

## EFFECT OF DIABETES MELLITUS ON QUALITY OF LIFE: A REVIEW

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The term "quality of life" (QL), and more specifically "health-related quality of life" (HQOL), is a multi-dimensional concept that encompasses the physical, emotional, and social components associated with an illness or its treatment.<sup>1</sup> Quality of life deals with the individual's perception of his or her life situation.<sup>2</sup> Hornquist defines QL as recognized need and functional satisfaction within different life domains.<sup>3,4</sup> More self-reported life satisfaction within such domains indicates higher levels of quality of life.

### Living With Diabetes

Financial, social and psychological handicaps are integral to all chronic diseases, but diabetes differs in two important respects. In the first place, although it affects virtually every aspect of everyday life to a greater or lesser degree, the patient is encouraged to lead a "normal life" without any of the concessions usually made to a person with chronic illness. Secondly, although the treatment is demanding and often complex, the patient is expected to bear much of the responsibility for making decisions which may effect his health, both in the short and long term. This burden is absent in most other chronic illnesses, even in those which are equally invisible, such as epilepsy and mental illness.<sup>5</sup>

### Diversity

People with diabetes make up the most diverse group imaginable, including members of both sexes, with all degrees of health, and in the different walks of life. This diversity, along with the fact that diabetes can occur at any time in the lifespan, accounts for the wide range of associated biopsychosocial issues.

### Similarity

People with diabetes, from the three-year-old girl with

insulin-dependent diabetes to the 65-year-old obese male with non-insulin-dependent diabetes, usually find it upsetting to learn and to be reminded daily that they have a serious, even life-threatening condition that will not go away.

Multiple stresses, which range from insulin reactions to permanent physical complications, run in three phases of health and function.<sup>6</sup> The first phase is the year after onset of diabetes, with emotional upheaval attendant on diagnosis. The mid-phase of relative well-being and full function usually lasts several years, and occasionally several decades, and the third phase begins if and when the person needs to make allowances for one or more permanent physical complications.

### Coping with Diabetes at Onset

The stress in the first phase of diabetes is the impact of the presenting symptoms, the diagnosis, and its implications for the individual and the family. Transient reactions range from mild to major adjustment disorders, with increased anxiety, depression, anger, withdrawal from others, diminished ability to feel intimate and playful, and impaired ability to learn and work.<sup>7</sup>

### Shock of Diagnosis

It has been suggested that the mental trauma at diagnosis is greater in diabetes than in other chronic diseases. The newly diagnosed diabetic is confronted by a new vocabulary, a need to learn food values previously ignored, a new responsibility for administering his own treatment, the frightening immediate or remote responsibility of self-injection, and anxiety about the possibility of hypoglycemia (a word which he probably does not understand anyway), and apparently terrifying medical complications.<sup>5</sup>

Parents who are informed that their child has diabetes often act with disbelief or shock. This is followed by bewilderment, anxiety, a sense of helplessness, and a deepening grief for the child whom they recently knew to be healthy.<sup>8</sup> To many whose diabetes is newly diagnosed, it seems that the world is fairly crammed with aunts, uncles, and acquaintances with amputations of feet or legs as a result of diabetes.

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### ***Child's Transition from Maternal to Self-Care***

#### ***Experimentation***

Transition from parental management of diabetes to self-management allows children to appropriately begin to give themselves insulin injections. They often carry out experiments to test the hypothesis that they do not have diabetes, to see what will happen if parental instructions about insulin and diet are not followed. Also, transition can be premature, leading to serious problems—due to mismanagement—when too much responsibility is given prematurely. Mismanagement of diabetes during the transition may also reflect other mechanisms, such as attempts to attract attention from distant, disinterested, or overwhelmed parents,<sup>9</sup> or may show the child's mixed feelings about overprotection by the mother.

