CAMDEX-R

The Cambridge examination for mental disorders of the elderly – revised.

Dementia is the most common mental disorder of old age. CAMDEX is a diagnostic assessment which provides a way to identify dementia, and to differentiate it from other common disorders and the normal processes of ageing. It may be administered in the community or in hospital by doctors or other mental health professionals. CAMDEX-R is the newly revised and updated version of this internationally acclaimed instrument. For the first time the range of information required for differential diagnosis of the varying forms of dementia is available in a single standardised interview and examination, along with other common mental disorders of the elderly. It consists of:

1 a structured clinical interview supplying systematic information about the presenting disorder, past and family history;

2 a brief neuropsychological battery (CAMCOG) comprising a range of objective cognitive tests. This very popular assessment has been updated to include remote memory items suitable for more recently born cohorts, and its coverage of executive function has been extended;

3 a structured interview with a relative or other informant to obtain independent information about the patient's present state and history;

4 a data input disk that will facilitate computer storage and analysis of interview and test results.

Devised and tested by Sir Martin Roth and his colleagues at Cambridge, the CAMDEX project has received widespread attention among psychiatrists, psychologists, geriatricians, epidemiologists and other professionals in the field of psychogeriatrics.

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The Cambridge examination
for mental disorders of
the elderly – revised

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Introduction

The CAMDEX is a standardised, structured interview and examination for diagnosing common mental disorders in later life, with special reference to the dementias.

Its principal aims are:

- to incorporate in a single instrument all the information required to make an accurate clinical diagnosis of dementia.
- to establish the type of dementia e.g. dementia of the Alzheimer type, vascular dementia, dementia of cortical Lewy body type, dementia of frontal type, dementia secondary to physical disease.
- to describe key features common to dementia and other psychiatric syndromes of later life that are likely to overlap with and cause difficulty in differential diagnosis from dementia.
- to diagnose dementia at an early stage.
- to provide a quantitative measure of performance on cognitive tests across a wide domain of cognitive functions.
- to provide an estimate of clinical severity of dementia.
- to be applicable to both clinical and community-based studies.

Brief outline

The CAMDEX incorporates the following components:

Interview with subject

Present state examination.
Past history.
Family history.
Cognitive examination (CAMCOG).
Physical examination, laboratory investigations.
Medication.
Interviewer observations.

Interview with informant (relative, care-giver)

Changes in personality, behaviour and cognition.
Activities of daily living.
Past and family history.

Clinical diagnosis

Primary and secondary psychiatric diagnoses.
Clinical estimate of severity of dementia if present.
Clinical estimate of severity of depressive symptoms.
Other medical diagnosis.

Incorporated scales

Dementia Scale (Blessed *et al.*, 1968).
Ischaemia Score (Hachinski *et al.*, 1975).
Mini-Mental State Examination (Folstein *et al.*, 1975).
Abbreviated Mental Test (Hodkinson, 1972).

Applications

CAMDEX has been used in many published investigations, both clinical and population-based. Longitudinal studies have shown that CAMDEX and CAMCOG are able to detect early cases of dementia and to document the progression of cognitive decline and dementia. CAMDEX and CAMCOG have provided valuable information in studies of neuropathology, neuroimaging and genetic factors in cognitive ageing and dementia. The CAMDEX schedule has been translated into many languages, and official versions of CAMDEX have been published in Spanish (1991), Dutch (1992), Italian (1993) and German (1994). A comprehensive list of publications which have employed CAMDEX or CAMCOG is provided in the Appendix of this manual.

Reliability

Studies of inter-rater reliability of the various sections of CAMDEX have been undertaken in both the UK (O'Connor *et al.,* 1989) and the US (Hendrie *et al.,* 1988) in clinical samples. The Phi co-efficients for various sections of the CAMDEX range from 0.83 to 1.00, indicating a high level of reliability. Reliability of the CAMCOG has also been investigated in a UK epidemiological sample. Test-retest reliability of CAMCOG total score was 0.86 (Pearson correlation co-efficient). Internal stability of items assessed using Cochrane alpha, was 0.82 and 0.89 on the first and second tests respectively (Huppert *et al.*, 1996).

