CENTRAL NERVOUS SYSTEM GUIDELINE

CENTRAL NERVOUS SYSTEM EXPERT PANEL MEMBERS

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Canadian Association of Radiologists
L'Association canadienne des radiologistes

Contents

ABBREVIATIONS

ACR	American College of Radiology
AGREE-II	Appraisal of Guidelines for Research & Evaluation Instrument
AI	Artificial Intelligence
CAR	Canadian Association of Radiologists
CT	Computed Tomography
CTA	Computed Tomography Angiography
EP	Expert Panel
EtD	Evidence to Decision
GRADE	Grading of Recommendations Assessment, Development and Evaluation
MRA	Magnetic Resonance Angiography
MRI	Magnetic Resonance Imaging
NICE	National Institute for Health and Care Excellence
US	Ultrasound
XR	Radiograph

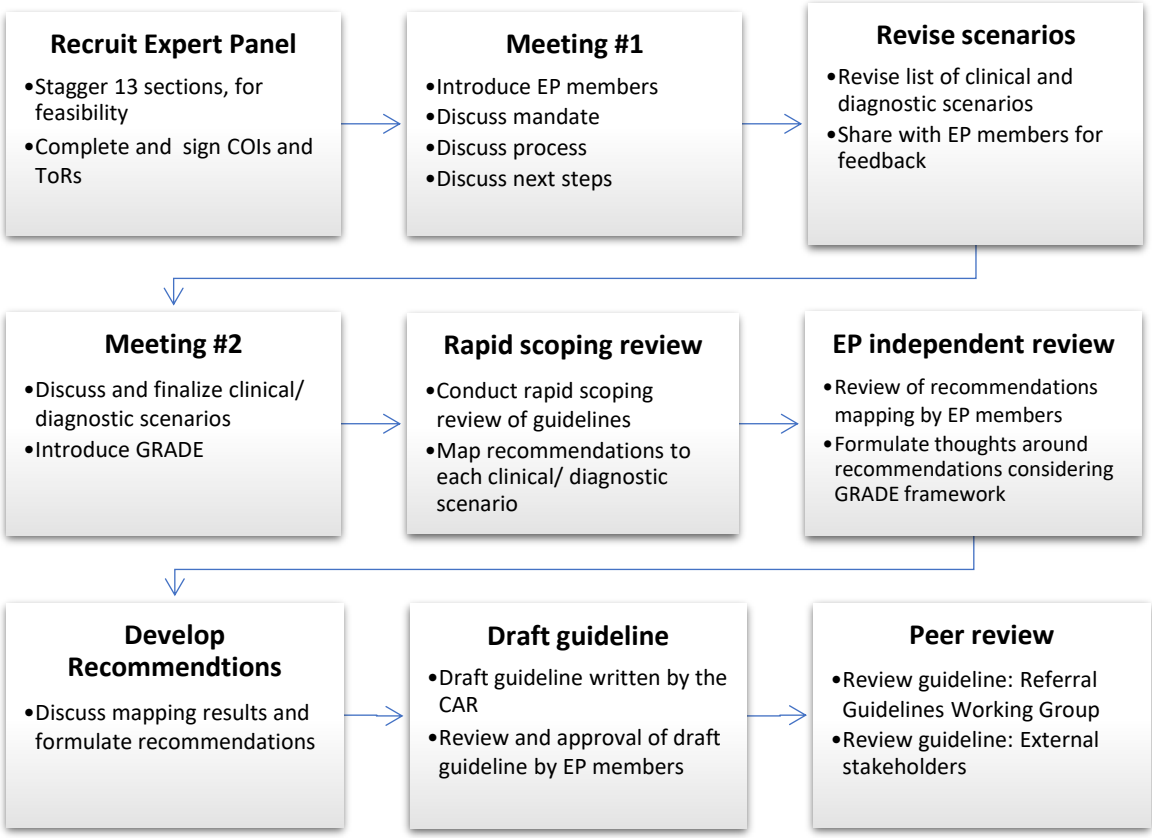
INTRODUCTION

The diagnostic imaging referral recommendations from the Canadian Association of Radiologists (CAR) were published in 2012 (https://car.ca/patient-care/referral-guidelines/) and are considered out of date. These recommendations were made up of 13 sections, of which one was Central Nervous System (CNS). In 2020, the CAR, funded by the Canadian Medical Association (CMA), developed a plan to update the CAR diagnostic imaging referral recommendations. The project mandate is to develop a comprehensive set of evidenced-based diagnostic imaging referral guidelines suited for integration into CDS systems.

An Expert Panel (EP) made up of physicians from the disciplines of radiology, emergency medicine, surgery, neurology, physiatry, a patient advisor, and an evidence review/ guideline methodologist from across Canada met over a series of three meetings from January to October 2024.

The 15 clinical/diagnostic scenarios in the 2012 CAR recommendations were used as the starting point for discussions. After a review and update of these scenarios, an updated list of 24 clinical/diagnostic scenarios was created, which informed the systematic search strategy and rapid scoping review.

The general process of the guideline development is presented in **Figure 1**.



Abbreviations: CAR = Canadian Association of Radiologists; **COI** = Conflict of Interest; **EP** = Expert Panel; **GRADE** = Grading of Recommendations Assessment, Development and Evaluation; **ToR** = Terms of Reference

Figure 1 - Guideline Development Process

WHO ARE THESE RECOMMENDATIONS FOR?

These recommendations are primarily for referring clinicians (e.g., physicians, nurse practitioners); however, they may also be used by radiologists, patients, and/or patient representatives.

The primary objective of the recommendations is to promote the most appropriate diagnostic imaging procedure(s), so that patients receive these procedure(s) at the right time, resulting in better health outcomes.

Scope

The guideline recommendations are to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. We did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring.

DISCLAIMER

These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability.

We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient.

METHODS OF THE RAPID SCOPING REVIEW

The conduct of the systematic rapid scoping review was guided by empirical review guidance: the Joanna Briggs Institute scoping review guidance [1], the Cochrane Handbook [2], and the rapid review interim guidance from the Cochrane Rapid Review Methods Group [3].

Inclusion Criteria

Publications were included if they met the following criteria:

Guidelines: Providing diagnostic imaging recommendations for one or more of the clinical/diagnostic scenarios identified by the CNS Expert Panel.

Study design: Guidelines that were produced using three criteria in the AGREE-II assessment tool [4]:

(1) Systematic methods were used to search for evidence: Searched and named at least 1 electronic database using an electronic search strategy (e.g., Medline, Embase, PubMed, CENTRAL);
(2) The criteria for selecting the evidence are clearly described: Described a formal process for study selection; AND reported the inclusion and exclusion criteria; OR if it is based on a systematic review even if it does not provide explicit methods; and
(3) The strengths and limitations of the body of evidence are clearly described: Performed critical appraisal on the included studies (e.g., risk of bias, describe study limitations); OR if it is based on a systematic review and GRADE is performed.

Interventions: Any diagnostic imaging modalities (e.g., radiograph [XR], magnetic resonance imaging [MRI], computed tomography [CT], ultrasound [US], nuclear medicine [NM]) were included.

Date of publication: To identify the most recent guidelines, which would contain the most recently published primary studies, and for feasibility, we included guidelines that were published or updated from 2019 onward.

Language of publication: English, for feasibility.

Search

A systematic search strategy was developed by an experienced information specialist (**Appendix 1**) using the list of clinical/diagnostic scenarios identified by the CNS Expert Panel members. The search was run in Medline and Embase on February 27, 2024. The search was limited to publications from 2019 onward to capture the most recent guidelines, and for feasibility. There was no language restriction in the search. Supplemental searching included searching the following national radiology and/or guideline groups: the American College of Radiology (ACR) and the National Institute for Health and Care Excellence (NICE).

Title/abstract screening

Using a standardized form in DistillerSR, an online systematic review software [5], one reviewer screened the records in prioritized order, using the artificial intelligence (AI) re-ranking tool in DistillerSR. A stop-screening approach was implemented once 95% of the predicted included studies were identified [6,7]. The AI reviewer tool in DistillerSR excluded the remaining records. The AI audit tool was run to identify any records that were excluded that had high score for inclusion (i.e., a prediction score of 0.85 and above). These records were rescreened to ensure that they should have been excluded. A second reviewer verified a random sample of 10% of the included records and 20% of the excluded records, without knowledge of the inclusion or exclusion decision by the first reviewer. Any disagreements were resolved through discussion. The AI audit tool was rerun, and any records with a prediction score of ≥0.85 were rescreened.

Full text screening

Using a standardized form in DistillerSR, one reviewer evaluated the full texts of the guidelines against the eligibility criteria described above in the Inclusion Criteria.

Mapping

Recommendations were extracted from all included guidelines by one reviewer and presented in tabular form for each clinical/ diagnostic scenario. A synopsis (i.e., a condensed version of the evidence table) for each clinical/ diagnostic scenario was created based on the information in the evidence tables. These synopses highlighted the main recommendations across guidelines, with a focus on guidelines that used GRADE, and highlighted any discordant recommendations. These synopses were produced by the guideline methodologist and distributed to the EP members to help guide discussion when formulating the recommendations.

Critical appraisal

Each guideline was assessed for the level of quality using the AGREE-II instrument [4]. This was performed by one reviewer with a quality control check on a random sample of 10% of the guidelines.

FORMULATING RECOMMENDATIONS

Over two virtual meetings (October 18 and 23, 2024), the EP members discussed each of the clinical scenarios using the information in the synopses as a guide. When required, the full evidence tables (**Appendix 2**) were consulted for additional information.

NOTE: Details have been removed from Appendix 2 to comply with copyright protection. For additional information on these

recommendations, please access the full publications.

The focus of these recommendations was to provide the recommendation for the initial imaging modality, and in some cases the next imaging modality or an alternative to the initial modality, in situations where the initial modality is negative, indeterminate, may not be available, or if additional imaging is required.

Specifying contrast protocols

Unless the panel agreed a specific protocol is required to optimize patient care/diagnosis, the recommendations do not specify when contrast should or should not be used, as this decision may vary based on clinical presentation, regional practice preferences, preference of the referring clinician, radiologist and patient, and resource availability.

Grading of Recommendations Assessment, Development and Evaluation

The Grading of Recommendations Assessment, Development and Evaluation (GRADE) for Guidelines framework [8,9] was used as a guide to determine the strength (i.e., strong, conditional) and direction (i.e., for, against) of the recommendation. As the GRADE methodology requires an Evidence to Decision (EtD) framework for each recommendation, this would not have been feasible as:

(i) We used recommendations from existing guidelines as our evidence base, thereby not allowing for full assessment of each outcome within the primary studies, including the five GRADE domains to evaluate the certainty of the evidence: risk of bias, indirectness, imprecision, inconsistency, and publication bias [10]. Therefore, this information was inferred by the level and strength of the evidence provided in the included guidelines.

(ii) We covered 24 clinical/diagnostic scenarios in the Central Nervous System section, which could have included several diagnostic imaging modality comparisons. This would have resulted in a minimum of 24 EtD frameworks, but realistically many more, as we would have had to create an EtD for each comparison (e.g., MRI vs CT, US vs CT, CT vs NM) within each clinical/diagnostic scenario.

Therefore, in addition to the diagnostic imaging recommendations presented by each included guideline, and the clinical expertise of the EP members, additional criteria were considered specific to the Canadian healthcare context:

- Certainty of the evidence (as presented in the included guidelines)
- Consideration of benefits and harms (e.g., ionizing radiation exposure)
- Values and preferences
- Equity, accessibility, and feasibility
- Resource use and costs

The strength and direction of the recommendations are represented by arrow directions and colours. Using GRADE as a guide [8], these can be interpreted as:

- **Strong recommendation ("recommend"), for (↑↑)**: All or almost all informed people would want/recommend this intervention and only a small proportion would not. If this intervention is not offered, the patient or patient representative should request a discussion.
- **Conditional recommendation ("suggest"), for (↑)**: Most informed people would choose/recommend this intervention, but a substantial number would not. This may be conditional upon patient values and preferences, the resources available or the setting in which the intervention will be implemented.
- **Conditional recommendation ("suggest"), against (↓)**: Most informed people would not

choose/recommend this intervention, but a substantial number would. This may be conditional upon patient values and preferences, the resources available or the setting in which the intervention will be implemented.

- **Strong recommendation ("recommend"), against (↓↓)**: All or almost all informed people would not want/recommend this intervention, but a small proportion would.

When there were no guidelines to support recommendations, the EP formulated recommendations based on their clinical expertise while considering values and preferences, resources, cost, equity, and accessibility. These recommendations are denoted with (EP consensus).

The recommendations for each clinical/ diagnostic scenario are presented below, with reference to the guidelines that were included for that scenario. Recommendations are also summarized in tabular form in **Appendix 3**.

INCLUDED GUIDELINES

A total of 6712 unique records were identified through the electronic database. After reviewing 1211 records, the AI reviewer excluded the remaining records (n=5501), as 95% of the predicted included records had been identified and the likelihood for inclusion of the remaining records was low (highest remaining prediction score of 9.98%) A second reviewer screened a set of randomly selected records (n=1344) for verification (~10% of included and 20% of excluded records). Among these, there were 13 conflicts. These conflicts were resolved through discussion. An additional 17 records were added from the supplemental searching and screened for eligibility. The full text for one record was not retrievable and 15 records were non-English publications (**Appendix 4**). Among the remaining full texts that were screened for eligibility, 36 were not guidelines providing recommendations for CNS imaging, 33 did not use systematic methods or sufficiently describe the methods used in the formulation of the guideline, and five were excluded for 'other' reasons. A list of excluded records with reasons is available upon request. Recommendations from 55 guidelines were included (**Figure 2 - PRISMA flow diagram**).

