ABSTRACT

Despite the lack of a biological marker for Alzheimer’s disease (AD), this disease has several characteristics that should at least trigger suspicion of a dementia, notably short-term memory loss, progressive decline, personality changes, and gradual impairment of activities of daily living. Diagnosing AD relies heavily on a thorough history taking, with laboratory and imaging data to support the diagnosis and exclude other possible causes. A primary care setting is ideal for detecting the earliest symptoms of AD, including mild cognitive impairment (MCI), and screening at-risk populations. During the tightly compressed physician evaluation in primary care, which most likely focuses on another medical disorder as the chief complaint, the nurse can and should incorporate quick and simple tests of cognitive function (eg, the Mini-Mental State Examination or Mini-Cog) into evaluation of elderly patients, particularly those at high risk. The primary care nurse is a sentinel, confidante, coach, and information resource with regard to dementia. This article reviews the recommended cognitive function tests, including how to use them. Specific, tangible examples of the earliest symptoms of AD and MCI are discussed, along with a case study illustrating the importance of the nurse’s persistence in drawing out information during the history taking. The benefits of early diagnosis of AD are numerous and have important ramifications for the patient and their loved ones. (Adv Stud Nurs. 2005;3(6):206-214)

REVIEW

THE NURSE’S ROLE IN SCREENING AND EARLY DETECTION OF ALZHEIMER’S DISEASE

Danielle Arends, RN, MSN, GNP*

As described elsewhere in this monograph, the diagnosis of Alzheimer’s disease (AD) can now be made with approximately 90% accuracy, when the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision, or National Institute of Neurological and Communicative Diseases and Stroke–Alzheimer’s Disease and Related Disorders Association criteria are used.1,2 Diagnosing AD relies heavily on a thorough history taking, with laboratory and imaging data to support the diagnosis and exclude other possible causes of cognitive decline. Alzheimer’s disease should be diagnosed as early as possible for several reasons. The patient needs to understand that their symptoms are not part of the normal aging process, will worsen with time, and will eventually interfere with their activities of daily living (ADLs) and independence. Therefore, plans need to be made for when that time arrives. Families and friends also need to understand that the patient’s change in behavior and cognitive functioning is part of a disease process and the patient is not “just being difficult.” As the disease progresses, extra care and patience will be required. As will be reviewed in Part 2 of this series on AD, there are now several medications that may slow the progression of cognitive decline while they are being taken. These medications are best started early, thus the patient can continue to extract as much quality of life as possible and, with the help of their loved ones, can put their affairs in order before they become unable to do so.

INITIAL SYMPTOMS

Short-term memory loss is the clinical hallmark of AD. This is almost always the first reported symptom, with impairments in other areas of cognition following...
shortly after. The onset of AD is insidious and progressive compared to, for example, vascular dementia, the onset of which may be sudden (caused by a stroke or cerebral infarct) and the progression more stepwise. Table 1 lists some signs and symptoms that suggest other forms of dementia. AD may have some pauses in its progression and it is often difficult to accurately identify the time of first symptoms, especially because many people attribute these changes to getting older. Some common symptoms that should prompt a consideration of dementia are deficits in ADLs and instrumental activities of daily living (IADLs; eg, activities related to independent living, such as preparing meals, managing money, shopping for groceries, performing housework, and using a telephone), not higher levels of cognitive functioning (Table 2). The challenge to the primary care practitioner is to educate the family and the patient that these types of changes, historically referred to as “old age” or “senility,” are outside and beyond the normal aging process. Table 3 describes some of the ways that normal aging is different from the presentation of AD. The key differentiating factor is whether these changes progress with time and interfere with ADLs and IADLs, such as grocery shopping and getting a haircut.

