General algorithm for the diagnosis and management of dementia
**INITIAL REPORT**
Patient/family/caregiver report or MD’s index of suspicion of:
- Decline in cognition/function. The A’s: Aphasia, Apraxia (eg, daily activities), Anomia (naming objects)
- Change in personality/behaviour, executive functioning (eg, judgment)

**SCREENING TESTS**
There is not enough evidence either way for routine screening if no dementia symptoms are present.

1. **Mini-Mental Status Exam (MMSE)**
   - Works best for Alzheimer’s disease (AD), vascular dementia (VaD), mixed dementias; does not pick up frontotemporal dementia (FTD) or differentiate mild cognitive impairment (MCI)
   - Sample MMSE questions:
     - **Orientation to time** “What is the date?”
     - **Registration** “Listen carefully. I am going to say three words. You say them back after I stop. Ready? Here they are... HOUSE [pause], CAR [pause], LAKE [pause]. Now repeat those words back to me.” [Repeat up to 5 times, but score only the first trial.]
     - **Naming** “What is this?” [Point to a pencil or pen.]
     - **Reading** “Please read this and do what it says.” [Show examinee the words on the stimulus form.] CLOSE YOUR EYES

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2. Three-question quick office screen for AD.³
   Ask the patient:
   a. What is the current year? (Likelihood ratio [LR] = 37)*
   b. Please draw a clock. (LR for poor drawing = 24)
   c. Recall 3 words at 5 minutes (LR for correct answer = 0.06—ie, helps rule out AD)

3. Time and change test.⁴ Ask the patient:
   a. What time is it? (Clock face set at 11:10—two tries within 60 seconds. No dementia = correct within 3 seconds on first try)
   b. Make change for a dollar. (Give patient 3 quarters, 7 nickels, and 7 dimes, and ask for $1.00—two tries within 120 seconds. No dementia = correct within 10 seconds on first try)

4. Three questions to screen for FTD. Ask the patient:
   a. Perform the Luria Hand Test (slap, chop, fist—demonstrate and ask patient to perform for 1 minute) or alternating rapid hand movement.
   b. Create a word list—eg, How many 4-legged animals can you name in 1 minute?
   c. Try an abstraction exercise—eg, What is the difference between a lie and mistake? What is the similarity between an apple and an orange?

5. Functional Ability Questionnaire (FAQ)⁵

6. Frontal Behaviour Inventory (FBI)⁶

7. Optional laboratory investigations⁷

*The likelihood ratio is defined as the probability of obtaining that result in patients with the disease divided by the probability of obtaining that result in patients without the disease. The higher the likelihood ratio, therefore, the more strongly the test discriminates between those with and those without the disease.

EVALUATION / DIFFERENTIAL DIAGNOSIS

EVALUATION
Essential elements in history (from family/caregivers)
- Onset, duration, evolution, fluctuations
- Precipitating factors
- Associated features (eg, hallucinations, sleep-wake disturbances)
- Medical history directed toward organic causes of dementia (see panel 7)
- Family history of dementing disorders

Physical examination
- Level of consciousness, delirium, orientation, attention
- Focal neurological findings (eg, up-going toe, facial droop)
- Psychomotor disturbances
- Evidence of systemic disease (eg, cardiovascular disease)

Laboratory investigations: MEDICOLEGAL IMPORTANCE
- Basic: CBC, TSH, electrolytes, calcium, blood sugar, creatinine
- Neuroimaging: limited indications (see panel 6)
- Others if indicated (see page 1739 in conclusions of the Canadian Consensus Conference on Dementia⁸)

DIFFERENTIAL DIAGNOSIS
Rule out reversible causes of dementia (see panel 7)
- Rule out delirium, depression

Determine subtype of dementia (see panel 9)
- Cognitive impairment not demented (CIND), aka mild cognitive impairment (MCI)
- AD, VaD, mixed, dementia with Lewy bodies (DLB), FTD
**Management**

Basic management
- Safety issues first (The 3 S's: smoking, stove, security)
- Early planning (advance directives, driving, power of attorney, and other legal issues, placement)
- Caregiver education and support (community resources/services)
- Nonpharmacological treatment (eg, environmental manipulation)
- Pharmacological treatment (see panel 8)
  - Maintenance/delay of deterioration of cognitive/functional level
  - Behavioural and psychological symptoms of dementia

Indications for referral
- Refer to a specialist if: the physician is uncertain about the diagnosis; the patient/family wants a second opinion; there are problems with drug treatment.
- Referral is also warranted for genetic counselling, where additional support is needed, or if the case has research implications.

