

On-line Table 1: Indications for imaging in adult populations

Symptom	Examples of Diagnostic Guidelines and Clinical Decision Rules	Indications for Imaging	First-Line Imaging Modality	Settings in Which Imaging Can Be Avoided (or Insufficient Evidence)
Mild traumatic brain injury	New Orleans Criteria ^{79a} Canadian Head CT Rule ^{47a} ACEP/CDC criteria ¹⁶ ACR Appropriateness Criteria ¹⁷	Any high-risk signs/symptoms: Age older than 65 yr GCS < 15 Seizure Focal neurologic deficit Oral anticoagulant use Intoxication Dangerous mechanism Signs of basilar skull fracture At least 2 episodes of vomiting Amnesia before impact of > 30 min Sudden onset, severe headache Acute or chronic headache with unexplained abnormal findings on neurologic examination Posttraumatic headache Unilateral headache with suspected arterial dissection Acute headache in high-risk patient (ie, immunocompromised) New headache in elderly patient with suspected temporal arteritis Acute back pain with "red flags": Known suspected malignancy Focal and/or progressive neurologic deficits Low-velocity trauma Concern for spinal infection or history of immunosuppression Signs of cauda equina syndrome Chronic back pain lasting >4–6 weeks; amenable to surgery	CT head (noncontrast)	All patients not meeting high-risk signs and symptoms according to clinical criteria
Headache	Headache Consortium guidelines in migraine work-up ²¹ Multispecialty consensus on diagnosis and treatment of headache ²² ACR Appropriateness Criteria ²³	Chronic headache without new features and stable neurologic examination findings Migraine headache with normal examination findings Tension-type headaches (insufficient evidence)	CT head (noncontrast) MRI head (with and without contrast)	Chronic headache without new features and stable neurologic examination findings Migraine headache with normal examination findings Tension-type headaches (insufficient evidence)
Low back pain	ACP low back pain guidelines ²⁶ <i>Lancet</i> , "Imaging for Low-Back Pain" ²⁷ ACR Appropriateness Criteria ²⁸	Back pain without "red flags" Uncomplicated back pain and/or radiculopathy Back pain lasting <4–6 weeks or incomplete trial of therapy Nonsurgical presentation	CT head (noncontrast) CTA head/neck with contrast; MRA head without contrast MRI head (with and without contrast) MRI head (with and without contrast) MRI lumbar spine (with and without contrast)	Back pain without "red flags" Uncomplicated back pain and/or radiculopathy Back pain lasting <4–6 weeks or incomplete trial of therapy Nonsurgical presentation
			MRI lumbar spine (with and without contrast)	

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On-line Table 1: Continued

Symptom	Examples of Diagnostic Guidelines and Clinical Decision Rules	Indications for Imaging	First-Line Imaging Modality	Settings in Which Imaging Can Be Avoided (or Insufficient Evidence)
Syncope or syncope mimic	San Francisco Syncope Rule ^{80a} European Society of Cardiology guidelines, syncope ²⁹ AAFP, "Evaluation of Syncope" ³¹ American Academy of Ophthalmology Preferred Practice Pattern Guidelines ³⁴ AAFP, "Vision Loss in Older Persons" ³⁵ ACR Appropriateness Criteria ³⁶ AAO-HNS "Clinical Practice Guideline: Sudden Hearing Loss" ³⁷	Signs and symptoms indicate neurologic etiology of syncope (ie, seizure, cerebrovascular accident, posttraumatic)	Determined by suspected etiology	Routine evaluation of syncopal episode
Vision loss	AAFP, "Evaluation of Syncope" ³¹ American Academy of Ophthalmology Preferred Practice Pattern Guidelines ³⁴ AAFP, "Vision Loss in Older Persons" ³⁵ ACR Appropriateness Criteria ³⁶ AAO-HNS "Clinical Practice Guideline: Sudden Hearing Loss" ³⁷	Sudden onset painless or painful vision loss Proptosis with vision loss Vision loss with uveitis or scleritis Posttraumatic vision loss	MRI head/orbits (with and without contrast) MRI head/orbits (with and without contrast) MRI head/orbits (with and without contrast) CT head (noncontrast)	Progressive, atraumatic vision loss without other neurologic signs
Hearing loss	AAO-HNS "Clinical Practice Guideline: Sudden Hearing Loss" ³⁷	Conductive hearing loss	CT temporal bone (without contrast) MRI head and IAC (with and without contrast)	Progressive, symmetric conductive or sensorineural hearing loss
Acute rhinosinusitis	"IDSA Clinical Practice Guideline for Acute Bacterial Rhinosinusitis in Children and Adults" ³⁹ AAO-HNS, "Clinical Practice Guideline (Update): Adult Sinusitis" ⁴⁰ AAFP, "Guidelines for the Diagnosis and Management of Rhinosinusitis in Adults" ⁴¹ ACR "Appropriateness Criteria: Sinusitis" ⁴² AAO-HNS, "Clinical Practice Guideline: Hoarseness (Dysphonia)" ⁴³	Unilateral, fluctuating, or unexplained sensorineural hearing loss Acute or subacute sinusitis with suspected orbital and/or intracranial complications Acute or subacute sinusitis in immunocompromised patients Surgical planning for recurrent sinusitis	CT paranasal sinuses (without contrast) CT paranasal sinuses (with and without contrast) CT paranasal sinuses (without contrast)	Cases meeting clinical criteria for uncomplicated acute or subacute sinusitis
Hoarseness	AAO-HNS, "Clinical Practice Guideline: Hoarseness (Dysphonia)" ⁴³	Persistent hoarseness with unrevealing laryngoscopic examination	CT or MRI (no clear to evidence to differentiate)	Hoarseness before evaluation by direct laryngoscopy