There are different types of cognitive impairment, of which memory is one (Table 4). Changes in the early stages of AD can include poor recall of new information (impairment of episodic memory), dysnomia (difficulty naming things), word-finding difficulty, misplacing objects, or difficulty driving (eg, slow response times and getting lost on familiar routes). Executive dysfunction may also be observed, such as difficulty balancing a checkbook or calculating expected change from a purchase. These complex skills tend to break down first, but highly overlearned motor tasks may be retained (eg, playing a musical instrument or knitting). As the disease continues, remote memories may be affected along with difficulty recognizing or copying complex figures, such as a clock. Behavioral signs, such as delusions, depression, agitation (irritability and pacing), and insomnia, may appear. The delusions are often of a paranoid nature, such as fear of personal harm or theft of personal property. Accusations of marital infidelity are a common delusion and can cause significant strife between the patient and the spouse. In more severe cases, patients can begin to believe that TV characters are real or the patient may no longer recognize his or her reflection in a mirror, which can be frightening. Depression or

<p>| Table 1. Atypical Early Features of Alzheimer’s Disease and Other Diagnostic Considerations |
|---------------------------------|----------------------------------|</p>
<table>
<thead>
<tr>
<th>Feature</th>
<th>Diagnostic Consideration</th>
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<tr>
<td>Abrupt onset</td>
<td>Vascular dementia</td>
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<tr>
<td>Stepwise deterioration</td>
<td>Vascular dementia</td>
</tr>
<tr>
<td>Prominent behavioral changes</td>
<td>Frontotemporal dementia</td>
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<tr>
<td>Profound apathy</td>
<td>Frontotemporal dementia</td>
</tr>
<tr>
<td>Prominent aphasia (difficulty speaking)</td>
<td>Frontotemporal dementia; vascular dementia</td>
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<tr>
<td>Progressive gait disorder</td>
<td>Delirium caused by infection, medications, or other causes; dementia with Lewy bodies; and seizures</td>
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<tr>
<td>Prominent fluctuations in level of consciousness or cognitive abilities</td>
<td>Delirium caused by infection, medications, or other causes; dementia with Lewy bodies</td>
</tr>
<tr>
<td>Hallucinations or delusions</td>
<td>Delirium caused by infection, medications, or other causes; dementia with Lewy bodies</td>
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<tr>
<td>Extrapyramidal signs or gait disorder</td>
<td>Parkinsonian syndromes; vascular dementia</td>
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<tr>
<td>Eye movement abnormalities</td>
<td>Progressive supranuclear palsy; Wernicke’s encephalopathy</td>
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<table>
<thead>
<tr>
<th>Table 2. Symptoms That Suggest Dementia</th>
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<tbody>
<tr>
<td>Does the person have increased difficulty with any of the activities listed below?</td>
</tr>
<tr>
<td>• Learning and retaining new information: is more repetitive; has trouble remembering recent conversations, events, and appointments; frequently misplaces objects; has difficulty performing familiar tasks</td>
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<tr>
<td>• Handling complex tasks: has trouble following a complex train of thought or performing tasks that require many steps, such as balancing a checkbook, operating appliances, or cooking a meal</td>
</tr>
<tr>
<td>• Reasoning ability: is unable to respond with a reasonable plan to problems at work or home, such as knowing what to do if the bathroom is flooded; shows uncharacteristic disregard for rules of social conduct</td>
</tr>
<tr>
<td>• Spatial ability and orientation: has trouble driving, organizing objects around the house, and finding his or her way around familiar places</td>
</tr>
<tr>
<td>• Language: has increasing difficulty with finding the words to express what he or she wants to say and with following conversations</td>
</tr>
<tr>
<td>• Mood and behavior: appears more passive and less responsive; shows less initiative; is more irritable than usual; is more suspicious than usual; misinterprets visual or auditory stimuli</td>
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</table>

In addition to a patient’s failure to arrive at the right time for appointments, the clinician can look for a patient’s difficulty discussing current events in an area of interest and changes in behavior or dress. It also may be helpful to follow up on areas of concern by asking the patient or family members relevant questions. Positive findings in any of these areas generally indicate the need for further assessment for the presence of dementia. Adapted with permission from Small et al; Corey-Bloom.2
depressive symptoms are commonly comorbid in AD, along with apathy and agitation or aggression.\textsuperscript{5-7} Behavioral changes in the early stages of AD can also include mechanisms used by the patient trying to hide their symptoms, such as using humor or ambiguous answers or becoming reticent or a less active participant in conversations. Comportment or interpersonal skills are often remarkably intact, even when other areas of cognition show clear signs of decline. Patients may also make unusual requests for assistance from family members, such as asking them for directions for a familiar route, assistance with financial transactions, or written notes for them as reminders.