**Resources**
- Alzheimer Society of Canada
  Toll-free: 1-800-616-8816
  Web site: www.alzheimer.ca
- Canadian Geriatric Society
  Phone: 1-613-592-7111
  Web site: http://www.canadiangeriatrics.ca
- Other: ______________________________________

**Indications for neuroimaging studies**
- Age < 60, duration of dementia < 2 years, rapid (eg, over 1-2 months) unexplained decline in cognition or function
- Recent significant head trauma, bleeding disorder or use of anticoagulants, unexplained neurologic symptoms (eg, new onset of severe headaches or seizures)
- History of cancer (esp. those that metastasize to the brain), new localizing signs (eg, hemiparesis, Babinski reflex), unusual or atypical cognitive symptoms or presentation (eg, progressive aphasia)
- Suspicion of normal pressure hydrocephalus (eg, early urinary incontinence or gait disorder), gait disturbance

**Put the PIECES together: Assess and treat**

- Physical
- Intellectual
- Emotional
- Capabilities
- Environmental
- Social
**SOME REVERSIBLE CAUSES OF DEMENTIA**

- Intoxication or substance abuse
- Adverse drug effects
  - Anticholinergics (eg, Atarax®, Benadryl®, Cogentin®, Detrol®, Ditropan®, Elavil®, Lomotil®, atropine)
  - Antidepressants (eg, Elavil®, Sinequan®, Prozac®, lithium)
  - Antipsychotics (eg, Haldol®, Mellaril®, Stelazine®, clozapine, chlorpromazine)
  - Antiparkinsonians (eg, Artane®, Cogentin®, Parlodel®, Sinemet®, amantadine)
  - Antihistamines (eg, Benadryl®, cimetidine, cough and cold preparations [OTC])
  - Narcotics (eg, Demerol®, Talwin®, codeine, morphine)
  - Benzodiazepines (eg, Dalmane®, Halcion®, Valium®, Librium®)
- Metabolic disorders
- Systemic illnesses
  - Generalized infections—TB, HIV (secondary to transfusion)
  - Nutritional and other deficiency states—B₁₂, folate, other anemia
- Cardiovascular—CHF, arrhythmias
- COPD
- Uncontrolled risk factors (eg, CV/stroke/diabetes)
- Constipation or fecal impaction
- Sensory deprivation (hearing or visual impairment)
- Sleep disorders
- Pain of any kind (eg, dental pain)
- Environmental changes

**TOTAL DAILY DOSE**

**NOTES ON DRUG THERAPY**

- Need baseline and serial measurements of key parameters (eg, MMSE)
- Explain to family that successful treatment in AD is not cure, but slower decline than natural progression (eg, MMSE worsens 1-2 points/year in mild and 2-4 points/year in moderate AD)
- Be alert for side effects of all drugs, especially:
  - Extrapyramidal side effects: abnormal involuntary movements or postures worsened by a distracting activity—note tongue (eg, fasciculations), head and neck (eg, torticollis), hand/arm (eg, tremors or spasm), muscle tone (resistance/unevenness on passive movement by examiner)
  - Fatigue, somnolence, dizziness (may increase risk of falls)
  - Nausea and vomiting
  - Sleep disturbance
### Types of Dementia