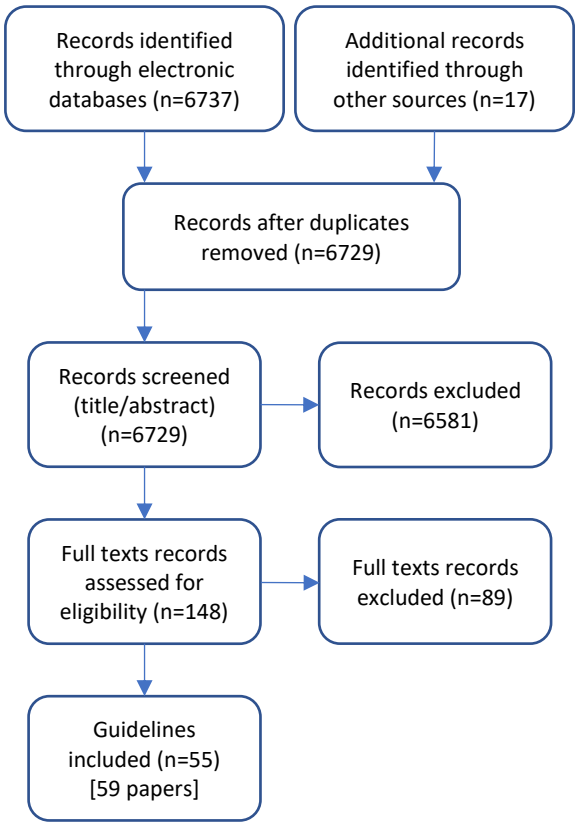


Figure 2 - PRISMA flow diagram

The number of guidelines included per clinical/diagnostic scenario ranged from 0 to 16. Where available, the certainty of the evidence and/or strength of the recommendations are highlighted to provide a sense of the certainty of the evidence of the included primary studies (**Appendix 2**).

Most guidelines were rated as moderate or high quality, using the AGREE-II tool (**Appendix 5**). Often, reasons for rating an item down were due to a lack of reporting.

LIMITATIONS OF THE RAPID SCOPING REVIEW

As the unit of inclusion for the rapid scoping review was guidelines, the recommendations were extracted as presented in the guidelines. We also extracted the level/certainty of the evidence based on the criteria presented in the completed guidelines. There were several tools/methods used to assess the level/certainty of the evidence, for example GRADE [10], the Oxford Centre for Evidence-based Medicine 2009 and 2011 [11,12], Level of Appropriateness (American College of Radiologists), consensus, or an adaptation/ modification of one or more methods. For feasibility, primary studies were not reviewed, and the level/certainty of the evidence was taken at face value from the guideline.

IONIZING RADIATION EXPOSURE

We have elected to not include any effective dose values (mSv), related metrics, or qualitative descriptors of radiation risk (e.g., symbol, risk level, approximate equivalent background radiation, lifetime additional risk of cancer induction/exam) for several reasons:

1) The Expert Panel members have considered the risks of ionizing radiation (i.e., GRADE for Guidelines benefits and harms) when formulating the recommendations.

2) The levels of ionizing radiation in modern medical imaging equipment should not unduly influence patient decision-making. The anticipated benefits of imaging to the patient, if a test is clinically indicated are likely to outweigh any potential small risks [13].

3) Per the following points, effective dose values and related metrics such as equivalent background radiation have very large uncertainties, and their utility is thus limited:

- There is uncertainty in the relative values of the effective dose for a reference patient with variation in the standard error [14];
- Effective doses are measured using reference phantoms with population, age and sex-averaged tissue weighting factors [14], therefore these should not be considered as the doses received by specific individuals;
- The publications providing data used to estimate the effective dose per scan (e.g., International Commission on Radiological Protection (ICRP) 1990 [15], 2007 [16]) are occasionally updated and may impact the effective dose values;
- There is variation in the average dose from natural background radiation by geographic location. For example, in Canada, the average is 1.8 mSv/year, which ranges from 1.3 mSv/year in Vancouver to 4.1 mSv/year in Winnipeg [17]; and
- There are variables around the equipment (e.g., age) and facility (e.g., protocol) that may impact the actual amount of ionizing radiation exposure used for any particular exam.

EXTERNAL REVIEW

This guideline and its recommendations have been externally reviewed by members of the CAR Diagnostic Imaging Referral Guidelines Working Group (**Box 1**).

FUTURE RESEARCH IN THIS AREA

This guideline will be updated upon the emergence of new evidence that may change the validity of the recommendations.

We plan on developing Patient Friendly Summaries for some of the clinical/diagnostic

scenarios covered in this guideline. The selection of scenarios will be dependent on a prioritization exercise, as well as funding. These summaries will be made available on the CAR website (www.car.ca).

Box 1. CAR Diagnostic Imaging Referral Guideline Working Group Members

Ryan Margau (co-chair), North York General Hospital, ON
Paul Pageau (co-chair), The Ottawa Hospital, ON

Other members listed alphabetically:
Barb Avard, Patient and Family Advisor, North York General Hospital, ON
Noel Corser, Hinton Medical Clinic, AB
Nicolas Dea, Spine surgeon, Vancouver General Hospital and the University of British Columbia, BC
Cathy MacLean, University of Saskatchewan, Department of Academic Family Medicine, SK
Kaitlin Zaki-Metias, Western University, London, ON

Italicized name is a WG member who was also a member of the Central Nervous System Expert Panel.

CENTRAL NERVOUS SYSTEM CLINICAL/DIAGNOSTIC SCENARIOS

The guideline recommendations are to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring. These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability. We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient.

RECOMMENDATIONS

CN01. Congenital disorders of the brain

Recommendations

1. In adults with suspected congenital disorder of the brain, we recommend **MRI** as the initial imaging modality (↑↑).

Recommendations from 1 guideline was used during the discussion and formulation of these recommendations: the 2012 CAR guideline Central Nervous System section [18] (**Appendix 2: Table CN01**).

CN02. Cerebrovascular disease

Recommendations

Acute stroke

1. In adults with symptoms of acute stroke who may be eligible for intervention, we recommend a stroke protocol that includes at minimum a **non-contrast CT head and multi-phase CTA** as the initial imaging modalities (↑↑).

   If CT perfusion is available, it may be included.

Transient ischemic attack

1. In adults presenting within 48 hours of symptoms consistent with transient ischemic attack (especially transient focal motor or speech symptoms, or persistent stroke symptoms), we recommend **CT/CTA as soon as possible** as the initial imaging modality (↑↑).
2. In adults presenting more than 48 hours after symptoms consistent with a transient ischemic attack, we recommend **CT/CTA** as the initial imaging modality (↑↑).

   ↳ **2.1** If CTA is unavailable, we suggest **carotid Doppler US** as a suitable interim modality until CTA is available (↑).

Extracranial carotid stenosis

1. In adults with symptomatic✦ carotid stenosis, we recommend **MRA or CTA** as the initial imaging modality (↑↑).

   ↳ **1.1** If MRA or CTA are unavailable, we suggest **carotid Doppler US** as an alternative for screening (↑).

   ↳ **1.2** If revascularization procedures are being considered, we recommend **MRA or CTA** (↑↑).
2. In adults with asymptomatic carotid stenosis who are being considered for revascularization procedures, we recommend **MRA or CTA** (↑↑).

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✦ Ipsilateral carotid-territory cerebral or retinal ischemic event (ischemic stroke, transient ischemic attack, transient monocular blindness, or retinal artery occlusion) within the preceding 6 months [19].

Arterial dissection/injury

For traumatic vascular injury, refer to the CAR Trauma guideline [20]*, scenario T07. Suspected head and neck vascular injury, including penetrating injury.*

Recommendations from 16 guidelines were used during the discussion and formulation of these recommendations: the 2012 CAR guideline Central Nervous System section [18], the 2023 ACR guideline on Cerebrovascular Diseases – Stroke and Stroke-Related Conditions [21], the 2021 ACR guideline on Cerebrovascular Disease – Aneurysm, Vascular Malformation, and Subarachnoid Hemorrhage [22], the 2022 American Heart Association/American Stroke Association guideline on Intracerebral Hemorrhage [23], the American Heart Association/American Stroke Association guideline on Prevention of Stroke in Patients with Stroke and TIA [24], the 2021 Canadian Stroke Consortium guideline on TIA and Stroke [19], the 2020 Canadian Stroke guideline on Spontaneous Intracerebral Hemorrhage [25], the 2020 Chinese Stroke Association on Intracerebral Hemorrhage [26], the 2019 Chinese Stroke Association guideline on Subarachnoid Hemorrhage [27], the 2020 European Academy of Neurology guideline on Monogenic Small Vessel Disease [28], the 2021 European Stroke Organization guideline on transient ischemic attack [29], the 2022 Japan Stroke Society guideline on Subarachnoid Hemorrhage [30], the 2022 NICE guideline on Stroke and Transient Ischemic Attack [31], the 2022 NICE guideline on Subarachnoid Hemorrhage [32], the 2019 Society of NeuroInterventional Surgery Standards and Guidelines Committee guideline on Large Vessel Occlusion Stroke [33], and the 2019 Swedish Society of Rheumatology guideline on Giant Cell Arteritis [34] (**Appendix 2: Table CN02**).

CN03. Multiple sclerosis and demyelinating disease

Recommendations

1. In adults with suspected multiple sclerosis or demyelinating disease, we recommend **MRI** as the initial imaging modality (↑↑).

Recommendations from 5 guidelines were used during the discussion and formulation of these recommendations: the 2012 CAR guideline on Central Nervous System section [18], the 2019 ACR guideline on Movement Disorders and Neurodegenerative Disease [35], the 2023 EAN/PNS guideline on Guillain-Barre Syndrome [36], the 2021 EAN/PNS guideline on Chronic Inflammatory Demyelinating Polyradiculoneuropathy [37], and the 2022 NICE guideline on Multiple Sclerosis [38] (**Appendix 2: Table CN03**).

CN04. Headache

Recommendations

1. In adults with acute or chronic headache clinically suspected to be a benign primary headache disorder (e.g., migraine, tension headache), we recommend **no routine imaging** (↓↓).
2. In adults with acute headache with red flags✧, we recommend **CT** as the initial imaging modality (↑↑).
   - ↳ **2.1** If a vascular cause is suspected, we suggest **CTA/CTV** as an additional imaging modality (↑).
   - ↳ **2.2** If a non-vascular cause is suspected, we suggest **MRI** as an additional imaging modality (↑).
3. In adults with chronic headache with concerning features✦, we recommend **MRI** as the initial imaging modality (↑↑).

The guideline recommendations are to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring. These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability. We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient.

↳ **3.1** If MRI is unavailable or contraindicated, we recommend **CT** as an alternative imaging modality (↑↑).

For traumatic vascular injury, refer to the CAR Trauma guideline [20]*, scenario T07. Suspected head and neck vascular injury, including penetrating injury.*

✧ Such as, severe, sudden onset ("thunderclap"), features of intracranial hypertension or hypotension, new onset or pattern during pregnancy or peripartum period, increasing frequency or severity, fever or neurologic deficit, history of cancer or immunocompromise, older age (>50 years) of onset, or posttraumatic onset [39]

✦ Such as, recent onset and rapidly increasing frequency and severity of headache, headache causing the patient to wake from sleep, associated dizziness, lack of coordination, tingling or numbness, new neurologic deficit, new onset of a headache in a patient with a history of cancer or immunodeficiency [18]

Recommendations from 8 guidelines were used during the discussion and formulation of these recommendations: the 2012 CAR guideline Central Nervous System section [18], the 2021 ACR guideline on Cerebrovascular disease – Aneurysm, vascular malformation, and subarachnoid hemorrhage [22], the 2023 ACR guideline on Headache [39], the 2019 American Headache Society guideline on Migraine [40], the 2019 Chinese Stroke Association guideline on Subarachnoid Hemorrhage [27], the 2022 Japan Stroke Society guideline on Stroke [30], the 2021 NICE guideline on Headache [41], and the 2022 NICE guideline on Subarachnoid hemorrhage [32] (**Appendix 2: Table CN04**).

CN05. Concussion

Recommendations

1. In adults with suspected acute concussion, refer to the CAR Trauma guideline [20], scenario T01. Acute head trauma in adults.
2. In adults with post-concussion syndrome, we recommend **no routine imaging** (EP consensus).

No guidelines were identified for this clinical scenario.

CN06. Pituitary and juxtasellar lesions

Recommendations

1. In adults with pituitary and/or juxtasellar lesions, we recommend **MRI** as the initial imaging modality (↑↑).

Recommendations from 1 guideline was used during the discussions and formulation of these recommendations: the 2012 CAR Central Nervous System section [18] (**Appendix 2: Table CN06**).

CN07. Cranial neuropathy, brain stem symptoms

Recommendations

1. In adults with cranial neuropathy and/or brain stem symptoms, we recommend **MRI** as the initial imaging modality (↑↑).

   ↳ **1.1** If MRI is unavailable or contraindicated, we recommend **CT** as an alternate imaging modality (↑↑).

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Recommendations from 3 guidelines were used during the discussion and formulation of these recommendations: the 2012 CAR guideline Central Nervous System section [18]**,** the 2022 ACR guideline on Cranial Neuropathy [42], and the 2023 EAN guideline on Trigeminal Neuralgia [43] (**Appendix 2: Table CN07**).

