

Review article

Quality of life in adults and children with asthma and rhinitis

Juniper EF. Quality of life in adults and children with asthma and rhinitis. *Allergy* 1997; 52: 971-977. © Munksgaard 1997.

Many clinicians now recognize the importance of incorporating an assessment of health-related quality of life (HRQL) into their clinical studies and practice. Conventional clinical measures provide valuable information about the status of the affected organ system, but they rarely capture the functional impairments (physical, emotional, and social) that are important to the patients in their everyday lives. In order to obtain a complete picture of a patient's health status, both the conventional clinical indices and the patient's HRQL must be measured. Both adults and children with asthma and rhinitis are distressed by the symptoms, and they are limited in their day-to-day activities such as sports, work or school work, and participation in other activities with friends. In addition, both adults and children experience emotional strain as a result of both conditions. Disease-specific HRQL questionnaires have been developed and validated for both adults and children with asthma and rhinitis. These questionnaires have good measurement properties and validity and can be used in both clinical trials and clinical practice to assess the impact of the condition on a patient's life. Since one of the aims of treatment is to ensure that patients benefit from it, an essential component of clinical assessment should be an evaluation of HRQL.

In recent years, awareness has increased of the importance of including health-related quality of life (HRQL) in clinical assessments. For many clinicians, HRQL is a new term but certainly not a new concept. Quality-of-life questionnaires ask patients the questions that clinicians have been asking for many generations. How are you feeling? Are you limited in your daily activities? Does this bother you? Did the new medication help? The questionnaires provide a standardized, quantified, and recorded summary of the problems patients themselves consider important; identify quickly any specific functional impairments that are troublesome; and record, more accurately than recall, changes over time.

What is health-related quality of life?

"Quality of life" is a rather nebulous expression often meaning different things to different people and this has made defining it very difficult. How-

ever, most agree that many factors, such as finances, spirituality, and health, each contribute to quality of life and also affect each other. HRQL is the component of overall quality of life that is determined primarily by the person's health and can be influenced by clinical interventions. For simplicity and focus, I like the definition by Schipper et al.: "the functional effects of an illness and its consequent therapy upon a patient, as perceived by the patient" (1). The final phrase is important because it emphasizes that these are the impairments that the patients themselves consider important.

Why is HRQL important in asthma and rhinitis?

It has been proposed that there are three reasons for treating patients: to prevent death, to reduce the probability of future morbidity, and to improve patient well-being (2). Most conventional clinical measures of asthma and rhinitis severity assess the

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Key words: asthma; health-related quality of life; rhinitis.

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Accepted for publication 17 February 1997

status of the airways for the achievement of the first two goals. In the past, it was frequently assumed that these measures also provided insight into patients' well-being. Certainly, patients with very impaired airways tend to have a worse HRQL than patients with milder disease, but there is a growing body of evidence, in both asthma and rhinitis (3-6) (Table 1), that correlations between clinical measures and how patients feel and how they are able to function in daily activities are only weak to moderate. Therefore, to obtain a complete picture of a patient's health status, HRQL must be measured along with the conventional clinical indices.

Why should the relationship between clinical measures and HRQL be so weak? Let us take as an example two hypothetical patients with identical clinical asthma. Both are women 35 years of age with a moderate degree of bronchoconstriction (FEV_1 : 65% pred.) and moderate airway hyperresponsiveness to methacholine (PC_{20} : 1 mg/ml). The first patient has very poor perception of airway narrowing; she works at home and can regulate her lifestyle according to how she feels. She lives a very sedentary life and is generally a very "laid-back" person. The second patient is very different. She has acute perception of airway narrowing, works in a high-pressure job, and has to attend meetings where people smoke. She is an athlete and is generally a very "uptight" person. She has had a life-threatening asthma episode. Although both these patients present with similar degrees of airway narrowing and hyperresponsiveness, the second patient is likely to have much greater impairment of HRQL than the former as a result of her asthma. Let us now assume that both patients are given an inhaled steroid and that in both patients airway calibre increases to an FEV_1 of 95% pred. and PC_{20} increases to 8 mg/ml. Although the clinical improvement is similar in both patients, the improvement in HRQL is likely to be much greater in the second patient than the first. Similar scenarios can easily be imagined for patients with rhinitis.

