Assessment of Functional Status in Young Children with Asthma

by

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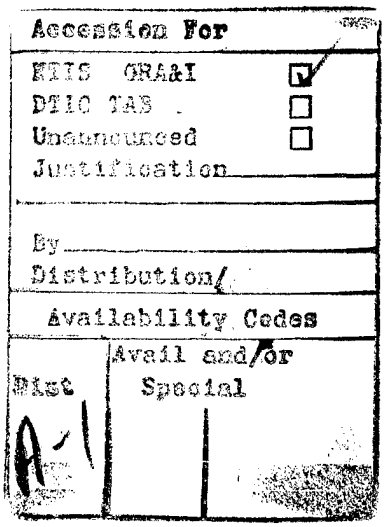

Assessment of Functional Status
in Young Children
With Asthma

By Janet Hegarty

Chairperson of the Supervisory Committee: Professor Gail Kieckhefer
Department of Nursing

This secondary analysis explored the psychometric properties of the Functional Status II ® (FS II ®)14 item instrument when used to assess the functional status of young children with asthma during three time periods during a hospital discharge study. The Functional Status II ® is a measure of functional status over the previous two weeks of a child's life. It was developed for use with children from birth to 16 years of age with chronic physical conditions. The FSII(R) measures parent's perceptions of the impact of illness on their children's functioning, encompassing physical, psychological, and social aspects. The elements included in the conceptual framework are communication, mobility, mood, energy, sleep, eating and toileting activities.

The sample of this pilot study consisted of 23 children (8 boys and 15 girls).The children were diagnosed with asthma and had no additional chronic illnesses. At the time of the study, they ranged in age from 2 to 13 years of age (mean 4.9 years; modal age 2 years). Time since asthma diagnosed ranged from 0 to 11 years. The mean duration of asthma was 2 years, 6 months and the mean age at diagnosis was 2 years and 3 months. On admission the parents rated the overall severity of their child's asthma using the classification of asthma by severity of disease published by the National Heart, Blood, and lung Institute in 1991. Six children were classified as having mild asthma, eight as having moderate asthma and eight as having severe asthma. Family social strata, according to the Hollingshead Four Factor Index, was mainly professional (66%), although all strata were represented.

Item level analysis revealed that there were 4 items that showed consistent variability across all three time periods. These items include sleep through the night, sleep well, seem to feel sick and tired and react to little things by crying. The internal consistency estimates of the FSII ® 14 item scale used at hospital admission, 2 weeks and 4 weeks after hospital discharge indicated that this scale functioned in an internally consistent manner in this study. The mean scores of the Functional Status scores did slightly improve over time from admission to 4 weeks after discharge as may be expected. However, using multiple comparison T- tests, the difference of scores was not statistically significant.

The strength of the relationships between the FSII ® scores and traditional measures of morbidity (number of medications used, symptom frequency, night awakenings, school absences, medical care utilization) were analyzed using a correlation matrix with 2 tailed p values. Data was analyzed separately for the admission, 2 week and 4 week time periods. The only relationships that approached statistical significance were severity of asthma and FSII ® scores on admission, frequency of night awakenings and FS II ® scores at 2 weeks after discharge and symptom frequency at 4 weeks after discharge.

The overall pattern of psychometric properties seen in this study are an indication that the Functional Status II ® may be a useful measure of functional status assessment in children with asthma following an acute exacerbation.

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Chapter I

INTRODUCTION

Over the last decade there has been an increasing awareness of the need to measure the impact of disease and illness along with outcomes of care to evaluate the effectiveness of prevention and treatment strategies. Health is often stated as the desired outcome of care. Using the World Health Organization's (1978) definition to conceptualize child health, as the state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity, it is not surprising that such a complex entity as child health is difficult to measure. Indeed, the complexity is compounded in the presence of chronic illness; particularly chronic illness whose expression changes dramatically throughout its course.

Asthma is the most common chronic childhood illness (Newacheck, Budetti,& Halfon, 1986). Although there is not any one definition of asthma that has been universally accepted, asthma has been defined as a disease with episodes of symptoms (coughing, wheezing, and other signs of bronchial obstruction) interspersed by symptom-free periods (American Thoracic Society, 1987). It is important to assess the impact of symptom episodes on health status and quality of life since it has been documented that children with chronic illness in general and asthma specifically experience physical limitations and disruptions of daily life activities as a result of their illness (Hobbs, Perrin & Ireys, 1985). Treatment may variably impact the episodes, yet treatment itself may cause limitations or disruptions in daily life activities. It is therefore important to ascertain that selected therapeutic interventions not have adverse effects that are perceived by the individual to be worse than the underlying disease.