CN08. Altered intracranial pressure

CN08A. Idiopathic intracranial hypertension

Recommendations

1. In adults with suspected or known idiopathic intracranial hypertension, we recommend **MRI/MRV or CT/CTV** as the initial imaging modality (↑↑).

Panel consensus is a preference for MRI/MRV.

Recommendations from 1 guideline was used during the discussion and formulation of these recommendations: the 2023 ACR guideline on Headache [39] **(Appendix 2: Table CN08A).**

CN08B. Spontaneous intracranial hypotension

Recommendations

1. In adults with spontaneous intracranial hypotension, we recommend **head MRI with contrast** as the initial imaging modality (↑↑).

↳ **1.1** If MRI is unavailable or contraindicated, we recommend **CT** as an alternative imaging modality (↑↑).

↳ **1.2** If head MRI is positive, we recommend **whole spine MRI** as the next imaging modality (↑↑).

Recommendations from 4 guidelines were used during the discussion and formulation of these recommendations: the 2012 CAR guideline Central Nervous System section [18], the 2023 ACR guideline on Headache [39], the 2022 ACR guideline on Sinonasal Disease [44], and the 2023 Multidisciplinary Specialists Interest Group guideline on Spontaneous Intracerebral Hypotension [45] **(Appendix 2: Table CN08B).**

CN08C. Hydrocephalus, suspected shunt malfunction

Recommendations

1. In adults with hydrocephalus, suspected shunt malfunction, we recommend **head CT and shunt series XR** as the initial imaging modalities (↑↑).

Recommendations from 1 guidelines were used during the discussion and formulation of these recommendations: the 2012 CAR guideline Central Nervous System section [18] **(Appendix 2: Table CN08C)**.

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CN08D. Normal pressure hydrocephalus

Recommendations

1. In adults with suspected normal pressure hydrocephalus✧, we recommend **MRI or CT** (↑↑).

✧ Clinical triad for normal pressure hydrocephalus: mental/cognitive impairment, gait disturbance, and incontinence [46]

Recommendations from 2 guidelines were used during the discussion and formulation of these recommendations: the 2019 ACR guideline on Dementia [46], and the 2021 Japanese Society of Normal Pressure Hydrocephalus guideline on Idiopathic Normal Pressure Hydrocephalus [47] **(Appendix 2: Table CN08D)**.

CN09. Vestibular and cochlear symptoms

CN09A. Hearing loss

Recommendations

1. In adults with unexplained conductive hearing loss, we recommend **CT temporal bone** as the initial imaging modality (↑↑).

2. In adults with sensorineural hearing loss, we recommend **MRI** as the initial imaging modality (↑↑).

Recommendations from 5 guidelines were used during the discussion and formulation of these recommendations: the 2012 CAR guideline Central Nervous System section [18], the 2023 ACR guideline on Dizziness and ataxia [48], the 2020 Meniere's disease guideline [49,50], the 2023 NICE guideline on Hearing loss [51], the 2019 guideline on Sudden hearing loss [52,53] (**Appendix 2: Table CN09A**).

CN09B. Vertigo

Recommendations

1. In adults with brief episodic vertigo, we recommend **no routine imaging** (↓↓).

2. In adults with <u>persistent peripheral</u> vertigo, we suggest **MRI or temporal bone CT** as the initial imaging modality (↑).

3. In adults with <u>persistent central</u> vertigo, we recommend **MRI/MRA or CT/CTA** as the initial imaging modality (↑↑).

Recommendations from 3 guidelines were used during the discussion and formulation of these recommendations: the 2012 CAR guideline Central Nervous System section [18], the 2023 ACR guideline on Dizziness and ataxia [48], the 2020 Meniere's disease guideline [49,50] (**Appendix 2: Table CN09B**).

The guideline recommendations are to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring. These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability. We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient.

CN10. Mental status change

CN10A. Mental status change: Acute (e.g., delirium, first-onset psychosis)

Recommendations

1. In adults with unexplained acute mental status changes, we recommend **CT** as the initial imaging modality (↑↑).

↳ **1.1** If CT is negative and occult pathology is suspected, we recommend **MRI** as the next imaging modality (↑↑).

CT and MRI have a low yield in those with new onset psychosis and no neurologic deficit.

Recommendations from 2 guidelines were used during the discussion and formulation of these recommendations: the 2012 CAR guideline Central Nervous System section [18], and the 2019 ACR Acute mental status change, delirium, and new onset psychosis guideline [54] (**Appendix 2: Table CN10A**).

CN10B. Dementia/memory loss

Recommendations

1. In adults with suspected dementia (including rapidly progressive dementia), to exclude structural causes or if relevant to clinical decision-making, we recommend **MRI** as the initial imaging modality (↑↑).

↳ **1.1** If MRI is unavailable, we suggest **CT** as a suitable interim modality until MRI is available (↑).

Recommendations from 4 guideline was used during the discussion and formulation of these recommendations: the 2012 CAR guideline Central Nervous System section [18], the 2019 ACR Dementia [46], the 2019 ACR movement disorders and neurodegenerative diseases guideline [35], and the 2020 Canadian Consensus Conference guideline [55] (**Appendix 2: Table CN10B**).

CN11. Visual loss

Recommendations

Etiology of visual loss is often identified on ocular exam [56]. If imaging is required, then:

1. In adults with acute visual loss, we recommend **CT/CTA** as the initial imaging modality (↑↑).

2. In adults with progressive/chronic visual loss, we recommend **MRI** as the initial imaging modality (↑↑).

Recommendations from 5 guidelines were used during the discussion and formulation of these recommendations: the 2012 CAR guideline Central Nervous System section [18], the 2020 British Society of Rheumatology guideline [57,58], the 2024 EULAR guideline on Large vessel vasculitis [59], the 2022 Japanese National Research Committee for Behçet's disease [60], and the 2019 Swedish Society of Rheumatology on Giant cell arteritis [34] (**Appendix 2: Table CN11**).

The guideline recommendations are to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring. These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability. We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient.

CN12. Epilepsy and seizure

Recommendations

1. In adults with established epilepsy presenting at an emergency department after a typical seizure, we **recommend no routine imaging** (↓↓).
   - ↳ **1.1** If there is concern for an acute intracranial injury or a significant change in the pattern of seizures, we recommend **CT or MRI** as the initial imaging modality (↑↑).
2. In adults with new onset seizure, we recommend **CT or MRI** as the initial imaging modality (↑↑).

If concern for CNS infection, see CN13. CNS infection.
If concern for cerebrovascular disease, see CN02. Cerebrovascular disease

Recommendations from 4 guidelines were used during the discussion and formulation of these recommendations: the 2012 CAR guideline [18], the 2019 ACR Seizures and epilepsy guideline [61], the 2021 European Association of Neuro-Oncology and European Society for Medical Oncology (EANO-ESMO) Primary and secondary brain tumour guideline [62], and the 2022 NICE Epilepsy guideline [63,64] (**Appendix 2: Table CN12**).

CN13. CNS infection

Recommendations

1. In adults with suspected CNS infection✧, we recommend **MRI brain with contrast** as the initial imaging modality (EP consensus).

✧For example, meningitis, ventriculitis, encephalitis

No guidelines were identified.

CN14. Intracranial space-occupying lesions

Recommendations

1. In adults with suspected intracranial space-occupying lesions, we recommend **MRI or CT** as the initial imaging modality (↑↑).

Recommendations from 10 guidelines were used during the discussion and formulation of these recommendations: the 2019 British Society for Haematology guideline on Primary central nervous system lymphoma [65], the 2022 Chinese Neurosurgical Society of the Chinese Medical Association/Society of Hematological Malignancies of the Chinese Anti-Cancer Association (CNS CMA/SHM) guideline on Primary central nervous system lymphoma [66], the 2024 European Society of Clinical Microbiology and Infectious Diseases guideline on Brain abscess [67], the 2021 European Association of Neuro-Oncology (EANO) guideline on Meningiomas [68], the 2021 EANO guideline on Glioma [69], the 2021 European Association of Neuro-Oncology and European Society for Medical Oncology (EANO-ESMO) guidelines on Primary and secondary brain tumour [62], the 2019 EANO and European Rare Cancer guideline on Medulloblastoma [70], the 2020 Joint Tumor Section of the American Association of Neurological Surgeons and the Congress of Neurological Surgeons guideline on Glioblastomas [71], the 2021 NICE guideline on Primary brain tumor and brain metastases [72], and the 2020 SINch (Italian Society of Neurosurgery) Neuro-Oncology Section, AINO (Italian Association of Neuro-Oncology) and SIN (Italian Association of Neurology) Neuro-Oncology Section guideline on Low-grade gliomas [73] (**Appendix 2: Table CN14**).

The guideline recommendations are to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring. These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability. We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient.

CN15. Suspected cerebral venous sinus thrombosis

Recommendations

1. In adults with suspected venous sinus thrombosis, we recommend **MRI/MRV or CT/CTV** as the initial imaging modality (↑↑).

Recommendations from 3 guidelines were used during the discussion and formulation of these recommendations: the 2023 ACR guideline on Cerebrovascular Diseases – Stroke and Stroke Related Conditions [21], the 2020 Canadian Stroke guideline on Spontaneous Intracerebral Hemorrhage [25], and the 2019 CSA guideline on Cerebral Venous Sinus Thrombosis [74] (**Appendix 2: Table CN15**).

CN16. Vasculitis

Recommendations

1. In adults with suspected CNS vasculitis, we recommend **CT/CTA ± MRI** as the initial imaging modality (↑↑).
2. In adults with suspected giant cell/temporal arteritis, where biopsy is not performed, we suggest **MRI or US** as the initial imaging modality (↑).

Recommendations from 5 guidelines were used during the discussion and formulation of these recommendations: the 2021 ACR guideline on Cerebrovascular Diseases – Aneurysm, Vascular Malformation, and Subarachnoid Hemorrhage [22], the 2020 British Society for Rheumatology guideline on Giant cell arteritis [57,58], the 2023 European Stroke Organisation guideline on Primary Angiitis of the Central Nervous System [75], the 2024 EULAR guideline on Large Vessel Vasculitis [59], and the 2022 Japanese National Research Committee guideline on Behcet's Disease [60] (**Appendix 2: Table CN16**).

CN17. Movement disorders/Parkinsonism

Recommendations

1. In adults with movement disorders/Parkinsonism, to exclude structural causes or if relevant to clinical decision-making, we recommend **MRI** as the initial imaging modality (↑↑).

Recommendations from 2 guidelines were used during the discussion and formulation of these recommendations: the 2020 ACR guideline on Movement Disorders and Neurodegenerative Diseases [35] and the 2019 Canadian Guideline by Grimes et al. on Parkinson's Disease [76] (**Appendix 2: Table CN17**).

CN18. Metabolic and toxic encephalopathies

Recommendations

1. In adults with suspected metabolic or toxic encephalopathy, we recommend **against routine imaging** (↓↓).
   - ↳ **1.1** If there remains diagnostic uncertainty or non-response to treatment, we recommend **CT or MRI** as the initial imaging modality (↑↑).
   - ↳ **1.2** If there is clinical suspicion of PRES, we recommend **MRI** as the initial imaging modality (EP consensus).

The guideline recommendations are to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring. These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability. We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient.

PRES: Posterior Reversible Encephalopathy Syndrome

Recommendations from 2 guidelines were used during the discussion and formulation of these recommendations: the 2022 EASL guideline on Hepatic Encephalopathy [77] and the 2019 guideline by Xu et al on Hepatic Encephalopathy in Cirrhosis [78] (**Appendix 2: Table CN18**).

CN19. Aneurysm screening

Recommendations

1. In adults at high risk✧ for cerebral aneurysm, we recommend **MRI/MRA or CT/CTA** for initial screening (↑↑).

✧Patients with autosomal dominant polycystic kidney disease [22], patients with ≥2 family members with intracranial aneurysms or subarachnoid hemorrhage. A higher risk of aneurysm occurrence in such families is found in those with a history of hypertension, smoking, and female sex [79].

Recommendations from 1 guideline were used during the discussion and formulation of these recommendations: the 2021 ACR guideline on Cerebrovascular Disease – Aneurysm, Vascular Malformation, and Subarachnoid Hemorrhage [22] (**Appendix 2: Table CN19**).