#### ***Prolonged Parental Protection and Autonomy***

The dramatic onset of diabetes in a child before the age of 11 has usually made the mother aware of her child's vulnerability to medical emergencies. This increases her fear that the child will die if left alone, and increases the intensity and rapidity with which an able mother responds to minor fluctuations in the well-being of her child. The child with diabetes picks up the mother's tension about "going out alone." The sense that something awful will happen tends to reach a peak when the child is both hypoglycemic and alone. This shared tension when the mother and child are separated can become a clear problem in adolescence when the youth should be striking out independently. This will lead to impaired autonomy<sup>10</sup> in the form of delayed age-appropriate separation of the adolescents from their mothers and hindered development of realistic independence.

### ***Special Challenges for the Adolescent and Young Adult***

#### ***Sense of Vulnerability and Feeling Different***

An adolescent with diabetes is advised to measure the glucose in urine or blood, eat carefully and differently from his friends, and inject himself with insulin one, two, or even more times daily before crossing the threshold of his parent's home to meet the world.<sup>11</sup> The adolescent's sense of personal vulnerability to catastrophe may be increased by severe hypoglycemic episodes. This awareness of vulnerability, along with feeling different, separates diabetic adolescents from their nondiabetic peers, and frequently makes it harder for them to feel attractive and confident, and to form friendships.<sup>11</sup>

#### ***Subjective Life Expectancy<sup>12</sup>***

Many adolescents and others with diabetes fluctuate in their expectations of the future, from an unexamined sense that they will live happily ever after, to the equally unrealistic notion that they will drop dead in a moment. A

typical daydream during a pessimistic phase is that the person will become blind, develop gangrene leading to amputation of both legs, and become totally dependent once again on now aging parents, before dying at a very young age.

#### ***Personal Development in Adolescence<sup>13</sup>***

Early results suggest that diabetes may slow psychologic development of the adolescent, thus affecting his self-image, self-esteem, and ability to play and enjoy life, share with others, set limits, renounce, identify and make commitments.

Family circumstances and attitudes shape both health and psychosocial development in those with growth-onset diabetes far more than does specific age at onset. The onset of diabetes creates a family crisis: it poses two new responsibilities—managing the diabetes itself, and coming to terms with its existence within the family—which somewhat complicate the course of the adolescent's psychosocial development. Most early adolescents pass through transitory periods of devaluing parents, rebelliousness, and intergeneration conflict in their attempts to achieve autonomy.

#### ***Diabetes With Onset After the Mid-Forties<sup>12,14</sup>***

The person with diabetes diagnosed after age 45 is provided an abrupt and concrete reminder of mortality. He must now live with a disease which makes him more imminently vulnerable to sickness, loss of function, loss of body parts, and disability, than his spouse, contemporaries, and most younger people with diabetes. Those over age 45 may react to stressful life events with fewer symptoms than younger people, but they tend to feel the impact deeply, and their symptoms tend to persist longer. If they have suffered more recent losses than positive life events, they become vulnerable to falling self-esteem and the re-emergence of unresolved conflicts.

Furthermore, since heredity plays a stronger role in non-insulin-dependent diabetes than in insulin-dependent diabetes, many of the over-40 patients have known relatives who suffered physical complications of diabetes such as neuropathy, cataracts, heart disease, amputations, and strokes.

#### ***Worries About the Future<sup>5,15</sup>***

The onset of diabetes at any age is an unsettling event that increases uncertainty about the future. Working people over age 45 wonder if they will be able to keep their jobs or find new ones, and if they can maintain life and hospital insurance. Menopausal women with diabetes wonder if they will be able to hold up their side of the marriage, take care of themselves and still be energetic, attractive, and have interests to share with their partners. Men wonder if they will become impotent. People of both sexes tend to

worry about becoming blind, losing one or both legs, and becoming "basket cases," dependent on others who may then become indifferent, contemptuous or even revolted.

