Headaches: What not to miss, when to image, how to reassure

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Clinical questions

For patients with non-traumatic headache, what are the time-sensitive, "can't miss" diagnoses? When is clinical imaging indicated? How do I reassure patients who don’t need imaging?

Recommendations

Consider the differential diagnosis for time-sensitive, "can’t miss" causes of headache.

Take a systematic approach to history and exam. Use the following tools to evaluate patients for headache red flags.

**DATA C^{2}A^{2}N save lives** mnemonic from David Newman-Toker, MD:

- Dissection (carotid or vertebral)
- Arteritis (giant cell)
- Thrombosis (dural venous)
- Aneurysm (leak, expansion, or subarachnoid hemorrhage (SAH))
- Carbon monoxide, Colloid cyst
- Angle closure glaucoma, Angina
- Norepi neoplasm (pheochromocytoma)

**NOTE:** Most urgent causes of headache are not ruled out with a non-contrast head CT scan and need to be excluded with specific imaging, exams, or serologic tests. A head CT does not "clear" a patient with headache.

In addition to considering can't miss diagnoses in the above **DATA C^{2}A^{2}N save lives** mnemonic, you might also use the **SNOOP** mnemonic to identify red flag symptoms and signs that suggest a high-risk condition where imaging may be appropriate:

- **Systemic**
  - Conditions: malignancy, HIV, pregnancy
  - Signs: fevers, sweats, rash, weight loss
- **Neurologic**
  - Symptoms: significant and new neurologic symptoms
  - Signs: optic nerve edema, abnormal neurologic exam
- **Onset sudden (< 5 minutes)**
- **Older than 50 years**
- **Pattern change**
  - Change in type or quality of headache
  - More than 50% increase in frequency or severity

Order imaging only when your differential diagnosis supports it.

Remember, more is not necessarily better. In non-acute headache with normal neurologic exam, significant abnormalities on neuroimaging are rare: 0–2.48%.
Patients with uncomplicated headache do not routinely need imaging to evaluate for brain tumor. Consider the parallel with pneumonia: Patients with pneumonia rarely have lung cancer, and patients with headache rarely have brain cancer. In both situations, we can exclude urgent causes for presenting symptoms, provide empiric treatment, reassess in 2–4 weeks, and then consider imaging if the initial symptoms do not improve as expected. There are few if any clinicians who would order chest CT to evaluate all patients with pneumonia for lung cancer at initial presentation. The same logic follows for headache: Do not perform head CT to evaluate for brain cancer in patients with uncomplicated headache in the absence of red flags.

High-end imaging (CT or MRI) for uncomplicated headache is low-value care, leading to increased costs, radiation exposure, and anxiety for patients without improving care quality.

Reassure your patients who don’t need imaging and offer them treatment.

Leverage continuity. When patients have no red flags or indications for imaging, ask them to gather more data on their headaches and schedule follow-up in primary care in 1–2 weeks to assess their response to empiric treatment.

- Give patients instructions to keep a headache log and advise them about when to seek immediate medical attention.
- Empirically treat headache. Refer to the recently published KPWA Migraine and Tension Headache Guideline.
- Suggested scripting: "Let’s try treating what is more likely the cause of your headache for a few weeks. If you follow this plan and are not better, we can always reconsider a brain scan."

Provide durable reassurance using the Four Habits model. One-liners like these can help guide your conversations:

- "What is it that concerns you most about your headache?"
- "Brain tumors do not cause headaches that go away and then return over weeks and months. Your long history of episodic headaches is actually a reassuring sign that brain imaging is not likely to be necessary."

How could this change my practice?

- Be less uncertain, more efficient, and more reassuring in your headache visits.
- Confidently evaluate for and exclude "can’t miss" diagnoses for headache.
- Understand what worries patients and provide durable reassurance when imaging is not clinically indicated.

Why did we choose this topic?

In the Washington Permanente Medical Group, we strive to provide the highest-quality, highest-value medical care.

We work together to make evidence-based clinical improvements, including this Choosing Wisely recommendation from the American College of Radiology: "Don't do imaging for uncomplicated headache."

See the accompanying patient handout, "Imaging tests for headaches: When you need a CT scan or MRI—and when you don’t."

We estimate that 20% of high-end imaging for uncomplicated headache is unnecessary within our medical group, with significant impacts on patients:

- **Incidental findings** of unclear significance: One in five patients with headaches has an incidental finding of unclear significance on high-end imaging—leading to anxiety, additional imaging, and/or specialist consultations.
- **Costs:** The scan itself, plus patients’ lost work time, parking fees, and childcare expenses.
- **Radiation:** A head CT uses 200 times the radiation of a chest X-ray. The estimated risk of malignancy from a head CT alone is 1 in 8,000.
References