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APPENDIX 1. SEARCH STRATEGIES

CNS Conditions – Imaging
2024 Feb 27

Database: Embase Classic+Embase <1947 to 2024 February 26>, Ovid MEDLINE(R) ALL <1946 to February 26, 2024>
Search Strategy:
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1 exp Central Nervous System Diseases/ (5052969)
2 ((CNS or central nervous system? or brainstem? or brain stem? or cerebell* or cerebral* or diencephalon or di-encephalon or encephalo*) adj3 (disease? or disorder? or dysfunction? or myelopath* or myeloneuropath* or myeloneuro-path* or myelo-neuropath* or myelo-neuro-path* or syndrome?)).tw,kw,kf. (182974)
3 (encephalopath* or encephalo-path* or encephalomyeloneuropath* or encephalo-myeloneuropath* or encephalo-myeloneuro-path* or encephalo-myelo-neuropath* or encephalo-myelo-neuro-path* or encephalomyeloneuro-path* or encephalomyelopath* or encephalo-myelopath* or encephalo-myelo-path* or encephalomyelo-path*).tw,kw,kf. (162516)
4 exp Demyelinating Diseases/ (360554)
5 (demyelinati* or de-myelinati*).tw,kw,kf. (99883)
6 clinically isolated syndrome?.tw,kw,kf. (6303)
7 exp Nervous System Malformations/ (228008)
8 ((CNS or nervous system? or encephalo*) adj3 (abnormalit* or anomal* or defect* or deform* or disorder* or dysfunction* or malform*)).tw,kw,kf. (52173)
9 ((congenital* or antenatal* or ante-natal* or antepartum or ante-partum or birth or f?etal* or f?etus* or intrauterin* or intra-uterin* or neonat* or newborn* or prenatal* or pre-natal*) adj3 (abnormalit* or anomal* or defect* or deform* or disorder* or dysfunction* or malform*) adj10 (brain or cereb* or encephal*)).tw,kw,kf. (10535)
10 exp Neural Tube Defects/ (70162)
11 (neural tube? adj3 defect*).tw,kw,kf. (20272)
12 (acrania? or craniorachischis* or cranio-rachischis* or diastematomyeli* or diastemato-myeli* or exencephal* or iniencephal* or neur?enteric cyst? or neur?-enteric cyst?).tw,kw,kf. (5621)
13 ((spinal or spine?) adj3 (melodysplasi* or melo-dysplasi*)).tw,kw,kf. (0)
14 (tethered adj2 cord? adj3 syndrome?).tw,kw,kf. (2069)
15 (anencephal* or aprosencephal* or Arnold-Chiari* or (chiari adj2 malform*) or ancephalocel* or cephalocel* or craniocel* or encephalocel* or notoencephalocel* or noto-encephalocel* or (hernia* adj2 cereb*) or (bifid* adj2 crani*) or meningocel* or (hernia* adj2 meninge*) or meningomyelocel* or meningo-myelocel* or myelocel* or (cantrell* adj2 pentalog*) or (cantrell* adj4 syndrome?) or thoracoabdominal syndrome? or thoraco-abdominal syndrome?).tw,kw,kf. (35919)
16 exp Spinal Dysraphism/ (25585)
17 (((spinal or spine?) adj3 (bifida or cleft or dysraph* or open)) or rachischis* or schistorrhachis*).tw,kw,kf. (6763)
18 exp Cerebrovascular Disorders/ (1297679)
19 ((cerebral vascul* or cerebrovascul* or cerebr* vascul* or brain vascul* or intracranial vascul* or intra-cranial vascul*) adj3 (damag* or disease? or disorder? or disturb* or dysfunction? or insufficien* or lesion? or occlusion? or patholog* or syndrome?)).tw,kw,kf. (104570)
20 (cerebroangiopath* or cerebro-angiopath* or cerebro-angio-path* or cerebroangio-path* or cerebrovasculopath* or cerebro-vasculopath* or cerebro-vasculo-path* or cerebrovasculo-path*).tw,kw,kf. (97)
21 ((brain? or cerebr*) adj3 (angiopath* or angio-path* or circulation failure? or h?emorrhag* or vasculopath* or vasculo-path*)).tw,kw,kf. (57760)
22 (stroke or strokes or apople* or vascular accident? or (CVA and (cerebr* or vascular* or accident*))).tw,kw,kf. (886964)
23 ((ischemi* adj2 transient) or (TIA and (brain? or transien* or ischemi* or attack*))).tw,kw,kf. (64645)
24 exp Carotid Artery Diseases/ (112371)
25 ((carotid or cervical) adj2 (arterial or artery or arteries or atherosclero*) adj3 (disease? or disorder? or dysfunction? or narrowing or plaque? or steno* or thrombo* or ulcer*)).tw,kw,kf. (41636)
26 ((carotid or cervical) adj2 (atheroscleros* or athero-scleros* or bruit)).tw,kw,kf. (16095)
27 (vessel? adj3 neck? adj3 (disease? or disorder? or dysfunction? or narrowing or plaque? or steno* or thrombo* or ulcer*)).tw,kw,kf. (84)
28 (moyamoya or moya moya).tw,kw,kf. (13406)
29 exp Multiple Sclerosis/ (241540)
30 ((multiple or disseminated or insular or multiplex) adj2 (scleros* or sclerot*)).tw,kw,kf. (250259)
31 ((MS or RRMS or PPMS or SPMS or HA-RRMS or HA-RMS or HDA-RMS) and (multiple or sclero* or progressive or relapse* or remitting or secondary or highly active or disease activity)).tw,kw,kf. (258282)
32 exp Demyelinating Autoimmune Diseases, CNS/ (106577)
33 ((spine? or spinal) adj3 schistosomia*).tw,kw,kf. (208)
34 (cerebral sclero* adj2 (diffuse or Schilder* or Sudanophil*)).tw,kw,kf. (305)
35 ((Alpers* or Balo or "Balo's" or Schilder*) adj3 (disease? or disorder? or sclero* or syndrome?)).tw,kw,kf. (1718)
36 (alpers* diffuse degenerat* or alpers* progressive infantile poliodystroph* or alpers* progressive infantile polio-dystroph* or diffuse degenerat* or encephalitis periaxial#s or myelinoclastic diffuse sclero* or poliodystroph* cerebr* or progressive sclero* poliodystroph* or progressive sclero* polio-dystroph*).tw,kw,kf. (651)
37 (encephalit* or encephalomyelit* or leukoencephalit* or leuko-encephalit*).tw,kw,kf. (179126)
38 (Hurst* adj3 (disease? or disorder? or syndrome?)).tw,kw,kf. (96)
39 (myelit#s or neuromyelit* or neuro-myelit*).tw,kw,kf. (30937)
40 exp Headache/ (329586)
41 exp Headache Disorders/ (447290)
42 (headache? or cephalalgia? or cephalgia? or cephalodynia? or cephalo-dynia? or ((cranial or cranium or head?) adj3 (ache? or pain*)) or hemicrania? or hemi-crania? or migraine?).tw,kw,kf. (350217)
43 (SNOOP or SNOOP4 or SNOOPP*).tw,kw,kf. (49)
44 Brain Concussion/ (20522)
45 (concussi* or commotio cerebr* or mild traumatic brain injur*).tw,kw,kf. (42270)
46 Cavernous Sinus/ab [abnormalities] (206)
47 (cavernous sinus* adj3 (abnormalit* or anomal* or defect* or deform* or disease? or disorder* or dysfunction* or malform* or problem* or symptom*)).tw,kw,kf. (566)

48 ((sella? or juxtasella? or pituitar*) adj3 (abnormalit* or anomal* or defect* or deform* or disease? or disorder* or dysfunction* or malform* or symptom*)).tw,kw,kf. (18903)
49 exp Cranial Nerve Diseases/ (310558)
50 (cranial* adj3 (nerve or nerves or nervus) adj3 (disease? or disorder? or palsy or palsies or syndrome?)).tw,kw,kf. (12134)
51 (cranial* adj3 (neuropath* or neuro-path*)).tw,kw,kf. (5080)
52 exp Cranial Fossa, Posterior/ and (disease? or disorder? or syndrome? or symptom?).ti,kw,kf. (1760)
53 exp Brain Stem/ and (disease? or disorder? or syndrome? or symptom?).ti,kw,kf. (55219)
54 ((brain stem? or brainstem? or clivus or cerebell* or (posterior adj2 fossa?) or medulla oblongata or mesencephalon or pons or truncus cerebri) adj5 (disease? or disorder? or syndrome? or symptom?)).tw,kw,kf. (33649)
55 exp Hydrocephalus/ (93954)
56 (hydrocephal* or hydro-cephal* or aqueductal stenos#s or aque-ductal stenos#s or cerebral ventriculomegal* or cerebral ventriculo-megal* or Dandy-Walker or Hakim* Syndrome? or Luschka-Magendie).tw,kw,kf. (82961)
57 Ventriculoperitoneal Shunt/ and Equipment Failure/ (485)
58 Ventriculoperitoneal Shunt/ and (malfunction* or problem*).ti,kw,kf. (499)
59 (shunt? adj3 (fail* or malfunction* or problem*)).tw,kw,kf. (5742)
60 exp Hearing Loss/ (216979)
61 (((auditory or hear*) adj3 (damag* or defect* or disturb* or impair* or loss* or lost)) and (CNS or central nervous system?)).tw,kw,kf. (4175)
62 ((central or cochlear or cortical or neurosensor* or neuro-sensor* or sensorineur* or sensori-neur* or sensoryneur* or sensory-neur*) adj3 (deaf* or (hearing adj3 (loss* or lost)))).tw,kw,kf. (50390)
63 presby?cus*.tw,kw,kf. (3924)
64 ((Hallgren* or Usher*) adj syndrome?).tw,kw,kf. (3691)
65 exp Vertigo/ (73532)
66 vertigo*.tw,kw,kf. (44900)
67 BPPV.tw,kw,kf. (4522)
68 (familial adj3 (vestibulopath* or vestibulopath*)).tw,kw,kf. (11)
69 Optic Neuritis/ (21406)
70 Neuromyelitis Optica/ (13975)
71 (optic neurit#s or neuropapillit#s or neuro-papillit#s or retrobulbar neurit#s or retro-bulbar neurit#s).tw,kw,kf. (22089)
72 ((Devic* or NMO) adj3 (disease? or disorder? or syndrome?)).tw,kw,kf. (6417)
73 (Devic* adj3 optica).tw,kw,kf. (609)
74 (((sight or vision or visual or ocular* or orbit*) adj3 (damag* or defect* or disturb* or impair* or loss* or lost)) and (CNS or central nervous system?)).tw,kw,kf. (5124)
75 ((memory or memories or mental* or cognit*) adj2 (chang* or declin* or degenerat* or deteriorat* or loss* or losing or lost)).tw,kw,kf. (183919)
76 ((memory or memories) adj3 (defect* or difficulties or difficulty or disorder? or dysfunction* or fail* or malfunction* or problem*)).tw,kw,kf. (34604)
77 Delirium/ (51131)
78 delir*.tw,kw,kf. (59949)
79 ((early or earliest or first episod* or first onset? or 1st episod* or 1st onset? or new) adj3 (psychos#s or psychotic*)).tw,kw,kf. (23027)
80 exp Dementia/ (678137)
81 (dement* or amentia? or pseudodement*).tw,kw,kf. (381599)
82 alzheimer*.tw,kw,kf. (467661)
83 (progressive adj2 aphasi*).tw,kw,kf. (6346)
84 PPA syndrome*.tw,kw,kf. (80)
85 (senile or senility).tw,kw,kf. (49763)
86 ((Mesulam* adj1 syndrome*) or binswanger* or (spongiform encephalopath$3 adj1 (subacute or sub-acute)) or "Kosaka-Shibayama" or ("diffuse neurofibrillary" adj tangle? adj5 calcif*) or ((frontotemporal or fronto-temporal) adj lobar degeneration)).tw,kw,kf. (10283)
87 (FTLD or DDPAC or FLDEM or FTD-GRN or FTD-PGRN or FTDP-17 or FTLD-17 GRN or FTLD-TDP or HDDD1 or HDDD2).tw,kw,kf. (7882)
88 ((Pick$2 adj1 disease*) or "Wilhelmsen-Lynch" or ((brain or lobar) adj2 atroph*) or "Kluver-Bucy" or "Kleuver-Bucy" or (Lewy bod$3 adj2 disease*) or CADASIL).tw,kw,kf. (40598)
89 exp Epilepsy/ (431932)
90 exp Seizures/ (314419)
91 (epileps* or epilept* or comitial disease* or convuls* or falling sickness* or seizure? or petit mal or grand mal or absence status).tw,kw,kf. (648359)
92 Sturge-Weber Syndrome/ (4399)
93 ((Landau-Kleffner or Lennox Gastaut or Sturge-Weber or Sturge or Weber or West) adj (disease? or disorder? or syndrome?)).tw,kw,kf. (15364)
94 ((infantile or nodding or flexor or "in flexion") adj2 spasm?).tw,kw,kf. (7947)
95 ((lightning or salaam) adj2 attack?).tw,kw,kf. (16)
96 hypsarrhythmi*.tw,kw,kf. (2594)
97 exp Central Nervous System Infections/ (345197)
98 ((central nervous system or CNS or brain? or cerebell* or cerebr* or infratentoria* or infra-tentoria* or intracerebr* or intra-cerebr* or intracrani* or intra-crani* or intraventric* or intra-ventric* or leptomeningeal or lepto-meningeal or midline or meningeal or parameningeal or para-meningeal or posterior fossa or spinal cord? or spinal nerv* or subtentorial or sub-tentorial or supratentorial or supra-tentorial) adj3 (abscess* or empy?ema* or infection? or inflam*)).tw,kw,kf. (119250)
99 (meningit#s or cerebromeningit#s or cerebro-meningit#s or encephalit#s or encephalomeningit#s or encephalo-meningit#s or encephalomyelit#s or encephalo-myelit#s or meningoencephalit#s or meningo-encephalit#s or myeloencephalit#s or myelo-encephalit#s or myelit#s or polio? or poliomyeliti#s or polio-myeliti#s or postpoliomyelit#s or post-poliomyelit#s or post-polio-myelit#s or postpolio-myelit#s).tw,kw,kf. (356212)
100 exp Central Nervous System Neoplasms/ (675084)
101 ((central nervous system or CNS or brain? or cerebell* or cerebr* or infratentoria* or infra-tentoria* or intracerebr* or intra-cerebr* or intracrani* or intra-crani* or intraventric* or intra-ventric* or leptomeningeal or lepto-meningeal or midline or meningeal or posterior fossa or spinal cord? or spinal nerv* or subtentorial or sub-tentorial or supratentorial or supra-tentorial) adj3 (adenocarcinoma* or adeno-carcinoma* or cancer* or carcinoma* or lesion? or malignan* or mass$2 or neoplas* or tumo#r*)).tw,kw,kf. (272030)
102 exp Glioma/ (289733)
103 glioma?.tw,kw,kf. (179990)
104 ((glia or glial) adj3 (adenocarcinoma* or adeno-carcinoma* or cancer* or carcinoma* or lesion? or malignan* or mass$2 or neoplas* or tumo#r*)).tw,kw,kf. (5176)

