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Aggressive Treatment of Nonmetastatic Osteosarcoma Improves Health-Related Quality of Life in Children and Adolescents

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Abstract

BACKGROUND—Health-related quality of life (HRQOL) of pediatric patients with osteosarcoma has not been documented longitudinally during treatment. Aims of this prospective study were to assess treatment effects on patients' HRQOL at diagnosis, during therapy, and after completion of therapy, sex- and age-related differences in HRQOL ratings, and differences between patient and parent reports.

PATIENTS and METHODS—Sixty-six patients (median age, 13.4 years) with newly diagnosed, localized disease completed 3 HRQOL instruments, and their parents completed 2 of the same instruments at diagnosis, before surgery (Week 12), at Week 23, and a median of 20 weeks after treatment completion.

RESULTS—Significant improvements in most domains and worsening of nausea were reported by patients and parents from diagnosis to Weeks 12 and 23. Symptom distress decreased from diagnosis to Weeks 12 and 23 in 81% and 64% of patients respectively. There were no sex- and few age-related differences in scores. Scores from patients and parents achieved good agreement.

CONCLUSIONS—The HRQOL of patients improves during aggressive treatment for nonmetastatic osteosarcoma, except in the domain of nausea. Clinicians can use these findings to prepare their patients for the distressing symptoms that they will likely experience at certain time points and to provide reassurance that these will significantly improve.

Keywords

health-related quality of life; patient and parent reports; pediatric; osteosarcoma

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CONFLICT OF INTEREST

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INTRODUCTION

Advances in sarcoma treatments have improved disease outcomes, control of treatment-related symptoms, and functional mobility.[1–5] The 5-year survival rate for patients with sarcoma in general has improved from 50% for the reporting period of 1975 to 1984 to 63% for the period of 1985–1994.[1] The current 6-year survival rate for patients with localized osteosarcoma, the most common malignant bone tumor in children, is approximately 70%[6]. These improved survival rates have facilitated the study of outcomes beyond disease response and treatment-induced toxicity to include aspects of the patient's life that have meaning to the patient, i.e., the health-related quality of life (HRQOL). Incorporating HRQOL findings into treatment is theorized to improve patient/family–physician communication and satisfaction with care, to identify hidden morbidities in the treatment of pediatric illnesses, and to facilitate treatment decision making.[7,8] Previous HRQOL research reports have not been specific to the illness or treatment experience of pediatric patients with osteosarcoma and have not followed patients through treatment. Instead, they have focused on adults with sarcoma or survivors of childhood sarcoma at a single time point,[5,9–11] combined data from adult and pediatric patients with osteosarcoma,[12–16] or summarized HRQOL data from patients with other types of sarcoma.[2,10,17] Only one report included both patient and parent proxy HRQOL ratings[18] and only two had longitudinal assessments of HRQOL (one based on maternal reports at the time of diagnosis and after completion of therapy,[19] and the other based on patient reporting at the time of surgery and then annually for an average of 3 years[20]). The aims of this prospective study were to assess the effect of treatment on patients' HRQOL at the time of diagnosis, during therapy, and after the completion of therapy; to assess whether differences in HRQOL ratings are associated with differences in sex and age; and to compare patient and parent HRQOL reports.

METHODS

Protocol Treatment

Patients with newly diagnosed nonmetastatic osteosarcoma were treated on our institution's osteosarcoma protocol (OS99) that incorporated polychemotherapy and aggressive surgery. Therapy comprised 12 intensive cycles of chemotherapy administered every 3 weeks with hematopoietic growth factor support for a total of 35 weeks. After 4 cycles of neoadjuvant chemotherapy, surgery for local control was done, mostly by a limb-sparing procedure, and followed by 8 additional cycles of chemotherapy.

Sample

Seventy-one of the 72 (98.6%) patients enrolled on OS99 who were older than 5 years, had nonmetastic osteosarcoma, spoke English or Spanish and had parental permission to be in the study were eligible to participate in this HRQOL study. Sixty-six (93%) patients and 67 (94%) parents completed 1 to 3 of the HRQOL instruments at 1 to 4 pre-specified times of data collection. Most participants (61/66; 92%) had osteosarcoma of the lower extremity; most of these patients (50/61; 82%) had limb-sparing surgery and 8 had amputation on study.

