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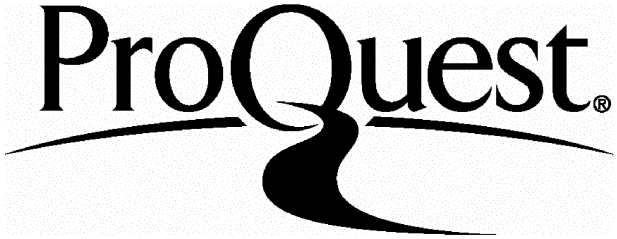

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This thesis is dedicated to the memory of Dorothy Rose Till-Burton.

Abstract

The development of a technique to assess the quality of life (QOL) patients with dementia and of their carers.

Although there are quality of life measures, both generic and disease-specific, for most medical conditions, to date none has been developed for the elicitation of subjective reports from patients with dementia. There are a number of methodological issues which make such assessments potentially difficult. Since progressive, global cognitive problems are the cardinal feature of the disorder, the first consideration is whether interviewing patients about their own QOL is feasible. The aim of this research was to develop a quality of life assessment schedule for patients with dementia and to ascertain at what point in the disease-process patient self-report of QOL is no longer possible.
A subjective, respondent-driven QOL assessment technique was developed and psychometrically validated. This was based on an existing psychological theory and methods, namely, Personal Construct Theory and Repertory Grid Technique. The resulting Quality of Life Assessment Schedule (QOLAS) is a generic technique. Five domains of functioning are assessed by the method: physical, psychological, social/family, work/economic and cognitive.

In order to test the psychometric properties of the new technique, the method was tested in two groups of patients with epilepsy in addition to psychometric testing in patients with dementia and their carers.

After piloting the technique in patients with dementia and their carers, the method was slightly modified for use in this context. A group of patients with mild-to-moderate dementia, plus their primary carer, were recruited and interviewed 3 times: at baseline, 6 months later and 12 months from baseline. The interviews conducted were: patient rating self; carer rating patient and carer rating their own QOL. The streamlined, simplified Quality of Life Assessment Schedule (QOLAS) formed the core of the interview in each case. A number of existing generic and disease-specific questionnaires were administered and qualitative data were also collected.
The question of the reliability or stability of the patients' perception of their own QOL was addressed in two ways: (i) by looking at correlations between scores obtained on a number of instrument subscales assessing the same, or similar, items; (ii) by a head-to-head comparison of the patients rating themselves and the carer rating the patient on the same instrument. Methodological issues in dementia research such as patient heterogeneity, variations in the pattern of cognitive decline, anosognosia, denial, ambiguity of questions, coping and adjustment are addressed and recommendations are made.

Patients with dementia are able to assess and report their own QOL at the onset of their illness but reliability diminishes with disease progression. The findings suggest that the simplified QOLAS technique is a valid procedure in assessing the QOL of patients with mild-to-moderate dementia and the QOL of their principal carer.

Contents

Chapter 1

Clinical Details: Dementia and Epilepsy

(1-1) Introduction

This thesis is concerned with the development of a technique to assess the quality of life (QOL) of patients with dementia and of their carers. The validation and psychometric testing of the technique was carried out in patients with epilepsy. This chapter reviews the clinical details of the most common disorders leading to a dementia syndrome and the clinical details of epilepsy.

(1-2) Dementia

(1-2-i) Dementia: history

Attempts at tracing the history of dementia before the nineteenth century have not been very successful. One problem is that this term was often used to refer to states quite different from that which is currently called dementia. At various times, words such as amentia, imbecility, morosis, fatuitas, foolishness, stupidity, anoea, simplicity, carus, idiocy, dotage, and senility were also used to describe conditions of intellectual and behavioural deterioration (Berrios & Freeman, 1991). The word 'dementia' had a much broader meaning in earlier periods, but throughout the centuries it has implied the existence of intellectual and behavioural deterioration associated with organic brain disease. Alzheimer's disease, the commonest cause of dementia, was originally described as a presenile disease (Alzheimer, 1907). Alois Alzheimer was born on 14th June, 1864, in Marktbreit am Main, near Wurzburg. In November, 1901, whilst working in Frankfurt, he examined a 51 year old woman who had been admitted to the psychiatric hospital. She presented with a distinct decrease in perceptivity and memory, as well as aphasia, lack of orientation, unpredictable behaviour, paranoid ideas, auditory hallucinations, and marked psychosocial incompetence.

(1-2-ii) Dementia: Definition

Dementia is not a final diagnosis and many conditions lead to a dementia syndrome. *Dementia* is defined as a syndrome of acquired, persistent intellectual impairment with compromised function in multiple spheres of mental activity, such as memory, language, visuospatial skills, emotion or personality, and cognition (Cummings et al., 1980). Dementing disorders can be categorised into cortical and subcortical types. The cortical dementias reflect dysfunction of the cerebral cortex and are characterised by amnesia, aphasia, apraxia and agnosia. Subcortical dementias are caused by dysfunction of the deep grey and white matter structures leading to disruption of arousal, attention, motivation and rate of information processing. Examples of subcortical dementias are those caused by human immunodeficiency virus (HIV) disease, Huntington's disease, and Parkinson's disease (Hales et al., 1999).

Dementia is an emerging major health challenge, not only for clinicians but for society as a whole. The American Psychiatric Association reports that dementia syndrome affects 5%-8% of individuals older

than age 65, 15%-20% of individuals older than age 75, and 25%-50% of individuals over the age of 85 (Hales et al., 1999). In a UK report, a meta-analysis of three major studies confirmed that the prevalence of dementia, after the age of 65 years, broadly doubles with every 5 years increase in age. The figures for the age specific prevalence of dementia (%) in the elderly are 1% (65-69 years), 2% (70-74 years), 5% (75-79 years) and 11% (80-84 years) (Harvey, 1998).

(1-2-iii) Dementia: Classification

Types of dementia

Among those with dementia, over 50% have AD, about 20% have vascular dementia, another 10% have AD plus vascular dementia, and the remaining 10-20% have other causes, some of which are treatable, arrestable or reversible (Mendez & Cummings, 1997).

(1-2-iii-1) Alzheimer's disease

Dementia of the Alzheimer's type (DAT) is the most commonly occurring dementia, accounting for approximately 50% of patients evaluated for progressive cognitive decline. Alzheimer's disease (AD) is a progressive neurodegenerative disorder with characteristic clinical and pathological features. Clinical variations are common including differences in rate of progression, pattern of neuropsychological deficits, and occurrence of non-cognitive neuropsychiatric symptoms (Cummings & Khachaturian, 1996). There are three widely used criteria-based approaches to the diagnosis of AD: the International Classification of Diseases, 10th revision (ICD-10) (WHO, 1992), the Diagnostic and Statistical Manual of Mental Disorders, 4th edition, (DSM-IV)(American Psychiatric Association, 1994) and the National Institute of Neurological and Communicative Disorders and Stroke-Alzheimer's Disease and Related Disorders Association Work Group Criteria (NINCDS-ADRDA) (McKhann et al., 1984). These three show considerable overlap. The DSM-IV defines dementia as a syndrome characterised by the development of multiple cognitive deficits, including memory impairment and at least one of the following cognitive disturbances: aphasia, apraxia, agnosia, or a disturbance in executive functioning. The deficits must be sufficiently severe to cause impairment in occupational or social functioning and must represent a decline from a previously higher level of functioning. This definition of dementia can be criticised since it does not address the first symptoms of all patients with dementia. Patients with fronto-temporal dementias, for example, have profound alteration in social conduct and personality and the first symptoms are often disinhibition (Neary and Snowden, 1997).

The DSM-IV criteria for dementia of the Alzheimer's type are outlined in Appendix 1. Patients with AD usually progress through three general clinical stages to death in 8-12 years (Mendez & Cummings, 1997). The first symptom of AD is usually amnesia with an inability to incorporate new knowledge despite continued ability to retain old, established memories. A second early cognitive impairment is an inability to retrieve words. This word-finding difficulty may become so profound that speech is empty and devoid of meaningful words. Visuospatial impairment is another frequent early manifestation. The middle stage is characterised by more prominent amnesia, aphasia and apraxia. Patients with AD often develop delusions, agitation, depression and other behavioural disturbances. In the early stages,

activities of daily living, such as driving, shopping, and preparing meals are progressively impaired and the patient does not attend to personal hygiene. In the last stage, the patients are globally demented, motor impaired, incontinent, and susceptible to other illnesses which may lead to the patient's death.

(1-2-iii-2) Vascular dementia

The second most common type of dementia is vascular dementia (VaD) (formerly Multi-Infarct Dementia). The vascular dementias are associated with multiple cortical or subcortical infarcts, the pattern of presentation relating to the number of infarcts, their site of extracranial origin and their location in the CNS (Trimble, 1996). The pattern of the disorder is of a stepwise dementia, often with a history of hypertension and evidence of recurrent strokes. The pattern is progressive, with deterioration in the mental and cognitive state of the patient which may plateau, followed by recovery. The latter is rarely to the state prior to the infarct, so a continuous but interrupted decline occurs.

Diagnostic criteria for vascular dementia are less well developed. The DSM-IV criteria are very similar to the criteria for AD, but require the presence of focal neurological symptoms, or neuroimaging signs of multiple infarctions in the cortex. The DSM-IV criteria for Vascular Dementia are outlined in Appendix 2.

The ICD-10 criteria require a history of transient ischaemic attacks, or a succession of small strokes. The Hachinski score is now an accepted method of helping establish a diagnosis, and is used widely in research (Hachinski et al., 1975). The Hachinski scale is reproduced in Appendix 3. The items on the scale are scored and summed. If over seven, the symptoms are more likely to be due to vascular dementia. Although there have been some criticisms of the scale, studies have shown that four features, namely, abrupt onset, stepwise deterioration, focal neurological symptoms and a history of hypertension, are the best discriminators of vascular dementia.

(1-2-iii-3) Frontotemporal dementias

Frontotemporal Dementia describes a clinical syndrome of behavioural disorder associated with fronto-temporal cerebral atrophy (The Lund and Manchester Groups, 1994), usually beginning before the age 65 years. The main clinical features are the insidious onset of a selective loss of cognitive abilities, namely language and/or frontal executive function, with the relative preservation in other domains such as episodic memory, orientation and visuo-perceptual function. Personal and social awareness is lost early, and the disease is associated with disinhibition, mental rigidity and inflexibility, although general independence is often maintained.

(1-2-iii-4) Dementia with Lewy Bodies

This is a type of dementia associated with Lewy Bodies as a pathological finding, occurring with or without associated plaques or tangles (Trimble, 1996). The presentation is often similar to AD, although frontal lobe and visuo-spatial impairments usually occur early in the disease. Other distinguishing features of dementia with Lewy bodies include: motor features of Parkinsonism,

prominent visual hallucinations, systematised delusions, marked fluctuation, falls and syncopal episodes.

(1-2-iii-5) Alcohol Related Dementia

Alcohol-Induced Persisting Dementia (DSM-IV), alcoholic dementia (ICD-10) and alcohol related dementia (ARD) all refer to patients with a history of chronic alcohol abuse presenting with cognitive impairments fitting a picture of dementia. Surveys of alcoholics attending for treatment suggest that up to 50% of those over the age of 45 years with a lengthy drinking history will have evidence of cognitive impairment (Edwards, 1982). These patients have neuropsychological deficits in the areas of memory function, speed and attention, visuo-perceptual function and particularly frontal lobe (executive) function.

(1-2-iii-6) Young Onset Dementia

Although Alzheimer's is predominantly a disease of old age, some patients have symptoms as early as their fourth decade (Rossor, 1993). The concept of "young onset dementia" has recently emerged in the literature and the question has arisen whether this is the same biological disease affecting different age groups, or whether they are similar clinical syndromes which have different causes in older and younger people. The cut-off, with the term senile dementia referring to patients developing dementia over the age of 65, is abritrary. Most of the evidence comes from studies of younger people with Alzheimer's disease. However, another group is those patients with non-Alzheimer dementias e.g. Frontotemporal dementia, Pick's disease, Huntington's disease and prion dementias. Most of these affect mainly younger people and are comparatively rare in older people. The cortical deficits described by Alzheimer in his original case, dysphasia, dyslexia, dysgraphia and agnosia have since been viewed as the clinical characteristics of early onset disease. It has been suggested, however, that dysphasia is more severe in younger onset cases and that in early onset cases there is a more rapid progression of the dementia (Seltzer & Sherwin, 1983) although some evidence contradicts this (Hart & Semple, 1994).

(1-2-iii-7) Subcortical dementia

It has been suggested that damage to the subcortical nuclei may lead to a dementia syndrome although the concept of subcortical dementias has not gained universal acceptance, mainly because of the strongly-held belief that 'higher' cognitive function is the prerogative only of the cortex (Trimble, 1996). The features of subcortical dementia have been described as emotional and personality changes, memory disorder, a defective ability to manipulate acquired knowledge and a slowness in the rate of information processing. The aphasias, apraxias and other characteristics of cortical dementias are not seen. This clinical picture is seen in a number of neurological conditions such as progressive supranuclear palsy (Steele-Richardson syndrome), Parkinson's disease, Huntington's chorea and Wilson's disease.

(1-2-iii-8) Others

There are a large number of other conditions that lead to a dementing syndrome. These include HIV/AIDS related dementia (Lipton, 1997), multiple sclerosis (Rao et al., 1991), Corticobasal degeneration (Schneider et al., 1997), and the prion diseases (Collinge et al., 1993), including new variant Creutzfeldt Jakob disease (nvCJD) (Will et al., 1996).

(1-2-iv) Epidemiology

The risk of developing Alzheimer's disease increases with age. A recent community survey showed annual incidence (i.e. new cases of AD each year) of 0.6% for ages 65-69, 1% for ages 70-74, 2% for ages 75-79, 3.3% for ages 80-84, and 8.4% for individuals of 85 and older (Herbert et al., 1995). Obtaining accurate epidemiological data for other dementias is more problematic since consensus criteria for other dementias have only recently been developed and their validity, sensitivity and specificity, particularly when applied in epidemiological studies, are yet to be demonstrated.

(1-2-v) Dementia: treatment

(1-2-v-1) Non-pharmacological treatments

The therapeutic approaches to Alzheimer's disease can be broadly divided into the pharmacological and the non-pharmacological. The non-pharmacological approaches have included: (i) behavioural techniques to modify disinhibited behaviours; (ii) reality orientation, which consists of regular, consistent communication with patients, backed up with easily observed boards indicating the day, date etc.; (iii) validation therapy, where the patient's own experiences are validated by a therapist regardless of the degree of disorientation and (iv) reminiscence therapy, a group activity consisting of the revitalisation of past experiences using audio-visual material which might include singing old songs together and looking at memorabilia.

(1-2-v-2) Pharmacological treatments

Pharmacological treatments can be broadly divided into those aimed at (i) non-cognitive symptomatology, such as behavioural disturbances, and (ii) cognitive symptoms (Lovestone & Howard, 1995).

Neuroleptics are the agents that are most commonly used for non-cognitive features. They are effective in treating agitation and restlessness (Burns, 1995). Neuroleptics can, however, cause high mortality and morbidity in patients with Lewy body dementia by exacerbating the motor disorder.

Other, non-neuroleptic drugs used in the management of patients with dementia include antidepressants which control agitation and restlessness, some anticonvulsants which help control agitation, beta-blockers for aggression, and benzodiazepines.

Although there is no proven drug treatment for Alzheimer's disease, the cognitive symptomatology of Alzheimer's disease has received considerable attention and research investment. There are a number

of psychoactive medications that are used for the purposes of restoring cognitive abilities, preventing further decline, and increasing functional status in patients with dementia. These include cholinesterase inhibitors (tacrine and donezepil); alpha-tocopherol (vitamin E); selegiline (deprenyl), approved for Parkinson's disease but studied and used in demented populations; and ergoloid mesylates (hydergine), which are approved for nonspecific cognitive decline. In addition, a number of other medications have been proposed for the treatment of cognitive decline, including NSAIDs, estrogen supplementation, melatonin, botanical agents (e.g. ginkgo biloba), and chelating agents (American Psychiatric Association, 1997). The class of compounds known as the nootropics and the related metabolically active compounds (including piracetam, oxiracetam, vincarine, and idebenone) have had largely disappointing results in clinical trials.

Early evidence, pointing to a predominant loss of brain cholinergic function, led to a cholinergic hypothesis to explain the memory deficits of Alzheimer's disease. Of the various pharmacological developments, the most promising seems to have been the use of acetylcholinesterase inhibitors to decrease acetylcholine breakdown. Three acetylcholinesterase inhibitors have received much attention. One of the first, developed 50 years ago, was tetrahydroaminoacridine (tacrine or THA, now marketed under the name Cognex). This has been tested in a number of clinical trials where only modest improvements have been seen on the global outcome measures, the cognitive measures, and the measures of daily living used (Lovestone & Howard, 1995). Common side-effects of this drug are nausea, vomiting and diarrhoea. Rash has also been described.

The drug donezepil (Aricept) was licensed in the United States in December, 1996, and was launched three months later in the United Kingdom. In trials, the benefits of the drug compared to placebo were very modest and the trial data has only been selectively reported, e.g. details of side-effects have not been published (Melzer, 1998).

Data on an international randomised controlled trial of a third acetylcholinesterase inhibitor rivastigmine, has recently been published (Rosler et al., 1999). Patients taking the drug did better than the placebo group on all outcome measures but, once again, it has been pointed out that these improvements, in a highly selected group of patients, were modest and the suggestion was made that future trials might benefit from the inclusion of pharmaco-economic analyses and more appropriate end-points, such as delays to institutionalisation (Flicker, 1999).

In conclusion, there are several different approaches which are being made to prevent or reduce the neurodegenerative process which characterises Alzheimer's disease. At best, the drugs so far developed for the treatment of Alzheimer's disease produce a relief of some of the symptoms in a minority of patients, but only for a relatively short time period (Leonard, 1998).

(1-3) Epilepsy

(1-3-i) History of epilepsy

The word epilepsy is derived from the Greek verb (*epilamvanein*) meaning "to be seized", "to be taken hold of". In ancient Greece, as now, people spoke of "having seized" and of having had an "attack". This terminology derived from the even older notion that all diseases represented attacks by the Gods or

evil spirits, usually as punishment. Because seizures were the most vivid example of demonic possession, epilepsy was considered to be "the sacred disease" and, by the fifth century BC, the word had gradually acquired the specific and particular meaning associated with it today (Engel & Pedley, 1997).

(1-3-ii) Epilepsy: Definition

Epilepsy is not a specific disease, or even a single syndrome, but rather a broad category of symptom complexes arising from any number of disordered brain functions that themselves may be secondary to a variety of pathologic processes (Engel & Pedley, 1997). As such, epilepsy is difficult to define (Trimble, 1996). One oft-quoted definition is of "occasional, sudden, rapid and local discharges of grey matter" (Taylor, 1958). The cardinal clinical symptom is the seizure and it is usual to accept that epilepsy requires recurrent seizures as opposed to a single seizure before the diagnosis can be made (Trimble, 1996). Specific epileptic syndromes have been identified by their characteristic seizure types, pattern of seizure recurrence, age of onset, associated neurologic and other clinical signs, electroencephalographic (EEG) findings, presence or absence of familial occurrence, and prognosis (Engel & Pedley, 1997).

(1-3-iii) Epilepsy: classification

It is important to distinguish the classification of seizures from that of epilepsy. The International League Against Epilepsy (ILAE), (1985) classification of epilepsies, reproduced from (Trimble, 1996), is presented in Appendix 4. An abbreviated version of the revised International League Against Epilepsy (ILAE) classification of epileptic seizures, taken from (Trimble, 1996) is given in Appendix 5.

(1-3-iv) Seizure types

Partial seizures

The fundamental distinction between simple partial seizures and complex partial seizures is the presence or the impairment of the fully conscious state (Dreifuss, 1997).

(1-3-iv-1) Simple partial seizures

(1-3-iv-1-a) With motor symptoms

Depending on the site of origin of the attack in the motor cortical representation area, the appropriate portion of the body will be involved in focal seizure activity. Such activity may remain strictly focal or may spread to contiguous cortical areas, producing a sequential involvement or "epileptic march". If the discharge spreads to structures whose participation is likely to result in loss of consciousness and generalised motor movements, the attack is considered to have become secondary generalised (Dreifuss, 1997).

(1-3-iv-1-b) With autonomic symptoms

Seizures with autonomic symptoms such as vomiting, pallor, flushing, sweating and incontinence may occur as partial seizures (Dreifuss, 1997).

(1-3-iv-1-c) With somatosensory or special sensory symptoms

These derive from those areas of cortex preserving sensory function and are frequently manifested as a "pins and needles" sensation or a feeling of numbness. Occasionally, proprioceptive or spatial perception abnormalities occur. Like motor seizures, somatosensory seizures may march and may spread at any time to become complex partial or generalised tonic-clonic seizures (Dreifuss, 1997).

(1-3-iv-1-d) With psychic symptoms (disturbance of higher cerebral function)

These usually occur with impairment of consciousness (i.e. complex partial seizures) but may be seen also in simple partial seizures. Symptoms include dysphasia or aphasia; dysmnesia e.g. deja vu, cognitive distortions, and perceptual distortions including dreamy states and auditory hallucinations. Affective symptomatology includes sensation of extreme pleasure or displeasure, as well as fear and an intense depression or feelings of unworthiness and rejection. Delusions frequently take the form of distorted perceptions, and the person incorrectly identifies visual or auditory stimuli (Dreifuss, 1997).

(1-3-iv-1-e) Complex Partial Seizures

The characteristic of complex partial seizures is impairment of consciousness, and there may be associated automatisms (involuntary motor activity occurring during the state of clouding of consciousness either in the course of, or after an epileptic seizure, and usually followed by amnesia for the event). The automatisms may be simply a continuation of an activity that was going on when the seizure occurred (e.g. eating, chewing swallowing) or may be a new activity that develops in association with the usual impairment of consciousness (Dreifuss, 1997).

(1-3-iv-1-f) Aura

The aura may be a sensation felt by some patients prior to the onset of a seizure. Others have referred to the aura as that portion of the seizure experienced before loss of consciousness occurs and for which memory is retained. In the case of simple partial seizures, the aura is the entire seizure; but where consciousness is subsequently lost, the aura is, in fact, the simple symptom of a complex partial seizure (Dreifuss, 1997).

(1-3-iv-2) Generalised Seizures

(1-3-iv-2-a) Absence seizures

The hallmark of the absence attack is a sudden onset, interruption of ongoing activities, a blank state, possibly a brief upward rotation of the eyes. The attack lasts from a few seconds to half a minute and evaporates as rapidly as it commenced. Absence seizures may occur with impairment of consciousness only; with mild clonic components (movement of muscle groups ranging from almost imperceptible

movements to generalised myoclonic jerks); with atonic components (diminution in muscle tone leading to e.g. drooping of head or of the arms); with tonic components (tonic muscular contraction may occur leading to increased muscle tone; the head may be drawn backward and the trunk may arch) and with automatisms (purposeful or quasi-purposeful movements occurring in the absence of awareness during an absence attack are frequent and may range from lip licking and swallowing to clothes fumbling or aimless walking (Dreifuss, 1997).

(1-3-iv-2-b) **Tonic-clonic seizures**

These were named 'grand mal' in previous classifications. The most frequently encountered of the generalised seizures are the generalised tonic-clonic seizures. Some patients experience a vague, ill-described warning, but the majority lose consciousness without any premonitory symptoms. There is a sudden, sharp contraction of muscles, and when this involves the respiratory muscles there is a stridor, a cry or moan, and the patient falls to the ground in the tonic state, occasionally sustaining injury in falling. The patient lies rigid, cyanosis may occur, the tongue may be bitten and urine may be passed involuntarily. The patient remains unconscious for a variable period of time and often awakes feeling stiff and sore all over. The patient then frequently goes into a deep sleep and awakens feeling quite well apart from soreness and, frequently, headache (Dreifuss, 1997).

(1-3-iv-2-c) **Myoclonic jerks**

Myoclonic jerks (single or multiple) are sudden, brief, shocklike contractions that may be generalised or confined to the face and trunk, to one or more extremities, or even to individual muscles or groups of muscles. Myoclonic jerks may be rapidly repetitive or relatively isolated. They may occur predominantly around the hours of going to sleep or upon wakening from sleep. They may be exacerbated by volitional movement and, at times, they may be regularly repetitive (Dreifuss, 1997).

(1-3-iv-2-d) **Clonic seizures**

Generalised convulsive seizures occasionally lack a tonic component and are characterised by repetitive clonic jerks. As the frequency diminishes, the amplitude of the jerks does not. The postictal phase is usually short (Dreifuss, 1997).

(1-3-iv-2-e) **Tonic seizures**

A tonic seizure is "a rigid, violent muscular contraction, fixing the limbs in some strained position. There is usually deviation of the eyes and of the head toward one side, and this may amount to rotation involving the whole body, sometimes actually causing the patient to turn around, even two or three times. The features are distorted; the colour of the face, unchanged at first, rapidly becomes pale and then flushed and ultimately livid as the fixation of the chest by the spasms stops the movements of respiration" (Gowers, 1881).

(1-3-iv-2-f) Atonic seizures

A sudden diminution in muscle tone occurs, which may be fragmentary, leading to a head drop with slackening of the jaw, the dropping of a limb, or a loss of all muscle tone, leading to a slumping to the ground. When these attacks are extremely brief, they are known as *drop attacks*. If consciousness is lost, this loss is extremely brief.

(1-3-iv-2-g) Unclassified epileptic seizures

There remain a number of seizures that cannot be classified because of inadequate or incomplete data and this includes some seizures that, by their nature, defy classification. Many seizures occurring in the infant will be classified here.

(1-3-iv-2-h) Psychiatric disorders of epilepsy

It is estimated that around 20%-30% of epileptic patients demonstrate psychopathology at some time, mainly anxiety and depression. The lifetime prevalence for an episode of psychosis is in the region of 4%-10%, increasing to 10-20% of patients with temporal lobe epilepsy (TLE) (Cummings & Trimble, 1995).

(1-3-v) Epidemiology

Epilepsy is one of the most common of the serious neurological conditions. It has an estimated incidence of between 50-122/100,000 per year, the prevalence of active epilepsy is 5-8/1000, and the lifetime prevalence is 3-5% of the general population. In the UK it is estimated that there are over 300,000 people with active epilepsy and over 1 million persons with a history of seizures (Cockerell et al., 1995).

(1-3-vi) Epilepsy: treatment

(1-3-vi-1) Non-drug treatments

In its long history, a number of treatments for epilepsy have been put forward. Those currently available include dietary recommendations, especially the "ketogenic" diet (Vining, 1998), hormonal treatment (Herzog & Eisenberg, 1998), vagal nerve stimulation (Wilder, 1998), behavioural therapy (Wolf, 1998) and a number of alternative and folk remedies (Sonnen, 1998).

(1-3-vi-2) Drug treatments

There are a number of drugs now available for the treatment of epilepsy. At the time of writing, in the late 1990s, these are roughly classified into two groups as "established" and "new" drugs. The older, more established anti-epileptic drugs include carbamazepine, ethosuximide, phenobarbital, phenytoin, primidone and sodium valproate. Several benzodiazepines have also been useful in epilepsy, including diazepam, for status epilepticus, clonazepam for generalised and partial seizures, and clobazam for partial and generalised epilepsies (McKee & Brodie, 1997).

In recent years, several new anti-epileptic drugs have become available, including vigabatrin, lamotrigine, oxcarbazepine, gabapentin, tiagabine and topiramate. Whilst approximately 70% of patients are well controlled on monotherapy, with standard AEDs, for the remaining 30% of patients polytherapy is considered.

(1-3-vi-3) Surgery

Surgical treatment for epilepsy has a long and distinguished history. Trephination was practised since prehistoric times in many parts of the world, and cauterization, a popular therapy in the European middle ages, persisted into the late nineteenth century (Engel, Wieser & Spencer, 1997). Whereas surgical intervention during the early years was constrained by the limited localising capabilities of reliable diagnostic tools, recent advances in clinicians' ability to accurately delineate structural and functional epileptogenic brain regions and to safely and effectively remove them, have led to a resurgence of interest in epilepsy surgery and the number of patients undergoing surgical treatment for medically refractory epileptic seizures doubled or tripled worldwide between 1985 and 1990 (Engel, Wieser & Spencer, 1997).

(1-4) Summary

Dementia, which is defined as a syndrome of acquired, persistent intellectual impairment with compromised function in multiple spheres of mental activity, is not a final diagnosis and many diseases lead to a dementing syndrome. At present there is no treatment for any of the dementias, although a number of drug therapies are now becoming available for Alzheimer's disease. The evidence to date, from a number of clinical trials, shows only modest improvements on the outcome measures used which assessed cognitive function, global assessments and carer-rated activities of daily living.
Epilepsy is not a specific disease, or even a single syndrome, and, as such, is difficult to define.
The cardinal clinical symptom is the seizure, and there is a variety of seizure types. Several treatments are available for epilepsy. Most epilepsy patients are well controlled on one of the anti-epileptic drugs although approximately 30% of patients are refractory and in these cases polytherapy is considered. In recent years a number of new anti-epileptic drug treatments have become available although they are associated with high costs, side-effects and the evidence to date suggests that few patients derive substantial long-term benefits from these new agents.

Chapter 2

The Measurement of QOL

(2-1) INTRODUCTION

> "When you can measure what you are speaking of and express it in numbers you know something about it: when you cannot express it in numbers your knowledge is of a very meagre kind".
>
> The Physicist, Lord Kelvin
>
> (quoted in Duncan, 1985)

(2-1) Introduction

The phrase "Quality of life" (QOL) is ubiquitous yet extremely difficult to define. This chapter has three aims. First, to review the use of the term quality of life, and the narrower concept of health-related quality of life (HRQL) that has been used in the clinical setting. Second, to discuss the different approaches to measurement of QOL/HRQL along the 'subjective-objective' continuum.

In the assessment of health-related quality of life, the psychometric approach has been dominant. There are, however, a number of criticisms of the psychometric approach to the development of measurement tools for QOL assessment. These criticisms will be presented and it will be argued that, whilst such an approach does have its place, measurement tools developed using psychometric criteria do not fully capture QOL i.e. they miss their target.

Assessment techniques at the other end of the continuum are reviewed, particularly those that are individually tailored to each patient at interview. It is argued that an individual, patient-tailored approach is more suitable for capturing the subjective, idiosyncratic nature of quality of life for the individual patient, and that there is a need for this approach.

Third, the literature on "patient-generated" approaches will be reviewed. The literature on the QOL of patients with dementia and of their carers will be reviewed in a separate chapter.

(2-2) Definitions: Quality of life (QOL) and Health-related Quality of life (HR-QOL)

"Quality of life" has been used in a range of contexts, from the visual arts to conservation and concerns for the environment, from the evaluation of medical treatments to transport and housing policy, from the marketing of products we buy to employment and the quality of working life (Bowling, 1995). The earliest population health indices used readily available numerical indicators such as mortality rates (McDowell & Newell, 1987). Rising expectations in recent years have led to a shift away from viewing health in terms of survival to a phase of defining it in terms of freedom from disease, to abilities to

perform daily activities and further to the current emphasis on positive themes of happiness, social and emotional well-being, and quality of life (McDowell & Newell, 1987). Although quality of life (QOL) has been used across many disciplines (including geography, literature, philosophy, health economics, advertising, health promotion, the medical sciences, sociology and psychology) there is general agreement that, in the clinical context, emphasis should be placed on addressing health-related quality of life (HR-QOL). The theoretical framework of health-related quality of life is largely based on a multidimensional perspective of health as physical, psychological and social functioning and well-being, derived from the World Health Organisation's (WHO) definition of health as a "state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity". The WHO set up a working party on quality of life and this group defined QOL as follows:

> *Quality of life is defined as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. It is a broad ranging concept affected in a complex way by the person's physical health, psychological state, level of independence, social relationships, and their relationships to salient features of their environment* (WHOQOL Group, 1993).

Whilst in early papers, there was much philosophical debate about the definition of QOL and HR-QOL (Fraser, 1993; Bowling, 1995), it is now only rarely debated in the medical literature (Oliver et al., 1995). However, although there is general agreement about assessing the narrower domain of HR-QOL in the clinical context, and that the three broad domains of physical, psychological and social well-being should be taken as the starting-point of most approaches to HR-QOL assessment, there is a wide diversity of approaches to measurement. The approach taken partly depends on why one wants to measure QOL.

(2-3) Why measure QOL..?

There may be a number of reasons for wanting to assess QOL and it is important to be clear about these. The type of measurement approach used will depend on the goal of the study and the use to which the data will be put. QOL measures have been devised for a number of reasons (Fitzpatrick et al., 1992). These are outlined in Appendix 6.

Instruments for all of these applications have different approaches to measurement. Before embarking on the development of any new instrument, the investigator should define exactly what the instrument is to measure (Juniper et al., 1996). The investigator needs to decide whether the primary purpose of the instrument is going to be evaluative, discriminative or predictive (Juniper et al., 1996). The type of measurement approach will depend on the type of data required which, in turn, will depend on the use to which the data will be put.

(2-4) Approaches to Measurement in the Social Sciences

There is a long-standing debate in the social sciences with, roughly, two opposing views concerning whether aspects of human behaviour can be studied, explained and predicted like other phenomena in the social sciences or whether human beings with intentions and motives cannot be studied scientifically with the establishment of general laws. On the one hand is 'positivism', or empiricism, which more or less insists that scientific knowledge is unique because of its certain, factual basis acquired through rigorous experimentation and measurement. The positivists emphasise the need for valid and reliable data collection conjoined with sophisticated statistical analysis. On the other hand are those researchers of the interpretative or hermeneutic school, who stress the intentionality of human action and who are inclined to treat measurement-centred analysis as an irrelevance given the paramount need for meaning-centred understanding. Many social scientists have thus argued that the methodology of the social sciences is fundamentally different from that of the natural sciences, and necessarily so, because the explanation of social phenomena requires an analysis of what individual persons do, not in terms of their physiological processes or their passive responses to changes in ambient conditions, but as active agents with the rational capacity to choose the means of achieving their objectives (Gordon, 1995).
An awareness of the restrictions imposed by a positivistic worldview has prompted enquiries into issues such as self-agency, hermeneutics and theories of intentional action and narrative knowing in sociology, psychology and the counselling professions, (Pawson, 1989; Reason & Rowan, 1981; Neimeyer & Neimeyer, 1993).
Two ways of studying phenomena corresponding to these two approaches are the ***idiographic*** (methods of study of individual, unique persons, events or things) versus ***nomothetic*** methods (in which the object is to find general laws which subsume individual cases) (Abercrombie, Hill & Turner, 1984).
This debate in the social sciences about the most appropriate ways to study human behaviour is highly relevant to debates about the best ways to assess QOL.

(2-5) Approaches to Measurement in QOL

There is a fundamental tension in the measurement of QOL. Since what is deemed important for QOL is acknowledged to be subjective and idiosyncratic, differences being influenced by a variety of personal and cultural factors, an appraisal of QOL should strive to capture the individual's subjective, phenomenological experience. On the other hand, the hallmark of scientific measurement is "objective", reproducible, empirical data-collection. QOL researchers have taken a whole range of approaches along this 'subjective/objective' continuum and there now exist over one thousand instruments that have been developed taking a variety of approaches to measurement (Hedrick et al., 1996). The two aspects of the qualitative-quantitative continuum have different strengths. It has been suggested that qualitative methods are more valid whilst quantitative methods are more reliable (Mays & Pope, 1996). Approaches to QOL measurement can be considered to fall upon various points of the subjective(qualitative) / objective(quantitative) continuum. They can be split roughly into two groups:

(i) the fixed, psychometrically tested questionnaire and (ii) unstructured (or semi-structured), individualised, respondent-driven methods.

(2-6) The fixed, psychometrically tested questionnaire

In the early days, when QOL was introduced into the clinical, or health-care, setting, QOL data were dismissed as being "soft" data and some clinicians have continued to make this point (Hunt, 1997). Partly as a response to this, there was a concerted effort to make QOL measures more "scientific" and for them to undergo rigorous testing, particularly for use in contexts such as the clinical trial (Juniper et al., 1996). Most effort has been directed at developing the fixed, questionnaire and there is a range of QOL/health status measures thus developed (Brooks, 1995). *Generic* instruments cover a broad range of QOL domains in a single instrument. Their chief advantage is in facilitating comparisons among different disease groups. Examples include the Sickness Impact Profile (SIP) (Bergner et al., 1981), the Nottingham Health Profile (NHP) (Hunt et al., 1986) and the Medical Outcomes Survey, Short-form-36 (SF-36) (Stewart & Ware, 1992; Ware et al., 1993). *Disease specific* instruments reduce patient burden by including only relevant items for a particular illness but their main disadvantage is the lack of comparability of results with those from other disease groups.
Health profiles provide separate scores for each of the dimensions of QOL, whereas a *health index,* a type of generic instrument, gives a single summary score, usually from 0 (death) to 1 (perfect health). A further category, developed within the economic tradition, is that of *utility* measures. Whilst some decisions are taken for *individual* patients, others, such as those made by health policy makers, concern *groups* of patients. Here the focus is on *society* as a whole and the societal allocation of scarce resources. For this purpose, preference weighted measures are required. All of these fixed questionnaires now undergo rigorous testing of their measurement properties.

(2-7) Psychometric testing

(2-7-i) From Psychophysics to Psychometrics

Measurements of health may be based on laboratory or diagnostic tests, or they may rely on indicators in which a person (the patient or a clinician) makes a judgement that forms the indicator of health. The latter are often termed "subjective" measurements. Subjective measurements are little different from the data collected for centuries by physicians when taking a medical history (McDowell & Newell, 1987). Because subjective reports of health are not inherently quantitative, some form of rating method was required to translate statements such as "severe pain" into a form suitable for statistical analysis. The scaling techniques originally developed by social psychologists to scale attitudes soon found application in health indices (McDowell & Newell, 1987).
What evidence is there that subjective judgements form a sound basis for making measurements of health at all..? The arguments for considering subjective judgements as a valid approach to measurement derive ultimately from the field of psychophysics. Psychophysical principles were later

incorporated into psychometrics, from which most of the techniques used to develop subjective measurements of health were derived. Psychophysics is concerned with the way in which people perceive and make judgements about physical phenomena such as the length of a line, the loudness of a sound, or the intensity of a pain. Fechner proposed a method of scaling sensations based on "just noticeable differences", and then recording the objective magnitude of just noticeable differences at different levels of the stimulus.

Traditionally, psychophysics studied subjective judgements of stimuli that may be measured on physical scales such as decibels. Psychophysical methods have been adapted for use in measuring qualities for which there is no physical scale. This is the field of psychometrics, and the work done by psychologists in this area has been applied in developing health measurement methods. Preliminary results suggest that a similar internal consistency of judgement holds for ratings of health as for other psychological measurements.

(2-7-ii) Psychometrics: Historical perspective

Psychometrics originated with Sir Francis Galton who was interested in the evolution of human intellect and who, in 1869, published, *Hereditary genius: an inquiry into its laws and consequences*. He established an anthropometric laboratory at the South Kensington Exhibition in 1883, where persons attending the exhibition could have their faculties tested for threepence. This work, plus the advances in statistical techniques made by Karl Pearson and Charles Spearman laid the foundation of test theory which was used almost entirely in the development of what had come to be called "intelligence tests" (Rust & Golombok, 1989). Most psychological scales, measures and tests have been undertaken within the tradition of psychometrics.

(2-7-iii) What does Psychometrics measure..?

(2-7-iii-a) Two models of psychometrics: trait and function

The way in which the subject matter of psychometrics is defined divides the two psychometric schools: the trait and the functional. For the functionalist school the source of the discipline is seen as lying within occupational and educational testing, particularly the examination system. Within the strict functionalist approach, the design of a test is completely determined by its use and "what it measures" has no meaning other than this application. The major contribution of the functional model to recent psychometrics has been the increased emphasis on test design.

(2-7-iii-b) Trait test design

Trait psychometrics arose originally from attempts to be more scientific about common-sense notions of different types of human personality. An important idea was that of the personality spectrum, suggesting that types of personality were not "all or none" but had many possibilities between the extremes. Psychometric tests were thus devised to measure traits which were seen as representing biological variation in personality or aptitude. Although the functionalist and trait model seem very

different, they do have aspects in common. In particular, they are linked by a fundamental theorem of psychometrics: the theory of true scores.

(2-7-iii-c) The theory of true scores

The theory of true scores states simply that any score on an item or a test by a subject can be represented by two component parts: the subject's true score on whatever the item measures, and some error of measurement. This is traditionally stated as: $\mathbf{X = T + E}$, where X = the observed score, T = the true score and E = the error.

(2-7-iii-d) Criticisms of the theory of true scores

The major criticisms have been directed against the concept of the true score itself. It has been argued that there can be no such thing as a true score, as this is merely a hypothetical entity generated by the theory (Loevinger, 1957). Is the true psychometrics trait or function..? Functional tests on their own can only be specific to a particular situation, they cannot be generalised. If we wish to generalise then we need a concept, e.g. a trait of depression, to provide justification for saying that the depression scale might be applicable in changed situations, for example with children, or with reactive as well as endogenous depression. To function in this way, an instrument like the Beck Depression Inventory (BDI) needs to have construct validity, and this cannot exist without presupposing the construct and trait of depression itself.

(2-7-iii-e) Traits, functions and psychometric debates

The functional approach is able to throw a fresh light on some of the traditional debates within psychometrics - for example, the argument about whether one factor or many are required to measure the construct of intelligence. Within functionalism, the deciding criterion is simply the use to which the test is to be put.

One valuable outcome of the recent ascendancy of the functional model in psychometrics has been the emphasis on obtaining a clear definition of the purpose of the assessment, and subsequently of the selection or assessment instrument. The initial definition of purpose should be simple and straightforward (Rust & Golombok, 1989).

(2-7-iv) Psychometric testing of a questionnaire to measure QOL or health status

The psychometric testing of a questionnaire, for use in a given context, is an intensive, ongoing process (Nunnally & Bernstein, 1994; Streiner & Norman, 1995). The main issues in instrument development and validation vary slightly depending upon whether the primary purpose of the instrument is going to be evaluative, discriminative or predictive (Juniper et al., 1996). In the health status/QOL literature, it has been generally agreed that a measure should demonstrate at least the basic requirements of validity, reliability and responsiveness, or sensitivity to change (Streiner & Norman, 1995).

Validity is how well the instrument measures what it purports to measure. There are various statistical procedures for testing different aspects of an instrument's validity.

1. *Content* validity: concerns whether the instrument contains a comprehensive range of items of relevance to the phenomenon it purports to be measuring. In the case of a measure to assess QOL in epilepsy, the question is whether the scale appears to tap items of importance to patients with epilepsy.

2. *Criterion* validity: is traditionally defined as the correlation of a scale with some other measure of the trait or disorder under study, ideally a "gold standard" which has been used and accepted in the field. Criterion validity is usually divided into two types: *concurrent* validity and *predictive* validity. With concurrent validity, the new scale, or a sub-domain of the scale, is correlated with the criterion measure both of which are given at the same time. Predictive validity concerns the ability of the test to predict which respondents will achieve a certain outcome at a later date.

3. *Construct* validity: is tested by an ongoing process whereby hypothetical 'constructs' or 'mini-theories' are tested. One such hypothesis might be that higher disease severity would correlate with lower scores indicating worse QOL.

Reliability is concerned with whether the same measurement can be obtained on other occasions and concerns the amount of error inherent in any measurement. Two basic tests are the *internal consistency* of a test, measured by coefficient alpha, and *test-retest* reliability where scores taken on two occasions are compared.
There are problems in assessing the test-retest reliability of QOL measures where genuine changes in the patient's well-being may have occurred before the follow-up assessment, making it difficult to distinguish measurement error from genuine change in health/QOL.

Sensitivity is concerned with how sensitive the measure is to detecting small, or clinically relevant, changes. This would be an important property of health status/QOL measures to be used for monitoring benefits of treatment.

(2-8) Criticisms of the psychometric approach

(2-8-i) Psychometrics versus clinimetrics versus econometrics

The psychometric approach to the development of QOL measures has been criticised. The psychometric approach is not the only one. Others approaches are the clinimetric (Gill, 1995) and the econometric traditions (Brazier & Deverill, 1999).
The name clinimetrics has been proposed for the domain concerned with the construction of clinical indexes (Feinstein, 1987; Gill, 1995). Measurements of health may be based on laboratory or diagnostic tests, or they may rely on indicators in which a person (the patient or a clinician) makes a judgement that forms the indicator of health. Econometrics concerns those instruments, particularly

preference-based measures, designed specifically for the purposes of economic evaluation (Brazier & Deverill, 1999).

(2-8-ii) Validity

The main criticism of the psychometric approach from researchers in the other two traditions, concerns the concept of validity. It is argued that validity is different in the psychometric and the econometric approaches because the former seeks to measure health change as perceived by patients, whilst economic evaluation requires a measure of the value or strength of preference for the health change (Brazier & Deverill, 1999). It has also been argued that most "standardised" QOL measures aim at the wrong target. A lavish devotion to psychometric, as opposed to clinimetric techniques means the scales often omit items important to the beliefs and values of individual patients (Gill, 1995). It is argued that the psychometric aim of internal reliability, assessed by statistics such as Crohnbach's alpha, is in conflict with the goals of achieving comprehensiveness and content validity. Moreover, since QOL is a multifactorial phenomenon, the striving for homogeneity is unnecessary (Gill, 1995). It is therefore argued that because quality of life in a uniquely personal perception, denoting the way that individual patients feel about their health status and/or nonmedical aspects of their lives, QOL can be suitably measured only by determining the opinions of patients and by supplementing (or replacing) the instruments developed by "experts" (Gill & Feinstein, 1994).

(2-8-iii) Reliability

There are two, closely-related critiques of the fixed, standardised QOL questionnaire concerning the claim that it is a robust, reliable, scientific tool. The first concerns language, interpretation and meaning. The second concerns a constellation of psychological findings such as coping, adaptation, response shift bias, personality variables and the dynamic nature of QOL. These are discussed below.

(2-8-iii-a) Language and meaning

Questions and response formats will not have the same meaning for everyone (Pawson, 1989). Close interviewing with subjects completing QOL questionnaires has shown: (i) that there is a range of interpretations as patients attempt to fit their illness experience into the response categories available (Selai, 1995); (ii) that health events are often poorly remembered (Tanur, 1994); and (iii) that questionnaires are filled in somewhat arbitrarily, sometimes clearly contradicting verbal comments made by the respondents (Donovan et al., 1993). Even instrument developers are often not clear about the meaning of the items on their questionnaires and what they hoped each question would tap, as was shown by a study conducted amongst users of the EuroQol Group (Fox-Rushby, 1997).

(2-8-iii-a-1) **Meaning as use**

Earlier this century, the influential proponents of 'analytical philosophy' and the logical positivists postulated a one-to-one correspondence between the parts of the sentence and the components of the world that the parts represented (Russell, 1918; Wittgenstein, 1922).

These views influenced a tradition in cognitive psychology, using methods adapted from laboratory-based experiments in psychophysics of investigating the meaning of words using scaling tasks. Indeed, many psychologists in the behaviourist/operationalist tradition such as E.G. Boring, S.S. Stevens and J.B. Watson, were influenced by aspects of the work of the logical positivists who moved to the United States (Hacker, 1996).

In later work Wittgenstein, famously, rejected his earlier ideas. Instead of viewing language as something like a logical calculus, with meaning representing a direct correlation between language and simple objects, the *Investigations* says that meaning of a sentence is its **use** or application (Wittgenstein, 1953). The concept of a **language-game** is introduced in order to expound the idea that language functions within the active, practical lives of speakers. Whatever the subsequent vicissitudes of analytic philosophy (Hacker, 1996), it is this idea of meaning as use, (i.e. meaning must be understood in a particular context) which greatly influenced the development of and research in the social sciences (Winch, 1958; Gellner, 1985).Social scientists, such as sociologists, anthropologists and some psychologists, influenced by the later work of Wittgenstein, emphasise the importance of understanding a word or phrase in the context of its use.

(2-8-iii-a-2) **Meaning: Scale development**

Questions to measure subjective status are unavoidably imprecise. After years of research which has focused on the technicalities of questionnaire development and administration such as framing effects, scale reproducibility and score meaning (Oppenheim, 1996), acquiescence bias, end-aversion, and positive skew (Streiner & Norman, 1995), the evidence points to the inescapable imprecision of questions to measure non-observable aspects of health status. A summary of the findings to date includes the facts: that there are numerous examples of how small changes in wording, which seem to be equivalent, produce very different results; that the ordering of response alternatives and the location of a question in a survey can affect the way the questions are answered and that the data show mixed evidence for the superiority of numerical 5-point, 7-point or 10-point scales versus adjectival scaling tasks. There is little agreement between people on the meaning of words or phrases used in many adjectival scales and part of the problem is the vagueness of the terms (Bryant & Norman, 1980; Streiner & Norman, 1995). In conclusion, the distribution of answers that come from a question about a subjective state is always relative; it has no absolute meaning (Fowler, 1995).

Within the psychometric setting, researchers have devised scaling tasks to look at the meaning of words. Two early studies showed that the meaning of a word may be considered as if it had two components, one constant (representing social meaning) and one subject to a degree of variability (representing individual interpretation in usage and associated context) (Mosier, 1941; Jones & Thurstone, 1955). In

the scaling tasks used, (where meaning value for an item is scale value for that item), the frequency of responses to a word was shown to be normally distributed in most cases. Some words e.g. "Average" exhibited bimodal distributions (two apparently distinct groups interpreted the word quite differently).

(2-8-iii-b) **Dynamic flux: Problems because of adaptation, coping, expectancy etc.**

Another area of criticism concerns an inter-connected group of ways in which the standardised, fixed questionnaire might not be reliably measuring QOL. These relate to the changing, dynamic nature of QOL and psychological variables such as coping techniques, personality and other pre-morbid characteristics.

The first of these is that QOL not a static phenomenon but dynamic and changing (Allison et al., 1997). It is argued that although investigators have implicitly recognised that there are between-subject differences in determining instrument content, the possibility of within-subject QOL construct dynamism (i.e. an individual changing the standards by which he/she assesses his/her QOL) and its subsequent effects upon valid QOL measurement have largely been ignored. On example is that between assessment and follow-up the patient's terms of reference for "the worst pain imaginable" could have changed in light of his/her experience with the treatment. In this case, the difference in ratings of pain at times 1 and 2 would not be valid. This concept of "response shift" is well-documented in the cancer literature (Breetvelt & Dam, 1991).

Another example is that aspects of life contributing to QOL may change. This has two components: not only have the domains contributing to that individual's evaluation of his own QOL changed, but also the relative importance of those domains have changed. The causes of dynamism include adaptation, coping, affect versus cognition, expectancy and optimism. One solution might be to include "then ratings" but there might be problems because the validity of "then ratings" is entirely dependent upon the accuracy of an individual's memory regarding his previous situation. Another suggestion is to use individualised questionnaires, which are extremely responsive and could be an excellent measure of outcome for within-subject trial designs.

Another point under this heading is that some people have response biases that lead them to give the answers they think are most socially acceptable or cast them in a favourable light (Brooks et al., 1990). QOL scores can also be influenced by personality and other psychological factors such as hypochondriasis, somatisation and neuroticism (Muldoon et al., 1998).

In summary, there are a number of criticisms of the fixed, standardised questionnaire concerning both validity (particularly content validity) and various aspects of the reliability of measurement. In response to these criticisms, and the argument that most QOL questionnaires are aiming at the "wrong target", an increasing number of researchers have been developing QOL assessment techniques at the other end of the measurement spectrum. Instead of a fixed questionnaire, these researchers have explored "individualised" questionnaires, tailored to each respondent who is allowed to choose the items they personally deem of most relevance/importance to their own QOL.

