Child and parental adaptation to pediatric oncology

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Child and parental adaptation to pediatric stem cell transplantation

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Abstract

Goals of work. Allogeneic pediatric stem cell transplantation (SCT) is a very intensive treatment with a high mortality and morbidity. The objectives of this study were to assess the 1) self- and proxy-reported HRQoL compared to a norm group, (2) levels of parenting stress compared to a norm group (3) differences in HRQoL and parenting stress pre and post-SCT and (4) the effect of child age and parenting stress on self and proxy reported HRQOL pre and post-SCT. *Methods.* Pre- and on average 10 months post-SCT, 21 children and adolescents and their parent(s) completed questionnaires on HRQoL and the mothers completed a measure of parenting stress. *Results.* Post-SCT, home functioning, physical functioning and total HRQoL scores were lower than the norm group. We found stable HRQoL scores over time, with the exception of the domain home functioning, which was rated lower post-SCT than pre-SCT. Parents reported lower HRQoL scores than the children pre and post-SCT and younger children experienced better HRQoL than older children. Parenting stress was higher post-SCT than pre-SCT and high levels of parenting stress were predictive of poor parental ratings of child HRQoL post-SCT.
Conclusion. Ongoing psychosocial assessment post-SCT is necessary to target children with a lowered HRQoL and parents who experience elevated parenting stress, who may be in greater need of more supportive care.

Introduction

Children undergoing stem cell transplantation (SCT) are subjected to a far-reaching, life threatening and rare medical procedure, only carried out about 60 times per year in the Netherlands. Even though the transplant procedure has become much more sophisticated and as a consequence mortality rates have decreased [8], SCT still represents a severe stressor for the child and family. SCT is often the last possibility after a long-term treatment. The lengthy hospitalization in isolation, physical discomfort, the uncertainty about the outcome and the fear of death are stressors associated with this treatment [31]. Outcomes may vary from cure (and normality) to chronic graft-versus-host disease (GVHD), relapse, or even death [5,14]. Many SCT survivors report long-term physical sequelae like fatigue [27], growth retardation and impaired pubertal development [4,26], pain [19,26], liver complications and decreased lung functioning [36].

An SCT inevitably has an impact on how physical, emotional and social functioning is perceived by the child and family, in other words, on the health related quality of life (HRQoL). HRQoL can be defined as a combination of the experienced health status (e.g. the assessment by a person of his or her own health functioning), and the affective response to problems with respect to this health status [39]. Most HRQoL research in SCT patients has been conducted with adults. In the majority of the studies a negative impact on the HRQoL evaluation in a proportion of adults has been found [8,10,38], often due to functional limitations and somatic symptoms [8] and to concerns about relapsing [2].

However, an extensive review of studies involving pediatric patients [41] showed that the majority of both children and their parents indicated an improved HRQoL with time [5], rated the child's HRQoL as 'good' post-SCT [18,19,26] or even reported a high quality of life post-SCT [3,28]. The reported high HRQoL scores in these studies could be explained in terms of 'response shift': as a result of health changes, an individual may undergo changes in internal standards, values or the conceptualization of HRQoL [35]. Children undergoing SCT might use response shift as a coping mechanism to accommodate themselves to their disease and health status. Furthermore, children with serious illness such as cancer or sickle cell anaemia have been found to show a remarkable 'hardiness' and a lack of psychopathology despite multiple challenges [29].

Differences between self-reported and parent proxy-reported HRQoL have been addressed by several authors (e.g. [9,11,15,39]). Parent-child agreement seems to be influenced by the child's age, with older age predicting greater differences, health status (a higher agreement has been found between parents and chronically sick children than between parents and healthy children), the types of the HRQoL domains investigated

(i.e. a higher agreement for physical aspects of health versus emotional aspects) [11,13], parental quality of life [16] and maternal affective disturbances [5,12]. To our knowledge, the influence of parenting stress on proxy-rated HRQoL has not been studied so far.

