Original Article

Health-Related Quality of Life Among Children With Cancer in Hyderabad, India

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ABSTRACT

Objective. Health-related quality of life (HRQL) experienced by children with cancer is more important than ever before as survival rates are increasing. The aim of this study was to assess the HRQL of children with cancer in a developing country, using physician proxy assessments.

Methods. The Health Utilities Index (HUI) was chosen as the measurement tool and physicians' assessments were obtained using an HUI proxy-respondent interview-administered questionnaire.

Results. A total of 45 patients and their physicians (n=6) were recruited from 2 hospitals in Andhra Pradesh, India. Most of the children had acute lymphoblastic leukaemia. There were no differences in patterns observed between cancer types for the child's HRQL, but there was wide variation in the total HRQL scores among the children. This variation was more evident in certain aspects of children's life such as emotion and pain.

Conclusion. This study has shown that HRQL as determined by physician proxy assessments in children with cancer in India is compromised, matching results in similar populations elsewhere. **[Indian J Pediatr 2009; 76 (12) : 1231-1235]**
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Key words: *Quality of life; Children; Cancer*

As the mortality from other illnesses in childhood (especially infectious diseases) in developing countries is decreasing, increasing numbers of children are being diagnosed with cancer. The burden of morbidity from malignant diseases is more important than ever before as 90% of cancers in childhood occur in countries with limited resources.[1] Childhood cancer is becoming a major cause for concern in these countries. This is exemplified by the incidence of acute lymphoblastic leukaemia (ALL) which has been reported to be increasing in India by 1.6% per year.[2]

Cancer is still the leading cause of disease-related mortality in childhood in industrialised countries, second only to trauma.[3] One in 600 children (aged 0-14 years) in the United Kingdom will experience a new diagnosis of cancer each year and 20-25% of them will die of their disease. Similar figures have been reported in Europe and North America.[4] In these countries the care of children with cancer is aimed at enhancing their quality of life as well as their lifespan. This concept of care is slowly being adopted in the developing countries.

The broad concept "Quality of Life" incorporates a multiplicity of factors such as health, environment, politics, community and economy that influence a person's well-being.[5,6] A narrower 'within the skin' concept - health-related quality of life (HRQL) - has become the focus of increasing attention in medical practice because it can be of great value in patient care, both in terms of clinical outcomes and patient satisfaction.[5,7] This is especially true in the context of complex chronic conditions such as malignant diseases. HRQL in children can be defined as "a multi-dimensional construct that includes physical, social and emotional functioning of the child and is sensitive to the changes that occur throughout development".[7]

Baars *et al*[8] showed that paediatricians are keen on having HRQL assessment in their practice but their main concern is time limitation. A risk when using a physician perspective is that he/she may be more concerned about the cancer, its treatment and the

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[DOI-10.1007/s12098-009-0262-3
[Received September 18, 2008; Accepted May 27, 2009]

physical effects on the patient rather than other aspects of the child's life. Baars et al also suggested that specialised nurses could do the assessments and help improve the overall care of these children.

In developing countries a holistic approach to patient care is often lacking which makes HRQL assessment even more essential, but at the same time more difficult to achieve. This is due to a wide variety of reasons such as lack of resources, low literacy levels, poor awareness of the disease and poverty.

The main aim of this study was to assess the HRQL of children with cancer in India, from their physicians' perspective.

MATERIALS AND METHODS

Study subjects and design

Children were recruited from two hospitals in Hyderabad, Andhra Pradesh: Nizam's Institute of Medical Sciences (NIMS) Hospital and Mehdi Nawaz Jung Institute of Oncology and Regional Cancer Centre (MNJIO & RCC) Hospital. Their physicians were then interviewed regarding the HRQL of these children.

The following inclusion criteria were used. Children with cancer who were on active treatment or in palliative care with cancer and between the ages of 5 and 15 years were eligible for the study. They were excluded if they were unaware of their diagnosis or had completed their treatment at the time of the study. Patients were excluded also if their physician was unable to understand and speak English well enough to answer the English-language questionnaire.