105 (glioblastoma? or glio-blastoma? or glyoblastoma? or glyo-blastoma? or gliosarcoma? or glio-sarcoma? or glyosarcoma? or glyo-sarcoma?).tw,kw,kf. (134986)
106 ((astrocyt* or astro-cyt* or oligodendrog* or oligodendro-g* or oligo-dendro-g* or ependymal* or ependymogl* or tanycyt* or tany-cyt*) adj3 (adenocarcinoma* or adeno-carcinoma* or cancer* or carcinoma* or lesion? or malignan* or mass$2 or neoplas* or tumo#r*)).tw,kw,kf. (9948)
107 (astroblastoma* or astro-blastoma* or astrocytoma? or astro-cytoma? or astroglioma? or astro-glioma? or oligoastrocytoma? or oligo-astrocytoma? or oligoastro-cytoma? or oligo-astro-cytoma? or ependymoma? or tanycytoma? or tany-cytoma? or xanthoastrocytoma* or xantho-astrocytoma* or xanthoastro-cytoma* or xantho-astro-cytoma*).tw,kw,kf. (60598)
108 (oligodendroglioma? or oligodendro-glioma? or oligo-dendroglioma? or oligo-dendro-glioma? or olegodendrocytoma? or olegodendro-cytoma? or olego-dendrocytoma? or olego-dendro-cytoma? or oligodendrocytoma? or oligodendro-cytoma? or oligo-dendrocytoma? or oligo-dendro-cytoma? or oligo-dendrocytes#s? or oligodendro-cytos#s? or oligo-dendro-cytes#s? or oligo-dendro-cytos#s? or oligodendroblastoma? or oligodendro-blastoma? or oligo-dendroblastoma? or oligo-dendro-blastoma?).tw,kw,kf. (12740)
109 (gbm and (brain* or multiform*)).tw,kw,kf. (34433)
110 Intracranial Thrombosis/ (3284)
111 exp Sinus Thrombosis, Intracranial/ (17888)
112 (sinus$2 adj3 (phlebit* or thrombo*)).tw,kw,kf. (16066)
113 Aneurysm/ (70547)
114 aneurysm?.tw,kw,kf. (317580)
115 Vasculitis/ (66109)
116 Vasculitis, Central Nervous System/ (1572)
117 (angiit#s or arterit#s or vasculit#s).tw,kw,kf. (148596)
118 exp Movement Disorders/ (1206454)
119 ((movement or motor) adj3 (disab* or disorder? or disturb* or impair* or dysfunction*)).tw,kw,kf. (168795)
120 exp Parkinsonian Disorders/ (139467)
121 (parkinson* or hemiparkinson* or hemi-parkinson* or paralys#s agitans or paralys#s syndrome?).tw,kw,kf. (376356)
122 or/1-121 [CNS CONDITIONS OF INTEREST] (8181927)
123 Diagnostic Imaging/ (302252)
124 dg.fs. [diagnostic imaging] (1481811)
125 (diagnos* adj3 (image? or imaging)).tw,kw,kf. (148557)
126 (x-ray* or xray*).tw,kw,kf. (1014738)
127 Image Interpretation, Computer-Assisted/ (92296)
128 exp Imaging, Three-Dimensional/ (224576)
129 ((3D or 3-D or 3-dimension* or three dimension*) adj (image? or imaging)).tw,kw,kf. (52116)
130 exp Ultrasonography/ (1534126)
131 (ultrasound* or ultrasonograph* or ultra-sonograph* or ultrasonic* or ultra-sonic*).tw,kw,kf. (1191396)
132 (echograph* or echo-graph* or echotomograph* or echo-tomograph* or echosonograph* or echo sonograph*).tw,kw,kf. (26776)
133 exp Radiography/ (2737856)
134 (radiograph* or radiographic imag* or roentgenograph* or roentgeno-graph*).tw,kw,kf. (658384)
135 (fluoroscop* or fluoro-scop*).tw,kw,kf. (95445)
136 exp Radionuclide Imaging/ (459170)
137 ((radionuclide* adj2 imag*) or (radio-nuclide* adj2 imag*) or (radionuclide* adj2 scan*) or (radio-nuclide* adj2 scan*) or (radioisotope* adj2 imag*) or (radio-isotope* adj2 imag*) or (radioisotope* adj2 scan*) or (radio-isotope* adj2 scan*) or scintigra* or scinti-gra* or scintiphotograph* or scinti-photograph* or scintiscan* or scinti-scan* or scanograph* or lymphoscintigra* or lympho-scintigra*).tw,kw,kf. (160668)
138 exp Tomography/ (3581991)
139 (tomograph* or tomo-graph*).tw,kw,kf. (1263863)
140 (CAT scan* or CT scan* or PET scan* or PET imag* or PT scan* or PT imag*).tw,kw,kf. (429221)
141 (SPECTCT or SPECT CT or "SPECT/CT").tw,kw,kf. (19634)
142 (magnetic resonance imag* or MRI or MRIs or fMRI or fMRIs or NMR imag* or chemical shift imag* or magneti#ation transfer contrast imag* or spin echo imag* or zeugmatograph* or zeugmato-graph*).tw,kw,kf. (1371096)
143 (cineradiograph* or cine-radiograph* or cinefluorograph* or cine-fluorograph* or radiocinematograph* or radio-cinematograph*).tw,kw,kf. (4252)
144 Nuclear Medicine/ (46455)
145 ((nuclear or atomic) adj1 medicine?).tw,kw,kf. (50648)
146 (nuclear adj1 radiolog*).tw,kw,kf. (1425)
147 (sialogra* or salivogra* or sialoscintigra* or sialo-scintigra*).tw,kw,kf. (3407)
148 (enteroclys* or enterogra*).tw,kw,kf. (6704)
149 (esophagra* or oesophagra* or esophagogra* or oesophagogra*).tw,kw,kf. (7598)
150 ((CT or virtual) adj colonoscop*).tw,kw,kf. (1972)
151 (contrast adj (study or studies or medium)).tw,kw,kf. (48145)
152 (cholangiopancreatogra* or cholangio-pancreatogra* or ERCP or MRCP).tw,kw,kf. (60741)
153 cholecystogra*.tw,kw,kf. (5503)
154 (angiograph* or angio-graph* or angiogram* or angio-gram*).tw,kw,kf. (602534)
155 (perfusion adj3 (image? or imaging)).tw,kw,kf. (45079)
156 or/123-155 [IMAGING] (8866225)
157 122 and 156 [CNS CONDITIONS OF INTEREST - IMAGING] (1818850)
158 exp Animals/ not Humans/ (17737485)
159 157 not 158 [ANIMAL-ONLY REMOVED] (1463768)
160 (case reports or address or autobiography or bibliography or biography or comment or dictionary or directory or editorial or "expression of concern" or festschrift or historical article or interactive tutorial or lecture or legal case or legislation or news or newspaper article or patient education handout or personal narrative or portrait or video-audio media or webcast or (letter not (letter and randomized controlled trial))).pt. (7142220)
161 159 not 160 [IRRELEVANT PUBLICATION TYPES REMOVED] (1201358)
162 exp Guidelines as Topic/ (910928)
163 exp Clinical Protocols/ (317179)
164 Guideline.pt. (16379)
165 Practice Guideline.pt. (31164)
166 standards.fs. (767758)
167 Consensus Development Conference.pt. (12377)
168 Consensus Development Conference, NIH.pt. (801)
169 (consensus or guideline* or guidance? or standards or recommendation*).ti,kw,kf. (576693)
170 (expert consensus or consensus statement* or consensus conference* or clinical guideline? or practice guideline? or treatment guideline? or practice parameter* or position statement* or policy statement* or CPG or CPGs).tw,kw,kf. (328849)
171 or/162-170 [GUIDELINE FILTER] (2335555)
172 161 and 169 [GUIDELINES] (7373)

173 limit 172 to yr="2019-current" [DATE LIMIT APPLIED] (3421)
174 173 use medall [MEDLINE RECORDS] (874)
175 exp central nervous system disease/ (5052969)
176 ((CNS or central nervous system? or brainstem? or brain stem? or cerebell* or cerebral* or diencephalon or di-encephalon or encephalo*) adj3 (disease? or disorder? or dysfunction? or myelopath* or myeloneuropath* or myeloneuro-path* or myelo-neuropath* or myelo-neuro-path* or syndrome?)).tw,kw,kf. (182974)
177 (encephalopath* or encephalo-path* or encephalomyeloneuropath* or encephalo-myeloneuropath* or encephalo-myeloneuro-path* or encephalo-myelo-neuropath* or encephalo-myelo-neuro-path* or encephalomyeloneuro-path* or encephalomyelopath* or encephalo-myelopath* or encephalo-myelo-path* or encephalomyelo-path*).tw,kw,kf. (162516)
178 exp demyelinating disease/ (360554)
179 (demyelinati* or de-myelinati*).tw,kw,kf. (99883)
180 clinically isolated syndrome?.tw,kw,kf. (6303)
181 exp nervous system malformation/ (228008)
182 ((CNS or nervous system? or encephalo*) adj3 (abnormalit* or anomal* or defect* or deform* or disorder* or dysfunction* or malform*)).tw,kw,kf. (52173)
183 ((congenital* or antenatal* or ante-natal* or antepartum or ante-partum or birth or f?etal* or f?etus* or intrauterin* or intra-uterin* or neonat* or newborn* or prenatal* or pre-natal*) adj3 (abnormalit* or anomal* or defect* or deform* or disorder* or dysfunction* or malform*) adj10 (brain or cereb* or encephal*)).tw,kw,kf. (10535)
184 exp neural tube defect/ (70162)
185 (neural tube? adj3 defect*).tw,kw,kf. (20272)
186 (acrania? or craniorachischis* or cranio-rachischis* or diastematomyeli* or diastemato-myeli* or exencephal* or iniencephal* or neur?enteric cyst? or neur?-enteric cyst?).tw,kw,kf. (5621)
187 ((spinal or spine?) adj3 (melodysplasi* or melo-dysplasi*)).tw,kw,kf. (0)
188 (tethered adj2 cord? adj3 syndrome?).tw,kw,kf. (2069)
189 (anencephal* or aprosencephal* or Arnold-Chiari* or (chiari adj2 malform*) or ancephalocel* or cephalocel* or craniocel* or encephalocel* or notoencephalocel* or noto-encephalocel* or (hernia* adj2 cereb*) or (bifid* adj2 crani*) or meningocel* or (hernia* adj2 meninge*) or meningomyelocel* or meningo-myelocel* or myelocel* or (cantrell* adj2 pentalog*) or (cantrell* adj4 syndrome?) or thoracoabdominal syndrome? or thoraco-abdominal syndrome?).tw,kw,kf. (35919)
190 exp spinal dysraphism/ (25585)
191 (((spinal or spine?) adj3 (bifida or cleft or dysraph* or open)) or rachischis* or schistorrhachis*).tw,kw,kf. (6763)
192 exp cerebrovascular disease/ (1297679)
193 ((cerebral vascul* or cerebrovascul* or cerebr* vascul* or brain vascul* or intracranial vascul* or intra-cranial vascul*) adj3 (damag* or disease? or disorder? or disturb* or dysfunction? or insufficien* or lesion? or occlusion? or patholog* or syndrome?)).tw,kw,kf. (104570)
194 (cerebroangiopath* or cerebro-angiopath* or cerebro-angio-path* or cerebroangio-path* or cerebrovasculopath* or cerebro-vasculopath* or cerebro-vasculo-path* or cerebrovasculo-path*).tw,kw,kf. (97)
195 ((brain? or cerebr*) adj3 (angiopath* or angio-path* or circulation failure? or h?emorrhag* or vasculopath* or vasculo-path*)).tw,kw,kf. (57760)
196 (stroke or strokes or apople* or vascular accident? or (CVA and (cerebr* or vascular* or accident*))).tw,kw,kf. (886964)
197 ((ischemi* adj2 transient) or (TIA and (brain? or transien* or ischemi* or attack*))).tw,kw,kf. (64645)
198 exp carotid artery disease/ (112371)
199 ((carotid or cervical) adj2 (arterial or artery or arteries or atherosclero*) adj3 (disease? or disorder? or dysfunction? or narrowing or plaque? or steno* or thrombo* or ulcer*)).tw,kw,kf. (41636)
200 ((carotid or cervical) adj2 (atherosclerosis* or athero-scleros* or bruit)).tw,kw,kf. (16095)
201 (vessel? adj3 neck? adj3 (disease? or disorder? or dysfunction? or narrowing or plaque? or steno* or thrombo* or ulcer*)).tw,kw,kf. (84)
202 (moyamoya or moya moya).tw,kw,kf. (13406)
203 exp multiple sclerosis/ (241540)
204 ((multiple or disseminated or insular or multiplex) adj2 (scleros* or sclerot*)).tw,kw,kf. (250259)
205 ((MS or RRMS or PPMS or SPMS or HA-RRMS or HA-RMS or HDA-RMS) and (multiple or sclero* or progressive or relapse* or remitting or secondary or highly active or disease activity)).tw,kw,kf. (258282)
206 exp "autoimmune demyelinating disease of the central nervous system"/ (16518)
207 ((spine? or spinal) adj3 schistosomia*).tw,kw,kf. (208)
208 (cerebral sclero* adj2 (diffuse or Schilder* or Sudanophil*)).tw,kw,kf. (305)
209 ((Alpers* or Balo or "Balo's" or Schilder*) adj3 (disease? or disorder? or sclero* or syndrome?)).tw,kw,kf. (1718)
210 (alpers* diffuse degenerat* or alpers* progressive infantile poliodystroph* or alpers* progressive infantile polio-dystroph* or diffuse degenerat* or encephalitis periaxial#s or myelinoclastic diffuse sclero* or poliodystroph* cerebr* or progressive sclero* poliodystroph* or progressive sclero* polio-dystroph*).tw,kw,kf. (651)
211 (encephalit* or encephalomyelit* or leukoencephalit* or leuko-encephalit*).tw,kw,kf. (179126)
212 (Hurst* adj3 (disease? or disorder? or syndrome?)).tw,kw,kf. (96)
213 (myelit#s or neuromyelit* or neuro-myelit*).tw,kw,kf. (30937)
214 exp headache/ (329586)
215 exp "headache and facial pain"/ (406253)
216 (headache? or cephalalgia? or cephalgia? or cephalodynia? or cephalo-dynia? or ((cranial or cranium or head?) adj3 (ache? or pain*)) or hemicrania? or hemi-crania? or migraine?).tw,kw,kf. (350217)
217 (SNOOP or SNOOP4 or SNOOPP*).tw,kw,kf. (49)
218 brain concussion/ (20522)
219 (concussi* or commotio cerebr* or mild traumatic brain injur*).tw,kw,kf. (42270)
220 cavernous sinus/ and (abnormalit* or anomal* or defect* or deform* or disease? or disorder* or dysfunction* or malform* or problem* or symptom*).ti,kw,kf. (1310)
221 (cavernous sinus* adj3 (abnormalit* or anomal* or defect* or deform* or disease? or disorder* or dysfunction* or malform* or problem* or symptom*)).tw,kw,kf. (566)
222 ((sella? or juxtasella? or pituitar*) adj3 (abnormalit* or anomal* or defect* or deform* or disease? or disorder* or dysfunction* or malform* or symptom*)).tw,kw,kf. (18903)
223 exp cranial neuropathy/ (310558)

