that 81% of HHH caregivers (vs. 46.7% in the hotel group, $p = .04$) felt cheerful most of the time at baseline, and 52.9% in the HHH group (vs. 18.2% in the hotel group, $p = .04$) did not feel restless as if they had to be on the move on Day 8 post HSCT. Anxiety symptoms in the HHH group had also improved more at Day 8 post HSCT compared with the hotel group (mean change from baseline, −1.9 vs. 0.6; $p = .02$).

On the PHQ-8 assessment, 100% of HHH caregivers did not feel fidgety or restless at all on Day 8 post HSCT compared with 75% of hotel caregivers ($p = .04$). However, 43.8% of HHH caregivers had little interest or pleasure in doing things on more than half the days or on several days compared with 0% in the hotel group on Day 30 post HSCT ($p = .03$).

Results were not different between the two groups for other PROMIS Social Isolation T-scores and items post HSCT. According to the PROMIS Emotional Support assessment results, 47.6% of HHH caregivers (vs. 86.7% in the hotel group, $p = .03$) had someone who made them feel needed (at baseline) and 18.8% in the HHH group (vs. 64.3% in the hotel group, $p = .02$) felt that there were always people who really understood them (on Day 1 post HSCT).

Discussion

As measured with the LASA questionnaire, HHH patients compared with the hotel subgroup had no differences in overall QOL30, the primary end point of this study. The differences observed between the HHH and hotel groups at Day 30 after transplant could be predicted by differences in their baseline QOL and age. Overall QOL results for caregivers in the HHH and hotel groups were not significantly different post HSCT. The autologous HSCT subset showed no differences in the QOL of patients and caregivers in either group at posttransplant Day 1, Day 8, and Day 30. These results suggest that focused efforts to develop programs aimed at improving and preserving the QOL of patients and caregivers in the controlled setting of the HHH may be worthwhile, particularly for patients with abnormal baseline QOL results and older patients (≥60 years).

Baseline and longitudinal QOL assessment after HSCT may be of value in identifying patients at risk for worsening QOL and for proactively implementing programs aimed at improving the mood and QOL changes observed. The HHH group was almost a decade older than the hotel group. This significant age difference most likely contributed to higher QOL in the hotel group during the first 8 days after HSCT. In addition to age, other factors may be responsible. For example, patients in the hotel group may have chosen to stay at a hotel because they had additional family and friends available to provide help and participate in their care, which may be more likely with younger patients. Given HHH restrictions (no television or food in rooms and limited accommodations for relatives and friends), it is possible that HHH patients had less social and family support than the hotel group when they arrived. For this reason, they may have chosen to stay where they might receive more social support from others.

The hotel group had a higher financial QOL at baseline and at Day 30. The financial burden of medical costs is known to affect QOL, and patients and caregivers who stay at the HHH may have more financial constraints (and thus, a worse QOL).

Caregivers who stayed at the HHH had a slightly higher QOL than those in the hotel group, although the difference was not statistically significant. These results most likely reflect the community of caregivers at the HHH. When staying at a hotel, caregivers rarely interact with other caregivers. At the HHH, however, caregivers find support and are surrounded by people in similar situations and experiencing similar emotions, including depression, sadness, and loneliness. By talking to others and expressing their anxieties and fears, caregivers may lessen their emotional burden and increase their sense of hope.

This study had several limitations, including missing questionnaires and skipped questions, questionnaires completed outside the designated time frame, failure to accurately track each patient's place of stay during the entire study period (e.g., switching from hotel to HHH during the study period), and switching caregivers during the study. Self-selection bias is possible, because patients who are healthier at the time of HSCT may be more likely to participate in the study. Similarly, transplant recipients experiencing poor QOL may be more likely to drop out. Additionally, results could be confounded if patients were involved in other support groups.

In conclusion, the posttransplant living place did not significantly affect the QOL of patients and caregivers. Our findings support the importance of baseline and longitudinal measurements of QOL for patients undergoing HSCT in determining their QOL30. Efforts to optimize the mood and QOL of patients and caregivers before transplant and shortly after transplant in the confined environment of an HHH, particularly in older patients ($\geq$60 years), are likely to ameliorate the decrease in QOL posttransplant. Evaluating patients' overall QOL before transplant would most likely identify opportunities to target and potentially increase QOL before and shortly after transplant. Specific biologic interventions for older patients before transplant aimed at improving muscle strength and stamina (e.g., low doses of testosterone or physical training) may be worth investigating. Also, increasing the mood and QOL of patients may psychologically improve their resiliency and survival after transplant.

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Conflict of interest

The authors have no conflicts of interest to declare related to the present study. G.C.-O. has received research funding from Novartis (to Mayo Clinic) for Investigator Initiated Trials.

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