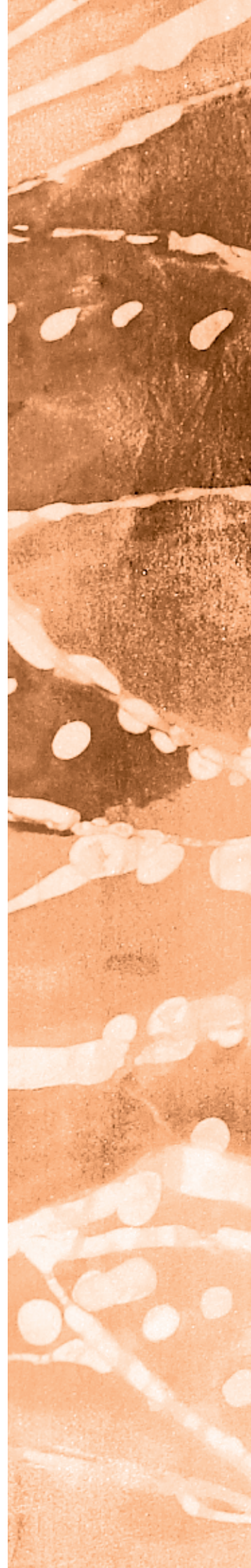


Chapter 1

What is dementia?



Introduction

1.1 This Chapter provides an overview of the nature and prevalence of dementia; the experience of living with dementia; the treatments and support that are available at present; the economic impact of dementia; and the scientific developments which are increasing our understanding of the physical causes of dementia. It aims to provide the necessary context for the general reader for the Chapters that follow, while not attempting to be comprehensive. We emphasise from the outset our belief that in order to tackle appropriately the ethical issues arising as a result of dementia, we need to draw both on the current state of scientific knowledge and on the direct experiences of people with dementia and of those caring for them. Neither is sufficient alone.

Nature and prevalence of dementia

1.2 Dementia has a number of scientific definitions. The term is used to describe a collection of signs and symptoms such as memory problems, communication difficulties, difficulties with organising and planning one's day-to-day life, changes in mood and behaviour, and the gradual loss of control of physical functions.³ These symptoms, taken together, are an indication of physical damage to the brain as a result of chronic progressive degeneration of nerve cells. The damage to the brain may be caused by a variety of different diseases: while Alzheimer's disease is the commonest and best known cause, there are many others, such as vascular dementia, Lewy body dementia, Parkinson's disease, frontotemporal dementia, alcohol-related dementias and prion diseases (see Box 1.1). In this Report we use the term 'dementia' to refer to the effects of all these different causes of damage to the brain. The Report does not, however, cover temporary and reversible forms of damage to the brain. Nor does it treat dementia as a form of mental disorder, for although dementia does potentially fall under definitions of 'mental disorder' used in UK mental health legislation, it is in practice primarily treated as a physical condition which affects mental capacity.

1.3 At present, it is estimated that 700,000 people in the UK have dementia,⁴ although fewer than half of these are likely to receive a formal diagnosis.⁵ Worldwide prevalence is thought to be over 24 million people.⁶ The likelihood of developing dementia becomes greater the older a person is: 1.3 per cent of people in the UK aged 65–69 have dementia, rising to 20 per cent of those over 85.⁷ As populations in both developed and developing countries are ageing rapidly, the number of people with dementia will increase, making it one of the most important public health issues of our generation. In the UK alone, it is forecast that the number of individuals with dementia could more than double to 1.7 million by 2051,⁸ while in India, China, south Asia and the western Pacific, threefold increases are expected by 2041.⁹

³ This is a lay definition. More detailed diagnostic criteria for various forms of dementia are set out in: American Psychiatric Association (1994) *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)* (Washington DC: American Psychiatric Association) and by the 'NINCDS-ADRDA' Work Group and 'NINDS-AIREN' International Workshop: see Scottish Intercollegiate Guidelines Network (SIGN) (2006) *Management of Patients with Dementia: A national clinical guideline* (Edinburgh: SIGN), p3, for more details.

⁴ Knapp M and Prince M (King's College London and London School of Economics) (2007) *Dementia UK* (London: Alzheimer's Society), pxiii.

⁵ National Audit Office (2007) *Improving Services and Support for People with Dementia* (London: The Stationery Office), p7.

⁶ Ferri CP, Prince M, Brayne C *et al.* (2005) Global prevalence of dementia: a Delphi consensus study *The Lancet* **366**: 2112–7.

⁷ Knapp M and Prince M (King's College London and London School of Economics) (2007) *Dementia UK* (London: Alzheimer's Society), pxii.

⁸ *Ibid*, pxiii.

⁹ Ferri CP, Prince M, Brayne C *et al.* (2005) Global prevalence of dementia: a Delphi consensus study *The Lancet* **366**: 2112–7. See also Rodriguez JLL, Ferri CP, Acosta D *et al.* (2008) Prevalence of dementia in Latin America, India and China: a population-based cross-sectional survey *The Lancet* **372**: 464–74, where it is argued that the estimates for India, in particular, may understate dementia prevalence.

- 1.4 It should also be noted that, despite its strong association with old age, dementia is not solely a disease of old age. Fifteen thousand people under the age of 65 living in the UK are estimated to have dementia, representing 2.2 per cent of the total number of people with dementia.¹⁰ People with Down's syndrome face an increased risk of early-onset dementia, with an estimated prevalence of around nine per cent for those aged 40–49, and 36 per cent for those aged 50–59.¹¹

Box 1.1: Types of dementia

There are approximately 100 types of dementia, the most common being Alzheimer's disease (estimated to make up 62 per cent of cases in the UK), vascular dementia (17%), dementia with Lewy bodies (4%), frontotemporal dementia (2%) and Parkinson's disease (2%).¹² Less common causes are Huntington's disease, alcohol-related dementias, prion diseases and dementia resulting from syphilis. It has been estimated that ten per cent of cases are of mixed origin, for example incorporating aspects of both Alzheimer's disease and vascular dementia.¹³ These figures are not, however, universally accepted: there is significant dispute, for example, over the prevalence of Lewy body dementia,¹⁴ and post-mortem studies of donated brains suggest that many more people may, in fact, have had 'mixed' dementias than is recognised in clinical practice.¹⁵

Alzheimer's disease

During the course of Alzheimer's disease, excessive and abnormally folded proteins accumulating in the brain result in the formation of protein 'plaques' around neurones and 'tangles' inside neurones, leading to the death of these brain cells, particularly in the region responsible for memory. The levels of neurotransmitters (chemical 'messengers') are also affected, disrupting communication within the brain. A combination of factors including age, genetic inheritance, environmental factors, diet and overall general health contribute to the onset and progression of the disease.

Vascular dementia

A stroke or a series of small strokes may cause damage to the network of blood vessels (the vascular system) that transport blood within the brain. The resulting disruptions in the supply of oxygen (which is transported in the blood) can lead to the death of brain cells, resulting in the symptoms of this type of dementia. Risk factors for vascular dementia include high blood pressure, heart problems, high cholesterol and diabetes.

The type of permanent brain damage caused by the interruption in the supply of blood to the brain during a stroke depends on which area of the brain has been damaged. 'Single-infarct' vascular dementia is caused by a single stroke that results in death of the brain cells in one, relatively large, area. 'Multi-infarct' vascular dementia is caused by a series of small strokes over time which cause death to brain cells in many relatively small areas, but which may not necessarily be noticed at the time by the individual experiencing them.

Vascular dementia may also be a result of 'small vessel disease' (also known as 'sub-cortical vascular dementia', or Binswanger's disease), in which blood vessels lying deep in the brain become damaged.

Dementia with Lewy bodies (DLB) and Parkinson's disease dementia (PDD)

Lewy bodies are spherical protein deposits that build up in brain cells, interfere with the chemical 'messengers' in the brain, and disrupt the brain's normal functioning. The precise mechanisms by which the Lewy bodies cause damage in the brain are not yet well understood.