Setting

The study was approved by the Institutional Review Boards of the participating institutions: St. Jude Children's Research Hospital, a pediatric comprehensive cancer center in Memphis, TN; Luis Calvo McKenna Hospital, a national center for pediatric bone tumors in Santiago, Chile; and Washington University in St. Louis, MO. All participants gave written informed consent or assent.

Study Design

We used a descriptive, longitudinal design in which patient and parent reports were solicited during face-to-face interviews at each of 4 time points: diagnosis (before or during cycle 1 of chemotherapy), Week 12 (before definitive surgery), Week 23 (cycle 8 of chemotherapy), and after the completion of therapy at a median of 20 weeks after the last cycle of chemotherapy. Patients 5 years of age and older and their parents completed the PedsQL Inventory v. 4.0 and the PedsQL Cancer Module v. 3.0. Patients 8 years of age or older additionally completed the Symptom Distress Scale (SDS).

Instruments

Because the study aims comprised longitudinal assessments, and score comparisons by patient sex and age and by patient and parent reports, we needed to select HRQOL instruments that could capture change over time, were available in age-specific forms, and had matching child and parent versions.

PedsQL Inventory v. 4.0—This 23-item instrument measures the domains of physical, emotional, social, and school HRQOL experienced during the past 30 days, has age- specific forms for patient reports (5 to 7 years, 8 to 12 years, and 13 years and older) with matching parent forms. Three domains (social, emotional, and cognitive) can be combined to yield a psychosocial health score. The response format for patients 5 to 7 years is a 3-point Likert type scale and the format for patients 8 years of age and older is a 5-point Likert-type scale. Ratings indicate the extent of problems in each domain; ratings are reverse-coded and linearly transformed such that higher scores indicated better HRQOL.21 This instrument has acceptable internal consistency, known groups, and construct-validity estimates when used with pediatric samples including well, acutely and chronically ill children.21–24 The Cronbach alpha values for patient reports in our study at baseline ranged from 0.45 (social functioning) to 0.88 (physical functioning) and for parents, from 0.58 (social functioning) to 0.90 (physical functioning). Because of the unacceptably low Cronbach alpha values (<0.70) for the social functioning domain for patient (0.45 to 0.68) and parent (0.55 to 0.62) reports at all 4 data points, we excluded this domain from our analyses.

PedsQL Cancer Module v. 3.0—This 27-item instrument measures the 8 domains of pain and hurt, nausea, cognition, procedural anxiety, treatment anxiety, worry, perceived physical appearance, and communication and has achieved satisfactory internal consistency, known groups, and construct-validity estimates.25–27 Item formatting and scoring were the same as those for the PedsQL inventory v. 4.0. The Cronbach alpha values for patient reports in our study at baseline ranged from 0.45 (physical appearance) to 0.90 (procedural anxiety) and from 0.65 (physical appearance) to 0.98 (procedural anxiety) for parents. Because of the unacceptably low Cronbach alpha values by patient report for the physical appearance domain (range, 0.44 to 0.65 across all 4 data points), we excluded this domain from our analyses.

Symptom Distress Scale—The SDS measures intensity (single item analysis) and distress (summed item analysis) of 10 cancer-related symptoms on a 5-point Likert-type scale: 1 meaning not distressing and 5 meaning intensely distressing. Internal consistency, face validity, and content and construct validity of the SDS have been established for use in pediatric patients with cancer.28,29 Internal consistency estimates in our study was 0.79 at baseline and ranged from 0.66 to 0.73 at the other 3 data points.

Statistical Methods

Domain scores for the PedsQL instruments were calculated for parents and patients at each time point using the standard approach specified by the developers of the instruments such that

higher scores indicate better HRQOL.[30] Because of the low internal consistency and exclusion of the social functioning domain from our analyses, psychosocial health and total scores could not be calculated for the PedsQL Inventory v. 4.0. The total SDS score was calculated as the sum of the item scores answered divided by the number of items answered, and this score was then multiplied by 10 to maintain the score range. Individual item scores represented the symptom intensity experienced by each patient for each of the 10 symptoms. Based on published literature, we classified item scores of 3 or higher as meriting clinical intervention.[29]