Problem Definition

The assessment of children's health status presents several methodological difficulties and may be especially problematic in the presence of asthma (Richards & Hemstreet,

1994). Issues that contribute to the methodological difficulties, include the (1) dilemma in use of generic versus disease specific measures, (2) frequent necessity of using adult proxies (Lewis, Pantell & Kieckhefer, 1989; Richards & Hemstreet, 1994), (3) evolving stages of the child's development (Stein & Jessop, 1990), and (4) nature and disease characteristics of asthma itself (Richards & Hemstreet, 1994). A more in-depth overview of these issues will be presented in the review of literature as each issue has important implications for measuring the health status of children with asthma. Given the complexities and methodological issues, several approaches and tools are currently being actively investigated for their ability to evaluate health status of children with asthma.

A traditional approach has been to define and measure severity of asthma in children (Ellis, 1983). Measures using this approach have generally incorporated information from several areas: parent reports of respiratory symptoms and daily activities; frequency of medical care utilization; frequency of sleep disruption; type and amount of medication needed; and pulmonary function test performance. Using this approach Ellis (1983) developed a grading of asthma as mild, moderate, or severe on the basis of history, physical examination, chest x-ray films, and pulmonary function tests. Ellis further delineated the type and duration of medications that would be of benefit to children in each category. Ellis differentiated within these categories, whether the child had acute exacerbation requiring only intermittent treatment while symptomatic, to the more severely affected individual with chronic asthma having daily symptoms and frequent exacerbations requiring daily medications to function normally. These latter individuals were described as being at risk for sudden death because of the significant lability of their airways.

More recently, measurements of functional status have been developed. Function has been described as the ability of an individual to perform and adapt to his or her

environment. Functional status assesses the patient's ability to perform the physical, emotional and social tasks of life. It represents a person's performance of daily activities in his or her natural environments (Nelson, Conger, Douglas 1987). Several measures of adult functional status have been developed which have gained acceptance for their usefulness as health status measures. One such instrument is the Sickness Impact Profile (SIP) which is a behaviorally based outcome measure of health used for assessing the impact of sickness on an individual's role performance and ability to carry out daily life activities (Bergner, Bobbit, Kressel, Pollard, Gilson, & Morris, 1976).

Bergner et al, (1976) have identified several favorable attributes of this performance conception of health that make it useful as the basis for an outcome measure of health care. First, the performance behavior may be observed and reported by others as well as the individual. Second, performance may be affected by medical treatment even though the disease remains unaffected. Third, performance can be measured whether or not the individual is receiving medical care. And lastly, a measure based on performance or behavior permits relating diverse definitions of disease and illness by uncovering universal patterns of affected behavior.

Another recent contribution in this area is by Juniper, Guyatt, Epstein, Ferrie, Jeaschke, and Hiller (1992) who developed an adult asthma quality of life questionnaire that assesses health related impairment. Juniper et al (1992) identified the need for a questionnaire to include the impact of the symptoms and other facets of the disease on patient's lives in addition to the more conventional physiological and clinical measures. The questionnaire encompasses several domains that were identified by asthma patients as having an impact on their daily lives. These domains include: physical activity limitations; symptoms; emotional function; exposure to environmental stimuli; and avoidance of environmental stimuli. The tool was designed to be capable of measuring change over

time within individual people and therefore to be used as an outcome measure to be used in asthma clinical trials.

In the context of children, especially younger children, measurement of functional status is inherently quite complex, due to the multiple contextual overlap of developmental domains such as cognitive, psychological, biologic, social, and environmental. This overlap compounds the difficulty in determining whether failure to perform an age appropriate task/activity is due to illness or some other confounding factor (Stein & Jessop, 1990). This uncertainty makes some applied researchers question whether it is possible to assess functional status in young children with chronic illness despite continuing efforts (Stein & Jessop, 1982; 1990).