A diagnosis of AD or any type of dementia is devastating to the patient and their loved ones. Many people realize that AD is ultimately fatal and are embarrassed as they realize that their mental capacity is deteriorating. Thus, patients and family members often are in denial about the symptoms and may even push back—consciously or subconsciously—against the healthcare team if a diagnosis of dementia is suspected. Patients and family members may ignore or disregard the symptoms as a denial mechanism.

**Screening Tools**

Diagnosing AD is a process of exclusion because there are so many possible causes of dementia and there is as yet no identified biological marker for the disease. Thus, diagnosis is achieved through a careful history, with corroborating evidence from an informant when possible, along with scores from at least one of the most commonly used tools, such as the Mini-Mental State Examination (MMSE), the Dementia Rating Scale, the Clock Drawing Test, the Time and Change Test, and the Mini-Cog Test. Each of these tests evaluates different abilities, including recall, language, spatial orientation, and learning. Each one by itself does not take a long time to perform but, in a primary care setting, time is a very limited commodity. This is where the nurse can play an essential role in screening and early identification.

A sample of the MMSE is shown in Table 5.\textsuperscript{8} The highest possible score is 30, with scores of 27 to 30 indicating normal cognition, 21 to 26 suggesting mild AD, 10 to 20 moderate AD, and less than 10 severe AD. The MMSE is a blunt instrument that serves as a general indicator of cognitive performance.
A single score does not necessarily indicate a diagnosis of AD. The patient’s age, education, ethnicity, and primary language may affect the score, in both directions. Highly educated patients may score highly for long periods of time while other areas of functioning are declining noticeably. Conversely, poorly educated or non-native English speakers may score lower on the test with no other signs of cognitive impairment. Therefore, the MMSE score must be considered in the context of the entire patient profile. In fact, the MMSE and history should show a change from a prior level of performance, rather than a one-time assessment, to substantiate an AD diagnosis.

The Dementia Rating Scale is a more complicated assessment tool, but it is recommended by the American Academy of Neurology Practice Guidelines on the diagnosis of dementia. Using the scale, the patient is assessed in 6 domains of cognitive and functional performance: memory, orientation, judgment and problem solving, community affairs, home and hobbies, and personal care. The information is obtained during a semistructured interview of the patient and a reliable informant. Each domain is rated on a 5-point scale, with the exception of personal care, which is rated on a 4-point scale. The overall score is calculated from an algorithm that weights the memory score in relation to the other scores.

### Case Study

#### MAN WITH SYMPTOMS OF DEMENTIA

**BACKGROUND**

Mr. R presents to his primary care physician for a follow-up visit, accompanied by his wife and daughter. He was last seen 4 years ago with complaints of poor memory. At that time, his Mini-Mental State Examination (MMSE) score was 27. According to his wife and daughter, they have noticed some subtle changes in his memory and behavior over the past few years: repetitive questioning, sometimes forgetting family members’ names or calling them by the wrong names (although he is able to recognize them), and difficulty keeping track of his children’s ages. Mr. R had one episode of getting lost while driving: it took him approximately 30 minutes to get to his destination when it should have taken him 10 minutes. He often misplaces things and accuses his wife of keeping secrets from him and withholding information from him, when in reality, it is because he has forgotten it. His daughter reports that he seems to be engaging in more “parallel play” with the grandchildren (ie, playing alongside them), rather than interacting with them like he once used to. He has difficulty following story lines on television programs.