Quality-of-life impairments in patients with asthma

Extensive HRQL research in asthma has highlighted the functional impairments that are most troublesome to patients (7-16). Adults with asthma are certainly bothered by the symptoms themselves. The most troublesome are usually shortness of breath, chest tightness, wheeze, and cough. Many patients have problems with physical activities such as sports, hurrying, walking upstairs, and shopping. Allergens may cause difficulties in daily activities such as vacuum-cleaning and other household chores, gardening, and hobbies. Environmental stimuli, such as cigarette smoke, strong smells, and adverse weather conditions, may limit family activities and visiting friends. Asthma patients are bothered by not being able to get a good night's sleep and often feel tired. In addition, they experience fears and concerns about having asthma and become frustrated by the disease. Occupational asthma causes its own special problems, HRQL being poorer in these patients than clinically matched patients whose asthma is not of occupational origin (17).

The burden of illness and functional impairments for children with asthma are similar to those experienced by adults. In addition, children are troubled because they cannot integrate fully with their peers; they feel isolated and left out, leading them to become frustrated, sad, and angry (18-24). There is growing evidence that parents of children with asthma often have a poor perception of the problems and emotions that are troubling the child; therefore, it is essential to obtain the information directly from the child (25, 26). Children as young as 7 years have little difficulty understanding the Paediatric Asthma Quality of Life Questionnaire and the Paediatric Rhinconjunctivitis Quality of Life Questionnaire, and they provide reliable and valid responses (Table 2).

Table 1. Longitudinal correlations between quality of life and clinical outcomes in adults with asthma

Change in clinical outcomes	Change in Asthma Quality-of-Life Questionnaire scores				
	Overall HRQL	Symptoms	Emotions	Activities	Environment
PEFR - morning	0.58	0.60	0.56	0.43	0.42
PEFR - evening	0.48	0.50	0.43	0.36	0.40
Morning symptoms	0.47	0.49	0.45	0.38	0.28
Disturbance-free nights	0.28	0.30	0.25	0.20	0.17
Daytime symptoms	0.54	0.52	0.54	0.45	0.44
FEV_1	0.38	0.35	0.37	0.33	0.28
Salmeterol use	0.43	0.41	0.46	0.35	0.29

Table 2. Reliability of Paediatric Asthma Quality of Life Questionnaire in children with stable asthma

Age groups	Reliability (intraclass correlation coefficient)			
	Overall HRQL	Symptoms	Activities	Emotions
All subjects	0.95	0.93	0.84	0.89
7–10 years	0.89	0.87	0.83	0.68
11–14 years	0.96	0.95	0.86	0.92
15–17 years	0.87	0.89	0.67	0.80

Juniper et al. (18).

Quality-of-life impairments in patients with rhinitis

Adults with both rhinitis and rhinoconjunctivitis are bothered by the symptoms themselves, particularly having a stuffy/blocked nose, a runny nose, and sneezing. They are bothered by not being able to sleep well at night and often feel exhausted during the day. They experience nonnasal symptoms that are troublesome such as thirst, poor concentration, and headache. They find practical problems annoying (having to carry tissues, always having to blow their noses, etc.), they are limited in their daily activities, and they feel frustrated and irritable (6, 27, 28).

Adolescents (12–17 years) with rhinoconjunctivitis experience very similar problems to adults except that insomnia is not so troublesome, but they do have more problems with concentration, particularly with school work (29).

Younger children (6–12 years) appear to present a slightly different picture (E. F. Juniper, et al., "Measuring quality of life in children with rhinoconjunctivitis. *J Allergy Clin Immunol* [submitted]). They are certainly bothered by their symptoms and the practical problems of carrying tissues and taking medications, but they tend to experience less interference with their normal daily activities and do not express the emotional dysfunction experienced by adults and adolescents. We observed that parents often seemed to be much more bothered by their children's rhinitis symptoms than the children themselves but tended to be less aware of their children's less overt problems, such as sleeping difficulties.

Selecting a quality-of-life instrument

We now have a range of valid instruments for measuring HRQL in patients with asthma and rhinitis (though not yet with the two together) (Tables 3–5). There is no best instrument. Each one has been developed for a different purpose and has different measurement properties.

Generic compared with specific

There are two types of HRQL questionnaires, generic and specific. Generic instruments are designed to be applicable to patients in all health states. The most commonly used and the best validated in adult asthma and rhinitis are the Sickness Impact Profile (SIP) (30), the Medical Outcomes Survey Short Form 36 (SF-36) (31), and the Nottingham Health Profile (25). Although each profile attempts to measure all important aspects of health-related function, they achieve this in different ways. For instance, the SF-36 contains nine domains which can be combined into two primary functions, mental and physical. In contrast, the SIP has two major domains, physical and psychosocial, which combine to give one overall score. Until recently, there were no generic health profiles for children, and, as yet, none have been validated in paediatric asthma and rhinitis.