One proposed measure of functional status for children is the Functional Status II ® developed by Stein and Jessop, (1990). This behaviorally based tool assesses impairment by measuring the behavioral consequences of disease for physical, psychological and social functioning of the child (Stein & Jessop, 1982). The tool is a generic measure not limited to use with persons having asthma. Indeed, it is more commonly used in investigations where subjects have a mix of illnesses/conditions. The performance of this tool as an outcome measure with a defined population of children having a common chronic illness is essentially unknown.

Purpose of the Study

The primary purpose of this research was to examine the psychometric properties of the Functional Status II ® instrument when used to assess the functional status of young children with asthma at three time periods during a hospital discharge study. Specific aims include: 1) examination of variability in response across items; 2) internal consistency of the short 14 item subscale applicable across the age span of children 2 to 13 years; 3) presence of theoretically expected relationships between this 14 item Functional Status II

® subscale score and other traditional measures of asthma morbidity. Determining the extent to which the Functional Status II ® operates as expected will assist in future decision making regarding this instrument's usefulness in small, intervention studies with young children having asthma. Information may also guide development of additional measures.

Chapter II

REVIEW OF LITERATURE

Generic and Disease-Specific Measures

The choice of general purpose measures of health status that are generic and can be used for different diseases, conditions and populations versus more disease-specific measures is an area of debate. Patrick and Deyo (1989) define generic health status measures as those being widely applicable across types and severities of disease and conditions, across different health interventions and treatment strategies, and across demographic and cultural groups. Advocates of general purpose measures note that their primary advantage is that of promoting integration of research across diseases and conditions. Thus data can be used for evaluation of medical care, program planning, policy formulation and allocation of resources (Bergner, Bobbitt, Carter & Gilson, 1981; Patrick & Deyo, 1989; Stein & Jessop, 1982). Disease-specific measures are those that are designed to assess specific patient populations of diagnostic categories/conditions with the objective of measuring responsiveness and clinically important changes (Patrick & Deyo, 1989). This responsiveness or sensitivity to change is the chief advantage of this condition specific measurement approach.

There is growing consensus that both types of measures are important and that research should incorporate both (Patrick & Deyo, 1989; Richards & Hemstreet, 1994). However, the differential priority placed on the two types of measures remains an area of debate. Patrick and Deyo (1989) recommend that the highest priority be given to generic measures, and that disease-specific measures be treated as supplements to the generic measures. Patrick and Deyo stress that the continued use of generic measures enable comparisons of different populations and different programs and is necessary for comparing benefits of different health interventions and the allocation of resources. They

suggest that the development of many disease specific instruments for the same condition may lead to a decrease in the external validity of study findings if the instruments are too specific to a given study and therefore, are not likely to be used in other studies. Patrick and Deyo also caution that advances in identifying outcomes across populations and interventions in a single field may be delayed if measures designed for single studies subsequently require thorough investigation into the individual merits of each instrument.

This perspective of the preferential value of generic measures differs from that of Richards and Hemstreet (1994) and Burney, Detels, Higgins, Peckham, Samet and Tager (1987) who suggest that in asthma research, asthma specific measures should be given the highest priority. Richards and Hemstreet (1994) suggest that unlike other chronic and/or life-threatening diseases that have a substantial continuous impact on quality of life, the underlying quality of life in asthma, due to its typical episodic nature and symptom free periods, is more likely to be closer to the general population. For this reason, they question the relevance of generic measures designed primarily for life-threatening diseases for use in asthma studies. Additionally, Burney et al. (1987) recommend that there is a need for greater specificity in asthma research to determine if there are any significant associations between asthma and risk factors that are independently associated with each of the pathologic processes involved in asthma. These differing perspectives over the relative priorities that should be given to generic versus specific measures continue to fuel this area of active debate.

Proxy Versus Child Response

Another methodological consideration that applies to the problem of assessing health status in children is the use of adult proxies (usually parents) in data collection. Newacheck, Budetti, and Halfon (1986) examined prevalence of activity limiting chronic conditions among children based on household interview. They found that the reporting of

activity limitations, especially mild limitations, varied amongst families and individual reportees and was influenced by several factors including: family attitudes of health and sick-role behavior; parental expectations, awareness of chronic condition, child's propensity to engage in strenuous activities, and cultural differences among respondents. Thus, two reportees might rate the same activity differently in terms of limitation.