The current study was designed to assess 1) self- and proxy-reported HRQoL compared to a norm group, (2) levels of parenting stress compared to a norm group (3) differences in HRQoL and parenting stress pre and post-SCT and (4) the effect of child age and parenting stress on self and proxy reported HRQOL pre and post-SCT.

Patients and methods

Study Design and Procedure

The study had a prospective design pretest (i.e. pre admission for SCT) and posttest. All consecutive patients receiving SCT in the Leiden University Medical Center (LUMC) from February 2004 to May 2005 and their parents were eligible for the study. Excluded were patients younger than three years old and patients and parents who did not speak Dutch sufficiently to fill in the questionnaires. After informed consent was obtained from parents and children older than 8 years, they were asked to complete a booklet of self-report questionnaires at home two weeks prior to admission to SCT.

At least 2 months post-SCT, letters were sent to children and parents briefly describing the follow-up study asking them to complete the same questionnaires again, supervised during a home visit. The Ethical Committee and the Department of Pediatrics of the LUMC approved the study.

Measures

Dutch Children's AZL/TNO Quality of Life Questionnaire (DUX25) [21]. This generic questionnaire was used to asses how children evaluate HRQoL in their day-to-day functioning. There are four domains: family -, physical -, emotional - and social functioning. Besides, a total HRQoL score can be obtained. An example of an item is: "I often feel...." Answers can be given on a 5 point Likert-scale, visualized as smiley's ranging from very happy to very sad (score 5-1). Items scores are converted to a 1-100 scale, with higher scores representing a higher quality of life. The DUX 25 consists of a child form (CF) and a parent form (PF). Both forms were found to be sufficiently internally consistent (i.e. reliable) in this sample (CF: α = .74-.90, PF: α = .79-.88). Scores were compared with a norm group drawn from the total pool of 935 children aged 8-18 [20].

The reason we chose the DUX 25 is that this instrument is user-friendly (because of the smiley's and the limited length of the questionnaire) and because it measures the *affective* appraisal of daily functioning instead of solely assessing functional status, like many other QOL-measures do.

Parenting Stress Index (PSI). The Dutch version of the PSI [1], named NOSI [7] was used to measure parenting stress. The PSI consists of 123 items tapping child and parent characteristics. Child characteristics are measured in 6 subscales, e.g. distractibility/ hyperactivity, adaptability, positive reinforcement, demanding, mood and acceptability. Parent characteristics are measured in 7 subscales, i.e. competence, social isolation, attachment, health, role restriction, depression and marital relationship. Validity and reliability of the PSI are sufficient. The PSI has been used extensively to assess the parent-child dyad in a variety of clinical and research settings e.g. [40]. Because the PSI is a lengthy questionnaire, we asked only one parent (i.e. the mother) to fill it in. The reliability of the total scale in this study was .96.

Demographic and disease related characteristics. Age at first measurement, gender, ethnicity, disease-related characteristics, length of time since SCT and the indication of SCT/diagnosis were obtained from the children's medical files. Parental age and gender were recorded as well.

Statistical analysis

The Statistical Package for Social Sciences (SPSS) version 14 was used for all analyses. One-way ANOVA was used to compare HRQoL scores to a norm group. We expected HRQoL of patients to be comparable to the norm group post-SCT. Analyses of Variance for Repeated Measures and Tukey Post Hoc correction were applied to compare pre- and post HRQoL scores. Independent T-tests were used to compare HRQoL and parenting stress scores to norm groups. Pearson correlations were used for the associations between the child- and proxy evaluations of HRQoL and to examine the association of age and length of time passed since SCT with post HRQoL. T-tests were also applied to investigate the role of length of time since SCT. Furthermore, Pearson correlations were used for finding associations between parenting stress and pre and post proxy HRQoL reports. Overall, significance was set at α of 0.05. We accounted for multiple testing by using the Bonferroni correction.