The physician was asked to consider the child's HRQL for the preceding period of 1 week. This was a feasibility study of cross-sectional design.

Data Collection

Basic demographic data were collected from the patients' notes: age, gender, height, weight, parental occupation, and area of residence. Information regarding the cancer was also collected: type of disease, symptoms at initial presentation, and treatment plan.

Health Utilities Index (HUI)

HRQL was assessed using the proxy respondent version of the 40-item Health Utilities Index (HUI) interviewer-administered questionnaire because a review by Pickard *et al*[9] which identified 17 assessment tools including both generic and specific instruments, reported that HUI was employed in most of the studies as the assessment tool of children with ALL. HUI2 and HUI3 are generic multi-attribute health status classification systems which examine various aspects of HRQL. These are described in detail by Feeny et al.[10]

HUI2 has six attributes (domains of health): sensation, mobility, emotion, cognition, self-care and pain. Each of them has 4 or 5 levels. HUI3 has eight domains: vision, hearing, speech, ambulation, dexterity, emotion, cognition and pain. Each domain has 5 or 6 levels. In the domains that are the same in HUI2 and HUI3, the constructs are different. Both HUI2 and HUI3 give single attribute scores for each domain and also a multi-attribute score for overall HRQL. A comprehensive health state is described by a vector (composed of 6 elements for HUI2 and 8 elements for HUI3) in which each element is a level in one attribute. The individual attributes were analysed in detail.[10,11] Overall HRQL scores were calculated from multi-attribute utility functions[12,13] for both HUI2 and HUI3 on a scale from 0.00=dead to 1.00=perfect health. HUI2 scores can range from -0.03 to 1.00 and HUI3 scores from -0.36 to 1.00. A negative score implies that the health status is worse than being dead. HUI instruments have been used by proxy respondents to provide assessments of health status and HRQL in children as young as 5 years of age.

RESULTS

Overall, 61 patients were recruited from both hospitals but 15 children were excluded because they were outwith the specified age limits and one patient had not yet been fully diagnosed at the time of the study. Hence the final study population consisted of 45 children; 15 patients from NIMS Hospital and 30 from MNJIO & RCC Hospital. In NIMS, 4 oncologists (1 consultant and 3 staff grade physicians) were interviewed. Two doctors (1 consultant and 1 staff grade physician) were interviewed for the children from MNJIO & RCC Hospital.

Patient characteristics

The male to female ratio was 1.37:1. Only 2 children had a BMI >20; a 12 year old boy (23.9) and an 11 year old girl (27.1). More than 50 % (23/45) of the children had a BMI < the 5th centile. The median BMI was the 3.3 centile.

Parental occupation is a good indicator of socio-economic status. The largest group (38%) consisted of labourers who earn very low wages. The second largest group (31%) was of agricultural workers. The remainder of the parents were of various occupations including teachers, policemen and taxi drivers.

The majority of the patients came from Hyderabad and the surrounding districts, *e.g.*, Warangal, Nalgonda and Rangareddi, but there were patients from almost all of the districts in Andhra Pradesh.

Disease characteristics

Fever, weight loss and enlarged neck nodes were the most common initial symptoms. Forty-one patients (91.1%) were on chemotherapy and 3 patients were receiving radiotherapy. The distribution of different cancer types among the study group is seen in Fig. 1; the majority of the children had ALL.

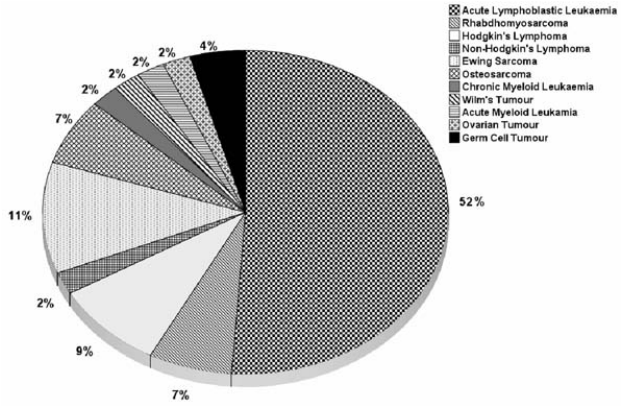

Fig. 1. Distribution of different cancer types in the study group.