Note:—AAP indicates American Academy of Pediatrics; GCS, Glasgow Coma Scale; ACEP/CDC, American College of Emergency Physicians/Centers for Disease Control and Prevention; IDSA, Infectious Diseases Society of America; ACP, American College of Physicians; IAC, internal auditory canal.

^a Clinical decision rules, which are data-driven clinical research studies (similar to trials) that carry a higher level of evidence than practice and consensus guidelines established by professional groups and societies.

On-line Table 2: Indications for imaging in pediatric populations

Symptom	Examples of Diagnostic Guidelines and Clinical Decision Rules	Indications for Imaging	First-Line Imaging Modality	Settings in Which Imaging Can Be Avoided (or Insufficient Evidence)
Mild traumatic brain injury	Pediatric Emergency Care Applied Research Network rule ^{45a} Children's Head Injury Algorithm for the Prediction of Important Clinical Events rule ^{46a} Canadian Assessment of Tomography for Childhood Head Injury rule ^{47a} ACR Appropriateness Criteria: Head Trauma-Child ⁴⁸	Concerning history/examination findings: Witnessed loss of consciousness for >5 min History of amnesia Abnormal drowsiness Severe/worsening headache ≥3 Episodes of vomiting Suspicion of nonaccidental injury Posttraumatic seizure GCS < 15 postinjury Depressed skull injury/bulging fontanelle Signs of basilar skull fracture High-risk mechanism of injury	CT head (noncontrast)	All patients not meeting high-risk signs and symptoms according to clinical criteria
Acute rhinosinusitis	"IDSA Clinical Practice Guideline for Bacterial Rhinosinusitis in Children and Adults" ³⁹ AAP, clinical practice guideline ⁵⁰ ACR Appropriateness Criteria ⁵¹ AAP, clinical practice guideline ⁵³ ACR Appropriateness Criteria ⁵⁴	Persistent, recurrent, or chronic sinusitis Acute or subacute sinusitis with suspected orbital and/or intracranial complications	CT paranasal sinuses (without contrast) CT paranasal sinuses (with contrast)	Cases meeting clinical criteria for uncomplicated acute sinusitis
Simple febrile seizure		Complex febrile seizures suspected for meningitis/encephalitis or underlying trauma	MRI or CT	Patients presenting with simple febrile seizures and most complex seizures not meeting high-risk signs and symptoms

Note:—ACP indicates American College of Physicians; GCS, Glasgow Coma Scale; IDSA, Infectious Diseases Society of America; AAP, American Academy of Pediatrics.

^aClinical decision rules are data-driven clinical research studies (similar to trials), which carry a higher level of evidence than practice and consensus guidelines established by professional groups and societies.