With the exclusion of the 2 domains with low internal consistency (see Instruments above), mean HRQOL domain scores were calculated and differences between mean scores over time were estimated using repeated measures models. Comparisons of means at different time points were performed for patients and parents separately using contrast statements in repeated measures models. In additional analyses (not shown), results were similar when nonparametric methods were used. Because the SDS responses were not normally distributed, exact Wilcoxon signed rank tests were used to compare differences in item and total SDS scores by time points. The significant findings reported were significant after adjusting (using a Bonferroni correction) for multiple comparisons. P values were considered significant if they were less than an appropriate Bonferroni-adjusted P value for a given comparison. For example, there were 6 time point comparisons planned for 8 domains of the parent PedsQL v. 3.0; therefore, P values <0.0010 (the quotient of $0.05 \div 48$) were considered statistically significant in the assessment of changes in HRQOL based on the PedsQL v. 3.0 over time. Unadjusted P values are reported although significant findings pertain to those significant after adjustment for multiple comparisons.

Spearman rank correlation coefficients and intraclass correlation coefficients (ICC) were used to assess agreement between patient and parent HRQOL reports. Agreement was designated as poor (ICC, ≤ 0.30), fair (ICC, 0.31–0.40), moderate (ICC, 0.41–0.60), good (ICC, 0.61–0.80), or excellent (ICC, 0.81–1.00).

RESULTS

The median age of the patient participants was 13.4 years and 55% of them were male (Table 1). Most participants (61/66; 92%) had osteosarcoma of the lower extremity; most of these patients (50/61, 82%) had limb-sparing surgery and 8 had amputation on study.

Osteosarcoma treatment improves patient HRQOL

PedsQL Inventory v. 4.0—Patients and parents rated physical functioning as the lowest HRQOL domain and school or emotional functioning as the highest domain across all 4 time points (Table 2). Patients reported significant improvement in emotional functioning from the time of diagnosis to Week 12, and both patients and parents reported significant improvement in emotional functioning from the time of diagnosis to Week 23. No significant changes were observed between Weeks 12 and 23 (data not shown). Physical functioning and emotional functioning in patient and parent reports showed significant or substantial improvement from the time of diagnosis to completion of therapy (Table 2).

PedsQL Cancer Module v. 3.0—At diagnosis, patients and parents rated the domains of worry and pain & hurt as the lowest and cognitive HRQOL as the highest (Table 3). Worry and nausea received the lowest HRQOL scores from patients and parents across treatment time points. Patients reported significant improvement in the domains of pain & hurt, procedural anxiety, and treatment anxiety from the time of diagnosis to Week 12, significant improvement in these plus worry from diagnosis to Week 23, and significant worsening of nausea in both of these time periods (Table 3). Parent reports were similar to patients' reports during both

periods. Five of the 8 domains (pain & hurt, nausea, procedural anxiety, treatment anxiety, and worry) for patients and parents significantly improved from the time of diagnosis to completion of therapy. Between Weeks 12 and 23, no significant changes were reported by patients.

Symptom Distress Scale—The descriptive item scores for the SDS indicated that getting around, being tired, appetite, able to sleep, and feeling now were the most distressing symptoms (Table 4). Patients reported statistically significant improvements in fatigue, appetite, pain, and sleep from diagnosis to Week 12 (Table 4) but no significant change in any symptom between Weeks 12 and 23 (data not shown). With the exception of concentration, all symptoms showed significant or substantial changes from diagnosis to after completion of therapy. Overall, symptom distress decreased in 81% of patients from diagnosis to Week 12, in 64% of patients from diagnosis to Week 23, and in 87% of patients from diagnosis to after the completion of therapy. Almost all patients (95%) had at least one symptom that merited clinical intervention at some time point during the study (most often at diagnosis).

Patient HRQOL ratings in relation to sex or age

The patients' and parents' ratings provided no evidence of significant differences in any of the PedsQL instruments' scores between the sexes. Adolescents (>12 years) reported significantly less procedural anxiety ($P<0.001$) than did younger patients. Parents reported the same age difference in procedural anxiety ($P=0.007$). Otherwise, patient and parent reports showed no significant differences among age groups. Neither the total SDS score, nor the number of SDS symptoms that merited clinical intervention differed significantly between the sexes or among age groups.

Comparison of patients' and parents' HRQOL reports

Ratings given by patients and parents on both the PedsQL instruments were similar, typically ranging from fair to good agreement (Table 5). The worst agreement was in the treatment anxiety domain: patients reported less treatment anxiety than did their parents at each time point.