CAMDEX and CAMDEX-R

The CAMDEX schedule was published in response to the many requests made by investigators and clinicians for copies of the schedule following the report of Roth *et al.* (1986). To make the full instrument available for general use it was necessary to publish the schedule together with all the materials required for its complete

Description of the schedule

administration. This includes the colour photographs needed for the neuropsychological (CAMCOG) section. When the CAMDEX had sold out, it was decided to produce a revised edition, CAMDEX-R, which takes into account recent advances in the study of dementia and the helpful comments of users of the CAMDEX.

The main ways in which CAMDEX-R differs from CAMDEX are:

- its ability to diagnose more recently described forms of dementia, including dementia of cortical Lewy body type and dementia of the frontal type.
- the ability to make clinical diagnoses based on DSM-IV and ICD-10 criteria.
- the inclusion in CAMCOG of items assessing remote memory which are suited to more recently born cohorts.
- the extended assessment of executive function in CAMCOG.
- the availability of a disk to facilitate data entry, scoring and analysis.

Aims

We had two major aims in developing the CAMDEX schedule. One was to incorporate in a single standardised instrument all the components needed to make an accurate clinical diagnosis of the most common forms of dementia, namely senile dementia of the Alzheimer type, vascular dementia, mixed Alzheimer and vascular dementia, and dementia secondary to physical disease. In order to achieve this aim, it was necessary to include information relevant to the main forms of organic and functional mental disorder which need to be differentiated from the dementias. This diagnostic aim requires the standardisation of all the components of an ordinary clinical interview and examination. It cannot be done on the basis of a present state examination alone.

The second aim was to detect the various forms of dementia at an early or mild stage. For this purpose a measure of cognitive function was required which would have a large enough range of scores to detect mild degrees of impairment. It was also considered important to obtain information from an informant about any changes in cognitive function as a test score does not of itself indicate whether cognitive decline has occurred.

The CAMDEX and the CAMDEX-R do not attempt to cover the full range of psychiatric disorders present in later life. CAMDEX is primarily a comprehensive schedule for the diagnosis and assessment of dementia. Features of other organic and functional disorders, including anxiety and phobic states and other neuroses, are included in so far as they have to be differentiated from a diagnosis of dementia.

The schedule has been designed for use both with patients in medical settings and with general population samples of the elderly in epidemiological enquiries. The term ‘subject’ is employed as a general term which refers to patients, controls or members of the general population.

Contents

The CAMDEX-R comprises a diagnostic schedule, divided into the following sections:

- **A** A structured psychiatric interview with the subject, incorporating questions regarding the present mental state, the previous personal and medical history and the family history.
- **B** A scale for objective evaluation of a broad range of cognitive functions.
- **C** A standardised schedule for recording observations of the present mental state together with appearance and demeanour.
- **D** A brief physical examination including a neurological examination.
- **E** A record of a range of laboratory findings, radiological and other investigations where applicable.
- **F** Current medications.
- **G** Additional information from subject interview.
- **H** A structured interview with a relative or other informant to provide independent information regarding the subject's general mental functioning, and everyday competence, current symptoms and previous medical and family history.
- **I** Additional information from informant.

Although there were a number of instruments for the diagnosis and assessment of dementia and other mental disorders of later life at the time when the CAMDEX was developed, there was no schedule which incorporated all the components listed above, which are essential for a comprehensive, standardised evaluation.

A more detailed description of each of the sections in CAMDEX-R is outlined below. These are preceded by the recording of basic demographic data, and for inpatients, a brief independent assessment of dementia and depression by medical staff.