Mr. R’s mood has also changed substantially. He has recently started “stacking” things at home, complaining of a messy house. His daughter and wife have noticed that he gets angry more easily and has a “shorter fuse” than ever before. He is argumentative, even with his grandchildren. His wife and daughter both feel that he is depressed. Mr. R frequently complains of arthritis and forgetfulness, with a tendency to focus on his impairments rather than his abilities. He also has been making emotional statements such as, “I don’t know what I would do without you,” which is uncharacteristically dramatic for him.

Mr. R complains of mild depression during this office visit, describing his symptoms as irritability, feelings of anger, and occasionally thinking negative thoughts and being unable to get rid of them. He feels melancholy about his state of health. The patient is independent in his activities of daily living, although he is incontinent because of prostate cancer and wears pads. He is driving, but his wife and daughter are concerned about his driving abilities because they feel that he has a decreased attention span and a slower reaction time. He gets very angry with his wife if she makes suggestions to him while he is driving. He has not gotten into any accidents, but he loses track of his destination sometimes.

Mr. R is sleeping without difficulty. He sleeps from 11 PM until approximately 9 or 10 AM, and naps in the afternoon for approximately 30 to 60 minutes.

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The memory score is considered to be the primary score. Staging from these scores is as follows: 0 = no impairment, 0.5 = very mild, 1 = mild, 2 = moderate, and 3 = severe dementia.10

The Clock Drawing Test is shown in Figure 1. The patient is asked to draw the face of a clock reading a particular time (eg, 11:20). This test is quick to perform and surprisingly revealing of cognitive decline in the absence of other symptoms.11,12

**Figure 1. The Clock Drawing Test**

<table>
<thead>
<tr>
<th>Clock Drawing</th>
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<tr>
<td>Patient's Name:</td>
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</table>

**Instructions:**
Step 1: Give the patient a large (relative to the size of handwritten numbers), uniform, standard-sized circle.*
Step 2: Instruct the patient to draw numbers in the circle to make the circle look like the face of a clock.
Step 3: After completing the task, consider instructing the patient to draw the hands of the clock to read 11:20.

**Scoring**
Step 1: Divide the circle into 4 equal quadrants by drawing one line through the center of the circle and the number that best corresponds to the 12. Draw a second line perpendicular and bisecting the first line.
Step 2: Count the number of digits in each quadrant in the clockwise direction, beginning with the digit corresponding to the number 12. Each digit is counted only once. If a digit falls on one of the reference lines, it is included in the quadrant that is clockwise from the line. Any 3 digits in each quadrant are considered correct.
Step 3: Assign a score of 1 for any error in the first 3 quadrants. For any error in the 4th quadrant, assign a score of 4.
Step 4: A normal score ranges from 0 to 3. An abnormal score is from 4 to 7.

* Another method of evaluation has patients also drawing the circle.

Data from Sunderland et al.11

The Time and Change Test assesses the patient’s ability to tell time and make change. First, the patient is shown a clock set to a specific time (eg, 11:10) and is asked to state the time. The time to response is noted; the patient is allowed 2 tries for a correct response. The patient is then presented with some loose change (eg, 3 quarters, 7 dimes, and 7 nickels). The patient is asked to put together $1 in change. The time to response is noted, with 2 tries allowed for a correct response. This test is more sensitive if the time to responses are limited (1 minute for telling time, 2 minutes for making change).13

The Alzheimer’s disease assessment scale-cognitive (ADAS-cog) assesses 5 aspects of cognitive performance, including elements of memory, orientation, attention, reasoning, language, and praxis (ability to carry out motor activities). The cognitive items include spoken language ability, comprehension of spoken language, recall of test instructions, word-finding difficulty in spontaneous speech, following commands, naming objects and fingers, praxis, orientation, word-recall task, and word-recognition task. The word-recall task is administered first, followed by an open-ended conversation to assess the various other aspects of language, which takes approximately 10 minutes, followed by the remaining cognitive items. Scoring with ADAS-cog ranges from 0 to 70, with higher scores indicating greater cognitive impairment.14 The ADAS-cog is primarily used as a research tool and is not commonly used in clinical practice.