(2-9) Individual, Patient-tailored QOL assessment Methods: A review

The individualised assessment technique, in its many guises, has a long history in psychology and psychotherapy where attempts have been made to chart the highly idiosyncratic progress of the individual patient (Kelly, 1995; Phillips, 1986; Viney, 1993). A variety of techniques which come under this heading are used by sociologists, anthropologists and other social scientists. In the era of "evidence based" medicine, even many clinicians are aware of the importance of "narrative based" medicine (Greenhalgh, 1999). Patients' stories or "narratives" have a prominent place in the study and understanding of illness in general and QOL in particular (Gordon & Paci, 1996). A recent book has reviewed individualised QOL assessment techniques (Joyce et al., 1999). The main techniques are reviewed below.

(2-9-i) The Schedule for the evaluation of individual quality of life (SEIQOL)

The Schedule for the evaluation of individual quality of life (SEIQOL) is an individualised technique based on judgement analysis (O'Boyle et al., 1993). The SEIQOL has three components: (i) those aspects of life considered by the individual to be crucial to his/her QOL are elicited by means of a structured interview; (ii) current functioning with each aspect is rated by the individual; (iii) the relative importance of each aspect of QOL is measured by deriving the weight the individual assigns to each in judging overall QOL, measured using visual analogue scales. These judgements are then modelled using simple multiple regression analysis to produce weights summing to 1.0 which represent the relative importance of each domain to the individual's overall QOL. Reliability and validity were fully demonstrated and, in a number of studies, it was found to be more sensitive to the health status differences between the groups than were the traditional health-related QOL measures (O'Boyle et al., 1993). The stability of elicited cues over time was examined and it was found that respondents changed, on average, one cue over 24 months, suggesting that the domains which individuals judge to be important to their QOL are likely to remain relatively constant over periods as long as two years (O'Boyle et al., 1993). The SEIQOL was used in a study comparing the QOL of attenders at an immunisation clinic (n=42) with the QOL of out-patients suffering from irritable bowel syndrome (n=20) and peptic ulcer disease (n=20). The study showed that items and the relative importance given to each varied across individuals (McGee et al., 1991). The SEIQOL was also used to assess QOL of patients undergoing hip replacement (O'Boyle et al., 1992) the QOL of the healthy elderly (Browne et al., 1994) and patients with dementia (Coen et al., 1993) although in this last study only 6/20 patients with dementia were able to complete the full task. A new short form individual quality of life measure, using a simpler, direct weighting system, (SEIQOL-DW) has been developed (O'Boyle et al., 1996) and has been used to assess QOL of patients with AIDS (Hickey et al., 1996).

(2-9-ii) Qualitator (Daily Diary Card)

Asking the patient to keep a diary, to record various aspects of their well-being over time, has a long tradition in psychology and psychotherapy. This method has been used as another 'individualised'

approach to QOL assessment. Some form of daily diary card has been used to assess QOL for use in cancer trials (Geddes et al., 1990; Fraser; 1993). The King's College Hospital Diary, or "Qualitator" was developed and its psychometric properties (validity, reliability and responsiveness) were tested (Fraser et al., 1990). In an advanced breast cancer trial the Qualitator daily diary card was administered 3-weekly and completed continuously from the first day of treatment (Fraser; 1993). From 23 items the patient chooses one she considers the most important from each of four domains: (1) symptoms of disease and side-effects of treatment, (2) psychological aspects, (3) personal relationships and (4) physical performance. In addition, a weighting variable is chosen from any domain. Daily thereafter, a score from 1-4 is given to the 5 chosen items, corresponding to the severity with which each item is perceived: "Not at all", "A Little", "Somewhat", "Very much". The opportunity to change items occurs every three weeks, when a new card is exchanged for the old one. Each patient's daily aggregated daily score is added to obtain a weekly total in the range of 35-140. In two studies, patient groups (and other QOL measures in the King's study) were compared using a mean diary score taken from the completed weeks during each successive four week period. This allowed inclusion of all the available data, but allowed for any missing weeks. Isolated missing days were given the mean score for the other days that week.

(2-9-iii) The Patient-generated Index (PGI)

Another approach is the Patient-Generated Index (PGI) (Ruta et al., 1994). The PGI is completed in three stages. In the first, patients are asked to list the 5 most important areas or activities of their life affected by their condition. In the second stage, patients are asked to rate how badly affected they are in each of their chosen areas on a scale from 0 to 100 where 0 represents the worse they can imagine for themselves and 100 represents exactly as they would like to be. A sixth box is provided to enable them to rate all other areas of their life not previously mentioned. In the third stage, patients are asked to imagine that they can improve some or all of the chosen areas of their life. They are given 60 'points' that they can choose to 'spend' across one or more areas. The points they allocate to each area represent the relative importance of potential improvements in that area. Finally, by multiplying each of the six ratings by the proportion of points allocated to that area and summing, an index is generated between 0 and 100. The method was found to be reliable and valid. For patients who reported no change in health between the first and second set of responses, a reliability coefficient of 0.7 ($p< 0.001$) was achieved, confirming that the measure is sufficiently reliable to be used for comparisons between groups. Patients reporting a change in health over the same period achieved coefficients well below the critical value of 0.5. The nomination of constructs was found to be reliable with patients who reported no change in health during a 2-week period making, on average, 1.7 changes to their chosen areas or activities of life. In testing criterion validity, the PGI score showed a high correlation with clinical (low back pain) score. Seven of the SF-36 scales demonstrated a correlation with the PGI that was significant at the 0.1% level.

(2-9-iv) 'GILL' individualised method

Another (un-named) individualised method has been described which was used in a pilot study of outcomes after an ischaemic stroke (Gill, 1995). This method involves 3 stages. After open-ended interviews to identify the particular problems or deficits, caused by the stroke, that they would like to have improved or resolved, patients are asked to choose the 5 most important items. Next, the patients are asked to rate the 5 items in terms of severity and importance on separate Visual Analogue Scales (VAS). Severity and importance scores are calculated for each of the five items by multiplying the ratings for severity and importance. Then these five severity-importance scores are summed to create overall QOL scores. During follow-up interviews, patients rate only the severity of the five items. Severity-importance scores are then formed for each item using the importance ratings from the initial interview. Change in quality of life is determined from the difference in scores between the baseline and follow-up assessments.

(2-9-v) The Quality of Life Assessment Schedule (QoLASCA)

(2-9-v-a) Background

Repertory Grid Technique has been used to assess QOL in clinical trials (Thunedborg, 1993). A further individualised approach, the Quality of Life Assessment by Construct Analysis (QoLASCA) was developed from Personal Construct Theory (PCT) and Repertory Grid Technique (RGT) (McGuire, 1991; Kendrick & Trimble, 1994; Kendrick, 1993; Kendrick, 1997).

Repertory Grid Technique (RGT) is the methodological component of Personal Construct Theory, a theory of personality proposed by George Kelly in the 1950s (Kelly, 1955). The fundamental postulate of this theory is that "a person's processes are psychologically channelized by the ways in which he anticipates events" (Kelly, 1955). According to Kelly, man can be viewed as a scientist, who formulates theories or hypotheses relating to himself and the world he inhabits. These theories are based on his personal construction or interpretation of experienced events and thus form a "personal construct system" (Kelly, 1995).

Repertory Grid Technique attempts to objectively explore and measure an individual's construct system. There are three major components of the technique: elements, constructs and the repertory grid itself.

(1) Elements: these define the area of construing to be studied. If we wished to study the individual's construing of interpersonal relationships, the elements are likely to be people. If, however, we were interested in his construction of illness, the elements may be different diseases.

(2) Constructs: Kelly defines a construct as "a way in which some things are construed as being alike and yet different from others". Thus, a construct is simply a way in which the individual groups and differentiates between the elements.

(3) Repertory Grid: In the Oxford English dictionary, "repertory" is defined as "a place for finding something, a store of information". Similarly, in repertory grid technique, the grid itself is a linking

mechanism in which the mathematical value assigned to each construct for each element is collated. A basic assumption of the technique is that the mathematical relationships within the repertory grid reflect psychological relationships within the person's construing system.

(2-9-v-b) Application of RGT to the assessment of quality of life

Four major concepts underpin the method (QoLASCA) that has been developed for the assessment of quality of life. This was designed to be a generic technique but was originally developed to assess QOL in patients with neurological disorders, and the early work was done with patients with epilepsy. First, based on a comprehensive literature review, it is proposed that, in general terms, 5 areas important to quality of life can be defined. These are physical functioning, psychological/emotional status, social and family life, economic/employment status and cognitive abilities. Second, it is recognised that within these general areas, specific items of importance will vary from individual to individual. Third, it is hypothesised that QOL is a function of levels of expectation. Thus, it is the discrepancy between current life situation and expectations that is important in determining an individual's QOL, not simply how they are at present. Fourth, it is suggested that QOL is a comparative phenomenon. In judging his/her QOL, an individual makes comparisons concerning their current life situation in relation to other times and people in their lives.

(2-9-v-c) QoLASCA: Choice of elements

Initially a total of 10 "elements" and, from these a subset of 7 elements considered appropriate to the assessment of quality of life (QOL), were chosen. These represent various situations and people in the patient's life: as you are (NOW); as you were before developing epilepsy (BEFORE); as you would like to be (LIKE); as you would expect to be (EXPECT); a close friend (FRIEND); the best possible life (BEST) and the worst possible life (WORST).

(2-9-v-d) QoLASCA: Construct elicitation

The constructs (or areas of importance to QOL) are individual to each patient and were elicited through a semi-structured interview. During the interview the elements were presented in groups of 3 (triads) and the patients were asked: "think of a way in which two of these are alike and different from the third in terms of their quality of life". For example, in comparing the elements 'as you are now', as you were before having epilepsy, and 'a close friend', a patient may respond "my friend and I both have epilepsy, whereas before I didn't". 'Having epilepsy' is a way in which the patient differentiates the elements and is thus termed a 'construct'. Where patients had difficulties with this procedure the elements were presented in pairs (dyads) and similarities and differences between the pair of elements discussed. This procedure was repeated until a minimum of ten 'constructs' had been elicited (two for each of the five main areas of physical functioning, cognitive ability, emotional status, social functioning and economic/employment status). Patients were guided during the interview to elicit constructs within these five areas by rephrasing the question asked. Thus, to elicit a construct in the physical domain, they would be asked: "think of a way in which two of these (elements) are similar and different from

the third in terms of their physical abilities". Similarly, to elicit a construct relating to social functioning, the patient would be asked: "think of a way in which two of these (elements) are similar and different from the third in terms of their social life and relationships with family and friends".

(2-9-v-e) QoLASCA: Scoring

Two types of scoring procedure were developed, based on inter-element distances and calculated such that a high score indicates greater dysfunction and subsequently poorer QOL. The aggregate score gives a single index of QOL, and the profile score provides information relating to satisfaction with the five key domains (physical, psychological, social, work and economic). An example of the first stage of the scoring, based on constructs elicited from a number or respondents, is shown below. This is graphically represented in Figure 1.

Scoring: hypothetical example

Domain	Construct	Construct score	Domain score	Total score
Physical:	Head-aches	3		
	Tiredness	2	5	
Psychological:	Anxious	4		
	Feel sad	4	8	
Social/family:	Don't go out anymore	4		
	Children no longer visit us	5	9	
Work:	Had a lot of time off work	4		
	I am not promoted	3	7	
Cognitive:	Memory	5		
	Finding the right word	3	8	
Total:				**37**

(2-9-v-f) QoLASCA: Psychometric Testing

The psychometric properties of the original QoLASCA were tested and it was found to be reliable, valid and sensitive in patients with epilepsy (Kendrick, 1993). Sensitivity to change was tested in two studies. First, in patients with epilepsy, the QoLASCA correlated with other measures in hypothesised ways according to whether patients had experienced positive or negative life-events. Second, sensitivity to change was assessed in a group of patients undergoing surgery for trigeminal neuralgia. Significant differences in QOL post-surgery were seen in those patients who had experienced relief from pain, in all domains of the QoLASCA except work/finances (this finding was expected).

(2-10) Partially fixed and partially individualised techniques

Finally, a compromise, half-way house approach has been taken and some techniques have a partially fixed questionnaire with scope for the respondent to freely choose some of the items. One example is the Chronic Respiratory Disease Questionnaire (Guyatt et al., 1987a; Guyatt et al., 1987b).

This a self-report questionnaire. The first part is "individualised" and the second part of the questionnaire asks 15 standard questions, which are identical for each subject. In the first part the questionnaire begins by eliciting 5 activities in which the patient experiences dyspnoea during day to day activities. The respondent is prompted with the aid of a 26-item list. If more than five items have been listed the interviewer then helps the subject determine the 5 activities which are most important in the subject's day to day life. These items constitute the dyspnoea dimension for that patient for the duration of the study. The respondent is asked to indicate how much shortness of breath they have had in the previous two weeks whilst engaging in each activity. The response options are: 1=extremely short of breath; 2=very short of breath; 3=quite a bit short of breath; 4=moderate shortness of breath; 5=some shortness of breath; 6=a little shortness of breath and 7=not at all short of breath.

Another partially-individualised method is the MACTAR (McMaster-Toronto Arthritis) Patient Function Preference Questionnaire (Tugwell et al., 1990). In a drug trial QOL was measured in two ways: the same, standard measurements in all patients, and individualised measurements selected by the patients at the start of the drug trial as representing the functions they most wanted to have improved by treatment. The traditional QOL questionnaires showed statistically significant but modest improvements. By contrast, the individualised MACTAR Patient Preference Function Questionnaire score improved by 29% over that in the placebo-treated group (making it one of only four measures to exceed 25% improvement) (Tugwell et al., 1990).
In the MACTAR, Patient Function Preference Questionnaire, the interviewer asks each patient to identify activities related to mobility, self-care, work, and social and leisure activity. Patients are then asked to rank these activities in the order in which they would most prefer to have them improved. At the end of the study (18 weeks) or at the time of dropout, all patients were asked if there had been improvement in the ranked disabilities specified by them at the beginning of the study (Tugwell et al., 1990).

(2-11) Individualised techniques: Summary

In response to the widely-acknowledged problem that the fixed, standardised QOL questionnaire misses out items of importance to the patient, and aims at the "wrong target" (Gill, 1995), a number of "individualised", patient-driven techniques have been developed. These all have slightly different methods of elicitation of the items of importance, of weighting and of scoring.

(2-12) Chapter 2: Summary.

This chapter has briefly reviewed the use of the term quality of life, and the narrower concept of health-related quality of life (HRQL). It has been argued that there have been a number of approaches to the measurement of QOL/HRQL along the 'subjective-objective' continuum and that the psychometric approach has been dominant. There are, however, a number of criticisms of the fixed questionnaire, rigorously tested according to psychometric criteria. Assessment techniques at the other end of the

continuum are reviewed, particularly those that are individually tailored to each patient at interview. It is argued that an individual, patient-tailored approach is more suitable for capturing the subjective, idiosyncratic nature of quality of life for the individual patient, and that there is a need for this approach.

Chapter 3

Quality of Life assessment in dementia - a review

(3-1) Introduction

The assessment of QOL in dementia raises a number of complex technical and ethical issues. When this research was started, only one published study had reported data on patient self-report and, in that study, only 6/20 patients completed the full interview (Coen et al., 1993). Throughout the course of this research, a number of other researchers have also started to develop ways to assess QOL in dementia and papers are now in preparation or submitted. This chapter has four aims: to review the methodological issues that need to be addressed in the assessment of QOL in dementia, to review the QOL assessment techniques in development for this patient group, and to review the literature on the QOL of caregivers of patients with dementia. Finally, this chapter ends with a statement of the research proposal.

(3-2) Why assess quality of life in dementia ?

Before considering the most appropriate technique to assess QOL in dementia, it is important to be clear about why we might want to assess QOL in this patient group. With the growing number of older and very old people, dementia is a rapidly growing, worldwide problem. It is estimated that the number of people with dementia in the U.K alone will increase from the present 665,000 to 855,000 by the year 2020 (DoH, 1997). As it is not possible currently to affect the course of this disease, the desired outcome for the older person with dementia is a focus on maintaining the best possible quality of life (DoH, 1997). Although Alzheimer's is predominantly a disease of old age, some patients have symptoms as early as their fourth decade (Rossor, 1993). Patients with young onset dementia have particular problems as their younger family and career are affected.

The assessment of QOL in dementia will become increasingly important since several new drug treatments are under development and drug trials will need to address the measurement of change of symptoms in relation to QOL (Burns, 1995; Kelly et al., 1997). There is likely to be a need for a range of QOL measures for use with patients with dementia, as with other patient groups, for purposes such as: screening and monitoring for psychosocial problems in individual patient care; medical audit; outcome measures in health services or evaluation research; clinical trials and cost-utility analyses (Fitzpatrick et al., 1992). Dementia largely affects older age groups and there are a number of technical and ethical issues pertaining to the assessment of QOL in younger versus older people.

(3-3) QOL in older versus younger people: conceptual issues

Age is an important variable to be considered in QOL assessments since issues of importance for older individuals might be different to those of importance to younger people. On the other hand, some issues may be the same but the relative importance might be different (Stewart et al., 1996). For example,

role-functioning may need to be redefined. There will be differences between those living at home with a certain degree of autonomy and institutionalised populations where important issues might be privacy and self-control (Philp et al., 1989).

(3-4) QOL in older versus younger people: Ethical Issues

The gradual decline in abilities associated with progressive, irreversible dementia raises many ethical issues concerning personhood, the self, and the value of life (Harris, 1988; Post, 1995). Being a "person" is defined by our ability to reason, which affects whether we are held morally responsible for our actions, and, in our legal system, it determines the bestowing or withdrawal of rights. Whilst all patients have a right to health care, in debates about the allocation of scarce resources, the question has arisen whether older people are unfairly discriminated against (Harris, 1988; Smith, 1987). As competition for scarce resources intensifies, attention is being focused on ways to evaluate the most cost-effective use of resources, using a number of methods to describe and value health status. The valuation of health states, however, is not without controversy (Drummond et al., 1997). In a recent study of the measurement of preferences for health states, respondents rated dementia and coma as worse than death (Patrick et al., 1994). Given the important existential, moral and legal ramifications, the development of tools to assess quality of life in patients with dementia must be scrupulously considered.

(3-5) QOL in dementia: conceptual issues

At the outset it is important to be clear about a number of conceptual issues that need to be considered in the measurement of QOL in dementia. Assessment of well-being in any patient is complex, and the process is even more difficult in the patient with a degenerating, dementing condition. The issues can be grouped under seven main headings:

(3-5-i) Cognitive function:

Lezak (1995) postulates four major classes of cognitive functions and it can be seen that self-appraisal of QOL or well-being involves each one of these:

(1) ***receptive functions:*** abilities to select, acquire, classify and integrate information;

(2) ***memory and learning:*** information storage and retrieval;

(3) ***thinking:*** mental organisation and reorganisation of information;

(4) ***expressive functions:*** means through which information is communicated or acted upon.

Whilst many disorders such Alzheimer's disease come under the heading *dementias*, dementia is commonly defined as *global cognitive decline* (Lezak, 1995).

QOL assessment comprises a highly complex procedure of introspection and evaluation, involving several components of cognition including implicit and explicit memory (Barofsky, 1996). As such, it seems clear that at a certain stage of cognitive decline there will come a point where QOL self-assessment will no longer be possible. We know that patients with mild cognitive impairment can appraise their QOL because patients with a variety of neurological disorders, where some intellectual

change occurs, have done so (e.g. Parkinson's disease, MS, epilepsy). Dementia progressively leads to both an impact on QOL and gradual impairment of the patient's ability to introspect. Research has not yet established at what stage of cognitive decline the patient is no longer able to appraise their QOL (Fletcher et al., 1992).

The sequence of changes in cognitive decline and behavioural disturbances varies across dementing conditions. The early stages of Pick's disease, for example, are dominated by personality and behavioural changes with deterioration in social behaviour. Although in the early stages of Pick's disease, cognitive impairment is generally less marked than personality changes and emotional disturbance, impairment of language can be an early feature (Hart & Semple, 1994).

A review of language and dementia, (Hart, 1988) revealed many discrepancies in the literature regarding the language of patients with dementia of the Alzheimer's type (DAT). Two key messages from this review are that, firstly, there is considerable heterogeneity between patients with DAT in terms of symptoms they present and in the rate and manner in which the disease progresses. Secondly, researchers must remember that DAT is a progressive condition and that the nature and extent of language and other cognitive deficits can be expected to change during its course.

Since the self-assessment of quality of life is a complex task involving several components of cognition, the global cognitive decline associated with dementia means that patient self-report will probably only be possible in the early stages of the illness. Research is needed to ascertain until what stage patient self-report is possible.

(3-5-ii) Communication

Language is a fundamental tool of human communication and, since language impairment is an early symptom of all dementing conditions, it is assumed that self-reports of health status, or QOL, are not valid in patients with dementia. Communication encompasses language, memory and personal orientation and, when describing their current well-being, a patient might either be reflecting on their current state or thinking of a past but well-remembered state. Although long neglected, attention is now being turned to the subjective experience of dementia (Kitwood, 1997). Both research and patients' own writings about their illness show that communication is possible in the early stages of the illness (Goldsmith, 1996) and it has been suggested that studies are needed to determine the extent to which self-reports can be accurately obtained directly from persons at different stages of dementia (Stewart et al., 1996).

(3-5-iii) Subjective versus objective viewpoint

Although QOL research places emphasis on the subjective view because, after all, "the patient knows best", it is argued that both subjective and objective views are important in dementia. In this case, quality of life "is the evaluation, by both subjective and social - normative criteria, of the behavioural and environmental situation of the person". Limiting QOL to subjective considerations is "only half the picture" (Lawton, 1994; Lawton, 1997).

(3-5-iv) Denial/loss of insight

The term insight refers to a complex phenomenon which is difficult to define (Markova & Berrios, 1992; Raven et al., 1992) encompassing concepts such as self-knowledge and self-awareness. Loss of insight has been thought to be part of the general cognitive collapse in dementia (Markova & Berrios, 1992). In a recent study of patients with Alzheimer's disease, a distinction was drawn between denial/unawareness and loss of insight (Weinstein et al., 1994). The conclusion of this study was that denial/unawareness of impairment in Alzheimer's disease is not explicable on the basis of the severity of the dementia. Marked denial was encountered in patients with Mini Mental Status Examination scores in the mid-20s, and awareness of disability was expressed by patients with scores as low as 7. Strong associations have been found between awareness of memory deficit and disturbed mood, particularly depression and irritability, in patients with Alzheimer's disease (Seltzer et al., 1995). Depression is a common co-morbidity of dementia (Eastwood & Reisberg, 1996) and mood disturbances may have an important impact on QOL. A study of life events in patients with senile dementia found that threatening life events are associated with depressive symptoms (Orrell & Bebbington, 1995) and the authors concluded that dementia sufferers are responsive to stress in the same way as cognitively intact individuals. On the other hand, patients with dementia under-report depressive symptoms (Ott & Fogel, 1992; Perel, 1998). There is likely to be a complex relationship between QOL, insight/awareness and mood throughout the course of the dementing illness.

(3-5-v) Anosognosia

Patients with dementia may be unaware of their deficit; they may have anosognosia (Rossor, 1993). At interview the patient will often describe himself as "well" and even on probing will admit to no problems. In the early stages carers, especially spouses, are often increasingly helping the patient, subtly assisting in daily activities, perhaps silently correcting small errors and otherwise shielding the patient so that the patient's claims that all is well are, indeed, justified.

(3-5-vi) Neuropsychiatric symptoms

Neuropsychiatric disturbances are common manifestations of dementing disorders (Cummings et al, 1994). Patients with Alzheimer's disease experience delusions, agitation, anxiety and personality changes, and neuropsychiatric disorders may be the presenting manifestations of the disease (Cummings & Trimble, 1995). The behavioural characteristics of frontotemporal dementia include disinhibition, impulsivity and loss of personal and social awareness (Neary and Snowden, 1997). At present, the patterns of behavioural changes related to various neuropathologies and the relationship between neuropsychiatric changes and the patterns of cognitive and functional decline are undocumented (Mega et al., 1996) although some interesting findings are coming to light. For instance, one recent study found no relationship between dysphoria and apathy indicating that the two are dissociable and should not be used interchangeably when attempting to identify mood changes in AD patients (Mega et al., 1996). Again, the relationship of neuropsychiatric symptoms to both patients' QOL and the QOL of their main carer is likely to be complex.

(3-5-vii) Stages of dementia

Any appraisal of QOL in dementia must take account of the different stages of dementia, the degree of insight, and variation in aspects of neuropsychological decline. The challenge is how to devise instrument(s) for a range of decrements and what to put in that range. Also, different patients and their families will hold values that differ. Another problem will be how to compare small improvements later on in the disease with small differences early on which might not be very noticeable or beneficial. Finally, account will need to be taken of whether the patient can function independently, of whether they can live alone, and of comorbidity.

(3-6) Definition of Quality of Life (QOL) in dementia

Although there is general consensus that the definition of "Quality of life" (QOL) in the clinical context, or "Health Related Quality of Life" (HRQOL) is a *multidimensional* construct comprising: Physical, Psychological, and Social well-being, subjectively assessed, various researchers have suggested that this definition needs to be revised for dementia (Lawton, 1994; Jones et al., 1986; Brod & Stewart, 1994; DeLetter et al., 1995). A number of proposed definitional models have been put forward; these are outlined in Appendix 7.

(3-7) Methodological issues

One approach to the assessment of QOL in dementia might be to adapt existing measures but it is important to re-evaluate the psychometric features of existing measures and otherwise assess their appropriateness for use in a different context (Salek et al., 1998). A measure developed for one patient group, or purpose, might not be appropriate for another. A number of additional practical considerations have been outlined in the literature. These are:

(3-7-i) Patients self-ratings: data quality

Patient's self-ratings will be influenced by education, memory and attention difficulties (Stewart et al., 1996). Since self-administration is likely to yield high levels of missing data, it is suggested that the optimal study design would incorporate the use of multiple methods of data-collection. When choosing measures, account needs to be taken of patient heterogeneity; the various stages at which patients with AD may present; the variable symptoms within stages and the varied levels of intelligence, opportunities and life experiences. Also, potential floor and ceiling effects can hamper detection of change. It is important to remember that there is increased complexity of health problems faced by older persons when they are ill; there is a pattern of declining average health but increasing variability (Stewart et al., 1996).

It is recommended that attention be paid to the format of questionnaires with an emphasis on simple language, a number of choices for answers and large font sizes as many patients will have visual problems. Short interviews are recommended for patients with dementia since patients tire easily. Finally, although QOL interviews are often conducted over the telephone, it is recommended that, in

this group, face-to-face interviews be used exclusively to facilitate patients' motivation and attention to the task (Stewart et al., 1996).

(3-7-ii) Proxy reports

Whilst it is generally acknowledged that, in the later stages of dementia, proxy measures are required since patients are no longer capable of making an evaluation (Stewart et al., 1996), it has also been suggested that patients in the early stages are likely to give overly optimistic ratings of their own functional capacities (Lawton, 1994).

Proxy reports have been reviewed (Magaziner, 1997; Zimmerman & Magaziner , 1994). Studies of proxy-derived data suggest that: (i) the more objective the question and the more concrete the item in question, the closer the proxy's response will be to the subject's; (ii) proxies are poorer reporters for conditions and symptoms that are private and not easily observed; (iii) findings regarding proxy-subject agreement for ratings of affective status are inconsistent.

Perhaps the most consistent findings across studies are that greater agreement is obtained for objective items that ask about discrete, observable aspects of functioning such as mobility, and that proxies tend to over-rate disability, compared to patients' own reports. One unavoidable problem with proxy measures is that the data are coloured by the opinion, and biases, of another person. Since there are a number of imperfections surrounding the use of proxies, it has been suggested that researchers should carefully document their use of proxies and the potential error their use introduces to specific studies (Magaziner, 1997).

Performance-based measures usually have excellent reliability and validity but standardised tasks may not reflect the demands experienced in the natural environment (Zimmerman & Magaziner, 1994).

(3-7-iii) Observational methods

Given the problems of self-report, and the potential bias of proxy reports, another proposed method is the assessment of behaviour together with the affect that accompanies the behaviour. In assessing affect, it is argued that we must pay more attention to positive states of mind rather than focusing on anxiety and depression, (Lawton, 1994). Observational methods have varied from study to study. Those studies assessing the quality of institutional care for elderly people with dementia have been reviewed (Brooker, 1995).

(3-8) Methodological recommendations

The measurement of QOL in dementia is fraught with pitfalls. One general recommendation is that measurement should use disease-specific measures which (i) take account of staging i.e. measures which discriminate between patterns of symptoms based on the stage of the disease and (ii) use an individualised outcome. In other words, the base-line and change in each individual patient should be monitored and account taken of the views and values of each patient and their family (Rockwood & Wilcock, 1996).

It is further recommended that instruments that measure QOL in dementia should: (i) be scaled similarly for all individuals; (ii) use proxy ratings of externally observable behaviours and expressions, and (iii) be specific for dementia (Rabins & Kasper, 1997).
Yet another group has looked at the definition and outcomes in end-stage dementia. The authors propose 13 domains to assess the quality of care and argue for the importance of measures of satisfaction, for both patients and their carers, at this stage of the illness (Teno et al., 1997).

(3-9) Review of current QOL instruments in dementia

The development of instruments and the choice of a tool will depend on the goal of the study. A number of QOL assessment techniques are in development and full testing of their psychometric properties is ongoing.

(3-9-i) The Schedule for the Evaluation of Individual Quality of Life (SEIQOL)

Patients with dementia were asked to rate their own QOL using the individualised measure, the SEIQOL. With this approach, devised from a technique known as judgement analysis, patients rate their level of functioning in five self-nominated facets of life and then indicate the relative weight or importance they attach to each. As discussed in chapter 2 of this thesis, the procedure is complex, however, and in this study only 6 of the 20 patients completed the full assessment (Coen et al., 1993). Although the SEIQOL has been validated in a number of patient groups, the results of this study suggest that it may only be of use in patients with very mild dementia.

(3-9-ii) The Quality of life-AD (QOL-AD)

The Quality of Life-AD (QOL-AD) obtains a rating of the patient's QOL from both the patient and the caregiver (Logsdon, 1996). The scale is based on a literature review on quality of life in older adults and on the assessment of QOL in other chronically ill populations. It has 13 items covering the domains of physical health, energy, mood, living situation, memory, family, marriage, friends, chores, fun, money, self and life as a whole. Each of the domain items are rated as poor, fair, good or excellent. The briefness of the scale, and its self-report format incorporating both patient and caregiver ratings makes it attractive for use in clinical trials. Early validation studies suggest it is a reliable and valid instrument.

(3-9-iii) Dementia QOL (DQOL)

This recently developed instrument has been designed for direct respondent assessment in cognitively impaired populations (Brod et al., 1996). The DQOL was originally a 96-item interview including domains of physical functioning, daily activities, discretionary activities, mobility, social well-being, interaction capacity, bodily well-being, psychological well-being, sense of aesthetics, and overall global quality of life. Some domains were deleted and a 56-item version was reported to take approximately 15 to 20 minutes to complete. After further refinement, the current DQOL has 5 domains : self-esteem;

positive affect/humour; negative affect; feelings of belonging and sense of aesthetics, with a total of 29 items. Psychometric testing showed this to be a reliable and valid instrument (Brod et al., 1999).

(3-9-iv) The Community Dementia QOL Profile (CDQLP)

This is a disease-specific, self-administered instrument which consists of 2 sections. Part I is a measure of the patient's quality of life assessed by their carer as a proxy and part II is a measure of the carer's own QOL and stress (Salek et al., 1996). This is a 33-item instrument with 4 dimensions including thinking and behaviour, family and social life, physical activities and other aspects of daily living. Construct validation has been performed by looking at correlation with the MMSE. Full testing of the psychometric properties of the scale is ongoing.

(3-9-v) The ADRQL (Alzheimer's Disease-Related Quality of Life) Instrument

The ADRQL (Alzheimer's Disease-Related Quality of Life) is a multidimensional, disease-specific, health-related QOL instrument, developed for use in evaluations of treatment interventions in Alzheimer's disease (Rabins et al., in press). It has five domains: Social Interaction; Awareness of Self; Feelings and Mood; Enjoyment of Activities and Response to Surroundings. The instrument is proxy-rated. Caregivers and health care professionals were involved in the process of identifying the domains and selecting the items. A draft instrument was reviewed by an expert panel and then presented to a focus group of family caregivers of persons with AD, which resulted in minor modifications. Item scoring is being developed using a preference-based weighting approach which will allow the calculation of both a single and subscale HRQL scores. Preliminary results show that the instrument has acceptable internal consistency, and construct validation has been performed by looking at correlation with the MMSE and other instruments. Full psychometric testing of both the instruments and of the weights are in progress

(3-9-vi) Blau QOL Scale

The Blau QOL scale, based on a "social indicators" approach, assesses QOL in ten domains relating to working, leisure, eating, sleeping, social contact, earning, parenting, loving, environment and self-acceptance (Blau, 1977). It is completed by the patient or, in the institutional setting, by a proxy. The items emerged from interviews with patients in individual and group psychotherapy. The instrument is not specific to dementia and extends beyond ADL to social relationships and subjective states. A subset of seven of these items were rated by the patient in a clinical trial of donepezil (Rogers et al., 1998). The domains chosen covered relationships, eating and sleeping, and social and leisure activity. There is no evidence, however, that this generic scale was previously validated for use in dementia and the method of scoring, using a visual analogue scale, might be a problem for some patients with dementia.

(3-9-vii) The York Scale

In a study looking at long-term psychiatric patients in the community, including 100 patients with senile dementia (Jones et al., 1986), QOL was assessed using a scale devised for the study based on Maslow's

hierarchy of needs (see Appendix 7). The authors reported that the scale required further development. In this study few patients were capable of answering questions and most of the information came from proxies, although often even professional staff were uncertain in their replies.

(3-9-viii) Cognitively Impaired Life Quality Scale (CILQ)

Based on a series of focus groups with nursing staff, an instrument to measure the QOL of profoundly impaired patients through nursing caregivers' eyes was developed (DeLetter et al., 1995). A 29-item version of the Cognitively Impaired Life Quality Scale (CILQ) scale and a shortened, 14-item version of the scale are being developed. The 14-item version for clinical use has 5 categories comprising social interaction, basic physical care, appearance to others, nutrition/hydration and pain/comfort. Full psychometric testing is ongoing.

(3-9-ix) Byrne-MacLean QOL index

This is a 56 item scale reflecting 6 categories of concern identified by residents of nursing homes including "niceness" (patient perception of staff), worry, care and comfort, choice, physical environment and social needs (Byrne & Maclean, 1997). Although the scale developers have described it as a QOL instrument, it perhaps assesses quality of care rather than quality of life.

(3-9-x) Observational Techniques

A number of techniques have been developed based on observational methods where behaviour of patients is rated by researchers or nursing staff usually for discrete periods of 10 or 15 minutes. Events, activities or social interactions are coded according to a specified protocol. These include: The Philadelphia Geriatric Center Affect Rating Scale (Lawton, 1994); the Short Observation Method (Macdonald et al., 1985); the Quality of Interactions Schedule (QUIS) (Dean et al., 1993) and Dementia Care Mapping (Bredin et al., 1995). Two other observational techniques are in development by Beck and Volicer & Hurley (Whitehouse et al., 1998a; Whitehouse 1998b).

(3-9-xi) Other instruments used in dementia

A number of other instruments have been used to assess some aspect of QOL in dementia although they were not specifically designed for this purpose. These have included both generic QOL instruments as yet unvalidated for use in patients with dementia and dementia-specific measures which tap some component of well-being but which might not be technically regarded as a QOL measure (Busschbach et al., 1998; Salek et al., 1998; Walker et al., 1998).

(3-10) Clinical Trials

The International Working Group on Harmonization of Dementia Drug Guidelines recently published a position paper on the harmonisation of dementia drug guidelines (Whitehouse et al., 1997). This paper highlights the importance of quality of life as an outcome measure when considering the future of international drug development for individuals affected by AD and other dementias. The authors also

give warning, however, that the importance of QOL will depend on a clear understanding of the role of patient and caregiver in its assessment, and on answers to a number of as yet unresolved conceptual and methodological issues.

In a recent review paper of QOL measures used in anti-dementia drug trials for Alzheimer's disease, the authors found that of 36 reports, 5 measured and 4 mentioned QOL. The authors conclude that most instruments now used to assess QOL in anti-dementia drug trials have not been adequately validated in patients with Alzheimer's disease (Howard & Rockwood, 1995). Since data generated in clinical trials of a new anti-dementia drug are likely to influence decisions made by regulatory bodies about whether to grant licences to market their products, it is extremely important that the psychometric properties of any QOL instrument used, particularly sensitivity to change, should have been demonstrated (Salek et al., 1998).

(3-11) Global measures

The United States Food and Drug Administration (FDA) in 1990 endorsed the use of global assessments as "the ultimate test of the clinical utility of a drug's anti-dementia effects". The FDA's stance is that licensing of a compound as an anti-dementia drug will require an effect which goes beyond improvement on psychometric tests. Global measures such as the CIBIC have been reviewed (Rockwood & Morris, 1996). A number of problems have been suggested such as that "unspecified" global measures like the CIBIC employ no specific guidelines in their measurement of disease progression and treatment effects. Also, although not formally tested, there is the suggestion that the CIBIC is less sensitive to change than other measures. Global measures provide a means of dealing with the heterogeneity of disease expression in dementia but they need more formal testing.

(3-12) QOL Instruments used in Clinical Trials

QOL was assessed in a clinical trial of donepezil, although the scale used (Blau, 1977), is a generic scale and probably unsuitable for the task. It is therefore not surprising that results were very variable, and no treatment effect could be discerned (Rogers et al., 1998).

The Progressive Deterioration Scale (PDS) (Dejong et al., 1989) was used as a measure of QOL, along with the Instrumental Activities of Daily Living assessment (Lawton et al., 1969) and the Physical Self Maintenance Scale (PSMS) (Lawton et al., 1969) as secondary measures, in clinical trials of tacrine (Davis et al., 1992; Farlow et al., 1992 & Knapp et al., 1994). Although the tacrine group did better on some of the QOL scores it can be questioned whether any of these measures comprehensively assesses QOL, as opposed to activities of daily living.

(3-13) Cost-utility analysis

Costs of care are coming under increasing scrutiny and attention has turned to ways of assessing economic aspects of dementia care. There are a number of methodological complexities in conducting a cost-effectiveness analysis of a drug for patients with Alzheimer's disease (Busschbach et al., 1998).

Cost utility analysis is a technique that uses the Quality Adjusted Life Year (QALY) as an outcome measure. For its calculation, the QALY requires well-being or QOL to be expressed as a single index score. The Quality of Well Being scale (QWB) is a utility-weighted measure of health-related quality of life that can be used in clinical trials and cost-utility analyses. Evidence has recently been reported for the validity of the QWB in patients with Alzheimer's disease (Kerner et al., 1998). The EuroQol EQ-5D has been purposefully designed to generate a cardinal index of health, thus giving it considerable potential for use in economic evaluation (Brooks, 1996). The EQ-5D has been piloted in patients with dementia but further evidence of the validity of the EQ-5D for use in this patient group is required (Selai, 1998b).

(3-14) QOL of caregivers

(3-14-i) QOL of caregivers: approaches

Whilst we have focused on the assessment of QOL in the patient with dementia, the quality of life of those caring for people with dementia is also of great importance. Although the term "quality of life" has rarely been used, researchers from various backgrounds have investigated the sequelae of being a carer of a person with dementia using concepts such as burden, coping, stress, distress, depression and other psychiatric morbidity. When we consider the three domains of physical, psychological and social well-being, taken from the WHO definition of health, and widely acknowledged as the starting point for the operationalisation of the term QOL in the clinical setting (Bowling, 1995), the existing carer research clearly fits into the QOL framework and contributes to our understanding of carers' health-related QOL. Although a large number of studies have shown both positive and negative effects of caregiving (Spackman, 1990; Kaplan, 1996; Gold et al., 1995), the constant, unremitting nature of the stress of caring for a relative with dementia has been called a "36-hour day" because of the seemingly endless responsibilities involved (Mace & Rabins, 1981). This literature shows that caring for a patient with dementia has a profound effect on many aspects of quality of life (Ballard et al., 1995; Brodaty, 1995).

Two studies have assessed all three components of physical, psychological and social well-being. In a study to assess the psychological, social and health consequences of caring for a relative with senile dementia, a group of carers was compared to a group of matched controls using a number of questionnaires (Haley et al., 1987). Caregivers reported significantly higher levels of depression and negative effect towards their relatives and lower overall life satisfaction than the control group. Caregivers also had significant impairment of their social activities, including visits with friends, vacations, and church attendance. Caregivers expressed less satisfaction with their social networks than did controls, they reported poorer health, more prescription medication use, and higher utilization of health care.

In a study comparing psychological and physical morbidity in carers of elderly people with dementia and those with depression, (Wijeratne & Lovestone, 1996), the mean GHQ-28 score of the dementia carers was significantly higher than that of the carers of elderly people with depression. Behavioural

difficulties in the patient, a poor premorbid relationship with the patient and dissatisfaction with their social contacts were associated with a significant GHQ-28 score (over 4) in carers. However, the two groups of carers reported comparable levels of physical health.

(3-14-ii) Health

Studies have consistently shown that caring for a person with dementia leads to a wide range of negative health outcomes. Somatic symptoms including exhaustion, aching limbs and heart and stomach complaints were found to be in greater prevalence among dementia carers than those caring for the elderly (Grassel, 1998). Studies have shown that caring has a negative influence on the following health behaviours of spousal carers: exercise, sleep patterns, weight maintenance, smoking and alcohol consumption (Gallant & Connell, 1998); that caring may lead to an increase in back problems in carers (Spackman, 1991) and that carers have increased stress on the immune system suggesting that the caregiving population may be more vulnerable to infectious disease than a population of a similar age (Vedhara et al., 1999).

Research conducted by the 1985 General Household Survey indicated that about one third of carers had an illness that limited their activities, and of carers who devoted at least 20 hours a week to caring, about half of those aged 45 and over reported a long-standing illness. Another study concluded that there is a greater risk of serious illness among caregivers than controls (Shaw et al., 1997). In other surveys, between a quarter and a half of carers interviewed had health problems of a physical or emotional nature (Levin et al., 1983; Charlesworth et al., 1984; Spackman, 1991).

Studies have shown that carers directly attributed a perceived deterioration in their own health to being a consequence of their caring role. Twenty-two per cent of a sample of carers in Manchester and 50% of carers with health problems in a study of carers in Lothian felt that their health problem had been caused or worsened by their caring role (Charlesworth et al., 1984; Aitken et al., 1988).

(3-14-iii) Psychological

Carers of patients with dementia consistently score highly on measures of psychological distress and psychiatric morbidity. The components measured have included hostility (Anthony-Bergstone et al., 1988) psychosocial health status (LoGiudice et al., 1998) and depression (Ballard et al., 1995). The severity of cognitive impairment was associated with depression in carers who lived with a dementia sufferer and a low level of premorbid marital intimacy was significantly associated with depression amongst carers who were marital partners. In another study of psychological morbidity, patient depression and demanding problem behaviours were independently and significantly associated with caregiver psychological morbidity (Brodaty & Luscombe, 1998).

(3-14-iv) Distress, Stress, Burden and Coping

A number of studies have looked at a cluster of concepts variously described as 'distress', 'stress', 'burden' and 'coping'. Studies have looked at the predictors of burden (a measure of the demands imposed by care giving activities). One study proposes that a measure of 'marital aggrandisement' is the single strongest predictor of burden (O'Rourke & Wenaus, 1998) whilst another (Grafstrom et al., 1994) proposes that it is the gender of the caregiver which is associated with burden. Behavioural disturbances also emerged as a predictive factor of burden in this latter study. Further, analysis of the primary stressors revealed that in the mild phase of dementia, long duration of the disease and decreased activities of daily living capacity cause greater burden for the caregiver.

Physical inactivity (King & Brassington, 1997) and low levels of 'self efficacy' have been proposed as risk factors for physical and psychological burden among family caregivers (Mowat & Spence Laschinger, 1994). Those with high levels of self-efficacy (determined by how each individual subjectively construed the situation) did not suffer from burden. A series of studies has proposed that depression-related behaviours in patients are correlated with caregiver burden and depression in carers (Teri, 1997). One of the findings, for example, was that the rates of caregiver depression were high among those caring for clinically depressed Alzheimer's patients. In another study it was found that all patients with depression had depressed carers.

A stress and coping model was used to study predictors of individual differences in caregiver adaptation (Haley et al., 1987a; Haley et al., 1987b). Appraisal, coping responses, and social support and activities were revealed as significant predictors of caregiver outcome (i.e. depression, self rated health), even when severity of caregiving stressors was statistically controlled. In another study, three stress related symptoms have been identified in family caregivers: social isolation, depressive disorders, and physical complaints (Adler et al., 1996a).

Behavioural disorders in dementia patients and their impact on caregiver stress were investigated (Savorani et al., 1998). Carers of patients with Alzheimer's ranked the most stressing behavioural disturbances in the demented family members as follows: sleeping, delusions, aggressiveness, agitation, and incontinence.

(3-14-v) Coping

Research has investigated whether coping strategies are positively or inversely associated with depression in carers of patients with dementia (Saad et al., 1995). An inverse association was found between the active management strategy and depression among caregivers. A relationship between the type of coping strategy used by caregivers and depression was also found. The authors do, however,

recommend that longitudinal studies of coping strategies of caregivers need to be done to establish cause and effect.

(3-14-vi) Behaviour or cognition

Research to assess whether patients' behaviour or their cognitions affect caregiver burden has shown that it is the behaviour, not the cognitions of the patient that cause the distress in the carer (Bedard et al., 1997; Chappell & Penning, 1996).

(3-14-vii) Individual differences in carers

Research has looked at caregiver well-being in relation to personality traits (Hooker & Frazier, 1994; Hooker et al., 1998) and a number of other variables. Studies have shown that finding "meaning" in caregiving, i.e. positive beliefs about the caregiving situation, is associated with carer well-being (Noonan & Tennstedt, 1997) as is having a high score on a measure of "mastery" and a low score on "neuroticism" (Bookwala & Schulz, 1998; Reis et al., 1994).

(3-14-viii) Ethnicity

Studies of ethnicity have shown cultural differences in both emotional and physical reactions to caregiver stress (Knight & McCallum, 1998). A study comparing the psychological, social and health variables of white and black dementia family caregivers and noncargivers found differences between the groups with race, and not care giving, being associated with physical health variables (Haley et al., 1995).

(3-14-ix) Gender

Whilst a number of studies have found gender differences in style of coping (Adler et al., 1996a; Adler et al., 1996b), with females experiencing more emotional distress and morbidity than men (Collins & Jones, 1997; Barusch & Spaid, 1989), others have found no gender differences (Ford et al., 1997).

(3-14-x) Life events and appraisals

Other studies have looked at life events and positive and negative appraisals (Reed et al., 1990), unmet needs of carers (Philp et al., 1995), and carers' perception of health and social support (Robinson & Austin, 1998).

(3-14-xi) Measures of Caregiver burden

There are different definitions of the term burden (Antonucci et al., 1997; Duijnstee, 1992a; Duijnstee, 1992b) and a number of measures of burden have been developed including the Zarit Burden Scale (Zarit et al., 1980; Antonucci et al., 1997); the Screen for Caregiver Burden (Vitaliano et al., 1991); the Caregiver Burden Inventory (CBI) (Guest, 1986; Caserta et al., 1996); the Caregiver Appraisal Measure (Lawton et al., 1989) and the Family Assessment Inventory (Rankin et al., 1992). Models of caregiving

(Lawton et al., 1991; Siriopoulos et al., 1999) and familial life quality (Quayhagen & Quayhagen, 1996) have also been developed.

(3-14-xii) Individualised approaches to Carer QOL

Finally, one study reported the use of an individualised technique to evaluate the impact of a dementia Carer Education Programme on carer quality of life, burden and well-being (Coen et al., 1999). QOL was assessed using the Schedule for the Evaluation of Individual Quality of Life-Direct Weighting, SEIQOL-DW (O'Boyle et al., 1996). In this study, the programme increased carers' knowledge about dementia, but had no significant impact on QOL, burden or well-being. The only results reported were pre- and post-programme differences on all measures (results of t-tests). It is diffucult to appraise the use of this individualised measure in this context since neither qualitative nor quantitative QOL data were reported and, moreover, there is no evidence that this technique was previously validated for use in dementia carers.

(3-14-xiii) Summary of carer QOL literature

In summary, whilst a number of studies have looked at the physical and psychological sequelae of being a carer of a patient with dementia, working with headings such as burden and distress, few have attempted comprehensively to address quality of life.

(3-15) Summary of chapter 3

Attention has recently turned to the subjective experience of dementia and to how we might conceptualise and assess QOL in a person with a dementing illness. This chapter has presented a summary of the theoretical issues and an overview of the current literature. Assessment of QOL in dementia raises a number of challenging methodological problems. Whilst at the outset of this research, only one published study had looked at patient-self-report, a number of studies are now underway. Finally, being a carer of a patient with dementia is associated with high levels of psychiatric morbidity and, although the term QOL has rarely been used, studies have addressed many aspects of well-being and components of physical, psychological and social well-being which are subsumed under the concept of health-related quality of life. It is clear from the literature that caring for a person with dementia has a profound affect of QOL.

(3-16) Statement of research proposal

Since the published research on patient-rated QOL of patients with dementia was almost non-existent at the start of this thesis, the primary aim of the current research was to develop a method for the assessment of QOL in dementia, simple enough for patient self-completion. It was decided that, with the current dearth of data, an "individualised" technique would be most appropriate, having the potential to yield both qualitative and quantitative data, with the emphasis on validity. A secondary aim was to ascertain at which point, due to cognitive impairment, the patient would no longer be able to report on

their own QOL. It was decided that the patient's main carer would also be interviewed, both about the patient's QOL and about their (i.e. the carer's) own QOL. The technique developed would be administered in another patient group, besides dementia, and the group chosen was epilepsy, a patient-group where QOL measures have become established and where one of these established QOL measures could be administered alongside the technique in development to assess its psychometric properties. In the dementia study, a number of other measures of well-being would be administered simultaneously to assess the psychometric properties of the method and appropriateness for use in dementia. Finally, longitudinal data would be collected in order to look at change over time.

Chapter 4

The simplification and refinement of the Quality of Life Assessment Schedule by Construct Analysis (QoLASCA) and further development for use in patients with dementia

(4-1) Introduction

Given the paucity of published data on QOLin dementia, and given the desirability of exploring the extent to which the patient with dementia can report on their own QOL, it was decided to develop an "individualised", patient-driven technique. A number of "individualised" techniques, which vary somewhat in their methods and scoring, have been described in Chapter 2. The technique we chose to develop was the Quality of Life Assessment by Construct Analysis (QoLASCA) (McGuire, 1991; Kendrick & Trimble, 1994; Kendrick, 1993; Kendrick, A, 1997). This chapter outlines the ways in which this technique was refined and tested in patients with epilepsy. After pilot testing in patients with dementia, the technique was further refined and simplified for that patient group.

(4-2) From QoLASCA to QOLAS: refinement and simplification of the technique

The initial development of the QoLASCA based on RGT has been described in chapter 2. Since various aspects of the interview and the scoring were complex, it was deemed desirable to simplify the technique. The simplification was done in two stages. The initial development of the streamlined method was done in patients with epilepsy and then this revised technique was piloted in patients with dementia. As a result of this pilot work, the method was further refined for use in patients with dementia. The refined technique has been labelled the Quality of Life Assessment Schedule (QOLAS).

