
Choosing MRI Wisely: Part 2

Headaches
Dementia

EFW Radiology Medical Brief

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March 2014

When to Choose MRI for Headaches or Dementia

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Physicians, policy makers, and elected officials are all acutely aware and concerned about rising healthcare costs. Data from the Organization for Economic Cooperation and Development (OECD) shows that Canada spends just over 11% of its GDP on healthcareⁱ. The recent Government of Alberta budget for 2014/15 allocates 45% of all operational spending to healthcareⁱⁱ. There is great interest and engagement in proposing solutions to curb costs. One such solution can be broadly described as a critical examination of the decisions physicians make when ordering tests. While no two patient encounters are identical, efforts are being made to support physicians as they strive to provide efficient, high quality, evidence based care to their patients. An example is the Choosing Wisely[®] initiative of the American Board of Internal Medicine Foundation (ABIM) launched in February 2012ⁱⁱⁱ. In Canada, the Choosing Wisely Canada campaign has recently been announced and the Canadian Association of Radiologists (CAR) is amongst the first wave of participating societies^{iv}.

MRI, perhaps because of media spotlight on wait times, receives a great deal of attention. The Canadian Institute for Health Information (CIHI) data indicates that 80% of outpatient MR is for imaging the head, spine and extremities^v. The purpose of this paper is to provide evidence based (please see bibliography for sources), appropriateness guidelines for MR imaging of these body parts in four common clinical scenarios – headache, dementia, low back pain, and knee pain. The goal is to help the reader maximize the chances that diagnostic MRI studies are ordered when they can improve clinical outcomes for patients.

MR Imaging of the Brain For Headache

Seventy (70%) of the population will experience headache annually; however, the overall yield of an abnormality on neuroimaging for headache, in the absence of an abnormality on neurologic examination ranges from 0.5% to 3%^{vi}. Despite this low yield, in both new and chronic cases of headache, secondary causes may exist, which if undiagnosed can have devastating consequences. CT and MRI are both useful imaging modalities when investigating headache. The following table provides a summary of current guidelines where MRI is the most appropriate first investigation.

NEW HEADACHE	CHRONIC HEADACHE
Suspected meningitis/encephalitis	New feature and/or neurologic deficit
Pregnant women	Trigeminal origin
Age > 55 and elevated ESR	Skull base origin (often with cranial nerve findings)
Cancer patient	Orbital/peri-orbital origin (can have cranial nerve findings)
Immune compromised	Associated with cough, exertion, or sexual activity
Papilledema	Positional

MR Imaging of the Brain for Dementia

In 2011, some form of dementia affected an estimated 750,000 Canadians, and this number is expected to double by 2031^{vi}. The most common cause of dementia is Alzheimer disease (AD), with Vascular Dementia, Lewy Body Dementia, and Fronto-temporal Dementia comprising most other causes. Less common causes of dementia include Creutzfeldt-Jakob disease (CJD), Normal Pressure Hydrocephalus (NPH) and movement disorders such as Parkinson's Disease, Parkinsonian Syndromes and Huntington Disease.

Other than the diagnosis of reversible causes of dementia such as NPH or brain tumors, or subdural collections/hematomas, the greatest value of structural neuroimaging is to increase the specificity of the diagnosis. The Health Quality Ontario report emphasized that in a Family Practice environment, neuroimaging plays a role in making an initial diagnosis with greater certainty, particularly in cases of clinically ambiguous dementia or mixed types of dementia^{vii}. Because MRI findings in many of the dementias overlap with normal age related structural changes, the interpretation of imaging results in the context of neuropsychological and cognitive testing further exploits the utility of MRI in the evaluation of a patient with suspected dementia. The following indications are considered appropriate use of MR imaging when the diagnosis of dementia needs to be made with reasonable specificity.

Probable or Possible AD, Vascular Dementia, Mixed Vascular Dementia and AD, Frontotemporal dementia, Lewy Body Dementia, CJD, NPH, Parkinson's or Huntington Dementia.

In conclusion, the application of evidence based, appropriateness guidelines such as these should increase the utility of MRI in a community based, primary care practice and increase the likelihood of MRI positively impacting patient outcomes.

Reference Articles:

- i. OECD. [OECD Health Data 2013](#). Accessed March 10, 2014.
- ii. Government of Alberta. [Health funding allocations for 2014-2015](#). Accessed March 10, 2014.
- iii. ABIM Foundation. [Choosing Wisely 2014](#). Accessed March 10, 2014
- iv. Levinson W, Huynh T. [Engaging physicians and patients in conversations about unnecessary tests and procedures: Choosing Wisely Canada](#). *CMAJ*. 2014 Feb 18. [Epub ahead of print] *PubMed*
- v. Canadian Institute for Health Information. [Waiting for health care in Canada: what we know and what we don't know](#). *Ottawa: The Institute*; 2006. Accessed March 10, 2014
- vi. Lester MS, Liu BP. [Imaging in the evaluation of headache](#). *Med Clin North Am*. 2013 Mar;97(2):243-65. doi: 10.1016/j.mcna.2012.11.004. Epub 2012 Dec 22.
- vii. Health Quality Ontario. [The appropriate use of neuroimaging in the diagnostic work-up of dementia: an evidence-based analysis](#). *Ont Health Technol Assess Ser [Internet]*. 2014 February;14(1):1–64.

Guidelines: [CAR Guidelines](#); the American College of Radiology, [ACR Appropriateness Criteria](#)[®] .

MRI

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