Dementia is an important public health problem, though more than half of all dementia cases may go undiagnosed in primary-care settings, which is why despite uncertainties that exist in the natural history of pre-clinical dementia and limited symptomatic benefits associated with pharmacotherapeutic options for dementia, it is important that screening for dementia in those with risk factors remains an important component of clinical care.

By Paige Moorhouse, MD, MPH, FRCPC

Management Issues in Primary Care

Screening for Dementia in Primary Care

More than half of all dementia cases may go undiagnosed in primary-care settings, which is why despite uncertainties that exist in the natural history of pre-clinical dementia and limited symptomatic benefits associated with pharmacotherapeutic options for dementia, it is important that screening for dementia in those with risk factors remains an important component of clinical care.

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Dementia is an important public health problem, though more than half of all dementia cases may go undiagnosed in primary-care settings.1 Screening is one strategy to increase detection and diagnosis of dementia in primary care, but only 24% of Canadian primary-care physicians routinely screen for dementia.2 Multiple barriers to screening have been identified, the most ubiquitous being “tyranny of the urgent.” Most primary care physicians identify difficulty implementing routine screening into a fee-for-service office visit. Screening for dementia has additional challenges in that people with dementia may not recognize or mention deficits, or may ascribe cognitive changes to normal aging. Family members may notice deficits but often do not accompany the affected individual to appointments. Finally, physicians who are skeptical about the benefits of treatment for dementia may not perceive benefit to early diagnosis and may believe that some patients could be harmed.3

Such barriers are important considerations when planning implementation of a screening program, however, application of the World Health Organization (WHO) criteria4 for optimal screening conditions (Table 1) for use in screening for dementia in primary care reveals that challenges extend beyond practical considerations to more fundamental issues.

Importance As a Public Health Issue

Dementia clearly satisfies the WHO criterion that the condition be an important public health issue. It affects about 8% of the population at age 65 and prevalence roughly doubles every five years thereafter to reach about 58% in those older than 95 years.5 The prevalence of cognitive impairment that does not meet the criteria for dementia (including mild cognitive impairment [MCI]) is considerably higher. Annual per-person formal and informal care costs may total more than $50,000.6

Challenges Surrounding the Natural History of Dementia

Screening is most appropriate when the natural history of a disease is well understood and a presymptomatic stage of this disease is readily recognizable. It has long been recognized that cognitive deficits precede diagnosis by several years. MCI has emerged as the most widely accepted construct for pre-clinical dementia, with an annual rate of conversion to dementia of approximately 12%.7 MCI is characterized by self-reported memory complaints (preferably with congruent collateral history), cognitive performance below age-adjusted mean on cognitive testing, ability to carry out most instrumental activities of daily living, and absence of dementia. Variability in the rate of progression from MCI and cognitive impairment that does not meet the criteria for dementia (cognitive impairment, no dementia
[CIND)] to dementia is well-recognized, and a significant proportion of cases may revert to normal cognition. This may be due to the fact that some patients satisfy the criteria for MCI due to other comorbidities such as depression, substance abuse, or adverse drug reactions.

In addition to the uncertainty with regards to the clinical profile and progression of pre-dementia, it is not currently clear whether early diagnosis of dementia is associated with better outcomes for patients and caregivers. Although there is some evidence that patients wish to be informed of a dementia diagnosis,8 so far, no studies have found psychological benefit to patients and caregivers from early detection.9 Other studies suggest that early diagnosis may actually cause harm by labeling patients. The Third Canadian Consensus Conference on the Diagnosis and Treatment of Dementia (CCCDTD3) guidelines state that “there is inadequate evidence to recommend that physicians advise their patients with MCI that they are already showing signs of dementia, or to treat MCI as equivalent to dementia.”10

### Challenges Related to Treatment

Part of the controversy associated with early diagnosis of dementia stems from the fact that there are currently no disease-modifying therapies. Although cholinesterase inhibitors have shown modest symptomatic benefits in the domains of cognition, function, and behavior, these benefits at best delay decline by less than 12 months and have not shown consistent delay in institutionalization.11 Similarly, cholinesterase inhibitors and cognitive rehabilitation have not shown consistent benefit in MCI. Although this argument may justify not screening for MCI, many of the sequelae of dementia are treatable or preventable and this may justify screening even if treatment for the dementia has not shown benefit otherwise.12

Non-pharmacologic interventions for dementia such as outpatient multi-disciplinary assessment and education for caregivers, have been associated with delay in institutionalization, improvement in caregiver satisfaction, and reduction in caregiver stress.13 Education for patients and caregivers may include safety monitoring with respect to driving and appliance use, and strategies for coping with behavioral symptoms. Early diagnosis promotes timely decision-making for advance directives and legal planning. Research suggests that even in MCI, patients’ ability to participate in the informed consent process is compromised, and this ability declines at an even greater rate once dementia begins.14

Screening for dementia may promote investigation and treatment for the reversible dementias (metabolic disease, normal pressure hydrocephalus, depression, and adverse drug effects), although these are comparatively rare as the sole cause of the clinical presentation.