#### *Difficulty of Adapting to New Situation With Diabetes After 45 years<sup>5</sup>*

The person over 45 with diabetes shares certain health and preventive issues with a non-diabetic person of the same age. Both should eat well-balanced, nutritious diets, exercise, achieve and maintain ideal body weight, accept more personal responsibility for their health, and maintain and even increase their independence. However, the lifestyle of an adult who has had many years to form prediabetic living patterns and practice ways of finding comfort may become maladaptive with the onset of diabetes. These patterns may need to be changed at a time in life when they are firmly rooted. Before diabetes, patients may have sought comfort in ways that involved social eating with others. After diagnosis, however, lack of information and experience in selecting the proper type and amount of food increases the strain of these activities and diminishes the comfort they can afford. Food can be a dependable, available comfort in itself, and treatment of diabetes plus overweight involves specifying and limiting food, thereby, decreasing the effectiveness of this form of comfort. In addition, the financial struggle to meet the high prices of a protein-oriented diet will be a problem.

#### *Hypoglycemia*

Hypoglycemia may harm the marital relationship, academic achievement, and performance on the job. Under certain circumstances, both insulin and oral hypoglycemic agents can cause the blood glucose to fall below 40 mg/dL. This stimulates counterregulatory hormones, giving rise to a range of signs and symptoms, and functional impairment.<sup>6</sup>

Epinephrine response to rapidly falling blood glucose, with tremors and sweating, often accompanied by weakness, hunger, unsteady movements and blurred vision, is relatively easy for patients to identify, except that in middle-aged women, it may occasionally be mistaken for a menopausal hot flash.<sup>6</sup>

With the passage of years, some people with diabetes develop neuropathy of the autonomic nervous system, which leads to rapid fall in blood glucose, resulting in "insulin reactions without warning." On the other hand, patients with panic attacks may believe they are hypoglycemic.<sup>16</sup> In contrast to acute hypoglycemia, a gradual fall in blood glucose to low levels, especially likely to occur at night, shows up in slow, confused thinking, passivity, drowsiness, and impaired initiative, with transiently impaired memory and lessened ability to judge the passage of time. If the patient fails to make the self-diagnosis at that point, either because of preoccupation or

sleep, mental incompetence becomes grossly and painfully apparent to others.<sup>17</sup> Repeated hypoglycemic episodes have the cumulative deleterious effects of undercutting the patient's and partner's sense that the patient is dependable.<sup>16</sup>

#### *Adaptation to Diabetes Complications*

The third and last phase of living with diabetes is characterized by permanent physical complications and the need to adapt to them. When diabetes is present, the incidence of terminal kidney failure is increased by 17 times, that of amputation by 15 times, and that of coronary infarct and stroke doubled. These tend to threaten self-esteem, stir up anxiety about losing hard-won skills and competence, bodily functions and parts, and produce guilt, shame, fear retaliation for shortenings, and anxiety about losing the approval, affection and respect of family, friends, and people at work.<sup>6</sup>

With onset of serious complications of diabetes, the patient comes to draw on the reserves of family members. When a nuclear family has only two adult members, is isolated from the extended family, and both parents are working, it is less likely to be equipped to carry on with this extra burden. Such a nuclear family may be unable to sustain both its healthy and chronically sick members, for the demands are heavy, physically and emotionally.<sup>5</sup> A person refusing to enter into new and more onerous living arrangements required by lower levels of function may reject his situation by suicide, divorce or abandonment.

#### *Blindness<sup>5</sup>*

From the patient's standpoint, there is a big difference between the process of losing one's sight and the fact of being permanently blind. The process of losing sight is an uncertain and disruptive period, where hope alternates with deep despair. The family is as much affected as the patient by the uncertainty of whether the housewife or wage earner will be able to continue in his or her allotted role.

Once permanent blindness has become a fact, it is important to emphasize that the patient can still lead a productive life. Many difficulties of the blind diabetic stem, not from loss of sight itself, but from public misconceptions about the blind and ignorance of the rehabilitative facilities available. It has been reported that the discovery that loss of sight does not entail loss of sexual potency becomes a part of recovery.

Two practical problems immediately arise. How will the patient give injections and how will he test his urine and blood? Physicians often take the line of least resistance and suggest entrusting these tasks to a spouse, friend or visiting nurse, while patients who have coped for years find it exasperating to be suddenly helpless and dependent on others. Fixed syringes, click count syringes or insulgages are effective solutions to the problems of injections.