Results

Participants

In the study period of fourteen months, 37 pediatric stem cell transplantations were carried out in the LUMC. Of the 28 eligible families approached, 24 agreed to participate (86%). Two families refused to participate because they felt 'too overwhelmed'. Two non-native speaking parents refused participation because of language problems not foreseen by the research team. Three children did not want to fill in the questionnaires, but their parents did. The children (N=21), of which 18 were male (85%) were diagnosed with a variety of malignant (N=13) and non-malignant (N= 8) diseases. The average age of the children pre-SCT was 11 years. See Table 1. Non-participants did not differ from participants with respect to age, gender and primary diagnosis. However, non-Dutch speakers were overrepresented in this group (57% versus 10%) and this might have influenced our results.

Pre-SCT: Two patients were too ill to complete the questionnaires and four children were too young to complete the questionnaires themselves, but their parents filled in the questionnaires. In total 15 children and 31 parents of 21 children (19 mothers and 12 fathers) completed the measures pre-SCT.

Post-SCT (range 2 to 16 months post-SCT, mean 10 months, SD 4.7): Due to a tight time schedule of the research students involved in the project, the study had to take place in a limited period of time. This has resulted in a relatively large variability in time since SCT between the participants. Between the pre-SCT and post-SCT assessment, three patients out of the total 21 potential participants died. The parents of these children were not asked to participate in the follow up assessment. One of the patients could not participate in the follow-up study due to medical complications. One family was lost to follow up. In total 16 children and 31 parents of 21 children (19 mothers and 12 fathers) completed the assessment measures post-SCT. Fourteen children filled in the questionnaires both pre and post-SCT. Because of the low number of girls in our study group and since boys and girls did not differ in age, time since SCT and severity of complications during and post-SCT, they were analyzed as one group.

Health related quality of life of pediatric SCT-patients norm group

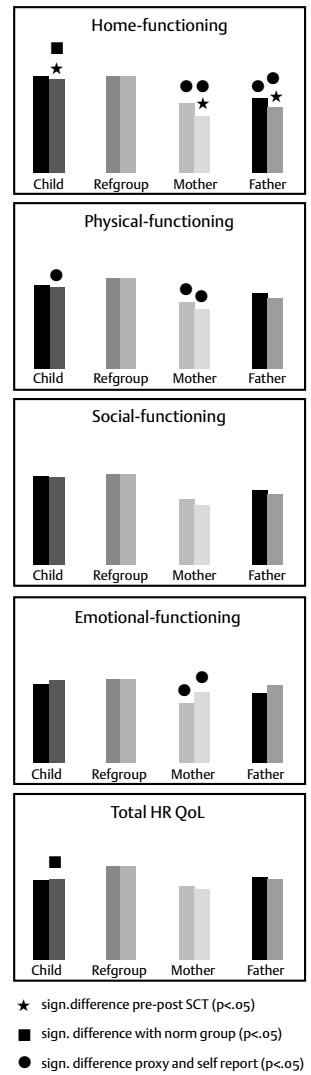
Compared to the -age and gender matched- norm group of healthy children (self-report) pre-SCT, HRQoL scores were comparable on all domains. However post-SCT, self-reported HRQoL was significantly lower on the domains Physical Functioning [F (1, 44) = 2.284; p = .027], Home Functioning [F (1, 45) = 2.40; p = .03] and Total HRQoL [F (1, 43) = 2.18; p = .035] (see Figure 1). Compared to the norm group, parents of SCT patients rated their child's HRQoL significantly lower on all four domains and on total HRQoL.

Table 1. Descriptive information of the study sample

Patient characteristics (n=21)	*Mean*	*SD*	*Range*
Age at first assessment (years)	11	4,8	3,7- 18,9
Time since SCT (months)	10	4.4	2-16
	n	%	
Sex			
Male	18	85	
Country of origin			
Dutch	19	90	
Non-Dutch	2	10	
Diagnoses			
Malignant:			
Leukemia (AML, ALL)	9	43	
Non-malignant:			
Blood disease (SAA, MDS)	10	47	
Immune disease (SCID)	2	10	
Parent characteristics (n=31)			
Age at first assessment (years)	42	5.5	35-59
Sex			
Male	12	39	

SCT = Stem cell transplantation; AML = Acute Myeloid Leukemia; ALL = Acute Lymphoblastic Leukemia; SAA = Severe Aplastic Anemia; MDS = Myeloid Dysplastic Syndrome; SCID = Severe Combined Immune Deficiency syndrome.