### Table 1

<table>
<thead>
<tr>
<th>WHO Guidelines for Screening Programs4</th>
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<tbody>
<tr>
<td>1. The disease should be an important public health problem.</td>
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<tr>
<td>2. There should be a recognizable latent or presymptomatic stage of the disease.</td>
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<tr>
<td>3. The natural history of the disease should be adequately understood.</td>
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<tr>
<td>4. There should be a treatment for the condition. Treatment should be more beneficial when applied at the presymptomatic phase compared with the later symptomatic stage.</td>
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<tr>
<td>5. There should be a test or examination to detect the condition with reasonable sensitivity and specificity.</td>
</tr>
<tr>
<td>6. The test should be acceptable to the population.</td>
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<tr>
<td>7. The healthcare system should have the capacity and policies in place to test for the condition and deal with the consequences.</td>
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Most primary care physicians spend less than 11 minutes per consultation, so screening tests requiring five minutes or less are most feasible. Screening tests that can be performed and interpreted by other members of the healthcare team may further improve feasibility through reduced time and staffing costs.

evaluation and treatment of other comorbidities, in particular vascular risk factors. Current guidelines state that vascular risk factors “should be screened for and treated optimally in MCI.” Treatment of systolic hypertension (> 160 mmHg) for reduction of stroke and reduction in incidence of dementia is also recommended. Although there is insufficient evidence to recommend acetylsalicylic acid (ASA) and statins as primary prevention strategies, these drugs remain important in the prevention of stroke, which is a risk factor for dementia. In more general terms, a diagnosis of dementia should prompt the physician to carefully consider whether a caregiver or other informant should participate in assessment and provision of health information and medication instructions.

Challenges Surrounding Resources
A further consideration is whether our healthcare system has the capacity to deal with the consequences of a screening program, which could double the number of cases diagnosed in primary care. Cost-effectiveness of population screening programs for dementia have not been evaluated, but, given the absence of disease-modifying treatment, and potential for increased costs associated with office visits, the duration of medication, and use of healthcare resources, screening for dementia is unlikely to be cost-effective.

The Bottom Line
The WHO guidelines for screening tests suggest that there are arguments for and against screening programs for dementia. Current Canadian, U.S., and U.K. guidelines do not advocate screening for dementia as part of the routine clinical evaluation in those without symptoms, but instead recommend screening those with risk factors for the disease. This is also referred to as targeted screening or case finding. The question becomes which tools are most useful for dementia screening in primary care?

The Features of a Useful Screening Test
Table 2 summarizes the features of screening tests. The mini-mental state examination (MMSE) is cur-
Currently the most commonly used cognitive screen, and thus provides a meterstick against which to evaluate other screening tests. Sensitivity and specificity describe what proportion of individuals will be correctly classified by the test at the population level. A good screening test should have a misclassification rate equal to or less than the MMSE. Predictive value refers to the probability of the presence (positive predictive value [PPV]) or absence (negative predictive value [NPV]) of disease in an individual according to the screening test result. Predictive value depends on the prevalence of the disease in the population. This makes it difficult to compare PPV results between studies, however, clinicians can increase the PPV of any screening test by screening only those who are at high risk of dementia (i.e., patients with advanced age, a family history of dementia, prior stroke or head injury, vascular risk factors, lower education, or a history of excessive alcohol consumption).

Most primary-care physicians spend less than 11 minutes per consultation, so screening tests requiring five minutes or less are most feasible. Screening tests that can be performed and interpreted by other members of the healthcare team may further improve feasibility through reduced time and staffing costs. Finally, screening tests for dementia must be resistant to the effects of low education, and language and cultural diversity within the population.