Lewy bodies are also found in the brains of people with Parkinson's disease, and a significant number of people with Parkinson's disease will also go on to develop dementia.¹⁶ The relationship between DLB and PDD is complex: it is thought that while the two conditions are part of the same continuum, they produce different signs and symptoms as a result of the different distribution of Lewy bodies in the brain.

¹⁰ Knapp M and Prince M (King's College London and London School of Economics) (2007) *Dementia UK* (London: Alzheimer's Society), pxiii.

¹¹ Prasher VP (1995) Age specific prevalence, thyroid dysfunction and depressive symptomatology in adults with Down syndrome and dementia *International Journal of Geriatric Psychiatry* **10**: 25–31.

¹² Knapp M and Prince M (King's College London and London School of Economics) (2007) *Dementia UK* (London: Alzheimer's Society), p29.

¹³ *Ibid.*

¹⁴ McKeith IG, Galasko D, Kosaka K *et al.* (1996) Consensus guidelines for the clinical and pathologic diagnosis of dementia with Lewy bodies (DLB): report of the Consortium on DLB International Workshop *Neurology* **47**: 1113–24; and Serby M and Almiron N (2005) Dementia with Lewy bodies: an overview *Annals of Long-Term Care* **13**(2): 20–2.

¹⁵ Neuropathology Group of the Medical Research Council Cognitive Function and Ageing Study (2001) Pathological correlates of late-onset dementia in a multicentre, community-based population in England and Wales *The Lancet* **357**: 169–75.

¹⁶ One estimate is that people with Parkinson's disease who reach the age of 90 have an 80–90 per cent risk of developing dementia: Buter TC, van den Hout FE, Matthews JP *et al.* (2008) Dementia and survival in Parkinson's disease: a 12-year population study *Neurology* **70**: 1017–22.

Frontotemporal dementia (FTD)

A rarer form of dementia is frontotemporal dementia, a term covering a range of conditions including Pick's disease, frontal lobe degeneration and dementia associated with motor neurone disease. It is caused by damage to the frontal lobe or temporal lobe areas of the brain, and there may be a family history of the disease in up to half of all cases. However, there are a number of different genetic mutations involved, all of which result in abnormalities in the production of proteins including tau, progranulin, TDP-43 and ubiquitin. Although symptoms vary between different individuals, damage characteristically appears in the front part of the brain, initially affecting mood and behaviour more than memory.

Rarer causes of dementia

There are many other rarer causes of dementia, including progressive supranuclear palsy, Huntington's disease, prion diseases such as Creutzfeldt-Jakob disease (CJD), and dementia associated with alcohol, HIV, multiple sclerosis and syphilis. A link has been suggested between head injury and later development of dementia, although this remains controversial.¹⁷

Inherited dementias

The most common forms of dementia are 'sporadic': that is, they occur in no particular pattern and are likely to be a result of interaction between environmental factors and the genetic make-up of the individual. A small proportion of dementias, however, have a strong genetic component. In Alzheimer's disease, these strongly inherited forms are very rare, accounting for less than one in 1,000 of Alzheimer's cases. Other rare inherited dementias include a form of frontotemporal dementia called 'frontotemporal dementia with Parkinsonism-17', familial British/Danish dementia, and a prion disease called Gerstmann-Straussler-Scheinker disease.

For more detail on the different forms of dementia see the Alzheimer's Society's factsheets at www.alzheimers.org.uk/factsheets.

Current treatments for dementia

- 1.5 At present, the treatments available for dementia cannot reverse the underlying degeneration of brain cells, although they may temporarily improve or delay decline in cognitive function. At the time of writing, four drugs are licensed for use in the UK: three 'cholinesterase inhibitors' (donepezil, rivastigmine and galantamine) are licensed for mild to moderate Alzheimer's disease, while a fourth drug, memantine, is licensed for moderate to severe Alzheimer's disease. Rivastigmine is also licensed for dementia associated with Parkinson's disease. The National Institute for Health and Clinical Excellence (NICE) has recommended only limited use of the cholinesterase inhibitors within the NHS in England and Wales, because of concerns about their cost-effectiveness (see Box 1.2), and has not recommended the use of memantine outside clinical studies. Treatment for vascular dementia includes routine medications used in generalised vascular disease such as drugs to reduce high blood pressure and high blood cholesterol levels, while no medicines are currently licensed for the specific treatment of other dementias.¹⁸
- 1.6 Guidelines issued in 2006 by the European Federation of Neurological Societies (EFNS) cited evidence that cholinesterase inhibitors had a "modest beneficial impact on neuropsychiatric and functional outcomes" for at least one year and recommended that their use for Alzheimer's disease should be considered at the point of diagnosis, as should memantine for people with moderate to severe Alzheimer's disease.¹⁹ Similar recommendations have been made in North America.²⁰ The EFNS guidelines do, however, emphasise that "realistic expectations" for their treatment effect should be discussed with the person with dementia.²¹ On the non-Alzheimer's dementias, the EFNS guidelines suggest that cholinesterase inhibitors "may be considered" for people with mild to moderate vascular dementia, dementia with Lewy bodies and dementia

¹⁷ Jellinger KA (2004) Head injury and dementia *Current Opinion in Neurology* **17**: 719–23.

¹⁸ Waldemar G, Dubois B, Emre M *et al.* (2007) Recommendations for the diagnosis and management of Alzheimer's disease and other disorders associated with dementia: EFNS guideline *European Journal of Neurology* **14**: e1–e26 at e15.

¹⁹ *Ibid.*, e11–e13.

²⁰ See, for example, the recommendations resulting from the third Canadian Consensus Conference on the Diagnosis and Treatment of Dementia 2006, reported in Hogan DB, Bailey P, Carswell A *et al.* (2007) Management of mild to moderate Alzheimer's disease and dementia *Alzheimer's & Dementia* **3**(4): 355–84; American Academy of Neurology (2001) *AAN Guideline Summary for Clinicians: Detection, diagnosis and management of dementia* (St. Paul, Minnesota: AAN).

²¹ Waldemar G, Dubois B, Emre M *et al.* (2007) Recommendations for the diagnosis and management of Alzheimer's disease and other disorders associated with dementia: EFNS guideline *European Journal of Neurology* **14**: e1–e26 at e12 and e13.

associated with Parkinson's disease, but again that expectations regarding their treatment effect should be "realistic."²²

- 1.7 While the role of medicines in treating dementia is currently relatively limited, support such as information and advice, psychological therapies to improve confidence, practical help in the home, and assistive technologies have an important role to play in improving the quality of life and promoting independence for people with dementia. Detailed guidance on forms of care and support which may benefit people with dementia was published in 2006 by the Scottish Intercollegiate Guidelines Network (SIGN)²³ and by NICE and the Social Care Institute for Excellence (SCIE) for England and Wales.²⁴ Although the NICE 'technology appraisal' of the medicines described with respect to Alzheimer's disease above has been criticised by many, this NICE/SCIE 'clinical guideline', which makes detailed recommendations in much wider aspects of dementia care, has been widely welcomed.²⁵ A summary of the NICE/SCIE and SIGN guidelines on drug and non-drug treatments, incorporating also the NICE technology appraisal, is given in the boxes below (see also Box 3.1 for NICE/SCIE guidelines on social care support).

Box 1.2: NICE recommendations on treatments for dementia, associated symptoms and co-existing mental disorders

Non-drug treatments for dementia: Everyone with mild-to-moderate dementia should have the opportunity to join in a structured group cognitive stimulation programme.