### *Erectile Impotence*

As a complication of diabetes, neuropathy can cause numbness, foot drop, diarrhea, pain, and total erectile impotence. Erectile dysfunction is an important cause of decreased quality of life in men with diabetes.<sup>18</sup> It has been associated with increased age, poor glycemic control, smoking, increased alcohol intake, depression, use of specific types of medications, and microvascular diabetic complications, such as retinopathy and nephropathy.<sup>19-24</sup> Impotence can cause great domestic disharmony and may be the basis of many seemingly inexplicable psychiatric and physical symptoms.

Before giving advice to the patient and his spouse, it is important to make an accurate diagnosis, as impotence may be psychogenic or organic, transient or permanent. When impotence is shown to be organic, the cause of the symptoms should be explained to the patient and his spouse in order to dispel any misunderstandings and guilt feelings that have arisen. Implantable prostheses may be an acceptable way of restoring potency for some patients. In one study, 81% of men were satisfied with the implant. Outside of a few complications, only 1% were displeased.<sup>25</sup> Usually, wives can accept their husbands' ability to have intercourse with the presence of the implant.

### *Driving*<sup>5</sup>

Diabetics at the wheel might be a hazard to themselves and others because of: 1) unconsciousness or mental impairment from hypoglycemia; or 2) complications of diabetes, in particular poor eyesight or ischemic heart disease. In the UK, official figures suggest that hypoglycemia was responsible for 17% of 1000 collapsing incidents at the wheel which led to accidents.<sup>5</sup> Thus, the driving of a vehicle by an insulin-treated patient is potentially hazardous, and great care must be taken to ensure that the driver habitually gets a warning of the onset of hypoglycemia, does not drive at times when attacks are most likely, and always carries sugar or carbohydrates in his car in an easily accessible place.

### *Employment*

Having successfully overcome the pitfalls of school, young diabetics will seek a worthwhile career. Common-sense dictates that insulin-dependent diabetics should not be employed in jobs where hypoglycemia might constitute a danger to themselves or to other people. Thus, certain jobs are automatically barred to them, and these include working at great heights as crane-drivers, working with potentially dangerous moving machinery, driving public service vehicles such as buses or long-distance express trains or heavy lorries, and the piloting of aircraft.<sup>5</sup>

Most physicians will recommend that their diabetic patients do a job in which energy expenditure and meal times are predictable. However, there are numerous examples of well-motivated and well-adjusted patients who have coped without difficulty for a number of years with

the demands of shift work and irregular patterns of exercise. There are also many notable examples of diabetics who have risen to the summit of their professions in journalism, medicine and international sport despite their diabetes.

Unemployment has a major impact on both morbidity and mortality, and is an indicator of living standards and poverty.<sup>26</sup> To become unemployed is to be deprived of a social role and function. It has been shown that unemployment rates were significantly higher for insulin-dependent diabetic young men when compared both with their controls and with published statistics.<sup>27</sup> However, interpreting female unemployment is complicated, as women tend not to register as unemployed if they are married. Among the older patients with diabetes, unemployment was high primarily due to ill health and complications. Therefore, more advice should be offered on the possibilities of retraining for different types of jobs, and patients must be encouraged to realize the importance of attending a diabetic clinic or seeing a general practitioner regularly, complying with treatment regimes, and keeping good diabetic control.<sup>27</sup>

### *Peripheral Vascular Disease and Amputation*<sup>5,28</sup>

The most serious consequence of peripheral neuropathy is reduced sensation in the lower extremities, leading to an increased risk for ulceration. Lower-extremity numbness makes the feet susceptible to calluses, which may break down and ultimately form ulcers. These serve as a source for bacterial invasion of the tissues, causing cellulitis and osteomyelitis. This sequence of events makes diabetes one of the leading causes of non-traumatic lower extremity amputations.

A patient with amputation of a limb and those closest to him feel the amputation personally and deeply. Some relatives may have just as much trouble accepting the patient with the amputation as does the patient, further impeding the amputee's self-acceptance.

The patient's post-amputation adjustment depends on pre-surgery physical and psychologic characteristics of both patient and family, and their preparation. If both are properly prepared for the amputation, the patient is more likely to regard the artificial limb as part of himself.