(4-2-i) Initial refinement and streamlining: construct elicitation

In the original QoLASCA, the constructs were elicited by a fairly cumbersome technique known as "triadic presentation". During the interview, the elements were presented in groups of 3 (triads) and the patients were asked: "think of a way in which two of these are alike and different from the third in terms of their quality of life". One of the first stages of the streamlining was to dispense with this and to simply ask patients: "I would like you to tell me what is important to you for your quality of life. In particular, what are the ways in which having epilepsy has interfered with your quality of life".
A small study was conducted where 50 patients with epilepsy were asked to supply constructs in this manner. The results were compared with the constructs elicited by the original technique (Kendrick, 1993). The results showed that similar items were being elicited, with the most frequently mentioned items being offered by strikingly similar percentages of respondents. These data were taken as evidence that the simpler construct elicitation method could replace the more complex technique. It is perhaps not surprising that the two methods should yield similar results in the context of patients with chronic illness.

In all his definitions, Kelly retains the essential notion that constructs are bipolar (Fransella & Bannister, 1977). We do not always, or even very often, specify our contrast pole but Kelly's argument is that we make sense out of our world by simultaneously noting likenesses and differences. In the interviews with patients with epilepsy, their narratives were peppered with comparisons to "the other", the person without epilepsy, be it friend or relative, or the person they would like to become when (if) their seizures were controlled (drugs) or removed altogether (surgery).

Arthur Kleinman makes the point in his influential book "The Illness Narratives" (Kleinman, 1988) that, to understand how symptoms and illnesses have meaning...we first must understand normative conceptions of the body in relation to the self and world".

In discussing their health-related QOL, these constructs and this way of construing the world were articulated by patients with epilepsy without a complex interview procedure.

(4-2-ii) Initial streamlining: Elements

As described in Chapter 2, in the original QoLASCA, a total of 10 "elements" and then, from these, a subset of 7 elements considered appropriate to the assessment of QOL were chosen. We experimented with various subsets of elements and eventually chose to retain only the elements "as you are now" (NOW) and "as you would like to be" (LIKE). The method therefore retained one of the original theoretical underpinnings, i.e. that QOL is a function of the discrepancy between expectation and reality, often known in the medical literature as "Calman's Gap" (Calman, 1984).

(4-2-iii) Initial streamlining: Scoring

The original two types of scoring procedures, based on inter-element distances were complex. Again, it was deemed desirable to streamline this aspect. The scoring at this stage of streamlining, and as used in the epilepsy studies is as follows:

(i) For each construct, the "like" score is subtracted from the "now", giving a score for the distance between expectation and reality.

(ii) The scores, calculated in (i) above, for the two constructs per domain are summed to give a domain score out of ten. The total for each of the five domains is summed to give an overall QOLAS score out of fifty.

(4-3) Refined interview as used with patients with epilepsy

At the end of the initial streamlining, the revised QOLAS interview, as used in the epilepsy studies is as follows:

(1) Introduction and rapport-building.

(2) The respondent is invited to recount what is important for his/her QOL and ways in which their currrent health condition is affecting their QOL. Key constructs are extracted from this narrative. Prompting is sometimes required.

(3) In total, ten "constructs" are elicited, two for each of the following domains of QOL: physical, psychological, social, daily activities and cognitive functioning (or well-being).

(4) The patient is asked to rate how much of a problem each of these is now on a 0-5 scale where 0=no problem; 1=very slight problem; 2=mild problem; 3=moderate problem; 4=big problem and 5=it could not be worse.
(5) The patient is asked to rate how much of a problem they would "like" each of these to be ideally on a 0-5 scale as above.
(6) At follow-up interview, the respondent's individual constructs are read out to them and they are invited to re-rate each on the 0-5 scale for how much of a problem there is with each "now".

(4-4) Further streamlining of QOLAS for use in dementia

Since it was not clear whether the technique, after inital revision, as described above, would be understood by patients with dementia, an initial pilot study was carried out to assess feasibility.

(4-4-i) Using the QOLAS in dementia: pilot study

We recruited ten patient-carer dyads into a small pilot-study to test the feasibility of using the first-stage revised QOLAS used in the epilepsy studies (outlined above). The patients all had mild-to-moderate dementia. The patients and carers were all able to understand the basic interview and to respond. As with the epilepsy patients, the dementia patients sometimes needed prompting. The scoring options for each construct (0-5) needed to be repeated and the patients tended to use the descriptive word answer (e.g. "slight problem" or "big problem") rather than answer with a number from 0-5. Two particular problems emerged from the pilot interviews and these resulted in two further refinements being made. First, although the element "NOW" was understood by the patients, who could all rate themselves "now", the element "LIKE" i.e. "how you would like to be" raised a number of questions and so this was dropped from the interview. In the epilepsy interviews, the score for "LIKE" was nearly always "0", i.e."no problems" and so this resulted in the dementia scoring being, in fact, virtually the same as that for the epilepsy patients.
Second, although the original 5 domains from the QoLASCA were kept for the revised QOLAS, as used in patients with epilepsy, it became clear that the question about "Work/economic" functioning was not appropriate for patients with dementia, nor was it relevant to many of the carers . Most of the patients interviewed had been obliged to give up work and take medical retirement some time prior to the interview. Many of the carers had given up work or had never worked. This question was therefore ambiguous and most patients and their carers wanted to answer "not applicable". The interviews yielded much qualitative data and, based on their comments, it became clear that this question would best be substituted by a question concerning whatever the patient or carer did during the day-time e.g. gardening, going for a walk or household duties. The domain "Work/economic" was therefore substituted by a domain headed "daily activities".

(4-4-ii) Refined interview as used with patients with dementia and their carers

After piloting the QOLAS in dementia, further modifications were made and the technique is as follows:

(1) Introduction and rapport-building

(2) The respondent is invited to recount what is important for his/her QOL and ways in which their currrent health condition is affecting their QOL. Key constructs are extracted from this narrative. Prompting is sometimes required.

(3) In total, ten "constructs" are elicited, two for each of the following domains of QOL: physical, psychological, social, daily activities and cognitive functioning (or well-being).

(4) The patient is asked to rate how much of a problem each of these is now on a 0-5 scale where 0=no problem; 1=very slight problem; 2=mild problem; 3=moderate problem; 4=big problem and 5=it could not be worse.

(5) At follow-up interview, the respondent's individual constructs are read out to them and they are invited to re-rate each on the 0-5 scale for how much of a problem there is with each "now".

(4-4-iii) QOLAS as used in dementia: scoring

The scores for the two constructs per domain are summed to give a domain score out of ten. The total for each of the five domains is summed to give an overall QOLAS score out of fifty.

(4-5) Summary of chapter 4

The original QoLASCA, based on Repertory Grid Technique, was lengthy and cumbersome, and it was deemed desirable to streamline the method. The streamlined technique, the QOLAS, was tested on patients with epilepsy and, after piloting this in patients with dementia, two further refinements were necessary. Patients with dementia only rate themselves "now" and one of the 5 domains ("Work/economic") was found to be not relevant for patients with dementia and their carers. After review of the qualitative data, this domain was changed to "Daily activities".

Chapter 5

Testing of Psychometric Properties of the QOLAS

Epilepsy study 1: Surgery

(5-1) Introduction

This chapter and the next describe two studies designed to test the psychometric testing of the revised QOLAS. In fully testing the psychometric properties of the modified QOLAS, it was considered important to do the validation work in a non-dementia group for comparison. Since the original QoLASCA had been developed for use in patients with epilepsy, the refinement and streamlining of the method was also tested in patients with epilepsy. This chapter reports the psychometric testing in a prospective, follow-up study to monitor the outcome of a group of patients being worked up for epilepsy surgery and in two sub-groups of these patients who were followed-up, one group who had gone on to have surgery and one group who did not go on to have surgery. The next chapter describes a second epilepsy study where the psychometric properties of the QOLAS were tested in a group of patients starting on an adjunctive anti-epileptic drug.

(5-2) Surgery study: background

A number of recent studies have assessed Health-Related Quality of Life (HRQL) pre and post definitive surgical treatment for intractable epilepsy. The findings are complex and our current knowledge is limited by a lack of long-term studies, absence of standardised patient populations and paucity of pre- and post-operative comparisons using standardised QOL and seizure assessment instruments (Spencer, 1996). Other unresolved methodological issues include what percentage of seizure reduction is the most appropriate outcome measure. Whilst it has been demonstrated that post-operative seizure freedom is associated with significant improvements in QOL (Hermann et al., 1992; Kim & Kim, 1995; Kellett et al., 1997), a number of other seizure based outcomes have been used and the picture for different degrees of seizure reduction is less clear. Some researchers have chosen a 75% (Bladin et al., 1992; Hermann et al., 1992; Malgrem et al., 1997) and some a 90% reduction in seizures (Rose et al., 1996; McLachlan et al., 1997).

There is no agreed follow-up period for assessing QOL post-surgery. Researchers have chosen periods as diverse as 3 months (Kim & Kim, 1995) 6-8 months (Hermann et al., 1992) 1 year (Rose et al., 1996) 2 years (McLachan et al, 1997) and 4 years (Malmgren et al., 1997).

Also, a number of QOL measures have been used and this diversity of instruments makes intra-study comparisons difficult. QOL measures used have included the ESI-55 (Rose et al., 1996; Vickrey et al., 1995a; McLachlan et al., 1997) the SF-36 (Malmgren et al., 1997) QOLIE-89 (Kim & Kim, 1995) the Liverpool battery (Kellett et al., 1997) the WPSI and the GHQ (Hermann et al., 1992).

Although a number of epilepsy-specific measures are now available, (Hays, 1995; Cramer, 1996), recent papers have raised the question of the sensitivity and the face validity of the instruments (Gilliam et al., 1997; Leidy et al., 1998). It is argued that more data are needed on the instruments' sensitivity to change and that many of the more established measures do not tap issues of concern to patients such as driving, independence and pregnancy/birth defects. The author of another study concluded that in future research into the quality of life of people with epilepsy it would be profitable to examine people's ***perceptions*** of their situation as well as their actual circumstances (Collings, 1990). Moreover, existing instruments used in epilepsy yield a profile score which cannot be aggregated into a single, overall score. The single index score, however, is required for cost-utility evaluations (Hays et al., 1996), a research area of growing importance as the costs of health care come under increasing scrutiny (Spilker, 1996). No measure of HRQL has emerged as ideal for QOL surgery and further psychometric testing of all currently available instruments is needed.

Given the issues of the validity and the responsiveness of QOL scales in epilepsy, we assessed the HRQL of patients pre and post epilepsy surgery using (i) the revised QOLAS, (ii) the ESI-55 (Vickrey, 1992), an established measure for use in epilepsy surgery and (iii) the EQ-5D (EuroQOL Group, 1990; Brooks, 1996), a measure specifically designed to yield a single, overall score for use in economic analyses. The study has two aims: to assess QOL pre- and post surgery and to specifically test the psychometric properties, i.e. validity, reliability and sensitivity to change, of the QOLAS.

(5-3) Subjects and methods:

A total of 145 patients undergoing evaluation for definitive treatment for intractable epilepsy were interviewed during their stay on the telemetry unit of the National Hospital, Queen Square. Quality of life was assessed using the revised version of the Quality of Life Assessment Schedule (QOLAS), the EQ-5D and the Epilepsy Surgery Inventory (ESI-55).

The ESI-55 (Vickrey et al., 1992)

The ESI-55 consists of the generic SF-36 plus a number of epilepsy-specific questions. The scoring produces eleven subscales (health, energy, QOL, social functioning, emotional functioning, cognitive functioning, role-emotional, role-memory, role-physical, physical function and pain) and three composite scores for physical health, mental health, and role functioning.

The EuroQol EQ-5D (EuroQol Group, 1990; Brooks, 1996)

The EQ-5D is a generic instrument for describing and evaluating health-related quality of life, developed to complement other forms of quality of life measure, and to generate a cardinal index of health, thus giving it considerable potential for use in economic evaluation (EuroQol Group, 1990; Brooks, 1996). It has three components, each providing separate data. In the first part, which yields a simple descriptive profile, the respondent rates his/her own health today on five questions, one for each of the dimensions: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. Each question has three response options: no problems, some problem and extreme problems. This

descriptive classification thus defines 243 possible health states. The respondent next rates their own health, today, on a visual analogue scale, calibrated from 0-100 with the end-points 100 = best imaginable health state and 0 = worst possible health state. Finally, valuations for each of the 243 health states have been obtained and so, according to how the respondent has rated themselves on the descriptive profile, the corresponding utility value can be ascertained.

Data on seizures and expectations of surgery were also collected. Our chosen outcome criterion was 75% or greater reduction in seizures.

A total of 3 patients had surgery but did not achieve a ≥ 75% seizure reduction at follow-up. Although the HRQL of this sub-group is of interest, they were excluded from the analysis due to small sample size.

The psychometric testing of the QOLAS was undertaken as follows. Criterion validity was tested by looking at correlations between the QOLAS and the subscales of the ESI-55 as appropriate. Construct validity was assessed by testing the hypothesis that patients saying that they were experiencing some or extreme problems on the EQ-5D usual activities domain would have a worse QOL as measured by the QOLAS-total score than those who were experiencing no problems with their usual activities. We thus split the patients into two groups: those experiencing a problem and those experiencing no problems. Internal reliability was assessed by correlating the domain scores to the total QOLAS score and by the coefficient alpha. Sensitivity of the QOLAS to change was assessed by looking at its ability to detect changes in QOL/health status after surgical intervention. A follow-up period of 24 hours was chosen for the testing of test-retest reliability.

(5-4) Statistics

The data were analysed by the chi-square statistic, by correlations or paired t-tests, 2-tailed, as appropriate. The QOLAS data, the VAS scores and the ESI-55 scores were normally distributed. The EQ-5D utility data were markedly skewed and so the non-parametric, Wilcoxon Signed Ranks test, was performed.

The statistics used in the testing of the psychometric properties were correlations and independent t-tests, 2-tailed. Criterion validity was tested using correlations and, since the scales most probably do not yield interval data, the non-parametric Spearman's rank correlation was used. Construct validity was tested using an independent t-test. Internal reliability was tested using correlations and the coefficient alpha. The most appropriate statistic to assess test-retest reliability is the Intraclass Correlation Coefficient (ICC) but this was not tested for reasons which will be explained.

(5-5) Results

(5-5-i) Seizure reduction

A subgroup of 40 patients was interviewed at follow-up (mean time to follow-up = 1 year). Of these 40 patients, 15 had not had surgery at follow up interview and 25 were post surgery. Sixteen (64%) of the surgical patients had left temporal lobe resection, four patients (16%) had right temporal lobe resection and 5 (20%) had extra temporal resection. Of the 25 patients who had undergone surgery, 22 had ≥ 75%

reduction in seizures and 3 patients did not. Of the 15 patients who had not gone on to have surgery, no patient achieved a ≥ 75% seizure reduction. These data are summarised in Table 1.

(5-5-ii) QOLAS scores

Tables 2 and 3 summarise the patient outcome data. The constructs elicited for each of the five QOLAS domains are reported in Appendix 8.

We compared the mean total QOLAS scores at baseline and at mean of 12 months follow up for the 2 sub-groups of patients: (1)≥ 75% reduction in seizures (n=22) and (2) no ≥ 75% seizure reduction (n=15). The group whose seizures were reduced by ≥ 75%, showed a statistically significant improvement in QOL (t=5.93, df=21, p=0.0001, 95% CI (9,9;20.5)).

(5-5-iii) EQ-5D profile data

Tables 4 and 5 show descriptive EQ-5D profile data at baseline and at follow-up for the 2 groups. Table 6 compares our EQ-5D data to UK normative data.

(5-5-iv) EQ-5D VAS scores

Most patients queried the VAS. Forty-two percent of patients said they thought that "health" did not include their epilepsy. These patients said that if the VAS was to include epilepsy the score would be up to 70 VAS points lower. Table 2 summarises the EQ VAS scores for the two groups of patients at baseline and follow up. The group whose seizures were reduced by ≥ 75%, showed a statistically significant improvement in QOL/health status (t=-2.6, df=20, p=0.02, 95%CI (-26.0:-2.8)).

(5-5-v) EQ-5D utility scores

Table 3 summarises the EQ-5D utility scores. There was no significant difference between the baseline and follow up scores of the patients whose seizures were reduced by ≥ 75%.

(5-5-vi) ESI-55 composite scores

Table 2 summarises the ESI-55 composite scores. The group whose seizures were reduced by 75% or more at follow up, showed a statistically significant improvement in QOL in comparison to baseline scores, on two of three ESI-55 composite scores: Composite Mental Health (CMH) t=-4.3; df=21, p=0.0001, 95% CI (-18.7;-6.5); Composite Physical Health (CPH) t=-4.4, df=20, p<0.0001, 95% CI (-14.8;-5.3). Although Composite Role Functioning (CRF) scores showed improvement at follow-up, they did not reach statistical significance.

(5-5-vii) Psychometric testing

The sensitivity of the QOLAS to change has been demonstrated above, with the group whose seizures were reduced by ≥ 75% showing a statistically significant improvement in QOL. Other aspects of the psychometric testing were as follows:

(5-5-vii-a) Criterion validity

We tested criterion validity by correlating the QOLAS subscale scores and QOLAS total score with the ESI-55 subscale scores. Some of the ESI-55 data were missing and we had full data sets on n=108

patients. The results are presented in Table 7. The QOLAS subscales correlated with subscales of the ESI-55 measuring similar items, e.g. the QOLAS-physical subscale correlated with the ESI-55 health, QOL and role-physical subscales; the QOLAS-psychological correlated with the ESI-55 QOL, emotional and role-emotional subscales; the QOLAS-social correlated with the ESI-55 social function; the QOLAS-work correlated with the ESI-55 role-memory, role-emotional, health and QOL subscales and the QOLAS-cognitive correlated with the ESI-55 cognitive and role-memory. The QOLAS-total scale was highly correlated with all of the ESI-55 subscales except pain.

(5-5-vii-b) Construct validity

We tested the hypothesis that patients saying that they were experiencing some or extreme problems on the EQ-5D Usual Activities questions would have a worse QOL as measured by the QOLAS-total score than those who were experiencing no problems with their usual activities. We thus split the patients into two groups: those experiencing a problem and those experiencing no problems. The mean QOLAS-total scores were 35.5 (s.d. 7.1) for those experiencing a problem (n=63) and 31.5 (s.d. 8.2) for those not experiencing a problem (n=80). The means for each group were significantly different, t-value = 3.12, $p = 0.002$.

(5-5-vii-c) Internal reliability

We tested the internal reliability by correlating all of the QOLAS subscale scores with the QOLAS total score. Each score correlated highly significantly with the QOLAS total score (although the cognitive domain did slightly less well than the others), showing the technique is internally reliable. The results are presented in Table 8. The coefficient alpha was .76 and this result is well within the acceptable range.

(5-5-vii-d) Test-retest reliability

One of the problems with assessing test-retest reliability is that, in the follow-up period, genuine changes in QOL/health status may have occurred. With this group of pre-surgical patients, we therefore planned a re-test period of 24 hours. It was found, however, that some patients had experienced seizures, some patients' emotional status had changed and, in general, there were shifts in QOL even after just 24 hours. This finding has been reported (Selai, 1997). Assessment of test-retest reliability was therefore not possible.

(5-6) Chapter 5: Discussion

Our results suggest that an improvement in HRQL can be seen, at one year follow-up, in patients who have undergone epilepsy surgery and who achieved a ≥ 75% seizure reduction. The QOLAS, the EQ-5D VAS and two of the three ESI-55 Composite Scores were sensitive to change as shown by statistically significant changes in scores. The EQ-5D utility scores showed improvement but the changes were not significantly different.

Since the QOLAS is an "individualised" patient-tailored technique, it has optimum face or content validity. In this study, the psychometric testing showed the QOLAS to have good construct and criterion validity, good internal reliability, and good sensitivity to change. We were unable to assess test-retest reliability and we acknowledge the need to assess this measurement property at a future date. Test-

retest reliability can only be assessed when no changes in QOL/health status have occurred during the follow-up period and chronic, intractable epilepsy therefore poses particular problems. Whilst the seizure itself and peri-ictal phenomena can have a profound impact on QOL, patients often report feeling very healthy, fit and well in-between seizures. One solution might be to assess test-retest reliability on patients whose epilepsy has been stabilised in medication but this would still leave the reliability of the method in this group with intractable epilepsy untested.

There is no simple relationship between seizure severity, seizure frequency and the consequences of epilepsy, and there is debate whether a reduction in (but not elimination of) seizures does lead to an improvement in HRQL (Smith et al., 1995). Also, patients about to undergo surgical treatment for epilepsy often have high, and sometimes unrealistic, expectations of significant positive changes post-operatively (Baxendale & Thompson, 1996).

Whilst post-operative seizure freedom is associated with significant improvements in QOL (Hermann et al., 1992; Kim & Kim, 1995; Kellett et al., 1997), a number of other seizure based outcomes have been used and the picture for different degrees of seizure reduction is less clear.

Some researchers have chosen a 75% (Bladin et al., 1992; Hermann et al., 1992; Malgrem et al., 1997) and some a 90% reduction in seizures (Rose et al., 1996; McLachlan et al., 1997).

Vickrey et al. (1995b) devised a four-point seizure classification system: (i) seizure free (ii) auras or 1 seizure only (iii) 2-12 seizures in the last year (iv) more than 12 seizures in the last year. Whilst there is no agreement on the degree of seizure reduction as outcome measure after surgery, we observed a significant improvement in QOL using a $\geq$ 75% reduction in seizure frequency as the outcome criterion.

There is no agreed follow-up period for assessing QOL post-surgery and researchers have chosen periods as diverse as 3 months (Kim & Kim, 1995) 6-8 months (Hermann et al., 1992) 1 year (Rose et al., 1996) 2 years (McLachan et al, 1997) and 4 years (Malmgren et al., 1997). Although it has been suggested that long-term follow up is important because changes in QOL might not be evident until at least 2 years post surgery (McLachan et al, 1997) the amount of change observed will depend upon the responsiveness of the instrument.

The ESI-55 has been used in a number of studies with similar findings to our own. For instance, Rose et al., (1996), also with a follow-up period of one year, found statistically significant improvement in the same two of the three subscales of the ESI-55 i.e. the physical and mental composite scores. A non-significant improvement was seen in the role functioning composite score. This may indicate a lack of comprehensiveness of the scale, and it has already been pointed out (Leidy et al. 1998) that the ESI-55 excludes certain domains important to patients with epilepsy such as social isolation and driving limitations. Another explanation for this finding is that changes in role functioning are not seen until some time after surgery when the patient has had time to adapt to a reduced seizure status.

In the current study the patients reported a significant improvement in HRQL at a mean follow-up of one year on the QOLAS. The QOLAS asks patients to nominate the HRQL topics of concern to them and to rate how much of a problem they are currently experiencing with each. The QOLAS therefore taps each patient's perceived change in their own HRQL and is more a measure of satisfaction rather than an indicator of objectively verifiable changes in status e.g. role/social functioning. An approach

such as that adopted by the QOLAS might be a useful, responsive method of eliciting the patient's subjective view.

This is the first study to report health status using the EQ-5D in patients with epilepsy. The EQ-5D, a generic instrument, might not have basic face validity for particular patient populations, and epilepsy in particular. Comparing our data to the UK norms, our patients did not score significantly worse in any domain except anxiety/depression. This is particularly surprising, given that the EQ-5D asks the patient to rate their health "today" and all of our patients were interviewed in their hospital beds during their stay on the video-telemetry unit. Moreover, numerous studies have shown that seizures and the stigma of epilepsy considerably impair HRQL, and HRQL is certainly poor in patients with intractable epilepsy, who have been referred to a centre of tertiary referral such as Queen Square. The phenomenon of coping/adjustment, resulting in the under-reporting of problems on HRQL instruments by patients with epilepsy, has been previously discussed (Devinsky et al., 1995). The EQ-5D might be more useful for acute rather than chronic illness since it does not capture chronic problems to which the patient has adapted.

A total of 42% of our patients with epilepsy queried the EQ-5D visual analogue scale (VAS). The most common comment was that "health does not include epilepsy". Most of these patients said that, if the VAS was to include epilepsy, the score would be up to 70 points lower. It has previously been reported that patients with epilepsy have difficulties completing visual analogue scales (Fallowfield, 1994). Even though the VAS was sensitive to change in this study, these qualitative data raise questions about the interpretation of the numerical data obtained from the VAS in this patient group. It would appear that the VAS is tapping aspects of QOL not directly related to epilepsy.

(5-7) Chapter 5: summary

We tested the psychometric properties of the QOLAS in a study of patients pre- and post epilepsy surgery. As far as we were able to test the psychometric properties in this study, we found it to have good construct validity, criterion validity, internal validity and sensitivity to change.

We observed significant improvements in HRQL at one year follow-up in patients who had undergone surgery and who acheived $\geq$ 75% seizure reduction on two of the three composite scales of the ESI-55, on the QOLAS and on the EQ-5D VAS. We conclude that the QOLAS is a useful tool for measuring subjectively perceived QOL in this patient group.

Chapter 6

Further psychometric testing of the QOLAS

Epilepsy study 2: patients starting on adjunctive anti-epileptic drugs.

(6-1) Introduction

This chapter and the previous one describe two studies in patients with epilepsy designed to test the psychometric testing of the revised QOLAS. The previous chapter described an epilepsy study where the psychometric properties of the QOLAS were tested in a group of patients being worked up for epilepsy surgery and in a sub-group of these patients who were followed-up. This chapter reports the psychometric testing in a prospective, follow-up study to monitor the outcome of group of patients starting on an adjunctive anti-epileptic drug.

(6-2) Background

Whilst the importance of measuring HRQL in epilepsy is widely acknowledged, trials of anti-epileptic drugs (AEDs) rarely report the clinical benefit experienced by patients (Pellock, 1995) and few trials incorporate HRQL assessments (Cramer, 1996). Although a number of promising new AEDs have recently become available, no drug therapy is without side-effects, and clinicians must continue to balance efficacy and adverse effects whilst considering overall HRQL (Smith et al., 1995). HRQL has been specifically assessed using a number of epilepsy-specific measures as an outcome in lamotrigine (Smith et al., 1993), using the Liverpool battery (Baker et al., 1993); vigabatrin (Dodrill et al., 1993; Dodrill et al., 1995) and tiagabine (Dodrill et al., 1997; Dodrill et al., 1998) using the WPSI (Dodrill et al., 1980), and vigabatrin (Provinciali, 1996), using the Life Satisfaction Index (Wade, 1992).
Although a number of epilepsy-specific measures have been developed and their psychometric properties well-tested, (Cramer 1996; Hays, 1995), recent papers have raised the question of the sensitivity and the face validity of the instruments (Leidy, 1998; Gilliam, 1997). Recent criticisms of these measures have been outlined in chapter 5 of this thesis. No measure of HRQL has emerged as ideal for trials of AED therapy and further psychometric testing (face validity, sensitivity to change) of all currently available instruments is needed.
This study had two aims: first to assess the QOL of patients going onto adjunctive anti-epileptic drug therapy using (i) the QOLAS and (ii) the EuroQol (EuroQOl Group, 1990; Brooks, 1996). The second aim of the study was to further test the psychometric properties of the QOLAS i.e. the validity, reliability and responsiveness to change.
In clinical trials of anti-epileptic drugs (AEDs), the traditional measure of efficacy has been a change in seizure frequency. Those patients who experience a >50% reduction in seizure frequency are described as "responders" whilst all other participants are "non-responders" (Smith et al., 1995).

(6-3) Subjects and methods

Patients attending for a follow-up appointment at the outpatient epilepsy clinics at Queen Square were approached after their medical consultation. The patients recruited were all about to start on one of the five anti-epileptic drugs (vigabatrin, clobazam, lamotrigine, gabapentin and topiramate) as add-on therapy. Those willing to take part, and who gave informed consent, were offered the choice of a telephone interview at home as an alternative to a face-to-face interview and most patients chose this option. The timing of the interviews was: (i) baseline; (ii) 3 months from baseline and (iii) 6 months from baseline. Only the baseline and 6 months follow up data are reported here.

Seizure frequency and seizure severity were assessed using the National Hospital Seizure Severity Scale (O'Donoghue et al., 1996). For each seizure type, points are given for seizure-related phenomena, yielding a score for each seizure type from 1 to 27.

Quality of life was assessed by the QOLAS and the EQ-5D. The EQ-5D has been used in a number of clinical studies, but in only one study in epilepsy. In this study, the EQ-5D VAS was used in a comparison of four preference measures (Stavem, 1998) but data on the HRQL of patients was not presented.

Side effects, adverse events, defined as any epilepsy-related health event requiring urgent medical attention, and the reason for stopping medication were also recorded. The outcome criterion was 50% or greater reduction in seizures. We do not report the relative performance of each individual drug.

(6-4) Psychometric testing of the QOLAS

The psychometric testing of the QOLAS was undertaken as follows. Criterion validity was tested by looking at correlations between the QOLAS and the domains of the EQ-5D as appropriate. Construct validity was assessed by testing the hypothesis that more severe epilepsy (i.e. more frequent and more severe seizures) would be associated with a worse QOL. An overall "Seizure" score was calculated using data collected by the National Hospital Seizure Severity Scale as follows: for each seizure type being experienced by the patient, the score for that type was multiplied for the frequency of that type of seizure. The total (severity x frequency) for each seizure type was summed to give an overall "Seizure" score (we are grateful to Dr. Michael O'Donoghue, the principle scale-developer, with whom we discussed this study-specific calculation). Construct validity was therefore assessed by testing the hypothesis that those patients with a higher overall "Seizure" score would have a worse QOL, i.e. higher QOLAS-total score than those patients with a lower overall "Seizure" score. We arbitrarily chose a cut-off score of 50 points on this composite score and compared the two groups using an independent t-test. Internal reliability was assessed by correlating the domain scores to the total QOLAS score and by the coefficient alpha. Sensitivity of the QOLAS to change was assessed by looking at its ability to detect changes in QOL/health status in cases where the adjunctive anti-epileptic drug resulted in a significant reduction in seizures.

(6-5) Statistics

The data were analysed by the chi-square statistic or paired t-tests, 2-tailed, as appropriate. The QOLAS data were normally distributed, as were the VAS scores (although the latter were slightly skewed). The EQ-5D utility data were markedly skewed and so the non-parametric, Wilcoxon signed ranks test, was performed.

The statistics used in the testing of the psychometric properties were correlations and independent t-tests, 2-tailed. Criterion validity was tested using correlations and, since the three levels of response on the EQ-5D (no problems, some problems, extreme problems) yield ordinal data, the non-parametric Spearman's rank correlation was used. Construct validity was tested using an independent t-test. Internal reliability was tested using correlations and the coefficient alpha.

(6-6) Results

A total of 146 patients who were about to start on one of the following five AEDs were recruited: vigabatrin, clobazam, lamotrigine, gabapentin and topiramate. These included 125 patients on whom complete data for 6 months were collected and 21 patients who failed to attend follow up. The mean age of the patients was 37.2 +/– 11.0. A total of 50 were working or studying (at least part-time) and 65 were not working (in 10 patients unknown).

(6-6-i) Seizures at baseline

Almost half of the patients (49 %) had been experiencing more than one type of seizure in the last month and 8% had experienced more than two seizure types. At baseline, most of our patients were classified as having severe epilepsy (Vickrey, 1995). In the previous year, 115 patients (92%) reported having more than 12 seizures, 6 patients (5%) were having from 2-12 seizures, no patients were seizure free or having only auras. The remaining patients (3%) reported having seizures in their sleep but were unable to report even approximate seizure frequency. The percentage of patients in each outcome group experiencing convulsions at baseline was identical (both 46%).

Of the 125 patients, 15 started on vigabatrin (of which 10 were male), 20 on clobazam (8 male), 26 on lamotrigine (14 male) 17 started on gabapentin (8 male) and 47 on topiramate (28 male). Of the other 21 patients, 3 had started on vigabatrin, 4 on clobazam, 6 on gabapentin, 6 on lamotrigine and 2 on topiramate. Table 9 summarises the status of the patients at the 6 month follow up.

(6-6-ii) Seizure reduction

At 6 months follow-up, 46 pts. (37%) had achieved 50% or greater reduction in seizures (27 male; 19 female). There was no significant difference in age between those patients who achieved 50% seizure reduction (mean age = 36 yrs.) and those who did not (mean age = 38 yrs.).

The constructs elicited for each of the five QOLAS domains are reported in Appendix 9.

Table 10 summarises the quantitative QOLAS and EQ-5D results for this study. The group whose seizures were reduced by >50%, showed significantly lower QOLAS scores i.e. a significant improvement in QOL, at follow-up compared to baseline ($t=6.18$, $p<0.001$).

(6-6-iii) EQ-5D profile scores

Tables 11, 12 and 13 show descriptive EQ-5D data i.e. the frequency of levels/domains ticked by patients describing their own health today. Table 11 shows the baseline data for the whole group (n=125). Table 12 shows baseline descriptive and follow-up data for the group whose seizures were reduced by 50% (n=46). Table 13 shows baseline and follow-up data for the group whose seizures were not reduced by 50% (n=79). At follow-up, there was no significant difference between the two outcome groups. We compared the baseline profile scores in our study to United Kingdom normative data (26) see Table 11.

(6-6-iv) EQ-5D VAS scores

Most patients queried the VAS, and 47% of patients said they thought that "health" did not include their epilepsy. These patients said that if the VAS was to include epilepsy the score would be up to 70 VAS points lower. Table 10 summarises the EQ-VAS scores for the 2 groups of patients at baseline and follow up. The group whose seizures were reduced by >50%, showed significantly higher VAS scores i.e. a significant improvement in QOL/health status, 2-tailed paired t-tests, $t=-2.48$, $p<0.02$.

(6-6-v) EQ-5D utility scores

Table 10 summarises the EQ-utility scores for the 2 groups of patients at baseline and follow-up. The group whose seizures were reduced by >50%, did not show a statistically significant improvement on the health utility score, (Wilcoxon $Z = -0.470$; $p=0.64$).

(6-6-vi) Results: Psychometric testing

Sensitivity to change has been shown above. Other components of the psychometric testing are as follows:

(6-6-vi-1) Criterion validity

This was assessed by looking at the correlations between the domains of the QOLAS and the domains of the EQ-5D. The results are presented in Table 14. The QOLAS and the EQ-5D correlated well across a number of domains tapping similar phenomena. Since the EQ-5D is, arguably, more a measure of health status, it is of interest that the QOLAS-physical domain correlated, albeit weakly, with all domains of the EQ-5D including the EQ-5D VAS. The QOLAS-psychological domain correlated well with the EQ-5D anxiety/depression domain. The QOLAS-social/family did not, however, correlate with what is perhaps the nearest domain, the EQ-5D "usual activities". The QOLAS-social domain only correlated with the EQ-5D VAS. The QOLAS-work/economic domain correlated modestly with the EQ-5D "usual activities" domain. The QOLAS-cognitive domain would appear to have no equivalent on the EQ-5D, but, interestingly, it correlated modestly with the EQ-5D domain "usual activities". Finally, the EQ-5D VAS correlated with all of the QOLAS domains and the largest (highly significant) correlation was the QOLAS-total score with the EQ-5D VAS.

(6-6-vi-2) Construct validity

This was assessed by testing the hypothesis that those patients with a higher overall "Seizure" score would have a worse QOL, i.e. higher QOLAS-total score than those patients with a lower overall "Seizure" score. We arbitrarily chose a cut-off score of 50 points on this composite score and compared the two groups using an independent t-test. The patients with a score of ≥ 50 (n=84) had a mean QOLAS-total score of 34.3 (s.d. 8.9) and the group who scored less than 50 had a mean QOLAS-total score of 29.4 (s.d. 9.2). These means were significantly different, $t=3.01$, $p = 0.003$.

(6-6-vi-3) Internal reliability

This was tested by correlating the QOLAS subscales with the QOLAS-total score and by coefficient alpha. The results are shown in Table 15. Each domain correlated highly significantly with the QOLAS-total score, (although the QOLAS-physical subscale did rather less well than the others), showing the QOLAS to be internally reliable. The coefficient Alpha was 0.77 and this result is well within the accepted range.

(6-7) Chapter 6: Discussion

The results of this study suggest that QOL improves in patients with severe epilepsy on adjunctive treatment who experience a 50% or greater seizure reduction. This is the first study to report the use of the EQ-5D in patients with epilepsy. The QOLAS and the EQ-VAS were sensitive to change but the EQ-5D profile and EQ-5D utility were not responsive. There are 3 main possible explanations for our findings.

(6-7-i) Choice of clinical outcome

There is no simple relationship between seizure severity, seizure frequency and the consequences of epilepsy, however, and there is debate whether a 50% reduction in seizures does lead to an improvement in QOL (Smith et al., 1995). Even if a new agent reduces the seizure frequency by 50%, patients will continue to experience seizures, which may be unpredictable with severe ictal or postictal phenomena (Baker et al., 1995). A 50% reduction in seizures might not greatly affect social or psychological well-being. Stigma is an important problem for many patients, yet a reduction in seizures might not have much effect on social life or leisure pursuits. Inability to drive is frequently mentioned yet a 50% reduction in seizures would not alter a patient's ability to drive. It has been suggested that the ultimate goal of new anti-epileptic drugs, therefore, should be seizure freedom (Walker & Sander, 1996).

(6-7-ii) Expected changes in AED trial

The typical clinical trial of an AED is usually brief and so large changes in QOL end-points should not be expected (Cramer, 1996). Should HRQOL items of greatest concern to patients be included, or only

those that are likely to improve after therapy..? Since bias can occur in HRQL assessments with the careful selection of instruments which will produce a favourable result, it has been suggested that all domains of QOL should be assessed, as well as multiple components of each domain (Spilker, 1996). In summary, the chosen instrument needs to assess QOL comprehensively and to be responsive to small changes in QOL in all domains.

(6-7-iii) Ability of QOLAS and EQ-5D to detect change in QOL

The QOLAS asks patients to nominate the HRQL topics of concern to them. They are able to both choose the items and, importantly, discuss them in their own language or idiom. The QOLAS is therefore able to pick up the patient's perceived change in QOL rather then objectively verifiable changes in status e.g. role/social functioning. Since this technique asks the patients to choose items within the 5 main domains of HRQL, this method has both content validity as acknowledged by the professional community and basic patient-endorsed face-validity (whether an instrument appears to be measuring what it is intended to measure) (Guyatt et al., 1996).

The EQ-5D, a generic instrument, might not have basic face-validity for particular patient populations. Numerous studies have shown that seizures and the stigma of epilepsy considerably impair HRQL and poor QOL is certainly the case for patients with intractable epilepsy, who are taking a cocktail of anti-epileptic drugs, and who have been referred to a centre of tertiary referral such as Queen Square. Comparing our data with the UK norms, the only noticeable difference is in the anxiety/depression domain.

Because the EQ-5D utility score is dependent upon the EQ-5D profile, and given the problems outlined above, it is not surprising that the utility scores were not sensitive to changes in seizure outcome.

As reported in the previous chapter, many patients queried the VAS. The most common comment was that "health does not include epilepsy". Most of these patients said that, if the VAS was to include epilepsy, the VAS score would be up to 70 points lower. As was noted in the previous chapter, even though the VAS was sensitive to change, these qualitative data raise questions about the interpretation of the numerical data obtained from the VAS in this patient group.

(6-7-iv) Psychometric testing

Since the QOLAS is an "individualised" patient-tailored technique, it has optimum face or content validity. In this study, the psychometric testing showed the QOLAS to have good construct and criterion validity and good internal reliability. The QOLAS was also sensitive to change.

(6-8) Chapter 6: summary

The QOLAS, an individualised measure, has optimum content validity. As far as was tested in this study, it was found to have good construct validity, criterion validity, good internal reliability and was responsive to clinically-defined change.

The EQ-5D VAS, which is measuring some aspect of health-related QOL, is also sensitive to change. Our data suggest that the EQ-5D does not have face validity for patients with severe epilepsy. The EQ-

5D profile and the EQ-5D utility data might therefore not be appropriate for chronic health conditions in general, and intractable epilepsy in particular.

Chapter 7

The Psychometric testing of the QOLAS in patients with dementia

(7-1) Introduction

This chapter has three aims: (i) to describe the psychometric properties of the QOLAS for the assessment of QOL of patients with dementia (ii) to compare the patient's ratings of their own QOL with the ratings given by the main carers, and (iii) to look at what independent variables might predict the total QOLAS score as rated by both the patient and the carer using multivariate regression techniques. Subsequent chapters will address the QOL of the sub-group of patients who could not be interviewed themselves (and for whom we only have carer proxy data); the QOL of the carers and the longitudinal data.

(7-2) Subjects and Methods

(7-2-i) Subjects

A total of 37 patient-carer dyads were recruited. The cognitive status of 13 patients precluded interview and 2 patients were subsequently found not to have a regular carer. The current paper addresses the QOL of the 22 patients with mild-to-moderate dementia who could be interviewed and for whom a primary carer was identified and interviewed. The interviews took place either at The National Hospital, Queen Square, or at home. Most of the patients had pre-senile dementia of the Alzheimer's type (DSM-IV criterion of onset before age 65 years) and in this preliminary study the patients were not further sub-grouped according to aetiology. Standard socio-demographic data were collected from carer.

(7-2-ii) Questionnaires

The patient completed: (i) the Quality of Life Assessment Schedule (QOLAS); (ii) the Mini-Mental State Examination (MMSE); (iii) the EuroQol EQ-5D and a selection of the Dartmouth COOP charts. The carer rated the QOL of the patient using (i) ; the QOLAS (a semi-structured interview); (ii) the Interview to Determine Deterioration in Daily Functioning in Dementia (IDDD); (iii) the Neuropsychiatric Inventory (NPI) and (iv) the EuroQol EQ-5D. These instruments are briefly described below.

The carers were also asked to rate their own QOL on (i) the QOLAS; (ii) the Medical Outcomes Study Short-form-36 (MOS SF-36) (Ware & Sherbourne, 1992); the General Health Questionnaire (GHQ-30) (Goldberg & Williams, 1988); and the Profile of Mood States (POMS) Short Form (McNair et al., 1992), although the main focus of this chapter is the QOL of the patient. The questionnaires are presented in the appendices.

(7-2-iii) QOL assessment: Patient on self

(7-2-iii-a) Modified QOLAS

Described in chapter 4 of this thesis.

(7-2-iii-b) Mini-mental state examination (MMSE) (Folstein et al., 1975)

This is probably the most widely used brief screening instrument for dementia (Lezak, 1995). The test consists of two parts: verbal and performance. The scores range from 0-30 with a lower score indicating greater cognitive impairment.

(7-2-iii-c) The EuroQol EQ-5D (EuroQol Group, 1990; Brooks, 1996)

This generic instrument, which measures health-related quality of life, has 5 domains: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. It has been described in chapter 5 of this thesis. The EQ-5D is designed for self-completion but in the current study it was interviewer-assisted i.e. copy given to patient but wording also read out to patient.

(7-2-iii-d) Dartmouth COOP charts (Nelson et al., 1987)

These generic self-rated health status questions were developed for the assessment of patients' functional health in routine clinical practice. Each chart consists of a question referring to the past month, with five response choices, each illustrated with a drawing. The scoring for each questions is from 1= 'no difficulty' to 5= 'can not do' with higher scores representing worse QOL. A sub-set of 5 questions was chosen which assessed the domains: (i) overall health (ii) daily activities (iii) physical fitness (iv) social activities and (v) feelings. The questions were presented so that one question filled a page of A4 size paper.

(7-2-iv) Proxy QOL assessment: Carer describing patient

(7-2-iv-a) QOLAS

The carer was asked to nominate and score the QOL items they perceived to be of most importance for the patient's QOL. Carers were reminded that this part of the interview concerned their perception of the patient's QOL and that there would be an opportunity later in the interview for carers to discuss their own QOL.

(7-2-iv-b) Interview to Determine Deterioration in Daily Functioning in Dementia (IDDD) (Teunisse et al., 1991)

This scale has 33 items concerning changes in patient's daily functioning. The questions refer to self-care and daily activities. A higher score indicates poorer abilities.

(7-2-iv-c) The Neuropsychiatric Inventory (NPI) (Cummings et al. 1994)

This scale, which assesses neuropsychiatric problems, has 12 domains. If a positive response is elicited from an initial screening question, further questions about each item are asked and total score based on frequency and severity can be calculated for each of the 12 items.

(7-2-iv-d) EQ-5D (carer on patient)

The EQ-5D was interviewer administered and the question plus response options were read out replacing e.g. "Do you have any problems in walking about?" with "Does you wife/husband (etc.) have any problems in walking about?".

(7-2-v) Staging of dementia

The staging of dementia was calculated using cut-offs on the MMSE as follows: scores 0 to 10 = severe; 11 to 20 = moderate; 21 to 30 = mild (Mega et al., 1996).

(7-3) Data analysis

(7-3-i) Validity

(7-3-i-a) Criterion validity

Criterion validity was assessed by examining the correlations between the QOLAS and other measures assessing similar aspects of well-being.

(7-3-i-b) Construct validity

We tested construct validity in two ways. First, we tested the hypothesis that the patients with greater deterioration in skills of daily activities, as measured by the IDDD would have a worse QOL than patients with less deterioration in these skills. We arbitrarily chose a cut-off of 50 on the IDDD and compared the two groups (n=11 patients per group) using independent t-tests. Second, we tested the hypothesis that the QOLAS total score (patient self-rating) would correlate with the MMSE.

(7-3-ii) Reliability

The reliability of a measure can be assessed in two ways: (i) internal consistency is assessed by looking at the correlation of each item/domain with the total score and coefficient alpha; (ii) test-retest reliability is assessed by a repeat administration of the measure after an interval sufficiently short that genuine changes in QOL/health status would not have occurred and sufficiently long such that similarity in responses is not due to a learning effect.

Most of the interviews were conducted in the patients' homes after considerable negotiation to find a convenient time and many of the patients and carers wept during the interviews. Although a repeat interview one week later had been planned to assess test-retest reliability, this was felt to have been too intrusive and burdensome. In this study we were able to look at the internal reliability of the QOLAS

but not test-retest reliability. We recognise the need to assess the QOLAS for test-retest reliability in patients with dementia.

(7-3-iii) Patient/proxy comparison

We looked at the correlations between the patients' and the carers' scores for each QOLAS domain. Since the QOLAS is in an individual, respondent-tailored technique, one would not expect, a priori, as much agreement between any two raters as with a fixed questionnaires with identical wording. We therefore also looked at the head-to-head comparison of the EQ-5D, patient rating self and carer rating patient.

(7-3-iv) Statistical analysis

In the psychometric testing of a new scale there is debate in the literature as to whether parametric or non-parametric statistics should be used. One criterion is whether the data are normally distributed. Another issue is that whilst the response options give the impression that the likert is an interval scale, psycho-semantic studies have show that it is only an ordinal scale of measurement i.e. the distance between any two adjacent points on the scale cannot be assumed to be the same. Other researchers have argued that this theoretical technicality does not matter in practice. We analysed the data using both the Pearson's correlation and the non-parametric Spearman's rank correlation coefficient. The results were almost identical.

The patients' and carers' scores on the QOLAS were compared using correlations as were the tests of construct validity. Criterion validity was tested in two ways: the two groups were compared using an independent t-test and the hypothesis that decreasing MMSE scores were associated with worse QOL scores was tested by correlation. We assessed internal reliability by looking at correlations between each domain score and the total score and by the coefficient alpha.

In a head-to-head comparison of the the responses to the EQ-5D, we compared the level of agreement between the patients and carers using the Cohen's kappa statistic.

Since the patient's cognitive ability is likely to affect the results, the results, where appropriate, are shown for the whole group of patients with mild-to-moderate dementia (n=22) and for the sub-group of patients with mild dementia (n=12).

Finally, using MINITAB, we investigated the contribution of the various predictor variables assessed (neuropsychiatric symptoms, dementia severity, patient and carer gender etc) in determining QOL, i.e. the total QOLAS score as rated by the patient and by the carer. To achieve this, an all-subsets regression technique was used to choose the best subset of predictor variables from all available variables as follows:

All possible (2Pmax-1) regression analyses were performed, with R2 calculated for each model.

The best models having the largest R^2 with each number of parameters (1, 2, ... , Pmax) were chosen.

Mallows Cp statistic was then used to determine the optimal number of predictor variables to include in the model and hence the optimal model.

Mallows Cp is calculated as follows; for a model with p predictor variables (1<=p<=Pmax)

$$C_p = \frac{(SS_0)_p}{\hat{\sigma}_2} + 2(p+1) - n$$

Where $(SS_0)p$ = Residual sum of squares for the model with p parameters.

We then used Hocking's criteria that the optimal model is the one with the least number of parameters such that Cp <= 2(p+1)-Pmax. The appropriateness of the models chosen was assessed using the overall F-test, normal plots of residuals, and plots of residuals against fitted values.

(7-4) Results

We interviewed 22 patient-carer dyads. The patients all had a MMSE score within the range 11-30 and thus were in the mild-to-moderate stages of dementia (Mega et al., 1996). The mean age of patient was 65 years, s.d. = 8 (range 48-80). Twelve patients were male and 10 were female. Eighteen of the carers were spouses and all carers were living with the patient at the time of interview. The mean age of the carers was 61 years, s.d. = 13 (range 30-77). Eight of the carers were male and 14 were female. The mean time of onset prior to interview was 5 years, s.d. = 3 years.

(7-4-i) Qualitative data: QOLAS semi-structured interview

One main advantage of the QOLAS interview is that each respondent can identify the items of importance to their own QOL, thus maximising the validity of the method. The constructs elicited from the patients and the carers (concerning the patient's QOL) are summarised in Appendix 10. The QOLAS subscale scores for both the patients' and the carers' ratings are shown in Figure 2. For each domain, the carers rated the patients as having a worse QOL than did the patients themselves. We looked at the correlations between the patients' and the carers' scores for each QOLAS domain. There was good agreement in all domains except daily activities and cognitive functioning. As predicted, the correlations were generally slightly better for the patients with only mild dementia (n=12). The results are summarised in Table 16.

(7-4-ii) Validity

The results for the assessment of criterion validity are summarised in Table 17. The QOLAS total score as rated by the patient correlated with measures of affect, social life and activities whereas the carers rating of the QOL of the patient correlated with more objective measures of mobility, activities of daily living and neuropsychiatric symptoms. As predicted, the correlations were generally better for the sub-set of patients with only mild dementia (n=12).

Construct validity was assessed, first, by testing the hypothesis that the patients with greater deterioration in skills of daily activities, as measured by the IDDD, would have a worse QOL than patients with less deterioration in these skills. We arbitrarily chose a cut-off of 50 on the IDDD and compared the two groups (n=11 patients per group) using independent t-tests. For the group where IDDD < 50 the mean total QOLAS score was 18.5 (s.d.=7.3) and for the group with IDDD scores above 50 i.e. with more problems, the mean QOLAS total score was 28.5 (s.d.=9.0), the higher scores indicating a poorer QOL. The mean scores were significantly different, t=2.85, p=0.01.

Whilst the patient self-rated QOLAS total score for the whole group (n=22) did not correlate with the MMSE score, the scores for the subgroup of patients with mild dementia only (n=12), the patient self-rated QOLAS total did correlate with the MMSE score, $r = 0.6$, $p=.05$.

(7-4-iii) Head-to-head comparison: patient self-rating and carer rating patient on the EQ-5D

We directly compared the results of the patient self-rated EQ-5D with the EQ-5D rated by the main carer to look at the level of agreement. The three levels per domain (no problem, some problems and extreme problems), yield ordinal scale data and agreement in each domain was assessed using Cohen's Kappa statistic with the strength of agreement for each value of K rated using the convention from "poor" to "very good" as per the current literature (Altman, 1991; Landis & Koch, 1977). The results are summarised in Table 18. The Cohen's weighted kappa, which takes account of the level of disagreement, was not calculated because it assumes equal intervals between each measurement level e.g. between "no problems" and "some" and between "some" and extreme" and a previous EQ-5D study showed this was not the case (Selai, 1998). The results for the "usual activities" domain was poor. Qualitative data revealed that both patient and carer asked "what is usual..?". In cases where the patient had been retired early on medical grounds, sometimes months or years previously, it was not clear whether work was a "usual activity". This finding suggests that a less ambiguous question would be more appropriate for patients with dementia.