Similar proxy reporting problems documented in studies with care givers of the elderly have not as yet been replicated with children. But concerns may be equally relevant. Several studies involving caregivers of elderly patients as proxies, have indicated a response bias. Responses were strongly influenced by the perceived burden of caregiving and the proxies own level of psychological distress (Rothman, Hedrick, Bulcroft, Hickam, & Rubenstein, 1991; Epstein, Hall, Tognetti, Son & Conant, 1989). Epstein and colleagues (1989) found that the number of hours a proxy spent each week helping the subject predicted discrepancies for functional status rating. The more hours spent, the more functionally impaired the proxy rated the subject, relative to the subject's own report. Other research, has similarly found that family members (as well as health care providers) have a tendency to rate patient's health more negatively than patients do (Rothman et al, 1991).

Stages of Development

The use of a behaviorally based functional status measure for children requires the articulation of normal roles and functions. In healthy children achievement of predictable milestones can be observed in the areas of psychosocial, language, vision, hearing and motor development. As maturation progresses and children are capable of increasing amounts of voluntary activity, the skills they attain occur in predictable sequences and can be measured by developmental testing. These typical sequences in child development, which have been derived for populations of healthy children, raises the question of

whether these patterns are applicable to children with chronic illnesses and/or handicapping conditions. The life experiences of these children may be very different from healthy children. As children undergo major developmental changes including alteration in autonomy, they are influenced by biologic as well as environmental factors. There is much less agreement of what constitutes normal function and roles of children at each age, within and across different social contexts than might be expected (Stein & Jessop, 1990). Stein and Jessop point out that one of the difficulties in developing a functional status measure for children is in differentiating whether failure of a child to achieve an area of independent function reflects an abnormal developmental process in one or more areas, an environment that does not promote independence or loss of ability to function because of illness.

Disease Characteristics

Asthma is a complex disorder in which the pathogenesis is not completely understood. It is thought to be a multifactorial chronic respiratory illness which involves alterations in biochemical, immunologic, infectious, autonomic, and psychological processes which affect different individuals in varying degrees (Larsen, 1992). Asthma may be defined as having the following characteristics: recurrent and reversible (but not completely so in some individuals) airway obstruction; airway inflammation; and increased airway responsiveness to a variety of stimuli (National Heart, Lung, and Blood Institute, 1991). The obstruction of the hyperreactive airways results from bronchial smooth muscle contraction, increased mucus secretion, and edema with inflammation (Ellis,1983). The contributions of these different components to airway obstruction varies among patients and from time to time in the same patient. The signs and symptoms usually are episodic in nature and reflect the reversibility of the airway obstruction that can improve spontaneously or as a result of treatment (Ellis, 1983). The level of airway

hyperresponsiveness is not static, it may increase or decrease in response to a variety of factors and stimuli (Ellis, 1983). The development of airway obstruction is responsible for the clinical manifestations of asthma.

The episodic nature of this disease in which there are usually extended symptom free periods interrupted by episodes of perhaps severe symptoms, contribute to the difficulties of health status measurement in these children, as there may not be a substantial continuous impact on quality of life or function (Richards & Hemstreet, 1994). Thus, although the child may function very poorly one day, that same child may function well the next.

Functional Status II ®

The Functional Status II ® (Stein & Jessop,1990) is a measure of functional status over the previous two weeks of a child's life. It was developed for use with children from birth to 16 years of age having chronic physical conditions. The Functional Status II ® instrument was designed to measure parent's perceptions of the impact of illness on their children's functioning, encompassing physical, psychological and social aspects. The elements included in the conceptual framework are communication, mobility, mood, energy, play, sleep, eating and toileting activities (Stein & Jessop, 1990).

The Functional Status II ® (FSII ®)has been tested on a sample of children with chronic illness and peers to assess its psychometric properties and the applicability of the measure to populations that include both well children and those with serious health problems. Data suggest that the internal consistency is above 0.80 and that the measure adequately distinguishes between well and ill children (Stein & Jessop,1990). The descriptive statistics reported by Stein and Jessop (1990) show that the means for the well children are higher than those for the ill children. There was also far more variation among the ill children than among the well as evidenced by the larger standard deviations

and wider ranges of scores. Stein and Jessop reported that the well and ill groups were significantly different on every functional status scale for each age group. Concurrent validity was established by correlating the FS II ® with traditional measures of morbidity status (days absent from school, days in hospital). The correlations were found to be consistent across the age ranges but slightly stronger for the older age groups. Stein and Jessop also report that there were significant differences in functional status between groups of children with various types of impairments. They additionally found that scores for those whose health was reported to have been the same as usual were significantly higher (more functional) than those whose reported health had been different from their usual state. Stein and Jessop conclude that the Functional Status II ® instrument appears to be useful for evaluating illness impact across a broad range of chronic illnesses and impairments.