Drugs for cognitive symptoms of Alzheimer's disease: Cholinesterase inhibitors should be used only for those with moderate disease, and should be started by a specialist in dementia care. A person's previous cognitive abilities (whether particularly high or low) should be taken into account when assessing their disease as 'moderate', as should fluency in the language in which the assessments are being made. The restriction of these drugs to moderate disease is made on cost-effective grounds as they are known to have some beneficial effect in early disease. Memantine should only be given to those with moderately severe to severe Alzheimer's disease as part of well-designed clinical studies.

Drugs for cognitive symptoms of non-Alzheimer's dementias: Cholinesterase inhibitors and memantine are not recommended for cognitive decline in vascular dementia, and further research has been recommended in connection with dementia with Parkinson's disease.

Interventions for non-cognitive symptoms and behaviour that challenges: These symptoms and behaviours include hallucinations, delusions, anxiety, aggressive behaviour, sexual disinhibition, apathy and shouting. Medication should be considered in the first instance only if there is severe distress or immediate risk of harm. An early assessment should be offered to identify factors that may be influencing the behaviour such as pain, side-effects of other medication, environmental factors and psychosocial factors. The person's behaviour should be analysed in conjunction with carers and care workers, and individual care plans developed. For agitation, options such as aromatherapy, animal-assisted therapy, therapeutic use of music or dancing and massage should be considered.

Anti-psychotic drugs should only be used where the symptoms are severe and where risks and benefits have been fully considered and discussed on an individual basis. Cholinesterase inhibitors may be used for such symptoms for people with dementia with Lewy bodies, or for those with Alzheimer's disease where neither non-drug approaches nor anti-psychotics have been appropriate or effective. They should not, however, be prescribed for vascular dementia.

Co-existing emotional disorders: People with dementia should be assessed and monitored for depression or anxiety, and psychosocial interventions such as cognitive behavioural therapy considered. Therapies such as reminiscence therapy, multisensory stimulation, animal-assisted therapy and exercise should be available. Anti-depressant drugs may be considered after risk-benefit analysis.

NICE/SCIE (2006) *Dementia: Supporting people with dementia and their carers in health and social care*, NICE Clinical Guideline 42 (London: NICE and SCIE), citing: NICE (2007) *Donepezil, Galantamine, Rivastigmine (Review) and Memantine for the Treatment of Alzheimer's Disease (Amended)*, NICE Technology Appraisal Guidance 111 (London: NICE); NICE (2006) *Parkinson's Disease: Diagnosis and management in primary and secondary care*, NICE Clinical Guideline 35 (London: NICE).

²² *Ibid*, e14.

²³ SIGN (2006) *Management of Patients with Dementia: A national clinical guideline*, SIGN Clinical Guideline 86 (Edinburgh: SIGN).

²⁴ NICE/SCIE (2006) *Dementia: Supporting people with dementia and their carers in health and social care*, NICE Clinical Guideline 42 (London: NICE and SCIE).

²⁵ See, for example, Downs M and Bowers B (2008) Caring for people with dementia *British Medical Journal* 336: 225–6.

Box 1.3: SIGN guidance on management of people with dementia**Non-pharmacological interventions:**

- Behaviour management can be used to reduce depression in people with dementia.
- Those providing care should receive comprehensive training on interventions that are effective for people with dementia.
- Cognitive stimulation should be offered to individuals with dementia.
- Environmental design is important in minimising restlessness, anxiety and disorientation in people with dementia living in institutions.
- A combination of structured exercise and conversation may help maintain mobility.
- Recreational activities should be introduced to enhance quality of life and well-being.

Pharmacological interventions (based on clinical effectiveness but not cost-effectiveness):

- Donepezil can be used to treat both cognitive decline and the management of non-cognitive symptoms such as psychotic symptoms in people with Alzheimer's disease.
- Galantamine can be used to treat cognitive decline in people with Alzheimer's disease and with mixed dementias, and for non-cognitive symptoms in people with Alzheimer's disease.
- Rivastigmine can be used to treat cognitive decline and for the management of non-cognitive symptoms in people with Alzheimer's disease and dementia with Lewy bodies.
- There is currently insufficient evidence to recommend the use of memantine.
- If necessary, conventional anti-psychotics may be used with caution, given their side-effects, to treat non-cognitive symptoms of dementia such as delusions, hallucinations and aggression.

SIGN (2006) *Management of Patients with Dementia: A national clinical guideline*, SIGN Clinical Guideline 86 (Edinburgh: SIGN).

The experience of dementia***Experiencing the symptoms of dementia***

1.8 Dementia is widely seen as being synonymous with memory problems. This perception, however, is far from adequate. Some degree of memory impairment is an inevitable part of normal ageing and dementia is more than forgetfulness or poor memory. The symptoms of dementia include: more profound memory impairment which is not significantly improved either by the giving of 'cues' or through repetition; changes in attention, judgment and awareness; increasing difficulties in communication; visuo-spatial difficulties; and changes in speed of action and response. Changes in mood and behaviour, such as unpredictable anger and aggression, depression and apathy, are also strongly associated with dementia. While some of these behavioural changes, such as inappropriate and disinhibited social behaviour, have been clearly associated with the physical damage to particular parts of the brain,²⁶ there are currently differences of opinion as to the extent to which others may be caused, or exacerbated, by the frustrations and difficulties associated with dementia, as much as by the physical effects of the underlying disease itself.²⁷

1.9 There are vivid descriptions by people with dementia of their own experience of these early stage symptoms. Malcolm Pointon, for example, a musician with early-onset dementia, wrote in his diary:

"Mind in a fog today ... thoughts and actions slipping from my grasp ... kept close to Barbara in the shops ... just didn't want to talk ... head full of cotton wool."²⁸

Carers have also commented on distressing changes in behaviour:

"There was something I said to him and he went berserk, turned very nasty ... It wasn't like him."²⁹

²⁶ See, for example, Shulman KI (1997) Disinhibition syndromes, secondary mania and bipolar disorder in old age *Journal of Affective Disorders* **46(3)**: 175–82.

²⁷ See, for example, James I and Stephenson M (2007) Behaviour that challenges us: the Newcastle support model *Journal of Dementia Care* **15(5)**: 19–22; Graham Stokes (2008) *And Still the Music Plays: Stories of people with dementia* (London: Hawker Publications).

²⁸ Extracts provided by Malcolm's widow, Barbara Pointon.

²⁹ Alzheimer's Society (2008) *Dementia: Out of the shadows* (London: Alzheimer's Society), p17.

“It was the same when he used to get into a rage, I knew it wasn’t him [...] you’ve got to accept that it’s not him. He would never have raised his voice to me at all. He was the most amiable of chaps.”³⁰

- 1.10 The different symptoms progress with time, but at a variable rate, and according to the regions of the brain affected by the underlying disease. The progression of Alzheimer’s disease is often divided into three stages: early stage (‘mild’), middle stage (‘moderate’) and late stage (‘severe’) Alzheimer’s disease. This is a very simple division, not always related to the degree of disability the person is experiencing, and there are many further subdivisions that can be identified. While individuals’ experiences of dementia will clearly vary considerably, the three stages can be used to provide a helpful summary of the kind of difficulties people are likely to experience as their Alzheimer’s disease progresses.³¹ During the earlier stages, the person is likely to experience memory loss, difficulty learning new things or making decisions, some degree of disorientation and bewilderment, and social withdrawal. The middle stages are associated with more serious disorientation, for example getting muddled about day and night, getting lost, and putting themselves at risk by forgetting to turn off household appliances; with increasing difficulty recognising family and friends; and also with problems with visual perception which may have a very significant effect on their ability to function independently. Finally, in the later stages, the person is likely to have difficulties with swallowing and eating, lose control over bodily functions and lose all, or virtually all, of their speech.
- 1.11 Other forms of dementia tend not to be characterised into formalised ‘stages’ in quite the same way. Some people with vascular dementia may experience a fairly gradual decline in their abilities, while others may find that they remain steady for some considerable time and then suddenly decline as the result of another stroke. Those with frontotemporal dementia tend first to experience behavioural changes associated with damage to the front part of the brain, including uncharacteristic rudeness and selfishness, along with loss of inhibition and the development of obsessive behaviour, and then later develop symptoms more similar to those of Alzheimer’s disease. A person with dementia with Lewy bodies, on the other hand, is more likely in the earlier stages to experience visual hallucinations, have difficulty judging distances (leading to falls) and experience some of the physical symptoms of Parkinson’s disease such as slowness of movement and tremors. Later, again, the symptoms are likely to develop on a similar basis to Alzheimer’s disease.³²
- 1.12 The use of the terms ‘mild’, ‘moderate’ and ‘severe’ Alzheimer’s disease is often associated with a person’s abilities in cognitive testing, particularly using the ‘Mini-Mental State Examination’ (MMSE), a widely used eleven-question measure that tests five areas of cognitive ability with a maximum total score of 30.³³ Scores of 20–24/26 using this test are taken to indicate mild disease, 10–19 moderate disease and less than ten severe disease.³⁴ However, it has been shown that many of the behaviours associated with dementia that cause particular difficulty or distress to carers,