224 (cranial* adj3 (nerve or nerves or nervus) adj3 (disease? or disorder? or palsy or palsies or syndrome?)).tw,kw,kf. (12134)
225 (cranial* adj3 (neuropath* or neuro-path*)).tw,kw,kf. (5080)
226 exp posterior fossa/ and (disease? or disorder? or syndrome? or symptom?).ti,kw,kf. (1399)
227 exp brain stem/ and (disease? or disorder? or syndrome? or symptom?).ti,kw,kf. (55219)
228 ((brain stem? or brainstem? or clivus or cerebell* or (posterior adj2 fossa?) or medulla oblongata or mesencephalon or pons or truncus cerebri) adj5 (disease? or disorder? or syndrome? or symptom?)).tw,kw,kf. (33649)
229 exp hydrocephalus/ (93954)
230 (hydrocephal* or hydro-cephal* or aqueductal stenos#s or aque-ductal stenos#s or cerebral ventriculomegal* or cerebral ventriculo-megal* or Dandy-Walker or Hakim* Syndrome? or Luschka-Magendie).tw,kw,kf. (82961)
231 brain ventricle peritoneum shunt/ and exp device failure/ (58)
232 brain ventricle peritoneum shunt/ and (malfunction* or problem*).ti,kw,kf. (336)
233 (shunt? adj3 (fail* or malfunction* or problem*)).tw,kw,kf. (5742)
234 exp hearing impairment/ (216979)
235 (((auditory or hear*) adj3 (damag* or defect* or disturb* or impair* or loss* or lost)) and (CNS or central nervous system?)).tw,kw,kf. (4175)
236 ((central or cochlear or cortical or neurosensor* or neuro-sensor* or sensorineur* or sensori-neur* or sensoryneur* or sensory-neur*) adj3 (deaf* or (hearing adj3 (loss* or lost)))).tw,kw,kf. (50390)
237 presby?cus*.tw,kw,kf. (3924)
238 ((Hallgren* or Usher*) adj syndrome?).tw,kw,kf. (3691)
239 exp vertigo/ (73532)
240 vertigo*.tw,kw,kf. (44900)
241 BPPV.tw,kw,kf. (4522)
242 (familial adj3 (vestibulopath* or vestibulopath*)).tw,kw,kf. (11)
243 optic neuritis/ (21406)
244 myelooptic neuropathy/ (13249)
245 (optic neurit#s or neuropapillit#s or neuro-papillit#s or retrobulbar neurit#s or retro-bulbar neurit#s).tw,kw,kf. (22089)
246 ((Devic* or NMO) adj3 (disease? or disorder? or syndrome?)).tw,kw,kf. (6417)
247 (Devic* adj3 optica).tw,kw,kf. (609)
248 (((sight or vision or visual or ocular* or orbit*) adj3 (damag* or defect* or disturb* or impair* or loss* or lost)) and (CNS or central nervous system?)).tw,kw,kf. (5124)
249 ((memory or memories or mental* or cognit*) adj2 (chang* or declin* or degenerat* or deteriorat* or loss* or losing or lost)).tw,kw,kf. (183919)
250 ((memory or memories) adj3 (defect* or difficulties or difficulty or disorder? or dysfunction* or fail* or malfunction* or problem*)).tw,kw,kf. (34604)
251 exp delirium/ (58816)
252 delir*.tw,kw,kf. (59949)
253 ((early or earliest or first episod* or first onset? or 1st episod* or 1st onset? or new) adj3 (psychos#s or psychotic*)).tw,kw,kf. (23027)
254 exp dementia/ (678137)
255 (dement* or amentia? or pseudodement*).tw,kw,kf. (381599)
256 alzheimer*.tw,kw,kf. (467661)
257 (progressive adj2 aphasi*).tw,kw,kf. (6346)
258 PPA syndrome*.tw,kw,kf. (80)
259 (senile or senility).tw,kw,kf. (49763)
260 ((Mesulam* adj1 syndrome*) or binswanger* or (spongiform encephalopath$3 adj1 (subacute or sub-acute)) or "Kosaka-Shibayama" or ("diffuse neurofibrillary" adj tangle? adj5 calcif*) or ((frontotemporal or fronto-temporal) adj lobar degeneration)).tw,kw,kf. (10283)
261 (FTLD or DDPAC or FLDEM or FTD-GRN or FTD-PGRN or FTDP-17 or FTLD-17 GRN or FTLD-TDP or HDDD1 or HDDD2).tw,kw,kf. (7882)
262 ((Pick$2 adj1 disease*) or "Wilhelmsen-Lynch" or ((brain or lobar) adj2 atroph*) or "Kluver-Bucy" or "Kleuver-Bucy" or (Lewy bod$3 adj2 disease*) or CADASIL).tw,kw,kf. (40598)
263 exp epilepsy/ (431932)
264 exp seizure/ (314419)
265 (epileps* or epilept* or comitial disease* or convuls* or falling sickness* or seizure? or petit mal or grand mal or absence status).tw,kw,kf. (648359)
266 Sturge Weber syndrome/ (4399)
267 Landau Kleffner syndrome/ (1268)
268 Lennox Gastaut syndrome/ (5316)
269 ((Landau-Kleffner or Lennox Gastaut or Sturge-Weber or Sturge or Weber or West) adj (disease? or disorder? or syndrome?)).tw,kw,kf. (15364)
270 ((infantile or nodding or flexor or "in flexion") adj2 spasm?).tw,kw,kf. (7947)
271 ((lightning or salaam) adj2 attack?).tw,kw,kf. (16)
272 hypsarrhythmi*.tw,kw,kf. (2594)
273 exp central nervous system infection/ (345197)
274 ((central nervous system or CNS or brain? or cerebell* or cerebr* or infratentoria* or infra-tentoria* or intracerebr* or intra-cerebr* or intracrani* or intra-crani* or intraventric* or intra-ventric* or leptomeningeal or lepto-meningeal or midline or meningeal or parameningeal or para-meningeal or posterior fossa or spinal cord? or spinal nerv* or subtentorial or sub-tentorial or supratentorial or supra-tentorial) adj3 (abscess* or empy?ema* or infection? or inflam*)).tw,kw,kf. (119250)
275 (meningit#s or cerebromeningit#s or cerebro-meningit#s or encephalit#s or encephalomeningit#s or encephalo-meningit#s or encephalomyelit#s or encephalo-myelit#s or meningoencephalit#s or meningo-encephalit#s or myeloencephalit#s or myelo-encephalit#s or myelit#s or polio? or poliomyeliti#s or polio-myeliti#s or postpoliomyelit#s or post-poliomyelit#s or post-polio-myelit#s or postpolio-myelit#s).tw,kw,kf. (356212)
276 exp central nervous system tumor/ (675084)
277 ((central nervous system or CNS or brain? or cerebell* or cerebr* or infratentoria* or infra-tentoria* or intracerebr* or intra-cerebr* or intracrani* or intra-crani* or intraventric* or intra-ventric* or leptomeningeal or lepto-meningeal or midline or meningeal or posterior fossa or spinal cord? or spinal nerv* or subtentorial or sub-tentorial or supratentorial or supra-tentorial) adj3 (adenocarcinoma* or adeno-carcinoma* or cancer* or carcinoma* or lesion? or malignan* or mass$2 or neoplas* or tumo#r*)).tw,kw,kf. (272030)
278 exp glioma/ (289733)
279 glioma?.tw,kw,kf. (179990)
280 ((glia or glial) adj3 (adenocarcinoma* or adeno-carcinoma* or cancer* or carcinoma* or lesion? or malignan* or mass$2 or neoplas* or tumo#r*)).tw,kw,kf. (5176)

Appendix 1. Search Strategies

281 (glioblastoma? or glio-blastoma? or glyoblastoma? or glyo-blastoma? or gliosarcoma? or glio-sarcoma? or glyosarcoma? or glyo-sarcoma?).tw,kw,kf. (134986)
282 ((astrocyt* or astro-cyt* or oligodendrog* or oligodendro-g* or oligo-dendro-g* or ependymal* or ependymogl* or tanycyt* or tany-cyt*) adj3 (adenocarcinoma* or adeno-carcinoma* or cancer* or carcinoma* or lesion? or malignan* or mass$2 or neoplas* or tumo#r*)).tw,kw,kf. (9948)
283 (astroblastoma* or astro-blastoma* or astrocytoma? or astro-cytoma? or astroglioma? or astro-glioma? or oligoastrocytoma? or oligo-astrocytoma? or oligoastro-cytoma? or oligo-astro-cytoma? or ependymoma? or tanycytoma? or tany-cytoma? or xanthoastrocytoma* or xantho-astrocytoma* or xanthoastro-cytoma* or xantho-astro-cytoma*).tw,kw,kf. (60598)
284 (oligodendroglioma? or oligodendro-glioma? or oligo-dendroglioma? or oligo-dendro-glioma? or olegodendrocytoma? or olegodendro-cytoma? or olego-dendrocytoma? or olego-dendro-cytoma? or oligodendrocytoma? or oligodendro-cytoma? or oligo-dendrocytoma? or oligo-dendro-cytoma? or oligo-dendrocytes#s? or oligodendro-cytos#s? or oligo-dendro-cytes#s? or oligo-dendro-cytos#s? or oligodendroblastoma? or oligodendro-blastoma? or oligo-dendroblastoma? or oligo-dendro-blastoma?).tw,kw,kf. (12740)
285 (gbm and (brain* or multiform*)).tw,kw,kf. (34433)
286 exp cerebral thrombosis/ (20963)
287 exp cerebral sinus thrombosis/ (13611)
288 (sinus$2 adj3 (phlebit* or thrombo*)).tw,kw,kf. (16066)
289 aneurysm/ (70547)
290 aneurysm?.tw,kw,kf. (317580)
291 vasculitis/ (66109)
292 exp central nervous system vasculitis/ (14183)
293 (angiit#s or arterit#s or vasculit#s).tw,kw,kf. (148596)
294 exp motor dysfunction/ (1043219)
295 ((movement or motor) adj3 (disab* or disorder? or disturb* or impair* or dysfunction*)).tw,kw,kf. (168795)
296 parkinsonism/ (48169)
297 (parkinson* or hemiparkinson* or hemi-parkinson* or paralys#s agitans or paralys#s syndrome?).tw,kw,kf. (376356)
298 or/175-297 [CNS CONDITIONS OF INTEREST] (8183444)
299 diagnostic imaging/ (302252)
300 (diagnos* adj3 (image? or imaging)).tw,kw,kf. (148557)
301 (x-ray* or xray*).tw,kw,kf. (1014738)
302 computer assisted tomography/ (931044)
303 computer assisted diagnosis/ (68673)
304 exp three-dimensional imaging/ (224576)
305 ((3D or 3-D or 3-dimension* or three dimension*) adj (image? or imaging)).tw,kw,kf. (52116)
306 exp echography/ (1534126)
307 (ultrasound* or ultrasonograph* or ultra-sonograph* or ultrasonic* or ultra-sonic*).tw,kw,kf. (1191396)
308 (echograph* or echo-graph* or echotomograph* or echo-tomograph* or echosonograph* or echo sonograph*).tw,kw,kf. (26776)
309 exp radiography/ (2737856)
310 (radiograph* or radiographic imag* or roentgenograph* or roentgeno-graph*).tw,kw,kf. (658384)
311 (fluoroscop* or fluoro-scop*).tw,kw,kf. (95445)
312 exp scintiscanning/ (219648)
313 ((radionuclide* adj2 imag*) or (radio-nuclide* adj2 imag*) or (radionuclide* adj2 scan*) or (radio-nuclide* adj2 scan*) or (radioisotope* adj2 imag*) or (radio-isotope* adj2 imag*) or (radioisotope* adj2 scan*) or (radio-isotope* adj2 scan*) or scintigra* or scinti-gra* or scintiphotograph* or scinti-photograph* or scintiscan* or scinti-scan* or scanograph* or lymphoscintigra* or lympho-scintigra*).tw,kw,kf. (160668)
314 exp tomography/ (3581991)
315 (tomograph* or tomo-graph*).tw,kw,kf. (1263863)
316 (CAT scan* or CT scan* or PET scan* or PET imag* or PT scan* or PT imag*).tw,kw,kf. (429221)
317 (SPECTCT or SPECT CT or "SPECT/CT").tw,kw,kf. (19634)
318 (magnetic resonance imag* or MRI or MRIs or fMRI or fMRIs or NMR imag* or chemical shift imag* or magneti#ation transfer contrast imag* or spin echo imag* or zeugmatograph* or zeugmato-graph*).tw,kw,kf. (1371096)
319 (cineradiograph* or cine-radiograph* or cinefluorograph* or cine-fluorograph* or radiocinematograph* or radio-cinematograph*).tw,kw,kf. (4252)
320 nuclear medicine/ (46455)
321 ((nuclear or atomic) adj1 medicine?).tw,kw,kf. (50648)
322 (nuclear adj1 radiolog*).tw,kw,kf. (1425)
323 (sialogra* or salivogra* or sialoscintigra* or sialo-scintigra*).tw,kw,kf. (3407)
324 (enteroclys* or enterogra*).tw,kw,kf. (6704)
325 (esophagra* or oesophagra* or esophagogra* or oesophagogra*).tw,kw,kf. (7598)
326 ((CT or virtual) adj colonoscop*).tw,kw,kf. (1972)
327 (contrast adj (study or studies or medium)).tw,kw,kf. (48145)
328 (cholangiopancreatogra* or cholangio-pancreatogra* or ERCP or MRCP).tw,kw,kf. (60741)
329 cholecystogra*.tw,kw,kf. (5503)
330 (angiograph* or angio-graph* or angiogram* or angio-gram*).tw,kw,kf. (602534)
331 (perfusion adj3 (image? or imaging)).tw,kw,kf. (45079)
332 or/299-331 [IMAGING] (8721469)
333 298 and 332 [CNS CONDITIONS OF INTEREST - IMAGING] (1790856)
334 (exp animal/ or exp animal model/ or exp animal experiment/ or nonhuman/ or exp vertebrate/) not (exp human/ or exp human experiment/) (13370861)
335 333 not 334 [ANIMAL-ONLY REMOVED] (1727992)
336 (conference abstract or editorial or letter).pt. (9101694)
337 case report/ or exp case study/ or directory/ (5557712)
338 335 not (336 or 337) [IRRELEVANT PUBLICATION TYPES REMOVED] (897069)
339 exp practice guideline/ (768966)
340 (consensus or guideline* or guidance? or standards or recommendation*).ti,kw,kf. (576693)
341 (expert consensus or consensus statement* or consensus conference* or clinical guideline? or practice guideline? or treatment guideline? or practice parameter* or position statement* or policy statement* or CPG or CPGs).tw,kw,kf. (328849)
342 or/339-341 [GUIDELINE FILTER] (1377087)
343 338 and 342 [GUIDELINES] (20623)
344 limit 343 to yr="2019-current" [DATE LIMIT APPLIED] (7609)
345 344 use emczd [EMBASE RECORDS] (6559)
346 174 or 345 [BOTH DATABASES] (7433)
347 limit 346 to yr="2022-current" (3395)
348 remove duplicates from 347 (3093)
349 346 not 347 (4038)
350 remove duplicates from 349 (3644)
351 348 or 350 [TOTAL UNIQUE RECORDS] (6737)