Section A *Interview with patient/subject*

Section A starts with three simple questions: the subject's name, age and date of birth. If the subject fails to provide satisfactory answers to two out of the three questions, the interviewer may abandon Section A and move on to Section B. The main part of Section A covers items regarding the subject's present physical and mental state and in particular seeks to define symptoms relating to organic psychoses, depression and functional paranoid psychoses. Enquiries regarding past history and family history are also made. The questions posed in the final part of this section relate to established or speculative risk factors for Alzheimer's disease.

Section B *Cognitive examination – CAMCOG*

This concise neuropsychological test was devised to meet the need to assess all the cognitive deficits specified in operational diagnostic criteria, i.e. memory impairment, aphasia, apraxia, agnosia and disturbance in thinking (executive function). Items within a cognitive domain are graded in difficulty to permit assessment of the full range of cognitive ability. The following broad areas of cognitive function are assessed: orientation, language, memory, attention/calculation, praxis, abstract thinking and perception. Scores can be calculated for each of these broad areas of cognitive function or added to give a total score. All the items of the Mini-Mental State Examination (MMSE) of Folstein *et al.* (1975) are included in the cognitive examination. The CAMCOG is described in more detail on pp. 81–86.

While evaluating the quality of the subject's performance is an integral part of the diagnostic process, quantitative scores on the CAMCOG and MMSE are deliberately not calculated prior to diagnosis.

Section C *Interviewer observations*

This section consists of the interviewer's observations on the subject's appearance, behaviour, mood, speech, mental slowing, activity, insight, thought processes and level of consciousness, and any bizarre behaviour. The section is completed at the end of the interview with the subject.

Section D *Physical examination*

Section D comprises a simple physical examination including blood pressure, superficial and tendon reflexes, gait, defects of hearing and sight, tremor and Parkinsonian features, to augment the information needed for differentiating between different types of dementias.

Section E *Investigations*

The results of laboratory, radiological and other investigations are recorded in Section E. Whenever available,

blood count, levels of vitamin B12 and folate, urea and electrolytes, and results of liver function tests, venereal disease tests, EEG, CT, MRI, SPET or PET scans, are recorded.

Section F *List of current medications*
A record is made here of any medication currently being taken by the subject and a note of the dosage, frequency of administration and approximate period during which drugs have been taken.

Section G *Additional information*
Section G provides for any additional items of information obtained in the course of the interview. Its purpose is to amplify the picture of the subject already obtained by the structured questions. Much information in this section is spontaneously offered and of interest on this account alone, in addition to the help it may afford in formulating a diagnosis at the end of the interview, particularly in atypical and difficult cases.

Section H *Informant interview*
Section H comprises a structured interview, in the absence of the subject, with a relative or a carer who knows the subject well. The interview should be face to face whenever possible but satisfactory information can be obtained by telephone interviews. Any personality change, difficulty in functioning in everyday life or indications of cognitive difficulty observed by the informant are noted. Items which permit the Dementia Scale of Blessed *et al*. (1968) to be scored are incorporated in this section. Questions about the presence or absence of depressive or paranoid phenomenology are included. Family history and past history are investigated with the aid of questions similar to those asked of the subject.

Section I *Additional information from informant*
In this section is recorded additional items relating to first signs of onset, course of illness and present psychopathology including any abnormal movements or neurological signs or symptoms not already recorded, e.g. cerebellar ataxia and choreo-athetosis.