³⁰ HealthTalkOnline (2009) Interview with a carer trying to accept that her husband’s hostile behaviour towards her was a symptom of his illness, available at: www.healthtalkonline.org/Nerves_and_brain/Carers_of_people_with_dementia/Topic/2107/Interview/824/Clip/3586/.

³¹ See, for example, Alzheimer Scotland (2006) *About Dementia: Some facts and figures*, Information Sheet 16, available at: www.alzscot.org/downloads/dementiafactsheet.pdf; Alzheimer’s Society (2008) *The Progression of Dementia*, Factsheet 458, (London: Alzheimer’s Society) available at: www.alzheimers.org.uk/factsheet/458.

³² Alzheimer’s Society (2008) *The Progression of Dementia*, Factsheet 458 (London: Alzheimer’s Society), available at: www.alzheimers.org.uk/factsheet/458.

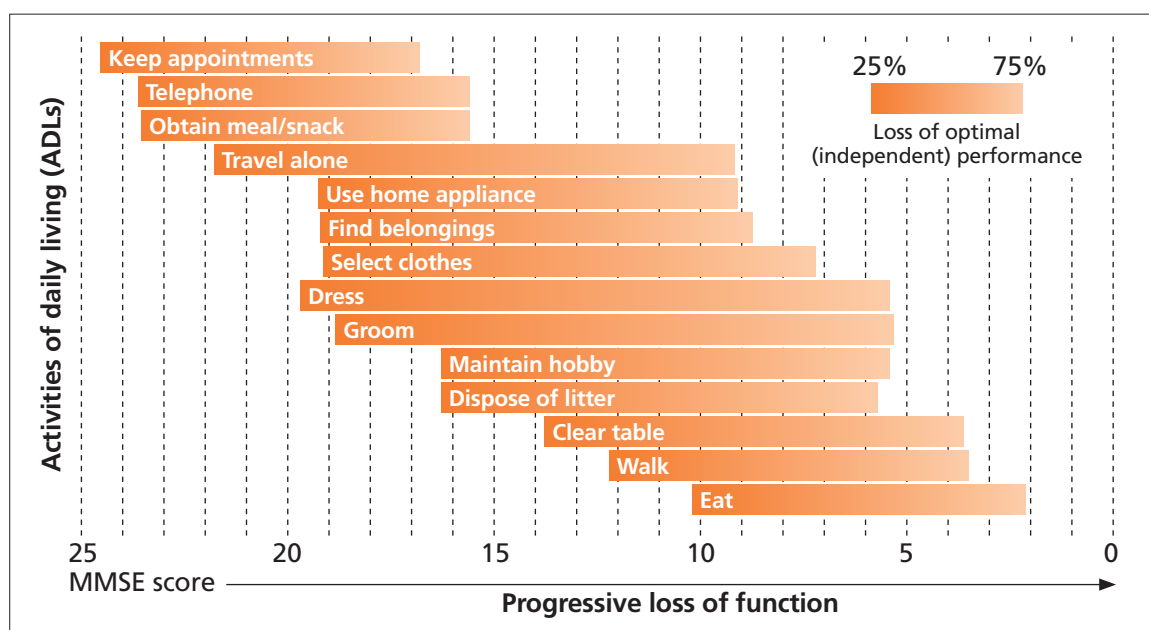
³³ Folstein MF, Folstein SE and McHugh PR (1975) “Mini-Mental State”: a practical method for grading the cognitive state of patients for the clinician *Journal of Psychiatric Research* 12(3): 189–98.

³⁴ There is no agreed cut off for ‘mild’ dementia: Kipps and Hodges suggest 24 is widely regarded as abnormal (Kipps CM and Hodges JR (2008) Clinical cognitive assessment, in *Oxford Textbook of Old Age Psychiatry*, Jacoby R, Oppenheimer C, Denning T and Thomas A (Editors) (Oxford: Oxford University Press), pp155–63), while the Alzheimer’s Society suggests that people with Alzheimer’s usually score 26 or less (Alzheimer’s Society (2008) *The Mini Mental State Examination (MMSE)*, Factsheet 436 (London: Alzheimer’s Society), available at: <http://alzheimers.org.uk/factsheet/436>).

such as various forms of aggressive behaviour, anxiety, ‘trailing’ a carer at all times, and increased or apparently aimless walking, do not have a direct association with particular stages of cognitive decline.³⁵ Rather, these behaviours occur in different individuals over a very wide range of levels of cognitive impairment, highlighting the importance of considering the needs of each individual at a particular point in time without relying on broad-brush characterisations of the ‘stage’ of their dementia.

1.13 Research in England and Wales published in 2008 suggested that, on average, a person will live for four and a half years after developing symptoms of dementia.³⁶ Survival times do, however, depend significantly both on the person’s state of general health and on their age at onset, with some people living with dementia for up to ten years.³⁷ In the 2008 study those aged 65–69 lived on average for a further 10.7 years, compared with those over 90 at onset, who lived on average another 3.8 years.³⁸ An American study looking at survival with different forms of dementia found that on average people with vascular dementia lived 3.9 years after the onset of their symptoms, those with Alzheimer’s disease 7.1 years and those with mixed dementias 5.4 years.³⁹ The diagram below gives a broad indication of how Alzheimer’s disease may gradually affect a person’s ability to carry out day-to-day activities, although, as emphasised above, there will be significant variation between individuals, and indeed individuals may experience significant day-to-day variation in their own symptoms.

Box 1.4: How ‘activities of daily living’ become more difficult as dementia progresses⁴⁰



³⁵ Hope T, Keene J, Fairburn CG, Jacoby R and McShane R (1999) Natural history of behavioural changes and psychiatric symptoms in Alzheimer’s disease: a longitudinal study *British Journal of Psychiatry* **174**: 39–44.

³⁶ Xie J, Brayne C, Matthews FE et al. (2008) Survival times in people with dementia: analysis from population based cohort study with 14 year follow-up *British Medical Journal* **336**: 258–62.

³⁷ Alzheimer’s Society (2008) *The Later Stages of Dementia*, Factsheet 417 (London: Alzheimer’s Society), available at: www.alzheimers.org.uk/factsheet/417.

³⁸ Xie J, Brayne C, Matthews FE et al. (2008) Survival times in people with dementia: analysis from population based cohort study with 14 year follow-up *British Medical Journal* **336**: 258–62. The ‘average’ figure cited is the median survival time of the 356 people who developed dementia and died during the 14 year period of the study (based on 13,000 people over the age of 65 at the start of the study). Participants were screened and assessed every two to four years for dementia, with onset of dementia estimated as being the midpoint between the last follow-up without dementia and the first follow-up with dementia.