352 351 use medall [MEDLINE UNIQUE RECORDS] (868)
353 351 use emczd [EMBASE UNIQUE RECORDS] (5869)

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APPENDIX 2. EVIDENCE TABLES

Table CN01. Congenital disorders of the brain

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered
	MRI: magnetic resonance imaging
CAR 2012 [18]	**A01. CONGENITAL DISORDERS OF THE BRAIN** - MRI: Indicated [B]: MRI is the best imaging modality for all malformations of the brain.

Abbreviations: CAR: Canadian Association of Radiologists

Table CN02. Cerebrovascular disease

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered
CT: computed tomography; **CTA**: computed tomography angiograph; **DSA:** Digital subtraction angiography; **MRA**: magnetic resonance angiograph; **MRI**: magnetic resonance imaging; **PET**: positron emission tomography; **SPECT**: single-photon emission computed tomography; **US**: ultrasound	
CAR 2012 [18]	**A02. ACUTE STROKE** - CT: Indicated [A]: Modern treatment protocols require CT or MRI at the earliest possible time in all cases of suspected stroke in order to allow initiation of treatment as soon as possible. CT is generally preferred based on availability and because it can be obtained quickly, without MR safety screening. Most Canadian centres use CT as the primary modality for investigating acute stroke. - MRI: Indicated [A]: Modern treatment protocols require CT or MRI at the earliest possible time in all cases of suspected stroke in order to allow initiation of treatment as soon as possible. MRI is a problem solving tool. It is particularly helpful in the evaluation of posterior fossa stroke. - CTA: Specialized investigation [A]: Urgent vascular imaging with CTA can help to guide patient management. - MRA: Specialized investigation [B]: Urgent vascular imaging with MRA can help to guide patient management. - SPECT or PET: Not indicated: Not indicated in the acute setting. **A03. TRANSIENT ISCHEMIC ATTACK (TIA)** - CTA: Indicated [A]: Urgent vascular imaging should be performed in all cases of high-risk TIA. - MRA: Indicated [B]: Urgent vascular imaging should be performed in all cases of high-risk TIA. - US carotids: Indicated [B]: Ultrasound can be an effective tool for screening the cervical common carotid and proximal internal carotid arteries but does not offer information on intracranial circulation. It is operator-dependent. If intervention is planned, a confirmatory CTA, MRA or DSA is recommended. - SPECT or PET: Not indicated [B]: Not indicated in the acute setting. **B09. ASYMPTOMATIC CAROTID BRUIT** - US carotids: Indicated only in specific circumstances [B]: Although US can detect carotid stenosis, it is not usually indicated because surgery is not recommended for asymptomatic carotid stenosis.
ACR 2023 [21] (Pannell et al)	**CEREBROVASCULAR DISEASES-STROKE AND STROKE-RELATED CONDITIONS** - Variant 1. Adult. Clinical transient ischemic attack (TIA). Symptoms resolved. Initial imaging. - Variant 2. Adult. Focal neurologic deficit. Clinically suspected acute ischemic stroke. Initial imaging. - Variant 3. Recent ischemic infarct; less than 24 hours. Initial imaging. - Variant 4. Recent ischemic infarct; greater than 24 hours. Initial imaging. - Variant 9. Adult. Asymptomatic cervical bruit. Initial imaging. - Variant 11. Adult. Suspected cervical vascular dissection or injury. Initial imaging.
ACR 2021 [22] (Ledbetter et al)	**CEREBROVASCULAR DISEASES-ANEURYSM, VASCULAR MALFORMATION, AND SUBARACHNOID HEMORRHAGE** - Variant 2. Suspected cerebral vasospasm. Initial imaging.
American Heart	**INTRACEREBRAL HEMORRHAGE**

Appendix 2. Evidence tables

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered
CT: computed tomography; **CTA**: computed tomography angiograph; **DSA:** Digital subtraction angiography; **MRA**: magnetic resonance angiograph; **MRI**: magnetic resonance imaging; **PET**: positron emission tomography; **SPECT**: single-photon emission computed tomography; **US**: ultrasound	
Association/American Stroke Association (AHA/ASA) 2022 [23] (Greenberg et al)	*Neuroimaging for ICH Diagnosis and Acute Course* - CT, CTA, non-contrast CT, serial head CT - MRI *Diagnostic Assessment for ICH Pathogenesis* - CTA - Venography - catheter intra-arterial DSA - MRA, MRI
American Heart Association/American Stroke Association (AHA/ASA) 2021 [24] (Kleindorfer et al)	**PREVENTION OF STROKE IN PATIENTS WITH STROKE AND TIA** - Recommendation 3. carotid ultrasonography, CT angiography (CTA), or magnetic resonance angiography (MRA) (COR: 1, LOE: B-NR) - Recommendation 4. CT or MRI (COR: 1, LOE: B-NR) - Recommendation 6. echocardiography (COR: 2a, LOE: B-R) - Recommendation 8. CT or MRI (COR: 2a, LOE: B-NR) - Recommendation 9. MRI (COR: 2a, LOE: B-NR) - Recommendation 11. MRA or CTA (COR: 2a, LOE: C-LD) - Recommendation 13. transesophageal echocardiography (TEE), cardiac CT, or cardiac MRI (COR: 2b, LOE: C-LD) - Recommendation 14. TCD (transcranial Doppler) with embolus detection (COR: 2b, LOE: C-LD)
Canadian Stroke Consortium 2021 [19] (Gladstone et al)	**TIA AND STROKE** **Hight Risk for Recurrent Stroke (Symptom onset within last 48 h)** - CT, CTA - MRI **Brain and Vascular Imaging** - CT, CTA - MRI, MRA
Canadian Stroke 2020 [25] (Shoamanesh et al)	**SPONTANEOUS INTRACEREBRAL HEMORRHAGE** - CT (Evidence Level A), CTA (Evidence Level B), CT venography (Evidence Level B) - intracranial vascular imaging (Evidence Level B) - MRI (Evidence Level B), MRA (Evidence Level B), MRI with MR venogram (Evidence Level B) - DSA (Evidence Level B).
Chinese Stroke Association (CSA) 2020 [26] (Cao et al)	**INTRACEREBRAL HEMORRHAGE** - CT, MRI (Class I, Level of Evidence A). - CTA (Class IIb, Level of Evidence B). - Contrast-enhanced CT, CTA, CTV (CT venography), MRI, MRA (MR angiography), MRV (MR venography), DSA (Class IIa, Level of Evidence B).

Appendix 2. Evidence tables

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered
CT: computed tomography; **CTA**: computed tomography angiograph; **DSA:** Digital subtraction angiography; **MRA**: magnetic resonance angiograph; **MRI**: magnetic resonance imaging; **PET**: positron emission tomography; **SPECT**: single-photon emission computed tomography; **US**: ultrasound	
Chinese Stroke Association (CSA) 2019 [27] (Dong et al)	**SUBARACHNOID HEMORRHAGE** - Non-contrast head CT (class IIa, level of evidence B), CTA (class I, level of evidence B) - Contrast MRA (class IIa, level of evidence B), MRI (class IIa, level of evidence C) - DSA (class IIa, level of evidence B)
European Academy of Neurology (EAN) 2020 [28] (Mancuso et al)	**MONOGENIC SMALL VESSEL DISEASE** - cerebral MRI
European Stroke Organisation (ESO) 2021 [29] (Fonseca et al)	**TIA** - MRA, CTA (Quality: Very Low, Recommendation: Weak for intervention)
Japan Stroke Society (JSS) 2022 [30] (Miyamoto et al)	**STROKE - Subarachnoid Hemorrhage** - MR (Grade B, LOE Moderate)
NICE 2022 (NG128) [31]	**STROKE AND TRANSIENT ISCHEMIC ATTACK** *Suspected TIA* - CT brain - MRI (including diffusion-weighted and blood-sensitive sequences) *Suspected acute stroke* - non-enhanced CT, CT contrast angiography, CT perfusion imaging (or MR equivalent)
NICE 2022 (NG228) [32]	**SUBARACHNOID HEMORRHAGE** - non-contrast CT head, CT angiography of the head - DSA - MRA
SNSSGC 2019 [33] (Kayan et al)	**LARGE VESSEL OCCLUSION STROKE** - CT and CTA (AHA Class I, Level of Evidence C-LD)
Swedish Society of Rheumatology (SSR) 2019 [34] (Turesson et al)	**GIANT CELL ARTERITIS - Cranial GCA and Extracranial GCA** - US, Doppler-US - MRI - PET/CT

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists; SNSSGC: Society of NeuroInterventional Surgery Standards and Guidelines Committee

Table CN03. Multiple sclerosis and demyelinating disease

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered
MRI: magnetic resonance imaging; **US**: ultrasound	
CAR 2012 [18]	**A04. MULTIPLE SCLEROSIS AND OTHER WHITE MATTER DISEASE** - MRI: Indicated [A]: MRI is the best imaging modality for diagnosis and follow-up of multiple sclerosis and for investigating other forms of white matter disease.
ACR 2019 [35]	**MOVEMENT DISORDERS AND NEURODEGENERATIVE DISEASES** - Variant 5: Suspected motor neuron disease. Initial imaging.
European Academy of Neurology/Peripheral Nerve Society (EAN/PNS) 2023 [36] (van Doorn et al)	**GUILLAIN-BARRE SYNDROME** - nerve MRI - US - Whole spine MRI with contrast
European Academy of Neurology/Peripheral Nerve Society (EAN/PNS) 2021 [37] (van den Berg et al)	**CHRONIC INFLAMMATORY DEMYELINATING POLYRADICULONEUROPATHY** - US - MRI
NICE 2022 (NG220) [38]	**MULTIPLE SCLEROSIS** - MRI