Based on the work of Stein and Jessop other's have begun to use the FSII ® as an outcome measure in studies of children having asthma. (Lewis, Pantell, Kieckhefer, 1989). One such group, the Maternal Child Health Asthma Task force at the University of Washington recently completed a hospital discharge study in which the Functional Status II® was used to depict return to normal activities post hospital admission for asthma exacerbation (Morray & Redding, 1995). This thesis reports the performance of the tool in this study in regard to item response variability, internal consistency and evidence for construct validity.

Chapter 3

METHODOLOGY

This research involves secondary analysis of data collected during a pilot study utilizing a longitudinal design. The purpose of this secondary analysis was to examine the psychometric properties of the Functional Status II ® instrument in assessing the functional status of children with asthma at three time periods in a hospital discharge study. Specifically to examine: 1) variability of response to items; 2) internal consistency of the short 14 item subscale applicable to ages 2 to 13 years of age; and 3) presence of theoretically expected relationships between Functional Status II ® subscale scores and other traditional measures of asthma morbidity to provide evidence of construct validity.

This hospital discharge study had approval from Children's Hospital Medical Center Human Subjects Research Committee. Upon admission to the hospital for asthma exacerbation the parent gave permission for study enrollment. Data was collected throughout the hospital stay and at discharge, 1, 2, 3, and 4 weeks post discharge. The Functional Status II ® was given on admission, 2 weeks and 4 weeks after discharge from the hospital.

Measures

In the hospital discharge study the Functional Status II ® measure was used to assess functional health status at the time of admission to establish the baseline level of function prior to illness, and at hospital discharge and 2 and 4 weeks after discharge to establish return to normal activities. The shortened 14- item measure of the Functional Status II ® was used in this secondary analysis as it is comprised of the core set of items applicable across the age range represented in the study sample. This short 14 item measure has been reported to have similar psychometric properties as the longer version (Stein & Jessop,

1990). The Functional Status II ® score is calculated as the percent of possible points that the child obtains of the sum total for the core 14 items. Items on the scale include: eat well; sleep well; seem contented and cheerful; act moody; communicate what (he/she) wanted; seem to feel sick and tired; occupy (him/herself); seem lively and energetic; seem unusually irritable or cross; sleep through the night; respond to your attention; seem unusually difficult; seem interested in what was going on around (him/her); react to little things by crying. Parents rate the child's function from 0 (no impact due to illness) to 1 (partly due to illness) and 2 (fully due to illness). On admission parents were asked the Functional Status questions face to face. Parents were telephoned at 2 and 4 weeks following hospital discharge to provide the respective functional health status data on their child.

Information regarding follow-up medical resource utilization (primary care office visits and emergency room visits), medication use, night awakenings, symptom frequency, and school absences was obtained via structured interview protocol designed for the study. This information was obtained face to face on admission and per telephone at 2 and 4 weeks.

Standard demographic information was collected about the parent and child. Socioeconomic status (SES) was measured using the Hollingshead Four Factor Index of Social Status (Hollingshead, 1975). The four factors used in the index are: education, occupation, sex and marital status. Possible scores with this measurement range from a high of 66 to a low of 8. It is assumed that the higher the score of a family or nuclear unit, the higher the status its members are accorded by other members of our society.

On admission the parents rated the overall severity of their child's asthma using the classification of asthma by severity of disease published by the National Heart, Blood, and Lung Institute in 1991. This multidimensional classification uses frequency of

exacerbations, frequency of symptoms, amount and type of medication to control symptoms (proxy measure of airway hyperactivity) in combination with frequency of sleep and activity disturbance (reflecting degree of life disturbance due to the illness) to assign a score from 1 to 3 with 3 being the most severe.