³⁹ Fitzpatrick AL, Kuller LH, Lopez OL, Kawas CH and Jagust W (2005) Survival following dementia onset: Alzheimer’s disease and vascular dementia *Journal of the Neurological Sciences* **229–30**: 43–9.

⁴⁰ Adapted from Galasko D, Bennett D, Sano M et al. (1997) An inventory to assess activities of daily living for clinical trials in *Alzheimer’s disease Alzheimer Disease and Associated Disorders* **11 (Supplement 2)**: S33–9.

- 1.14 It is easy to characterise dementia simply as a list of things the person can no longer do. This approach, however, is strongly contested by some, such as academics at the Bradford Dementia Group, who warn against this 'deficit model' of dementia and argue that it is more fruitful to think of dementia as a 'disability', focusing on what a person *can* still do and enjoy, and adapting the environment in which the person lives to enhance these abilities and opportunities.⁴¹ The diagram above demonstrates how a person's ability to function independently will gradually be reduced; but a rather different picture would emerge if the impact of some degree of practical help and appropriate environmental adaptations were included. Moreover, it should be noted that while 'optimal' performance of many day-to-day tasks may be affected relatively early on, some degree of ability in many areas is retained long into the progress of the dementia.⁴²
- 1.15 Research carried out by the Alzheimer's Association in America suggests that people with early-stage dementia strongly support this 'disability' approach to dementia.⁴³ Those participating in a series of 'town-hall meetings' organised by the Association emphasised the importance to them of focusing on the things that they could do, and on learning to forge a new life with their retained abilities – an approach echoed by people with dementia writing in recent publications from organisations such as the Joint Dementia Initiative (JDI) in Falkirk, and Alzheimer Scotland.⁴⁴ A number of those participating in the Alzheimer's Association research also highlighted the effect the process of diagnosis had on their sense of self-esteem and self-worth: although the complex nature of dementia may make a lengthy diagnostic process inevitable, they felt that the insensitive way tests were often administered could emphasise this sense of deficit, making the individual feel that they were personally 'failing', rather than receiving a medical diagnosis:

"They put me through the whole rigmarole, a four-hour test that I came out of feeling like a total idiot. You come out thinking, 'Where am I? Who am I?'"⁴⁵

The report's authors went on to conclude that "those with early-stage Alzheimer's seek to be defined not by the memory loss and functional decline they have experienced, but rather by their remaining abilities."⁴⁶

- 1.16 While it is clearly harder to obtain the views of those with more severe dementia in the same way as those in the very early stages, accounts such as the audio-diary kept by an American academic, Cary Henderson, several years after his diagnosis of Alzheimer's disease, provide further support for the disability approach, suggesting that more abilities may be retained for longer than may initially appear to be the case from the 'outside'. Henderson comments acerbically that "people with Alzheimer's do actually think" and makes a telling distinction between being able to take part in a conversation and being able to talk if given sufficient time: even when he finds "conversing" difficult, "damn it, still I can talk."⁴⁷ He is well aware that he repeats himself incessantly but "we don't want to keep our mouths shut all the time. We want to help."⁴⁸ In his diary, he also highlights continuing sources of considerable pleasure, such as music, picking up

⁴¹ Fact-finding meeting with members of the Bradford Dementia Group, 29 June 2008; see also Blackman T, Mitchell L, Burton E *et al.* (2003) The accessibility of public spaces for people with dementia; a new priority for the 'open city' *Disability & Society* 18(3): 357–71 for a discussion of the social model of disability applied to dementia.

⁴² See, for example, the interviews with people with moderate to severe dementia described in: Sabat SR (2001) *The Experience of Alzheimer's Disease: Life through a tangled veil* (Oxford: Blackwell).

⁴³ Alzheimer's Association (2008) *Voices of Alzheimer's Disease* (Chicago: Alzheimer's Association).

⁴⁴ JDI Mutual Support Group (2008) *In the Mists of Memory: A celebration of the circle of life* (Falkirk: JDI); Alzheimer Scotland (2003) *Don't Make the Journey Alone* (Edinburgh: Alzheimer Scotland).

⁴⁵ Alzheimer's Association (2008) *Voices of Alzheimer's Disease* (Chicago: Alzheimer's Association), p11.

⁴⁶ *Ibid*, p3.

⁴⁷ Henderson CS (1998) *Partial View: An Alzheimer's journal* (Dallas: Southern Methodist University Press), pp3, 18 and 21.

⁴⁸ *Ibid*, p86.

leaves and watching birds,⁴⁹ and comments: “we do have feelings and we do have some kind of knowledge.”⁵⁰

- 1.17 We will return, in later Chapters of this Report, to this idea that it is crucial to ‘see the person, not only the dementia’⁵¹ and to recognise the dangers of seeing dementia (and by implication those living with dementia) primarily as a collection of negative attributes. At the same time, however, it is important not to minimise the powerful effect that the symptoms and diagnosis of dementia have on those with the condition and on their families and friends.
- 1.18 Those responding to the Nuffield Council’s consultation paper on dementia provided the Working Party with a compelling body of evidence in this respect.⁵² Almost half of the 200 respondents had direct family experience of caring for someone with dementia; seven individual respondents themselves had a diagnosis of dementia; and many of the group responses such as those from the Alzheimer’s Society, Alzheimer Scotland and local support groups were based on the contributions and insights of people with dementia and carers. Many in their responses expressed concerns about actual or potential loss: loss of mental ability and easy communication, loss of confidence and self-esteem, loss of independence and control over one’s own life, and loss of dignity. Strongly associated with this sense of loss came fear of social embarrassment, anxiety about being a burden, especially in the future, and a sense of vulnerability. A third key theme in the responses was the emotional impact of dementia: the anxiety, frustration, depression and changed behaviours associated with the condition. The impact of dementia should never be under-estimated, even while emphasising the importance of focusing on what *can* be achieved.

Social and cultural factors affecting the experience of dementia

- 1.19 Dementia affects people from all communities and backgrounds. People with dementia have the same basic human needs – for example for comfort, attachment and inclusion – irrespective of their background. However, the way these needs show themselves and can be met may depend to a large degree on the person’s cultural and social background.⁵³ Factors associated with ethnicity, for example, such as family and community structures, concepts of family duty, and attitudes and beliefs about old age in general and dementia in particular, are likely to play a significant role in a person’s experience of dementia, on the level of disability it creates and on the kind of support required.⁵⁴
- 1.20 However, socio-economic factors such as income, occupation and education will also play an important role in a person’s experience of dementia, and it has been suggested that a focus on culture and ethnicity in isolation may promote misunderstandings and make it harder to provide support that is genuinely appropriate for the individual.⁵⁵ In addition to the importance of socio-economic variations within communities, there is also a growing awareness of the extent to which

⁴⁹ *Ibid*, pp17 and 77.

⁵⁰ *Ibid*, p56.

⁵¹ Adapted from Kitwood T (1997) *Dementia Reconsidered: The person comes first* (Buckingham, UK: Open University Press), p7.

⁵² Nuffield Council on Bioethics (2008) *Dementia: Ethical issues – consultation paper* (London: Nuffield Council on Bioethics); Nuffield Council on Bioethics (2009) *Dementia: Ethical issues – summary of public consultation* (London: Nuffield Council on Bioethics).

⁵³ See, for example, Mortimer J (2002) *A Toolkit for Working with Cultural Diversity* (London: Alzheimer’s Society); Dementia Plus (2001) *Twice a Child: Dementia care for African-Caribbean and Asian older people in Wolverhampton* (Wolverhampton: Dementia Plus).