The great advantage of generic instruments is that the burden of illness can be compared across different medical conditions. For instance, one can compare the burden of illness experienced by patients with rhinitis and asthma (32, 33). However, because they are required to be broadly comprehensive to cover all medical conditions, they lack depth; as a result, impairments that are important to patients with a specific condition may not be included. Consequently, in many conditions, including rhinitis and asthma, generic instruments may be unresponsive to small – but what to patients are important – changes in their HRQL (4, 34, 35). Therefore, the use of generic instruments in clinical trials and clinical practice where one wants to examine the effect of treatment within individual patients or groups of patients, is limited.

This lack of depth of focus of the generic instruments has led to the development of specific instruments. These instruments may be specific for a group of patients (e.g., the elderly), a particular function (e.g., pain, sexual function), or a disease. Disease-specific instruments are developed by asking the patients themselves about the impairments that are most important to them; therefore, these instruments focus on the problems for which patients seek help. As a result, disease-specific instruments are much more responsive than generic ones to clinically important changes in HRQL.

Utilities

These instruments measure the value that either the patient or society places on various health states. They are very popular with health economists, not only because they provide a single

Table 3. HRQL questionnaires for adult asthma*

Instrument [reference(s)]	Type	Patients	No. of questions
Asthma Quality of Life Questionnaire (7)	Disease-specific	Asthma	32
Asthma Quality of Life Questionnaire (9)	Disease-specific	Asthma	20
Living with Asthma Questionnaire (11)	Disease-specific	Asthma	68
St George's Respiratory Questionnaire (13)	Disease-specific	COPD and asthma	76
Life Activities Questionnaire for Asthma (14)	Disease-specific	Asthma	71
Respiratory Illness Quality of Life Questionnaire (15)	Disease-specific	COPD and asthma	55
Asthma Bother Profile (16)	Disease-specific	Asthma	22
Sickness Impact Profile (4, 30)	Generic		137
MOS Short Form 36 (31, 33)	Generic		36
Feeling Thermometer (4, 36)	Utility		None
Standard Gamble (4, 36)	Utility		None

* HRQL instruments for which there are published measurement properties in adults with asthma. All questionnaires are copyright and should not be altered or translated without author's permission.

number representing HRQL from 0 = death to 1 = perfect health but also because most instruments meet the assumptions for utility theory. For measuring the value that patients themselves place on their own health state, the most common instruments are the Standard Gamble (36), the Time Trade-Off (36), and the Feeling Thermometer (36). For measuring the value that society places on various health states, there are the Quality of Well-Being Scale (37), the Multiattribute Health Utilities Index (38), and the EuroQol (39). For a long time, these instruments were used only in generic form; i.e., to be applicable in all medical conditions, and, in this form, they have the same weakness as the generic health profiles – they are unresponsive to important changes (4). Recently, the Standard Gamble and the Feeling Thermometer have been modified for use as disease-specific instruments in children with asthma and appear to have much improved measurement properties (34).

Measurement properties

When one selects an instrument, it is important to ensure that it has both face and content validity; that is to say, the instrument appears to measure what it purports to measure (face validity), and the items in a questionnaire have been selected by recognized psychometric procedures which ensure that they capture all the areas of function that are considered important by patients (content validity). Questionnaires in which items have been selected by clinicians rarely meet this criterion, because some impairments that patients themselves consider important may have been omitted.

Next, the measurement properties should be examined to ensure that the instrument is capable of the intended task. Instruments that are to be used in cross-sectional studies (e.g., surveys) need to possess good discriminative properties, and those used in longitudinal studies (e.g., clinical

Table 4. HRQL questionnaires for paediatric asthma*

Instrument [reference(s)]	Type	Patients	No. of questions
Paediatric Asthma Quality of Life Questionnaire (18)	Disease-specific	7–17 years	23
Childhood Asthma Questionnaires (20)	Disease-specific		
CAQA		4–7 years	18
CAQB		8–11 years	34
CAQC		12–16 years	7
Life Activities Questionnaire for Childhood Asthma (22)	Disease-specific	5–17 years	71
Health Utilities Index (34, 38)	Utility	> 7 years	15
Feeling Thermometer (34, 36)	Utility	> grade 2 reading	None
Standard Gamble (34, 36)	Utility	> grade 6 reading	None
Paediatric Asthma Caregivers' Quality of Life Questionnaire (56)	Disease-specific	Parents of children with asthma	36

* HRQL instruments for which there are published measurement properties in children's asthma. All questionnaires are copyright and should not be altered or translated without author's permission.