Sample

The convenience sample of this pilot study consisted of 23 children (8 boys and 15 girls) admitted to the hospital for status asthmaticus between February 1994 and June 1994. Parents consented to involvement in the study at the time of admission. The children were diagnosed with asthma and had no additional chronic illnesses other than allergies. At the time of the study, they ranged in age from 2 to 13 years of age (mean 4.9 years; modal age 2 years). Time since asthma diagnosis ranged from 0 to 11 years. The mean duration of asthma was 2 years, 6 months and the mean age at diagnosis was 2 years and 3 months. Six children were classified by their parents as having mild asthma, eight as having moderate asthma and eight as having severe asthma. Family social strata, according to the Hollingshead Four Factor Index, was mainly professional (66%), although all strata were represented.

Analysis

Data was analyzed using the statistical program SPSS for Windows Release 6.0 (1993). Frequencies and visual analysis was used to describe the sample and item level responses to Functional Status II (R) items. The internal consistency of the Functional Status II ® 14 item scale at three time points was determined through reliability analysis using Cronbach's alpha. Because of the small sample size and distributional properties of the data, the strength of the relationships between Functional Status II ® 14- item scale and other variables including the number of beta 2 drugs used to control symptoms in previous 24 hours; frequency of sleep disruption in previous 24 hours; school days missed

in past 2 weeks; and health care utilization in past 2 weeks were examined using the nonparametric test, Kendall Correlation Coeffient. A significance level of 0.05 was established apriori.

Chapter IV

RESULTS

Item Variability

Item level analysis revealed that there was variability on several items consistently across the 3 time points (See Table 1). These items include sleep through the night, react to little things by crying, seem to feel sick and tired, and sleep well. Another item, seem unusually irritable or cross demonstrated variability across 2 time points. The majority of other items showed minimal variability. Examples of these items include: communicate what he/she wanted; respond to your attention; eat well; and seem interested in what going around him/her.

Internal Consistency

The internal consistency estimates of the FS II ® 14 item scale used at hospital admission, 2 weeks and 4 weeks after hospital discharge were satisfactory. At all times alpha was in excess of 0.80 (standard item alpha .82, .85, .82 respectively) indicating that the Functional Status II ® 14 item scale functioned in an internally consistent manner in this study.

Theoretical Expected Relationships

The descriptive statistics shown in Table 2 show that the mean scores of the Functional Status scores did slightly improve over time from admission to 4 weeks after discharge as may be expected. Using multiple comparison T- tests, however, the difference of scores was not statistically significant.

Table 1. Means and Standard Deviations for Functional Status II ® variables at Admission, 2 weeks and 4 weeks after discharge

Variable	Admission Mean (SD)	2 weeks Mean (SD)	4 weeks Mean (SD)
Eat Well	1.81(.40)	1.95 (.21)	1.95 (.22)
Sleep Well	**1.71 (.56)**	**1.73 (.55)**	**1.71 (.64)**
Seem Contented and cheerful	1.86 (.35)	1.86 (.40)	1.90 (.30)
Act moody	1.48 (.51)	1.54 (.60)	1.71 (.46)
Communicate what he wanted	1.90 (.30)	2.00 (.00)	2.00 (.00)
Seem to feel sick and tired	**1.52 (.60)**	**1.50 (.60)**	**1.40 (.59)**
Occupy him/herself	1.86 (.36)	1.86 (.47)	1.90 (.30)
Seem lively and energetic	1.86 (.36)	1.82 (.40)	1.71 (.46)
Seem unusually irritable or cross	**1.62 (.59)**	**1.59 (.59)**	1.52 (.51)
Sleep through the night	**1.24 (.94)**	**1.54 (.74)**	**1.76 (.62)**
Respond to your attention	1.95 (.22)	2.00 (.00)	1.76 (.43)
Seem unusually difficult	1.71 (.46)	1.64 (.58)	1.86 (.36)
Seem interested in what was going around him/her	1.81 (.51)	1.90 (.29)	1.90 (.30)
React to little things by crying	**1.53 (.68)**	**1.59 (.59)**	**1.38 (.67)**

Table 2. ***Means and Standard Deviations :***

Functional Status II ® Percent of Total Score

Time	Mean +/- SD
Admission	85.9 +/- 13.4
2 weeks after discharge	87.9 +/- 12.9
4 weeks after discharge	87.1 +/- 14.1

The strength of the relationships between the Functional Status II ® scores at 2 and 4 weeks after discharge and traditional measures of morbidity (number of medications used, symptom frequency, night awakenings, medical care utilization) were analyzed using a correlation matrix with 2 tailed p values. Data was analyzed separately for the admission, 2 week and 4 week time periods. The only relationships that approached statistical significance are shown in Table 3. All computed correlations were negative as expected, indicating that these variables were inversely related to functional status scores.