(7-4-iv) Reliability

Table 19 shows the internal consistency of the QOLAS. Each domain correlated highly with the total QOLAS score showing good internal consistency. The coefficient alpha, for patient rating self and carer rating patient was in each case 0.78, and this result is well within the acceptable range.

(7-4-v) Regression analysis

For patient self-rated QOL, the optimal model had eleven parameters: patient age; patient gender; MMSE; IDDD; COOP overall; COOP daily activities; COOP fitness; COOP social; COOP feelings; profile of mood states; GHQ, and is summarised in Table 20. For carer-rated patient QOL a model with six parameters was optimal: patient gender, age at onset, IDDD, NPI, Co-op daily activities and Co-op feelings (Table 21).

(7-5) Discussion

This chapter presents the results of a study to assess the feasibility of using an individualised assessment technique, the QOLAS, to rate the QOL of patients with dementia as rated by both the patients themselves and the patient's main carer. These patients with mild-to-moderate dementia understood the interview and were able to answer questions about their QOL, providing both qualitative and quantitative data. It was found during the psychometric testing that the subset of patients with only mild dementia generally did slightly better than the whole group of patients with mild-to-moderate dementia.

When this research began, only one published study of patient self-reported QOL was found in the literature (Coen et al., 1993) although a number of other studies of patient self-reported QOL are in preparation or in press (Selai & Trimble, 1999). In the previous published study of patient self-reported QOL in dementia, the method was complex and only 6/20 patients completed the full interview (Coen et al., 1993).

Although various purported QOL measures have been used in clinical trials of anti-dementia drugs, these instruments have been criticised, either because they have not been fully validated or because they do not comprehensively assess the QOL construct (Salek et al., 1998; Walker et al, 1998).

In the current study, the QOLAS was administered alongside a number of other measures of well-being to assess its psychometric properties. Since it is a subjective, respondent-driven approach, the method has optimum face (or content) validity. This study demonstrated that, as far as it was tested, the QOLAS had acceptable criterion validity, and concurrent validity. Reliability was good, as assessed by internal consistency and the coefficient alpha. In this study we were not able to address test-retest reliability or sensitivity to change. Test-retest reliability for other individualised approaches has been good. For example, respondents made a mean of 1.7 changes in their choice of constructs on the PGI (Ruta et al., 1994) and changed a mean of 1 construct on the SEIQOL at 2 years follow-up (O'Boyle et al., 1993). We acknowledge the need to assess these measurement properties of the QOLAS in patients with dementia.

There are a number of points for discussion. First, this is a small feasibility study of patients with "dementia", irrespective of aetiology. In future studies, it would be important to look at patients subgrouped according to diagnosis since factors of importance to both patients and carers might vary considerably e.g. patients with fronto-temporal dementias have profound alteration in social conduct and personality which might have different implications for the QOL of both patient and carer (Neary and Snowden, 1997).

Some Health Services researchers are sceptical about the feasibility of asking patients with dementia to rate their own well-being (Bond, 1999). The first question, therefore, concerns the reliability or stability of responses and this raises a number of methodological issues. Since cognitive deterioration will affect the patient's ability to self-report, it is of interest to look at whether the patient's views correspond to those of their main carer. However, there are a number of problems with this approach. First, many studies have documented poor patient-proxy agreement in QOL ratings (Slevin et al., 1988). Poor agreement might be due to a number of factors, such as (a) there might be error inherent in the measuring instrument e.g. ambiguous wording of an item on a questionnaire (b) the patient and carer might just have different views on whether something is relevant to QOL e.g. attending dinner-parties (c) an eccentricity identified by the carer might be acknowledged by the patient but not be felt to be a problem by the patient e.g. choosing to wear orange trousers with a pink shirt. One of the patients in this study felt it was entirely acceptable to wear her nightdress under an anorak to church on Sunday causing her sister much distress. Published studies suggest that there will be less agreement for non-observable things e.g. pain and psychological problems compared to concrete, observable items such as "ability to walk" (Zimmerman & Magaziner, 1994; Magaziner, 1997).

Criterion validity can be assessed by comparing answers to items on different questionnaires which are tapping the same QOL domain. However, there are a number of problems with this approach which have been highlighted in the psychometric literature. Research has shown that even an apparently identical question, phrased in a slightly different way, or situated in a different place on the questionnaire page, can lead to quite different responses. Also, the time frames for measures of QOL or health status are often different, with some questions asking how things are today and others asking how things have been in the last week, the last month or in the last 6 months. Bearing in mind these methodological limitations, the QOLAS appeared to have good construct and criterion validity.

The carers rated the patients as having a poorer QOL in all domains of the QOLAS than the patients rated themselves, and this might be due to lack of insight or anosognosia (Whitehouse et al., 1997; Selai & Trimble, 1999). This finding raises a number of technical and ethical issues concerning who is the best "judge" of QOL in cases where patients have poor and diminishing cognitive abilities.

It is interesting to note the similarities in the constructs elicited from the patients and from the carers (Appendix 10). The most frequently made comment, by both patients and carers, in the physical domain, was that physical health was good or that the patient was physically fit. Since physical health might not be a problem in the early stages of dementia, especially in younger patients, measures of health status might not pick up the subtle early manifestations of the disease and they might be susceptible to ceiling effects.

There is a complex interaction of patient and carer QOL since the two are mutually influential. Carer stress, mood and psychiatric morbidity, exacerbated by carer burden, will, in turn, affect the patients' QOL (e.g. the carer might be angry, hostile or emotionally unavailable for the patient). Many carers in this study tearfully recounted how they had, on occasions, shouted, screamed, "bullied" and "punished" the patient whilst feeling under extreme pressure.

This stress will also influence the carer's judgement and perception of the patient's QOL. Since proxy measures yield data that are coloured by the opinion, and biases of another person, it has been suggested that researchers should carefully document their use of proxies and the potential error/bias their use introduces to specific studies (Magaziner, 1997).

The regression analyses provide an intriguing insight into the determinants of QOL from both the patients and the carers perspective. The correct interpretation of the regression models are important in understanding these results. The objective of the regression analysis is to select the best combination of predictor variables that together provide a linear prediction of the QOL score. The models presented in Tables 20 and 21 are two of many possible models, but are essentially 'optimal' in terms of their ability to predict QOL scores, and the proportion of the variance explained (R^2). The partial regression co-efficients represent units on the QOLAS scale, for example in table 6, for patient gender, a 1 unit increase in gender (i.e. changing from male to female) is associated with a 6.38 unit drop in QOL ($p=0.004$) controlling for all other predictors – i.e. female patients report a worse QOL than male patients when controlled for other factors. Similarly, a 1 year increase in patient age is associated with a 0.26 increase in the QOL score, which can be interpreted as older patients experiencing better QOL, when controlled for other factors.

It is however important to realise that these are only two of many possible models, and it is more important to interpret trends in determinants of QOL, than to draw very specific conclusions about particular predictors.

The QOLAS is one of a growing number of patient-tailored approaches , which take account of the individual's perspective, in a way that cannot be address by the fixed, standardised questionnaire. The need for such an approach has been strongly argued for in the QOL literature (Bowling, 1995; Gill, 1995).

The finding of poor agreement for the EQ-5D domain "usual activities" highlights the problem. The patients and their carers found this question ambiguous and asked "What is a 'usual' activity...?". An individualised approach would have allowed the respondent to identify an activity, the performance of which mattered greatly to their QOL.

Attention has only relatively recently turned to the assessment of QOL in dementia. As with the assessment of QOL in other patient groups, the most suitable QOL measure for use in dementia will depend upon the use to which the data will be put and it is likely that a variety of assessment methods will be useful for different purposes.

A number of recommendations have been made in the dementia literature e.g. that QOL measurement should use disease-specific measures which use an individualised outcome. In other words, the base-line and change in each individual patient should be monitored and account taken of the views and values of each patient and their family (Rockwood & Wilcock, 1996). The advantage of the QOLAS is its individualised outcome and it is therefore likely to have a role to play in the assessment of QOL in dementia.

(7-6) Chapter 7: summary

We tested the feasibility and the psychometric properties of an individualised patient-tailored quality of life assessment technique, the QOLAS, for use as a measure of QOL in patients with dementia. This study was limited by a small sample size. As far as we were able to test it, the QOLAS was shown to have acceptable validity and reliability although a lot more work on the psychometric testing needs to be done. The results suggest that patients with mild-to-moderate dementia can rate their own QOL and that the QOLAS is a promising method for assessing QOL in this patient group.

Chapter 8

The 13 patients who could not be interviewed but for whom there was a carer proxy-rating

(8-1) Introduction

In the study of patients with dementia and their main carer, a total of 37 patient-carer dyads were recruited. The previous chapter reports on those patients who were able to be interviewed and for whom a carer was identified and also interviewed. Of the 37 patients, two were subsequently found not to have a regular carer and were eliminated from the study. The cognitive status of 13 patients precluded interview and this chapter reports the QOL of these 13 patients who could not rate their own QOL but whose carers could give a rating for the patient.

(8-2) Subjects and methods

(8-2-i) The interview

Of the total 37 patient-carer dyads recruited, a total of 13 patients could not be interviewed because their cognitive status precluded engaging them in research. In all cases, an effort was made to build rapport and commence a preliminary qualitative interview. Where possible, an attempt was made to administer the MMSE. In these 13 cases, however, the interview could not proceed. As in the previous interviews, reported in the last chapter, data were obtained using the following carer-rated assessments: (1) the QOLAS; (2) Interview to Determine Deterioration in Daily Functioning in Dementia (IDDD) (Teunisse et al., 1991) (3) The Neuropsychiatric Inventory (NPI) (Cummings et al., 1994) and (4) the EQ-5D (proxy rated).

(8-2-ii) Statistics

The results for the two groups, patients who could be interviewed (n=22) and those who could not be interviewed (n=13) were compared using the parametric t-tests and the non-parametric Mann Whitney U, as appropriate.

(8-3) Results

Of the 13 patients who could not complete the QOL interview, nine patients could not be interviewed at all and so had a MMSE score of zero. A total of 4 patients could partly engage in the interview and answer some questions. Of these, 2 patients had a MMSE score of 5, one had a MMSE score of 8 and one had a MMSE score of 9. The mean age of the patients was 65 years (s.d. = 4; range 58-70 years). Nine of these patients were male and four were female. The mean age of the carers was 63 years (s.d = 6 years; range 52-71 years). Four of the carers were male and nine were female. The mean onset prior to interview was 6 years (s.d.= 4 years; range 1-15 years).

(8-3-i) QOLAS

The results of the QOLAS (carer rating patient) are shown in Table 22. For comparison, the proxy results for the patients who could not complete the interview (n=13) are shown alongside the patients (n=22) who could complete the interview. The missing data in the "Daily activities" domain is mainly the result of this question being judged irrelevant.

(8-3-ii) IDDD

The mean IDDD score for the patients who could not be interviewed (n=13) was 88.23 (s.d. = 17.49; range 49-99). The mean IDDD score for the patients who could be interviewed (n=22) was 53.32 (s.d.= 12.37; range = 40.86). The scores for the two groups were significantly different, t=6.91, p=0.000.

(8-3-iii) Neuropsychiatric Inventory (NPI)

The results of the NPI are shown in Table 23. For comparison, the results for the patients who could not complete the interview (n=13) are shown alongside the patients (n=22) who could complete the interview. There were significant differences between the two groups on the subscales agitation and eating and on the NPI global score.

(8-3-iv) The EQ-5D

The results of the EQ-5D descriptive, carer rating patient, are shown in Table 24. Again, for comparison, the results for the patients who could not complete the interview (n=13) are shown alongside the patients (n=22) who could complete the interview. As might be predicted, compared to those patients with mild-to-moderate dementia, more patients with severe dementia had problems (and more severe problems) on every subscale of the EQ-5D.

Most respondents had problems giving an overall score for the EQ-5D Visual Analogue Scale (VAS). The most frequently mentioned problem with giving an overall rating was that the respondent wanted to give one score for physical well-being, (health or fitness) and a separate score for what they called "mental" functioning. In the group where the patients had mild-to-moderate dementia (n=22), a total of 6 respondents gave a VAS rating. In the group where the patients had severe dementia, a total of 5 respondents gave a VAS rating. Since the comment about wanting to give two scores was so frequently expressed, respondents were given the opportunity to score the two components of well-being separately. The results are presented in Table 25. The mean VAS-total score was much higher (indicating better health) for the mild-to-moderate group than for the severely affected group. The 'VAS-physical' was, somewhat surprisingly, higher for the group of patients with 'severe' dementia than for the group with mild-to-moderate dementia but the 'VAS-mental' score was, predictably, lower for the more severely affected group. Because of the very small sample sizes in each group, no statistical tests were performed on these data.

(8-4) Discussion

This chapter has looked at two groups, those who could be interviewed and were in the mild-to-moderate stages of dementia and those who could not be interviewed and who were in the severe stage

of dementia. The results show significant differences between the two groups, i.e. those with mild-to-moderate dementia (n=22) and those with severe dementia (n=13) on all subscales of the QOLAS. Qualitative data collected at the time of interview revealed a problem/ambiguity in the question concerning daily activities since, for most of these patients, the question about daily activities was no longer applicable. Because most of the patients with severe dementia no longer engaged in any purposeful, goal-directed activities, a question about problems with daily activities could elicit either the response that the patient was having extreme problems or, conversely, the response that (since the patient was no longer aware) he/she was having no problems with daily activities, or that the question was "not relevant".

On the Neuropsychiatric Inventory (NPI) differences between the two groups were observed on the agitation, eating and the global NPI subscales.

The EQ-5D descriptive data showed marked differences between the groups. The 'Usual activities' question was difficult to score when this question was no longer applicable and/or when the patient had no insight, leading the carer to the conclusion that this was not a 'problem' for the patient. In the group with severe dementia, 23% of carers could not give a rating for pain/discomfort and 8% could not rate the anxiety/depression question. The most frequent comment made by carers was that the patient sometimes made a gesture or a facial grimace or otherwise behaved such that the carer thought that the patient might be in pain or be anxious but that it was impossible to be sure.

In Table 26 we compare the results of the EQ-5D descriptive profile for 4 groups: (i) our patients being assessed for their suitability for definitive surgical treatment for intractable epilepsy, (ii) the UK population survey (Kind et al. 1998), (iii) the carers' rating of the patients with severe dementia, and (iv) the carers' rating of the patients with mild-to-moderate dementia. Because of the differences in sample sizes and the fact that two of the groups were proxy-rated, no statistical analyses have been performed. It is nevertheless of interest to informally compare the groups in Table 26. It was previously reported (in chapter 6) that the percentage of patients in our surgery reporting "no problems" on each EQ-5D domain, was similar to that in the UK survey and this was surprising given that they had chronic, intractable epilepsy. Table 26 shows that the dementia (carer-rating-patient) results were quite different. Overall, both the mild-to-moderate and the severe dementia groups had smaller percentages reporting "no problems" (carer-rated) on any question than respondents in either the surgery study or the UK survey. It is of note that a larger percentage of the group of patients with mild-to-moderate dementia and a larger percentage of the surgery group had "no problems" with pain/discomfort than did the UK survey population. On the other hand, the dementia carers reported being unsure whether the patient was experiencing any pain.

The other interesting comparison is between the patients with mild-to-moderate dementia and the surgery group on the anxiety/depression domain. A slightly larger percentage (68%) of patients with mild-to-moderate dementia were rated by their carers as having no problems with anxiety/depression, compared to the surgery patients (65%). This might be explained by the fact that, as documented in the literature, carers under-report affective states because they have difficulties in knowing about "inner", subjective states of well-being. It also suggests that spending time on the telemetry unit, having tests

which might lead to major brain surgery, is just slightly more anxiety inducing than being in the mild-to-moderate stages of dementia (the latter being proxy-rated).

(8-5) Chapter 8: summary

Of the 37 patient-carer dyads recruited, only 22 patients could complete an interview and these were in the mild-to-moderate stages of dementia. A total of 13 patients already had severe dementia at the time of recruitment and therefore only proxy ratings were available. This chapter has reported and compared the carer-rated QOL of the two groups. Overall, the patients with severe dementia have a worse QOL that those with mild-to-moderate dementia but it must be noted that scores can appear to dramatically "improve" if the carer decides that the patient has lost insight into their condition. In these cases, after a period where the carer would score "extreme problems" or very poor QOL, they decide that question is no longer applicable and/or the patient is beyond 'experiencing' a problem and is, therefore, experiencing no problem.

Chapter 9

Carers' rating their own QOL

(9-1) Introduction

A total of 37 patient-carer dyads were recruited. In the preceding two chapters, the results of the patients rating themselves and the carers rating the patients were reported. In this chapter the results are presented of the carers rating their own quality of life. The QOLAS was administered alongside a number of other instruments of well-being/health status. A study-specific check-list of carer issues, containing the main items mentioned by carers in preliminary qualitative interviews was developed. Preliminary testing e.g. test-retest reliability of this check-list was conducted.

(9-2) Aims

This study had two aims. First, to obtain both qualitative and quantitative descriptions of carers' self-reported quality of life. Second, to develop a brief check-list of the main items of importance to the carers.

(9-3) Subjects and methods

(9-3-i) Part one: description of carer's self-rated QOL

In the first part of the interview with the main carer, the carers were asked to describe and rate the QOL of the patient. In the second part of the interview, the carer was asked to describe their own QOL and the effect that being a carer was having on various aspects of their well-being. The carer rated their own QOL on the following scales: (i) the QOLAS; (ii) the General Health Questionnaire GHQ-30 (Goldberg & Williams, 1988); (iii) the Medical Outcomes Study Short-form-36 (SF-36) (Ware & Sherbourne, 1992); (iv) the EQ-5D (EuroQol Group, 1990); and (v) the Profile of Mood States (POMS) Short Form (McNair et al., 1992.). In addition, a "carers scale" was specifically designed for this study to tap a constellation of issues which arose in the pilot qualitative interviews but for which there appeared to be no simple measure/check-list available. The QOLAS has been described in previous chapters. The other scales are described below:

(9-3-i-a) The General Health Questionnaire GHQ-30

The General Health Questionnaire GHQ-30 (Goldberg & Williams, 1988) was designed to measure current psychiatric/affective disorders. The GHQ has been used extensively to estimate the prevalence of affective disorders and to assess illness severity. Response categories on the GHQ are "better than usual", "same as usual", "worse than usual", and "much worse than usual". Items are scored using the traditional Likert format of (0-1-2-3), or the responses may be scored as (0-0-1-1) which discriminates cases and non-cases. Cut-off points of 4/5 have been recommended for the GHQ-30 (Naughton et al., 1996).

(9-3-i-b) The Medical Outcomes Study Short-form-36 (SF-36)

The Medical Outcomes Study Short-form-36 (SF-36) (Ware & Sherbourne, 1992) is a short questionnaire, designed for self-completion, that was derived from the Rand health batteries. The SF-36 is rapidly becoming the generic health status measure of choice and it has increased in popularity in the UK to the extent that researchers are beginning to use it in preference to the traditional UK measure, the Nottingham Health Profile (Hunt et al., 1996). The 36 items are aggregated into 8 subscales: physical functioning; role-physical; bodily pain; general health; vitality; social functioning; role-emotional and mental health. It is also possible to combine the sub-scales to yield two overall summary scores of physical and mental health (Ware, 1996).

(9-3-i-c) The EQ-5D

The EQ-5D, a generic instrument for describing and evaluating health-related quality of life, has been previously described in chapter 5 of this thesis.

(9-3-i-d) The Profile of Mood States (POMS) Short Form (McNair et al., 1992)

The Profile of Mood States (POMS) Short Form (McNair et al., 1992) was designed to assess mood states and transient changes in mood. Six identifiable moods or affective states are measured: tension-anxiety, depression-dejection, anger-hostility, vigour-activity, fatigue-inertia, and confusion-bewilderment. The POMS is self-administered and the version we used contains 24 adjectives relating to mood states during the last week, which are scored on a four-point scale with the response choices "not at all", "a little", "quite a bit" and "extremely".

(9-3-i-e) Study-specific "carer's scale"

In the pilot interviews, a number of issues arose for the carers and we searched for existing scales to measure these items. However, the items mentioned seemed to be covered by scales which were very long and, potentially, very burdensome e.g. measures of carer stress or carer burden (Harvey, personal communication).We therefore devised a simple check-list with those items frequently mentioned by the carers in qualitative interviews. The check-list is shown in the appendices under Section 16: Copies of all instruments.

(9-3-ii) Materials and methods: part two
Development and preliminary psychometric testing of the new study-specific carer's scale.

After preliminary pilot interviewing, the items most commonly mentioned in the qualitative interviews were chosen. A main consideration was to keep the scale brief. The questions were drawn up and tested on a small convenience sample. We chose 0-10 Likert scales for each item as response choice options. We reversed the order on two of the questions so that 10 sometimes indicated "good" i.e. no problem and sometimes the worst possible problem.

(9-4) Statistics

Only some of our data were normally distributed and so we used predominantly non-parametric statistics. We used the Spearman's correlation coefficient to look at similarities between scales/groups. We used the parametric t-tests and the non-parametric Mann Whitney U to look at differences between groups. We looked at the results for the mild-to-moderate group versus the severe group.
Test-retest reliability was as assessed by the Spearman's Rank Correlation Coefficient and the Intraclass Correlation Coefficient (ICC).

(9-5) Results (1)

(9-5-i) Carer self-reported QOL

We interviewed a total of 35 carers about their own QOL. The mean age of the carers was 62 years (s.d.11 years, range 30-77 years). Twelve of the carers were male and twenty-three were female. The estimated time since the onset of the illness was 5.24 years (s.d. 3.28 years, range 1-15 years). These figures for the whole group, alongside the figures for the two groups (mild-to-moderate and severe) displayed separately, are shown in Table 27. The gender of the carers is shown in Table 28. The figures for the overall group and the two sub-groups are very similar with approximately one third of the carers being male and two thirds female.
The results for the carers rating themselves on the QOLAS are shown in Table 29. The differences between the groups on the QOLAS are shown in Table 30. A significant difference was found on the QOLAS-PSYCHOLOGICAL sub-domain. The results of the Profile of Mood States (POMS) are shown in Table 31. There was a significant difference between the mild and severe groups on the sub-scale "vigour". The results for the GHQ (two scoring methods) are shown in Table 32. The mean scores for both groups were above the cut-off of 4 or 5 which indicates psychiatric "caseness". The results for the SF-36 are shown in Table 33. There were no significant differences between the mild and severe group on any SF-36 subscale.
In Tables 34-37 we present the results of tests of the criterion validity of the QOLAS. Because not all subscales are covered by all instruments, we looked at the physical, psychological and social domains recommended by the WHO definition. Table 34 shows correlations between the QOLAS-TOTAL scores and the other instruments; 8/10 comparisons were significant. Table 35 shows correlations between the QOLAS-PHYSICAL subscale scores and the other instruments; 10/10 comparisons were significant. Table 36 shows correlations between the QOLAS-PSYCHOLOGICAL subscale scores and the other instruments; 6/10 were significant and these were especially amongst those measuring psychological constructs. Table 37 shows correlations between the QOLAS-SOCIAL subscale scores and the other instruments; 4/10 comparisons were significant and this QOLAS subscale seems to correlate more with measures of psychiatric morbidity.
The list of QOLAS constructs elicited from the carers concerning their own QOL is shown in Appendix 11.

(9-5) Results (2)

(9-5-ii) Psychometric validation of the Carers scale

Table 38 shows the carers' scale, mean and median scores and differences between the two groups: the carers caring for those with mild-to-moderate dementia and the group caring for those with severe dementia. Significant differences between the two severity groups were observed on the questions about: caring interfering with life; work and whether plans for the future had had to change.

There was one open-ended question in the carers scale which allowed for the collection of qualitative data. This question was "Are there any special things you do to help you cope..?" The responses are summarised in Appendix 12. The carers called upon a range of resources to help them cope with the burden of caring. Although the small sample sizes necessitate caution in interpreting the results, we can nevertheless see that there are not many differences between the genders, with similar numbers enjoying an alcoholic drink, attending support groups and keep-fit. More female carers, however, report getting help from friends and relatives.

Table 39 shows the test-retest reliability (test-retest period of one week), as assessed by the Spearman's Rank Correlation Coefficient and the Intraclass Correlation Coefficient (ICC). The results were good but answers to two of the questions i.e. whether caring had affected work, and whether plans for the future had had to change, were apparently less stable over time.

(9-6) Discussion

(9-6-i) Carers rating their own QOL

The carers' self-reported QOL was assessed using a number of instruments. The QOLAS was shown to have good criterion validity since the subscales correlated with other instruments tapping similar domains of well-being. The only difference between those caring for patients in the mild-to-moderate and severe dementia groups was in the psychological subscale. There were no differences between these two groups on any subscale of the SF-36 or on the GHQ-30. A difference between the two groups was seen on only one subscale of the POMS, i.e. vigour. The mean scores for carers of both groups of patients with dementia (mild-to-moderate and severe) on the GHQ-30 showed the carers to be above the cut-off for "caseness" suggesting a high degree of psychiatric morbidity in these carers.

Although it might have been predicted that those caring for patients with severe dementia would have had a worse QOL than those caring for patients in the mild-to-moderate range, qualitative data revealed that many carers had resigned themselves to their caring role and/or had found ways of coping.

Appendix 13 shows the initial description of their QOL, as described by the carers of the patients with severe dementia at baseline interview (n=13). Most of these carers describe coming to terms with their situation, either by seeking professional help (e.g. GP who prescribed anti-depressants or psychologist for non-pharmacological intervention) or by some other self-devised coping mechanism.

(9-6-ii) The development of the Carers scale

A simple carers check-list was developed to measure items that had come up in the pilot QOL interviews. The test-retest reliability was assessed and this was found to be good except the question on work (which proved to be an unreliable question since the carers' employment status was changing) and the question about feeling in control. The latter finding is interesting and one possible interpretation is that carer self-perceptions of being in control might be in a state of flux. As such, there might be genuine changes in responses to this question after a one week interval.

The testing of validity is more problematic. Criterion validity, for example, which could be assessed by correlating the questions against other measures tapping similar items, is difficult since the scale was developed precisely because no other quick and simple scale appeared to be measuring these items.

(9-7) Chapter 9: summary

The quality of life of 35 carers of patients with dementia was assessed. The carers were experiencing considerable distress and the mean group scores on the GHQ suggested there was a high level of psychiatric morbidity. The QOLAS was assessed and was shown to have acceptable criterion validity. Test-retest reliability of the QOLAS was not addressed since a second interview, after a short interval, was deemed to be too burdensome. A simple, study-specific carer-scale was developed and carers were sent a second copy by post to complete at home in order to assess test-retest reliability of this scale. The Carers Scale was found to have good test-retest reliability but testing of validity (e.g. criterion validity) proved difficult in that it was not easy to find a suitable "gold-standard" against which to compare the questions on the Carers Scale.

Chapter 10

Longitudinal/follow-up data

(10-1) Introduction

This chapter describes the changes seen over the one year follow-up period. The study design was to interview all patients and carers at 3 time-points: at baseline; at 6 months follow-up and at 12 months follow-up. Over the one year period, there was considerable loss to follow-up for a number of reasons. This chapter describes the changes over the one year period in the QOL of both the patients and carers. In addition to the descriptive statistics, some basic statistical analyses were performed but, because of the small sample sizes, more complex multi-variate statistics were not performed. This chapter discusses a number of methodological issues pertaining to the feasibility of conducting a follow-up study of patients with diminishing cognitive abilities where there is considerable loss to follow-up.

(10-2) Aims

The aim of the longitudinal component of the study was to describe and monitor the changes in QOL over one year of both the patient and their main carer. Since no longitudinal data have been previously published, however, this was essentially a feasibility study to look at the types of methodological issues which, it was predicted, would arise.

(10-3) Methods

After recruitment, each patient and carer dyad was to be followed up 6 months later and then 12 months after the baseline interview. The interview schedule and questionnaires were to be the same as at the baseline interview; these have previously been described.

(10-4) Statistics

Simple descriptive statistics to describe the changes in QOL were planned. Differences between groups (with patients allocated according to stage of dementia and time-point) would be assessed using either t-tests or the non-parametric equivalent, Mann Whitney, after preliminary exploration of the data. With the testing of multiple end-points, and the increased probability of finding a significant result by chance, it is advisable to apply Bonferroni corrections or to take a more conservative indicator of significance i.e. $p=0.01$. Since this was a small feasibility study, results at the significance level $p=0.05$ have been highlighted and the need for caution in generalising from these results is emphasized. Although more complex multi-variate statistics were considered, the small, and diminishing, sample sizes precluded more complex analysis since it is suggested in the literature that at least 10 data-points are needed for each variable. Although the data for all time-points are presented, we chose to compare, statistically, the $t=1$ data to the $t=3$ data.

(10-5) Results

(10-5-i) Data collected

A total of 37 patient-carer dyads were recruited. Of these, 2 patients were found not to have a regular carer who could be interviewed and these 2 were excluded from the study. Of the remaining 35 patient-carer dyads, 25 patients could participate in an interview although a total of 3 patients, who were in the "severe" stage of dementia (i.e. had a mini-mental state of less than 10), could not participate fully in the interview. The 22 patients with a MMSE score of 11 or greater who could complete the interview at time=1 (and their carers) participated in the full testing of the psychometric properties of the QOLAS and this is presented in Chapter 8. Data on the quality of life of the remaining 13 patients, who could not be interviewed, were collected by interviews with their carer as proxy reporter.

Data were not available at either of the follow-up interviews for a number of reasons: (i) a number of patients went from a stage in the disease process where they could be interviewed to a stage of dementia where their diminishing cognitive abilities precluded interview; (ii) interviews were difficult to organise, particularly if the carer was attempting to hold down a job in addition to their increasingly burdensome caring duties (iii) one patient died during the course of the study; (iv) some patients moved a considerable distance (e.g. to Scotland) and, although attempts were made, it was not possible to organise a follow-up visit and (v) some carers were unable to be contacted despite a number of attempts. The reasons for this last finding were not clear but one possible reason is that they just felt unable to continue participating in a research study. In only 11 cases did both the patient and carer complete interviews at all three time-points. Full details of the number of interviews conducted at all time-points is presented in Table 40.

(10-5-ii) Descriptive results: mild-to-moderate dementia

Table 41 shows the mean and median scores at each time-point (1,2,+3) for the MMSE, NPI-global, the COOP charts, the three QOLAS-total scores, the POMS and the GHQ-30 referring to the patients with mild-to-moderate dementia (MMSE ≥11). Table 42 shows the mean and median scores for the study-specific carers' scale at each time-point (1,2,+3) for the carers of patients with mild-to-moderate dementia (MMSE ≥11). Table 43 shows mean and median scores for the SF-36 at each time-point (1,2,+3) for the carers of patients with mild-to-moderate dementia (MMSE ≥ 11).

(10-5-iii) Descriptive results: severe dementia

Table 44 shows mean and median scores at each time-point (1,2,+3) for the MMSE, NPI-global, the COOP charts, the three QOLAS-total scores, the POMS and the GHQ-30 referring to the patients with severe dementia (MMSE ≤ 10). Table 45 shows the mean and median scores for the study-specific carers' scale at each time-point (1,2 +3) for the carers of patients with severe dementia (MMSE ≤ 10). Table 46 shows the mean and median scores for the SF-36 at each time-point (1,2,+3) for the carers of patients with severe dementia (MMSE ≤ 10).

(10-5-iv) Group comparisons: Time=1 versus time=3

Table 47 shows a comparison of the scores at time=1 versus time=3 for the instruments: MMSE, NPI-global, the COOP charts, the three QOLAS-total scores, the POMS and the GHQ-30, for the patients with mild-to-moderate dementia (non-parametric Mann Whitney U test). There were no significant differences between the scores at time=1 and time=3.

Table 48 shows a comparison of the scores at time=1 versus time=3 for the study-specific carers' scale, for the patients with mild-to-moderate dementia (non-parametric Mann Whitney U test). Again, there were no significant differences between the scores at time-1 and time=3.

Table 49 shows a comparison of the scores at time=1 versus time=3 for the SF-36 for patients with mild-to-moderate dementia (non-parametric Mann Whitney U test). Again, there were no significant differences between the scores at time-1 and time=3.

(10-5-v) Group comparisons: mild-to-moderate versus severe dementia

Table 50 shows a comparison of the group with mild-to-moderate dementia versus severe at each time-point (1,2,+3) for the instruments: MMSE, NPI-global, the COOP charts, the three QOLAS-total scores, the POMS and the GHQ-30. At time=1, there was a significant difference between the stages of dementia (mild-to-moderate dementia compared to severe) on the NPI-global score, with those patients with severe dementia having significantly higher scores, i.e. more neuropsychiatric problems than those patients with mild-to-moderate dementia. There was a significant difference at time=1 also for the COOP 3 chart which assesses perceptions of physical fitness. At time=2 there were significant differences between the two stages (mild-to-moderate and severe) on the QOLAS-total score (carer rating patient) and the Profile of Mood States. At time=3, there were significant differences between the two stages (mild-to-moderate and severe) on the QOLAS-total score (carer rating patient).

Table 51 shows a comparison of the carers of the group with mild-to-moderate dementia versus severe at each time-point (1,2,+3) for the study-specific carers' scale. At time=1, there were differences between the two groups on questions 4 and 10 (concerning work and plans for the future). At time=2, there were differences between the two groups on questions 2 and 10 (questions about perception of making sacrifices for caring duties and about plans for the future). At time=3, there were differences between the two groups on question 2 only (perception of making sacrifices for caring duties).

Table 52 shows a comparison of the group with mild-to-moderate dementia versus severe at each time-point (1,2,+3) for the SF-36. There were no significant differences between the two stages (mild-to-moderate and severe) on any of the SF-36 subscales at any of the three time-points.

(10-5-vi) The Sub-group interviewed at all 3 time-points

We analysed separately the data where both patients and their carers were interviewed at all 3 time-points (n=11) since this sub-group would give a clearer picture of change over time. These data are summarised in Table 53. To assess change over one year, we compared the mean scores at baseline and time=3. The only significant change at one year follow-up was in the scores for the QOLAS-TOTAL

(patient rating self) which went from a mean of 18.82 (s.d. 8.41) to 9.36 (s.d. 7.50) i.e. the patients rated themselves as having lower QOLAS-TOTAL scores after one year indicating that they perceived their QOL to be improved.

(10-6) Discussion

A literature search found no reported studies documenting changes in quality of life of either patients with dementia, or their carers, over time and this is therefore the first study to report longitudinal QOL data.

One aim of this study was to document the methodological issues which, it was predicted, would arise. In a chapter 8, the initial problems surrounding the recruitment of patient-carer dyads, and the organising of mutually convenient interviews (particularly when busy carers were holding down a full-time job) were reported. We were thus able to conduct comprehensive qualitative and quantitative interviews on a relatively small number of patient-carer dyads.

We anticipated that there would be loss to follow up and this was the case for a number of reasons. In only 11 cases did both the patient and carer complete interviews at all three time-points.

A second aim was to explore the methodological issues surrounding the statistical analysis of the data. We started with a relatively small sample size (number of carer-patient dyads) and the numbers further decreased over time due to patients becoming unable to complete an interview and other loss to follow-up. Although the most appropriate method of analysing this type of data-set, with multiple variables over time would be to use multi-variate statistics such as MANOVA, our small and diminishing sample-size precluded such statistics since it is recommended that at least ten subjects per variable are required. We looked at two-subgroups of patients with dementia, split according to severity of disease i.e. mild-to-moderate and severe. We further grouped the data according to interview time-point: 1, 2 or 3. There was little difference in the scores on any of the measures over the three time-points, either for the mild-to-moderate group or the severe group. This comparison over time is complicated because some of the patients moved from being in the mild-to-moderate group to the severe group and thus the groupings were in a state of flux.

For the mild-to-moderate group, the QOLAS results show an interesting pattern. The mean scores for each group (patient self-rating, carer rating patient and carer self-rating) were stable over time and this finding has a number of interpretations. On the one hand it suggests that the measurements were reliable but it could also mean that the measurements were unreliable and, in the absence of any comaprison data, it is not clear whether QOL alters over this time and, if so, by what magnitude. The mean QOLAS-total scores (patient rating self) are similar: t1 = 13.73; t2 = 12.36 & t3 = 9.5. The mean QOLAS-total scores for the carer rating the patient are also similar to each other but much higher (indicating worse QOL) than the patients own self-ratings: t1 = 23.5; t2 = 20.07 & t3 = 19.5. The mean QOLAS-total scores for the carers rating their own QOL are, again, very similar across time and close to the scores that the carers gave for their perceptions of the patients' QOL.

On the study-specific carers' scale, there were relatively few problems on questions 3, 5, 8 & 9 (about whether caring had affected family relationships/friendships; the carer's own health; whether the carer

was feeling in control; whether the carer felt there was stigma). The scores suggested moderate problems for questions 1, 2, 4 & 10 (whether caring interfering with life; whether the carer was making any sacrifices because of caring duties; whether caring was affecting the carer's work; whether plans for the future had had to change). Finally, the scores suggested big problems for question 6 and 7 (whether the carer felt they were coping with caring; whether the carer was feeling supported). Particular caution is necessary here since these are the only two questions where the scoring (i.e. whether higher or lower scores indicate more of a problem) is reversed. It is possible that the respondents did not notice this reversal of the scoring options.

Scores on the SF-36 were fairly stable over time. The scores were quite high, indicating that the carers, on the whole, were in fairly good health. The only noticeable exception was for the subscale 'vitality' which had low scores: t1 = 57.50; t2 = 46.43; & t3 = 45.50.

For the group of patients with severe dementia, the results were, again, fairly stable over time. In the severe dementia group only very few patients could complete a self-rating: t1 = 3; t2 = 1 and t3 = 1.

The carers rated the QOL of the patients as being poor with mean QOLAS-total scores (carer rating patient) of t1 = 29.31; t2 = 29.09 and t3 = 27.18. The carers rated their own QOL as only slightly better (around 5 QOLAS points better) with scores of t1 = 25.62; t2 = 24.18 and t3 = 21.75.

We next compared the two groups (mild-to-moderate dementia versus severe) at each of the three time-points to see whether there were any differences in QOL according to stage of dementia at each of the three assessments. There were very few differences. Moreover, because we were testing multiple end-points, with a potential increase in (false) significant results due to chance alone, and did not do Bonferroni corrections, we must be careful not to place too much emphasis on the results that were apparently significant. At time=1, there was a significant difference between the stages of dementia (mild-to-moderate dementia compared to severe) on the NPI-global score, with those patients with severe dementia having significantly higher scores, i.e. more neuropsychiatric problems than those patients with mild-to-moderate dementia. There was also a difference at time=1 on the COOP scale question 3 (perceptions of physical fitness). At time=2 there were significant differences between the two stages (mild-to-moderate and severe) on the QOLAS-total score (carer rating patient) and a significant difference on this measure was also seen at time=3, suggesting that the carers' perception of a difference between the milder and more severe stages of the illness is a fairly robust finding. At time=2 there was also a difference between the milder and more severe groups on the Profile of Mood States (POMS). There was also a difference between the two groups (stages of dementia) on the QOLAS-TOTAL score (carer rating patient). Although there were differences in the POMS scores at time=1 and at time=3, the differences were not significant.

We compared the carers of the group with mild-to-moderate dementia versus severe at each time-point (1,2,+3) for the study-specific carers' scale. At time=1, there were differences between the two groups on questions 4 and 10 (i.e. has caring affected work and have plans for the future had to change).

At time=2, there were differences between the two groups on questions 2 and 10 (i.e. does the carer feel they are making sacrifices because of caring duties and have plans for the future had to change).

At time=3, there were differences between the two groups on question 2 only (i.e. does the carer think they are making sacrifices because of caring duties). It is interesting to note that the difference for carers of patients in the two severity groups is only apparent at the first interview and suggests that adjustments to new working routines might be made before the second and third follow-up interviews. The other differences in areas such as whether the carer feels they are making sacrifices and whether plans for the future have had to change are also interesting in that these quantitative data reflect some of the patients' comments i.e. the qualitative data collected during the interview. The message conveyed by the patients was one of peaks and troughs of anger, despair, readjustment and coping as the carers reassessed the remainder of their lives after what was usually a profound "existential" crisis. Many carers spoke of having "scrimped and saved" all their lives in anticipation of their retirement which they planned to spend travelling or devoting time to their hobbies. Not only did all of these plans have to be jettisoned, they bitterly regretted how they might have chosen to live their lives had they known that the present situation would arise.

There were no significant differences between the two stages (mild-to-moderate and severe) on any of the SF-36 subscales at any of the three time-points. This suggests one of two things. It could be either that general health (as measured by the generic SF-36) is fairly stable over the one year follow-up period and therefore that caring for a patient with dementia does not appear to have a deleterious affect on health during this time. Or it could be that the SF-36 is insensitive to any of the more subtle changes in health status that might otherwise be seen in this context.

To assess change over one year, we compared the mean scores at baseline and time=3 on all scales for those patient-carer dyads where both patients and carers were interviewed at all three time-points (n=11). The only significant change at one year follow-up was in the scores for the QOLAS-TOTAL (patient rating self). The patients rated themselves as having lower QOLAS-TOTAL scores after one year indicating that they perceived their QOL to be improved. The mean scores for the other measures were fairly stable over this one year period, differing by only a few points. However, as measured on what might be regarded as two "objective" tests i.e. cognitive function and carer-rated neuropsychiatric symptoms, the dementia had clearly worsened over this period. The mean MMSE score dropped by nearly 4 points showing a deterioration in cognitive skills and the mean NPI-Global score increased by 12 points showing an increase in neuropsychiatric symptomatology although neither of these differences was statistically significant. With the current data, we can only speculate as to why the patients perceived their QOL to have improved whilst their cognitive function had deteriorated and their neuropsychiatric symptoms increased. It might be that a decrease of 4 points in the MMSE does not lead to worse self-perceived QOL, particularly in cases where the carer is helping the patient with many activities and perhaps silently correcting the patient's errors. Another explanation is that the patients started adapting to or coping with loss of abilities. A further possible explanation is that, at this point of change in the disease, the patients have started to lose insight into their condition or are in denial i.e. denying, or failing to acknowledge that they are having problems. The relationships between symptoms, abilities, and mechanisms such as coping, denial and loss of insight and patient-perceived QOL require further study.

(10-7) Chapter 10: summary

In summary, we aimed to administer our complete interview battery at six-monthly intervals to monitor changes over a period of one year. This longitudinal component was the least satisfactory component of the research.

One of our main goals of this feasibility study was to document and address the methodological problems that we anticipated would arise in this patient group, such as loss to follow-up and the impact of this on data-analysis. As predicted, our sample size diminished over time as patient-carer dyads were lost to follow up. Amongst the patient-carer dyads that we did retain in the study, some patients who were initially able to participate in a QOL interview were unable, at a later time, to engage in a discussion about their well-being. Since we had some loss to follow up and we were running statistical tests on multiple end-points, the main findings are about the feasibility of the study. The issue of missing data needs to be addressed and the imputing of missing values may be one avenue to explore. On the whole, the reports of QOL (patients self-rating, carers rating patients and carers self-rating) appeared to remain fairly stable over the one-year period but, given the methodological issues, our conclusions must remain tentative. When we teased out the sub-set of patient-carer dyads who were interviewed at all three time-points (n=11), the only statistically significant change from baseline to one year follow-up was a perceived improvement on the QOLAS-TOTAL score (patient self-rated).

Chapter 11

Discussion

This research aimed to develop a technique to assess the QOL of patients with dementia and their carers. When the project was conceived there was very little research into dementia patients' own self-assessment of their QOL and that which had been undertaken had used methods that were either too complex (the SEIQOL) or which did not assess QOL comprehensively (the instruments used in anti-dementia drug trials).

In choosing the most appropriate approach for dementia, the full spectrum of QOL assessment techniques was reviewed, ranging from the fully qualitative to the purely quantitative. Since so little work had been done in assessing the QOL of patients with dementia, there was clearly a need to do two preliminary things. First, it was necessary to establish whether patients with dementia could communicate anything about their quality of life and, if so, until what stage of their illness this was possible. Second, if they were able to express a view about their QOL, there would be a need to collect preliminary qualitative data on what the patients said about their well-being, and what they deemed important to their quality of life. Only after this exploratory work had been undertaken would it be possible to move on to a more sophisticated, quantitative analysis. This work attempted to address these stages simultaneously, that is to say an attempt was made to collect both qualitative and quantitative data at each interview.

The Quality of Life Assessment Schedule (QOLAS)

The method developed and refined, based on the Repertory Grid Technique (RGT), was one which allowed for a synthesis of qualitative and the quantitative data. The RGT was originally conceived to chart the individual, idiosyncratic progress of the patient undergoing psychotherapy. From the RGT, a generic technique, the QoLASCA, was developed to assess the QOL of patients with neurological conditions and the early psychometric testing was done in patients with epilepsy and trigeminal neuralgia.

This method, which was complex and time-consuming, was further refined and streamlined and the resulting method, known as the QOLAS, was tested in two populations of patients with intractable epilepsy. The psychometric properties of the QOLAS were assessed and the technique was shown to be valid and more sensitive to change pre and post treatment than some of the other QOL measures used in the studies. Internal reliability of the QOLAS was tested, and found to be good, but it was not possible to assess test-retest reliability because of fluctuations in QOL/health status.

Already at this stage of streamlining and refinement, the QOLAS was sufficiently far removed from the Repertory Grid Technique to question whether the QOLAS could still be said to be based on the RGT. In the first place the "grid", with a complex array of constructs and elements, has been reduced to such an extent that it can no longer really be said to be a grid. Secondly, the repertory grid is one aspect of the methodology of Personal Construct Psychology (PCP) and the basic tenet of PCP is constructive alternativism. This is the theory that with all of the phenomena we encounter in our daily lives, it is we

who impose on events our own framework (or construction) of categories or dimensions, so that what we perceive around us appears to have order and pattern. A central part of the original Repertory Grid method, designed to explore the respondent's constructs, known as "triadic presentation" was found to be too lengthy in our QOL studies and we therefore dispensed with this component. In our refined method, the constructs have been elicited by more direct questioning.

In the context of researching **health-related** quality of life, this modification appeared to be justified since a key component of self-construal for patients with a certain health condition, such as epilepsy, was found to be the perceived distinction between "me" i.e. a person who experiences seizures and the following restrictions in my life, versus the "other" i.e. a person without epilepsy who is perceived to be free from these restrictions. In other words, enquiries about health-related quality of life, put to someone with a chronic health condition, appear to prompt the elicitation of bi-polar constructs (illness leading to impairment/restrictions versus health implying freedom from impairment/restrictions). It could be argued, nevertheless, that this streamlining of the technique is a further departure from both the original Personal Construct theory and the Repertory Grid methodology and that the simplified method of eliciting constructs has not been tested with a sufficiently wide variety of respondents (e.g. different patient populations) to allow the conclusion to be drawn that in streamlining the technique, no important insights are lost. A key concept, embedded within the original method, has been exploited, however, namely individualised subjective assessment.

After pilot testing, the QOLAS was streamlined and simplified for the assessment of the QOL of patients with dementia and their carers. The resulting method is therefore even further removed from the original Repertory Grid Technique but there was a clear need for simplification for use with patients with cognitive impairment.

There are, however, additional points for discussion concerning the use of a method based on RGT for patients with dementia. We chose an 'individualised technique' as the general approach, and the Repertory Grid in particular, because the literature suggests (both theoretically and empirically) that individualised methods are more valid. Instead of a fixed questionnaire, the respondent is invited to think, reflect, judge and generate items of concern to themselves. As outlined in Kelly's original work, construct theory is based on the idea of the person as a "scientist". By this, he meant that we have our own view of the world (our theories), our expectations of what will happen in given situations (hypotheses) and through our behaviour we continue to experiment with life. For a person to explore the world like a scientist, however, entails a fairly sophisticated level of cognitive functioning and we might ask whether this theoretical underpinning holds up for the person with increasing cognitive impairment. On the other hand, the vast Personal Construct and Repertory Grid literature has many papers on use of the Repertory Grid with patients with a wide range of psychiatric illness including schizophrenia, organic brain injury and suicidal behaviour. The repertory grid has also been used with children and adults with low IQ. Most patients with dementia in general, and Alzheimer's disease in particular, have few cognitive problems in the very early stages of their illness and the patients interviewed for this research were fluent and articulate in the mild-to-moderate stages of the disease. It

therefore seems appropriate to continue to tap in to the construct system of the person with dementia until such a time as the cognitive complexity of this interview is no longer possible.

Further testing of the QOLAS required

Preliminary testing of the feasibility and psychometric properties of the QOLAS was undertaken in a group of patients with dementia. The method was feasible for all carers and for patients with mild-to-moderate dementia. Patients with mild-to-moderate dementia are able to talk about their wellbeing and they appeared, from their replies, to understand the term "quality-of-life". Interviews were possible until the patients' cognitive abilities had reached a Mini-Mental State Examination (MMSE) score of approximately 12 points. After this cut-off quality of life interviews were no longer possible. Although the brevity and simplicity of the MMSE have guaranteed its widespread use (it is the first choice in most studies), it has nevertheless been criticised in the literature. It has been suggested, for example, that the MMSE is not a precise staging tool for use in drug trials. Another problem is that it is not valid for all types of dementia. Fronto-temporal dementias, for example, are characterised in the early stages by changes in personality and behaviour and the cognitive profile of the Alzheimer's patient (e.g. early memory impairment) is usually not seen. It could be argued that other methods of assessing the severity and progress of dementia will be more valid for future QOL studies.

After preliminary testing, two main modifications to the QOLAS were made to facilitate its use by persons with dementia: (1) because many patients and carers, for different reasons, were found to have stopped work, the question about work was changed to a question about "daily activities"; (2) the scoring of each construct, asking the question "please rate how much of a problem you would like this (construct) to be, ideally" was dropped since this question was difficult for the patients to understand.

It has been suggested that, at the extremes, quantitative methods are reliable but not valid and that qualitative methods are valid but not reliable (Mays & Pope, 1996). The QOLAS technique aims to synthesise both qualitative and quantitative data. As might be expected, the method was found to be valid with acceptable face, construct and criterion validity. One of the problems in this testing was that, with no "gold standard", and a paucity of measures of wellbeing for this patient group, criterion validity was difficult to assess. Our results relied heavily on a comparison with the COOP charts. It could be argued that these are not really appropriate since the precise wording of the questions (and the time frame that the respondent is asked to consider) result in the COOP charts tapping into different aspects of health or well-being when compared to the QOLAS. The pictorial representations (cartoons of 'stick-men') will have added to the difference between the questions asked (and thus information being elicited) by the two measures.

Internal reliability was found to be good but we did not, in this study, have the opportunity to assess test-retest reliability in either patients with chronic epilepsy or the patients with dementia. The assessment of test-retest reliability is difficult because genuine changes in health, mood and quality of life may have occurred in the intervening period. In the case of intractable epilepsy, the occurrence of seizures and/or fluctuations in mood led to changes in reporting of QOL even after as little time as a 24-hour follow-up period. The assessment of the reliability of a new instrument is a complex process and

the recent literature has suggested a shift in our understanding of the concept of reliability with a change in emphasis away from the reliability of the instrument itself to thinking about the reliability of the patients or other groups responding to the questionnaire (Streiner & Norman, 1995).