⁵⁴ See, for example, La Fontaine J, Ahuja J, Bradbury NM, Phillips S and Oyebo J (2007) Understanding dementia amongst people in minority ethnic and cultural groups *Journal of Advanced Nursing* 60: 605–14; Bowes A and Wilkinson H (2003) ‘We didn’t know it would get that bad’: South Asian experiences of dementia and the service response *Health and Social Care in the Community* 11(5): 387–96; Mackenzie J (2006) Stigma and dementia: East European and South Asian family carers negotiating stigma in the UK *Dementia* 5: 233–47; Iliffe S and Manthorpe J (2004) The debate on ethnicity and dementia: from category fallacy to person-centred care? *Aging & Mental Health* 8(4): 283–92.

⁵⁵ Iliffe S and Manthorpe J (2004) The debate on ethnicity and dementia: from category fallacy to person-centred care? *Aging & Mental Health* 8(4): 283–92.

members of the same ethnic community may have very different experiences and expectations, particularly between different generations.⁵⁶ Cultural sensitivity will therefore best be achieved by care providers being alert to the beliefs, preferences and experiences of each of those for whom they care, without prior assumptions.⁵⁷ This clearly has major educational implications given the wide range of cultures and backgrounds of those both providing and receiving care.

- 1.21 More individualised factors, such as the individual's personal coping mechanisms when facing adversity, or the existence (or absence) of family support or other informal supportive network, may also play a significant part in how any particular individual experiences and copes with the symptoms of dementia.⁵⁸ As we will discuss in Chapter 4, the attitudes of others – the extent to which they are able to accept the person with dementia and adjust their own behaviour appropriately – are also crucial.

The economic impact of dementia

- 1.22 In addition to its personal and social impact, dementia also has significant financial implications for those with dementia, their families and carers and for the health care and social care systems. In the UK the overall annual economic cost of late-onset dementia was estimated in 2007 at over £17 billion. This figure includes costs resulting from care provided by formal agencies and also the estimated financial value of unpaid care provided by family and friends, with the latter amounting to more than a third of the total.⁵⁹ Families and individuals further contribute to the cost of care home accommodation: the National Audit Office notes that 30 per cent of care home fees in England are met in this way, with the result that families bear around half the total cost.⁶⁰ The cost in the UK of NHS and local authority social care services provided for people with dementia are estimated at £1.36 billion and £2.5 billion respectively.⁶¹ These dwarf the amounts currently spent on medicines: it is estimated that approximately £82 million was spent on drugs for treating cognitive symptoms in dementia (cholinesterase inhibitors and memantine) in England in 2007.⁶²

Scientific understandings of dementia and current research targets

- 1.23 While there is a growing understanding of the physical changes in the brain associated with the development of the various forms of dementia, the causal mechanisms that result in a person's developing the signs and symptoms of dementia are still far from clear. A number of the dementias are believed to be caused by the accumulation in the brain of a normal protein which becomes abnormally folded and then forms aggregates either outside or inside the nerve cells (neurones).

⁵⁶ Jutlla K and Moreland N (2007) *The personalisation of dementia services and existential realities: understanding Sikh carers caring for an older person with dementia in Wolverhampton*, paper delivered at the UK Dementia Congress, 6–7 Nov 2007; Seabrooke V and Milne A (2004) *Culture and Care in Dementia: A study of the Asian community in North West Kent* (Northfleet, Kent: Alzheimer's and Dementia Support Services).

⁵⁷ Iliffe S and Manthorpe J (2004) The debate on ethnicity and dementia: from category fallacy to person-centred care? *Aging & Mental Health* 8(4): 283–92.

⁵⁸ Aminzadeh F, Byszewski A, Molnar FJ and Eisner M (2007) Emotional impact of dementia diagnosis: exploring persons with dementia and caregivers' perspectives *Aging & Mental Health* 11(3): 281–90; Clare L, Roth I and Pratt R (2005) Perceptions of change over time in early-stage Alzheimer's disease: implications for understanding awareness and coping style *Dementia* 4(4): 487–520; Katsuno T (2005) Dementia from the inside: how people with early-stage dementia evaluate their quality of life *Aging & Society* 25: 197–214.

⁵⁹ Knapp M and Prince M (King's College London and London School of Economics) (2007) *Dementia UK* (London: Alzheimer's Society), pxviii; informal care was costed by reference to the cost of a home care worker and to the minimum wage, depending on the tasks performed, and the overall figure includes lost income where carers have given up paid work, but not the value of welfare benefits.

⁶⁰ National Audit Office (2007) *Improving Services and Support for People with Dementia* (London: The Stationery Office), p18.

⁶¹ Knapp M and Prince M (King's College London and London School of Economics) (2007) *Dementia UK* (London: Alzheimer's Society), pxviii.

⁶² House of Commons *Hansard*, 25 November 2008, cc1214–5W, available at: www.publications.parliament.uk/pa/cm200708/cmhansrd/cm081125/text/81125w0011.htm#08112617000678. Figures relate to the drugs listed in section 4.11 of the British National Formulary.

In Alzheimer's disease, the protein beta-amyloid (A β) accumulates around the neurones to form 'plaques' and the protein tau accumulates within the neurones to form 'tangles'. In dementia with Lewy bodies, the 'Lewy bodies' are accumulations of alpha-synuclein protein. These and other misfolded proteins are thought to damage neurones in particular functional pathways in the brain, with some structures being more affected than others depending on the particular disease. In vascular dementia, on the other hand, the damage to the neurones is fundamentally caused by the reduced energy supplied to the cells. This can be by direct damage caused by interruption to the blood supply by stroke, or more subtle changes caused by hypertension, and even changes in vessel walls caused by accumulations of amyloid. In other dementias such as frontotemporal dementia, neurones are damaged by the accumulation of the proteins ubiquitin and TDP-43, and also by reductions in the protein progranulin, which would normally help cell growth.

- 1.24 When neurones are stressed or dying, levels of neurotransmitters (chemical 'messengers' in the brain) are reduced or become less effective. Much of the clinical trial work under way at present has been aimed at identifying drugs that will alter neurotransmitter levels in the damaged pathways and hence provide improvements in the person's cognitive skills and ability to function independently. Some of this research is now translating into treatments. In Alzheimer's disease, for example, cholinesterase inhibitors, which prevent the enzyme acetylcholinesterase from breaking down acetylcholine in the brain, have been by far the most successful drug treatments developed so far. Memantine, which blocks the receptor of the neurotransmitter glutamate, has also shown convincing evidence of efficacy and possibly disease modification.⁶³
- 1.25 Considerable research effort is directed towards 'anti-amyloid' strategies for treating Alzheimer's disease, focusing directly on the role played by the protein beta-amyloid in damaging the neurones. These include attempts to prevent the production of excess amyloid and its subsequent aggregation into plaques;⁶⁴ stimulation of the body's own immune system to remove the amyloid;⁶⁵ and 'passive' immunisation in which antibodies against amyloid that have been made in the laboratory are used to remove the amyloid.⁶⁶ Other areas of investigation include research into the role that inflammation may play in driving or exacerbating the disease process,⁶⁷ and the use of nerve growth factor to protect and even restore the 'circuits' within the brain.⁶⁸ Strategies trying to alter the processing of the tau protein to prevent the formation of tangles, or to support molecular pathways that generate the energy supply of neurones, are also under way.⁶⁹ It is hoped that this will reduce the damaging effects of degeneration on cell function and help maintain normal communication between neurones.
- 1.26 However, while there is a great deal of enthusiasm for the hypotheses underlying these approaches, research is not, as yet, leading to significant clinical improvements. One explanation for this is the possibility that disease-modifying therapies may work only in the very early stages of dementia, before extensive brain damage has already been caused, and it is not currently possible to identify

⁶³ Salloway S, Mintzer J, Weiner MF and Cummings JL (2008) Disease-modifying therapies in Alzheimer's disease *Alzheimer's & Dementia* **4**(2): 65–79.