Health-related quality of life

Multi-attribute scores

The mean HUI2 score was 0.71 with a standard deviation of 0.26. The scores were spread widely with an inter-quartile range of 0.51 and total range 0.18 to 1.00. The lowest mean HUI2 HRQL score by disease was in a patient with chronic myeloid leukaemia (CML). This 14 year old girl was in chronic phase but had severe pain. Individual patient analysis revealed that the lowest score (0.18) was observed in a child with ALL. This 7 year old boy was wheelchair-bound because of severe pain. Perfect health (score = 1.00) was reported in 9 children: 3 with ALL, 1 with rhabdomyosarcoma, 2 with Hodgkin lymphoma, 1 with ovarian cancer, 1 with Ewing sarcoma, 1 with osteosarcoma.

The mean HUI3 score was 0.62 with a standard deviation of 0.34. The scores were again spread widely with an inter-quartile range of 0.66 and total range – 0.06 to 1.00. Physicians rated 2 children's HRQL to be worse than being dead (score <0.00). The lowest mean HUI3 HRQL score by disease was observed again in the patient with CML. The lowest individual score (-0.06) was in a child with ALL (see above). A score of 1.00 was observed in 6 children: 2 with ALL, 1 with rhabdomyosarcoma, 1 with Wilms tumour, 1 with Hodgkin lymphoma, 1 with osteosarcoma.

Single attribute scores

More than half of the children had 2 attributes or more affected in both HUI2 and HUI3 (Table 1). The largest number of attributes affected was 5 in a child with Ewing sarcoma. In terms of unique health state vectors there were 27 and 28 in HUI2 and HUI3 classification systems, respectively (Appendix). The number of unique health states per subject was 0.62 in both.

Table 1. Frequency Distribution of Subjects by Number of HUI2 and HUI3 Attributes Affected

No. of Attributes Affected	HUI2	HUI3
0	9	6
1	11	9
2	8	16
3	6	13
4	9	0
5	2	1
6	0	0
7	*NA*	0
8	*NA*	0

Among these health states, perfect health (1,1,1,1,1,1) was seen most frequently in HUI2, whereas in HUI3 there were 2 frequent health states (1,1,1,1,1,1,1,1) and (1,1,1,1,1,2,1,1), each recorded in 6 subjects.

The single-attribute scores for HUI2 and HUI3 are shown respectively in Tables 2 and 3. Figure 2 and 3 display the frequencies of levels within each attribute in HUI2 and HUI3 respectively.

Table 2. HUI2 Single-Attribute Scores

HUI2 Domains	Mean Single-Attribute Utility Score (±s.d.)
Sensation	0.99 (±0.05)
Mobility	0.92 (±0.18)
Emotion	0.84 (±0.17)
Cognition	0.99 (±0.04)
Self-care	0.64 (±0.48)
Pain	0.76 (±0.26)

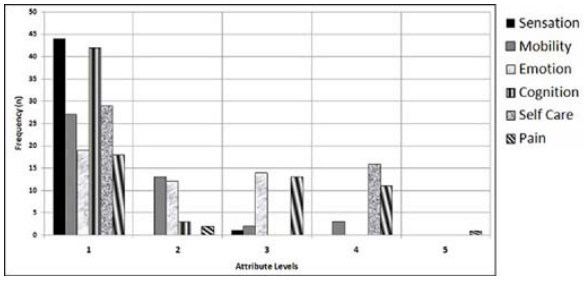

Fig. 2. Frequency of HUI2 Single Attribute Levels.