In the case of dementia, we encountered another problem in that it was clear that requesting extra interviews with carers at this difficult time was unreasonably burdensome. The test-retest reliability of the QOLAS in both patients with dementia and their carers needs to be assessed. Also, we did not have the opportunity in the dementia study to assess the sensitivity of the QOLAS to change pre and post an intervention. In the epilepsy studies, the QOLAS was found to be more sensitive to change than some other QOL assessment techniques used but the sensitivity of the method in dementia needs to be tested. This is especially important for any instrument used in the context of drug studies. Finally, our longitudinal dementia data raise questions about the validity and sensitivity of all of our scales to detect change over time. Most of the scales were stable over the one year period with the exception of the patient-self-rated QOLAS-Total (for the subset of patient-carer dyads where complete data was obtained at all 3 time-points, n=11). In this subset, the patients rated themselves as having significantly improved QOL at one year follow-up even though their Mini-Mental State Examination scores had dropped by a few points and they were experiencing, on average, more neuropsychiatric symptoms. The QOLAS, rather than rating "objectively" observable phenomena, asks the respondent to nominate items and score how much of a problem they perceive each item to be. It is thus a matter of satisfaction. The patients' perception that their QOL had improved at one year follow-up may be due to a number of phenomena such as coping, adjustment, anosognosia and/or denial. These will be discussed further below. It is not clear from the current research which, if any, of these mechanisms are being deployed. The relationship between QOL and insight, denial, coping and so forth is likely to be complex and further research is required to understand these phenomena and their relation to QOL in this patient group.

In summary, whilst the results of the preliminary testing of the psychometric properties of the QOLAS look promising, considerably more testing in a much larger sample is necessary.

Other methodological issues

Because of the progressive nature of all dementing illnesses, one major concern is the reliability, or stability, of the patients' replies. This was assessed in two ways: first, by comparing each patient's answers about a particular domain, (concerning one aspect of their QOL) elicited by two different questionnaires or assessment techniques during the same interview. Second, the patient's answers were compared to the views of the main carer. There are problems with both of these approaches. Although two questions might appear to be tapping the same aspect of QOL, research has shown that slight differences in wording or in the time-frame being considered (today/in the last week/in the last month) can have a profound effect on responses. It is virtually impossible to disentangle measurement error from these so-called "framing-effects".

There are problems in asking a proxy because proxy answers are filtered through the views and judgements of another person. In cases where the carer was distressed at interview, there is even more

reason to believe that their views about the patient's QOL, and their perception of number and degree of problems the patient might have, will be largely coloured by their own distress in the caring role. Our results show that the patients' views on their own QOL and the carers' views on the QOL of the patient, differed, with the patients reporting fewer problems. This finding raises the important question of whose views about QOL should we take. Is one or the other view (patient self-report or carer proxy-report) more "true" than the other..? Does it make sense, in this context, to speak of a "true" answer..? This question has important implications, particularly where QOL data are used in cost-utility analyses to inform decisions about the allocation of scarce resources.

Research in the field of dementia is rapidly moving forwards and results of studies yielding new insights are continually being published. As more is known about the different dementias, further sub-types are being named and even within the "Alzheimer's type", recent results suggest there are further distinct sub-types with differing cognitive and behavioural profiles. Given this trend, it is unlikely that one single QOL scale for dementia, even a 'generic' one, will prove adequate. Rather, there will probably be a need for separate disease-specific QOL scales for each type of dementia. Given the need to compare across disease-groups, there will probably be a need to use generic scales in these patient groups and any such generic scales will, of course, need to have been fully validated in each dementia group.

QOL in dementia is further complicated by mechanisms such as coping, adjustment, anosognosia and/or denial. Both the patients and their carers might be in denial at different stages throughout the illness. The carers might be employing psychological (cognitive) coping mechanisms and the patients might also be doing so in the early stages of their illness. With increasing organic changes in the brain, however, as the illness progresses, the patient will move on from mechanisms that are primarily psychological in origin, to those that have an organic, or physical basis. The phenomena of denial and anosognosia, and their relationship to QOL, require further study.

A diagnosis of dementia is clearly devastating, both for the patient and the patient's main carer. Patients are often emotionally labile at interview, especially those that have insight and are aware of their difficulties in formulating an answer. The carers in our study attempted to convey the full scale of their private tragedy with such descriptions as "I could scream sometimes", "the last seven years have been too terrible" and "you are seeing somebody die every day".

As researchers we must ask whether we should be interviewing this extremely vulnerable group..? It is surely an ethical issue whether our QOL interviews in these circumstances might be unduly intrusive and burdensome. We must be particularly careful to ascertain the meaning of the responses given and to ask, regarding our quantitative data, "what do the numbers mean..?" Most of the patients and carers in this study said that they enjoyed the opportunity to talk to someone but it was clearly a painful experience. This research would suggest that sensitive interviewing by an experienced researcher is important in this clinical group.

The carers' replies clearly indicated that caring for a person with dementia is very stressful and has a profound impact on the carers' quality of life. Indeed, the mean scores on a measure of psychiatric symptoms were above the cut-off for "caseness", suggesting that there was a high degree of psychiatric morbidity. The picture suggested, however, by the qualitative data, was one of peaks and troughs with

depression, anger and bitterness evolving into a later stage of acceptance, the seeking of help, and the deployment of coping mechanisms. Future research, with a larger data set, could look at a number of variables that might influence carer QOL such as age, relationship to patient, quality of marital relationship and the patient's cognitive, psychiatric and affective symptoms.

The longitudinal data was perhaps the least satisfactory component of the research. Our sample size, relatively small to begin with, became smaller at each successive follow-up interview. The patients all recruited from the Queen Square Dementia Research Group, were mainly attending the National Hospital regularly as participants in one of the anti-dementia drug trials were thus a highly selected sample. The patients and their carers were thus already regularly undergoing a number of neuropsychological, physical and other examinations when they were invited to participate in the current study. Although the QOL interviews took place on a different day, often in the patient's home to minimise any inconveninece, nevertheless consenting to yet more research may have been an extra burden which perhaps precluded many patients and carers from consenting to take part. The results were relatively stable over time and it may be that one year is not a long enough follow-up in which to observe significant changes. Future research could address this with a longer follow-up period.

There were relatively few significant differences between the mild-to-moderate and the severe groups on any of the measures at any of the three time-points. This finding might have been due to the (in)sensitivity of our measures but it might also have been due to small sample sizes. The SF-36, which is more correctly regarded as a measure of health status, did not show change over one year. It might be that there is not much change in the carers' health over one year. It might also be that there were changes but that the SF-36 was not sensitive enough to detect change. Similarly, the EQ-5D does not appear to a valid and sensitive instrument for the detection of subtle changes in QOL in the early stages of dementia. Further research with larger sample sizes is necessary to corroborate these findings. Because of these methodological inadequacies, the results of the longitudinal part of the study must be interpreted with extreme caution.

The QOLAS was shown to be a useful tool, in the two epilepsy studies and for use with both patients with dementia and their carers. The debate about the most useful approach to measure QOL will no doubt continue, with researchers choosing a technique somewhere along the subjective-objective/quantitative-qualitative/valid-reliable continuums as fits their purposes. There could not be one perfect, ideal method because the uses to which QOL data are put are so diverse. The QOLAS requires an interview and the building up of rapport with the respondent (and the mirroring of the respondent's choice of vocabulary) are seen as important features of the approach, maximising the technique's validity. The practicalities and resource implications of having an interviewer to collect the data may preclude the use of the QOLAS in some studies. The economies made by dispensing with an interview might, however, prove to be a false economy if this resulted in the collection of data which lacked basic validity for the respondent.

Future research:

Although preliminary testing of the psychometric properties of the modified and streamlined QOLAS shows this to be a promising technique, further testing of the method is required in a number of other settings with larger sample sizes. First, although the method appeared to be valid, with good internal reliability and excellent sensitivity to change in the two epilepsy studies, we were unable to assess test-retest reliability and this is an important shortcoming which needs to be addressed in future research. In the dementia study, preliminary testing showed the measure to be feasible and valid. Whilst internal reliability was assessed, and found to be acceptable, again, test-retest reliability was not assessed and this needs to be addressed in a future study. In the current dementia study it was not possible to assess sensitivity to change and this also could be tested in the future. A number of new anti-dementia drugs are becoming available and one possibility would be to incorporate the QOLAS alongside other measures into a follow-up study to look at QOL pre and post treatment. If none of the measures is sensitive, however, such an approach would not be possible.

If the QOL scales developed for use in dementia are intended to detect changes in QOL as a result of an intervention, then the sensitivity of the measure to change becomes a crucial issue. The issue of sensitivity, or responsiveness, of QOL measures is a topic of continuing methodological debate in the QOL literature. Many scales have not been adequately tested in this respect and there are ongoing conceptual debates about how much change is significant and the difference between statistical significance and what is termed "clinical significance". Whilst this debate will no doubt continue for some time, sensitivity is an important and crucial property of a measure, particularly if decisions about the prescription (or the withholding) of treatment depends upon the presentation of credible data clearly showing a benefit.

Assessment of QOL in dementia is in the very early stages and, although a number of measures are now becoming available, none of them is fully validated and psychometric testing of all of the new QOL techniques for use in dementia is ongoing.

This group of patients with dementia had a number of diagnoses, although most of the patients were diagnosed as having "probable Alzheimer's disease". In future studies, it would be important to sub-group the patients according to aetiology. Since the different types of dementia have differing cognitive and behavioural profiles, the question of whether a number of QOL scales needs to be developed, one for each of the different types of dementia, would need to be addressed at some point.

With larger sample sizes it would be possible to answer more sophisticated research questions for all three components of this research i.e. patient self-rating, carer rating patient and carer self-rating. Larger sample sizes would allow the use of multivariate statistics such as regression techniques to predict the contribution of each of a number of variables such as age, gender and symptomatology on the overall QOL score.

Although the QOLAS method relies upon an interview (and a sensitive and experienced interviewer is the best option for dementia research), one possibility for the future would be to explore other ways of collecting these data. With the advances in computers and information technology, it remains to be explored whether a computerised version of the QOLAS could be developed.

In summary, dementia is a devastating health condition which has a profound impact on the QOL of both the patient and their carers. As our population ages, the numbers of persons with dementia will continue to rise. At present there is no cure for any of the dementias and so the goal of management and treatment is to attempt to improve QOL. In order to assess and monitor changes in QOL, valid, reliable and sensitive assessment techniques must be available. The QOLAS is a promising technique but further psychometric testing of the method is required. A number of QOL measures are currently being developed for use in dementia but they are all in the early stages of development and further testing and validation are ongoing. Finally, there are many technical and ethical issues raised by the assessment of QOL in dementia. As such, all aspects of the collection, interpretation and use of QOL data in the area of dementia must therefore be scrupulously monitored.

Section 12

Tables

Table 1: Epilepsy surgery study:

Summary of patient data

	NO 75% Ss. reduction	75% or greater Ss. reduction
Number of patients.	18 (15)	22
male	08 (7)	07
female	10 (8)	15
No surgery	15	0
Yes surgery	03	22

Table 2: Epilepsy surgery study

Summary of outcome measures scores

Outcome measure	75% Red mean (SD) t=1		75% Red mean (SD) t=2		No op mean (SD) t=1		No op mean (SD) t=2	
QOLAS	32.3	(8.0)	17.1	(8.8)	31.3	(6.7)	29.3	(8.3)
EQ-VAS	61.6	(20.3)	76.6	(15.6)	64.6	(17.4)	69.1	(13.6)
ESI-CMH	62.2	(14.3)	74.8	(12.1)	59.9	(14.9)	63.4	(14.5)
ESI-CPH	73.2	(14.0)	82.9	(11.6)	65.6	(26.8)	71.1	(18.3)
ESI-CRF	69.6	(22.9)	78.5	(20.8)	56.5	(27.1)	67.4	(27.9)

ESI-CMC = ESI-55 composite mental health score.
ESI-CPH = ESI-55 composite physical health score.
ESI-CRF = ESI-55 composite role functional score.

Table 3: Epilepsy surgery study

Summary of outcome measures scores

EQ-UTILITY	75% Red		No op	
	median	mean (SD)	median	mean (SD)
t=1	0.85	0.81 (0.31)	0.85	0.77 (0.24)
t=2	1.00	0.91 (0.11)	0.85	0.90 (0.11)

Table 4: Epilepsy surgery study

EQ-5D descriptive health profile data

Baseline EQ-5D profile data for the two groups: (1) op&75% seizure reduction (n=22) and (2) no op (n=15)

EQ domain	No problems		Some problems		Severe/extreme	
	Ss reduced	Ss not redc	Ss reduced	Ss not redc	Ss reduced	Ss not redc
Mobility	86*	80	9	20	5	0
Self-care	86	87	14	13	0	0
Usual acs.	72	67	18	27	9	7
Pain/discom	82	80	18	20	0	0
Anx/depr	59	33	32	60	9	7

* figures are % of patients

Table 5: Epilepsy surgery study

EQ-5D descriptive health profile data

EQ-5D profile data at 6 months follow-up for the two groups: (1) op & 75% seizure reduction (n=22) and (2) no op (n=15)

EQ domain	No problems		Some problems		Severe/extreme	
	Ss reduced	no op	Ss reduced	Ss not redc	Ss reduced	Ss not redc
Mobility	90*	93	10	7	0	0
Self-care	100	100	0	0	0	0
Usual acs.	89	93	11	7	0	0
Pain/discom	85	80	15	20	0	0
Anx/depr	80	60	20	40	0	0

* figures are % of patients

Table 6: Epilepsy surgery study

Comparison of baseline EQ-5D profile data with UK norms

Percentage reporting "no problems".

EQ domain	Our study (n=125) %	UK survey (n=3395) %
Mobility	88	82
Self-care	93	96
Usual activities	78	84
Pain/discomfort	82	67
Anxiety/depress	65	79

Table 7: Epilepsy surgery study

Test of criterion validity

Correlations of QOLAS subscales and QOLAS total with the eleven subscalse of the ESI-55 and the three composite ESI-55 scales (n=108). All time 1 data. Non-parametric Spearman's rank correlation coefficients.

ESI-55	QOLAS Physical	QOLAS Psychol.	QOLAS Social	QOLAS Work/econ.	QOLAS Cognitive	QOLAS Total
Health	.35 ****	.46 ****	.36 ****	.29 **	.02	.47 ****
Energy	.11	.14	.09	.11	.14	.22 **
QOL	.31 ***	.46 ****	.41 ****	.25 **	.06	.48 ****
Soc. Func.	.19 *	.31 ***	.46 ****	.12	.04	.32 ***
Emotional	.16	.39 ****	.30 ***	.07	.11	.27 **
Cog. func.	.02	.09	.02	.15	.44 ****	.24 **
Role emot.	.15	.26 **	.07	.24 **	.03	.24 **
Role mem.	.003	.19 *	.13	.24 **	.30 **	.28 **
Role-phys.	.24 **	.20 *	.16	.14	.19 *	.27 **
Phys func.	.22 *	.20 *	.13	.17	.09	.24 **
Pain	.26 **	.18	.03	.16	.01	.15
Composite						
CMH	.26 **	.44 ****	.35 ****	.22 *	.06	.43 ****
CPH	.30 ***	.32 ***	.18	.24 **	.14	.34 ****
CRF	.18	.30 **	.17	.30 ***	.26 **	.38 ****

* p = 0.05; ** p = 0.01; *** p = 0.001; **** p = 0.0001

Table 8: Epilepsy surgery study

Internal reliability

Correlations of QOLAS subscales with the QOLAS total score (n=145). All time 1 data. Non-parametric Spearman's rank correlation coefficients.

QOLAS subscale	Correlation coeff.	Sig.
Physical	.66	****
Psychological	.71	****
Social	.68	****
Work/economic	.63	****
Cognitive	.58	****

**** p = 0.0001

Table 9: Epilepsy drugs study

Clinical status at 6 months follow up

Status at 6 months	Patients (n=125)	%
Still on drug	75	60%
Experiencing side-effects *	49	39%
Experienced serious ** adverse events	15	12%
50% or more reduction in seizures	46	37%
Did not attend follow-up interview	21	---

Key: * Side-effects as reported by patients and attributed by them to the add-on therapy.
** Serious adverse events are epilepsy-related events requiring urgent medical intervention.

Table 10: Epilepsy drugs study

Summary of outcome measures scores

Outcome measure	Ss were Redc. baseline mean ± (s.d)	Ss were Redc. 6 month FU mean ± (s.d)	Ss NOT Redc. baseline mean ± (s.d)	Ss NOT Redc. 6 month FU mean ± (s.d)
QOLAS	31 (10)	23* (11)	32 (8)	30 (11)
EQ-VAS	67 (23)	75** (17)	63 (19)	64 (20)
EQ-utility	0.86†	0.89†	0.85†	0.85†

* P = 0.001, ** P = 0.02, † median reported

Table 11: Epilepsy drugs study

Comparison of baseline EQ-5D profile data with UK norms

Percentage reporting "no problems".

EQ domain	Our study (n=125) %	UK survey (n=3395) %
Mobility	88	82
Self-care	93	96
Usual activities	78	84
Pain/discomfort	82	67
Anxiety/depress	65	79

Table 12: Epilepsy drugs study

EQ-5D Descriptive health profile data

50% seizure reduction group: Baseline and Follow-up (n=46)

EQ domain	No problems		Some problems		Severe/extreme	
	t=1	t=2	t=1	t=2	t=1	t=2
Mobility	40 (87)*	39 (85)	6 (13)	7 (15)	0 (0)	0 (0)
Self-care	43 (93)	44 (96)	3 (07)	2 (04)	0 (0)	0 (0)
Usual acs.	35 (76)	38 (83)	9 (20)	8 (17)	2 (4)	0 (0)
Pain/discom	36 (78)	39 (85)	10 (22)	7 (15)	0 (0)	0 (0)
Anx/depr	36 (78)	29 (63)	8 (17)	16 (35)	2 (5)	1 (2)

* (figures in brackets are % of patients)

Table 13: Epilepsy drugs study

EQ-5D Descriptive health profile data

NO 50% seizure reduction group: Baseline and Follow-up (n=79)

EQ domain	No problems		Some problems		Severe/extreme	
	t=1	t=2	t=1	t=2	t=1	t=2
Mobility	70 (87)*	70 (89)	9 (11)	9 (11)	0 (0)	0 (0)
Self-care	73 (92)	75 (95)	6 (08)	4 (5)	0 (0)	0 (0)
Usual acs.	63 (80)	68 (86)	15 (19)	11 (14)	1 (1)	0 (0)
Pain/discom	66 (84)	61 (77)	13 (16)	16 (20)	0 (0)	2 (3)
Anx/depr	45 (57)	45 (57)	30 (38)	31 (39)	4 (5)	3 (4)

* (figures in brackets are % of patients)

Table14: Epilepsy drugs study

Criterion validity (n=125). Time-1 data. All non-parametric Spearmans rank correlations.

QOLAS	EQ-5D Mobility	EQ-5D Self-care	EQ-5D Usual acs	EQ-5D Pain/disc	EQ-5D Anx/depr	EQ-5D EQ-VAS
Physical	.18 *	.19 *	.18 *	.31 ***	.18 *	.37 ***
Psychological	.04	.08	.07	.13	.36 ***	.37 ***
Social/family	.09	.14	.07	.09	.13	.32 ***
Work/economic	.05	.08	.26 **	.12	.16	.24 **
Cognitive	.14	.03	.25 **	.14	.17	.31 ***
QOLAS-Total	.13	.10		.20 *	.29 ***	.46 ***

* p = 0.05; ** p = 0.01; *** p = 0.001

Table 15: Epilepsy drugs study

Internal reliability

Correlations of QOLAS subscales with the QOLAS total score (n=125). All time 1 data. Non-parametric Spearman's rank correlation coefficients.

QOLAS subscale	Correlation coeff.	Sig.
Physical	.53	****
Psychological	.72	****
Social	.74	****
Work/economic	.72	****
Cognitive	.71	****

**** p = 0.0001

Table 16: Psychometric testing of the QOLAS in dementia

Correlations between patients self-rating and carers rating the patient for two groups: mild-to-moderate dementia (n=22) and mild dementia (n=12).

	Mild-to-moderate (MMSE>10) (n=22)				Mild dementia (MMSE>20) (n=12)			
Domain	**Spearman's correl.**		**Pearson's correl.**		**Spearman's correl.**		**Pearson's correl.**	
	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.
Phys.	.3761	.007**	.3787	.007**	.8166	.001***	.7934	.002**
Psych.	.4308	.002**	.3699	.008**	.7330	.007**	.6671	.018*
Soc.	.4540	.001***	.4252	.002**	.5728	.052*	.6107	.035*
D. Acs.	.3412	.082	.4123	.033*	.3234	.305	.4045	.192
Cogn.	-.0473	.744	-.0519	.720	.3229	.306	.2906	.359
Total	.4149	.031*	.4061	.036*	.7937	.002**	.7349	.006**

* p = 0.05; ** p = 0.01; *** p = 0.001; (all 2-tailed)

Table 17: Psychometric testing of the QOLAS in dementia

Criterion validity: correlations between the total QOLAS score and instruments assessing other aspects of well-being. All (non-parametric) Spearman's Correlation coefficients.

Scale	Patient rating self				Carer rating patient			
	mild-to-mod (n=22)		mild dementia (n=12)		mild-to-mod (n=22)		mild dementia (n=12)	
	coeff.	p	coeff.	p	coeff.	p.	coeff.	p.
MMSE	.1709	.447	-.4472	.145	-.1457	.518	-.4716	.122
COOP (overall)	.4060	.068	.4690	.124	---	---	---	---
COOP (daily acs)	.3914	.079	.7058	.010**	---	---	---	---
COOP (fitness)	.4264	.054*	.8838	.000***	---	---	---	---
COOP (social)	.6495	.001***	.8517	.000***	---	---	---	---
COOP (feelings)	.6574	.001***	.7900	.002**	---	---	---	---
EQ-5D (mob)	.2253	.314	.2609	.413	.4312	.045*	.5886	.044*
EQ-5D (self-care)	-.0105	.936	.4838	.111	.2551	.252	.3893	.211
EQ-5D (usual acs)	.4076	.060	.5099	.090	.5389	.010	.5731	.051*
EQ-5D (pain/disc)	.3862	.076	.5671	.055	-.1530	.497	.2052	.522
EQ-5D (anx/depr)	.5170	.014*	.6189	.032*	.3157	.152	.4660	.127
NPI-global	---	---	---	---	.6347	.002**	.7005	.011**
IDDD	---	---	---	---	.4248	.049*	.5477	.065

* p = 0.05; ** p = 0.01; *** p = 0.001; (all 2-tailed)

Table 18: Psychometric testing of the QOLAS in dementia

EQ-5D Head-to-head Comparison

Cohen's weighted kappa statistic

	mild-to-moderate (n=22)		**mild dementia (n=12)**	
Mobility	.35	fair	.43	moderate
Self-care	.67	good	.63	good
Usual activities	.09	poor	.09	poor
Pain/discomfort	.67	good	.82	very good
Anxiety/depr.	.45	moderate	.47	moderate

Table 19: Psychometric testing of the QOLAS in dementia

Internal consistency: correlation of QOLAS domain scores with QOLAS total score.

QOLAS	**Patient rating self (n=22)**				**Carer rating patient (n=22)**			
domain	Spearman		Pearson		Spearman		Pearson	
	coeff.	p.	coeff.	p.	coeff.	p.	coeff.	p.
Physical	.5549	.007**	.5888	.004**	.5947	.004**	.6657	.001***
Psychological	.8471	.000***	.8112	.000***	.7906	.000***	.8065	.000***
Social	.8645	.000***	.8579	.000***	.6290	.002**	.6447	.001***
D. activities	.7987	.000***	.7941	.000***	.6440	.001***	.7140	.000***
Cognitive	.8169	.000***	.8112	.000***	.7041	.000***	.6996	.000***

* p = 0.05; ** p = 0.01; *** p = 0.001; (all 2-tailed)

Table 20: Psychometric testing of the QOLAS in dementia

Eleven Parameter Optimal Model for patient self-rated QOL

Predictor	**Partial Regression Co-Efficient (β)**	**95% Confidence Interval**	**p**
Patient Age (years)	0.26	-0.03 to 0.55	0.08
Patient Gender (0=Male, 1=Female)	-6.38	-10.1 to -2.6	0.004
MMSE Score	-1.14	-1.67 to –0.61	0.001
IDDD Score	-0.66	-0.91 to –0.42	<0.001
Co-op Overall	-2.25	-4.95 to 0.44	0.09
Co-op Daily Activities	-2.25	-4.84 to 0.33	0.08
Co-op Fitness	9.31	5.94 to 12.69	<0.001
Co-op Social	8.08	5.49 to 10.66	<0.001
Co-op Feelings	-3.94	-6.58 to -1.29	0.009
Profile of mood states	-0.40	-0.70 to –0.1	0.01
GHQ Score	0.13	-0.21 to 0.49	0.39
Constant (α)	33.6	11.8-55.4	0.007

$F(11,8) = 18.07$, $p = 0.0002$, $R^2 = 0.96$, Adjusted $R^2 = 0.91$

Table 21: Psychometric testing of the QOLAS in dementia

Six Parameter Optimal Model for carer-rated patient QOL

Predictor	Partial Regression Co-Efficient (β)	95% Confidence Interval	p
Patient Gender (0=Male, 1=Female)	-7.84	-13.9 to –1.76	0.02
Age at onset (years)	0.94	-0.13 to 2.02	0.08
IDDD	0.22	-0.03 to 0.48	0.08
NPI Global Score	0.26	0.05 to 0.47	0.02
Co-op Daily activities	-2.05	-5.6 to 1.49	0.23
Co-op Feelings	3.19	0.79 to 5.61	0.01
Constant (α)	3.12	-11.65 to 17.9	0.65

$F^{(6,13)} = 7.25$, $p = 0.002$, $R^2 = 0.77$, Adjusted $R^2 = 0.66$

Table 22: Results for the 13 patients with severe dementia - (proxy-rated)

Mean QOLAS scores for the patients who could (n=22) and could not (n=13) be interviewed. All carer rating patient.

QOLAS Domain	n=13 Mean	n=22 Mean	Parametric statistics T-tests		Non-parametric Mann-Whitney U	
			t-value	*2-tailed sig.*	*U*	*2-tailed sig.*
Physical	5.92	3.45	2.12	0.041 *	87.0	0.05 *
Psychol.	6.55	4.09	2.20	0.035 *	69.0	0.048 *
Social	7.77	3.55	4.58	0.000 ***	36.0	0.0001 ***
Daily acs.	2.50 (n=8)	6.55 (n=13)	4.35	0.000 ***	38.5	0.0001 ***
Cognitive	8.54	5.86	4.01	0.000 ***	47.0	0.0007 ***

* p = 0.05; ** p = 0.01; *** p = 0.001

Table 23: Results for the 13 patients with severe dementia - (proxy-rated)

Mean N.P.I. scores for patients who could (n=22) and who could not (n=13) be interviewed.

NPI scale	Interviewed (n=22)		Not intervwd. (n=13)		t-value	2-tailed
	Mean	s.d.	Mean	s.d.		Signif.
Euphoria	0.36	1.29	0.15	0.38	-0.57	0.574
Disinhibition	1.56	2.52	0.54	1.33	-1.27	0.213
Hallucinations	0.73	2.60	0.92	1.89	0.24	0.815
Delusions	0.95	2.80	1.23	2.62	0.29	0.775
Anxiety	2.18	2.50	2.23	2.86	0.05	0.958
Depression	1.41	2.81	2.46	2.50	1.11	0.273
Irritability	1.86	2.83	2.54	2.93	0.67	0.506
Night behav.	1.50	2.84	3.38	4.57	1.51	0.141
Agitation	1.32	1.84	3.62	2.99	2.83	0.008 **
Eating	1.00	2.39	4.31	4.13	3.01	0.005 **
Motor	2.36	3.51	4.62	4.03	1.74	0.092
Apathy	3.68	4.34	5.38	5.69	1.00	0.325
Global	18.86	14.61	31.38	16.94	2.31	0.027 *

* p = 0.05; ** p = 0.01

Table 24: Results for the 13 patients with severe dementia - (proxy-rated)

Results of the EQ-5D (carer rated) for patients who could (n=22) and who could not (n=13) be interviewed. The figures are percentages.

Domain	Missing		No problems		Some problems		Extreme problems	
	n= 13	n= 22	(n=13)	(n=22)	(n=13)	(n=22)	(n=13)	(n=22)
Mobility	--	--	39	68	39	32	22	0
Self-care	--	--	15	73	08	23	77	4
Usual acs.	--	--	0	32	15	50	85	18
Pain/disc.	23	--	54	73	15	27	08	0
Anx/depr.	8	--	39	68	39	32	14	0

Table 25: Results for the 13 patients with severe dementia - (proxy-rated)

EQ-5D Visual Analogue (VAS) scores

	Mild-to-moderate dementia (n=6)			Severe dementia (n=5)		
	Mean	Std. Dev.	Range	Mean	Std. Dev.	Range
VAS Total	70.58	18.13	35 - 95	27.00	22.25	0 - 50
VAS Physical	76.67	15.06	50 - 90	82.50	15.00	70 -100
VAS Mental	27.50	13.32	10 - 50	2.50	5.00	0 - 10

Since respondents almost all expressed the wish to give a separate score for physical and mental health, these separate scores were noted.

Table 26: Results for the 13 patients with severe dementia - (proxy-rated)

EQ-5D descriptive - percentage reporting "no problems".

EQ domain	Surgery study (n=125)	UK survey (n=3395)	Dementia study Carer rating pt. Severe stage (n=13)	Dementia study Carer rating pt. Mild-to-mod (n=22)
Mobility	88	82	39	68
Self-care	93	96	15	73
Usual activities	78	84	0	32
Pain/discomfort	82	67	54	73
Anxiety/depress	65	79	39	68

Table 27: Carers' own QOL

Carers: descriptive data

Carer	Whole group (n=35)			Mild-to-moderate (n=22)			Severe group (n=13)		
	mean	s.d.	range	mean	s.d.	range	mean	s.d.	range
Age	62	11	30-77	61.32	13	30-77	63.33	5.97	52.71
Onset*	5.24	3.28	1-15	4.71	2.9	1-10	6.08	3.80	1-15

* number of years since the onset of patients' symptoms (prior to interview)

Table 28: Carers' own QOL

Carers: gender

Gender	Whole group (n=35)		Mild-to-mod grp (n=22)		Severe grp. (n=13)	
	Number	**%**	**Number**	**%**	**Number**	**%**
Male	12	**34**	8	**36**	4	**31**
Female	23	**66**	14	**64**	9	**69**

Table 29: Carers' own QOL

Carers rating self: QOLAS

QOLAS	Whole group (n=35)		Mild-to-mod grp (n=22)		Severe grp (n=13)	
	Mean	**s.d.**	**Mean**	**s.d.**	**Mean**	**s.d.**
Physical	3.51	3.21	2.68	2.55	4.92	3.80
Psychol.	6.63	3.10	5.77	3.12	8.08	2.56
Soc/Fam	6.23	3.04	5.73	3.18	7.08	2.69
Work	4.34	3.26	4.27	3.24	4.46	3.43
Cogn.	1.31	1.55	1.45	1.77	1.08	1.12
Total	22.03	10.43	19.91	10.63	25.62	9.39

Table 30: Carers' own QOL

QOLAS: differences between the groups: mild-to-moderate versus severe

QOLAS	Parametric: t-tests		Non-parametric: Mann-Whitney		
	t-value	2-tailed sig	U	W	2-tailed sig
Physical	1.89	0.074	94.5	282.5	0.098
Psychol.	2.25	0.031 *	79.0	298.0	0.029 *
Soc/Fam	1.28	0.209	108.5	268.5	0.243
Work	0.16	0.871	136.5	240.5	0.827
Cogn.	-0.69	0.494	132.0	223.0	0.724
Total	1.60	0.119	96.5	280.5	0.113

* p = 0.05.

Table 31: Carers' own QOL

Profile of Mood States (POMS): comparison of the two groups: mild-to-moderate dementia (n=22) and severe dementia (n=13). T-tests and the Mann-Whitney U.

POMS	n=13		n=22		t-value	2-tail Sig.	U.	V.	2-tail *P*
	Mean	s.d.	Mean	s.d.					
Tension	2.85	3.13	1.55	1.85	1.50	0.144	102.0	249.0	0.284
Anger	1.69	2.36	1.40	1.73	0.41	0.684	124.0	215.0	0.817
Depression	4.77	4.83	3.30	4.07	0.94	0.354	103.5	247.5	0.320
Vigour	2.39	4.31	3.96	2.70	-1.29	0.208	76.0	167.0	0.043 *
Fatigue	4.15	3.57	4.20	2.78	-0.40	0.967	124.0	215.0	0.823
Total	11.08	14.37	6.50	9.57	1.10	0.279	97.0	254.0	0.223

* p = 0.05.

Table 32: Carers' own QOL

The General Health Questionnaire (GHQ-30): comparison of the two groups: mild-to-moderate dementia (n=22) and severe dementia (n=13). T-tests and the Mann-Whitney U.

GHQ scoring	n=13		n=22		t-value	2-tail Sig.	U.	V.	2-tail P
	Mean	s.d.	Mean	s.d.					
0011	9.15	7.09	7.86	5.05	0.62	0.54	123.5	240.5	0.64
0123	36.38	15.95	30.48	10.50	1.31	0.20	108.0	256.0	0.31

Table 33: Carers' own QOL

SF-36 results.

SF-36	mean (n=13)	mean (n=22)	median (n=13)	median (n=22)	mean rank (n=13)	mean rank (n=22)	U	W	2-tailed P
Phys	71.15	83.18	75.0	87.5	14.81	19.89	101.5	192.5	0.15
Role	68.75	82.95	100.0	100.0	15.46	18.61	107.5	185.5	0.38
Pain	79.23	82.23	100.0	100.0	16.69	18.77	126.0	217.0	0.57
GH	69.00	80.32	82.0	87.0	15.04	18.84	102.5	180.5	0.29
Vita	43.75	57.50	45.0	57.0	14.04	19.39	90.5	168.5	0.13
SocF	80.00	73.86	90.0	95.0	18.29	17.07	122.5	219.5	0.71
RE	81.82	71.67	100.0	100.0	18.64	16.18	103.0	205.0	0.40
MH	58.33	71.09	56.0	80.0	14.67	19.05	98.0	176.0	0.22

Table 34: Carers' own QOL

Criterion validity. QOLAS-total score. Correlations with other scales. Spearmans rank correlations. Whole group (n=35).

QOLAS correl. with scales:	Spearman coefficient	2-tailed p.
POMS Total	0.53	0.001 ***
GHQ-0123	0.53	0.001 ***
SF36 Physical	0.32	0.062
SF36 Role	0.30	0.088
SF36 Pain	0.33	0.05 *
SF36 General Health	0.34	0.05 *
SF36 Vitality	0.59	0.000 ***
SF36 Social Function	0.33	0.05 *
SF36 Role Emotional	0.36	0.041 *
SF36 Mental Health	0.67	0.000 ***

* p = 0.05; ** p = 0.01; *** p=0.001

Table 35: Carers' own QOL

Criterion validity

Physical subscale of the QOLAS (CSel.phy): correlations with other instruments. Whole group (n=35).

QOLAS correl. with scales:	Spearman coefficient	2-tailed p.
POMS-Total	0.64	0.000 ***
GHQ-0123	0.47	0.005 **
SF-36 Physical	0.59	0.000 ***
SF-36 Role	0.47	0.005 **
SF-36 Pain	0.45	0.006 **
SF36 General Health	0.55	0.001 ***
SF-36 Vitality	0.69	0.000 ***
SF-36 Social Function	0.47	0.005 **
SF-36 Role Emotional	0.39	0.024 *
SF-36 Mental Health	0.55	0.001 ***

* p = 0.05; ** p = 0.01; *** p=0.001

Table 36: Carers' own QOL

Criterion validity

Psychological subscale of the QOLAS (Csel.psy): correlations with other instruments.

Whole group (n=35).

QOLAS correl. with scales:	Spearman coefficient	2-tailed p.
POMS-Total	0.45	0.009 **
GHQ-0123	0.548	0.001 ***
SF-36 Physical	0.305	0.074
SF-36 Role	0.347	0.044 *
SF-36 Pain	0.258	0.134
SF36 General Health	0.347	0.044 *
SF-36 Vitality	0.547	0.001 ***
SF-36 Social Function	0.203	0.250
SF-36 Role Emotional	0.153	0.396
SF-36 Mental Health	0.595	0.000 ***

* p = 0.05; ** p = 0.01; *** p=0.001

Table 37: Carers' own QOL

Criterion validity

Social subscale of the QOLAS (Csel.soc): correlations with other instruments. Whole group (n=35).

QOLAS correl. with scales:	Spearman coefficient	2-tailed p.
POMS-Total	0.42	0.014 **
GHQ-0123	0.38	0.026 *
SF-36 Physical	0.06	0.705
SF-36 Role	0.07	0.675
SF-36 Pain	0.07	0.679
SF36 General Health	0.09	0.679
SF-36 Vitality	0.38	0.028 *
SF-36 Social Function	0.184	0.298
SF-36 Role Emotional	0.277	0.118
SF-36 Mental Health	0.45	0.008 **

* p = 0.05; ** p = 0.01; *** p=0.001

Table 38: Carers' own QOL

Carers' scale mean and median scores and differences between the group caring for those with mild-to-moderate dementia and the group caring for those with severe dementia.

Carers scale	Mild-to-moderate (n=19)			Severe dementia (n=12)			Comparison of the carer data for the two groups		
Ques.	**mean**	**S.D.**	**median**	**mean**	**S.D.**	**median**	**U**	**W**	**2-tail p**
1	5.58	3.83	7.0	8.27	2.20	10.0	60.5	214.5	0.053*
2	5.21	3.78	7.0	6.33	3.87	7.5	93.0	213.0	0.386
3	3.16	3.20	2.0	4.58	3.99	3.5	85.0	221.0	0.229
4	4.77	3.42	5.0	8.30	2.26	10.0	23.5	161.5	0.008**
5	2.26	2.77	0.0	3.92	4.12	2.5	84.0	222.0	0.201
6 ϒ	8.21	2.20	9.0	9.08	1.56	10.0	87.0	219.0	0.243
7 ϒ	7.32	3.02	8.0	7.58	3.58	10.0	99.5	206.5	0.536
8	2.42	3.31	1.0	4.17	4.32	3.5	92.5	213.5	0.358
9	3.17	3.19	2.0	3.33	3.77	2.5	105.5	183.5	0.914
10	5.05	4.40	6.0	8.67	3.08	10.0	59.5	246.5	0.018*

* p = 0.05; ** p = 0.01.

ϒ Each question on scale scored from 0-10 where 0 = "no problem" and 10 = "the worst problem" except questions 6 and 7 where the scoring is reversed i.e. 0 = "the worst problem" and 10 = "no problem".

Key:
The questions are about:
(1) caring interfering with life; (2) making sacrifices because of caring duties; (3) caring affected family relationships/friendships; (4) caring affected work; (5) caring affected your own health; (6) coping with caring; (7) feeling supported; (8) feeling in control; (9) feel there is stigma; (10) have plans for the future had to change.

Table 39: Carers' own QOL

Carers scale: test-retest reliability assessed by both the Intra-class Correlation Coefficient (ICC) and the Spearman's Rank correlation coefficient.

Question	ICC	Spearmans Correln.	P
1	0.81	0.72	0.03 *
2	0.73	0.67	0.006 **
3	0.70	0.67	0.007 **
4	0.59	0.22	0.6
5	0.84	0.79	0.000 ***
6	0.83	0.67	0.005 **
7	0.60	0.67	0.005 **
8	0.57	0.47	0.06
9	0.75	0.83	0.000 ***
10	0.55	0.58	0.02 *

* p = 0.05; ** p = 0.01; *** p=0.001

Key:
The questions are about:
(1) caring interfering with life; (2) making sacrifices because of caring duties; (3) caring affected family relationships/friendships; (4) caring affected work; (5) caring affected your own health; (6) coping with caring; (7) feeling supported; (8) feeling in control; (9) feel there is stigma; (10) have plans for the future had to change.

Table 40: Longitudinal component of the dementia study

Numbers of interviews completed at each of the 3 time-points

Data collected at time-points: 1, 2 and/or 3.	Number
Patient all 3 interviews and carer all 3	11
Patient 2 interviews and carer all 3	01
Patient 1 interview and carer all 3	03
Patient no interviews and carer all 3	09
Patient 2 interviews and carer 2	02
Patient 1 interview and carer 2	01
Patient 1 interview and carer 1	08
TOTAL	**35**

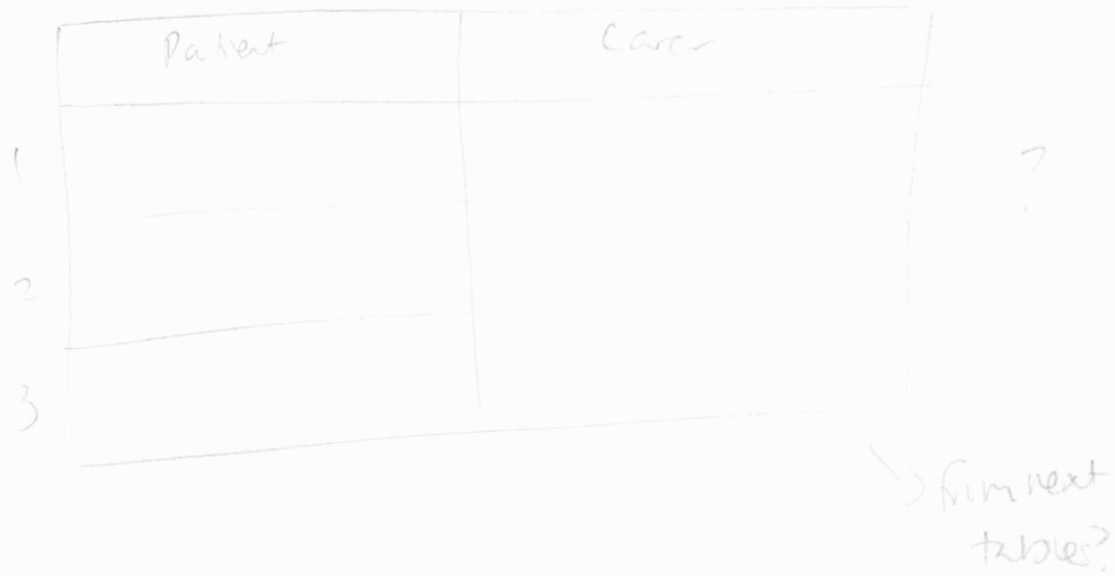


Table 41: Longitudinal component of the dementia study

Mean and median scores at each time-point (1,2,+3) for the MMSE, NPI-global, the COOP charts, the three QOLAS-total scores, the POMS and the GHQ-30. All patients with mild-to-moderate dementia (MMSE ≥ 11).

	Time 1 (n=22)			**Time 2 (n=14)**			**Time 3 (n=10)**		
	Mean	Std.dev	*Median*	Mean	Std.dev	*Median*	Mean	Std.dev	*Median*
MMSE	21.00	5.23	22.00	21.21	05.96	19.00	19.50	05.32	18.50
NPI-glo	18.86	14.61	16.00	24.36	19.38	22.50	34.20	25.37	28.00
COOP-1	2.00	1.10	2.00	01.86	01.23	02.00	02.00	0.94	02.00
COOP-2	2.24	1.45	2.00	02.14	01.35	01.00	01.50	0.85	01.00
COOP-3	2.29	1.31	3.00	02.21	01.31	02.00	02.50	0.95	02.00
COOP-4	2.67	1.11	2.00	02.36	0.84	02.00	02.00	1.25	01.50
COOP-5	2.76	1.09	2.00	02.57	01.02	02.00	02.20	1.23	02.00
qsel.tot	13.73	10.02	12.00	12.36	08.21	11.00	09.50	7.89	07.50
qcar.tot	23.50	9.44	21.50	20.07	08.53	22.00	19.50	8.42	20.50
csel.tot	19.91	10.63	21.00	20.36	11.22	22.00	20.40	13.13	19.00
POMS	6.50	9.57	3.5	3.79	10.27	-2.50	10.10	12.45	7.50
GHQ-30	30.48	10.50	32.0	31.79	15.05	26.00	32.60	17.02	28.50

Key:

MMSE = Mini Mental State Examination
NPI-glo = Neuropsychiatric Inventory - global score
COOP-1 = Overall Health
COOP-2 = Daily Activities
COOP-3 = Physical Fitness
COOP-4 = Social Activities
COOP-5 = Feelings
qsel.tot = QOLAS-total score (patient rating self)
qcar.tot = QOLAS-total score (carer rating patient)
csel.tot = QOLAS-total score (carer rating self)
POMS = Profile of Mood States
GHQ-30 = General Health Questionnaire-30 (0-1-2-3 scoring)

Table 42: Longitudinal component of the dementia study

Mean and median scores for the study-specific carers' scale at each time-point (1,2,+3). All patients with mild-to-moderate dementia (MMSE ≥ 11).

Scale	Time 1 (n=22)			Time 2 (n=14)			Time 3 (n=10)		
Ques	Mean	Std.dev	*Median*	Mean	Std.dev	*Median*	Mean	Std.dev	*Median*
1	5.58	3.83	7.00	5.64	3.32	5.50	5.70	3.06	7.00
2	5.21	3.78	7.00	4.50	3.98	4.50	5.00	3.56	7.00
3	3.16	3.20	2.00	3.31	3.43	3.00	4.30	3.77	4.50
4	4.77	3.42	5.00	2.08	3.43	0.00	3.71	3.95	4.00
5	2.26	2.77	0.00	2.86	2.32	3.00	2.60	2.37	2.00
6	8.21	2.20	9.00	8.07	2.50	9.50	8.10	1.79	8.50
7	7.32	3.02	8.00	6.14	4.05	8.00	5.60	2.55	6.00
8	2.42	3.31	1.00	1.64	2.37	0.00	3.30	2.87	2.50
9	3.17	3.19	2.00	3.79	3.64	4.00	4.00	3.74	4.00
10	5.05	4.40	6.00	5.36	4.34	7.00	5.50	6.06	4.50

Key:
The questions are about:
(1) caring interfering with life; (2) making sacrifices because of caring duties; (3) caring affected family relationships/friendships; (4) caring affected work; (5) caring affected your own health; (6) coping with caring; (7) feeling supported; (8) feeling in control; (9) feel there is stigma; (10) have plans for the future had to change.

Scoring:
For each question, "0" = no problem and "10" = a big problem EXCEPT questions 6 + 7 where the scoring is reversed i.e. for ques. 6 + 7, the score "0" = a big problem and "10" = no problem.

Table 43: Longitudinal component of the dementia study

Mean and median scores for the SF-36 at each time-point (1,2,+3). All patients with mild-to-moderate dementia (MMSE ≥ 11).

SF-36	Time 1 (n=22)			Time 2 (n=14)			Time 3 (n=10)		
	Mean	Std.dev	*Median*	Mean	Std.dev	*Median*	Mean	Std.dev	*Median*
Phys	83.18	22.60	87.50	86.43	14.86	92.50	78.00	26.48	87.50
Role	82.95	35.68	100.00	100.00	0.00	100.00	87.50	31.73	100.00
Pain	82.23	31.01	100.00	85.93	18.33	100.00	78.30	37.50	100.00
GH	80.32	23.45	87.00	74.29	20.37	82.00	71.90	24.31	82.00
Vita	57.50	20.97	57.50	46.43	18.23	45.00	45.50	19.36	42.50
Socf	73.86	32.38	95.00	88.04	22.00	100.00	66.67	39.76	90.00
RE	71.67	42.03	100.00	95.24	17.82	100.00	66.67	44.45	100.00
MH	71.09	21.27	80.00	68.00	18.36	68.00	65.20	19.87	70.00

Key:
Phys = physical; Role = role; Pain = pain; GH = general health; Vita = vitality; Socf = social function; RE = role emotional; MH = mental health.

Table 44: Longitudinal component of the dementia study

Mean and median scores at each time-point (1,2,+3) for the MMSE, NPI-global, the COOP charts, the three QOLAS-total scores, the POMS and the GHQ-30. All patients with severe dementia (MMSE ≤10).

Scale	Time 1 (n=13) *			Time 2 (n=11)			Time 3 (n=12)		
	Mean	Std.dev	*Median*	Mean	Std.dev	*Median*	Mean	Std.dev	*Median*
MMSE	2.08	3.40	0.00	0.45	1.51	0.00	0.58	2.02	0.00
NPI-glo	31.38	16.94	33.00	33.55	23.23	32.00	24.50	19.96	21.50
COOP1	1.67	1.15	1.00	1.00	---	3.00	5.00	---	---
COOP2	2.67	2.08	2.00	1.00	---	1.00	3.00	---	---
COOP3	1.33	0.58	1.00	2.00	---	2.00	3.00	---	---
COOP4	1.00	0.00	1.00	1.00	---	1.00	1.00	---	---
COOP5	1.67	1.15	1.00	1.00	---	1.00	3.00	---	---
qsel.tot	---	---	---	---	---	---	8.00	---	---
qcar.tot	29.31	9.48	29.00	29.09	12.07	32.00	27.18	27.18	27.00
csel.tot	25.62	9.39	28.00	24.18	12.28	26.00	21.75	21.75	26.50
POMS	11.08	14.37	8.00	14.55	16.06	19.00	11.00	10.57	10.00
GHQ-30	36.38	15.95	34.00	31.64	10.31	29.00	31.17	9.50	31.50

* N.B: the sample sizes quoted above refer to the number of patient-carer dyads at each time-point. The number of patients who could complete a self-rating (in at least some of the scales) were as follows: t1 = 3; t2 = 1; t3 = 1.

Key:

MMSE = Mini Mental State Examination
NPI-glo = Neuropsychiatric Inventory - global score
COOP-1 = Overall Health
COOP-2 = Daily Activities
COOP-3 = Physical Fitness
COOP-4 = Social Activities
COOP-5 = Feelings
qsel.tot = QOLAS-total score (patient rating self)
qcar.tot = QOLAS-total score (carer rating patient)
csel.tot = QOLAS-total score (carer rating self)
POMS = Profile of Mood States
GHQ-30 = General Health Questionnaire-30 (0-1-2-3 scoring)

Table 45: Longitudinal Component of the dementia study

Mean and median scores for the study-specific carers' scale at each time-point (1,2 +3) for the patients with severe dementia (MMSE ≤ 10).

Scale	Time 1 (n=13)			Time 2 (n=11)			Time 3 (n=12)		
Ques.	Mean	Std.dev	*Median*	Mean	Std.dev	*Median*	Mean	Std.dev	*Median*
1.	8.27	2.20	10.00	7.18	3.37	9.00	6.55	3.47	8.00
2.	6.33	3.87	7.50	7.45	3.30	9.00	6.82	3.87	9.00
3.	4.58	3.99	3.50	2.82	4.24	1.00	3.27	3.35	4.00
4.	8.30	2.26	10.00	5.25	4.92	6.00	2.38	3.54	0.50
5.	3.92	4.12	2.50	3.82	4.09	3.00	4.27	3.64	5.00
6.	9.08	1.56	10.00	8.09	3.08	9.00	7.82	2.56	9.00
7.	7.58	3.58	10.00	6.36	4.13	9.00	6.27	2.97	7.00
8.	4.17	4.32	3.50	3.55	4.03	2.00	1.55	2.30	0.00
9.	3.33	3.77	2.50	4.27	3.93	3.00	6.00	4.24	8.00
10.	8.67	3.08	10.00	8.18	3.63	10.00	5.82	4.49	8.00

Key:
The questions are about:
(1) caring interfering with life; (2) making sacrifices because of caring duties; (3) caring affected family relationships/friendships; (4) caring affected work; (5) caring affected your own health; (6) coping with caring; (7) feeling supported; (8) feeling in control; (9) feel there is stigma; (10) have plans for the future had to change.