Finally, a very short and simple screening tool was developed in 1999 and called the Mini-Cog. It consists of a 3-item recall and the clock drawing test, modified to be used in any patient population, irrespective of educational level or primary language, with no special equipment needed. During Mini-Cog testing, the patient is asked to repeat 3 unrelated words, with a possible score of 0 to 3. Patients who score 3 are classified as not demented. Those patients scoring 0 are rated as demented. Those patients scoring 1 or 2 on the recall test are then asked to do a freehand version of the clock drawing test, for which they are scored as normal or abnormal (Figure 2). The results are rated as normal if all numbers are in correct sequence and position and the hands readable display the requested time. The clock drawing test also serves as a recall distractor—the patient is then asked to recall the previously mentioned 3 words, after completing the clock drawing portion.15 Three studies in 3 groups of heterogeneous populations of elderly adults (age ≥65
years) showed that the Mini-Cog was as or more sensitive and specific than the MMSE in detecting dementia. In the most recent study, the Mini-Cog was equally successful in identifying AD of differing severity, including mild cognitive impairment (Figure 3). In this study, although low education negatively affected detection of dementia with the MMSE, it did

FIGURE 2. The Mini-Cog Scoring Algorithm

CDT = clock drawing test.

FIGURE 3. Classification of Impairment Using the Mini-Cog Versus MMSE

CDR = clinical dementia rating; MMSE = Mini-Mental State Examination.

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CURRENT MEDICATIONS
Sertraline 50 mg, donepezil 10 mg, aspirin 81 mg, clopidogrel 75 mg, lovastatin 40 mg, multivitamin, B-complex vitamin, and vitamin D. He is allergic to naproxen.

PHYSICAL EXAMINATION
On examination, the patient's blood pressure was 161/80 mm Hg, with a heart rate of 58. His weight was 157 pounds, which is a 10-pound weight loss since he was last evaluated in 2001. He complained of lower back discomfort caused by arthritis and gave his pain a score of 30/100.

NEUROLOGIC EXAMINATION
Mr. R’s MMSE score during this visit is 26 of 30 (7 of 10 in orientation, 2 of 3 on recall). Motor examination reveals normal strength and no evidence of tremor, bradykinesia, or rigidity, with symmetric deep tendon reflexes. He is able to rise out of a chair with minimal assistance of the desk, which he attributes to arthritis in his hip and knee, and he is able to walk unaided.

DISCUSSION
Mr. R presents with a slight deterioration in his cognitive abilities since he was first evaluated in 2001. His cognitive impairment is evident in the areas of memory and orientation and is most consistent with the diagnosis of probable mild Alzheimer’s disease. It is important to note that although the wife and daughter provided a great deal of information, the nurse had to coax this information from them through direct questioning to obtain a complete picture. Although they were concerned, there was a certain hesitation among the wife and daughter in admitting that these changes could be caused by a dementia, rather than declining health in old age or subtle “personality quirks.”

The nurse recommended Mr. R to continue with donepezil and to stay physically and socially active. This will help to ease the stiffness from arthritis and improve his mood. Controlling his blood pressure was also important to minimize cardiovascular risk factors. The nurse also recommended increasing the sertraline dose to 100 mg once a day for the treatment of his depressive symptoms.

After consultation with the primary care physician, they asked to see the patient again in 3 to 4 months to monitor his mood and cognitive status. The nurse also had a frank discussion with Mr. R and strongly encouraged him to limit his driving to daytime driving, close to home only. The patient was also encouraged to avoid long trips, traveling on expressways or toll roads, and congested parking lots. Mr. R was reluctant, but he ultimately agreed to these recommendations. The nurse also encouraged his wife or daughter to have him do a driving evaluation and gave them a list of facilities that offer objective driving assessments.
not affect detection with the Mini-Cog. Also, administration of the Mini-Cog takes only 3 minutes compared to 7 minutes for the MMSE. Thus, the Mini-Cog may be a “quick and dirty” screening tool that can be used handily in a primary care setting, in which time is limited, a wide variety of patients are encountered, and specialized tools or training to administer a screening test may preclude its use.