DISCUSSION

This study is the first to examine the HRQOL of children and adolescents with nonmetastatic osteosarcoma at the time of diagnosis, during key points in treatment, and after the completion of treatment. Strengths of this study included: the largest patient sample with nonmetastatic osteosarcoma to date to participate in a HRQOL study; patients were treated on one frontline therapeutic protocol; longitudinal design; and patients and parent proxies reported the patients' HRQOL information using established generic and cancer-specific HRQOL instruments.

Patient reporting revealed that patients' well-being can unexpectedly improve in the midst of aggressive polychemotherapy and surgery for osteosarcoma; however, during these same time periods nausea significantly worsened. This result indicates that concerted clinical attention needs to be given to this symptom to improve patients' HRQOL during treatment. Patients reported no significant HRQOL improvements between Weeks 12 and 23. This time period includes postoperative care following limb-sparing procedures or in a small number of patients, amputation, and the continuation of chemotherapy. These challenges likely explain the lack of continued improvement in HRQOL during this period. Clinicians can use this finding to prepare patients and parents for this period in which no improvements in HRQOL are likely to be perceived.

Although the patient and parent ratings of HRQOL domains tended to improve from the time of diagnosis, the mean domain scores were lower by as much as 30 points than those reported

by healthy students and parents,[27,31] and by pediatric patients receiving treatment for a brain tumor, ALL, AML or in survivorship from treatment of a brain tumor or ALL.[32–34] Similarly, the physical and emotional functioning scores in our patient and parent groups were lower than those of children and adolescents identified as chronically ill (those with diagnoses of asthma, cancer, heart disease, functional abdominal pain, or rheumatologic disease),[22,35] and those of overweight or obese 8- to 12-year-old children.36 Furthermore, the mean domain scores reported by patients and parents in our study remained low by wide point spreads until after completion of treatment when all domain scores reported by both, except physical functioning, were similar to those reported by healthy children and adolescents.31 Combined, these findings indicate that patients with nonmetastatic osteosarcoma have substantially poorer cancer-specific HRQOL than do pediatric patients with other forms of cancer.

The SDS ratings indicated decreased symptom distress and intensity from the time of diagnosis to later time points but that most patients had 1 or more symptoms requiring clinical intervention at each time point, including after completion of therapy. Clinicians need to prepare patients and their families for the high likelihood that the patient will experience fatigue and difficulty with mobility, sleep, and mood during treatment. Clinicians can also assure patients and families that the patient will probably experience significantly decreased distressing symptoms after the initiation of treatment, although a minority (4%–30%) of patients who complete treatment will require interventions for fatigue and problems with mobility and sleep.

Our findings of fair to good agreement between patient and parent HRQOL ratings support the value of parent reports of their child's HRQOL over time. Other studies have generally reported parent HRQOL ratings to be lower than patient ratings, with particular discrepancies in emotion-focused items[35,37–39] and with ratings from adolescents.[39] Disagreement in HRQOL ratings may be attributed to patients basing their responses on a single recent event, and parents basing theirs on multiple events.[40] In an illness such as osteosarcoma, disease and treatment changes can occur rapidly, and having 2 reporters of the patient's HRQOL can be essential.

Our findings indicate minimal differences in patient-reported HRQOL scores in relation to patient age or sex. This result suggests that the experience of treatment of nonmetastatic osteosarcoma is similar across pediatric patients or that the instruments do not include adequate age- or sex-sensitive domains. Another study team using a different HRQOL instrument with pediatric patients with a primary bone sarcoma reported that female sex was a risk factor for poorer HRQOL[20] while a second study team using interviews and scales found no differences between sexes.[2] Findings of sex differences may be related to instrumentation and the timing of measurement, but in general, the support for sex differences at this time is low.

Most research has focused on HRQOL in patients with osteosarcoma of the lower extremity. A limitation of our work is that, because of the small number of patients with tumors of sites other than the lower extremity (n=5), we were unable to compare HRQOL in patients with tumors of the lower extremity versus other sites. This small number of patients with non lower-extremity tumors is not likely to cause significant differences between our results and those of previous studies that focused only on lower extremity tumors. In addition, most of the items in the instruments used (except for physical functioning and ability to get around) are not specific to assessing QOL in patients with lower-extremity tumors only. In addition, we did not analyze HRQOL in the small subset of patients who underwent amputation on the study (n=8).

In summary, aggressive multimodality polychemotherapy for nonmetastatic osteosarcoma improves HRQOL of children and adolescents, as reported by patients and parents, from the time of diagnosis to times during treatment, and to after completion of treatment. Our findings

indicate when and which aspects of patients' HRQOL will change or remain stable during treatment. Clinicians can use these findings to help prepare patients and parents for the treatment experience. These findings will also help clinicians know when to obtain additional resources to support patients and parents during treatment.

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Table 1

Overall Participation and Patient and Disease Characteristics

	All Patients	Adolescents (≥13 y)	Children (8–12 y)	Children (5–7 y)
No. of eligible patients	71	42	23	6
No. (%) of participants*	66 (93%)	39 (93%)	21 (91%)	6 (100%)
Participation^ rate by time point				
At diagnosis	65 (92%)	39 (93%)	20 (87%)	6 (100%)
Week 12	55 (77%)	33 (79%)	16 (70%)	6 (100%)
Week 23	55 (77%)	32 (76%)	17 (74%)	6 (100%)
After completion of therapy	54 (76%)	31 (74%)	18 (78%)	5 (83%)
Age at Study Enrollment (years)				
Median	13.4	15.4	10.9	5.9
Range	5.0 – 23.0	13.0 – 23.0	8.0 – 12.6	5.0 – 7.1
Mean (standard deviation)	13.3 (3.9)	15.9 (2.4)	10.7 (1.5)	6.0 (0.8)
Sex (%)				
Male	36 (55)	21 (54)	13 (62)	2 (33)
Female	30 (45)	18 (46)	8 (38)	4 (67)
Race (%)				
White	28 (42)	18 (46)	10 (48)	0 (0)
Black	11 (17)	6 (15)	3 (14)	2 (33)
Hispanic	27 (41)	15 (38)	8 (38)	4 (67)
Primary Site of Disease (%)				
Femur	43 (65)	23 (59)	15 (71)	5 (83)
Tibia	16 (24)	10 (26)	5 (24)	1 (17)
Fibula	2 (3)	2 (5)	0 (0)	0 (0)
Humerus	2 (3)	2 (5)	0 (0)	0 (0)
Ulna	1 (2)	1 (3)	0 (0)	0 (0)
Rib	1 (2)	1 (3)	0 (0)	0 (0)
Jaw	1 (2)	0 (0)	1 (5)	0 (0)

*A participant was any patient who completed 1 to 3 HRQOL instruments at 1 or more of the 4 designated time points.

^Participation was considered as the completion of at least 1 of the 3 HRQOL instruments at the designated time point.

Table 2

PedsQL Inventory v. 4.0: Comparisons of Estimated Domain Mean Scores* at Diagnosis vs. Those at Each Time Point

Patient Self-Reports				
Domain	**At Diagnosis**	**Week 12**	**Week 23**	**After Completion of Therapy**
Physical Functioning	43 (3)	50 (3)	52 (3)	67 (3) ^
Emotional Functioning	55 (3)	66 (3) ^	69 (3) ^	75 (3) ^
School Functioning	63 (3)	67 (4)	67 (3)	73 (3)
Parent Proxy Reports				
Domain	**At Diagnosis**	**Week 12**	**Week 23**	**After Completion of Therapy**
Physical Functioning	46 (3)	51 (3)	44 (3)	59 (3) ^
Emotional Functioning	52 (3)	57 (3)	63 (3) ^	68 (3) ^
School Functioning	65 (3)	65 (4)	59 (4)	70 (4)

*Mean scores were estimated from repeated measures models. Standard errors are shown in parentheses. Higher scores indicate better HRQOL.

^Statistically significant after Bonferonni adjustment ($P < (0.05)/36 = 0.0014$)

Table 3

PedsQL Cancer Module v. 3.0: Comparisons of Estimated Domain Mean Scores* at Diagnosis vs. Those at Each Time Point

Patient Self-Reports				
Domain	**At Diagnosis**	**Week 12**	**Week 23**	**After Completion of Therapy**
Pain & Hurt	54 (3)	78 (3) ^	75 (3) ^	72 (3) ^
Nausea	62 (3)	46 (3) ^	47 (3) ^	79 (3) ^
Procedural Anxiety	60 (4)	72 (4) ^	74 (4) ^	80 (4) ^
Treatment Anxiety	72 (3)	87 (3) ^	89 (3) ^	90 (3) ^
Worry	45 (4)	50 (4)	61 (4) ^	66 (4) ^
Cognitive Problems	77 (2)	77 (2)	78 (2)	78 (2)
Communication	71 (3)	76 (3)	81 (3)	82 (3)
Parent Proxy Reports				
Domain	**At Diagnosis**	**Week 12**	**Week 23**	**After Completion of Therapy**
Pain & Hurt	48 (3)	77 (4) ^	62 (4)	66 (4) ^
Nausea	59 (3)	42 (4) ^	41 (4) ^	80 (4) ^
Procedural Anxiety	58 (4)	67 (4)	74 (4) ^	81 (4) ^
Treatment Anxiety	61 (4)	70 (4)	72 (4)	81 (4) ^
Worry	44 (4)	51 (4)	63 (4) ^	69 (4) ^
Cognitive Problems	67 (3)	73 (3)	75 (3)	75 (3)
Physical Appearance	67 (3)	66 (3)	70 (3)	74 (3)
Communication	63 (4)	67 (4)	71 (4)	72 (4)

*Mean scores were estimated from repeated measures models. Standard errors are shown in parentheses. Higher scores indicate better HRQOL.

^Statistically significant after Bonferonni adjustment ($P < (0.05)/48 = 0.0010$)

Table 4

Symptom Distress Scale: Comparisons of Mean Symptom Intensity and Distress at Diagnosis vs. Those at Each Time Point

Item	At diagnosis	Week 12	Week 23	After completion of therapy
SDS Total Scale Score	23.7 (7.0)	17.4 (4.5) ^	17.5 (5.0) ^	15.0 (4.1) ^
How much you are able to get around	3.3 (1.3)	2.7 (1.2)	2.3 (1.1) ^	2.0 (1.0) ^
How tired you are feeling	3.0 (1.3)	2.2 (1.2) ^	2.2 (1.1)	1.7 (0.8) ^
How good your appetite is	2.8 (1.4)	1.6 (1.0) ^	1.7 (1.0) ^	1.3 (0.6) ^
How much pain you are having	1.9 (1.0)	1.1 (0.4) ^	1.2 (0.5) ^	1.3 (0.5) ^
How much nausea you have	1.8 (1.1)	1.4 (0.8)	1.4 (0.7)	1.1 (0.5) ^
How well you slept last night	2.5 (1.3)	1.6 (0.9) ^	1.9 (1.2)	1.8 (1.1)
How you feel about your appearance	2.1 (1.2)	1.8 (0.9)	1.7 (0.9)	1.4 (0.6)
How you are feeling	2.6 (1.0)	2.0 (1.0)	1.9 (0.8) ^	1.7 (0.8) ^
How regular your bowels are working	2.0 (1.3)	1.5 (0.8)	1.8 (1.0)	1.2 (0.5) ^
How well you are able to concentrate	1.7 (1.1)	1.4 (0.6)	1.5 (0.8)	1.5 (0.8)

* Lower item and total scores indicate better HRQOL. Standard deviations are shown in parentheses.

^ Statistically significant after Bonferonni adjustment ($P < (0.05)/72 = 0.0007$)

Table 5

Intraclass Correlation Coefficients* from Comparison of Patient and Parent PedsQL v. 4.0 Inventory and PedsQL v. 3.0 Reports at Each Time Point

PedsQL v. 4.0				
Domain	**At Diagnosis**	**Week 12**	**Week 23**	**After Completion of Therapy**
Physical functioning	0.59	0.47	0.54	0.47
Emotional functioning	0.45	0.27	0.62	0.40
School functioning	0.53	0.65	0.71	0.37
PedsQL v. 3.0				
Domain	**At Diagnosis**	**Week 12**	**Week 23**	**After Completion of Therapy**
Pain and hurt	0.69	0.56	0.45	0.52
Nausea	0.76	0.67	0.58	0.50
Procedural anxiety	0.79	0.40	0.48	0.39
Treatment anxiety	0.42	0.11	<0.01	0.05
Worry	0.62	0.53	0.44	0.56
Cognitive problems	0.32	0.64	0.28	0.45
Communication	0.53	0.41	0.34	0.26

* Between patient and parent ratings, interclass correlation coefficients showed poor (≤0.30), fair (0.31–0.40), moderate (0.41–0.60), good (0.61–0.80), or excellent (0.81–1.00) agreement.