### Three Screening Tests You Should Know About

Three well-conducted systematic reviews have compared the properties of a multitude of screening tests for dementia. The first review compared tests taking 10 minutes or less that had been studied in community care settings. This review found that three tests, the General Practitioner Assessment of Cognition (GPCOG), the Memory Impairment Screen (MIS), and the Mini Cognitive Assessment Instrument (Mini-Cog) were most valid and best suited to primary-care applications. A subsequent review also recommended these three tests after comparing the validity and feasibility of 16 screening instruments for primary-care physicians, because they could each be administered in five minutes or less, had sensitivity and specificity rates > 80%, and lower misclassification rates than the MMSE. Most recently, 11 of the most commonly used cognitive screening instruments were compared using a rating scale that included assessment of feasibility, practicality, and range of applicability in addition to standard psycho-

### Table 3: Comparison of Screening Tests for Dementia

<table>
<thead>
<tr>
<th>Test</th>
<th>Time (minutes)</th>
<th>Sensitivity (95% CI)</th>
<th>Specificity (95% CI)</th>
<th>Considerations</th>
</tr>
</thead>
</table>
| MMSE         | 10             | 0.69 (0.66 – 0.73)   | 0.89 (0.87 – 0.92)   | • Extensively studied  
• Difficult to interpret because no clear consensus on cut-off scores  
• Susceptible to age, education, cultural biases |
| GPCOG        | 4              | 0.85 (0.76 – 0.92)   | 0.86 (0.81 – 0.91)   | • Informant and patient items  
• Shows educational bias  
• Has not been evaluated for language or cultural bias |
| MIS          | 5              | 0.80 (0.66 – 0.90)   | 0.96 (0.94 – 0.98)   | • Does not show educational or language bias  
• Has been evaluated in a telephone format |
| Mini-Cog     | 2-4            | 0.76 (0.65 – 0.85)   | 0.80 (0.87 – 0.91)   | • Less affected by education, language or culture compared with the MMSE  
• May not have been administered in its suggested form in validation studies |
metric properties. This review came to the same conclusion (the MIS, Mini-Cog, and GPCOG scored highest). The properties of each of these three tests (and the MMSE) are summarized in Table 3, and a brief description of each follows. Table 4 describes situations (based on recommendations from systematic reviews) in which one screening test might be preferred over another.

The GPCOG was specifically designed for primary-care settings and includes a six-item patient test (orientation, clock drawing, recall of recent events and free recall) and a six-item informant interview that asks about the patient’s short-term memory, word-finding ability, and instrumental activities of daily living.

The MIS consists of a four-item, delayed free and cued recall item that uses controlled learning (a memorization task that requires the patient to identify a to-be-remembered item in response to its category cue; i.e., animal, city, vegetable, and musical instrument). It is free for research use, but licensed for commercial use.

The Mini-Cog consists of a three-item registration task, followed by a scored clock-drawing test, and then delayed three-item recall. The authors suggest that this test may be more sensitive to cognitive impairment involving executive dysfunction than simple memory tests. Adding the Functional Assessment Questionnaire (FAQ), a 30-item questionnaire completed by an informant to the Mini-cog, may increase its sensitivity to 89% and allow test scores discriminate between those with no cognitive impairment (NCI) and those with MCI or dementia.

The MMSE is a 20-item scale that measures orientation to time and place, immediate recall, short-term memory, calculation, language and constructive ability. The MMSE shows good reliability, but sensitivity is longer when used in primary-care settings.

The Montreal Cognitive Assessment (MoCA) was developed as a quick screening tool for cognitive impairment, assessing attention and concentration, executive function, memory, language, visuoconstructional skills, conceptual thinking, calculation, and orientation. Because of concerns about relatively low specificity, the MoCA is currently recommended in situations where there is concern about the patient’s cognitive status and the MMSE is in the normal range (≥ 24).

The MoCA has been included in recent systematic reviews, but its major shortcoming as a screen is that it takes approximately 10 minutes to perform.

**Conclusion**

Despite uncertainties that exist in the natural history of pre-clinical dementia and limited symptomatic benefits associated with pharmacotherapeutic options for dementia, screening for dementia in those with risk factors remains an important component of clinical care.

Screening presents opportunities for amelioration of reversible contributors to cognitive impairment and optimization of risk factor profiles.

The MMSE is not the most efficient or feasible screen for cognitive impairment in primary care, and several other options exist. A positive screening test result should not be considered tantamount to a diagnosis of dementia and should lead to further testing.

**Table 4**

<table>
<thead>
<tr>
<th>Situation</th>
<th>Preferred test(s)</th>
</tr>
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<tbody>
<tr>
<td>Patient belongs to an ethnic minority</td>
<td>Memory Impairment Screen (MIS)</td>
</tr>
<tr>
<td>Only informant is available</td>
<td>General Practitioner Assessment of Cognition (GPCOG) informant section</td>
</tr>
<tr>
<td>Suspicion of mild impairment in a patient with high education</td>
<td>Hopkins Verbal Learning Test* Word Acquisition Test*</td>
</tr>
<tr>
<td>Very little time available</td>
<td>Memory Impairment Screen (MIS)</td>
</tr>
<tr>
<td>Lots of time available</td>
<td>Montreal Cognitive Assessment (MoCA) Mini Mental State Examination (MMSE)</td>
</tr>
</tbody>
</table>

* These tests are described elsewhere
References:


