

Diagnosis of dementia

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Abstract

There are two stages to making a diagnosis of dementia: establishing the presence of a dementia syndrome and determining the likely cause.

Dementia should be distinguished from mild cognitive impairment, in which any cognitive and functional changes are less marked.

Diagnosis of dementia is essentially clinical but investigations are helpful in excluding other disorders and in determining the underlying cause of the condition.

International diagnostic criteria exist for the most common causes of dementia and these are useful for clinical and research purposes. At and following diagnosis, patients and their families require information, support and guidance about the future.

Authors

Malarvizhi Babu Sandilyan Consultant in old age psychiatry, Berkshire Healthcare NHS Foundation Trust, Reading, England.

Tom Dening Professor of dementia research, Institute of Mental Health, University of Nottingham, Nottingham, England.

Correspondence to: tom.dening@nottingham.ac.uk, @TomDening

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should be ruled out by relevant investigations.

This article the fourth in this series on dementia, discusses the process for assessing a person with possible dementia and the criteria currently used for making a diagnosis of dementia.

Course of dementia

Dementia is a neurodegenerative condition and is progressive in nature; it can be classified into mild, moderate and severe stages. Table 1 details the common symptoms observed at these three stages of dementia. Dementia will eventually lead to other conditions associated with frailty, dependency and poor swallowing. The most common cause of death is pneumonia. Life expectancy after a diagnosis is variable because it depends on the age of the person and the presence of other comorbid health problems. Xie *et al* (2008) estimated that the median survival rate for incident (newly occurring) dementia was 4.1 years for men and 4.6 years for women, ranging from 10.7 years for those aged 65-69 to 3.8 years for people aged over 90.

Assessment of dementia

The importance of diagnosing dementia has been emphasised by the National Dementia Strategy (Department of Health 2009), which requires that dedicated memory services to assess people with possible dementia be available. The key components of a memory assessment service are:

- ▶ Offering a prompt assessment service for people referred with a possible diagnosis of dementia.
- ▶ Providing a high quality service for dementia assessment, diagnosis and management.

The clinicians at a memory clinic usually comprise doctors – geriatricians, neurologists or old age psychiatrists; specialist nurses; psychologists; occupational therapists; and social workers. Assessments may take place at the person's home, in a hospital clinic or in a GP surgery. Nurse-led memory clinics have become increasingly common, although the diagnosis of dementia is usually made only after discussion with a doctor.

During the initial assessment, information is collected about the background of the person, their general functioning, other health problems, medications and details of memory problems,

WHEN A PERSON experiences memory loss or other features of dementia, he or she is usually referred to specialists in memory assessment. The diagnosis of dementia is a two-stage process: first, to establish if the person has a dementia syndrome and, second, to determine the likely cause of dementia. Each of the stages involves obtaining a detailed history from the person and their family, performing mental state and physical examinations and undertaking relevant investigations. Other conditions, such as vitamin deficiencies, infections and metabolic disorders, can mimic the presentation of dementia, and these

alongside any other mood or anxiety complaints.

Questionnaires to assess mood and anxiety symptoms or the person's level of functioning might be used. Vital information about all of these issues is usually also gathered from an informant, often a family member, with the permission of the person. Subsequently, cognitive tests might be applied to assess memory function. Investigations including blood tests and brain scans are performed if indicated to rule out any reversible causes of cognitive impairment.

Cognitive testing

There are several cognitive tests available, all of which have advantages and disadvantages.

Simple tests The most commonly used simple test is the Mini-Mental State Examination (MMSE), which comprises questions and tasks that assess memory, language and attention. The highest possible score is 30 and a score of 26 or below is considered to be suggestive of dementia. Scores of 17-25 approximate to mild dementia and below ten to severe dementia. There are potential copyright issues with the MMSE, which have led to the increased use of free-to-use tests, such as the Montreal Cognitive Assessment (Nasreddine *et al* 2005).