### *Heart and Kidney Complications*<sup>28</sup>

Angina, myocardial infarction, and heart or kidney insufficiency are especially distressing to patients who become symptomatic and limited in function in their twenties and thirties. Having known an active life, they see themselves as having reached only the threshold of adult life.

For patients with coronary insufficiency, fury at the dinner table may be all that is needed to precipitate a severe anginal episode. Such patients can learn to manage their rising rage and other emotional states in order to minimize the chance of overtaxing compromised circulation.

The beginning of either dialysis or a kidney transplant is a crisis for the patient and the family. The combination of the patient's and family members' fears and strongly held attitudes, the force of the rapidly changing medical needs of the patient, plus the medical organization's forceful way of moving to meet those needs, frustrates the patient in his desire to be his own prime mover. The effect of dialysis itself on the ability of the patient to concentrate perhaps limits thinking and memory quite a bit. The patient is likely to intensely hate the machine which sustains life only if he is obedient to a rigid schedule. Also, the process of finding money for the expensive treatment of dialysis and transplant, and the heavy personal toll extracted from a couple engaged in home dialysis do perhaps affect the quality of life of such couples.

### **Determinants of Diabetes Quality of Life**

Despite the demands diabetes may make on daily life as well as the concern regarding long-term complications, these do not necessarily result in a reduced QL.<sup>29,30</sup> There are some medical and social factors that modify the effect of such demands on QL.

#### **Medical Factors**

##### *Perceived Difficulties in Adherence to a Diabetic Regimen*<sup>31</sup>

An individual's satisfaction within the different life domains and level of subjective well-being has been associated with perceived difficulties in adherence to diabetic regimens, such as diet, smoking, exercise, injection treatments, etc. The greater the satisfaction with life, the easier it is to adhere to the regimen. Even if it is impossible to draw conclusions about causality, there seems to be a growing body of evidence that emotional well-being contributes to improved self-care.

##### *Complications*

It has been reported<sup>32</sup> that complications negatively affect the perspective on diabetes, as well as social life and relationships with other people. However, a somewhat unexpected finding<sup>33</sup> was that fewer than 10% of the patients with complications regarded themselves as unwell. Self-reported health has been suggested to play an important role in the adherence to diabetes management and metabolic control, and also to be important for diabetic patients' symptoms, use of health care, and their satisfaction with the doctor-patient relationship.<sup>34</sup> Patients with complications considered the fear of developing complications to be most worrying, while patients without complications thought that the necessity of maintaining regular habits was a greater problem.

##### *Duration of Diabetes*

Duration of diabetes affected the way in which patients felt about complications, thus, the fear of developing complications increased with the duration of the disease.<sup>33</sup>

##### *Onset of Diabetes*

Developing diabetes early in life may affect personal development (i.e., the process of autonomy and independence), self-perception, and the way the sufferer is perceived by others.<sup>35</sup> On the other hand, an early onset may facilitate long-term adjustment to managing diabetes, as the patient has no memory of life without diabetes.

#### **Social Factors**

##### *Age*

Younger patients have a more positive attitude to diabetes than those who are older.<sup>36</sup> This could be both the effect of youthful optimism and the fact that the disease is still at an early stage.<sup>33</sup> Patients in early middle-age find life with diabetes the most difficult. This period in life is often accompanied by considerable stress caused by expectations and obligations difficult to combine with managing diabetes.

##### *Gender*

Men have been noted to have a more positive attitude towards diabetes than women,<sup>37</sup> or they may have a greater need to deny problems related to their illness.<sup>33</sup> This may present facets of a single problem. Boys are taught to be independent and adventurous from an early age,<sup>38</sup> characteristics that are inappropriate in a demanding disease like diabetes.