Table 3

Summary of Kendall Correlations Coefficient with Functional Status Scores

Traditional Morbidity Measures	r	p	Time
Severity of Asthma	**-0.37**	**.05**	**Admission**
Frequency of night awakenings	**-0.45**	**.02**	**2 weeks after discharge**
Symptom frequency	-0.29	.11	2 weeks after discharge
Number of beta agonists	-0.18	.30	2 weeks after discharge
Medical care utilization	-0.11	.57	2 weeks after discharge
Frequency of night awakenings	-0.28	.14	4 weeks after discharge
Symptom frequency	**-0.39**	**.04**	**4 weeks after discharge**
Number of beta agonists	-0.15	.42	4 weeks after discharge
Medical care utilization	-0.30	.13	4 weeks after discharge

Chapter V

DISCUSSION FINDINGS

Limitations of the Study

There are several limitations regarding the application of this study. First, this study was conducted at one institution in one geographic location. Hospital admission or discharge practices might have in some way influenced some aspect of the process and therefore the outcomes of the study. Most cases of parental report were really maternal report. To what extent similar results would emerge if fathers were the principal proxy's is unknown. This limitation however, may mimic the real world since mothers remain the principal caregivers of health care for young children and respondents to health surveys. Last, because of the small sample size, there is limited power to find significant relationships that truly exist unless they are of large magnitude. These results thus may underestimate the usefulness of the Functional Status II ® instrument.

Item Variability

There were 5 items that showed variability consistently during at least 2 time periods. These items include sleep through the night, sleep well, seem to feel sick and tired, react to little things by crying and seem unusually irritable or cross. Two of these items, sleep through the night and sleep well have traditionally been used in the assessment of children with asthma. For example, it is well recognized that the hallmark of hyperreactive airway is cough, which is characteristically at its worst at night. Therefore, symptom assessment of children having asthma, typically includes questions about nocturnal awakening and cough. However, the finding of consistent variability to react to little things by crying, seem unusually irritable and feeling sick and tired represent symptoms that may be included in a global assessment of a child but are nonspecific to asthma. These particular

symptoms may occur in a vast array of illnesses and diseases and typically are not found on clinical and research tools for asthma. These findings may indicate that the assessment of feeling sick and tired and emotional lability is another important area of assessment in children having asthma. Whether these 5 variables are independent or causal and the direction of influence of each is not known from these results. Therapeutic interventions may affect all 5 items and it would be an interesting area for further study to see if this would be a consistent finding where the effects of age, disease deterioration and/or medications could be partitioned out.

Theoretically Expected Relationships

Given the lack of variability at the item level, it is not surprising that the relatively high scores on admission did not significantly change over time, even though they did move up in the expected direction. The mean FS II ® scores in this study (see Table 2), at all three time points, were more comparable to the mean scores of ill children than the mean scores of well children in the data set reported by Stein and Jessop (1990) of their study of 732 children. In their study, Stein and Jessop reported that the mean scores of ill children ranged from 85.1+/- 18.3 to 91 +/- 16 versus the mean scores of well children which ranged from 93.9 +/- 8.2 to 98.6 +/- 3.1. Stein and Jessop also noted that while it appears that there are not large differences between the means of ill and well children, there was far more *variation* among the ill children than among the well children, as observed from the larger standard deviations and wider ranges of scores. A similar finding of larger standard deviations was also noted in this study. The standard deviations in this study compared more closely to the standard deviations of ill children in the Stein and Jessop study than their well children. Stein and Jessop also pointed out that the lack of significant differences in mean scores between well and ill children is consistent with their clinical experience that many children with chronic disorders often function at a comparable level

to those of well children. It is important to remember that the functional status tool in this current hospital discharge study was administered at 3 time points and precipitated by an asthma exacerbation necessitating subsequent hospitalization. Therefore, it is not known if any of the scores represent a true baseline score for the children, but rather reflect an impairment of their functional status attributable to their current asthma exacerbation. Between episodes, the child with asthma may appear entirely normal and their baseline level of functioning may be more comparable to the mean scores of well children in the Stein and Jessop study. Regardless, the overall pattern of psychometric properties seen are an indication that the Functional Status II ® could be a useful measure of functional status assessment in children with asthma following an acute exacerbation.