⁶⁴ *Ibid.*

⁶⁵ Holmes C, Boche D, Wilkinson D *et al.* (2008) Long-term effects of A β 42 immunisation in Alzheimer's disease: follow-up of a randomised, placebo-controlled phase I trial *The Lancet* **372**(9634): 216–23.

⁶⁶ Brody DL and Holtzman DM (2008) Active and passive immunotherapy for neurodegenerative disorders *Annual Review of Neuroscience* **31**: 175–93.

⁶⁷ Perry VH, Cunningham C and Holmes C (2007) Systemic infections and inflammation affect chronic neurodegeneration *Nature Reviews Immunology* **7**(2): 161–7.

⁶⁸ Nagahara AH, Merrill DA, Coppola G *et al.* (2009) Neuroprotective effects of brain-derived neurotrophic factor in rodent and primate models of Alzheimer's disease *Nature Medicine* **15**(3): 331–7.

⁶⁹ Wischik CM, Bentham P, Wischik DJ and Seng KM (2008) Tau aggregation inhibitor (TAI) therapy with rember™ arrests disease progression in mild and moderate Alzheimer's disease over 50 weeks *Alzheimer's & Dementia* **4**(4) (Supplement): T167.

people at this stage to participate in the trials.⁷⁰ Other difficulties involve the extent to which the mouse models used in research are directly applicable to humans, and the possibility that clinical trials will need to extend over a much longer period than at present in order to identify clinical effects on a person's memory or behaviour.⁷¹

- 1.27 As yet, the work on non-Alzheimer's dementias is not as advanced as that on Alzheimer's disease. Similar approaches, however, such as the use of antibodies, are now being considered for other forms of dementia where abnormal protein accumulation is responsible for decline in cell function and cell death.
- 1.28 While research to modify the effects of dementia or even provide a 'cure' is continuing, it is clearly also important to explore avenues that might prevent the diseases that lead to dementia. Epidemiological studies suggest that risk factors associated with cardiovascular disease may also be risk factors for developing dementia, and strategies aimed at improving exercise and reducing risks such as hypertension and high blood cholesterol have been proposed. The idea that looking after the heart will look after the brain is therefore an attractive one and may influence the future prevalence not only of vascular dementia but also of Alzheimer's disease. Other theories suggest that social activity and engagement may reduce the risk of developing dementia,⁷² while cognitive activity in middle age may help develop and maintain a 'cognitive reserve' which may delay the onset of dementia symptoms.⁷³
- 1.29 However, what is not yet clear is whether, once Alzheimer's disease is established, reducing the vascular risk factors will have a significant effect on disease progression. Indeed, the relative importance of these risk factors for Alzheimer's disease remains uncertain.⁷⁴ It is also important to note that, if people live longer as a result of living a healthier lifestyle, their risk of developing dementia at the very end of their (extended) life is also likely to increase. Strategies that aim to delay the onset of dementia may therefore not succeed in reducing the total number of people developing dementia before their death, although they may decrease the total amount of time in which the disabling effects of dementia are experienced.⁷⁵
- 1.30 As our understanding of the physical changes in the brain, both those associated with various forms of dementia and those associated with ordinary ageing, increases, the idea of what a 'cure' for dementia might look like may need to be reconsidered. One idea that has been put forward is that Alzheimer's disease is simply 'accelerated ageing': that is, that everyone, were they to live long enough, would ultimately experience the cognitive decline associated with Alzheimer's. This has been strongly contested: although cognitive abilities do decline in old age and it is difficult to draw a clear line between cognitive losses associated with dementia and those associated with old age, epidemiological studies of the very old suggest that it is not the case that everyone would get Alzheimer's disease were they to live long enough.⁷⁶ Moreover, it is well accepted that different

⁷⁰ Abbott A (2008) The plaque plan *Nature* **456**: 161–4.

⁷¹ *Ibid*; Schnabel J (2008) Standard Model *Nature* **454**: 682–5

⁷² Wang H-X, Karp A, Herlitz A *et al.* (2009) Personality and lifestyle in relation to dementia incidence *Neurology* **72**: 253–9.

⁷³ Carlson MC, Helms MJ, Steffens DC *et al.* (2008) Midlife activity predicts risk of dementia in older male twin pairs *Alzheimer's & Dementia* **4**(5): 324–31.

⁷⁴ Purnell C, Gao S, Callahan CM and Hendrie HC (2009) Cardiovascular risk factors and incident Alzheimer disease: a systematic review of the literature *Alzheimer Disease & Associated Disorders* **23**(1): 1–10; Yip AG, Brayne C and Matthews FE (2006) Risk factors for incident dementia in England and Wales: The Medical Research Council Cognitive Function and Ageing Study. A population-based nested case-control study *Age and Ageing* **35**: 154–60.

⁷⁵ Brayne C, Gao Lu, Dewey M and Matthews FE (2006) Dementia before death in ageing societies: the promise of prevention and the reality *PLoS Medicine* **3**(10) e397; Jagger C, Matthews R, Lindesay J *et al.* (2009) The effect of dementia trends and treatments on longevity and disability: a simulation model based on the MRC Cognitive Function and Ageing Study (MRC CFAS) *Age and Ageing* **38**(3): 319–25.

⁷⁶ See, for example, Anderson E (2008) Cognitive change in old age, in *Oxford Textbook of Old Age Psychiatry*, Jacoby R, Oppenheimer C, Dening T and Thomas A (Editors) (Oxford: Oxford University Press), pp33–50 at p34.

forms of dementia have different causes, and there seems no reason to conflate Alzheimer's disease with ordinary ageing when a different explanation is accepted for other dementias.⁷⁷ Nevertheless, the degree of cognitive decline which undoubtedly accompanies old age does challenge the idea that a 'cure' for dementia could ever restore a person's brain to how it was when the person was much younger. A more realistic concept of what a 'cure' for dementia might look like would therefore be action to stop the disease process in its tracks at the point of diagnosis.

- 1.31 Given that there is little immediate prospect of such a cure being developed,⁷⁸ and that those medicines that are currently licensed to slow disease progression have a relatively limited and temporary effect, the importance of maximising the quality of life of those who currently have dementia becomes all the more imperative. More interest is gradually being shown in approaches which focus on treating the way people with dementia feel, and attempting to maximise their independence and quality of life, rather than on seeking a radical 'cure'. There is a growing acceptance that it may be more productive when assessing the benefits of treatment to look at the effect the treatment has had on reducing the person's rate of decline, minimising their level of disability or improving their quality of life, rather than looking for improvement in the way the person scores in a cognitive test.⁷⁹ Such an approach could potentially affect both how existing therapies are evaluated and the choice of future areas of research.
- 1.32 Developments in scientific understandings of the physical mechanisms which underlie many of the symptoms of dementia are also potentially highly valuable in improving the quality of care and support for people with dementia, even where they do not lead directly to disease-modifying therapies. Much distress, for example, may be caused by disinhibited behaviour on the part of a person with dementia, with those close to the person seeing such uncharacteristic behaviour as an example of fundamental personality change. Growing understanding of how such behaviour is linked with damage to the mechanisms in the brain that usually enable people to keep particular thoughts and emotions private will encourage more appropriate responses to such behaviour and help reduce the stress placed on carers.⁸⁰

Diagnosing dementia

Methods of diagnosis

Box 1.5: NICE guideline on diagnosis

A diagnosis of dementia should only be made after a comprehensive assessment, which will include taking the person's medical history, examining their cognitive and mental state, conducting a physical examination, and reviewing their existing medication. Account should be taken of wider factors that may affect a person's performance in cognitive and functional tests, such as any existing physical or mental illnesses or disabilities, their educational level and their former levels of attainment and functioning. Where the diagnosis is mild or questionable, formal neuropsychological testing should be conducted.