Table 3. HUI3 Single-Attribute Scores

HUI3 Domains	Mean Single-Attribute Utility Score (±s.d.)
Vision	0.99 (±0.04)
Hearing	1.00 (±0.00)
Speech	1.00 (±0.00)
Ambulation	0.91 (±0.21)
Dexterity	0.97 (±0.14)
Emotion	0.81 (±0.22)
Cognition	0.98 (±0.06)
Pain	0.63 (±0.42)

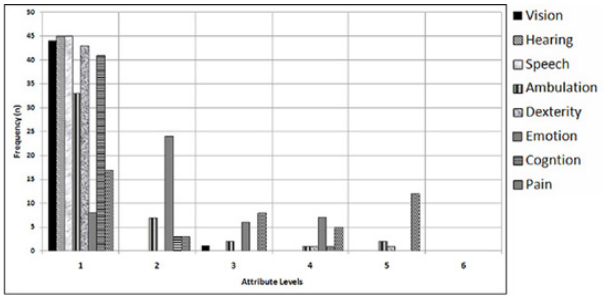

Fig. 3. Frequency of HUI3 Single Attribute Levels.

In HUI2, most children's pain was rated levels 1, 3 and 4, with one child scored at level 5 (severe pain that was not relieved by any drugs). With regard to mobility, 5 children relied on mechanical equipment or help from carers. The frequencies of scores for emotion were evenly spread from levels 1 to 3, indicating that physicians felt that the children were overall anxious and fretful. The attribute of cognition was not affected much at all. From their parents physicians had been informed that 93% of children had no problems with their school work while the rest had slower academic progression. The mean utility score for self-care was the lowest among HUI2 attributes. Physicians scored this domain to be either level 1 (64%) or level 4 (36%) which is complete dependence on others.

Appendix: Unique Health State Vectors

TABLE A. Frequencies of unique health state vectors of HUI2 classification. S, sensation; M, mobility; E, emotion; C, cognition; S/C, self care; P, pain.

HUI2 Unique Health State Vectors								
S	M	E	C	S/C	P	Frequency	%	Utility Score
1	1	1	1	1	1	9	20	1.00
1	1	1	1	1	2	2	4.4	0.97
1	2	1	1	1	1	2	4.4	0.97
1	1	2	1	1	1	2	4.4	0.93
1	1	1	1	1	3	2	4.4	0.84
1	3	1	1	1	1	1	2.2	0.83
1	2	1	1	1	3	1	2.2	0.81
1	1	3	1	1	1	2	4.4	0.80
1	1	2	1	1	3	4	8.9	0.78
1	2	2	1	1	3	1	2.2	0.75
3	1	3	1	1	1	1	2.2	0.68
1	1	1	1	4	3	1	2.2	0.66
1	2	2	1	4	3	1	2.2	0.59
1	2	2	2	4	3	1	2.2	0.56
1	2	2	1	1	4	1	2.2	0.55
1	1	3	1	4	3	1	2.2	0.52
1	2	3	1	4	3	1	2.2	0.51
1	1	3	1	1	4	1	2.2	0.49
1	1	2	1	4	4	1	2.2	0.44
1	2	2	1	4	4	1	2.2	0.43
1	4	3	2	4	1	1	2.2	0.42
1	1	3	1	4	4	1	2.2	0.38
1	2	3	1	4	4	3	6.7	0.37
1	2	3	2	4	4	1	2.2	0.35
1	3	3	1	4	4	1	2.2	0.31
1	4	3	1	4	4	1	2.2	0.26
1	4	1	1	4	5	1	2.2	0.18

TABLE B: Frequencies of Unique health state vectors of HUI3 classification. V, vision; H, hearing; S, speech; A, ambulation; D, dexterity; E, emotion; C, cognition; P, pain