Scoring:
For each question, "0" = no problem and "10" = a big problem EXCEPT questions 6 + 7 where the scoring is reversed i.e. for ques. 6 + 7, the score "0" = a big problem and "10" = no problem.

Table 46: Longitudinal Component of the dementia study

Mean and median scores for the SF-36 at each time-point (1,2,+3) for the patients with severe dementia (MMSE ≤ 10).

SF-36	**Time 1 (n=13)**			**Time 2 (n=11)**			**Time 3 (n=12)**		
	Mean	Std.dev	*Median*	Mean	Std.dev	*Median*	Mean	Std.dev	*Median*
Phys.	71.15	27.78	75.00	78.18	27.86	90.00	79.58	21.37	80.00
Role	68.75	41.46	100.00	81.82	40.45	100.00	87.50	31.08	100.00
Pain	79.23	27.20	100.00	73.27	37.03	100.00	79.00	31.64	100.00
GH	69.00	29.61	82.00	71.73	29.03	87.00	75.50	27.45	87.00
Vita	43.75	27.15	45.00	44.55	29.62	40.00	47.08	23.30	50.00
Socf	80.00	27.82	90.00	88.64	15.94	100.00	89.79	26.03	100.00
RE	81.82	40.45	100.00	84.85	34.52	100.00	84.17	37.04	100.00
MH	58.33	27.21	56.00	61.09	20.87	60.00	63.67	17.93	68.00

Key:
Phys = physical; Role = role; Pain = pain; GH = general health; Vita = vitality; Socf = social function; RE = role emotional; MH = mental health.

Table 47: Longitudinal Component of the dementia study

A comparison of the scores for Time=1 versus Time=3 for the instruments: MMSE, NPI-global, the COOP charts, the three QOLAS-total scores, the POMS and the GHQ-30. All patients with mild-to-moderate dementia (MMSE ≥ 11) (non-parametric Mann Whitney U test).

	U	W	2-tail p.	sig.
MMSE	91.5	146.5	0.46	ns
NPI-glo	69.5	205.5	0.10	ns
COOP1	67.5	122.5	0.11	ns
COOP2	78.5	133.5	0.22	ns
COOP3	90.5	145.5	0.52	ns
COOP4	97.5	152.5	0.76	ns
COOP5	102.0	157.0	0.92	ns
qsel.tot	79.0	134.0	0.22	ns
qcar.tot	88.5	143.5	0.39	ns
csel.tot	108.5	166.5	0.95	ns
POMS-tot	84.0	171.0	0.50	ns
GHQ-30	102.0	163.0	0.90	ns

Key:

MMSE = Mini Mental State Examination
NPI-glo = Neuropsychiatric Inventory - global score
COOP-1 = Overall Health
COOP-2 = Daily Activities
COOP-3 = Physical Fitness
COOP-4 = Social Activities
COOP-5 = Feelings
qsel.tot = QOLAS-total score (patient rating self)
qcar.tot = QOLAS-total score (carer rating patient)
csel.tot = QOLAS-total score (carer rating self)
POMS = Profile of Mood States
GHQ-30 = General Health Questionnaire-30 (0-I-2-3 scoring)

Table 48: Longitudinal Component of the dementia study

A comparison of the scores at time=1 versus time=3 for the study-specific carers' scale, for the patients with mild-to-moderate dementia (non-parametric Mann Whitney U test).

Ques.	U	W	2-tail p.	sig.
1.	94.0	149.0	0.98	ns
2.	90.0	145.0	0.84	ns
3.	72.5	172.5	0.31	ns
4.	38.0	66.0	0.59	ns
5.	80.5	164.0	0.51	ns
6.	84.0	139.0	0.64	ns
7.	58.5	113.5	0.09	ns
8.	71.0	174.0	0.26	ns
9.	79.5	155.5	0.61	ns
10.	92.0	147.0	0.91	ns

Key:
The questions are about:
(1) caring interfering with life; (2) making sacrifices because of caring duties; (3) caring affected family relationships/friendships; (4) caring affected work; (5) caring affected your own health; (6) coping with caring; (7) feeling supported; (8) feeling in control; (9) feel there is stigma; (10) have plans for the future had to change.

Scoring:
For each question, "0" = no problem and "10" = a big problem EXCEPT questions 6 + 7 where the scoring is reversed i.e. for ques. 6 + 7, the score "0" = a big problem and "10" = no problem.

Table 49: Longitudinal Component of the dementia study

A comparison of the scores at time=1 versus time=3 for the SF-36 for patients with mild-to-moderate dementia (non-parametric Mann Whitney U test).

SF-36	U	W	2-tail p.	sig.
Phys.	94.5	149.0	0.52	ns
Role	106.0	169.0	0.82	ns
Pain	109.0	164.0	0.96	ns
GH	82.5	137.5	0.26	ns
Vita	73.5	128.5	0.14	ns
Socf	87.5	132.5	0.59	ns
RE	105.5	160.0	0.81	ns
MH	86.5	141.5	0.34	ns

Key:
Phys = physical; Role = role; Pain = pain; GH = general health; Vita = vitality; Socf = social function; RE = role emotional; MH = mental health.

Table 50: Longitudinal Component of the dementia study

A comparison of the group with mild-to-moderate dementia versus severe at each time-point (1,2,+3) for the instruments: MMSE, NPI-global, the COOP charts, the three QOLAS-total scores, the POMS and the GHQ-30.

	TIME=1			TIME=2			TIME=3		
	U	W	2-tail p.	U	W	2-tail p.	U	W	2-tail p.
MMSE	------	-----	------	-----	-----	-----	-----	-----	-----
NPI-glo	81.5	295.5	0.036 *	71.5	176.5	0.22	42.5	122.5	0.38
COOP1	16.0	22.0	0.16	3.5	11.5	0.39	0.0	11.0	0.94
COOP2	25.5	43.5	0.58	4.0	5.0	0.43	1.0	10.0	0.14
COOP3	7.5	13.5	0.03 *	4.5	5.5	0.53	3.0	8.0	0.50
COOP4	15.0	21.0	0.12	3.0	4.0	0.32	2.5	3.5	0.39
COOP5	22.5	28.5	0.41	3.0	4.0	0.32	3.0	8.0	0.51
qsel.tot	------	-----	-----	----	-----	------	-----	-----	-----
qcar.tot	96.5	280.5	0.11	40.5	145.5	0.008 **	31.0	86.0	0.05 *
csel.tot	96.5	280.5	0.11	73.0	178.0	0.25	59.0	114.0	0.71
POMS	97.0	254.0	0.22	53.0	158.0	0.04 *	52.5	107.5	0.62
GHQ-30	108.0	256.0	0.31	82.5	190.5	0.68	61.0	116.0	0.80

* p = 0.05; ** p = 0.01

Statistic for group comparisons = Non-parametric MannWhitney.

Key:

MMSE = Mini Mental State Examination
NPI-glo = Neuropsychiatric Inventory - global score
COOP-1 = Overall Health
COOP-2 = Daily Activities
COOP-3 = Physical Fitness
COOP-4 = Social Activities
COOP-5 = Feelings
qsel.tot = QOLAS-total score (patient rating self)
qcar.tot = QOLAS-total score (carer rating patient)
csel.tot = QOLAS-total score (carer rating self)
POMS = Profile of Mood States
GHQ-30 = General Health Questionnaire-30 (0-1-2-3 scoring)

Table 51: Longitudinal Component of the dementia study

A comparison of the group with mild-to-moderate dementia versus severe at each time-point (1,2,+3) for the study-specific carers' scale.

Scale	TIME=1			TIME=2			TIME=3		
Ques.	U	W	2-tail p.	U	W	2-tail p.	U	W	2-tail p.
1.	60.5	214.5	0.53	72.5	177.5	0.23	42.5	98.5	0.27
2.	93.0	213.0	0.39	53.5	158.5	0.04 *	30.5	85.5	0.04 *
3.	85.0	221.0	0.23	82.0	191.0	0.65	53.5	121.5	0.66
4.	23.5	161.5	0.009 **	32.5	129.5	0.06	24.0	67.0	0.39
5.	84.0	222.0	0.201	90.5	195.5	0.72	42.0	97.0	0.23
6.	87.0	219.0	0.243	97.5	203.5	0.98	53.5	108.5	0.66
7.	99.5	206.5	0.54	91.0	196.0	0.74	53.0	108.0	0.64
8.	92.5	213.5	0.36	72.0	177.0	0.20	40.0	135.0	0.17
9.	105.5	183.5	0.91	96.0	201.0	0.92	44.0	99.0	0.28
10.	59.5	246.5	0.02 *	43.5	148.5	0.009 **	49.0	104.0	0.46

* p = 0.05; ** p = 0.01

Key:
The questions are about:
(1) caring interfering with life; (2) making sacrifices because of caring duties; (3) caring affected family relationships/friendships; (4) caring affected work; (5) caring affected your own health; (6) coping with caring; (7) feeling supported; (8) feeling in control; (9) feel there is stigma; (10) have plans for the future had to change.

Scoring:
For each question, "0" = no problem and "10" = a big problem EXCEPT questions 6 + 7 where the scoring is reversed i.e. for ques. 6 + 7, the score "0" = a big problem and "10" = no problem.

Table 52: Longitudinal Component of the dementia study

A comparison of the group with mild-to-moderate dementia versus severe at each time-point (1,2,+3) for the SF-36.

SF-36	TIME=1			TIME=2			TIME=3		
	U	W	2-tail p.	U	W	2-tail p.	U	W	2-tail p.
Phys	101.5	192.5	0.15	74.0	227.0	0.26	61.5	123.5	0.83
Role	107.5	185.5	0.27	78.0	195.0	0.16	62.0	123.0	0.79
Pain	126.0	217.0	0.50	78.5	222.5	0.33	58.0	127.0	0.62
GH	102.5	180.5	0.28	98.0	203.0	1.00	61.0	116.0	0.80
Vita	90.5	168.5	0.13	79.5	221.5	0.34	63.5	121.5	0.93
Socf	122.5	219.5	0.71	92.0	209.0	0.75	40.5	85.5	0.18
RE	103.0	205.0	0.39	90.5	210.5	0.52	56.0	111.0	0.49
MH	98.0	176.0	0.22	69.5	231.5	0.19	57.5	127.5	0.64

Key:
Phys = physical; Role = role; Pain = pain; GH = general health; Vita = vitality; Socf = social function; RE = role emotional; MH = mental health.

Table 53: Longitudinal Component of the dementia study

Longitudinal data for the sub-set of patient-carer dyads where both patients and carers were interviewed at all three time-points (n=11). The mean scores for each scale at baseline and one-year follow-up (t1 vs t3) were compared.

Measure	Time = 1		Time = 2		Time = 3		T1 vs T3 Sig. diff.
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	
MMSE	21.91	3.59	20.55	5.70	18.36	6.30	
POMS	7.60	10.20	5.64	10.92	9.09	12.28	
NPI-glo	19.45	10.64	21.18	13.44	31.64	25.52	
QSEL-tot	**18.82**	**8.41**	**12.18**	**7.80**	**9.36**	**7.50**	*
CSEL-tot	21.00	12.97	19.91	12.27	18.73	13.64	
QCAR-tot	24.45	9.43	19.36	8.80	19.18	8.06	
GHQ0123	31.18	13.10	32.73	16.94	31.27	16.74	
IDDD	53.73	13.64	47.90	14.01	52.82	11.19	
PT-VAS	72.50	31.82	82.00	10.37	68.89	25.83	
SEL-VAS	77.20	15.08	72.50	15.14	72.27	11.91	
CAR-VAS	58.40	17.11	54.57	21.09	60.63	20.26	
SF36-RE	63.64	45.84	93.94	20.10	69.70	43.35	
SF36-MH	64.00	25.30	67.64	20.90	66.55	19.37	
SF36-SOC	68.18	35.95	86.59	24.32	70.00	38.94	
SF36-VIT	53.18	21.94	46.36	18.72	47.73	19.79	
SF36-PHY	80.00	26.17	85.00	16.43	77.73	25.14	
SF36-GH	80.09	22.24	71.91	22.58	73.73	23.84	
SF36-PN	82.45	31.36	88.18	18.16	80.27	36.17	
SF36-ROL	84.09	21.16	100.00	00	88.64	30.34	

Key:
MMSE = Mini Mental State Examination
POMS = Profile of Mood States
NPI-glo = Neuropsychiatric Inventory global score
QSEL-tot = QOLAS-TOTAL score: patient-self-rated
CSEL-tot = QOLAS-TOTAL score: carer rating self
QCAR-tot = QOLAS-TOTAL score: carer rating patient
GHQ0123 = General Health Questionnaire with likert scoring (0,1,2,3)
IDDD = Interview to determine deteriorating in activities of daily living in dementia
PT-VAS = EQ-5D visual analogue scale (0-100): patient rating self
SEL-VAS = EQ-5D visual analogue scale (0-100): carer rating self
CAR-VAS = EQ-5D visual analogue scale (0-100): carer rating patient
SF36-RE = SF36 role-emotional (carer self-rated)
SF36-MH = SF-36 mental health (carer self-rated)
SF36-SOC = SF-36 social life (carer self-rated)
SF35-VITA = SF-36 vitality (carer self-rated)
SF36 - PHY = SF-36 physical health (carer self-rated)
SF36-GH = SF36 general health (carer self-rated)
SF36-PN = SF36 pain (carer self-rated)
SF36-ROLE = SF-36 Role physical (carer self-rated)

Section 13

Appendices

? Source

Appendix 1

The DSM-IV criteria for dementia of the Alzheimer's type

A. The development of multiple cognitive deficits manifested by both

(1) memory impairment (impaired ability to learn new information or to recall previously learned information)

(2) one (or more) of the following cognitive disturbances:

(a) aphasia (language disturbance)

(b) apraxia (impaired ability to carry out motor activities despite intact motor function)

(c) agnosia (failure to recognise or identify objects despite intact sensory function)

(d) disturbance in executive functioning (i.e. planning, organising, sequencing, abstracting)

B. The cognitive deficits in Criteria A1 and A2 each cause significant impairment in social or occupational functioning and represent a significant decline from a previous level of functioning.

C. The course is characterised by gradual onset and continuing cognitive decline.

D. The cognitive deficits in Criteria A1 and A2 are not due to any of the following:

(1) other central nervous system conditions that cause progressive deficits in memory and cognition (e.g. cerebrovascular disease, Parkinson's disease, Huntington's disease, subdural haematoma, normal-pressure hydrocephalus, brain tumour)

(2) systemic conditions that are known to cause dementia (e.g. hypothyroidism, vitamin B12 or folic acid deficiency, niacin deficiency, hypercalcemia, neurosyphilis, HIV infection)

(3) substance-induced conditions

E. The deficits do not occur exclusively during the course of a delirium.

F. The disturbance is not better accounted for by another Axis I disorder (e.g. Major Depressive Disorder, Schizophrenia).

Appendix 2

The DSM-IV criteria for dementia for Vascular Dementia (formerly Multi-Infarct Dementia)

A. The development of multiple cognitive deficits manifested by both

(1) memory impairment (impaired ability to learn new information or to recall previously learned information)

(2) one (or more) of the following cognitive disturbances:

(a) aphasia (language disturbance)

(b) apraxia (impaired ability to carry out motor activities despite intact motor function)

(c) agnosia (failure to recognise or identify objects despite intact sensory function)

(d) disturbance in executive functioning (i.e. planning, organising, sequencing, abstracting)

B. The cognitive deficits in Criteria A1 and A2 each cause significant impairment in social or occupational functioning and represent a significant decline from a previous level of functioning.

C. Focal neurological signs and symptoms (e.g. exaggeration of deep tendon reflexes, extensor plantar response, pseduobulbar palsy, gait abnormalities, weakness of an extremity) or laboratory evidence indicative of cerebrovascular disease (e.g. multiple infarctions involving cortex and underlying white matter) that are judged to be aetiologically related to the disturbance.

D. The deficits do not occur exclusively during the course of a delirium

Source?

Appendix 3

The Hachinski scale (from Hachinski et al., 1975)

Abrupt onset	2
Stepwise deterioration	1
Fluctuation	2
Nocturnal confusion	1
Relative preservation of personality	1
Depression	1
Somatic complaints	1
Emotional lability	1
Hypertension	1
History of stroke	2
Focal symptoms	2
Focal signs	2
Other arteriosclerotic signs	1

Appendix 4

Classification of epilepsies (International League Against Epilepsy, 1985) reproduced from (Trimble, 1996)

1. Localization related (focal, local partial) epilepsies and syndromes
   - Idiopathic with age-related onset (e.g. benign epilepsy of childhood)
   - Symptomatic, e.g. frontal lobe, temporal lobe

2. Generalized epilepsies or syndromes
   - Idiopathic
   - Idiopathic and/or symptomatic (e.g. West's syndrome)
   - Symptomatic

3. Epilepsies and syndromes undetermined as to whether they are focal or generalised

4. Special syndromes (e.g. febrile convulsions)

Appendix 5

Revised ILAE classification of epileptic seizures (1981);

reproduced from (Trimble, 1996)

I Partial (focal, local) seizures

A Simple partial seizures (consciousness not impaired)

B Complex partial seizures (with impairment of consciousness; may sometimes begin with simple symptomatology)

C Partial seizures evolving to secondarily generalised seizures (this may be generalised tonic-clonic, tonic or clonic)

II Generalised seizures (convulsive or non-convulsive)

III Unclassified epileptic seizures

Appendix 6

Applications of Quality of life measures

- Screening and monitoring for psychosocial problems in individual patient care
- Population surveys of perceived health problems
- Medical audit
- Outcome measures in health services or evaluation research
- Clinical trials
- Cost-utility analyses

Appendix 7

QOL in dementia: Proposed definitional models

Lawton, 1994	psychological well-being; perceived QOL; behavioural competence; objective environment.
Jones et al.,1986	survival safety/security; purpose; independence (based on Maslow's hierarchy of needs).
Brod & Stewart, 1994	physical functioning; daily activities (recreational, instrumental, work); mobility; social functioning and well-being; bodily well-being; positive and negative affective states; sense of aesthetics; self-concept and overall life satisfaction.
DeLetter et al., 1995	social interaction; basic physical care; appearance of patient to others and nutrition.

Appendix 8

Appendix 8-1: Epilepsy surgery study: QOLAS constructs. All baseline (n=145)

QOLAS Physical domain

Physical	N	%
Seizures	140	95.2
injury due to sz	39	26.5
tiredness related to sz	30	20.4
drug SE (drowsiness, weight gain, sweat, constipation)	18	12.2
headaches due to sz	11	7.5
impaired mobility	4	2.7
unable to bath/shower	2	1.4
food restriction due to ep	1	0.7
other illnesses (endometriosis, hemiplegia, DM)	5	3.4
difficulty with sleep	1	0.7
unfit	2	1.4
losing consciousness	4	2.7
panic	3	2.0
paralysed after seizure	1	0.7
aura is frightening	3	2.0
ep slows pt down	1	0.7
bizarre behaviour	2	1.4
sex life affected	3	2.0
increased absence of warning	1	0.7
sleep walking	1	0.7
Language/speech affected	1	0.7
incontinence	1	0.7
fit & healthy	12	8.2

Appendix 8-2: Epilepsy surgery study: QOLAS constructs. All baseline (n=145)

QOLAS Psychological domain

Psychological	N	%
mood swings	16	10.9
depression	76	51.7
anxiety	29	19.7
lethargy	3	2.0
suicidal ideation	4	2.7
stressed due to ep	5	3.4
resentful to ep	6	4.1
tearful	8	5.4
no control over ep	3	2.0
hearing voices	1	0.7
affecting confidence, low self esteem	13	8.8
feeling guilty	4	2.7
feeling abnormal	8	5.4
embarressed/ hiding ep	8	5.4
drug SE (mood swings)	2	1.4
fed up with ep, frustration "Why Me?"	34	23.1
desillusioned	1	0.7
agression/ anger	17	11.6
feeling isolated	2	1.4
worried seizure is going to happen, threat, unpredictability	14	9.5
missing out on life	3	2.0
feeling empty	1	0.7
well	2	1.4
stronger person through ep	1	0.7
accept life with ep	29	19.7

Appendix 8-3: Epilepsy surgery study: QOLAS constructs. All baseline (n=145)

QOLAS Social/Family domain

Social Life/ Family	N	%
unable to drive	66	44.9
social life affected/limited	46	31.3
unable to do certain sports (swimming), hobbies	22	15.0
unable to travel alone	5	3.4
like to start family but afraid because of ep	4	2.7
lack of independance/being dependant	37	25.2
difficulty making friends/relationship	14	9.5
afraid of going out in case sz	3	2.0
unable to stay up late	3	2.0
restricted alcohol intake	9	6.1
bringing up/looking after children	10	6.8
diff. making conversation	3	2.0
diff. understanding conversation	2	1.4
avoid shops due to musicogenic ep	1	0.7
feeling stigmatised	7	4.8
family embarrassed, scared by ep.	7	4.8
problems with family, partner	12	8.2
always aware/thinking about ep.	3	2.0
physical abuse	1	0.7
people's attitude, don't understand ep, frightened, ignorant	13	8.8
never on one's own	1	0.7
loosing a day if seizure	1	0.7
housebound	1	0.7
unable to plan ahead	3	2.0
can't afford social life	1	0.7
get on with life	5	3.4
good social life	7	4.8
family/partner supportive	13	8.8
faith helps	1	0.7

Appendix 8-4: Epilepsy surgery study: QOLAS constructs. All baseline (n=145)

QOLAS Work/study domain

Work/study	N	%
career path affected (not getting promoted)	43	29.3
ep interferes with work/ study	47	31.9
unable to work/ study due to ep	50	34.0
concealing ep at work	7	4.8
unable to apply for jobs with DL	15	10.2
having to take time off at short notice	8	5.4
lack of confidence	5	3.4
employer not supportive, prejudiced	9	6.1
financial problems	8	5.4
housework affected	7	4.8
discrimination at job application	16	10.9
having to live off benefits	2	1.4
not achieved full potential	8	5.4
slow at work	3	2.0
pressure at work can bring on fit	1	0.7
embarrassed by sz at work	2	1.4
stigmatized	2	1.4
employer, teacher,colleagues supportive	8	5.4
work/study ok	8	5.4

Appendix 8-5: Epilepsy surgery study: QOLAS constructs. All baseline (n=145)

QOLAS Cognitive domain

Cognitive	N	%
concentration affected	47	31.9
memory affected	101	68.7
word finding diff.	30	20.4
slow reaction time	2	1.4
diff. making decisions	3	2.0
drug SE (speech, concentration worse)	4	2.7
speech affected	5	3.4
writing, spelling affected	5	3.4
thinking process slow	7	4.8
less alert	1	0.7
assimilating information by reading	8	5.4
short attention span	2	1.4
confusion post sz	12	8.2
slow at learning	3	2.0
post fit amnesia	2	1.4
voluntary work	2	1.4
deaf	1	0.7
memory good	5	3.4
concentration good	5	3.4

Appendix 9

Appendix 9-1: Epilepsy drug study: QOLAS constructs (n=146)

QOLAS Physical domain

PHYSICAL DIMENSION	N
Seizures	**125**
Tiredness	**34**
Drug SE (hairloss, weight gain, gum bleed, erectile dysfunction, headache, nausea)	**21**
Injuries due to sz	17
Incontinence	7
Joint problems due to sz (eg disclocation, osteoarthritis)	4
Difficulties with walking	3
R/L sided weakness	3
Asthma	3
Dizziness	3
Visual disturbances	2
Tremor	1
Eczema	1
Menstruation disturbance/Menopause	1
Irritable bowel syndrome	1
Cerebral Palsy	1
Tonsillitis	1
Fit & well	1

Appendix 9-2: Epilepsy drug study: QOLAS constructs (n=146)

QOLAS Psychological domain

PSYCHOLOGICAL DIMENSION	
Depression	**57**
Anger, "Why me"	**34**
Anxiety	**30**
Frustration	19
Acceptance	13
Lack of self-confidence	11
Unpredictability, fear of another seizure	10
Tearful	7
Different from anyone else	4
Embarrassment due to ss	4
Panic attacks	3
Not in control over ep	2
Stress related to taking ep drugs during pregnancy	2
Aggression	2
Denial	2
Short tempered	2
Interference with religious duties	2
Being happy	1
Mood swings	1
Personality changes	1
Feeling insecure	1
Epilepsy is encouraging	1

Appendix 9-3: Epilepsy drug study: QOLAS constructs (n=146)

QOLAS Social domain

SOCIAL DIMENSION	
Inability to drive	**59**
Restricted social life	**47**
Unable to persue sports/ activities (swimming, cycling etc)	**19**
Family difficulties	18
Good family support	16
Lack of independance	15
Discrimination by people because of epil.	14
Unable to go out unaccompanied	12
Marital conflict/ strain	10
Good social network	6
Burden to others	5
Difficulties forming relationships with opposite sex	4
Friends terrified	3
Concealing epilepsy in public	2
People prejudiced	1
Travelling impossible	1
Privacy invaded (eg accompanied when taking a shower)	1
Worry concerning passing epilepsy on to offspring	1
Fear of injuring children while having an attack	1
Wanting children but concerned about epilepsy drugs	1

Appendix 9-4: Epilepsy drug study: QOLAS constructs (n=146)

QOLAS Work/economic domain

WORK DIMENSION	
Unable to work/hold job	**41**
interference with career/promotion/ unable to persue career	**33**
discrimination at job application	**21**
Unable to use certain equipment (eg ladder, vehicles)/ restricted activities	10
Ep interferes with studies	8
Made redundant	8
Financial difficulties	6
Interference of epil with home work	6
Time off due to ep	5
Supportive employer	4
Prejudiced employer	4
Pessimistic about future employment	4
Driving is prerequisite for job	3
Working slower than collegues	3
Travel to work issue	2
Concealing ep from employer	2

Appendix 9-5: Epilepsy drug study: QOLAS constructs (n=146)

QOLAS Cognitive domain

COGNITIVE DIMENSION	
memory impaired	**91**
concentration impaired	**45**
word finding difficulties	**10**
Confused thinking	9
Speed of thinking impaired	7
Slower mentally, less sharp	6
Learning capacity impaired	2
Slow reading speed	2
Deterioration generally of cognitive abilities	2
Speech is confused	2
Losing skills	1
Slow decision making	1
Good memory	1
Good concentration	1
Unable to read book	1
Difficulty with names	1
Mind slowly seizes up for several minutes	1
Inability to hold normal conversation (lose thread)	1
Difficulty understanding people	1
Being on "auto pilot"- automatic behaviour	1
Dyslexia	1
Deterioration of intellectual abilities	1
Not so quick at thinking	1
Easily distracted	1

Appendix 10

Appendix 10-1

Dementia study: QOL of patients with mild-to-moderate dementia (MMSE>10)

QOLAS constructs - Patient self-report

QOLAS Physical domain

Physical domain

No problems/healthy	14
Alzheimer's (and fits)	01
Broken arm	02
Can't raise my arms	01
Hearing	02
pins and needles	01
Head pain/ache	04
Back pain	01
Standing/Balance	01
Tired	01
By-pass (chest pain)	01
Foot infection	01
Frozen shoulder	01
Phlegm	01
Diabetic (controlled)	01
"Female problems"	01
No second construct	08
Cough	01
Arteries in my neck (?)	01

Total	44

Appendix 10-2

Dementia study: QOL of patients with mild-to-moderate dementia (MMSE>10)

QOLAS constructs - Patient self-report

QOLAS Psychological domain

Psychological domain

No problems	06
Memory	01
Anxiety	02
Feel I am lucky/happy	05
Meeting/communicating with others	02
"Up and down"	03
Depressed/down	09
Furious with myself	01
Frustrated	02
Upset	03
Feel vulnerable/unsafe	02
"Not quite 100%"	01
Conforted by family	01
Keep myself occupied	01
Feel like a zombie	01
No second construct	04

Total	44

Appendix 10-3

Dementia study: QOL of patients with mild-to-moderate dementia (MMSE>10)

QOLAS constructs - Patient self-report

QOLAS Social/family domain

Social/family domain

No problems	06
Still see people/ Don't see as many	06
See family members	07
Going out (not) as much	14
Wish I could drive/no car	02
Leisure/sports activities	04
"Just do things..."	01
No second construct	03
shopping	01
---	---
Total	44

Appendix 10-4

Dementia study: QOL of patients with mild-to-moderate dementia (MMSE>10)

QOLAS constructs - Patient self-report

QOLAS Work/economic domain

Work/econ. domain

No problems	02
Not able to work/retired	20
Get benefits	01
Go to day centre	01
Still working e.g. volunteer	01
Daily activities around home	05
Still able to read	01
People come and look (supervision?)	01
I go walking	01
No second construct	11

Total	44

Appendix 10-5

Dementia study: QOL of patients with mild-to-moderate dementia (MMSE>10)

QOLAS constructs - Patient self-report

QOLAS Cognitive domain

.

Cognitive domain

No problem	05
Memory/forgetting	15
Lose things	01
Orientation	01
Concentration (e.g. T.V.)	03
Writing (transpose numbers)	01
Thinking/thinking and speaking	02
Finding words	01
Recognising people	02
Bit confused	01
No second construct	12
Total	44

Appendix 10-6

Dementia study: QOL of patients with mild-to-moderate dementia (MMSE>10)

QOLAS constructs - Carer rating patient (proxy report)

QOLAS Physical domain

Physical	
Hearing	01
Heart problems	02
Physical/health = Good	13
Deafness	01
Excema	01
Co-ordination	01
Frozen shoulder	01
Hypochondriac	01
Problems walking	05
Washing/dressing	01
Cooking	01
Urinary frequency/incontinence	01
Tired/sleep	03
Deterioration in ability	01
Headaches	01
Confused	01
Cannot do anything by himself	01
Back problem	01
Appetite	01
Asthma	01
No second construct	05
---	---
TOTAL	44

Appendix 10-7

Dementia study: QOL of patients with mild-to-moderate dementia (MMSE>10)

QOLAS constructs - Carer rating patient (proxy report)

QOLAS Psychological domain

Psychological	
Self-esteem/self-confidence	03
Frustrated/annoyed	02
Seems (mainly) happy	10
Anxious	04
Impatient/Agitated/aggressive	03
Up and down, emotionally labile/tantrums	06
Sad/depressed	06
Upset	01
Problems but now settled down (medication)	01
Difficult to know what (s)he is feeling,	01
In denial	01
Decision-making	01
Keeps occupied (puzzle book, etc.)	01
Withdrawn	01
Emotionally cut-off	01
No second construct	02

TOTAL	44

Appendix 10-8

Dementia study: QOL of patients with mild-to-moderate dementia (MMSE>10)

QOLAS constructs - Carer rating patient (proxy report)

QOLAS Social/family domain

Social/family	
No problems	05
Was in Masons - now dropped	01
Sport/leisure	02
Just watches TV	01
Relationship with family	08
Going out (fine/restricted)	10
Friends (backing off)	05
No social life	01
Social withdrawal/communication	04
Driving	01
Affected what we might have done separately	01
Affected other activities e.g. cooking,	02
Our relationship	01
Spends all his money on drink	01
No second construct	01

TOTAL	44

Appendix 10-9

Dementia study: QOL of patients with mild-to-moderate dementia (MMSE>10)

QOLAS constructs - Carer rating patient (proxy report)

QOLAS_Work/economic domain

Work/economic	
Restrictions e.g. DIY	02
Still does charity work	01
Had to give up work	17
Already retired	01
No longer works	01
Needs to be stimulated	02
Bored	01
Stubborn - in denial	01
Hobbies	01
Other activities e.g. around the home	04
No second construct	13

TOTAL	44

Appendix 10-10

Dementia study: QOL of patients with mild-to-moderate dementia (MMSE>10)

QOLAS constructs - Carer rating patient (proxy report)

QOLAS Cognitive domain

Cognitive	
Asks repeatedly same question/not listening	03
Memory	17
Communication/ speech	04
Reading	01
Has to think about simple things	01
Affects him more than he wants to admit	01
Concentration	04
"Not there"	01
Cannot do two things at same time	02
Only word is "now"	01
Planning/organisation	02
Confusion	01
Mental arithmetic	01
Extremely egotistical	01
Dresses inappropriately	01
Invents stories (confabulation)	01
No second construct	01
"Everything "gone"	01

TOTAL	44

Appendix 11

Appendix 11-1: Carers' own QOL

QOLAS constructs - physical domain

Fit/healthy	19
Stress	08
Tiredness/sleep	06
Pains (chest/back/neck)	04
Blood Pressure	03
Cancer	02
Angina	02
Prostate	02
Panic attacks	01
Thyroid	01
Vascular problems	01
Arthritis	01
Running /training	01
Cannot walk	01
I do everything	01
Eye-sight (glaucoma)	01
Tinnitus	01
Overweight	01
Asthma	01
No second construct	10

Total	70

Appendix 11-2: Carers' own QOL

QOLAS constructs - psychological domain

Depressed/low	15
Angry/emotional	11
Anxious	06
Worried about the future	05
Coping (by shutting off/relaxing)	04
Loss of companionship/loneliness	04
Feel I am going round in circles/lost	04
Think of nothing else	03
Stress	03
Happy overall/fine	02
Exhausted	01
Anticipated we could travel	01
Resentment	01
Tearful	01
Responsibility for everything	01
Feel sorry for myself	01
Marital relationship	01
Fine	01
No second construct	05

Total	70

Appendix 11-3: Carers' own QOL

QOLAS constructs - Social/family domain

Social life affected (travel, outings)	25
Family life	08
Fewer people visit/friends disappear	05
Contact with others/moral support	05
Hobbies	04
Spend most of my time with patient	03
Lost partner (companionship)	03
Gardening	02
Spouse follows me everywhere	02
Freedom lost	02
Go out walking	01
Other people/couples out	01
Others don't understand	01
Anticipated we could travel	01
Alzheimer's group (support)	01
Live from day-to-day	01
Fine - OK	01
No second construct	04

	70

Appendix 11-4: Carers' own QOL

QOLAS constructs - work/economic domain

Don't work/gave up work	21
Work affected/cut down hours	09
Finances/money	04
Caring duties	03
Stress	03
Anxious/guilty when I work	03
Am negotiating giving up work	02
Still try to work	02
Voluntary work e.g. caring	02
Back to study	01
Family (I do all the work)	01
Work is OK	01
Not enough time for work	01
No second construct	17

	70

Appendix 11-5: Carers' own QOL

QOLAS constructs - cognitive domain

Fine	17
Worried/anxious about my memory	14
Try to stimulate my own mind	03
"Does my brain in"	02
Concentration	02
Moody	01
Thinking - bad	01
Live from day-to-day	01
Stressed out	01
Compulsions	01
No second construct	27

Total	70

Appendix 12: Carers' own QOL

Data elicited from the one qualitative question in the study-specific carers' scale from the carers in the study (n=35). The question asked the carer if there was anything they did to help them cope. The carer could give more than one answer.

Male carers (n=13):

Ways of coping	**No of carers reporting item**
Support/Alzheimer's meetings	2
Drink (alcohol)	3
Laugh	1
Anticipate my wife's errors	1
Sport/keep-fit	1
Hobbies	1
Retreat into my own space	1
Nothing	6

Appendix 12 (continued): Carers' own QOL

Data elicited from the one qualitative question in the study-specific carers' scale. All carers in the study (n=35). The question asked the carer if there was anything they did to help them cope. The carer could give more than one answer.

Female carers (n=22):

Ways of coping	**No of carers reporting item**
Support group/Professional help	4
Drink (alcohol)	3
Visit friends/family	5
Hobbies	3
Laugh	3
Holidays	1
Prayer	2
Just accept it	2
Hot bath	2
Gym/keep-fit	2
Smoke	1
Make lists	1
Sleep	1
Eat	1
Spend	1
Nothing	4

Appendix 13: Carers' own QOL

The initial description of their own QOL, as recounted by the carers of the patients with severe dementia at baseline interview (n=13). Most of these carers describe coming to terms with their situation, either by seeking professional help (e.g. psychologist or GP who prescribed anti-depressants) or by some other self-devised coping mechanism.

(1) "The last seven years have been too terrible. I have been on anti-depresssants for years. I also see a psychologist. Things are more stable now. If you had interviewed me a couple of years ago you would have got very different answers"

(2) "I have lost my life's companion. The doctor says "she is dead" but she is still alive..! I am lonely. I feel very bitter towards a lot of people - so-called "friends". It is still very hard. You train your mind and learn to adapt".

(3) "You feel as though you are a widow but not a widow".

(4) "I do everything for her (my wife). It is a 24 hour a day job. She cannot swallow now and so I spend over six hours per day just feeding her. Sometimes I get tensed up and there is a flash but then I just shut off".

(5) "I get angry and emotional..."Why us..?" I can no longer go out. I have watched my husband deteriorate before my eyes. I get very angry. I could scream sometimes. I am depressed. I am on anti-depressants. But now I just try to just take it as it comes....I try to have a laugh about it.."

(6) "I cannot go out...I get very depressed"

(7) "My quality of life is finished. My social life is nil. I feel guilty and depressed. The carer needs a carer. I can manage if I don't think too deep. I have "doors" which I shut off. If not, it is too upsetting.

(8) "You are seeing somebody die every day. It started 5 years ago. I used to cry every day. I am completely exhausted. But I am a little bit more "accepting". I am no longer feeling that I am boiling inside."

Appendix 13 (Continued): Carers' own QOL

The initial description of their QOL, as described by the carers of the patients with severe dementia at baseline interview (n=13).

(9) "I can't do what I want...I am on duty... But we try to have a laugh. Life is not all gloom".

(10). "I do everything for him. At the start (of his illness) he was very aggressive towards me and so I left him and went to live with my mother for 15 months. Then I moved back. I am very upset at the moment. Very tearful".

(11) "This has been going on now for 14 years. It was very bad in the beginning. My husband was so aggressive early on. He was aggressive physically, verbally, sexually...nobody would come near him. Now he just sits in a chair. I don't know if he has any insight. Occasionally he says a word. I now do things like raise money for Alzheimer's...my friend and I make cakes."

(12) "My husband has dementia, is blind and nearly deaf. He is very aggressive and sometimes he 'plays with himself'...I am so embarrased. I have cancer and my previous operation went wrong. I don't know what will happen when I have gone. Who will take care of him..? I have no social life but I have got used to it".

(13) "I think of nothing else. My life revolves around this. My wife has now just gone into a home. Last week I cried for the first time in 35 years. I am now on anti-depresssants. They help me sleep".

Section 14 - Figures

Figure 1:
QOLAS scoring. This is a hypothetical example based on a number of patients' responses

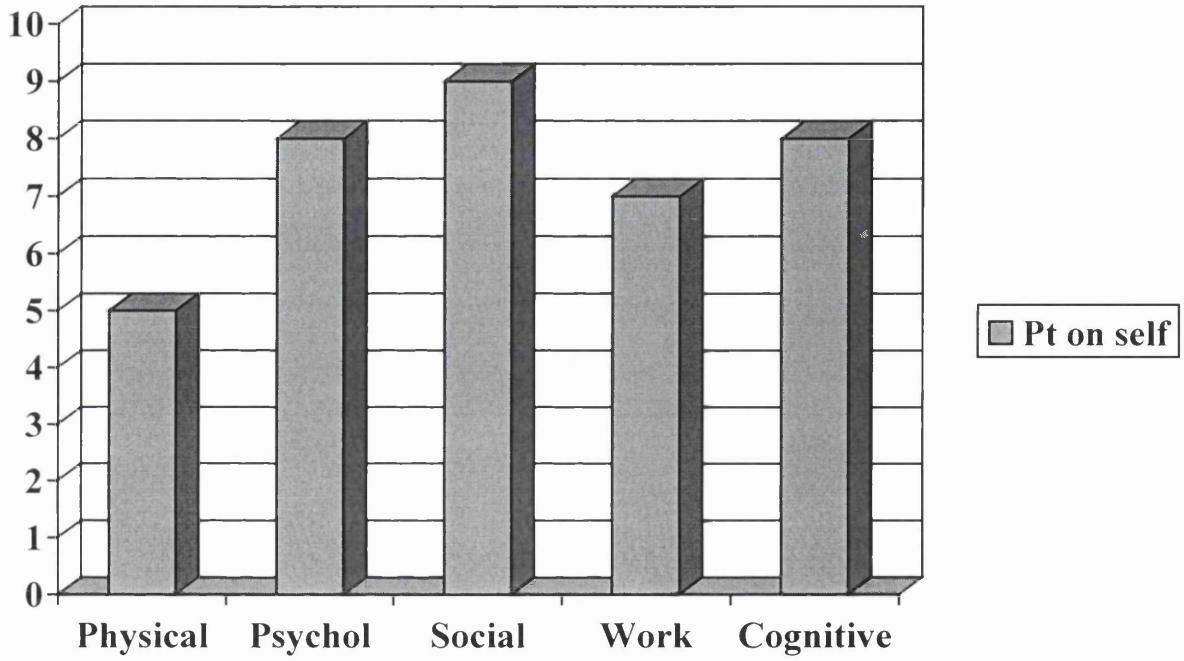
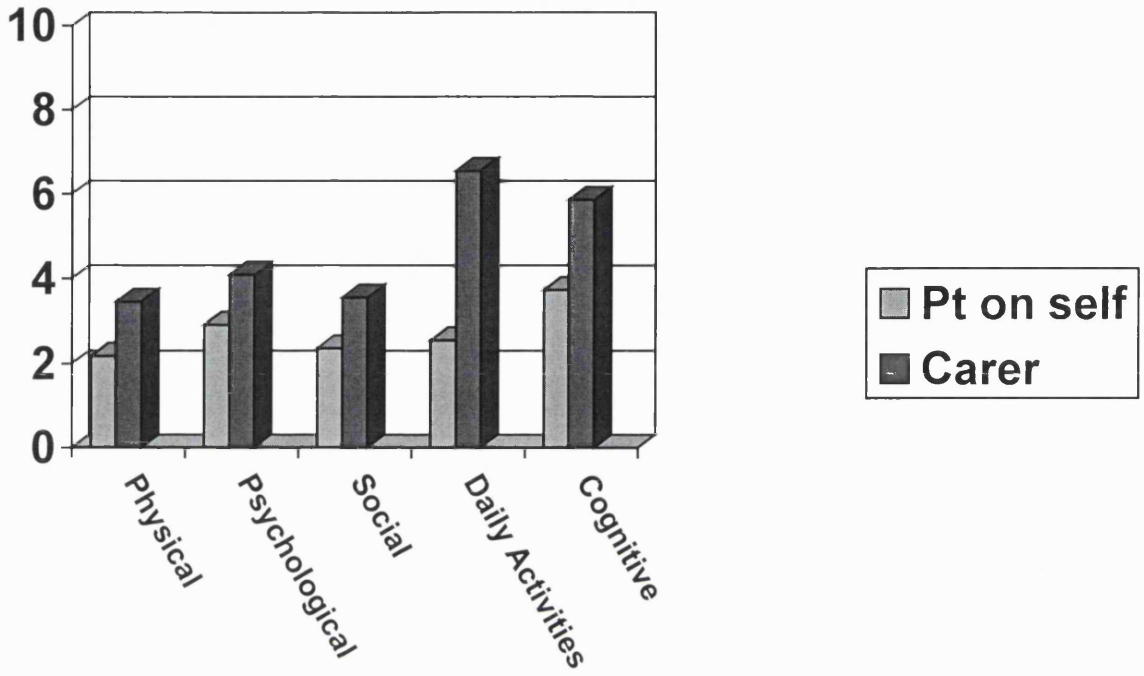


Figure 2:
Dementia study. QOLAS scores for each of the five domains.



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Section 16 - Copies of all instruments

Epilepsy and dementia studies

Epilepsy studies

1. The Epilspsy Surgery Inventory-55 (ESI-55)
2. The EuroQol EQ-5D
3. The National Hospital Seizure Severity Scale

Dementia Studies

4. Study-specific Carer's Scale
5. Mini-Mental State Examination (MMSE)
6. Dartmouth COOP Charts
7. Interview to Determine Deterioration in Daily Functioning in Dementia (IDDD)
8. The Neuropsychiatric Inventory (NPI)
9. The Medical Outcomes Study Short-form-36 (SF-36)
10. The General Health Questionnaire (GHQ-30)
11. The Profile of Mood States - Short form (POMS)

EPILEPSY SURGERY INVENTORY (ESI-55)

QUESTIONNAIRE ITEMS

INSTRUCTIONS:

This survey asks about your health and daily activities. Answer every question by circling the appropriate number (1, 2, 3, ...).

If you are unsure about how to answer a question, please give the best answer you can and write a comment or explanation in the margin.

Please feel free to ask someone to assist you if you need help reading or marking the form.

1. In general, would you say your health is:

(circle one number)

Excellent 1

Very good 2

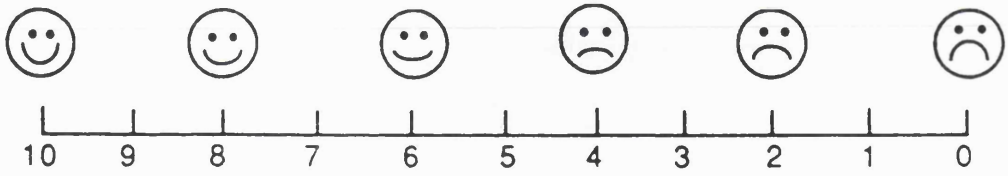
Good 3

Fair 4

Poor 5

2. Overall, how would you rate your own quality-of-life?

Circle one number on the scale below:



Best Possible Quality-of-Life

Worst Possible Quality-of-Life

3. **Compared to one year ago**, how would you rate your health in general **now**?

(circle one number)

Much better now than one year ago 1

Somewhat better now than one year ago 2

About the same 3

Somewhat worse now than one year ago 4

Much worse now than one year ago 5

4-13. The following questions are about activities you might do during a typical day. Does **your health** limit you in these activities? If so, how much? (Circle 1, 2, or 3 on each line)

	Yes, Limited a Lot	Yes, Limited a Little	No, Not Limited at All
4. Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports	1	2	3
5. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	1	2	3
6. Lifting or carrying groceries	1	2	3
7. Climbing several flights of stairs	1	2	3
8. Climbing one flight of stairs	1	2	3
9. Bending, kneeling, or stooping	1	2	3
10. Walking more than a mile	1	2	3
11. Walking several blocks	1	2	3
12. Walking one block	1	2	3
13. Bathing and dressing yourself	1	2	3

14-18. During the **past 4 weeks**, have you had any of the following problems with your regular daily activities or work **as a result of any physical problems**? (Please answer **YES** or **NO** for each question by circling 1 or 2 on each line.)

	YES	NO
14. Cut down on the amount of time you could spend on work or other activities	1	2
15. Accomplished less than you would like	1	2
16. Were limited in the kind of work or other activities	1	2
17. Had difficulty performing the work or other activities	1	2
18. Did work or other activities less carefully than usual	1	2

19-23. During the **past 4 weeks**, have you had any of the following problems with your regular daily activities or work **as a result of any emotional problems** (such as feeling depressed or anxious). (Please answer **YES** or **NO** for each question by circling 1 or 2 on each line.)

	YES	NO
19. Cut down on the amount of time you could spend on work or other activities	1	2
20. Accomplished less than you would like	1	2
21. Were limited in the kind of work or other activities	1	2
22. Had difficulty performing the work or other activities	1	2
23. Did work or other activities less carefully than usual	1	2

24. During the **past 4 weeks**, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

(circle one number)

Not at all	1
Slightly	2
Moderately	3
Quite a bit	4
Extremely	5

25-33. These questions are about how you feel and how things have been with you **during the past 4 weeks**. For each question, please indicate the one answer that comes closest to the way you have been feeling.

How much of the time during the **past 4 weeks**...

	All of the Time	Most of the Time	A Good Bit of the Time	Some of the Time	A Little of the Time	None of the Time
25. did you feel full of pep?	1	2	3	4	5	6
26. have you been a very nervous person?	1	2	3	4	5	6
27. have you felt so down in the dumps that nothing could cheer you up?	1	2	3	4	5	6
28. have you felt calm and peaceful?	1	2	3	4	5	6
29. did you have a lot of energy?	1	2	3	4	5	6
30. have you felt downhearted and blue?	1	2	3	4	5	6
31. did you feel worn out?	1	2	3	4	5	6
32. have you been a happy person?	1	2	3	4	5	6
33. did you feel tired?	1	2	3	4	5	6

34-39. How much of the time during the **past 4 weeks**...

	All of the Time	Most of the Time	A Good Bit of the Time	Some of the Time	A Little of the Time	None of the Time
34. has your health limited your social activities (like visiting with friends or close relatives)?	1	2	3	4	5	6
35. have you had difficulty concentrating and thinking?	1	2	3	4	5	6
36. did you have trouble keeping your attention on an activity for long?	1	2	3	4	5	6
37. have you worried about having another seizure?	1	2	3	4	5	6
38. did you have difficulty reasoning and solving problems (for example, making plans, making decisions, learning new things?)	1	2	3	4	5	6
39. were you discouraged by your health problems?	1	2	3	4	5	6

40. How much **bodily** pain have you had during the **past 4 weeks**?

(circle one number)

None 1

Very mild 2

Mild 3

Moderate 4

Severe 5

Very severe 6

41. During the **past 4 weeks**, how much did bodily **pain** interfere with your normal work (including both outside the home and housework)?

(circle one number)

Not at all 1

A little bit 2

Moderately 3

Quite a bit 4

Extremely 5

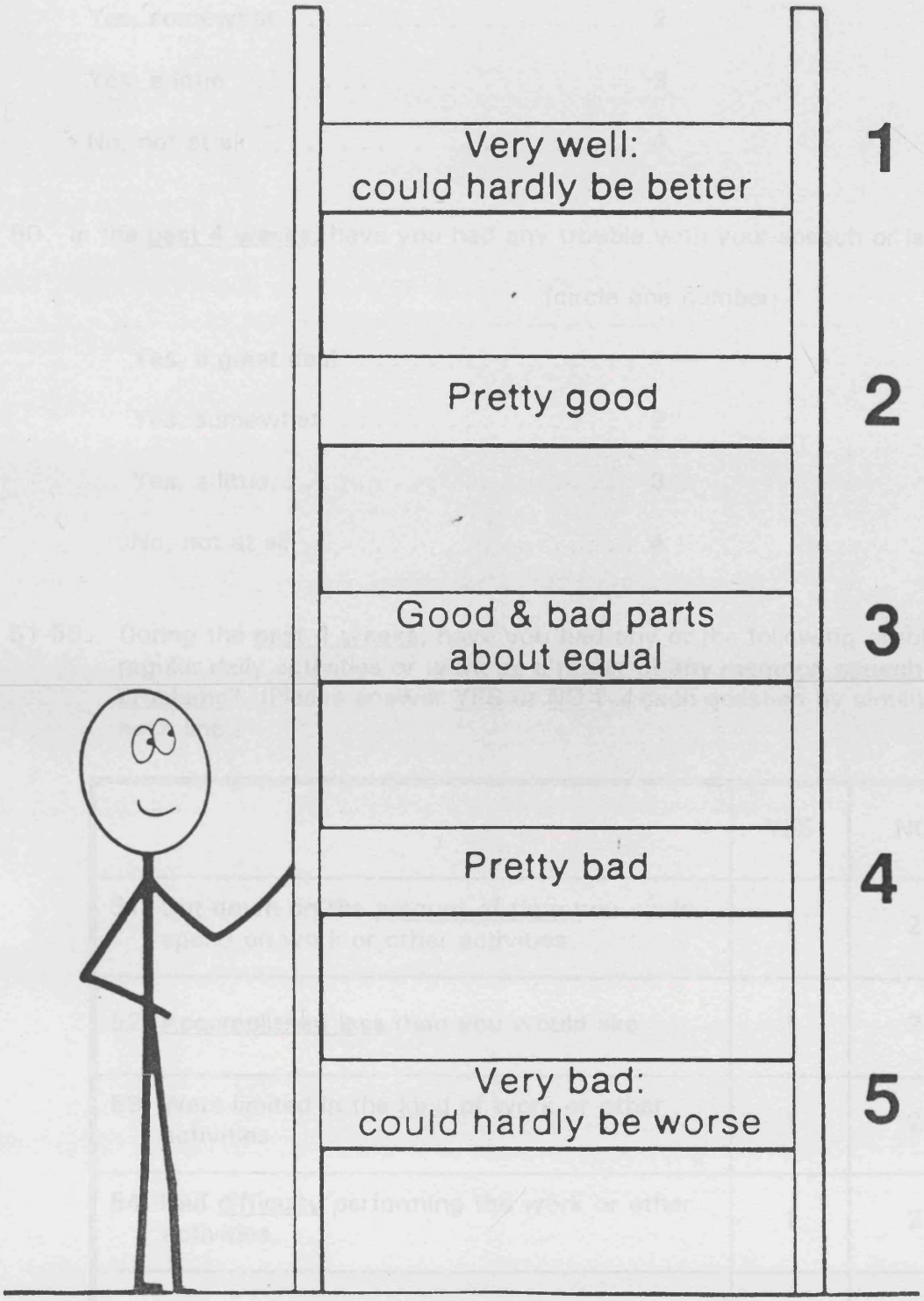
42-47. Please choose the answer that best describes how true or false each of the following statements is for you.