Diagnosis and severity ratings
At the end of the interview, the interviewer makes a psychiatric diagnosis based on all the relevant and available information according to the operational diagnostic criteria provided on pp. 59–63. This is a clinical diagnosis and is not based on scale scores (see below). Diagnoses are assigned to one of 12 categories: normal, six categories of dementia (dementia of the Alzheimer type (DAT), vascular or multi-infarct dementia, mixed DAT and vascular dementia, dementia of Lewy body type, dementia of frontal lobe type and dementia secondary to other causes), two categories of clouding or delirium (clouded state, clouded state with dementia), paranoid or paraphrenic illness, depressive illness, anxiety state and other psychiatric diagnosis. Secondary diagnosis refers either to a concomitant psychiatric diagnosis or a complication of the primary diagnosis. A diagnosis of physical disorder based on observed and recorded findings should also be made where appropriate. Subjects are also graded for severity of dementia and severity of depressive symptoms, each on a 5 point scale. Operational criteria for rating clinical severity of dementia are provided on pp. 59–63. Severity of depressive symptoms is recorded regardless of diagnosis as depressive symptoms may adversely affect cognitive function and behaviour.

Administration of the Schedule

Duration of administration
The administration of the subject's part of the interview can be completed in about 60 minutes for most patients, and more quickly in normals. The informant's section takes about 20 minutes.

Scoring
It is strongly recommended that every item in the schedule be coded at the time of interview. In cases where the subject or informant cannot or will not give an answer, or where an item is not applicable, clear coding instructions have been provided for dealing with such missing values.

The scores on certain items can be added to create quantitative scales. This is particularly true in the cognitive section from which MMSE, CAMCOG and other scaled scores may be derived (see p. 65). The scores on certain non-cognitive items may also be added to derive the Dementia Scale of Blessed *et al*. (1968) and the Ischaemia Score of Hachinski *et al*. (1972) (see p. 72). The new CAMDEX-R disk allows these scales to be derived on the computer.

Users

The CAMDEX-R includes items which require clinical experience and a degree of knowledge of psychiatric diagnosis, classification and nomenclature. It is important that persons intending to use it should be trained in basic psychopathology by a competent supervisor. For example, interviewers need to be familiar with clinical depression and the severity it can reach. They need to recognise delusions and hallucinations. The greater part of the questionnaire, however, can be completed by people with relatively brief training. The medical examination and the clinical diagnoses should be completed only by those medically trained.

Informed consent

For research purposes it is necessary to obtain informed consent from the subject, or in the case of moderate or severe dementia, from a relative or carer. The statement which we read out to the subject is as follows:

Thank you very much for seeing me. I would just like to explain what the study is about and what I will be asking you to do. The answers which you and others give will help us to understand more fully some of the problems elderly people have and how we can help them.

I will therefore be asking you about yourself in the past, how you are now and a little about your family. I would also like to do a brief physical examination. Some of the questions may not seem relevant to you, but it would be helpful if you would answer them all.

Later on I would like to ask a person who knows you well some questions. Before we start, I must ask you to sign a consent form to show that you agree to take part.

Everything you tell me is confidential. I want to assure you that whatever you decide will in no way affect any treatment you might need.

Reproducing the Schedule

In recognition of the fact that many users preferred to photocopy the schedule rather than use the score sheets provided in the original version of CAMDEX, we have waived the copyright on reproducing the CAMDEX-R schedule (pp. 7–56 of this manual).

We have also incorporated a facility for users to print copies of the schedule directly from the disk.

The CAMDEX-R computer disk and its applications

A computer disk is included in the CAMDEX-R package to facilitate data entry, scoring and analysis. The disk also incorporates an option to print out blank CAMDEX-R schedules, ready for administration. The disk is a PC high density disk. Menu-driven DOS programs are used, rather than Windows, to minimise the amount of memory required.

Data entry

The data entry program is available in two forms. A full text version which is essentially a facsimile of all sections of the schedule, helps to ensure that data is entered accurately. An abbreviated text version allows for greater speed of data entry. The abbreviated version also incorporates an automatic 'skip' facility, where not-applicable questions are automatically coded as missing if a lead-in question is answered in a particular way (e.g. if the subject has no children, all subsequent items about children are automatically coded as missing). Both data entry programs incorporate range checks, so that only sensible values can be entered, and validation checks for consistency of responses.