HUI3 Unique Health State Vectors										
V	H	S	A	D	E	C	P	Frequency	%	Utility Score
1	1	1	1	1	1	1	1	6	13.3	1.00
1	1	1	1	1	2	1	1	6	13.3	0.93
1	1	1	1	1	2	1	2	3	6.7	0.88
1	1	1	1	1	1	1	3	1	2.2	0.86
1	1	1	2	1	2	1	1	1	2.2	0.84
1	1	1	1	1	2	1	3	4	8.9	0.80
1	1	1	1	1	3	1	1	1	2.2	0.79
3	1	1	1	1	2	1	1	1	2.2	0.79
1	1	1	3	1	2	1	1	1	2.2	0.75
1	1	1	2	1	2	1	3	1	2.2	0.72
1	1	1	1	1	1	1	4	1	2.2	0.69
1	1	1	1	1	2	1	4	2	4.4	0.63
1	1	1	1	1	3	2	3	1	2.2	0.59
1	1	1	4	1	2	1	3	1	2.2	0.49
1	1	1	1	1	4	2	1	1	2.2	0.44
1	1	1	1	1	2	1	5	1	2.2	0.35
1	1	1	2	1	2	1	5	1	2.2	0.30
1	1	1	1	1	3	1	5	2	4.4	0.27
1	1	1	2	1	4	1	4	1	2.2	0.26
1	1	1	2	1	3	1	5	1	2.2	0.23
1	1	1	2	5	2	2	4	1	2.2	0.19
1	1	1	1	1	3	4	5	1	2.2	0.16
1	1	1	1	1	4	1	5	1	2.2	0.11
1	1	1	5	1	2	1	5	1	2.2	0.10
1	1	1	2	1	4	1	5	1	2.2	0.08
1	1	1	3	1	4	1	5	1	2.2	0.04
1	1	1	1	4	4	1	5	1	2.2	0.00
1	1	1	5	1	4	1	5	1	2.2	-0.06

In HUI3 the lowest mean utility score was seen in the attribute of pain. The frequencies were spread out among all five levels. Physicians scored 17 children (37%) at level 1 and 12 children (26%) at level 5 (severe pain that prevents most activities). The mean single-attribute score for emotion was the second lowest mean score. Physicians rated over 50% of children at level 2 which is "somewhat happy". Other HUI3 attributes were minimally affected or not affected at all.

DISCUSSION

Most of the children in this study had ALL and almost all had either normal or low weight for their age and height. More than 50 % were malnourished by the CDC criterion of BMI < 5th centile. This is to be expected in a developing country, especially in children with cancer.[14] NIMS and MNJIO & RCC are both government hospitals and therefore almost all the children were from a low socio-economic background. Most presented with advanced stage disease. There is a lack of awareness among the general population about the occurrence and seriousness of malignant diseases in children, and people often do not seek medical attention as they cannot meet the attendant hospital costs.[15]

Cancer and its treatment do seem to affect the HRQL of these children. Physician ratings revealed the burden of morbidity to be high even though physicians commonly under estimate the impact of the disease and associated therapy on HRQL by comparison with nurses, parents and children themselves.[16] Under-estimation is manifest particularly in subjective domains such as cognition. The report of apparent perfect health in 9 patients, by physician proxy assessors, exemplifies this limitation.

When HRQL was analysed in terms of the total number of attributes affected, it was found that the majority of the children had only, at most, two in HUI3 and one in HUI2 affected. With regard to single attribute scores in HUI2 and HUI3, sensation was not reported to be affected at all except in one patient whose vision was diminished due to a metastasis of his germ-cell tumour. Furthermore, it was reported that the attributes of vision, hearing, speech, dexterity, cognition and ambulation were affected very little. However, emotion and pain scores were variable. The physicians did not rate any HUI3 attributes at the lowest level and none of the HUI2 domains was rated lowest except for pain.

Although the sample size was small, this study demonstrates the feasibility of measuring the HRQL of even socio-economically disadvantaged children with cancer in India, albeit restricted to the perspectives of physician proxy respondents. The availability of questionnaires in Hindi and other Indian languages would allow responses to be elicited in future from parental proxies, from other caring professionals and even from children themselves. The availability of such assessments would facilitate communications between and among health care providers, patients and their families.[5] Evidently the long-term impact of treatment on HRQL requires assessments in survivors following the completion of therapy.

Acknowledgements

We would like to thank Health Utilities Inc (HUInc) for providing the questionnaires for this study and Mr William Furlong for sponsoring the application for an HUI grant. Special thanks go to all the children, their parents and physicians who took part in this study, without whom this would not have been possible.