**General definition:** Decline in cognitive abilities (e.g., memory) that impairs daily functioning

<table>
<thead>
<tr>
<th>Type/Prevalence*</th>
<th>Key Pathology/Pathophysiology</th>
<th>Key Clinical Features</th>
<th>Screening Tests</th>
<th>Supporting Evidence</th>
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<tbody>
<tr>
<td><strong>Alzheimer’s (AD)</strong>&lt;br&gt;40%-50%</td>
<td>Reduced ACh&lt;br&gt;Neuritic plaques&lt;br&gt;Neurofibrillary tangles</td>
<td>Memory decline plus 1 other cognitive domain (e.g., anomia, apraxia, agnosia, abstraction, visuospatial, or executive)</td>
<td>MMSE 3-question screen&lt;br&gt;Time and change&lt;br&gt;FAQ&lt;br&gt;FBI</td>
<td><strong>Mild-to-moderate AD:</strong>&lt;br&gt;Donepezil (Aricept®)‡&lt;br&gt;Galantamine (Reminyl™ER)‡&lt;br&gt;Rivastigmine (Exelon®)‡&lt;br&gt;<strong>Moderate-to-severe AD:</strong>&lt;br&gt;Donepezil (Aricept®)‡&lt;br&gt;Memantine (Ebixa®)‡&lt;br&gt;Rivastigmine (Exelon®)‡</td>
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<tr>
<td><strong>Mixed</strong>&lt;br&gt;20%-25%</td>
<td>Both AD and VaD changes</td>
<td>Slow progressive deterioration (as w. AD) superimposed with clinical vascular features: focal symptoms or neurologic signs</td>
<td>MMSE 3-question screen&lt;br&gt;Time and change</td>
<td>Galantamine (Reminyl™ER)‡</td>
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<tr>
<td><strong>Dementia with Lewy bodies (DLB)</strong>&lt;br&gt;5%-15%</td>
<td>Characteristic Lewy bodies</td>
<td>2 out of 3 of:&lt;br&gt;early parkinsonism; hallucinations (often detailed visual); fluctuations (in cognition, attention, and/or alertness)*</td>
<td>Serial MMSE (to note fluctuations)&lt;br&gt;Very poor visual-spatial</td>
<td>Rivastigmine (Exelon®)‡&lt;br&gt;Donepezil (Aricept®)‡&lt;br&gt;Galantamine (Reminyl™ER)‡</td>
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<td><strong>Vascular (VaD)</strong>&lt;br&gt;(formerly multi-infarct dementia)&lt;br&gt;5%-10%</td>
<td>Association with cerebrovascular disease</td>
<td>Abrupt onset, stepwise decline, emotional lability plus evidence of CVD; temporal relationship between CVD and dementia</td>
<td>MMSE 3-question screen&lt;br&gt;Time and change&lt;br&gt;FAQ&lt;br&gt;FBI</td>
<td>Memantine (Ebixa®)‡&lt;br&gt;Donepezil (Aricept®)‡&lt;br&gt;Galantamine (Reminyl™ER)‡&lt;br&gt;Rivastigmine (Exelon®)‡</td>
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<td><strong>Frontotemporal (FTD)</strong>&lt;br&gt;5%-10%</td>
<td>Primary: Pick’s, ALS, idiopathic Secondary: EtOH, strokes, normal pressure hydrocephalus, COPD with chronic hypoxia to frontal lobes*</td>
<td>Not always consistent: insidious onset of behavioural symptoms (e.g., affective changes, poor insight, impulsivity, disinhibition, early neglect of hygiene, antisocial acts); Memory and perception better preserved</td>
<td>Luria hand test&lt;br&gt;Word list&lt;br&gt;Abstraction&lt;br&gt;FAQ&lt;br&gt;FBI</td>
<td>(CIs not indicated—no cholinergic deficit)†&lt;br&gt;SSRIs (serotonergic deficit)†&lt;br&gt;Trazodone (Desyrel®)†</td>
</tr>
<tr>
<td><strong>Mild cognitive impairment (MCI)</strong></td>
<td></td>
<td>Conversion rate to dementia 5%-15% annually</td>
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<td>[no studies yet]</td>
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*Percentage of all dementias ‡Evidence from large randomized controlled trials †Less strong levels of evidence
REFERENCES


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