Women tend to feel more anxious about their diabetes and its complications, while men, even those with a long diabetic duration and complications, find the regulated lifestyle imposed by managing their diabetes to be the most difficult aspect of having diabetes. Gender roles leading to sex differences in the perception of health and the readiness to report symptoms may explain this.<sup>39</sup> Thus, it is more socially acceptable for women both to experience and to report feelings of anxiety and depression, or to have health concerns, than it is for men.<sup>33</sup>

In conclusion, diabetic patients have different experiences of living with diabetes, depending on social and medical factors. As perception is the psychological step that precedes response and action, the outcome of diabetes health care might improve if it were adapted to each patient's personal experience of the disease and the psychological needs related to it.

### **Measuring Diabetes Quality of Life**

Health-related quality of life (HQOL) includes a broad

range of functional limitations, capabilities, and perceptions that may influence the diabetic's performance and satisfaction with life.<sup>1</sup> In assessing HQOL of the diabetic, it is important to measure not only the actual functional capability, but also the diabetic's perceptions of the impact of these abilities or disabilities on his or her life. Subjective as well as objective measures are required for a comprehensive evaluation of HQOL. A number of different methods are available for measuring health-related quality of life, including both generic and disease-specific measures.

Generic instruments are used in general populations to assess a wide range of domains applicable to a variety of health states, conditions, and diseases.<sup>40</sup> They are usually not specific to any particular disease state or susceptible population of patients. Among the most widely used general health status measures are the Sickness Impact Profile, the Quality of Well-Being Scale, the McMaster Health Index Questionnaire, the General Health Rating Index,<sup>1,41</sup> and the World Health Organization Quality of Life Assessment (WHOQOL).<sup>42</sup>

Disease-specific instruments focus on the domains most relevant to the disease or condition under study, and on the characteristics of patients in whom the condition is most prevalent.<sup>43,44</sup> In case of diabetes, a specific measure called Diabetes Quality of Life (DQOL) oriented towards patients with insulin-dependent diabetes mellitus has been developed.<sup>15</sup> The measure has four scales for: 1) satisfaction; 2) impact; 3) worry: social/vocational; and 4) worry: diabetes related.

**How to Improve the Diabetic's Quality of Life**

*Diabetes Care*

The management of chronic incurable diseases such as diabetes has always been an important part of the work of the general practitioner, but there has been a lack of discussion and consensus as to what exactly the role of the general practitioner should be. For many diabetics, their general practitioner is their only source of health care and is the gatekeeper to other services. Greater knowledge among doctors of the functional and social aspects of diabetes would, therefore, improve the quality of care for patients, and should be assessed through clinical audit.<sup>45</sup>

Knowing the definition of chronic disease and its consequences enables one to look at a person's problem at different levels, and to view patients both in terms of their disease and their environment, e.g., a disease and its consequences can be represented as sequences (as follows):

- Diabetes .....Disease (or disorder)
- Erectile dysfunction.....Impairment
- Lack of sexual activity.....Disability
- Unhappy family.....Handicap

*Diabetes Education*

The person with diabetes makes the majority of the day-to-day decisions about his diabetes management.<sup>46</sup> Inadequate knowledge of the disease and its associated tissue damage among diabetic patients results in multiple hospital admissions and emergency department visits and a higher incidence of long-term complications.<sup>47</sup> Hence, diabetes education is of paramount importance in order for the patient to understand the principles of self-care, and reduce the number of hospital admissions,<sup>48</sup> thereby improving his quality of life with diabetes.

**Research Needs**

The effects of medical treatments and programs on QL for diabetes and other chronic diseases should not be ignored simply because such effects are difficult to measure.<sup>49</sup> Although QL research has its roots in the social sciences, it will be fully accepted by health care practitioners only when it answers questions directly related to clinical programs and therapeutic choices, such as: 1) what is the effect of diabetes management programs, not only on long-term complications but also on the day-to-day QL and compliance of patients?; 2) do cost-containment programs in managed health care actually increase costs to employers because of decreased function and productivity of employers?; 3) are relatively small gains in survival among patients with limited life expectancy offset by reductions in the patient's QL during aggressive long-term therapy?; and 4) does intensive diabetes treatment influence quality of life outcomes in different ways than does the conventional diabetes therapy?<sup>17</sup>