Concurrent validity was explored by correlating the FS II ® 14- item measure with traditional measures of asthma morbidity (medical care utilization, number of medications used, symptom frequency, night awakenings, and school absences). In every case, at all three time points, the FSII ® scores correlate with the criterion variable in the expected direction. But, in only three instances do these correlations reach statistical significance (See Table 2). One may speculate as to why there were not stronger correlations. Perhaps the limited variability of scores in this sample on all measures reduced the apparent strength of associations found. Since FS II ® scores and measures of morbidity status were by parental report, scores may have been contaminated by parental bias in ways that reduced the strength of associations.

The fact that FSII ® scores on admission to the hospital for asthma exacerbation were significantly correlated with NHLBI asthma severity scores lends construct validity to the tool. That is children with severe asthma experienced more limitations and impairment of functional status than those with milder asthma.

Future Study

One area for additional study would be to examine the psychometric properties of the FSII ® given to parents of children who had no recent symptoms of asthma and to those who had severe symptoms through out the past 2 weeks. If variability is constrained during the asymptomatic state this gives further evidence that the FSII ® is most useful in the time surrounding an asthma exacerbation.

While results were not totally consistent, they did indicate that an adaptation of this tool may be useful in the study of children recovering from asthma exacerbations. In this study the FS II ® tool was initially administered to parents in the ER prior to their child's hospital admission. The standard administration of the FS II ® tool asks the parents to think about their child during the last 2 weeks. This time framing could potentially impact scores depending on how closely the parents adhered to the directions. Many asthma patients may experience limitations in function only upon onset of their exacerbation and experience very minimal limitations, if any, during the previous 14 days. The time specification might be modified according to the specific purposes of the study or administered time point. For example, when assessing the functional status at the time of an attack, it might be more appropriate to assess the child's functional status within a more delimited time period (i.e., the previous 48 hours) instead of the previous 14 days. Subsequent follow up assessment might be over increasingly longer time periods (i.e., previous 14 days). If the study is attempting to track improvement over time however, it might be necessary to retain the 48 hour time frame to get an accurate picture at any one measurement point and not have time frames overlap. Using the standard 2 week time frame may be useful only after at least 6 weeks when pulmonary function possibly returns to baseline status. Experimentation using a variety of time frames might prove fruitful.

Nursing Practice Implications

In combination with disease specific measures (PEFR if possible , symptom assessment) serial assessments of functional status could provide valuable clinical information when compared to an individual's baseline assessment. Serial functional status measurements could provide information regarding efficacy of treatment and the impact of illness and/or treatment on the child's daily life. This patient oriented information could be used to determine the need for change or adjustments of medications and assist in the monitoring of complex medication regimes to determine adequacy of therapy relative to what is needed to return the child to his normal baseline functioning. In addition to the information obtained from traditional physiological and clinical parameters, assessment of functional status of children with asthma, incorporating the child's self perception where possible as well as parental report, would provide further insights to the psychological and social implications of the disease. If functional status is deteriorating while all other parameters remain stable, this could be an indication that psychosocial interventions need to be implemented to reduce the impact on the child's/family's total life activities. For example, as emotion plays an important role in potentiating problems, it is essential that the child and family be helped to gain a realistic understanding and acceptance of the condition.

The findings also emphasize the importance of continued symptom assessment particularly in the areas of sleep disruption, emotional lability, and symptom frequency in the clinical evaluation of children with asthma. The history, physical examination and symptom assessment become especially important elements in the evaluation of younger children with asthma less than 5 years of age in who the effort dependent test like peak expiratory flow rate is often unattainable.

The complex interplay of many potentially confounding variables makes accurate health status measurement, especially in younger children with asthma a challenge. Parental difficulty in reading their child's cues; potential bias of parental proxy reports and parental perceived burden of illness; developmental stage of child; and disease characteristics all complicate the process. Regardless, I think the findings of this study support the continued combination of generic and disease specific measures in asthma research and clinical practice and continued pursuit of improvement of functional status measurement for children.

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