(circle one number on each line)

	Definitely True	Mostly True	Not Sure	Mostly False	Definitely False
42. I seem to get sick (any kind of sickness) a little easier than other people	1	2	3	4	5
43. I am as healthy as anybody I know	1	2	3	4	5
44. I expect my health to get worse	1	2	3	4	5
45. My health is excellent	1	2	3	4	5
46. When there is an illness going around, I usually catch it	1	2	3	4	5
47. I seem to get seizures a little easier than other people with epilepsy	1	2	3	4	5

48. How has the quality of your life been during the **past 4 weeks**?
That is, how have things been going for you?

(circle one number)



49. In the **past 4 weeks**, have you had any trouble with your memory?

(circle one number)

Yes, a great deal 1

Yes, somewhat 2

Yes, a little 3

No, not at all 4

50. In the **past 4 weeks**, have you had any trouble with your speech or language?

(circle one number)

Yes, a great deal 1

Yes, somewhat 2

Yes, a little 3

No, not at all 4

51-55. During the **past 4 weeks**, have you had any of the following problems with your regular daily activities or work **as a result of any memory, speech or language problems**? (Please answer **YES** or **NO** for each question by circling 1 or 2 on each line.)

	YES	NO
51. Cut down on the amount of time you could spend on work or other activities	1	2
52. Accomplished less than you would like	1	2
53. Were limited in the kind of work or other activities	1	2
54. Had difficulty performing the work or other activities	1	2
55. Did work or other activities less carefully than usual	1	2

By placing a tick (thus [✓]) in one box in each group below, please indicate which statements best describe your own health state today.

Mobility

: I have no problems in walking about
: I have some problems in walking about
: I am confined to bed

Self-Care

: I have no problems with self-care
: I have some problems washing or dressing myself
: I am unable to wash or dress myself

Usual Activities

: I have no problems with performing my usual activities (e.g. work, study, housework, family or leisure activities)
: I have some problems with performing my usual activities
: I am unable to perform my usual activities

Pain/Discomfort

: I have no pain or discomfort
: I have moderate pain or discomfort
: I have extreme pain or discomfort

Anxiety/Depression

: I am not anxious or depressed
: I am moderately anxious or depressed
: I am extremely anxious or depressed

Compared with my general level of health over the past 12 months, my health state today is

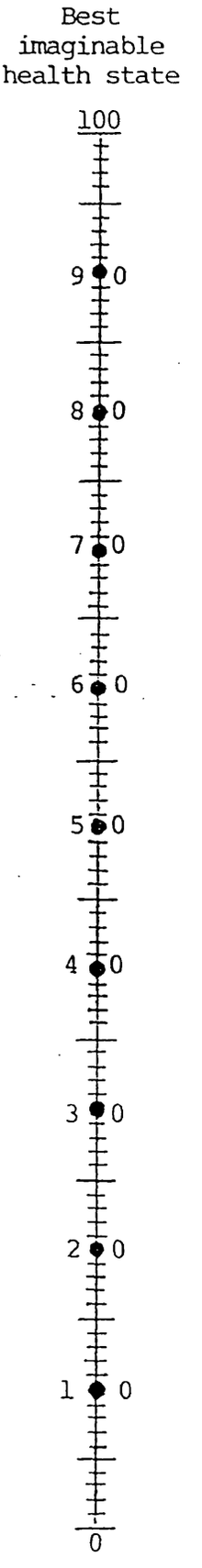
PLEASE TICK ONE BOX

: Better
: Much the same
: Worse

To help people say how good or bad a health state is, we have drawn a scale (rather like a thermometer) on which the best state you can imagine is marked by 100 and the worst state you can imagine is marked by 0.

We would like you to indicate on this scale how good or bad is your own health today, in your opinion. Please do this by drawing a line from the box below to whichever point on the scale indicates how good or bad your current health state is.

Your own health state today



THE NATIONAL HOSPITAL SEIZURE SEVERITY SCALE - NS3

Patients name:

Date:

Instructions for completion:

1. Define how many different types of seizure occur (e.g aura, complex partial, generalized convulsion...). Call these type 1-3 arbitrarily.

2. Apply questions 2-8 to each seizure type separately. As the NS3 indicates current seizure severity, define the time frame: e.g. 1-3 months or time since the last clinic visit. Use clinical judgement whether each factor occurs in the seizure type (i.e. the physician decides if there is a convulsion after questioning the patient). Allow the patient to judge the frequency of each event. Then tick the box opposite the response options. The number in the box is the score for that question.

Note:
Q.3. Only actual falls are recorded i.e. if the seizures could cause falls but have not because they all occured while in bed, then the score is 0.

Q.7 refers to the time until the patient feels fully functional.

Note the specific scoring instructions for Q4. and 6.

3. The column totals give the seizure severity score.

	Type 1	Type 2	Type 3
1. Record the name of the seizure types that occur under headings "type1,2,3...."			
Record the frequency of this seizure type *since the last visit:*			
2. Does the patient have a generalized convulsion during this type of seizure ?			
Yes	4	4	4
No	0	0	0
3. How often has the patient fallen to the ground in this type of seizure ?			
Nearly always or always	4	4	4
Often	3	3	3
Occasionally	2	2	2
Never	0	0	0
4. Has this type of seizure caused any of following ? (score only the worst)			
Burns,scalds, deep cuts, fractures	4	4	4
Bitten tongue or severe headaches	3	3	3
Milder injuries or mild headaches	2	2	2
No injuries	0	0	0
5. How often has the patient been incontinent of urine in this type of seizure ?			
Nearly always or always	4	4	4
Often	3	3	3
Occasionally	2	2	2
Never	0	0	0
6. If the seizure causes loss of consciousness, is there a warning long enough for the patient to protect him/herself ? (no loss of consciousness or seizures only while asleep scores 0)			
Never	2	2	2
Sometimes	1	1	1
Nearly always or always	0	0	0
7. How long is it until the patient is really back to normal after the seizure?			
Less than 1 minute	0	0	0
Between 1 and 10 minutes	1	1	1
Between 10 minutes and 1 hour	2	2	2
Between 1 and 3 hours	3	3	3
More than 3 hours	4	4	4
8. Do the following events occur in this type of seizure ?			
Seriously disruptive automatisms (e.g. shouting, wandering, undressing)	4	4	4
Mild automatisms or focal jerking	2	2	2
None	0	0	0
Add 1 point to each column	1	1	1
TOTAL SCORE FOR EACH SEIZURE TYPE ⇒			

Carers Scale

These questions are concerned with how thing have been in the last month. For each question, please circle the number which best describes how much of a problem (if any) you are having with the following:

Caring *(Duties will have been obtained during previous interview)*

1. *How much does caring for (XXX) interfere with your life?*

Not at all ***Very much***

0.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

2. Compared to the onset of (XXX)'s illness, are you making sacrifices in any area of your life to keep up with caring duties?

Not at all ***Very many***

0.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

3. Has caring for (XX) affected the way you get on with your family or friends..?

Not at all ***Very much***

0.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

4. Has caring for (XX) affected your work (if applicable)..?

Not at all ***Very much***

0.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

5. Has caring for (XX) affected your own health in your opinion..?

Not at all ***Very much***

0.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

Coping

6. Do you think you are coping with the demands of being a carer..?

Not at all ***Very well***

0.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

7. Do you feel you have support form friends/family/others..?

Not at all ***Very much***

0.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

8. Do you feel in control of things (in your life) or that things are out of control..?

I am in control ***I am NOT in control***
(of things in my life) ***(of things)***

0.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

9. Do you feel that there is any stigma surrounding (XXX)'s illness..? In other words, do people react to either of you in a strange way (such as with fear, embarrassment..?)

None ***A great deal***

0.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

10. Are there any special things you do to help you cope..?

.....

.....

The future

11. Have your plans for the future (e.g. travel, holidays, had to change..?

Not at all ***Very much***

0.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

"MINI-MENTAL STATE"

Patient's Name:

Examiner:

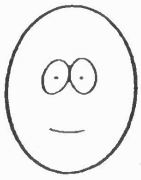
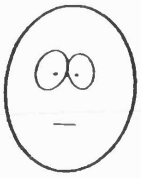
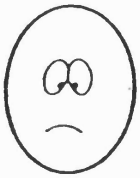
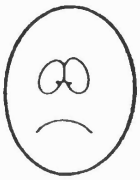
Date:

Maximum Score	Score	
		Orientation
5	( )	What is the (year) (season) (date) (day) (month)?
5	( )	Where are we: Country, Town, District, Hospital, Ward?
		Registration
3	( )	Name three objects: one second to say each. Then ask the patient all three after you have said them. Give 1 point for each correct answer. Then repeat the trials until he either learns all three, or has six trials. Count all trials and record them. No. of Trials:_____
		Attention and Calculation
5	( )	Serial 7's. 1 point for each correct. Stop after 5 answers. Alternatively, spell "world" backwards.
		Recall
3	( )	Ask for the three objects repeated above. Give 1 point for each correct.
		Language
2	( )	Name a pencil and a watch.
1	( )	Repeat the following: "No ifs ands or buts".
3	( )	Follow a three-stage Command: "Take a sheet of paper in your right hand, fold it in half, and put it on the floor."
1	( )	Read and obey the following: CLOSE YOUR EYES.
1	( )	Write a sentence.
1	( )	Copy a design.

FRW/rn/3.90

OVERALL HEALTH

During the past 4 weeks . . .
How would you rate your health in general ?

Excellent		1
Very good		2
Good		3
Fair		4
Poor		5

DAILY ACTIVITIES

During the past 4 weeks . . .

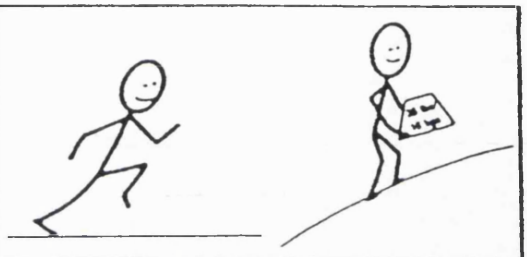
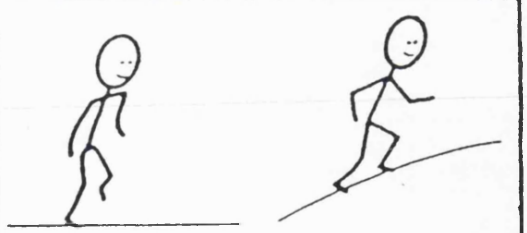
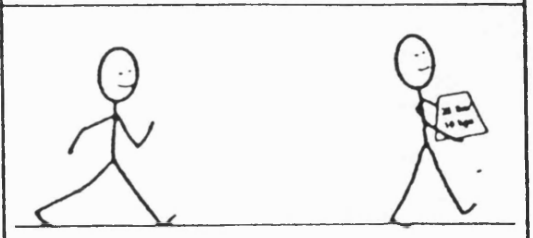
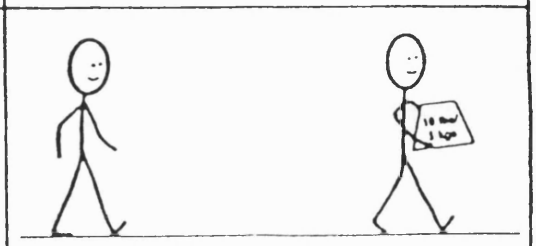
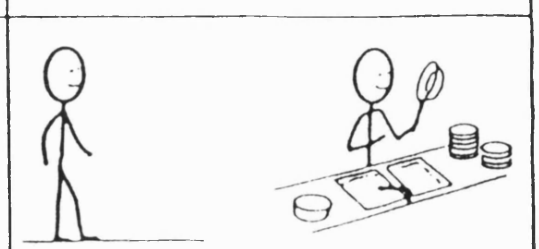
How much difficulty have you had doing your usual activities or task, both inside and outside the house because of your physical and emotional health ?

No difficulty at all		1
A little bit of difficulty		2
Some difficulty		3
Much difficulty		4
Could not do		5

C

PHYSICAL FITNESS

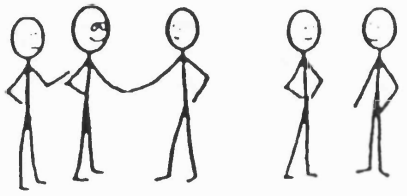
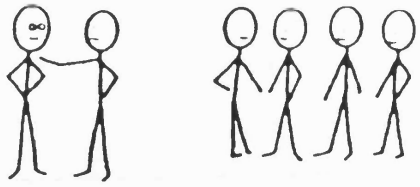
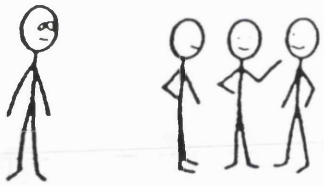
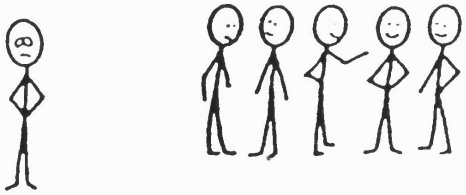
During the past 4 weeks . . .
What was the hardest physical activity
you could do for at least 2 minutes ?

Very heavy, (for example) •Run, fast pace •Carry a heavy load upstairs or uphill (25 lbs/10 kgs)		1
Heavy, (for example) •Jog, slow pace •Climb stairs or a hill moderate pace		2
Moderate, (for example) •Walk, medium pace •Carry a heavy load level ground (25 lbs/10 kgs)		3
Light, (for example) •Walk, medium pace •Carry light load on level ground (10 lbs/5kgs)		4
Very light, (for example) •Walk, slow pace •Wash dishes		5

SOCIAL ACTIVITIES

During the past 4 weeks . . .

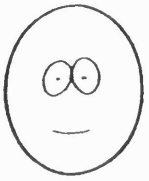
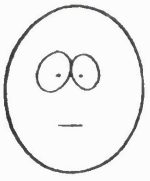
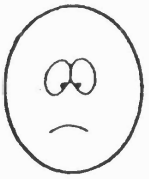
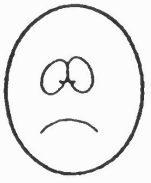
Has your physical and emotional health limited your social activities with family, friends, neighbors or groups ?

Not at all		1
Slightly		2
Moderately		3
Quite a bit		4
Extremely		5

FEELINGS

During the past 4 **weeks** . . .

How much have **you** been bothered by **emotional problems** such as feeling anxious, depressed, **irritable** or downhearted and blue ?

Not at all		1
Slightly		2
Moderately		3
Quite a bit		4
Extremely		5

Patient Initials: ☐☐☐

Interview to Determine Deterioration in Daily Functioning in Dementia (IDDD)

Instructions

This questionnaire deals with changes in the patients daily functioning. The caregiver's opinion is sought because they know him/her best of all. All the questions refer to the patients behaviour over the last month. The caregiver is requested to compare the behaviour over the last month with how it was previously (i.e. the period in the patients life before any memory problems occurred). The intention in asking these questions is to determine the extent to which the patients illness has made him./her dependant on other people.

After each response, ask the following additional questions:

1. After a negative response:

-is his/her behaviour unchanged when compared to what it was previously?

2. After a positive response:

-Is your help really necessary?
-what happens if you don't help?
-do you have to help him/her more often than you used to?

Scoring:

1 = help (almost) never needed/no change
2 = help sometimes needed/help needed more often than previously
3 = help (almost) always needed/help needed much more often than previously

8 = cannot be assessed
9 = not applicable to the patient

Patient Initials: ☐☐☐

1. Do you have to remind her to get washed (i.e. does her getting washed depend upon your prompting to wash, bath, shower etc.?)

2. Do you actually have to help her to get washed (to get the washcloth and soap for her; soap and rinse her body for her)?

3. Do you have to remind her to dry herself (does drying herself depend upon your prompting her to do so. so you have to prompt her to pick up the towel)?

4. Do you actually have to help her to dry herself (do you dry the parts of her body that have been washed for her) ?

5. Do you have to remind her to get dressed (do you have to prompt her to go to the wardrobe)?

6. Do your have to help her put her clothes on (getting the order right, help with actually putting on articles of clothing)?

7. Do you have to help her to do up zips, buttons, laces ?

8. Do you have to remind her to brush her teeth or comb her hair?

9. Do you have to help her to brush her teeth?

10. Do you have to help her to do her hair?

11. Do your have to remind her that she should have something to eat (does having something to eat depend upon your prompting her to do so) ? (If she is prompted by circumstances, check whether the patient would also do this spontaneously)

12. Do you have to help her to make a sandwich ?

13. Do you have to help her to cut or mash food?

14. Do you have to help her to actually eat or drink (i.e. help with the (physical) manoeuvres involved)?

15. Do you have to remind her to go to the toilet (does her going to the toilet when she need to depend upon your prompting her to do so)?

16. Do you have to help her with the various operations connected with going to the toilet (rearranging clothes, using the toilet and toilet paper)?

17. Do you have to help her find her way around the house (find her way around in familiar surroundings)?

18. Do you have to help her find her way around outside the house (find her way around in familiar surroundings)?

19. Does she take the initiative with regard to shopping as much as she used to (does she do the things usually associated with going shopping, such as asking or looking to see what needs to be bought)?

20. Does she have to be helped to do the shopping herself (in the shop, finding necessary items in the quantities required)?

Patient Initials: ☐☐☐

21.	Does she have to be reminded to pay for the articles when shopping?
22.	Does she have to be helped with the actual payment (knowing how much she should hand over and how much change she should receive)?
23.	Does she pick up a book, newspaper or the post as often as she used to?
24.	Do you have to actually help her to read things (understand a message)?
25.	Do you have to help her write a card or fill in the form (to write more than one sentence)?
26.	Does she initiate conversations with people as often as she used to?
27.	Is she capable of expressing herself clearly, or do you have to help her?
28.	Does she listen to what people are saying to her as much as she used to ?
29.	Does she understand what people are saying to her, or do you have to help her?
30.	Does she use the telephone as much as she used to (does she go to answer the phone, does she call people up)?
31.	Do you have to help her to actually use the phone (pick up the receiver, make a call)?
32.	Is she able to find things that she needs in the house, or do you have to help her?
33.	Do you have to remind her to switch off the gas or coffee maker?

Name _____ Date _____

ID# _____ Source: Spouse/patient/other _____

UCLA Neuropsychiatric Inventory

Item	N/A	Never	Frequency				Severity			Severity x Frequency
Delusions	x	0	1	2	3	4	1	2	3	_____
Hallucinations	x	0	1	2	3	4	1	2	3	_____
Agitation	x	0	1	2	3	4	1	2	3	_____
Depression/dysphoria	x	0	1	2	3	4	1	2	3	_____
Anxiety	x	0	1	2	3	4	1	2	3	_____
Euphoria/elation	x	0	1	2	3	4	1	2	3	_____
Apathy/indifference	x	0	1	2	3	4	1	2	3	_____
Disinhibition	x	0	1	2	3	4	1	2	3	_____
Irritability/lability	x	0	1	2	3	4	1	2	3	_____
Aberrant motor behavior	x	0	1	2	3	4	1	2	3	_____
Night-time behavior	x	0	1	2	3	4	1	2	3	_____
Appetite/eating change	x	0	1	2	3	4	1	2	3	_____

Diagnosis: _____

MMSE: _____

Age: _____

Gender: _____

Duration of illness: _____

Education: _____

Medications: _____

Instructions for Administration of the NPI

The purpose of the Neuropsychiatric Inventory (NPI) is to obtain information on the presence of psychopathology in patients with brain disorders. The NPI was developed for application to patients with Alzheimer's disease and other dementias, but it may be useful in the assessment of behavioral changes in other conditions. Information for the inventory may be obtained from the spouse or other person intimately familiar with the patient's behavior; information may be augmented by direct observation and questioning of the patient. The interview is best conducted with the caregiver in the absence of the patient to facilitate an open discussion of behaviors that may be difficult to describe with the patient present. Questions should be asked exactly as written. Clarifications should be provided if the caregiver does not understand the question. Acceptable clarifications are restatements of the questions in alternate terms. The answers pertain to changes in the patient's behavior that have appeared since the onset of the illness. Behaviors that have been present throughout the patient's life and have not changed in the course of the illness are not scored even if they are abnormal (e.g., anxiety, depression). Behaviors that have been present throughout life but have changed since the illness are scored (e.g., the patient has always been apathetic but there has been a notable increase in apathy during the period of inquiry). Remind the respondent periodically that the answers pertain to changes in the patient's behavior that have appeared since the onset of the illness.

In some studies, the NPI may be used to address changes occurring in response to treatment or that have changed since the last clinic visit. The time frame of the question would then be revised to reflect this interest in recent changes. Emphasize to the caregiver that the questions pertain to behaviors that have appeared or changed since the onset of the illness. For example, the questions might be phrased "Since he/she began treatment with the new medications..." or Since the dosage of _____was increased ...."

The screening question is asked to determine if the behavioral change is present or absent. If the answer to the screening question is negative, mark NO and proceed to the next screening question without asking the subquestions. If the answer to the screening question is positive or if there are any uncertainties in the caregiver's response or any inconsistencies between the response and other information known by the clinician (e.g., the caregiver responds negatively to the euphoria screening question but the patient appears euphoric to the clinician), the category is explored in more depth with the subquestions. If the subquestions confirm the screening question, the severity and frequency of the behavior are determined according to the criteria provided with each behavior. When determining frequency and severity, use the behaviors identified by the subquestions as most aberrant. For example, if the caregiver indicates that resistive behavior is particularly problematic

when you are asking the subquestions of the agitation section, then use resistive behavior to prompt judgments regarding the frequency and severity of agitation. If two behaviors are very problematic, use the frequency and severity of both behaviors to score the item. For example, if the patient has two types or more types of delusions, then use the severity of the most severe and the frequency of any delusional behaviors.

In some cases, the caregiver will provide a positive response to the screening question and a negative reply to all subquestions. If this happens, ask the caregiver to expand on why they responded affirmatively to the screen. If they provide information relevant to the behavioral domain but in different terms, the behavior should be scored for severity and frequency as usual. If the original affirmative response was erroneous, leading to a failure to endorse any subquestions, then the behavior is rescored as absent ("no" on the screen).

Some sections such as the questions pertaining to appetite are framed so as to capture whether there is an increase or decrease in the behavior (increased or decreased appetite or weight). If the caregiver answer "yes" to the first member of the paired question (such as has the patient's weight decreased?), do not ask the second question (has the patient's weight increased?) since the answer to the second question is contained in the answer to the first. If the caregiver answers "no" to the first member of the pair of questions, then the second question must be asked.

When determining frequency, say to the person being interviewed "Now I want to find out how often these things [define using the description of the behaviors they noted as most problematic on the subquestions] occur. Would you say that they occur less than once per week, about once per week, several times per week but not every day, or every day?" Some behaviors, such as apathy eventually become continuously present, and then "are constantly present" can be substituted for "every day." When determining severity, tell the person being interviewed "Now I would like to find out how severe these behaviors are. By severity, I mean how disturbing or disabling they are for the patient. Would you say that [the behaviors] are mild, moderate, or severe?" Additional descriptors are provided in each section that may be used to help the interviewer clarify each grade of severity. When beginning the inventory, say to the caregiver "These questions are designed to evaluate your [husband's/wife's/etc] behavior. They can usually be answered 'yes' or 'no' so please try to be brief in your responses." If the caregiver lapses into elaborate responses that provide little useful information, they may be reminded of the need to be brief. In each case, be sure that the caregiver provides you with a definite answer as to the frequency and severity of the behaviors. Do not guess what you think the caregiver would say based on your discussion. We have found it helpful to provide the caregiver with a piece of paper on which is written the frequency and severity descriptions (less than once per week, about once per week, several time per week and daily or continuously for frequency and mild, moderate, and severe for severity) to allow them to visually see

he response alternatives. This also saves the examiner from reiterating the alternatives with each question.

In very impaired patients or in patients with special medical circumstances, a set of questions may not be applicable. For example, bed-bound patients may exhibit hallucinations or agitation but could not exhibit aberrant motor behavior. If the clinician or the caregiver believes that the questions are inappropriate, then the section should be marked NA (upper right corner or each section), and no further data are not recorded for that section. Likewise, if the clinician feels that the responses are invalid (e.g., the caregiver did not seem to understand the particular set of questions asked), NA should also be marked.

When each domain is completed and the caregiver has completed the frequency and severity rating, you may want to ask the associated caregiver distress question if your protocol includes the distress assessment. To do this, simply ask the caregiver how much, if any, "emotional or psychological" distress the behavior he or she just discussed causes him or her (the caregiver). The caregiver must rate their own distress on a five point scale from 0 - no distress, 1- minimal, 2 - mild, 3 - moderate, 4 - moderately severe, 5 - very severe or extreme.

Delusions (NA)

Does the patient have beliefs that you know are not true? For example, insisting that people e trying to harm him/her or steal from him/her. Has he/she said that family members are not ho they say they are or that the house is not their home? I'm not asking about mere suspiciousness; am interested if the patient is convinced that these things are happening to him/her.

0 (If no, proceed to next screening question). YES (If yes, proceed to subquestions).

Does the patient believe that he/she is in danger - that others are planning to hurt him/her? _____

Does the patient believe that others are stealing from him/her? _____

Does patient believe that his/her spouse is having an affair? _____

Does patient believe that unwelcome guests are living in his/her house? _____

Does the patient believe that his/her spouse or others are not who they claim to be? _____

Does the patient believe that his/her house is not his/her home? _____

Does the patient believe that family members plan to abandon him/her? _____

Does the patient believe that television or magazine figures are actually present in the home ? [Does he/she try to talk or interact with them?] _____

Does the he/she believe any other unusual things that I haven't asked about? _____

the screening question is confirmed, determine the frequency and severity of the delusions.

Frequency:
1. Occasionally - less than once per week.
2. Often - about once per week.
3. Frequently - several times per week but less than every day.
4. Very frequently - once or more per day.

Severity:
1. Mild - delusions present but seem harmless and produce little distress in the patient.
2. Moderate - delusions are distressing and disruptive.
3. Marked - delusions are very disruptive and are a major source of behavioral disruption. [If PRN medications are prescribed, their use signals that the delusions are of marked severity.]

Distress: How emotionally distressing do you find this behavior?
0. Not at all
1. Minimally
2. Mildly
3. Moderately
4. Severely
5. Very severely or extremely

Hallucinations (NA)

Does the patient have hallucinations such as false visions or voices? Does he/she seem to see, ar or experience things that are not present? By this question we do not mean just mistaken liefs such as stating that someone who has died is still alive; rather we are asking if the patient tually has abnormal experiences of sounds, or visions.

0 (If no, proceed to next screening question). YES (If yes, proceed to subquestions).

Does the patient describe hearing voices or act as if he/she hears voices? _____

Does the patient talk to people who are not there? _____

Does the patient describe seeing things not seen by others or behave as if he/she is seeing things not seen by others (people, animals, lights, etc)? _____

Does the patient report smelling odors not smelled by others? _____

Does the patient describe feeling things on his/her skin or otherwise appear to be feeling things crawling or touching him/her? _____

Does the patient describe tastes that are without any known cause? _____

Does the patient describe any other unusual sensory experiences? _____

the screening question is confirmed, determine the frequency and severity of the hallucinations.

Frequency:
1. Occasionally - less than once per week.
2. Often - about once per week.
3. Frequently - several times per week but less than every day.
4. Very frequently - once or more per day.

Severity:
1. Mild - hallucinations are present but harmless and cause little distress for the patient.
2. Moderate - hallucinations are distressing and are disruptive to the patient.
3. Marked - hallucinations are very disruptive and are a major source of behavioral disturbance. PRN medications may be required to control them.

Distress: How emotionally distressing do you find this behavior?
0. Not at all
1. Minimally
2. Mildly
3. Moderately
4. Severely
5. Very severely or extremely

Agitation/Aggression (NA)

Does the patient does have periods when he/she refuses to cooperate or won't let people help her? Is he/she hard to handle?

(If no, proceed to next screening question). YES (If yes, proceed to subquestions).

Does the patient get upset with those trying to care for him/her or resist activities such as bathing or changing clothes? _____

Is the patient stubborn, having to have things his/her way? _____

Is the patient uncooperative, resistive to help from others? _____

Does the patient have any other behaviors that make him hard to handle? _____

Does the patient shout or curse angrily? _____

Does the patient slam doors, kick furniture, throw things? _____

Does the patient attempt to hurt or hit others? _____

Does the patient have any other aggressive or agitated behaviors? _____

If the screening question is confirmed, determine the frequency and severity of the agitation.

Frequency:
1. Occasionally - less than once per week.
2. Often - about once per week.
3. Frequently - several times per week but less than daily.
4. Very frequently - once or more per day.

Severity:
1. Mild - behavior is disruptive but can be managed with redirection or reassurance.
2. Moderate - behaviors disruptive and difficult to redirect or control.
3. Marked - agitation is very disruptive and a major source of difficulty; there may be a threat of personal harm. Medications are often required.

Distress: How emotionally distressing do you find this behavior?
0. Not at all
1. Minimally
2. Mildly
3. Moderately
4. Severely
5. Very severely or extremely

Depression/Dysphoria (NA)

Does the patient seem sad or depressed? Does he/she say that he/she feels sad or depressed?

0 (If no, proceed to next screening question). YES (If yes, proceed to subquestions).

Does the patient have periods of tearfulness or sobbing that seem to indicate sadness? _____

Does the patient say or act as if he/she is sad or in low spirits? _____

Does the patient put him/herself down or say that he/she feels like a failure? _____

Does the patient say that he/she is a bad person or deserves to be punished? _____

Does the patient seem very discouraged or say that he/she has no future? _____

Does the patient say he/she is a burden to the family or that the family would be better off without him/her? _____

Does the patient express a wish for death or talk about killing him/herself? _____

Does the patient show any other signs of depression or sadness? _____

the screening question is confirmed, determine the frequency and severity of the depression.

Frequency:
1. Occasionally - less than once per week.
2. Often - about once per week.
3. Frequently - several times per week but less than every day.
4. Very frequently - essentially continuously present.

Severity:
1. Mild - depression is distressing but usually responds to redirection or reassurance.
2. Moderate - depression is distressing, depressive symptoms are spontaneously voiced by the patient and difficult to alleviate.
3. Marked - depression is very distressing and a major source of suffering for the patient.

Distress: How emotionally distressing do you find this behavior?
0. Not at all
1. Minimally
2. Mildly
3. Moderately
4. Severely
5. Very severely or extremely

E. Anxiety (NA)

Is the patient very nervous, worried, or frightened for no apparent reason? Does he/she seem very tense or fidgety? Is the patient afraid to be apart from you?

NO (If no, proceed to next screening question). YES (If yes, proceed to subquestions).

1. Does the patient say that he/she is worried about planned events? _____
2. Does the patient have periods of feeling shaky, unable to relax, or feeling excessively tense? _____
3. Does the patient have periods of [or complain of] shortness of breath, gasping, or sighing for no apparent reason other than nervousness? _____
4. Does the patient complain of butterflies in his/her stomach, or of racing or pounding of the heart in association with nervousness? [Symptoms not explained by ill health] _____
5. Does the patient avoid certain places or situations that make him/her more nervous such as riding in the car, meeting with friends, or being in crowds? _____
6. Does the patient become nervous and upset when separated from you [or his/her caregiver]? [Does he/she cling to you to keep from being separated?] _____
7. Does the patient show any other signs of anxiety? _____

If the screening question is confirmed, determine the frequency and severity of the anxiety.

Frequency:
1. Occasionally - less than once per week.
2. Often - about once per week.
3. Frequently - several times per week but less than every day.
4. Very frequently - once or more per day.

Severity:
1. Mild - anxiety is distressing but usually responds to redirection or reassurance.
2. Moderate - anxiety is distressing, anxiety symptoms are spontaneously voiced by the patient and difficult to alleviate.
3. Marked - anxiety is very distressing and a major source of suffering for the patient.

Distress: How emotionally distressing do you find this behavior?
0. Not at all
1. Minimally
2. Mildly
3. Moderately
4. Severely
5. Very severely or extremely

f. Elation/Euphoria (NA)

Does the patient seem too cheerful or too happy for no reason? I don't mean the normal happiness that comes from seeing friends, receiving presents, or spending time with family members. I am asking if the patient has a persistent and abnormally good mood or finds humor where others do not.

NO (If no, proceed to next screening question). YES (If yes, proceed to subquestions).

1. Does the patient appear to feel too good or to be too happy, different from his/her usual self? _____
2. Does the patient find humor and laugh at things that others do not find funny? _____
3. Does the patient seem to have a childish sense of humor with a tendency to giggle or laugh inappropriately (such as when something unfortunate happens to others)? _____
4. Does the patient tell jokes or make remarks that have little humor for others but seem funny to him/her? _____
5. Does he/she play childish pranks such as pinching or playing "keep away" for the fun of it? _____
6. Does the patient "talk big" or claim to have more abilities or wealth than is true? _____
7. Does the patient show any other signs of feeling too good or being too happy? _____

If the screening question is confirmed, determine the frequency and severity of the elation/euphoria.

Frequency:
1. Occasionally - less than once per week.
2. Often - about once per week.
3. Frequently - several times per week but less than every day.
4. Very frequently - essentially continuously present.

Severity:
1. Mild - elation is notable to friends and family but is not disruptive
2. Moderate - elation is notably abnormal.
3. Marked - elation is very pronounced; patient is euphoric and finds nearly everything to be humorous.

Distress: How emotionally distressing do you find this behavior?
0. Not at all
1. Minimally
2. Mildly
3. Moderately
4. Severely
5. Very severely or extremely

Apathy/Indifference (NA)

Has the patient lost interest in the world around him/her? Has he/she lost interest in doing ings or lack motivation for starting new activities? Is he/she more difficult to engage in nversation or in doing chores? Is the patient apathetic or indifferent?

0 (If no, proceed to next screening question). YES (If yes, proceed to subquestions).

Does the patient seem less spontaneous and less active than usual? _____
Is the patient less likely to initiate a conversation? _____
Is the patient less affectionate or lacking in emotions when compared to his/her usual self? _____
Does the patient contribute less to household chores? _____
Does the patient seem less interested in the activities and plans of others? _____
Has the patient lost interest in friends and family members? _____
Is the patient less enthusiastic about his/her usual interests? _____
Does the patient show any other signs that he/she doesn't care about doing new things? _____

the screening question is confirmed, determine the frequency and severity of the apathy/ difference.

Frequency:
1. Occasionally - less than once per week.
2. Often - about once per week.
3. Frequently - several times per week but less than every day.
4. Very frequently - nearly always present.

Severity:
1. Mild - apathy is notable but produces little interference with daily routines; only mildly different from patient's usual behavior; patient responds to suggestions to engage in activities.
2. Moderate - apathy is very evident; may be overcome by the caregiver with coaxing and encouragement; responds spontaneously only to powerful events such as visits from close relatives or family members.
3. Marked - apathy is very evident and usually fails to respond to any encouragement or external events.

Distress: How emotionally distressing do you find this behavior?
0. Not at all
1. Minimally
2. Mildly
3. Moderately
4. Severely
5. Very severely or extremely

H. Disinhibition (NA)

Does the patient seem to act impulsively without thinking? Does he/she do or say things that are not usually done or said in public? Does he/she do things that are embarrassing to you or others?

NO (If no, proceed to next screening question). YES (If yes, proceed to subquestions).

1. Does the patient act impulsively without appearing to consider the consequences? _____
2. Does the patient talk to total strangers as if he/she knew them? _____
3. Does the patient say things to people that are insensitive or hurt their feelings? _____
4. Does the patient say crude things or make sexual remarks that they would not usually have said? _____
5. Does the patient talk openly about very personal or private matters not usually discussed in public? _____
6. Does the patient take liberties or touch or hug others in way that is out of character for him/her? _____
7. Does the patient show any other signs of loss of control of his/her impulses? _____

If the screening question is confirmed, determine the frequency and severity of the disinhibition.

Frequency:
1. Occasionally - less than once per week.
2. Often - about once per week.
3. Frequently - several times per week but less than every day.
4. Very frequently - essentially continuously present.

Severity:
1. Mild - disinhibition is notable but usually responds to redirection and guidance.
2. Moderate - disinhibition is very evident and difficult to overcome by the caregiver.
3. Marked - disinhibition usually fails to respond to any intervention by the caregiver, and is a source of embarrassment or social distress.

Distress: How emotionally distressing do you find this behavior?
0. Not at all
1. Minimally
2. Mildly
3. Moderately
4. Severely
5. Very severely or extremely

. Irritability/Lability (NA)

Does the patient get irritated and easily disturbed? Are his/her moods very changeable? Is he/she abnormally impatient? We do not mean frustration over memory loss or inability to perform usual tasks; we are interested to know if the patient has abnormal irritability, impatience, or rapid emotional changes different from his/her usual self.

NO (If no, proceed to next screening question). YES (If yes, proceed to subquestions).

1. Does the patient have a bad temper, flying "off the handle" easily over little things? _____
2. Does the patient rapidly change moods from one to another, being fine one minute and angry the next? _____
3. Does the patient have sudden flashes of anger? _____
4. Is the patient impatient, having trouble coping with delays or waiting for planned activities? _____
5. Is the patient cranky and irritable? _____
6. Is the patient argumentative and difficult to get along with? _____
7. Does the patient show any other signs of irritability? _____

If the screening question is confirmed, determine the frequency and severity of the irritability/lability.

Frequency:
1. Occasionally - less than once per week.
2. Often - about once per week.
3. Frequently - several times per week but less than every day.
4. Very frequently - essentially continuously present.

Severity:
1. Mild - irritability or lability is notable but usually responds to redirection and reassurance.
2. Moderate - irritability and lability are very evident and difficult to overcome by the caregiver.
3. Marked - irritability and lability are very evident, they usually fail to respond to any intervention by the caregiver, and they are a major source of distress.

Distress: How emotionally distressing do you find this behavior?
0. Not at all
1. Minimally
2. Mildly
3. Moderately
4. Severely
5. Very severely or extremely

J. Aberrant Motor Behavior (NA)

Does the patient pace, do things over and over such as opening closets or drawers, or repeatedly pick at things or wind string or threads?

NO (If no, proceed to next screening question). YES (If yes, proceed to subquestions).

1. Does the patient pace around the house without apparent purpose? _____
2. Does the patient rummage around opening and unpacking drawers or closets? _____
3. Does the patient repeatedly put on and take off clothing? _____
4. Does the patient have repetitive activities or "habits" that he/she performs over and over? _____
5. Does the patient engage in repetitive activities such as handling buttons, picking, wrapping string, etc? _____
6. Does the patient fidget excessively, seem unable to sit still, or bounce his/her feet or tap his/her fingers a lot? _____
7. Does the patient do any other activities over and over? _____

If the screening questions is confirmed, determine the frequency and severity of the aberrant motor activity:

Frequency:
1. Occasionally - less than once per week.
2. Often - about once per week.
3. Frequently - several times per week but less than every day.
4. Very frequently - essentially continuously present.

Severity:
1. Mild - abnormal motor activity is notable but produce little interference with daily routines.
2. Moderate - abnormal motor activity is very evident; can be overcome by the caregiver.
3. Marked - abnormal motor activity is very evident, it usually fails to respond to any intervention by the caregiver and is are a major source of distress.

Distress: How emotionally distressing do you find this behavior?
0. Not at all
1. Minimally
2. Mildly
3. Moderately
4. Severely
5. Very severely or extremely

K. Sleep (NA)

Does the patient have difficulty sleeping (do not count as present if the patient simply gets up once or twice per night only to go to the bathroom and falls back asleep immediately)? Is he/she up at night? Does he she wander at night, get dressed, or disturb your sleep?

NO (If no, proceed to next screening question). YES (If yes, proceed to subquestions).

1. Does the patient have difficulty falling asleep? _____
2. Does the patient get up during the night (do not count if the patient gets up once or twice per night only to go to the bathroom and falls back asleep immediately)? _____
3. Does the patient wander, pace, or get involved in inappropriate activities at night? _____
4. Does the patient awaken you during the night? _____
5. Does the patient awaken at night, dress, and plan to go out thinking that it is morning and time to start the day? _____
6. Does the patient awaken too early in the morning (earlier that was his/her habit)? _____
7. Does the patient sleep excessively during the day? _____
8. Does the patient have any other night-time behaviors that bother you that we haven't talked about? _____

If the screening question is confirmed, determine the frequency and severity of the night-time behavior disturbance.

Frequency:
1. Occasionally - less than once per week.
2. Often - about once per week.
3. Frequently - several times per week but less than every day.
4. Very frequently - once or more per day (every night)

Severity:
1. Mild - night-time behaviors occur but they are not particularly disruptive.
2. Moderate - night-time behaviors occur and disturb the patient and the sleep of the caregiver; more than one type of night-time behavior may be present.
3. Marked - night-time behaviors occur; several types of night-time behavior may be present; the patient is very distressed during the night and the caregiver's sleep is markedly disturbed.

Distress: How emotionally distressing do you find this behavior?
0. Not at all
1. Minimally
2. Mildly
3. Moderately
4. Severely
5. Very severely or extremely

A. Appetite and eating disorders (NA)

Has he/she had any change in appetite, weight, or eating habits (count as NA if the patient is incapacitated and has to be fed)? Has there been any change in type of food he/she prefers?

NO (If no, proceed to next screening question). YES (If yes, proceed to subquestions).

1. Has he/she had a loss of appetite? _____
2. Has he/she had an increase in appetite? _____
3. Has he/she had a loss of weight? _____
4. Has he/she gained weight? _____
5. Has he/she had a change in eating behavior such as putting too much food in his/her mouth at once? _____
6. Has he/she had a change in the kind of food he/she likes such as eating too many sweets or other specific types of food? _____
7. Has he/she developed eating behaviors such as eating exactly the same types of food each day or eating the food in exactly the same order? _____
8. Have there been any other changes in appetite or eating that I haven't asked about? _____

If the screening question is confirmed, determine the frequency and severity of the changes in eating habits or appetite.

Frequency:
1. Occasionally - less than once per week.
2. Often - about once per week.
3. Frequently - several times per week but less than every day.
4. Very frequently - once or more per day or continuously

Severity:
1. Mild - changes in appetite or eating are present but have not led to changes in weight and are not disturbing
2. Moderate - changes in appetite or eating are present and cause minor fluctuations in weight.
3. Marked - obvious changes in appetite or eating are present and cause fluctuations in weight, are embarrassing, or otherwise disturb the patient.

Distress: How emotionally distressing do you find this behavior?
0. Not at all
1. Minimally
2. Mildly
3. Moderately
4. Severely
5. Very severely or extremely

[5/30/95: JLC]

For office use

HEALTH STATUS QUESTIONNAIRE (SF-36)

THE FOLLOWING QUESTIONS ASK FOR YOUR VIEWS ABOUT YOUR HEALTH, HOW YOU FEEL AND HOW WELL YOU ARE ABLE TO DO YOUR USUAL ACTIVITIES. IF YOU ARE UNSURE ABOUT HOW TO ANSWER ANY QUESTION, PLEASE GIVE THE BEST ANSWER YOU CAN AND MAKE ANY COMMENTS IN THE SPACE AVAILABLE AFTER QUESTION 10.

Please tick one

1. **In general would you say your health is:**

- Excellent ◯
- Very good ◯
- Good ◯
- Fair ◯
- Poor ◯

2. **<u>Compared to one year ago,</u> how would you rate your health in general <u>now</u>?**

- Much better now than one year ago ◯
- Somewhat better now than one year ago ◯
- About the same ◯
- Somewhat worse now than one year ago ◯
- Much worse now than one year ago ◯

Continued ...

For office use

HEALTH AND DAILY ACTIVITIES

3. The following questions are about activities you might do during a typical day. Does your health limit you in these activities? If so, how much?

Please tick one circle on each line

	Yes, limited a lot	Yes, limited a little	No, not limited at all	
a. Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports	○	○	○	☐
b. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling or playing golf	○	○	○	☐
c. Lifting or carrying groceries	○	○	○	☐
d. Climbing several flights of stairs	○	○	○	☐
e. Climbing one flight of stairs	○	○	○	☐
f. Bending, kneeling or stooping	○	○	○	☐
g. Walking more than a mile	○	○	○	☐
h. Walking half a mile	○	○	○	☐
i. Walking 100 yards	○	○	○	☐
j. Bathing and dressing yourself	○	○	○	☐

4. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

Answer Yes or No to each question

	YES	NO	
a. Cut down on the amount of time you spent on work or other activities	○	○	☐
b. Accomplished less than you would like	○	○	☐
c. Were limited in the kind of work or other activities	○	○	☐
d. Had difficulty performing the work or other activities (e.g. it took extra effort)	○	○	☐

For office use

5. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

Answer Yes or No to each question

	YES	NO	
a. Cut down on the amount of time you spent on work or other activities	○	○	☐
b. Accomplished less than you would like	○	○	☐
c. Didn't do work or other activities as carefully as usual	○	○	☐

6. During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours or groups?

Please tick one

Not at all	○	☐
Slightly	○	☐
Moderately	○	☐
Quite a bit	○	☐
Extremely	○	☐

7. How much bodily pain have you had during the past 4 weeks?

None	○	☐
Very mild	○	☐
Mild	○	☐
Moderate	○	☐
Severe	○	☐
Very severe	○	☐

8. During the past 4 weeks, how much did pain interfere with your normal work (including work both outside the home and housework)?

Not at all	○	☐
A little bit	○	☐
Moderately	○	☐
Quite a bit	○	☐
Extremely	○	☐

Continued ...

For office use

YOUR FEELINGS

9. **These questions are about how you feel and how things have been with you during the past month.** *(For each question, please indicate the one answer that comes closest to the way you have been feeling)*

Please tick one circle on each line

How much time during the past month:	All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time	For office use
a. Did you feel full of life?	○	○	○	○	○	○	☐
b. Have you been a very nervous person?	○	○	○	○	○	○	☐
c. Have you felt so down in the dumps that nothing could cheer you up?	○	○	○	○	○	○	☐
d. Have you felt calm and peaceful?	○	○	○	○	○	○	☐
e. Did you have a lot of energy?	○	○	○	○	○	○	☐
f. Have you felt downhearted and low?	○	○	○	○	○	○	☐
g. Did you feel worn out?	○	○	○	○	○	○	☐
h. Have you been a happy person?	○	○	○	○	○	○	☐
i. Did you feel tired?	○	○	○	○	○	○	☐
j. Has your health limited your social activities (like visiting friends or close relatives)?	○	○	○	○	○	○	☐

For office use

HEALTH IN GENERAL

10. Please choose the answer that best describes how true or false each of the following statements is for you.

Please tick one circle on each line

	Definitely true	Mostly true	Not sure	Mostly false	Definitely false	
a. I seem to get ill more easily than other people	○	○	○	○	○	☐
b. I am as healthy as anybody I know	○	○	○	○	○	☐
c. I expect my health to get worse	○	○	○	○	○	☐
d. My health is excellent	○	○	○	○	○	☐

Comments

Thank you very much for your assistance

Please return the completed booklet in the envelope provided.

NO STAMP IS REQUIRED.

Medical Care Research Unit, Department of Public Health Medicine,
University of Sheffield Medical School, Beech Hill Road, Sheffield, S10 2RX

GENERAL HEALTH QUESTIONNAIRE

GHQ-30

Please read this carefully:

We should like to know if you have had any medical complaints, and how your health has been in general, *over the past few weeks*. Please answer ALL the questions on the following pages simply by underlining the answer which you think most nearly applies to you. Remember that we want to know about present and recent complaints, not those that you had in the past.

It is important that you try to answer ALL the questions.

Thank you very much for you co-operation.

HAVE YOU RECENTLY:

1 — been able to concentrate on whatever you're doing?	Better than usual	Same as usual	Less than usual	Much less than usual
2 — lost much sleep over worry?	Not at all	No more than usual	Rather more than usual	Much more than usual
3 — been having restless, disturbed nights?	Not at all	No more than usual	Rather more than usual	Much more than usual
4 — been managing to keep yourself busy and occupied?	More so than usual	Same as usual	Rather less than usual	Much less than usual
5 — been getting out of the house as much as usual?	More so than usual	Same as usual	Less than usual	Much less than usual
6 — been managing as well as most people would in your shoes?	More so than usual	Same as usual	Rather less than usual	Much less than usual
7 — been feeling on the whole you were doing things well?	Better than usual	About the same	Less well than usual	Much less well
8 — been satisfied with the way you've carried out your task?	Better than usual	About as usual	Less well than usual	Much less well
9 — been able to feel warmth and affection for those near to you?	Better than usual	About same as usual	Less well than usual	Much less well
10 — been finding it easy to get on with other people?	Better than usual	About same as usual	Less well than usual	Much less well
11 — spent much time chatting with people?	Not at all	No more than usual	Rather more than usual	Much more than usual
12 — felt that you are playing a useful part in things?	More so than usual	Same as usual	Less useful than usual	Much less useful
13 — felt capable of making decisions about things?	More so than usual	Same as usual	Less useful than usual	Much less useful

HAVE YOU RECENTLY:

14 — felt constantly under strain?	Not at all	No more than usual	Rather more than usual	Much more than usual
15 — felt that you couldn't overcome your difficulties?	Not at all	No more than usual	Rather more than usual	Much more than usual
16 — been finding life a struggle all the time?	Not at all	No more than usual	Rather more than usual	Much more than usual
17 — been able to enjoy your normal day-to-day activities?	More so than usual	Same as usual	Less so than usual	Much less than usual
18 — been taking things hard?	Not at all	No more than usual	Rather more than usual	Much more than usual
19 — been getting scared or panicky for no good reason?	Not at all	No more than usual	Rather more than usual	Much more than usual
20 — been able to face up to your problems?	More so than usual	Same as usual	Less able than usual	Much less able
21 — found everything getting on top of you?	Not at all	No more than usual	Rather more than usual	Much more than usual
22 — been feeling unhappy and depressed?	Not at all	No more than usual	Rather more than usual	Much more than usual
23 — been losing confidence in yourself?	Not at all	No more than usual	Rather more than usual	Much more than usual
24 — been thinking of yourself as a worthless person?	Not at all	No more than usual	Rather more than usual	Much more than usual
25 — felt that life is entirely hopeless?	Not at all	No more than usual	Rather more than usual	Much more than usual
26 — been feeling hopeful about your own future?	More so than usual	About same as usual	Less so than usual	Much less hopeful
27 — been feeling reasonably happy, all things considered?	More so than usual	About same as usual	Less so than usual	Much less than usual
28 — been feeling nervous and strung-up all the time?	Not at all	No more than usual	Rather more than usual	Much more than usual
29 — felt that life isn't worth living?	Not at all	No more than usual	Rather more than usual	Much more than usual
30 — found at times you couldn't do anything because your nerves were too bad?	Not at all	No more than usual	Rather more than usual	Much more than usual

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MOOD ADJECTIVE CHECK LIST

Name ..... Date .....