Structural imaging should be used to exclude other possible causes of the person's symptoms, and to help establish the subtype of dementia: magnetic resonance imaging (MRI) is preferred but computed tomography (CT) scanning may also be used. Various forms of SPECT (single-photon emission computed tomography) may be used to help differentiate Alzheimer's disease, vascular dementia and frontotemporal dementia, and to help confirm suspected dementia with Lewy bodies. If the person with suspected dementia also has learning disabilities, specialist advice should be sought when interpreting the scans.

NICE/SCIE (2006) *Dementia: Supporting people with dementia and their carers in health and social care*, NICE Clinical Guideline 42 (London: NICE and SCIE).

⁷⁷ *Ibid.*

⁷⁸ See, for example, the discussion in paragraph 1.26 and the disappointing results of the immunisation study, where removal of amyloid did not lead to improvements in symptoms: Holmes C, Boche D, Wilkinson D *et al.* (2008) Long-term effects of Aβ42 immunisation in Alzheimer's disease: follow-up of a randomised, placebo-controlled phase I trial *The Lancet* **372(9634)**: 216–23.

⁷⁹ Wilkinson D and Andersen HF (2007) Analysis of the effect of memantine in reducing the worsening of clinical symptoms in patients with moderate to severe Alzheimer's disease *Dementia and Geriatric Cognitive Disorders* **24(2)**: 138–45.

⁸⁰ Shulman KI (1997) Disinhibition syndromes, secondary mania and bipolar disorder in old age *Journal of Affective Disorders* **46(3)**: 175–82.

1.33 Other than in specialist research centres, the most accurate diagnosis that can be achieved at present is through a clinical evaluation and diagnosis by an experienced clinician. Routine investigations and a brain scan are also used to exclude any contributory causes of the person's symptoms, such as those due to physical illness or other brain disease, like stroke or tumour. Examination of amyloid and tau in the cerebrospinal fluid (CSF) is thought to increase diagnostic accuracy in early cases of Alzheimer's disease, but is not routinely available outside research centres.⁸¹ New imaging techniques that enable beta-amyloid to be seen on brain scans and hence potentially increase diagnostic accuracy are being developed,⁸² but these are not yet available in general clinical practice. Moreover, it is not yet known how well these scans or CSF tests will work in larger older populations, and hence how useful they will be as an accurate diagnostic tool: a major post-mortem study has found a high frequency of individuals showing significant signs of amyloid deposits, which would have appeared as 'positive scans', regardless of whether the person in fact experienced any signs of dementia during their life-time.⁸³

Box 1.6: Biomarkers

Biological markers or 'biomarkers' are molecules or sets of different molecules that, when detected at a particular level in body fluids or tissues, indicate the presence of a disease. Biomarkers being developed in dementia include examination of the levels of beta-amyloid or tau proteins in a person's CSF, and the use of a radioactive ligand (a molecule which binds to a protein, in this case beta-amyloid) to make the beta-amyloid visible on a brain scan.

- 1.34 The clinical diagnosis is based on the history and type of cognitive impairment and its effect on the person's everyday life, combined with corroborative history from someone who knows the person with suspected dementia well. The cognitive impairments are then confirmed through testing with validated procedures, of which the best known is the 'Mini-Mental State Examination' (MMSE) (see paragraph 1.12). The MMSE will then usually be followed by more detailed tests. It is clearly important that people who are beginning to experience possible symptoms of dementia have ready access to experienced teams who are well placed to exclude other possible causes of disorientation or memory loss.
- 1.35 The accuracy of diagnosis, and whether it will in the future become possible to identify people at risk in the very early stages of the disease, is clearly a key research question. The development of reliable 'biomarkers' could potentially be valuable for a number of purposes: predicting who may, or may not, be likely to develop a particular disease; distinguishing between different types or sub-types of dementia; and acting as a surrogate measure for the effectiveness of medicines both in clinical trials and in clinical practice. There are several promising approaches in the development of biomarkers, at least in the case of Alzheimer's disease, including the new imaging techniques and CSF tests described above (see paragraph 1.33 and Box 1.6). However, these tests are invasive, and while at present they may increase diagnostic certainty, they do not necessarily correlate directly with treatment effects. Clearly a blood or urine test, which would be much less invasive than the lumbar puncture required to obtain CSF, would be useful in developing this work further. As yet, however, no such test is available and the CSF markers have largely been used in people with confirmed disease, and in a limited number of individuals. It is therefore not known whether

⁸¹ Sonnen JA, Montine KS, Quinn JF *et al.* (2008) Biomarkers for cognitive impairment and dementia in elderly people *The Lancet Neurology* **7**(8): 704–14.

⁸² de Leon MJ, Mosconi L, Blennow K *et al.* (2007) Imaging and CSF studies in the preclinical diagnosis of Alzheimer's disease *Annals of the New York Academy of Sciences* **1097**: 114–45.

⁸³ Neuropathology Group of the Medical Research Council Cognitive Function and Ageing Study (2001) Pathological correlates of late-onset dementia in a multicentre, community-based population in England and Wales *The Lancet* **357**: 169–75. See also Savva GM, Wharton SB, Ince PG *et al.* (2009) Age, neuropathology, and dementia *New England Journal of Medicine* **360**: 2302–9, reporting evidence that the strength of the association between the pathological features of Alzheimer's disease and the symptoms of dementia diminishes after age 75.

they will act as useful predictors of disease in all individuals or in the most elderly, who are likely to have complex multiple health problems.⁸⁴

Pre-symptomatic diagnosis and screening

1.36 Given that there is currently neither an effective way of diagnosing the changes in the brain that precede dementia, nor effective treatment to prevent the development of dementia if identified at this early stage, population screening would not be valuable at present.⁸⁵ While considerable research effort is being devoted to identifying genetic predispositions to various forms of dementia (for example the ApoE4 gene variant which indicates susceptibility for late-onset Alzheimer's disease) this information cannot yet be used in any useful way for prediction or screening, as the presence of the gene indicates only a relatively small increased risk of developing the condition: many other factors will come into play to determine whether the person in fact goes on to develop the disease.

Ethical questions arising out of this Chapter

1.37 Dementia gives rise to many ethical questions affecting both the individuals directly involved – the person with dementia themselves together with their close family and friends who provide much of their support – and society as a whole. We now know much more about the damage to the brain that leads to the symptoms and behaviours of dementia, but we also have a growing awareness of the abilities and emotions which are retained long into dementia, despite serious cognitive losses. This increased understanding poses a strong challenge to past ideas of dementia as a 'death that leaves the body behind' and raises important questions as to the way in which people with dementia are currently regarded and respected. Yet this increase in knowledge has not yet delivered treatments which have more than a temporary effect. This lack of a 'quick-fix' solution challenges us to look more closely at how people can be supported to live well with dementia, how their experience of disability can be minimised, and the implications of this for both services and research.

1.38 Even with the best support, a person with dementia will experience profound effects in their life as a result of their disease. The decline in mental capacity and ability to function independently, together with the effect dementia may have on mood and behaviour, is highly distressing to the person with dementia themselves, and creates difficulties for carers as they seek to respond appropriately. The potential for frequent and serious conflicts of interest between the person being cared for and their carer or carers generates further ethical difficulties. The increasing number of people developing dementia means that many more people will be facing these questions in their own lives. This raises further ethical questions about how society supports people with dementia, and how it prioritises various forms of research into dementia.

⁸⁴ de Leon MJ, Mosconi L, Blennow K *et al.* (2007) Imaging and CSF studies in the preclinical diagnosis of Alzheimer's disease *Annals of the New York Academy of Sciences* **1097**: 114–45; Sonnen JA, Montine KS, Quinn JF *et al.* (2008) Biomarkers for cognitive impairment and dementia in elderly people *The Lancet Neurology* **7(8)**: 704–14.

⁸⁵ Brayne C, Fox C and Boustani M (2007) Dementia screening in primary care: is it time? *The Journal of the American Medical Association* **298(20)**: 2409–11.