To answer these and similar questions, future research should be used to demonstrate the links among medical interventions, clinical and physiologic changes and QL, so that the practicing clinician can better understand the clinical implications of these measures and enable health care planners to use them in setting priorities.<sup>48</sup>

**References**

1. Revicki DA. Health-related quality of life in the evaluation of medical therapy for chronic illness. *J Fam Pract* 1989;29:377-80.
2. Hanestad BR, Albrektsen G. Quality of life: perceived difficulties in adherence to a diabetes regimen, and blood glucose control. *Diabetic Med* 1991;8:759-64.
3. Hornquist JO. The concept of quality of life. *Scand J Soc Med* 1982; 10:57-61.
4. Hornquist JO. Quality of life: concept and assessment. *Scand J Soc Med* 1989;18:69-79.
5. Tattersall RB, Jackson JGL. Social and emotional complications of diabetes. In: Keen H, Jarrett J, editors. *Complications of diabetes*. 2nd edition. London: Edward Arnold, 1982:271-85.
6. Laine C, Caro JF. Preventing complications in diabetes mellitus. The role of primary care physician. *Med Clin North Am* 1996;80:457-73.
7. Galatzer A, Amir S, Gil R, et al. Crisis intervention program in newly-diagnosed diabetic children. *Diabetes Care* 1982;5:414.