Below are a number of words which describe moods. Please put a cross to indicate how much you have felt the way described in the last 24 hours.

	Not at all	A little	Quite a bit	Extremely
Shaky				
Sluggish				
Resentful				
Nervous				
Weary				
Vigorous				
Hopeless				
Lively				
Guilty				
Tired				
Unhappy				
Tense				
Full of pep				
Active				
Worthless				
Miserable				
Worn out				
Discouraged				
Spiteful				
Depressed				
On edge				
Angry				
Furious				
Helpless				

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ORIGINAL ARTICLE

Assessing quality of life in dementia

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Abstract
Quality of Life (QOL) data are an established outcome measure in the assessment of therapeutic interventions. Combined QOL and pharmacoeconomic data are now routinely used to inform decisions about the optimum use of health care resources. All pharmacological, and other therapeutic interventions, have implications for quality of life, and the prospect of drug treatment for Alzheimer's disease (AD) raises important questions about the QOL of patients with dementia. Careful economic evaluation of the benefits of potential drug treatments will have to be made, and additional expenditure on drugs balanced against reduced expenditure on hospital and residential care. The assessment of QOL in dementia, however, raises a number of methodological issues and research in this patient group is just beginning. This paper presents a summary of the conceptual issues and a review of the current literature.

Background

With the growing number of older and very old people, dementia is a rapidly growing, worldwide problem. It is estimated that the number of people with dementia in the UK alone will increase from the present 665,000 to 855,000 by the year 2020 (DoH, 1997).

Dementia is not a final diagnosis and many conditions lead to a dementia syndrome. By far the most common and best known of the dementias is Alzheimer's disease (AD) which is characterized by progressive global deterioration of intellect and personality (Lezak, 1995). As it is not possible currently to affect the course of this disease, the desired outcome for the older person with dementia is a focus on maintaining the best possible quality of life (DoH, 1997).

Although Alzheimer's is predominantly a disease of old age, some patients have symptoms as early as their fourth decade (Rossor, 1993). Patients with young onset dementia have particular problems as their younger family and career are affected.

Why assess quality of life?

Whilst quality of life measures have been developed for a number of reasons (Fitzpatrick *et al.*, 1992), (see Table 1), two basic aspects of health-care underlie most of the questions that QOL appraisals set out to answer: outcome of treatment and cost. With increasingly sophisticated life-saving and life-prolonging medical interventions, and a range of options between alternative treatments, quality of life has emerged as an important outcome. Also, it is argued that no country in the world can *afford* to do all that it is technically possible to do to improve the health of its citizens and so the need has arisen for some system of setting priorities. Quality of life and other outcome data are informing health economic decisions and debate about the allocation of scarce resources. The field of QOL research is thriving, and much progress has been made in the last ten years. The assessment of QOL in dementia will become increasingly important since several new drug treatments are under development and drug trials will need to address the measurement of change of symptoms in relation to QOL (Burns, 1995; Kelly *et al.*, 1997). Considering ways to measure QOL in dementia has, however, necessitated a conceptual re-appraisal.

TABLE 1. Applications of quality of life measures (after Fitzpatrick *et al.*, 1992)

- Screening and monitoring for psychosocial problems in individual patient care.
- Population surveys of perceived health problems.
- Medical audit.
- Outcome measures in health services or evaluation research.
- Clinical trials.
- Cost-utility analyses.

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Definition of quality of life (QOL)

Although the definition of this somewhat elusive term is still occasionally discussed in the literature, there is general consensus on some fundamental points. First, although the phrases 'Quality of life' (QOL), 'Health Related Quality of Life' (HRQOL) and 'Health Status' (HS) are used somewhat interchangeably, there is broad agreement that, in the medical context, QOL should be regarded as a *multidimensional* construct comprising physical, psychological, and social well-being. Whilst there is no absolute agreement about the sub-components of each domain, most scales include items such as physical fitness, main activities (work and social life), cognitive functioning, mood, and pain.

Secondly, it is agreed that QOL is highly subjective and, since research has shown that proxy ratings of QOL do not correlate with patients' own answers, any appraisal of QOL should rely, where possible, on the perception of the individual patient. In the case of dementia QOL researchers have started by reviewing both of these basic principles.

Types of QOL measure

There is no 'gold standard' for measuring QOL and several hundred instruments are available, or in development. The different categories of QOL/health status measures have been comprehensively reviewed elsewhere (Brooks, 1995). In brief, *Generic* instruments cover a broad range of QOL domains in a single instrument. Their chief advantage is in facilitating comparisons among different disease groups. *Disease specific* instruments reduce patient burden by including only relevant items for a particular illness but their main disadvantage is the lack of comparability of results with those from other disease groups. *Health profiles* provide separate scores for each of the dimensions of QOL, whereas a *health index*, a type of generic instrument, gives a single summary score, usually from 0 (death) to 1 (perfect health). A further category, developed within the economic tradition, is that of *utility* measures. Whilst some decisions are taken for individual patients, others, such as those made by health policy makers, concern groups of patients. Here the focus is on society as a whole and the societal allocation of scarce resources. For this purpose, preference weighted measures are required. The choice of measure will depend upon the goal of the study; a common recommendation is to include both disease specific and generic measures in an investigation.

Measurement issues

The psychometric testing of a measure is labour intensive and the evaluation of a measure's performance in a number of situations is an ongoing process. In considering the psychometric properties of an instrument, the basic criteria are that the measure be valid, reliable and sensitive. For a comprehensive review of the statistical procedures see (Streiner & Norman, 1995). In brief:

Validity is how well the instrument measures what it purports to measure. There are various statistical procedures for testing different aspects of an instrument's validity. The terminology is somewhat confusing but Streiner & Norman provide a useful guide to the various types (*face* validity, *construct* validity; *criterion* validity, *concurrent* validity and *predictive* validity etc.).

Reliability is concerned with whether the same measurement can be obtained on other occasions and concerns the amount of error inherent in any measurement. Two basic tests are the *internal consistency* of a test, measured by coefficient alpha, and *test-retest* reliability where scores taken on two occasions are compared. There are problems in assessing the test-retest reliability of QOL measures where genuine changes in the patient's well-being may have occured before the follow-up assessment, making it difficult to distinguish measurement error from genuine change in health/QOL. Another important confounding variable relates to intervening life-events which have an impact on both mood and quality of life.

Sensitivity is concerned with how sensitive the measure is to detecting small, or clinically relevant, changes in health/QOL. This is important for monitoring benefits of treatment.

QOL in older versus younger people

(i) Conceptual issues

Age is an important variable to be considered in QOL assessments since issues of importance for older individuals might be different to those of importance to younger people. On the other hand, some issues may be the same but the relative importance might be different (Stewart *et al.*, 1996). For example, role-functioning may need to be redefined. There will be differences between those living at home with a certain degree of autonomy and institutionalized populations where important issues might be privacy and self-control (Philp *et al.*, 1989).

(ii) Ethical issues

The gradual decline in abilities associated with progressive, irreversible dementia raises many ethical issues concerning personhood, the self, and the value of life (Harris, 1988; Post, 1995). Being a 'person' is defined by our ability to reason, which affects whether we are held morally responsible for our actions, and,

in our legal system, it determines the bestowing or withdrawal of rights. Whilst all patients have a right to health care, in debates about the allocation of scarce resources, the question has arisen whether older people are unfairly discriminated against (Harris, 1988; Smith, 1987). As competition for scarce resources intensifies, attention is being focussed on ways to evaluate the most cost-effective use of resources, using a number of methods to describe and value health status. The valuation of health states, however, is not without controversy (Drummond *et al.*, 1997). In a recent study of the measurement of preferences for health states, respondents rated dementia and coma as worse than death (Patrick *et al.*, 1994). Given the important existential, moral and legal ramifications, the development of tools to assess quality of life in patients with dementia must be scrupulously considered.

QOL in dementia: conceptual issues

At the outset it is important to be clear about a number of conceptual issues that need to be considered in the measurement of QOL in dementia. Assessment of well-being in any patient is complex, and the process is even more difficult in the patient with a degenerating, dementing condition. The issues can be grouped under seven main headings:

(1) Cognitive function

Lezak (1995) postulates four major classes of cognitive functions and it can be seen that self-appraisal of QOL or well-being involves each one of these:

(1) *Receptive functions:* abilities to select, acquire, classify and integrate information;
(2) *Memory and learning:* information storage and retrieval;
(3) *Thinking:* mental organisation and reorganisation of information;
(4) *Expressive functions:* means through which information is communicated or acted upon.

Whilst many disorders such Alzheimer's disease come under the heading *dementias*, dementia is commonly defined as *global cognitive decline* (Lezak, 1995).

QOL assessment comprises a highly complex procedure of introspection and evaluation, involving several components of cognition including implicit and explicit memory (Barofsky, 1996). As such, it seems clear that at a certain stage of cognitive decline there will come a point where QOL self-assessment will no longer be possible. We know that patients with mild cognitive impairment can appraise their QOL because patients with a variety of neurological disorders, where some intellectual change occurs, have done so (e.g. Parkinson's disease, MS, epilepsy). Dementia progressively leads to both an impact on QOL and gradual impairment of the patient's ability to introspect. Research has not yet established at what stage of cognitive decline the patient is no longer able to appraise their QOL (Fletcher *et al.*, 1992).

The sequence of changes in cognitive decline and behavioural disturbances varies across dementing conditions. The early stages of Pick's disease, for example, are dominated by personality and behavioural changes with deterioration in social behaviour. Although in the early stages of Pick's disease, cognitive impairment is generally less marked than personality changes and emotional disturbance, impairment of language can be an early feature (Hart & Semple, 1994).

A review of language and dementia, (Hart, 1988) revealed many discrepancies in the literature regarding the language of patients with AD. Two key messages from this review are that, firstly, there is considerable heterogeneity between patients with AD in terms of symptoms they present and in the rate and manner in which the disease progresses. Secondly, researchers must remember that AD is a progressive condition and that the nature and extent of language and other cognitive deficits can be expected to change during its course.

Since the self-assessment of quality of life is a complex task involving several components of cognition, the global cognitive decline associated with dementia means that patient self-report will probably only be possible in the early stages of the illness. Research is needed to ascertain until what stage patient self-report is possible.

(2) Communication

Language is a fundamental tool of human communication and, since language impairment is an early symptom of all dementing conditions, it is assumed that self-reports of health status, or QOL, are not valid in patients with dementia. Communication encompasses language, memory and personal orientation and, when describing their current well-being, a patient might either be reflecting on their current state or thinking of a past but well-remembered state. Although long neglected, attention is now being turned to the subjective experience of dementia (Kitwood, 1997). Both research and patients' own writings about their illness show that communication is possible in the early stages of the illness (Goldsmith, 1996) and it has been suggested that studies are needed to determine the extent to which self-reports can be accurately obtained directly from persons at different stages of dementia (Stewart *et al.*, 1996).

(3) Subjective versus objective viewpoint

Although QOL research places emphasis on the subjective view because, after all, 'the patient knows

best', it is argued that both subjective and objective views are important in dementia. In this case, quality of life 'is the evaluation, by both subjective and social — normative criteria, of the behavioural and environmental situation of the person'. Limiting QOL to subjective considerations is 'only half the picture' (Lawton, 1994, 1997).

(4) Denial/loss of insight

The term insight refers to a complex phenomenon which is difficult to define (Markova & Berrios, 1992; Raven *et al.*, 1992) encompassing concepts such as self-knowledge and self-awareness. Loss of insight has been thought to be part of the general cognitive collapse in dementia (Markova & Berrios, 1992). In a recent study of patients with Alzheimer's disease, a distinction was drawn between denial/unawareness and loss of insight (Weinstein *et al.*, 1994). The conclusion of this study was that denial/unawareness of impairment in Alzheimer's disease is not explicable on the basis of the severity of the dementia. Marked denial was encountered in patients with Mini Mental Status Examination scores in the mid-20s, and awareness of disability was expressed by patients with scores as low as 7.

Strong associations have been found between awareness of memory deficit and disturbed mood, particularly depression and irritability, in patients with Alzheimer's disease (Seltzer *et al.*, 1995). Depression is a common co-morbidity of dementia (Eastwood & Reisberg, 1996) and mood disturbances may have an important impact on QOL. A study life events in patients with senile dementia found that threatening life events are associated with depressive symptoms (Orrell & Bebbington, 1995) and the authors conclude that dementia sufferers are responsive to stress in the same way as cognitively intact individuals. On the other hand, patients with dementia under-report depressive symptoms (Ott & Fogel, 1992; Perel, 1998). There is likely to be a complex relationship between QOL, insight/awareness and mood throughout the course of the dementing illness.

(5) Anosognosia

Patients with dementia may be unaware of their deficit; they may have anosognosia (Rossor, 1993). At interview the patient will often describe himself as 'well' and even on probing will admit to no problems. In the early stages carers, especially spouses, are often increasingly helping the patient, subtly assisting in daily activities, perhaps silently correcting small errors and otherwise shielding the patient so that the patient's claims that all is well are, indeed, justified.

(6) Neuropsychiatric symptoms

Neuropsychiatric disturbances are common manifestations of dementing disorders (Cummings *et al.*, 1994). Patients with Alzheimer's disease experience delusions, agitation, anxiety and personality changes, and neuropsychiatric disorders may be the presenting manifestations of the disease (Cummings & Trimble, 1995). The behavioural characteristics of frontotemporal dementia include disinhibition, impulsivity and loss of personal and social awareness (Neary and Snowden, 1997). At present, the patterns of behavioural changes related to various neuropathologies and the relationship between neuropsychiatric changes and the patterns of cognitive and functional decline are undocumented (Mega *et al.*, 1996) although some interesting findings are coming to light. For instance, one recent study found no relationship between dysphoria and apathy indicating that the two are dissociable and should not be used interchangeably when attempting to identify mood changes in AD patients (Mega *et al.*, 1996). Again, the relationship of neuropsychiatric symptoms to both patients' QOL, and the QOL of their main carer is likely to be complex.

(7) Stages of dementia

Any appraisal of QOL in dementia must take account of the different stages of dementia, the degree of insight, and variation in aspects of neuropsychological decline. The challenge is how to devise instrument(s) for a range of decrements and what to put in that range. Also, different patients and their families will hold values that differ. Another problem will be how to compare small improvements later on in the disease with small differences early on which might not be very noticeable or beneficial. Finally, account will need to be taken of whether the patient can function independently, of whether they can live alone, and of comorbidity.

Suggested theoretical models

Various researchers have suggested that the tri-partite model of QOL as physical, psychological and social well-being, subjectively assessed, needs to be revised for dementia (Brod & Stewart, 1994; DeLetter *et al.*, 1995; Jones *et al.*, 1986; Lawton, 1994). A number of proposed definitional models have been put forward; these are outlined in Table 2.

Methodological issues

One approach to the assessment of QOL in dementia might be to adapt existing measures but it is important to re-evaluate the psychometric features of existing

TABLE 2. QOL in dementia: proposed definitional models

Lawton (1994)	Psychological well-being; perceived QOL; behavioural competence; objective environment.
Jones *et al.*, (1986)	Survival safety/security; purpose; independence (based on Maslow's hierarchy of needs).
Brod & Stewart (1994)	Physical functioning; daily activities (recreational, instrumental, work); mobility; social functioning and well-being; bodily well-being; positive and negative affective states; sense of aesthetics; self-concept and overall life satisfaction.
DeLetter *et al.*, (1995)	Social interaction; basic physical care; appearance of patient to others and nutrition.

measures and otherwise assess their appropriateness for use in a different context (Salek *et al.*, 1998). A measure developed for one patient group, or purpose, might not be appropriate for another. A number of additional practical considerations have been outlined in the literature. These are:

(i) Patients self-ratings: data quality

Patient's self-ratings will be influenced by education, memory and attention difficulties (Stewart *et al.*, 1996). Since self-administration is likely to yield high levels of missing data, it is suggested that the optimal study design would incorporate the use of multiple methods of data-collection. When choosing measures, account needs to be taken of patient heterogeneity; the various stages at which patients with AD may present; the variable symptoms within stages and the varied levels of intelligence, opportunities and life experiences. Also, potential floor and ceiling effects can hamper detection of change. It is important to remember that there is increased complexity of health problems faced by older persons when they are ill; there is a pattern of declining average health but increasing variability (Stewart *et al.*, 1996). It is recommended that attention be paid to the format of questionnaires preferring simple language, a number of choices for answers and large font sizes as many patients will have visual problems. Short interviews are recommended for patients with dementia since patients tire easily. Finally, although QOL interviews are often conducted over the telephone, it is recommended that, in this group, face-to-face interviews be used exclusively to facilitate patients' motivation and attention to the task (Stewart *et al.*, 1996).

(ii) Proxy reports

Whilst it is generally acknowledged that, in the later stages of dementia, proxy measures are required since patients are no longer capable of making an evaluation (Stewart *et al.*, 1996), it has also been suggested that patients in the early stages are likely to give overly optimistic ratings of their own functional capacities (Lawton, 1994).

Proxy reports have been reviewed (Magaziner, 1997; Zimmerman & Magaziner, 1994). Studies of proxy-derived data suggest that: (i) the more objective the question and the more concrete the item in question, the closer the proxy's response will be to the subject's; (ii) proxies are poorer reporters for conditions and symptoms that are private and not easily observed; (iii) findings regarding proxy-subject agreement for ratings of affective status are inconsistent. Perhaps the most consistent findings across studies are that greater agreement is obtained for objective items that ask about discrete, observable aspects of functioning such as mobility, and that proxies tend to over-rate disability, compared to patients' own reports. One unavoidable problem with proxy measures is that the data are coloured by the opinion, and biases, of another person. Since there are a number of imperfections surrounding the use of proxies, it has been suggested that researchers should carefully document their use of proxies and the potential error their use introduces to specific studies (Magaziner, 1997).

Performance-based measures usually have excellent reliability and validity but standardised tasks may not reflect the demands experienced in the natural environment (Zimmerman & Magaziner, 1994).

(iii) Observational methods

Given the problems of self-report, and the potential bias of proxy reports, another proposed method is the assessment of behaviour together with the affect that accompanies the behaviour. In assessing affect, it is argued that we must pay more attention to positive states of mind rather than focussing on anxiety and depression, (Lawton, 1994). Observational methods have varied from study to study. Those studies assessing the quality of institutional care for elderly people with dementia have been reviewed (Brooker, 1995).

Methodological recommendations

The measurement of QOL in dementia is fraught with pitfalls. One general recommendation is that measurement should use disease-specific measures which (i) take account of staging i.e. measures which discriminate between patterns of symptoms based on the stage of the disease and (ii) use an individualized

outcome. In other words, the base-line and change in each individual patient should be monitored and account taken of the views and values of each patient and their family (Rockwood & Wilcock, 1996). It is further recommended that instruments that measure QOL in dementia should: (i) be scaled similarly for all individuals; (ii) use proxy ratings of externally observable behaviours and expressions, and (iii) be specific for dementia (Rabins & Kasper, 1997).

Yet another group has looked at the definition and outcomes in end-stage dementia. The authors propose 13 domains to assess the quality of care and argue for the importance of measures of satisfaction, for both patients and their carers, at this stage of the illness (Teno *et al.*, 1997).

Review of current QOL instruments in dementia

The development of instruments and the choice of a tool will depend on the goal of the study. A number of QOL assessment techniques are in development and full testing of their psychometric properties is ongoing.

The schedule for the evaluation of individual quality of life (SEIQOL)

Patients with dementia were asked to rate their own QOL using an individualized measure called the Schedule for the Evaluation of Individual Quality of Life (SEIQOL). With this approach, devised from a technique known as judgement analysis, patients rate their level of functioning in five self-nominated facets of life and then indicate the relative weight or importance they attach to each. The procedure is complex, however, and in this study only 6 of the 20 patients completed the full assessment (Coen *et al.*, 1993). Although the SEIQOL has been validated in a number of patient groups, the results of this study suggest that it may only be of use in patients with very mild dementia.

The quality of life assessment schedule (QOLAS)

The Quality of Life Assessment Schedule (QOLAS) is another method which is subject-driven i.e. personally tailored to each individual patient. The QOLAS is based on existing psychological theories and methods: Personal Construct Theory and the Repertory Grid Technique (RGT). The RGT was initially developed as a generic tool to assess the QOL of patients with neurological disorders, particularly epilepsy (Kendrick & Trimble, 1994). The full Repertory Grid Technique was lengthy and cumbersome and it was deemed desirable to streamline the method. The brief version has been used in a study of patients with epilepsy (Selai & Trimble, 1998a), and more recently has been modified for use in patients with dementia (Selai *et al.*, submitted). In the dementia study, evidence of construct validity was obtained by looking at correlations with the MMSE and with a number of other disease-specific and generic instruments. Full testing of the psychometric properties of the modified version is ongoing.

Quality of life-AD (QOL-AD)

The Quality of Life-AD (QOL-AD) obtains a rating of the patient's QOL from both the patient and the caregiver (Logsdon, 1996). The scale is based on a literature review of quality of life in older adults and on the assessment of QOL in other chronically ill populations. It has 13 items covering the domains of physical health, energy, mood, living situation, memory, family, marriage, friends, chores, fun, money, self and life as a whole. Each of the domain items are rated as poor, fair, good or excellent. The briefness of the scale, and its self-report format incorporating both patient and caregiver ratings makes it attractive for use in clinical trials. Early validation studies suggest it is a reliable and valid instrument.

Dementia QOL (DQOL)

This recently developed instrument has been designed for direct respondent assessment in cognitively impaired populations (Brod *et al.*, 1996). The DQOL was originally a 96-item interview including domains of physical functioning, daily activities, discretionary activities, mobility, social well-being, interaction capacity, bodily well-being, psychological well-being, sense of aesthetics, and overall global quality of life. Some domains were deleted and the current 56-item version takes approximately 15 to 20 minutes to complete. Evidence of the reliability and the validity of a number of the DQOL scales has been obtained.

The community dementia QOL profile (CDQLP)

This is a disease-specific, self-administered instrument which consists of 2 sections. Part I is a measure of the patient's quality of life assessed by their carer as a proxy and part II is a measure of the carer's own QOL and stress (Salek *et al.*, 1996). This is a 33-item instrument with 4 dimensions including thinking and behaviour, family and social life, physical activities and other aspects of daily living. Construct validation has been performed by looking at correlation with the MMSE. Full testing of the psychometric properties of the scale is ongoing.

The ADRQL (alzheimer's disease-related quality of life) instrument

The ADRQL (Alzheimer's Disease-Related Quality of Life) is a multidimensional, disease-specific, health-related QOL instrument, developed for use in evaluations of treatment interventions in Alzheimer's disease (Rabins *et al.*, in press). It has five domains: Social Interaction; Awareness of Self; Feelings and Mood; Enjoyment of Activities and Response to Surroundings. The instrument is proxy-rated. Caregivers and health care professionals were involved in the process of identifying the domains and selecting the items. A draft instrument was reviewed by an expert panel and then presented to a focus group of family caregivers of persons with AD, which resulted in minor modifications. Item scoring is being developed using a preference-based weighting approach which will allow the calculation of both a single and subscale HRQL scores. Preliminary results show that the instrument has acceptable internal consistency, and construct validation has been performed by looking at correlation with the MMSE and other instruments. Full psychometric testing of both the instrument and of the weights are in progress.

Blau QOL scale

The Blau QOL scale, based on a 'social indicators' approach, assesses QOL in ten domains relating to working, leisure, eating, sleeping, social contact, earning, parenting, loving, environment and self-acceptance (Blau, 1977). It is completed by the patient or, in the institutional setting, by a proxy. The items emerged from interviews with patients in individual and group psychotherapy. The instrument is not specific to dementia and extends beyond ADL to social relationships and subjective states. A subset of seven of these items were rated by the patient in a clinical trial of donepezil (Rogers *et al.*, 1998). The domains chosen covered relationships, eating and sleeping, and social and leisure activity. There is no evidence, however, that this generic scale was previously validated for use in dementia and the method of scoring, using a visual analogue scale, might be a problem for some patients with dementia.

The York scale

In a study looking at long-term psychiatric patients in the community, including 100 patients with senile dementia (Jones *et al.*, 1986), QOL was assessed using a scale devised for the study based on Maslow's hierarchy of needs (see Table 2). The authors reported that the scale required further development. In this study few patients were capable of answering questions and most of the information came from proxies, although often even professional staff were uncertain in their replies.

Cognitively impaired life quality scale (CILQ)

Based on a series of focus groups with nursing staff, an instrument to measure the QOL of profoundly impaired patients through nursing caregivers' eyes was developed (DeLetter *et al.*, 1995). A 29-item version of the Cognitively Impaired Life Quality Scale (CILQ) scale and a shortened, 14-item version of the scale are being developed. The 14-item version for clinical use has 5 categories comprising social interaction, basic physical care, appearance to others, nutrition/hydration and pain/comfort. Full psychometric testing is ongoing.

Byrne-MacLean QOL index

This is a 56 item scale reflecting 6 categories of concern identified by residents of nursing homes including 'niceness' (patient perception of staff), worry, care and comfort, choice, physical environment and social needs (Byrne & Maclean, 1997). Although the scale developers have described it as a QOL instrument, it perhaps assesses quality of *care* rather than quality of life.

Observational techniques

A number of techniques have been developed based on observational methods where behaviour of patients is rated by researchers or nursing staff usually for discrete periods of 10 or 15 minutes. Events, activities or social interactions are coded according to a specified protocol. These include: The Philadelphia Geriatric Center Affect Rating Scale (Lawton, 1994); the Short Observation Method (Macdonald *et al.*, 1985); the Quality of Interactions Schedule (QUIS) (Dean *et al.*, 1993) and Dementia Care Mapping (Bredin *et al.*, 1995). Two other observational techniques are in development by Beck and Volicer & Hurley (Whitehouse *et al.*, 1998).

Other instruments used in dementia

A number of other instruments have been used to assess some aspect of QOL in dementia although they were not specifically designed for this purpose. These have included both generic QOL instruments as yet unvalidated for use in patients with dementia and dementia-specific measures which tap some component of well-being but which might not be technically regarded as a QOL measure (Busschbach *et al.*, 1998; Salek *et al.*, 1998; Walker *et al.*, 1998).

Clinical trials

The International Working Group recently published a position paper on the harmonization of dementia

drug guidelines (Whitehouse *et al.*, 1997). This paper highlights the importance of quality of life as an outcome measure when considering the future of international drug development for individuals affected by AD and other dementias. The authors also give warning, however, that the importance of QOL will depend on a clear understanding of the role of patient and caregiver in its assessment, and on answers to a number of as yet unresolved conceptual and methodological issues.

In a recent review paper of QOL measures used in anti-dementia drug trials for Alzheimer's disease, the authors found that of 36 reports, 5 measured and 4 mentioned QOL. The authors conclude that most instruments now used to assess QOL in anti-dementia drug trials have not been adequately validated in patients with Alzheimer's disease (Howard & Rockwood, 1995). Since data generated in clinical trials of a new anti-dementia drug are likely to influence decisions made by regulatory bodies about whether to grant licences to market their products, it is extremely important that the psychometric properties of any QOL instrument used, particularly sensitivity to change, should have been demonstrated (Salek *et al.*, 1998).

Global measures

The United States Food and Drug Administration (FDA) in 1990 endorsed the use of global assessments as 'the ultimate test of the clinical utility of a drug's anti-dementia effects'. The FDA's stance is that licensing of a compound as an anti-dementia drug will require an effect which goes beyond improvement on psychometric tests. Global measures such as the CIBIC have been reviewed (Rockwood & Morris, 1996). A number of problems have been suggested such as that 'unspecified' global measures like the CIBIC employ no specific guidelines in their measurement of disease progression and treatment effects. Also, although not formally tested, there is the suggestion that the CIBIC is less sensitive to change than other measures. Global measures provide a means of dealing with the heterogeneity of disease expression in dementia but they need more formal testing.

QOL instruments used in clinical trials

QOL was assessed in a clinical trial of donepezil, although the scale used (Blau, 1997), is a generic scale and probably unsuitable for the task. It is therefore not surprising that results were very variable, and no treatment effect could be discerned (Rogers *et al.*, 1998).

The Progressive Deterioration Scale (PDS) (Dejong *et al.*, 1989) was used as a measure of QOL, along with the Instrumental Activities of Daily Living assessment (Lawton *et al.*, 1969) and the Physical Self Maintenance Scale (PSMS) (Lawton *et al.*, 1969) as secondary measures, in clinical trials of tacrine (Davis *et al.*, 1992; Farlow *et al.*, 1992 & Knapp *et al.*, 1994). Although the tacrine group did better on some of the QOL scores it can be questioned whether any of these measures comprehensively assesses QOL, as opposed to activities of daily living.

Cost-utility analysis

Costs of care are coming under increasing scrutiny and attention has turned to ways of assessing economic aspects of dementia care. There are a number of methodological complexities in conducting a cost-effectiveness analysis of a drug for patients with Alzheimer's disease (Busschbach *et al.*, 1998). Cost utility analysis is a technique that uses the Quality Adjusted Life Year (QALY) as an outcome measure. For its calculation, the QALY requires well-being or QOL to be expressed as a single index score. The Quality of well-being scale (QWB) is a utility-weighted measure of health-related quality of life that can be used in clinical trials and cost-utility analyses. Evidence has recently been reported for the validity of the QWB in patients with Alzheimer's disease (Kerner *et al.*, 1998). The EuroQol EQ-5D has been purposefully designed to generate a cardinal index of health, thus giving it considerable potential for use in economic evaluation (Brooks, 1996). The EQ-5D has been piloted in patients with dementia but further evidence of the validity of the EQ-5D for use in this patient group is required (Selai, 1998b).

QOL of caregivers

Whilst we have focussed on the assessment of QOL in the patient with dementia, the quality of life of those caring for people with dementia is also of great importance. A plethora of studies document high rates of carer distress, depression and other psychiatric morbidity (Ballard *et al.*, 1995; Brodaty, 1995) and it is clear from the literature that caring for a patient with dementia has a profound effect on quality of life. A full review of the vast caregiving literature is, however, outside the scope of this paper.

Conclusion

Attention has recently turned to the subjective experience of dementia and to how we might conceptualise and assess QOL in a person with a dementing illness. This paper has presented a summary of the theoretical issues and an overview of the current literature. The measurement of QOL in this patient group in its early days. Whilst this topic raises a number of challenging methodological problems, preliminary

research has shown that the measurement of QOL in patients with dementia is feasible. There is a need both for thorough testing and validation of existing measures for use in dementia and for the development of new techniques. As with all QOL research, the most appropriate assessment technique will depend on the goal of the study and the type of data required which, in turn, will depend upon the use to which the data will be put. With the predicted increase in the number of persons with dementia, with the rising demand for institutional care and the development of new drugs, the need for QOL assessment in these patients and their carers will increase. It is also of the utmost importance.

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Quality of life pre and post epilepsy surgery

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Abstract

The aim of this work was to assess the health-related quality of life (HRQL) of patients pre and post surgical treatment for epilepsy. A total of 145 patients were interviewed during their pre-surgical assessment on the telemetry unit, Queen Square. The HRQL assessment comprised the quality of life assessment schedule (QOLAS), the EuroQol EQ-5D and the epilepsy surgery inventory (ESI-55). A total of 40 patients were followed up, of which 22 had undergone surgery and achieved 75% or greater reduction in seizures. The QOLAS scores for the patients who achieved 75% or greater seizure reduction post-op were significantly lower (i.e. improved HRQL) compared to baseline. The descriptive data suggest that the EQ-5D may not be capturing all of the QOL issues of relevance to patients with chronic, intractable epilepsy and the EQ-5D may not be valid for this group. Most patients queried the visual analogue scale (VAS) which asks for an overall rating of the respondent's self-perceived health. The most frequent comments, from 42% of patients, was that 'health' did not include their epilepsy. Despite this, the group whose seizures were reduced had significantly higher VAS scores at follow-up. We can conclude that the VAS is sensitive to clinical change. The baseline EQ-5D utility and follow-up scores were compared. There were no significant changes in QOL scores for either group. The patients who achieved 75% or greater reduction in seizures post-op scored significantly higher (i.e. better QOL) on 2/3 composite scores of the ESI-55 at follow-up. The QOLAS, the EQ-5D VAS and the ESI-55 were sensitive to clinically defined outcome. The results for the EQ-5D profile and the EQ-5D utility suggest that the EQ-5D is not a valid and responsive instrument for use in patients with intractable epilepsy.

Keywords: Quality-of-life; Health-status-indicators; Outcome measures; Epilepsy-surgery; EuroQol

1. Introduction

A number of recent studies have assessed health-related quality of life (HRQL) pre and post definitive surgical treatment for intractable epilepsy. The findings are complex and our current knowledge is limited by a lack of long-term studies, absence of standardised patient populations and paucity of pre- and post-operative comparisons using standardised QOL and seizure assessment instruments (Spencer, 1996). Other unresolved methodological issues include what percentage of seizure reduction is the most appropriate outcome measure and what is the

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most appropriate follow-up period. Whilst it has been demonstrated that post-operative seizure freedom is associated with significant improvements in QOL (Hermann et al., 1992; Kim and Kim, 1995; Kellett et al., 1997), a number of other seizure based outcomes have been used and the picture for different degrees of seizure reduction is less clear. Some researchers have chosen a 75% (Bladin, 1992; Hermann et al., 1992; Malgrem et al., 1997) and some a 90% reduction in seizures (Rose et al., 1996; McLachlan et al., 1997).

There is no agreed follow-up period for assessing QOL post-surgery. Researchers have chosen periods as diverse as 3 months (Kim and Kim, 1995), 6–8 months (Hermann et al., 1992), 1 year (Rose et al., 1996), 2 years (McLachlan et al., 1997) and 4 years (Malgrem et al., 1997).

Also, a number of QOL measures have been used and this diversity of instruments makes intra-study comparisons difficult. QOL measures used have included the ESI-55 (Vickrey et al., 1995a; Rose et al., 1996; McLachlan et al., 1997) the SF-36 (Malgrem et al., 1997) QOLIE-89 (Kim and Kim, 1995) the Liverpool battery (Kellett et al., 1997) the WPSI and the GHQ (Hermann et al., 1992).

Although a number of epilepsy-specific measures are now available (Hays, 1995; Cramer, 1996), recent papers have raised the question of the sensitivity and the face validity of the instruments (Gilliam et al., 1997; Leidy et al., 1998). It is argued that more data are needed on the instruments' sensitivity to change and that many of the more established measures do not tap issues of concern to patients such as driving, independence and pregnancy/birth defects. Moreover, existing instruments used in epilepsy yield a profile score which cannot be aggregated into a single, overall score. The single index score, however, is required for cost-utility evaluations (Hays et al., 1996), a research area of growing importance as the costs of health care come under increasing scrutiny (Spilker, 1996). No measure of HRQL has emerged as ideal for QOL surgery and further psychometric testing of all currently available instruments is needed.

Given the issues of the validity and the responsiveness of QOL scales in epilepsy, we assessed the HRQL of patients pre and post epilepsy surgery using (i) the QOLAS (Kendrick and Trimble, 1994; Selai and Trimble, 1998), a measure shown to have validity for the patient and to be sensitive to change; (ii) the ESI-55 (Vickrey et al., 1992), an established measure for use in epilepsy surgery; and (iii) the EQ-5D (EuroQol Group, 1990; Brooks, 1996), a measure specifically designed to yield a single, overall score for use in economic analyses.

2. Subjects and methods

A total of 145 patients undergoing evaluation for definitive treatment for intractable epilepsy were interviewed during their stay on the telemetry unit of the National Hospital, Queen Square. Quality of life was assessed using the quality of life assessment schedule (QOLAS); the epilepsy surgery inventory (ESI-55), and the EuroQol EQ-5D. The three instruments are described below.

2.1. The quality of life assessment schedule (QOLAS)

The QOLAS is an individualised QOL assessment technique which is tailored to each individual patient, and is a revised version of the quality of life assessment by construct analysis (QoLASCA), a method originally based on repertory grid technique (Kendrick and Trimble, 1994; Kendrick, 1997). The full QoLASCA technique was somewhat burdensome and the revised method (QOLAS) has been considerably streamlined (Selai and Trimble, 1998). The psychometric properties of the revised QOLAS have been tested in a number of patient groups (Selai et al., 1999). Two main aspects of the original theoretical work have been maintained (i) the original emphasis (in order to assess therapeutic outome) on a careful and comprehensive interview, recording items of importance to the patient in the patient's own words; (ii) the idea that QOL is a function of the conceptual distance between 'how I am now' and 'how I would like to be', the gap between actuality and expectation. This is known in the medical literature as 'Calman's gap' since Calman sug-

gested that a key aim of medical care should be to narrow the gap between a patient's hopes and expectations and the patient's current state (Calman, 1984). The QOLAS is described below.

2.1.1. QOLAS: Interview

The QOLAS interview used in this study is as follows: (1) introduction and rapport-building. (2) The respondent is invited to recount what is important for his/her QOL and ways in which their current health condition is affecting their QOL. Key constructs are extracted from this narrative. Prompting is sometimes required.

(3) In total, ten 'constructs' are elicited, two for each of the following domains of QOL: physical, psychological, social, daily activities and cognitive functioning (or well-being).

(4) The patient is asked to rate how much of a problem each of these is now on a 0–5 scale where 0, no problem; 1, very slight problem; 2, mild problem; 3, moderate problem; 4, big problem and 5, it could not be worse.

(5) The patient is asked to rate how much of a problem they would 'like' each of these to be, ideally, on a 0–5 scale as above.

(6) At follow-up interview, the respondent's individual constructs are read out to them and they are invited to rate each one again on the 0–5 scale for how much of a problem there is with each item 'now'.

2.1.2. QOLAS: Scoring

(i) For each construct, the 'like' score is subtracted from the 'now', giving a score for the distance between expectation and reality.

(ii) The scores, calculated in (i) above, for the two constructs per domain are summed to give a domain score out of ten. The total for each of the five domains is summed to give an overall QOLAS score out of 50.

2.2. The epilepsy surgery inventory (ESI-55)

The ESI-55 consists of the generic SF-36 plus a number of epilepsy-specific questions (Vickrey et al., 1992). The scoring produces eleven subscales (health, energy, QOL, social functioning, emotional functioning, cognitive functioning, role-emotional, role-memory, role-physical, physical function and pain) and three composite scores for physical health, mental health, and role functioning.

2.3. The EQ-5D

The EQ-5D is a generic instrument for describing and evaluating health-related quality of life, developed to complement other forms of quality of life measure, and to generate a cardinal index of health, thus giving it considerable potential for use in economic evaluation (EuroQol Group, 1990; Brooks, 1996). It has three components, each providing separate data. In the first part, which yields a simple descriptive profile, the respondent rates his/her own health today on five questions, one for each of the dimensions: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. Each question has three response options: no problems, some problem and extreme problems. This descriptive classification thus defines 243 possible health states. The respondent next rates their own health, today, on a visual analogue scale, calibrated from 0 to 100 with the end-points 100 = best imaginable health state and 0 = worst possible health state. Finally, valuations for each of the 243 health states have been obtained and so, according to how the respondent has rated themselves on the descriptive profile, the corresponding utility value can be ascertained. The technical issues surrounding the valuation of health in general, and the valuations pertaining to the EQ-5D in particular, are outside the scope of this paper but these have been reviewed (Drummond et al., 1997).

Data on seizures and expectations of surgery were also collected. Our chosen outcome criterion was 75% or greater reduction in seizures.

A total of three patients had surgery but did not achieve a $\geqslant 75\%$ seizure reduction at follow-up. Although the HRQL of this sub-group is of interest, they were excluded from the analysis due to small sample size. In this paper we report only the results of the patients who had surgery and a 75% seizure reduction ($n = 22$).

2.4. Statistics

The data were analysed by the chi-square statistic or paired t-tests, two-tailed, as appropriate. The EQ-5D utility data were markedly skewed and so the non-parametric, Wilcoxon signed ranks test, was performed. Criterion validity and internal reliability were assessed using Spearman's rank correlations and the coefficient alpha. The differences between the QOLAS scores at baseline and follow-up were tested using the Wilcoxon signed ranks test.

3. Results

3.1. Seizure reduction

A subgroup of 40 patients was interviewed at follow-up (mean time to follow-up = 1 year). Of these 40 patients, 15 had not had surgery at follow-up interview and 25 were post surgery. Sixteen (64%) of the surgical patients had left temporal lobe resection, four patients (16%) had right temporal lobe resection and five (20%) had extra temporal lobe resection. Of the 25 patients who had undergone surgery, 22 had $\geqslant 75\%$ reduction in seizures and three patients did not. Of the 15 patients who had not gone on to have surgery, no patient achieved a $\geqslant 75\%$ seizure reduction. These data are summarised in Table 1.

The mean duration of epilepsy in years was 23.1 (S.D. 9.9) and the median was 24 years. The mean age was 32.8 years (S.D. 8.6) and the median 31.0 years. The mean follow-up period was 14.3 months (S.D. 8.7) and median 12.5 months.

Table 1
Summary of patient data

	No 75% Ss. Reduction	75% or Greater Ss. reduction
Number of patients	18	22
Male	08	07
Female	10	15
No surgery	15	0
Yes surgery	03	22

Table 2
Summary of outcome measures scores[a]

Outcome measure	Baseline ($n = 22$)		Follow-up ($n = 22$)	
	Mean	(SD)	Mean	(SD)
QOLAS	32.3	(8.0)	17.1	(8.8)
EQ-5D VAS	61.6	(20.3)	76.6	(15.6)
ESI-CMH	62.2	(14.3)	74.8	(12.1)
ESI-CPH	73.2	(14.0)	82.9	(11.6)
ESI-CRF	69.6	(22.9)	78.5	(20.8)

[a] QOLAS, Quality of life assessment schedule; EQ-5D VAS, EQ-5D visual analogue scale; ESI-CMH, ESI-55 composite mental health score; ESI-CPH, ESI-55 composite physical health score; ESI-CRF, ESI-55 composite role functional score.

The mean age of onset of epilepsy was 9.6 years (S.D. 9.4) and the median was 8 years. Table 2 summarises the patient outcome data.

3.2. ESI-55 Composite scores

Table 2 summarises the ESI-55 composite scores. At follow-up, there was a statistically significant improvement in QOL in comparison to baseline scores, on two of three ESI-55 composite scores: composite mental health (CMH) $t = 4.3$; $df = 21$, $P = 0.0001$, 95% CI (-18.7; -6.5); composite physical health (CPH) $t = 4.4$, $df = 20$, $P < 0.0001$, 95% CI (-14.8; -5.3). Although composite role functioning (CRF) scores showed improvement at follow-up, they did not reach statistical significance.

3.3. QOLAS Scores

The results for the QOLAS at baseline and at follow-up are presented in Table 2. There was significant improvement in all QOLAS domains at follow-up (Table 3). We compared each QOLAS domain and the QOLAS total scores with the ESI-55 composite scales. The two instruments correlated well (Table 4). The QOLAS also had good internal reliability as shown by correlations between the domain scores and the QOLAS-total score (Table 5). The coefficient alpha was 0.7 and this is well within the acceptable range.

3.4. EQ-5D

Tables 6 and 7 show descriptive EQ-5D profile data at baseline and at follow-up. Most patients queried the EQ-5D visual analogue scale (VAS). Forty-two percent of patients said they thought that 'health' did not include their epilepsy. These patients said that if the VAS was to include their epilepsy, they would have given a score up to 70 points lower on the VAS scale. For example, one patient said that his 'health' was excellent in general and he felt well on the day of the interview so he scored himself as 80. On reflection, he added that if the score was supposed to include his epilepsy and seizures, then he would have adjusted it to 30. Although we noted the qualitative data, we took the score each patient originally gave for their health since this is what the EQ-5D asks. Table 2 summarises the EQ-5D VAS scores for the two groups of patients at baseline and follow up. There was significant improvement at follow-up ($t = -2.6$, $df = 20$, $P = 0.02$, 95% CI (-26.0: -2.8)). The EQ-5D utility scores at baseline and at follow-up were: mean 0.81 (median 0.85) and mean 0.91 (median 1.0), respectively. The difference was not significant.

4. Discussion

This is one of the first studies to report the use of the EQ-5D and the QOLAS in patients with severe epilepsy undergoing definitive surgical treatment. Our results suggest that an improvement in HRQL can be seen, at one year follow-up. The QOLAS, two of the three ESI-55 composite scores and the EQ-5D visual analogue scale were sensitive to change as shown by statistically significant differences in scores. The EQ-5D utility scores showed improvement but the changes were not significantly different.

There is no simple relationship between seizure severity, seizure frequency and the consequences of epilepsy, and there is debate whether a reduction in (but not elimination of) seizures does lead to an improvement in HRQL (Smith et al., 1995). Also, patients about to undergo surgical treatment for epilepsy often have high, and sometimes unrealistic, expectations of significant positive changes post-operatively (Baxendale and Thompson, 1996).

Whilst post-operative seizure freedom is associated with significant improvements in QOL (Hermann et al., 1992; Kim and Kim, 1995; Kellett et al., 1997), a number of other seizure based outcomes have been used and the picture for different degrees of seizure reduction is less clear.

Some researchers have chosen a 75% (Bladin, 1992; Hermann et al., 1992; Malgrem et al., 1997) and some a 90% reduction in seizures (Rose et al., 1996; McLachlan et al., 1997).

Vickrey et al. (1995b) devised a four-point seizure classification system: (i) seizure free; (ii) auras or one seizure only; (iii) two to 12 seizures

Table 3
QOLAS domains at baseline and follow-up ($n = 22$)

Domain	Baseline	Baseline	Follow-up	Follow-up
	Median	Mean	Median	Mean
Physical	7	7.4	2	2.5****
Psychological	6	5.6	2	2.9***
Social	6.5	6.5	4	4***
Work	7	6.4	2	3.2***
Cognitive	7	6.5	4.5	5.2*
Total	32.5	32.3	15	17.1****

* $P = 0.05$.
*** $P = 0.001$.
**** $P = 0.0001$.

Table 4
Test of criterion validity[a]

ESI-55 Composite	QOLAS Physical	QOLAS Psychol.	QOLAS Social	QOLAS Work/econ.	QOLAS Cognitive	QOLAS Total
CMH	0.26**	0.44****	0.35****	0.22*	0.06	0.43****
CPH	0.30***	0.32***	0.18	0.24**	0.14	0.34****
CRF	0.18	0.30**	0.17	0.30***	0.26**	0.38****

[a] Correlations of QOLAS subscales and QOLAS total with the three composite ESI-55 scales ($n = 108$). All baseline data. CMH, ESI-55 Composite mental health score; CPH, ESI-55 composite physical health score; CRF, ESI-55 composite role functional score.
* $P = 0.05$.
** $P = 0.01$.
*** $P = 0.001$.
**** $P = 0.0001$.

in the last year; (iv) more than 12 seizures in the last year. Whilst there is no agreement on the degree of seizure reduction as outcome measure after surgery, we observed a significant improvement in QOL using a $\geqslant 75\%$ reduction in seizure frequency as the outcome criterion. We chose this criterion since a number of other studies have used a $\geqslant 75\%$ reduction in seizure frequency (Vickrey et al., 1995b).

There is no agreed follow-up period for assessing QOL post-surgery and researchers have chosen periods as diverse as 3 months (Kim and Kim, 1995), 6–8 months (Hermann et al., 1992), 1 year (Rose et al., 1996), 2 years (McLachlan et al., 1997), and 4 years (Malgrem et al., 1997). Although it has been suggested that long-term follow up is important because changes in QOL might not be evident until at least 2 years post surgery (McLachlan et al., 1997) the amount of change observed will depend upon the responsiveness of the instrument.

The ESI-55 has been used in a number of studies with similar findings to our own. For instance, Rose et al. (1996), also with a follow-up period of one year, found statistically significant improvement in the same two of the three subscales of the ESI-55, i.e. the physical and mental composite scores whilst a non-significant improvement was seen in the role functioning composite score. This may indicate a lack of comprehensiveness of the scale, and it has already been pointed out (Leidy et al., 1998) that the ESI-55 excludes certain domains important to patients with epilepsy such as social isolation and driving limitations. Another explanation for this finding is that changes in role functioning are not seen until some time after surgery when the patient has had time to adapt to a reduced seizure status. Also, it could be related to our small sample size.

In the current study the patients reported a significant improvement in HRQL at a mean follow-up of one year on the QOLAS. The QOLAS asks patients to nominate the HRQL topics of concern to them and to rate how much of a problem they are currently experiencing with each. The QOLAS therefore taps each patient's perceived change in their own HRQL and is more a measure of satisfaction rather than an indicator of objectively verifiable changes in status, e.g. role/social functioning. An approach such as that adopted by the QOLAS might be a useful, responsive method of eliciting the patient's subjective view. The correlations with the ESI-55 composite scales show that the QOLAS has good

Table 5
Correlations of the QOLAS subscales with the QOLAS-total score

QOLAS Subscale	Correlation sig. coeff.
Physical	0.66****
Psychological	0.71****
Social	0.68****
Work/economic	0.63****
Cognitive	0.58****

**** $P = 0.0001$.

Table 6
Baseline EQ-5D profile data ($n = 22$)

EQ domain	No problems	Some problems	Severe problems
Mobility	86*	9	5
Self-care	86	14	0
Usual acs.	72	18	9
Pain/discom	82	18	0
Anx/depr	59	32	9

* Figures are % of patients.

criterion validity. The QOLAS also has good internal reliability as shown by correlations between the domain scores and the QOLAS-total score. The coefficient alpha was well within the acceptable range.

The EQ-5D, a generic instrument, might not have basic face validity for some patient populations, and epilepsy in particular. Comparing our data to the UK norms, our patients did not score significantly worse in any domain except anxiety/depression (Kind et al., 1998). This is particularly surprising, given that the EQ-5D asks the patient to rate their health 'today' and all of our patients were interviewed in their hospital beds during their stay on the video-telemetry unit. Moreover, numerous studies have shown that seizures and the stigma of epilepsy considerably impair HRQL, and HRQL is certainly poor in patients with intractable epilepsy, who have been referred to a centre of tertiary referral such as Queen Square. The phenomenon of coping/adjustment, resulting in the under-reporting of problems on HRQL instruments by patients with epilepsy, has been previously discussed (Devinsky et al., 1995). The EQ-5D might be more useful for acute rather than chronic illness since it does not capture chronic problems to which the patient has adapted.

A total of 42% of our patients with epilepsy queried the EQ-5D visual analogue scale (VAS). The most common comment was that 'health does not include epilepsy'. Most of these patients said that, if the VAS was to include epilepsy, the score would be up to 70 points lower. It has previously been reported that patients with epilepsy have difficulties completing visual analogue scales (Fallowfield, 1994). Even though the VAS was sensitive to change in this study, and seems to be tapping non-seizure related QOL, or health, these qualitative data raise questions about the interpretation of the numerical data obtained from the VAS in this patient group.

Table 7
EQ-5D profile data at follow-up

EQ domain	No problems	Some problems	Severe problems
Mobility	90*	10	0
Self-care	100	0	0
Usual acs.	89	11	0
Pain/discom	85	15	0
Anx/depr	80	20	0

* Figures are % of patients.

5. Conclusion

We observed significant improvements in HRQL at one year follow-up in patients who had undergone surgery and who achieved $\geqslant$ 75% seizure reduction on two of the three composite scales of the ESI-55, on the QOLAS and on the EQ-5D VAS. We conclude that the one year follow-up period and the $\geqslant$ 75% seizure reduction outcome criterion are reasonable. To demonstrate improvement, however, the HRQL scales used need to be responsive and valid and we would recommend that the QOLAS and the ESI-55 be used.

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