However, with any screening tool it is important to remember that no single element of the assessment stands alone to make the AD diagnosis. Therefore, primary care practitioners should establish baseline cognitive histories and test scores on all older adult patients.

MILD COGNITIVE IMPAIRMENT

Mild cognitive impairment (MCI), as an early stage of AD, is typically characterized by memory impairment alone or impairment in a single cognitive domain. The diagnostic criterion for MCI is primarily memory complaint, preferably corroborated by an informant. If the memory complaint is substantiated by an informant, it is much more likely to be reliable. The patient has essentially normal cognition and largely normal ADLs and level of independence, but signs of objective memory impairment for age.

Commonly used instruments to screen for MCI include the Wechsler Memory Scale (WMS)-III, the Auditory Verbal Learning test, or interview-based tools, such as the Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE), the Blessed Dementia Rating Scale (BDRS), and the Clinical Dementia Rating Scale. The WMS-R assesses memory and attention functions using auditory and visual stimuli. It requires strict timing for certain subtests. The Auditory Verbal Learning test is simply a list-learning test. The IQCODE is completed by a relative or friend who has known the elderly person for 10 years or more. Importantly, the person completing the form is noting changes over the 10-year period. IQCODE scores range from 1 to 5, derived as an average from 26 questions. The BDRS asks the informant to rate the patient on numerous items pertaining to performance of everyday activities and changes in habits, personality, interests, and drive (Figure 4).

CHALLENGES TO SCREENING

The responsibility of diagnosing AD does not lie...
squarely on the shoulders of nurses. AD diagnosis requires a team effort among the nurses and physicians, in addition to the patient and family members. This is especially true in a primary care setting, in which the average office visit is less than 10 minutes. The physician is focusing on the chief complaint of the patient, which is often not cognitive impairment. The changes in functioning often get lost among the myriad other health problems in this patient group (ie, the elderly). Compounding this challenge is a reluctance by some families or family members to reveal cognitive deficits, out of fear of losing driving privileges or other forms of independence. Cognitive decline can also be an embarrassment to the patient, making them reluctant to discuss it. This is where the skills of nursing bring to the field of medicine a complete patient profile not otherwise possible. There are many steps to diagnosing possible or probable AD. Nurses, by using keen assessment and interview skills in addition to brief memory testing, can be proactive and identify those patients suffering from early AD or even MCI. Nurses can and should make this type of screening a standard part of every patient visit for those patients older than 65 years. Assessment can even begin with a “mini MMSE,” by asking just a few of the questions, such as orientation to time and place, and asking the patient to recall 3 words heard several minutes before. The nurse also acts as a coach, working with the family to give them the understanding and courage to acknowledge and report symptoms of cognitive impairment early. This may help to identify and correct possible reversible causes of dementia. For those patients with AD, early guidance and referral to resources, such as the Alzheimer’s Association or the Alzheimer’s Disease and Education Referral Web site (www.alz.org), are good ways to link patients and families with appropriate support networks.

CONCLUSIONS

Despite the lack of a biological marker for AD, this disease has several characteristics that should at least trigger suspicion of a dementia, notably short-term memory loss, progressive decline, personality changes, and gradual impairment of ADLs. Although the primary care setting may be insufficient to make a firm diagnosis of AD, it is the ideal setting for detecting the earliest symptoms, including MCI, and screening at-risk populations. Time is always of the essence in a primary care setting, but the nurse can and should incorporate quick and simple tests of cognitive function (eg, the MMSE or Mini-Cog) into evaluation of elderly patients, particularly those patients at high risk. The nurse is also often able to draw out information from the patient that may otherwise be overlooked during the tightly compressed physician evaluation, which most likely focuses on another medical disorder as the chief complaint. Although discussion of a dementia may be embarrassing or uncomfortable for the patient or their family, many patients will be thankful for honest information about the changes they are experiencing, which are often frightening. The primary care nurse is a sentinel, confidante, coach, and information resource. The benefits of early diagnosis of AD are numerous and cannot be overstated.

REFERENCES