Calculating scores and analysing data

Scores may be obtained for individual subjects on all the quantitative scales (see pp. 67–72). A summary sheet can be printed out, which contains all the scores and a CAMCOG profile (see p. 81). There is also an on-screen data browser for checking individual records and confirming that the correct number of records has been entered. The full (anonymised) dataset, or selected subsets of the data may be read into popular statistical packages (SPSS and SAS) for the analysis of group or longitudinal data.

The use of CAMDEX-R for arriving at alternative operational diagnoses

Diagnostic procedures

When CAMDEX-R is administered by clinicians, a clinical diagnosis is made at the conclusion of the full

examination. This clinical diagnosis is based on the operational criteria defined on pp. 59–63, and draws upon all the information gathered in the schedule. It is also possible to arrive at diagnoses making use of DSM-IV and ICD-l0 criteria, as well as consensus criteria for dementia of Lewy body type and frontal type. CAMDEX-R items which correspond to the specific criteria relevant for a differential diagnosis of dementia are listed on pp. 64–72.

Provisional diagnostic scales

We previously developed some empirical diagnostic scales, based on item analysis of the first version of the CAMDEX (Roth *et al*., l986). These include an oganicity scale, a vascular (MID) scale and a depression scale. Details of the development of these scales are reproduced on pp. 92–95. The items corresponding to the scales appear on pp. 73–75. A number of extensive epidemiological studies are in progress in Cambridge and elsewhere, which will enable us to test the validity of these and additional scales in fresh population samples.

Provisional schema for combining information from (a) clinical diagnosis, (b) the diagnostic scales and (c) measures of the severity of cognitive impairment (CAMCOG) were presented in the original CAMDEX. Some CAMDEX users have found the schema helpful, so they are reproduced here, but like the diagnostic scales remain to be independently validated. Furthermore, as CAMCOG performance is strongly influenced by socio demographic variables (see pp. 84–85) as well as by physical and sensory function, the use of standard cut-off scores on the CAMCOG should be treated with caution.

Severity of dementia

Clinical criteria for the severity of dementia on a four-point scale of minimal, mild, moderate or severe, are presented on pp. 64–65. While including decline in cognitive function, these criteria also encompass changes in daily activities and interests, social behaviour and personality.

The category minimal dementia corresponds closely to 'questionable' dementia (CDR 0.5) in the Clinical Dementia Rating of Hughes *et al.* (1982). In a population-based study reported by Paykel *et al.* (1994), where CAMDEX was administered to 461 subjects aged 77 years and above, 97% of subjects with a diagnosis of minimal dementia were rated independently as CDR 0.5 ($n = 70/72$) and 96% of subjects with a CDR 0.5 rating were diagnosed as minimal dementia ($n = 70/73$). Minimal dementia indicates some uncertainty in the clinical diagnosis of dementia and a need for further investigation. CAMDEX-R also incorporates a numerical estimate of the severity of dementia, the Dementia Scale (Roth & Hopkins, 1953; Blessed *et al*., 1968).

In addition to this global assessment of clinical severity, CAMDEX-R incorporates a number of scales which yield numerical estimates of the severity of the cognitive impairment. These are: (1) the Mini-Mental State Examination (MMSE: Folstein *et al*., l975), (2) the abbreviated Information Memory Concentration Test (Roth & Hopkins, 1953; Hodkinson, 1972), and (3) the Cambridge Cognitive Examination (CAMCOG: Huppert *et al*., 1995, 1996). The items which correspond to each of these scales are listed on pp. 64–66.

Note: It is unwise to regard scores on a cognitive test as a direct reflection of dementia severity. This is because test scores are markedly influenced by socio-demographic factors, physical health and sensory function, as well as by pre-existing learning disability. For this reason CAMDEX makes a clear distinction between severity of cognitive impairment (scores on cognitive tests) and severity of dementia (ratings of change in cognition, behaviour, personality and daily living skills).

The CAMDEX-R Schedule

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