Other brief tests are available, for example Test Your Memory (TYM) (Brown *et al* 2009), which the patient administers, or clock drawing (tinyurl.com/03wx775), a simple exercise that tests several areas of cognition. The Addenbrooke's Cognitive Examination – Revised (ACE-R) test includes detailed tests on cognitive domains

such as memory, attention, language and spatial orientation. It encompasses the MMSE and therefore has the same potential limitations with copyright. The highest possible score is 100 and a score of less than 82 is considered to indicate a diagnosis of dementia. A recent alternative, which does not contain the MMSE, is the ACE-Third Edition(III) test (tinyurl.com/q7fgpjax).

These simple tests have limitations. Factors such as educational status, culture, language and hearing or eyesight problems can affect scores, and the effects of such factors are sometimes overlooked. Simple tests are often limited to tasks of orientation and recall and thus might fail to assess executive functions of the brain (attention, motivation, ability to plan and to shift attention), which are particularly relevant in frontotemporal dementia. Diagnosis of dementia is a clinical judgement, and scores on cognitive tests can only supplement this.

Neuropsychological tests

Neuropsychological testing may be used for other purposes, for example to assess the patient's premorbid intelligence or educational level in cases where the MMSE score does not appear to match that person's level of daily functioning; to determine whether the pattern of cognitive deficits is consistent with Alzheimer's or another type of dementia; and to distinguish deficits that occur as a result of ageing. Such tests include a variety of tasks, for example recalling paragraphs of text, copying pictures and tests of reasoning. They are usually administered by a psychologist and may take at least two hours.

TABLE 1

The course of dementia and features of each stage

	Mild dementia	Moderate dementia	Severe dementia
Cognitive symptoms	<ul style="list-style-type: none">▶ Difficulty in learning new information.▶ Difficulty in finding the right words.▶ Poor attention.	<ul style="list-style-type: none">▶ Progressive memory loss.▶ Difficulty in using words and phrases in a meaningful way.▶ Inability to recognise objects and faces.	<ul style="list-style-type: none">▶ Severe memory loss.▶ Profound loss of ability to perform purposeful actions.▶ Inability to identify day-to-day objects and familiar faces.▶ Severe language problems.
Functional impairment	<ul style="list-style-type: none">▶ Misplacing of items.▶ Forgetting appointments and recent conversations.▶ Taking longer to perform complex mental activities.▶ Being repetitive.	<ul style="list-style-type: none">▶ Difficulty in doing routine work, for example cooking, laundry, using the telephone.▶ Losing the way in familiar places.▶ Unable to have a coherent and fluent conversation.▶ Difficulty in handling money.	<ul style="list-style-type: none">▶ Inability to recognise close family members.▶ Inability to perform basic activities such as feeding, toileting and dressing.▶ Urinary and faecal incontinence.▶ Swallowing difficulties.
Non-cognitive symptoms	<ul style="list-style-type: none">▶ Apathy or lack of motivation.▶ Anxiety.▶ Low mood.	<ul style="list-style-type: none">▶ Delusions.▶ Increasing social withdrawal.▶ Irritability.▶ Depression.▶ Sleep disturbances.▶ Loss of appetite.	<ul style="list-style-type: none">▶ Purposeful walking.▶ Agitation.▶ Verbal and physical aggression.▶ Disinhibited behaviour.▶ Depression.▶ Hallucinations.▶ Delusions.

Clinical assessments

It is important to assess the person's level of everyday functioning in terms of activities of daily living (ADL). The Bristol Activities of Daily Living Scale (Bucks *et al* 1996) is in widest use among scales to assess ADL, and has good psychometric properties. The Neuropsychiatric Inventory is the most commonly used scale for recording non-cognitive (behavioural and psychological) symptoms of dementia (Cummings *et al* 1994, van der Linde *et al* 2013).

Blood tests There may be potentially reversible causes of memory impairment, such as abnormalities in vitamin and calcium levels or hormonal imbalance. To exclude such causes for cognitive impairment, the following blood tests are usually performed, often in general practice before referral to secondary care:

- ▶ Full blood count to identify anaemia and signs of infection.
- ▶ Erythrocyte sedimentation rate and C-reactive protein to determine the presence of infection and/or inflammatory responses.
- ▶ Thyroid hormone and thyroid-stimulating hormone: hypothyroidism may cause problems with memory.
- ▶ Biochemical screen, including urea and creatinine, electrolytes, liver function tests and albumin. Disturbances in sodium, for example, may lead to memory impairment.
- ▶ Glucose to identify diabetes.
- ▶ Vitamin B₁₂ and folate levels: deficiencies in these vitamins can produce memory disturbances.

Other possible blood tests, though not routinely requested, include syphilis serology and investigations for human immunodeficiency virus, which can present with marked cognitive impairment. Other investigations such as a chest X-ray, electrocardiograph and urine tests may also be requested.

Neuroimaging

Structural neuroimaging techniques, such as computed tomography (CT) and magnetic resonance imaging (MRI), are used mainly to detect causes of dementia such as stroke, brain tumour, multiple sclerosis or brain haemorrhage. These scans might appear normal in the early stages of Alzheimer's disease, but can identify early tissue loss beginning in the hippocampus and the medial temporal lobe. They may show characteristic patterns of brain tissue loss in the later stages of Alzheimer's disease or frontotemporal dementia.

Functional imaging, such as functional MRI, positron emission tomography (PET) and single photon emission computed tomography (SPECT), show the metabolic activity and blood flow in

different regions of the brain. Results can help to distinguish between different types of dementia, though these techniques are not universally available. Other scans might help with a specific diagnosis, for example amyloid scans and dopamine transporter scans for Alzheimer's disease and Parkinson's disease, respectively.

Diagnostic criteria for dementia

The main systems in current use, *International Statistical Classification of Diseases and Related Health Problems 10th Revision* (ICD-10) (World Health Organization (WHO) 2015) and the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV) (American Psychiatric Association 1994), use the following criteria to determine whether there is a dementia syndrome:

- ▶ Multiple cognitive deficits – there should be problems in more than one cognitive domain, such as memory, language, spatial orientation or organisational skills. Amnesia or memory impairment for learning new information or recalling previously learned information must be one of the core features.
- ▶ Functional impairment – there should be difficulty in maintaining the ability to perform routine activities at work, home or socially because of cognitive deficits.
- ▶ Change from a previous level – there should be a clear decline in this functional impairment when compared with previous abilities, with progressive decline.
- ▶ Clear consciousness – the person should be alert and without any disturbance in consciousness. Altered levels of consciousness can occur in acute confusional states or delirium.

A variety of international classification systems derived for research and clinical uses exist for diagnosing different types of dementia.

Criteria for Alzheimer's disease

In ICD-10, the following criteria should be met to arrive at a clinical diagnosis of dementia (WHO 2015):

- ▶ Gradual onset and prolonged duration: the symptoms should have occurred gradually with progressive decline, with a duration of at least six months.
- ▶ There is no evidence of any other neurological or systemic disease that can explain the symptoms of dementia.

Other criteria for Alzheimer's disease include those from the National Institute of Neurological and Communicative Disorders and Stroke, and the Alzheimer's Disease and Related Disorders

Association (McKhann *et al* 1984) in the United States (US). These criteria recommend neuropsychological testing to provide a 'possible' or 'probable' diagnosis in people with cognitive impairment and a suspected dementia syndrome. A definitive diagnosis requires histopathological confirmation.

Working groups including Dubois *et al* (2010) and those from the National Institute on Aging with the Alzheimer's Association in the US (Jack *et al* 2011) have been developing and updating criteria for the diagnosis of Alzheimer's disease. One reason for this is the availability of biomarkers, such as cerebrospinal fluid proteins and brain imaging. The other reason is increasing interest in earlier diagnosis of Alzheimer's disease, either at the stage of mild cognitive impairment or before any cognitive impairment has developed. New criteria may mean it is not always necessary to wait until a dementia syndrome has developed to make a fairly confident diagnosis of Alzheimer's disease.

Four sets of these criteria have been published by the National Institute on Aging and Alzheimer's Association group:

- ▶ *The Diagnosis of Dementia due to Alzheimer's Disease* (McKhann *et al* 2011), intended for clinical and research purposes.
- ▶ *The Diagnosis of Mild Cognitive Impairment due to Alzheimer's Disease* (Albert *et al* 2011), intended for clinical and research purposes.
- ▶ *Toward Defining the Preclinical Stages of Alzheimer's Disease* (Sperling *et al* 2011), for research purposes only.
- ▶ *Guidelines on Neuropathologic Assessment of Alzheimer's Disease* (Hyman *et al* 2012), for specialists.

Criteria for other types of dementia

An international group of Lewy body disease specialists (the Dementia with Lewy Bodies Consortium) issued consensus guidelines for clinical and pathological diagnosis (McKeith *et al* 1996). These were later revised (McKeith *et al* 2005). In addition to progressive dementia syndrome, additional criteria included persistent visual hallucinations, fluctuation in cognitive functioning and spontaneous parkinsonian motor symptoms. Other secondary features that add weight to the diagnosis are rapid eye movement sleep disorder, frequent falls and sensitivity to antipsychotic drugs (McKeith *et al* 2005).

Diagnostic criteria for other common forms of dementia include:

- ▶ Vascular dementia – National Institute of Neurological Disorders and Stroke-Association Internationale pour la Recherche et l'Enseignement en Neurosciences (NINDS-AIREN) (Román *et al* 1993).

- ▶ Dementia in Parkinson's disease – Movement Disorder Study Task Force (Emre *et al* 2007).
- ▶ Frontotemporal dementia – Lund-Manchester Criteria (Neary *et al* 1998).

Mild cognitive impairment

Some people have relatively mild memory loss or other forms of cognitive impairment that do not cause sufficient day-to-day impairment to warrant a diagnosis of dementia. There have been several terms used to describe this clinical status, but the one in current use is mild cognitive impairment. One reason for increased attention to this group is the realisation that people who have early signs of disorders such as Alzheimer's disease will go through a stage of mild cognitive impairment, and it may be possible to detect dementia early. Treatment at this stage is more effective than later on, by which time the person has significant brain damage.

Mild cognitive impairment is likely to result from a combination of causative factors, among which the early signs of Alzheimer's disease is one. Research has shown that people with mild cognitive impairment have an increased risk of developing dementia, but it is by no means certain they will do so. About 10% of people with mild cognitive impairment have a diagnosis of dementia 12 months later (O'Brien and Grayson 2013).

However, the state of mild cognitive impairment remains fairly static for some people over time, while others seem to improve and move from mild cognitive impairment to the usual cognitive range at follow up. Therefore, the best way to consider mild cognitive impairment might be as a state of being at risk of dementia.

Offering treatment to people with mild cognitive impairment seems a good idea, because it is best, in general, to treat diseases at the earliest possible stage. However, the results of trials with cholinesterase inhibitor drugs have been disappointing, with no evidence that they offer any protection from developing dementia, presumably because people with mild cognitive impairment form a heterogeneous group (Petersen *et al* 2005). Nonetheless, mild cognitive impairment remains an area of great interest. Any treatment that could delay people's transition from mild cognitive impairment to overt dementia would have a positive effect on public health.

Differentiating dementia

There are many conditions that can mimic the presentation of dementia. Normal ageing-related forgetfulness, poor educational attainment, learning disabilities, drugs, deafness and poor

vision are among conditions that should be taken into account. Two other important differential diagnoses to be considered during the initial assessment are depression and delirium.

Depression may present as cognitive impairment, which is sometimes referred to as pseudodementia, if severe. This is at least partly a result of impaired attention, which is common in depression and may appear as poor memory. Depression has been suggested as an independent risk factor for dementia and some studies report that people with pseudodementia are at increased risk of developing dementia later in life (Steffens *et al* 2014).