Tim Eden is funded by the Teenage Cancer Trust

Contributions: Dr Susmitha Chirivella: Principal investigator; Dr Senthil Rajappa: Clinical supervisor in NIMS Hospital, India; Dr Sudha Sinha: Clinical supervisor in MNJIO & RCC Hospital, India; Professor Tim Eden: Editor; Dr Ronald Barr: Editor

Funding for the questionnaires was provided by HUInc.

REFERENCES

1. Barr, R, Ribeiro R, Agarwal B, Masera G, Hesseling P, Magrath I. Pediatric oncology in countries with limited resources. In Pizzo PA, Poplack DG, eds. *Principles and Practice of Pediatric Oncology 5th ed*. Philadelphia; Lippincott, Williams and Wilkins, 2006: 1604-1616.
2. Sharma DC. Standard protocol helps improve ALL survival rates in India. *Lancet Oncol* 2002; 3:710.
3. Gurney JG, Bondy ML. Epidemiology of childhood cancer. In Pizzo PA, Poplack DG, eds. *Principles and Practice of Pediatric Oncoogy* 5th ed. Philadelphia; Lippincott, Williams and Wilkins, 2006: 1-13
4. Steliarova-Foucher E, Coebergh JW, Kaatsch P, Pritchard-Jones K, Stiller C, eds. Cancer in children and adolescents in Europe. *Eur J Cancer* 2006; 42: 1913-2190.
5. Feeny D, Furlong W, Mulhern RK, Barr RD, Hudson M. A framework for assessing health-related quality of life among children with cancer. *Int J Cancer* 1999; Suppl 12: 2-9
6. Nathan PC, Furlong W, Barr RD. Challenges to the measurement of health-related quality of life in children receiving cancer therapy. *Pediatr Blood Cancer* 2004; 43:215-223.
7. Bradlyn AS, Ritchey AK, Harris CV *et al.* Quality of life research in pediatric oncology. Research methods and barriers. *Cancer* 1996; 78:1333-1339.
8. Baars RM, van der Pal SM, Koopman HM, Wit JM. Clinicians' perspective on quality of life assessment in paediatric clinical practice. *Acta Paediatr* 2004; 93:1356-1362.
9. Pickard AS, Topfer LA, Feeny DH. A structured review of studies on health-related quality of life and economic evaluation in pediatric acute lymphoblastic leukemia.[see comment]. *J Natl Cancer Inst Monogr* 2004;33: 102-125
10. Feeny D. The Health Utilities Index: A tool for assessing health benefits. *Patient Reported Outcomes Newsletter*. 2005;34(Spring Issue):2-6
11. Horsman J, Furlong W, Feeny D, Torrance G. The Health Utilities Index (HUI®): Concepts, measurement properties and applications. *Health and Quality of Life Outcomes (electronic journal).* 2003 Oct; 1:54. Available at *http://www.hqlo.com/content/1/1/54. Accessed 25/02, 2008*
12. Feeny D, Furlong W, Boyle M, Torrance GW. Multi-attribute health status classification systems. Health Utilities Index. *Pharmaco Economics* 1995; 7: 490-502.
13. Torrance GW, Furlong W, Feeny D, Boyle M. Multin-attribute preference functions. Health Utilities Index. *PharmacoEconomics* 1995; 7: 503-520.
14. Sala A, Antillon F, Pencharz P, Barr RD. Nutritional status in children with cancer: A report from the AHOPCA workshop held in Guatemala City, August 31 – September 5, 2004. *Pediatr Blood Cancer* 2005; 45:230-236.
15. Chandy M. Childhood acute lymphoplastic leukemia in India: An approach to management in a three-tier society. *Med Pediatr Oncol* 1995; 25:197-203.
16. Barr RD, Gonzalez A, Longchong M *et al.* Health status and heath-related quality of life in survivors of cancer in childhood in Latin America: A MISPHO feasibility study. *Int J Oncol* 2001; 19: 413-421.