Figure 1 HRQoL Pre and Post-SCT
Lower scores refer to lower HRQoL



★ sign.difference pre-post SCT (p<.05)
■ sign. difference with norm group (p<.05)
● sign. difference proxy and self report (p<.05)

Table 2 Parenting stress scores (mothers) pre and post-SCT

PSI subscales	Pre-SCT Mean (sd) n=13	Post-SCT Mean (Sd) n=19	Norm group n=161
Distractibility	33.3 (7.2)	32.5 (7.5)	30.6 (11.0)
Adaptability	28.1 (6.8)	28.4 (10.8)	32.3 (8.6)
Reinforces parent	19.2 (3.6)	22.0 (5.6)	17.3 (5.2)
Demanding	21.5 (9.3)	25.7 (13.6)*	20.8 (7.3)
Mood	20.1 (5.4)	22.8 (8.8)	21.7 (7.6)
Acceptance	18.9 (5.7)	22.3 (8.8)	22.6 (7.6)
Competence	33.2 (7.8)	**34. 2 (7.3)***	29.4 (9.1)
Social isolation	10.2 (4.0)	12.5 (10.6)	13.5 (6.8)
Attachment	10.4 (3.5)	10.3 (4.1)	12.3 (4.3)
Health	13.1 (5.7)	14.8 (6.7)	13.6 (5.0)
Role restriction	15.5 (6.5)	16.5 (7.4)	14.3 (5.8)
Depression	23.1 (10.4)	24.8 (10.9)	26.8 (9.6)
Marital relation	13.6 (6.1)	13.7 (6.5)	13.5 (6.8)
Total PSI	259.8 (67.1)	277.3 (89.1)*	266.5 (66.9)

PSI, Parenting Stress Index. Higher scores refer to more problems.
* = < 0.05. Printed in bold: sign. difference with norm group; underlined: sign. difference between pre and post-SCT.

Pre- and post HRQoL scores

There was an effect of time for Home Functioning (i.e. the perception of the child's well-being at home) [F (1, 24) = 6.22; p = .02]. The child-, mother- and father- ratings of Home Functioning post-SCT were lower than the ratings of Home Functioning pre-SCT (see Figure 1). The evaluation of Physical Functioning, Emotional Functioning and Social Functioning remained stable, just as the total HRQoL scores (see Figure 1).

Child-proxy (parent) agreement

There was an effect of group (child, mother) for Physical Functioning [*F* (2, 24) = 3.79; *p* = .04], Home Functioning [*F* (1, 24) = 10.74; *p* = .001] and Emotional Functioning [*F* (1, 24) = 4.03; *p* = .03]. Mothers reported lower scores than the children on all three domains (see Figure 1), whereas the ratings of the fathers only differed with the child ratings on the Home Functioning domain. Mothers and fathers did not differ significantly in their HRQoL-ratings.

Table 3. Bivariate correlations between independent variables with proxy-reported HRQoL pre and post-SCT

	HRQoL Pre-SCT n =13		HRQoL Post-SCT *n=21*	
	r	*p*	*r*	*p*
Demographics				
Time since SCT	-	-	.26	n.s.
Child age	-.47*	.02	.17	n.s.
PSI subscales (mothers)				
Distractibility	.32	n.s.	-.45*	n.s.
Adaptability	-.33	n.s.	-.64*	.01
Reinforces parent	.03	n.s.	-.61*	.01
Demanding	-.56*	.04	-.71*	.01
Mood	-.35	n.s.	-.71*	.01
Acceptance	-.22	n.s.	-.67*	.01
Competence	-.37	n.s.	-.51*	.02
Social isolation	-.48	n.s.	-.33	n.s.
Attachment	-.21	n.s.	-.41	n.s.
Health	. 01	n.s.	-.58*	.01
Role restriction	-.10	n.s.	-.61*	.01
Depression	-.30	n.s.	-.64*	.01
Marital relation	.03	n.s.	-.64*	.01
Total parenting stress	-.34	n.s.	-.38	n.s.