8. Cahill GF, McDevitt HO. Insulin-dependent diabetes mellitus: the initial lesion. *N Engl J Med* 1981;304:1454.
9. Belmonte MM, Bunn T, Gonthier M. The problem of cheating in the diabetic child and adolescent. *Diabetic Care* 1981;4:116.
10. Benett IJ. What do people with diabetes want to talk about with their doctors? *Diabetic Med* 1993;10:968-71.
11. Lloyd CE, Robinson N, Andrews B, Elston MA, Fuller JH. Are the social relationships of young insulin-dependent diabetic patients affected by their condition? *Diabetic Med* 1993;10:481-5.PP
12. Gordon D, Fisher SG, Wilson M, Fergus E, Paterson KR, Semple CG. Psychological factors and their relationship to diabetes control. *Diabetic Med* 1993;10:530-4.
13. Kovacs M, Iyengar S, Mukerji P, Drash A. Psychiatric disorder and metabolic control among youths with IDDM: a longitudinal study. *Diabetes Care* 1996;19:318-23.
14. Eaton WW, Pratt L, Armenian H, Ford DE, Gallo J. Depression and risk for onset of type II diabetes: a prospective population-based study. *Diabetes Care* 1996;19:1097-102.
15. The DCCT Research Group. Reliability and validity of diabetes quality of life measure for the Diabetes Control and Complications Trial (DCCT). *Diabetes Care* 1988;11:725-31.
16. Weinberger M, Oddone EZ, Henderson WG. Does increased access to primary care reduce hospital readmissions? *N Engl J Med* 1996;334: 1441-7.
17. The DCCT Research Group. Influence of intensive diabetes treatment on quality-of-life outcomes in the diabetes control and complications trial. *Diabetes Care* 1996;19:195-203.
18. NIH Consensus Development Panel on Impotence. Impotence. *JAMA* 1993;270:83-90.
19. McCulloch DK, Young RJ, Prescott RJ, Campbell IW, Clarke BF. The natural history of impotence in diabetic men. *Diabetologia* 1984;26: 437-40.
20. Shabsigh R, Fishman IJ, Schum C, Dunn JK. Cigarette smoking and other vascular risk factors in vasculogenic impotence. *Urology* 1991; 38:227-31.
21. Lustman PJ, Clouse RE. Relationship of psychiatric illness to impotence in men with diabetes. *Diabetes Care* 1990;13:893-5.
22. Lipson LG. Treatment of hypertension in diabetic men: problems with sexual dysfunction. *Am J Cardiol* 1984;53:46A-50A.
23. Muller SC, El-Damanhoury H, Ruth J, Lue TF. Hypertension and impotence. *Eur Urol* 1991;19:29-34.
24. Wiles PG. Erectile impotence in diabetic men: aetiology, investigation, and management. *Diabetic Med* 1992;9:888-92.
25. Klein R, Moss SE, Klein BEK, Cruickshanks KJ, Lee KE. Prevalence of self-reported erectile dysfunction in people with long-term IDDM. *Diabetes Care* 1996;19:135-41.
26. Smith R. Occupationless health. "Gissa job": the experience of unemployment. *BMJ* 1985;291:1263-6.
27. Robinson N, Yatemana NA, Protopapa LE, Bush L. Unemployment and diabetes. *Diabetic Med* 1989;6:797-803.
28. Macleod CA, Murchison LE, Russell EM, Dingwall-Fordyce I. Measuring outcome of diabetes: a retrospective survey. *Diabetic Med* 1989;6:59-63.
29. Hanestad BR. Insulin-dependent diabetes mellitus (IDDM) and quality of life: a theoretical analysis. *Scand J Caring Sci* 1989;3:123-8.
30. Shillitoe RW. Psychology and diabetes. Psychosocial factors in management and control. London: Chapman and Hall, 1988.
31. Hanestad BR, Albrektsen G. Quality of life, perceived difficulties in adherence to a diabetes regimen, and blood glucose control. *Diabetic Med* 1991;8:759-64.
32. Redhead J, Hussain A, Gedling P, McCulloch AJ. The effectiveness of a primary care-based diabetes education service. *Diabetic Med* 1993;10: 672-5.
33. Gafvels C, Lithner F, Borjeson B. Living with diabetes: relationship to gender, duration and complications: a survey in Northern Sweden. *Diabetic Med* 1993;10:768-73.
34. Linn MW, Linn BS, Skyler JS, Harris R. The importance of self-assessed health in patients with diabetes. *Diabetes Care* 1980;3:599-606.
35. Coupey SM, Cohen MI. Special considerations for the health care of adolescents with chronic illnesses. *Ped Clin North Am* 1984;31:211-9.
36. Jenny JL. A comparison of four age groups' adaptation to diabetes. *Can J Publ Health* 1984;75:237-44.
37. Wikblad KF, Wibell LB, Montin KR. The patient's experience of diabetes and its treatment: construction of an attitude scale by semantic differential technique. *J Adv Nurs* 1990;15:1083-91.
38. Skelton R. Man's role in society and its effect on health. *Nursing (London)* 1988;26:953-6.
39. Verbrugge LM. Gender and health: an update on hypotheses and evidence. *J Health Soc Behav* 1985;26:156-82.
40. Ware JE Jr, Sherbourne CD. The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. *Med Care* 1992; 30:473-83.
41. Fletcher A, Gore S, Jones D, Fitzpatrick R, Spiegelhalter D, Cox D. Quality of life measure in health care. II: Design, analysis, and interpretation. *BMJ* 1992;305:1145-8.
42. The WHOQOL Group. What quality of life? *World Health Forum* 1996;17:354-6.
43. Meenan RF, Mason JH, Anderson JJ, Guccione AA, Kazis LE. The content and properties of a revised and expanded Arthritis Impact Measurement Scales Health Status Questionnaire. *Arthritis Rheum* 1992;35:1-10.
44. Epstein RS, Deverka PA, Chute CG, et al. Validation of a new quality of life questionnaire for benign prostatic hyperplasia. *J Clin Epidemiol* 1992;45:1431-45.
45. Memel D. Chronic disease or physical disability?: the role of the general practitioner. *Brit J Gen Pract* 1996;26:109-13.
46. Overland JE, Hoskins PL, McGill MJ, Yue DK. Low literacy: a problem in diabetes education. *Diabet Med* 1993;10:847-50.
47. Simmons D, Meadows KA, Williams DRR. Knowledge of diabetes in Asians and Europeans with and without diabetes: the Coventry Diabetes Study. *Diabet Med* 1991;8:651-6.
48. Glasgow RE, Osteen VL. Evaluating diabetes education. Are we measuring the most important outcomes? *Diabetes Care* 1992;15:1423-32.
49. Testa MA, Lenderking WR. Interpreting pharmacoeconomic and quality-of-life clinical trial data for use in therapeutics. *Pharmacoeconomics* 1992;2:107-17.