Table 5. HRQL questionnaires for rhinitis*

Instrument (reference(s))	Type	Patients	No. of questions
Rhinoconjunctivitis Quality of Life Questionnaire (6)	Disease-specific	Adults	28
Rhinitis Quality of Life Questionnaire (51)	Disease-specific	Adults	24
Adolescent Rhinoconjunctivitis Quality of Life Questionnaire (29)	Disease-specific	12–17 years	25
Paediatric Rhinoconjunctivitis Quality of Life Questionnaire SF-36 (31, 32)	Disease-specific	6–12 years	23
	Generic	Adults	36

* HRQL instruments for which there are published measurement properties in patients with rhinitis. (Paper on Paediatric Rhinoconjunctivitis Quality of Life Questionnaire is under review.) All questionnaires are copyright and should not be altered or translated without author's permission.

trials and clinical practice) need to possess good evaluative properties.

Discriminative properties. Instruments that are to be used to distinguish between individuals or groups of patients need to possess good discriminative properties. For example, a clinician may wish to compare the HRQL of individuals who do and do not have asthma, or, within an asthmatic population, between those who have mild, moderate, or severe impairment. The measurement properties required for good discrimination are reliability and cross-sectional construct validity (40). (Cronbach's alpha is a measure of internal consistency and does not provide evidence of an instrument's discriminative properties.)

Evaluative properties. Instruments that are required to measure longitudinal change within an individual or group of patients needs to possess good evaluative properties. For example, a clinician may wish to examine the effect of an intervention in a clinical trial or follow the progress of a patient in the clinic. The measurement properties required for good evaluation are responsiveness and longitudinal validity (40). Questionnaires with good reliability and cross-sectional validity often fail to detect important changes in asthma and rhinitis because they have poor responsiveness (4, 34).

Interpreting quality-of-life data. Repeated experience with a wide variety of physiological measures allows clinicians to make meaningful interpretation of results. For instance, the experienced clinician will have little difficulty in interpreting a 0.5-l increase in forced expiratory volume in 1 s (FEV₁). In contrast, the meaning of a change in score of 0.5 on an HRQL instrument is less intuitively obvious, not only because there are no units but also because each instrument has its own scoring system. Two approaches have been suggested for the interpretation of HRQL data: "anchor-based" and "distribution-based" (41). The former bases

interpretation on clinically meaningful changes in other indices, while the latter depends entirely on statistical distribution. Our research group has adopted the anchor-based approach and defined a minimal important difference (MID) as "the smallest difference in score in the domain of interest which patients perceive as beneficial and would mandate, in the absence of troublesome side-effects and excessive cost, a change in the patient's management" (42, 43). A similar anchor-based approach has been used in the St George's Respiratory Questionnaire (44).

Cultural adaptation of quality-of-life questionnaires

Adapting quality-of-life questionnaires to other languages and cultures is considerably more complicated than simple translation (45). Many asthma- and rhinitis-specific questionnaires have been translated into most European and Asian languages, and tested by well-established procedures. Information on the availability of the translations can be obtained from the developers.

Modification of questionnaires

HRQL questionnaires are scientific instruments in which the items and response options have been selected by carefully standardized and established psychometric methods. Any modifications may seriously affect the measurement properties and validity of the instrument. Therefore, no changes or adaptations should be made without the permission of the developer.

The place of HRQL assessments in clinical trials and clinical practice

The recognition of the importance of assessing patient well-being, the poor correlation between conventional clinical indices and HRQL, and the advent of HRQL instruments with strong measurement

properties have already ensured that many asthma and rhinitis clinical trials include assessment of HRQL as one of the primary end-points (3, 4, 46–55). Most instruments are short, easily understood, and usually self-administered in format, making completion very little burden to either the investigator or the patient. We have found that patients enjoy completing HRQL questionnaires because they can relate to the questions and know that the things that are important to them are being taken into consideration. In addition, it is likely that national pharmaceutical regulatory agencies are soon going to ask for evidence of patient benefit for new product submissions.

The use of HRQL instruments in clinical practice is growing. Disease-specific quality-of-life questionnaires are a standardized and quantified method for taking a simple patient history. The advantages are that the patient can complete the questionnaire in the waiting-room and a quick scan of the responses will save consultation time, the interviewer does not have to remember all the important questions, the questionnaire often reveals problems not spontaneously identified by the patient (particularly in children), the clinician can quickly focus on areas of particular importance to the patient, and responses at each clinic visit can be compared to determine whether interventions have been beneficial. As more and more clinicians start using HRQL data in very innovative ways, such as for the improvement of treatment compliance, further uses are likely to emerge.

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