Delirium – sometimes referred to as acute confusional state, although this is not a preferred term – can present as cognitive impairment and may coexist with dementia. Delirium is usually associated with an underlying physical cause. Therefore, management should begin by investigating possible causes and treating any that are found. A person presenting with delirium often has a reversal of their usual sleep-wake pattern and poor attention. They present as agitated, distractible and sometimes with psychotic symptoms such as delusions and hallucinations. People with delirium should be identified promptly to ensure they receive adequate nursing care and that any treatable cause, such as an infection or pain, is corrected. Nurses working in hospitals will encounter patients with delirium frequently, so it is important to remain alert to the possibility of this occurring in older patients.

Sharing the diagnosis of dementia

When a reasonably confident diagnosis of dementia has been made, together with an assessment of the likely underlying cause, the diagnosis should be communicated to the patient and their carers sympathetically. Although the NHS has placed emphasis on improved diagnosis rates for dementia, it is important to remember that diagnosis is not really an end in itself, and it is what happens subsequently that matters more. It should also be remembered that not every patient wants to be told they have dementia, so a health professional should be ready to tailor the message accordingly. However, in general, it is best to share the diagnosis, because it is frequently not a surprise to the person or the family.

There should be an opportunity for the patient and family members to ask questions as part of post-diagnostic counselling, because their questions might come to mind only after the clinic appointment. Good sources of information, such as the Alzheimer's Society website (www.alzheimers.org.uk) or IDEA (Improving Dementia Education and Awareness; www.idea.nottingham.ac.uk) are useful sources of information and support.

There are issues that might require discussion, for example, possibilities for medical treatment, opportunities to participate in research, driving, financial and legal arrangements (wills and lasting power of attorney), and future living and care arrangements. Treatment and management of dementia will be discussed in more detail in the next article and in subsequent articles in the series.

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Support at home

A diagnosis of a dementia can be a life-changing event and adequate support at home is vital. This should be in the form of visits and assessments by psychiatrists, psychiatric nurses, social workers and carers. Psychiatrists and nurses can help the person maintain a sense of wellbeing by helping them to concentrate on their strengths and abilities and by helping them to identify activities that they will be able to undertake and enjoy. The social worker can help with financial assessments such as attendance allowances. The main priority is to maintain the person's independence at home for as long as possible. Voluntary organisations, such as the Alzheimer's Society, and specialist practitioners, such as Admiral Nurses supported by Dementia UK, can also have a major role in helping people with dementia and their families.

Neurocognitive disorder

In 2013, the American Psychiatric Association published the fifth edition of its *Diagnostic and Statistical Manual of Mental Disorders* (DSM-V). Among several other radical changes, DSM-V proposed a new entity of neurocognitive disorder (NCD) as an alternative to the term 'dementia' (American Psychiatric Association 2015). The idea was that the new term would be associated with less stigma than the word dementia, and that it would encompass disorders that do not necessarily have a progressive course, for example the effects of head injuries. It is also intended that whether someone has NCD should be established psychometrically.

Clinicians are still permitted to use the term dementia, if it seems more appropriate. There have been various criticisms of DSM-V, the strongest of which is that it seems to medicalise aspects of ordinary life, and this is probably true of NCD in that it covers more people than previous criteria for dementia.

It is unproven whether the term will be any more satisfactory in everyday use than the word dementia and it appears likely clinicians in the UK will still be using the word dementia in the foreseeable future.

Conclusion

It is important to consider the possibility of dementia when someone presents with memory or other problems that might suggest this diagnosis. Even in the absence of curative treatment, a diagnosis of dementia can help people with the condition and their families, by providing an explanation for the changes they may have noticed and by providing them with access to information and support, which help them to make plans. The essential basis for assessing dementia is a full clinical history augmented by cognitive testing and other investigations as appropriate.

There are sets of criteria both for diagnosing the syndrome of dementia and for the disorders that cause dementia, and these are periodically reviewed in the light of technical advances **NS**

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