* = <0.05. *n.s.* = not significant

Parenting stress compared to the norm group

Compared to the norm group of the PSI, mothers reported to have higher parenting stress levels than parents of healthy children post-SCT, but not pre-SCT. Significantly lower scores compared to the norm group was seen post-SCT on the subscale 'Competence' (the feelings of competence the parent gets from parenting this child). Scores on the other scales were not statistically different from the norm group. See table 2.

Pre- and post parenting stress scores

Thirteen mothers completed the PSI both pre and post-SCT. Most of the PSI domains remained stable over time. However, the subscale 'Demanding' and Total parenting stress were significantly higher post-SCT than pre-SCT, meaning stress accumulated over time (Table 2).

Child age

The age of the children at first measurement was associated with the children's self-reported HRQoL pre-SCT: younger children reported higher HRQoL scores [Pearson correlation coefficient = -.55; p=.03]. Pre-SCT, child age was also associated with proxy-reported HRQoL [Pearson correlation coefficient = -.47; p=.02] (see Table 3). Post-SCT, child age was not associated with self or proxy reported HRQoL.

The impact of parenting stress on proxy-reported HRQoL

The PSI subscale 'Demanding' was significantly related to pre and post proxy HRQoL reports. No other domains of the PSI were correlated to pre-SCT proxy HRQoL report. However, post-SCT, Pearson correlations revealed significant associations between several domains of parenting stress and HRQoL: low adaptability, a lack of positive reinforcement, mood swings, problems related to acceptance, feeling incompetent as a parent, parents' own health, role restriction, parental depressive feelings and dissatisfaction with the marital relationship were all associated with lower proxy-reported HRQoL scores (see Table 3). Strangely, there was no association between total parenting stress and proxy-ratings of HRQoL post-SCT.

Discussion

On average ten months after stem cell transplantation, children and adolescents reported low HRQoL scores compared to a norm group of healthy peers, especially with relation to functioning at home. Parents rated their children's HRQoL significantly lower both pre and post-SCT compared to the children themselves and compared to a norm group of healthy peers. As expected and in line with other studies [31,32], younger children experienced better HRQoL than older children and adolescents. Total parenting stress levels were significantly higher post-SCT than pre-SCT. An important predictor of proxy-rated HRQoL was found in the child's demandingness perceived by the parents, assessed before and after admittance for SCT.

The low post-SCT HRQoL ratings we found are in contrast with results reported in several other studies [5,14,26], in which an improved HRQoL was found after 6 months or more. One explanation for this difference could be the number of assessments done in some of these studies [14,32]. Multiple assessments can generate higher scores: being involved in a trial can create a 'Hawthorne effect' because of the extra attention that is given to a person [6]. Another explanation for the discrepancy could be the length of time passed since transplantation. We assessed HRQoL on average 10 months post-SCT, which is still a more or less active treatment period, whereas other researchers reported improved HRQoL [18] using an interval of three years [38] or five years post transplantation [10]. It is possible that our follow-up period post-SCT was too short to detect any time effects and needs to be extended in further studies.

Differences in child and proxy-evaluations of HRQoL have been reported by many other researchers [9,13,30]. A first explanation could be that parent- and child reports of HRQoL are based on different perspectives: the child reports on his or her subjective personal situation, whereas parents can only infer from observations and communication with the child [22]. Secondly, children are usually more focused on 'here and now', whereas parents are more concerned with their child's well-being and HRQoL in the future [15]. This generates different perspectives on the same issues.

Furthermore, parental emotional functioning and the way parents perceive stressors associated with a child's SCT may negatively affect the evaluations of their child's HRQoL [12,31]. Research has shown that parents of children undergoing SCT can suffer from posttraumatic stress symptoms [24,25] depression [5], distress [33,37] and anxiety [5,24]. Maternal post-SCT anxiety and depression scores have been found to correlate with their children's quality of life ratings at 6 months post-SCT [5]. It has been suggested that maternal psychological problems could be a result of their children's ongoing medical problems and subsequent reduced quality of life. However, the opposite could also be true: parents who experience more stress could be less optimistic in general

and tend to see their children's situation in their own frame of mind [15].

In our study, parenting stress was significantly related to the appreciation of the child's HRQoL, both pre and –especially- post-SCT. Specifically, pre-SCT, the degree to which parents perceived the child to be demanding (e.g. crying, clinging, asking for help) influenced parental HRQoL ratings. Post-SCT, significant associations were found between child demandingness, parental health, role restriction, a lack of reinforcement from the child and marital stress on the one hand and proxy-rated HRQoL on the other. Parents felt significantly less competent than parents of healthy children, post-SCT. This may indicate that post-SCT; parents are faced with more stress concerning parent-child interaction and marital functioning, than pre-SCT. The strain of caring for the child after discharge adds to the already present stressors of parents. Furthermore, the fear of relapse remains and makes parents vulnerable to stress and could be reflected in the lower rating of the domain 'home functioning' by both parents and children, post-SCT. Given the strong relationship between maternal ratings of the child's functioning with ratings of her own functioning, ideally dyadic ratings of both parents and children should be used as much as possible to determine pediatric HRQoL in clinical settings [13,34].

The present study has a number of limitations that should be taken into account. Since our single centre study sample contained a relatively small number of children and parents, there is a chance of missing important relationships or of detecting significant differences even though they may not exist. Due to high mortality and morbidity rates in this patient group, it is very difficult to collect large samples, especially in a country as small as the Netherlands. In addition, our group of children contained more boys than girls and our parent group contained more mothers than fathers. We analyzed fathers and mothers of the same children together, which can cause bias. We only assessed parenting stress in mothers, which limits the generalization of results to all parents. Furthermore, there was a large variance in age and length of time since SCT within the child group. Comparing children with heterogeneous underlying diagnoses (malignant or non-malignant) can also have disadvantages. A recent study by Löf et al. [23] showed that parents of children with leukemia rated their child's HRQoL lower than parents of children transplanted for non-malignant diseases. Children with leukemia reported more problems in the psychosocial area than children with non-malignant diseases.

Due to the small number of participants, we were unable to study other important factors that are of influence on HRQoL, such as clinical factors (primary diagnosis, risk of relapse at SCT, post-transplant complications including acute and chronic GVHD) and socio-demographic characteristics of the participants. Finally, we assessed HRQoL and parenting stress with generic questionnaires. Making use of disease-related and/ or disease-specific questionnaires could provide more specific insight in the effects of SCT on the child's HRQoL and on parental stress.

Other areas of interest like self-esteem and parental quality of life could also be studied with the use of more specific instruments.

Conclusions

Since SCT is of very low incidence and morbidity and mortality rates are high, research involving multiple institutions should be the primary setting for studying patients that are homogeneous with regard to age, diagnosis, time since SCT and the presence of late effects like GVHD. Larger time intervals and multiple assessments are needed to study the process of HRQoL and parenting stress in time in more depth. Proxy data can provide significantly different information than self-reported data, especially for adolescents [9,17], hence consulting the child's own perception next to the parent's view when measuring HRQoL is necessary [13].

We strongly recommend ongoing psychological assessment pre- and post-SCT, in order to target children who report lowered HRQoL scores pre-SCT and/or post-SCT and parents who experience high levels of parenting stress, who may be in greater need of preventive interventions or more supportive care, not only during the active SCT phase, but also in the months following discharge.

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