Abbreviations: CAR: Canadian Association of Radiologists

Table CN04. Headache

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered
CT: computed tomography; **CTA**: computed tomography angiograph; **CTV**: computed tomography venography; **DSA:** Digital subtraction angiography; **MRA**: magnetic resonance angiography; **MRI**: magnetic resonance imaging; **MRV**: Magnetic resonance venography	
CAR 2012 [18]	**A05. HEADACHE: ACUTE, SEVERE, "THUNDERCLAP"; SUSPECT SUBARACHNOID HEMORRHAGE (SAH)** - CT: Indicated [B]: CT should be obtained urgently. - CTA: Specialized investigation [C]: CTA should be used to identify an aneurysm or other vascular malformation if there is a subarachnoid hemorrhage. - DSA: Specialized investigation: DSA should be limited to solving problems where diagnostic problems persist after CTA. **A06. HEADACHE: CHRONIC/RECURRENT** The following features significantly increase the likelihood of finding a major abnormality and justify requesting diagnostic imaging: • Recent onset and rapidly increasing frequency and severity of headache • Headache causing the patient to wake from sleep • Associated dizziness, lack of coordination, tingling or numbness, new neurologic deficit • New onset of a headache in a patient with a history of cancer or immunodeficiency - CT: Indicated in specific circumstances [B]: CT is an excellent modality to screen for significant intracranial pathology. In the absence of focal features imaging is not often helpful. If imaging is indicated, CT can be used; however radiation is a consideration particularly for repeat examinations. - MRI: Indicated only in specific circumstances [C]: In the absence of focal features imaging is not often helpful. MRI provides more detailed images of the brain than CT.
ACR 2021 [22] (Ledbetter et al)	**CEREBROVASCULAR DISEASE-ANEURYSM, VASCULAR MALFORMATION, AND SUBARACHNOID HEMORRHAGE** - Variant 1. Known acute subarachnoid hemorrhage (SAH) on CT. Next imaging study.
ACR 2023 [39] (Utukuri et al)	**HEADACHE** - Variant 1. Sudden onset severe headache that reaches maximal severity within one hour. Initial imaging. - Variant 2. Primary migraine or tension-type headache. Normal neurologic examination. Initial imaging. - Variant 3. Primary trigeminal autonomic cephalalgias (eg, cluster headache). Initial imaging. - Variant 6: Headache with new onset or pattern during pregnancy or peripartum period. Initial imaging. - Variant 7. Headache with one or more of the following "red flags": increasing frequency or severity, fever or neurologic deficit, history of cancer or immunocompromise, older age (>50 years) of onset, or posttraumatic onset. Initial imaging. - Variant 8. Headache without any of the following "red flags": sudden onset ("thunderclap"), features of intracranial hypertension or hypotension, new onset or pattern during pregnancy or peripartum period, increasing frequency or severity, fever or neurologic deficit, history of cancer or immunocompromise, older age (>50 years) of onset, or posttraumatic onset. Initial imaging.
American Headache Society (AHS) 2019 [40]	**MIGRAINE** - neuroimaging

Appendix 2. Evidence tables

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered
CT: computed tomography; **CTA**: computed tomography angiograph; **CTV**: computed tomography venography; **DSA:** Digital subtraction angiography; **MRA**: magnetic resonance angiography; **MRI**: magnetic resonance imaging; **MRV**: Magnetic resonance venography	
(Evans et al)	
Chinese Stroke Association (CSA) 2019 [27] (Dong et al)	**SUBARACHNOID HEMORRHAGE** - Non-contrast head CT (class IIa, level of evidence B) - CT angiography (CTA) (class I, level of evidence B) - contrast magnetic resonance angiography (MRA) and three-dimensional time-of-flight MRA (class IIa, level of evidence B) - MRI (class IIa, level of evidence C) - DSA (class IIa, level of evidence B)
Japan Stroke Society (JSS) 2022 [30] (Miyamoto et al)	**STROKE** **Subarachnoid Hemorrhage** - noncontrast head CT, MR imaging (Grade B, LOE Moderate)
NICE 2021 (CG150) [41]	**HEADACHE** **Tension-type headache, migraine (with or without aura) and cluster headache** - neuroimaging
NICE 2022 (NG228) [32]	**SUBARACHNOID HEMORRHAGE** - non-contrast CT head - CT angiography - DSA, MRA

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists; NICE: National Institute for Health and Care Excellence

Table CN06. Pituitary and juxtasellar problems

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered
	MRI: magnetic resonance imaging; **XR**: radiograph
CAR 2012 [18]	**A08. PITUITARY AND JUXTASELLAR PROBLEMS** - MRI: Specialized investigation [B]: If vision is deteriorating the examination should be done as soon as possible. CT can be used if MRI is unavailable or contraindicated. - Skull XR: Not indicated [C]: Patients who require investigation need MRI

Abbreviations: CAR: Canadian Association of Radiologists

Table CN07. Cranial neuropathy, brain stem symptoms

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered
CT: computed tomography; **MRI**: magnetic resonance imaging	
CAR 2012 [18]	**A09. POSTERIOR FOSSA SIGNS** - MRI: Indicated [A]: MRI is the imaging modality of choice. - CT: Indicated [A]: CT is an acceptable alternative if MRI is unavailable or contraindicated.
ACR 2022 [42] (Rath et al)	**CRANIAL NEUROPATHY** - Variant 1. Anosmia or other abnormalities of the sense of smell (olfactory nerve, CN I). Initial imaging. - Variant 2. Unilateral isolated weakness of the mastication muscles, paralysis of the mastication muscles, sensory - abnormalities of the face and head, facial numbness, or trigeminal neuralgia (trigeminal nerve, CN V). Initial imaging. - Variant 3. Unilateral isolated weakness of the facial expression, paralysis of the facial expression, hemifacial spasm, or Bell - palsy (facial nerve, CN VII). Initial imaging. - Variant 4. Multiple different middle cranial nerve palsies (CN V-VII). Initial imaging. - Variant 5. Oropharyngeal neurogenic dysphagia or oropharyngeal pain (glossopharyngeal nerve, CN IX). Initial imaging. - Variant 6. Unilateral isolated palatal or vocal cord paralysis or both (vagal nerve, CN X). Initial imaging. - Variant 7. Unilateral isolated weakness or paralysis of the sternocleidomastoid and trapezius muscles (accessory nerve, CN XI). Initial imaging. - Variant 8. Unilateral isolated weakness or paralysis of the tongue (hypoglossal nerve, CN XII). Initial imaging. - Variant 9. Multiple different lower cranial nerve palsies or combined lower cranial nerve syndromes (CN IX-XII). Initial imaging. - Variant 10. Head and neck cancer. Suspected or known perineural spread of tumor. Initial imaging.
European Academy of Neurology 2019 [43] (Bendtsen et al)	**TRIGEMINAL NEURALGIA** - MRI

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists

Table CN08A. Altered intracranial pressure: Intracranial hypertension

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered
CAR 2012 [18]	This scenario was not covered in the 2012 guideline.
ACR 2023 [39] (Utukuri et al)	**HEADACHE** - Variant 4. Headache with features of intracranial hypertension (eg., papilledema, pulsatile tinnitus, visual symptoms worse on Valsalva)

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists

Table CN08B. Altered intracranial pressure: Intracranial hypotension

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered
CT: computed tomography; **MRI**: magnetic resonance imaging	
CAR 2012 [18]	**A07. HEADACHE: LOW PRESSURE** - MRI: Specialized investigation [C]: In the presence of intermittent headache happening when upright and disappearing while recumbent, MRI is the best investigation. If there is a clinical indication for determining the site for a CSF leak, cisternography can be performed using MRI, CT or NM. - CT: Specialized investigation [C]: When MR is not available or contra-indicated, CT can be used.
ACR 2023 [39] (Utukuri et al)	**HEADACHE** - Variant 5. Headache with features of intracranial hypotension (eg, positional, worse when upright, better when lying down). Initial imaging.
ACR 2022 [44] (Hagiwara et al)	**SINONASAL DISEASE** - Variant 6. Suspected CSF leak. Initial imaging.
Multidisciplinary Specialists Interest Group 2023 [45] (Cheema et al)	**SPONTANEOUS INTRACRANIAL HYPOTENSION** - MRI - MRI brain with contrast - MRI of the whole spine - CT of the brain

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists

Table CN08C. Hydrocephalus, suspected shunt malfunction

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered
CT: computed tomography; **MRI**: magnetic resonance imaging; **NM**: nuclear medicine; **XR**: radiograph	
CAR 2012 [18]	**A10. HYDROCEPHALUS, SUSPECT SHUNT MALFUNCTION** - CT: Indicated [B]: CT is appropriate for most cases. - MRI: Indicated [B]: MRI is effective and has no radiation dose. - XR of entire shunt tube: Indicated in specific circumstances [C]. If there is evidence of shunt malfunction on imaging, XR may be used to diagnose a break in the shunt tubing. - NM: Indicated [C]: A radionuclide shunt study can evaluate shunt function.

Abbreviations: CAR: Canadian Association of Radiologists

Table CN08D. Normal pressure hydrocephalus

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered
CT: computed tomography; **MRI**: magnetic resonance imaging; **SPECT**: single-photon emission computed tomography	
CAR 2012 [18]	This scenario was not covered in the 2012 guideline.
ACR 2019 [46] (Moonis et al)	**DEMENTIA** - Variant 5. Suspected idiopathic normal-pressure hydrocephalus. Initial imaging.
Japanese Society of Normal Pressure Hydrocephalus (JSNPH) 2021 [47] (Nakajima et al)	**IDIOPATHIC NORMAL PRESSURE HYDROCEPHALUS** - CT - MRI - SPECT

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists

Table CN09A. Hearing loss

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered
CT: computed tomography; **MRI**: magnetic resonance imaging	
CAR 2012 [18]	**A11. MIDDLE OR INNER EAR SYMPTOMS (INCLUDING VERTIGO)** - CT: Specialized investigation [B]: Referral to a specialist should precede imaging, as these symptoms requires ENT, neurological, or neurosurgical expertise. - MRI: Specialized investigation [B]: Referral to a specialist should precede imaging, as these symptoms requires ENT, neurological, or neurosurgical expertise. **A12. SENSORINEURAL HEARING LOSS** - MRI: Specialized investigation [B]: Referral to a specialist should precede imaging.
ACR 2023 [48] (Wang et al)	**DIZZINESS AND ATAXIA** - Variant 4. Adult. Chronic recurrent vertigo. Associated with unilateral hearing loss or tinnitus. Initial imaging.
Meniere's disease 2020 [49,50] (Basura et al)	**MENIERE'S DISEASE** - Statement 4. MRI (Strength: Option)
NICE 2023 (NG98) [51]	**HEARING LOSS** - MRI
Sudden hearing loss 2019 [52,53] (Chandrasekhar et al)	**SUDDEN HEARING LOSS** - Statement 3. CT (High level of confidence in the evidence) - Statement 6. MRI (High level of confidence in the evidence)

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists; NICE: National Institute for Health and Care Excellence

Table CN09B. Vertigo

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered
CT: computed tomography; **MRI**: magnetic resonance imaging	
CAR 2012 [18]	**A11. MIDDLE OR INNER EAR SYMPTOMS (INCLUDING VERTIGO)** - CT: Specialized investigation [B]: Referral to a specialist should precede imaging, as these symptoms requires ENT, neurological, or neurosurgical expertise. - MRI: Specialized investigation [B]: Referral to a specialist should precede imaging, as these symptoms requires ENT, neurological, or neurosurgical expertise.
ACR 2023 [48] (Wang et al)	**DIZZINESS AND ATAXIA** - Variant 1. Adult. Brief episodic vertigo. Triggered by specific head movements (eg, Dix-Hallpike maneuver). Initial imaging. - Variant 2. Adult. Acute persistent vertigo. Normal neurologic examination and HINTS examination is consistent with peripheral vertigo. Initial imaging. - Variant 3. Adult. Acute persistent vertigo. Abnormal neurologic examination or HINTS examination is consistent with central vertigo. Initial imaging. - Variant 4. Adult. Chronic recurrent vertigo. Associated with unilateral hearing loss or tinnitus. Initial imaging.
Meniere's disease 2020 [49,50] (Basura et al)	**MENIERE'S DISEASE** - Statement 4. MRI (Strength: Option)

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists

Table CN10A. Mental status change: Acute (e.g., delirium, first-onset psychosis)

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered
CT: computed tomography; **MRI**: magnetic resonance imaging; **PET**: positron emission tomography	

CAR 2012 [18]	**A13. DEMENTIA AND MEMORY DISORDERS, FIRST-ONSET PSYCHOSIS**
	- CT: Indicated: CT is indicated to screen for common causes of these disorders.
	- MRI: Specialized investigation [B]: This is the most sensitive and specific imaging modality to exclude treatable causes.
	- PET: Specialized investigation [B]: Brain FDG-PET is the most sensitive and specific imaging modality to detect and categorize dementia and memory disorders.
	  ○ It is especially recommended in cases of clinical doubt between Alzheimer's disease and fronto-temporal dementia.
	  ○ It can identify among patients presenting with mild cognitive impairment (MCI) which ones are at risk of conversion to Alzheimer's disease.

ACR 2019 [54] (Luttrull et al)	**ACUTE MENTAL STATUS CHANGE, DELIRIUM, AND NEW ONSET PSYCHOSIS** - Variant 4. Persistent or worsening mental status change despite clinical management of the suspected underlying cause (intoxication, medication-related, hypoglycemia, sepsis, etc) or acute change in mental status of unknown cause. Initial imaging. - Variant 5. New onset delirium. Initial imaging. - Variant 6. New onset psychosis. Initial imaging.

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists

Table CN10B. Dementia/memory loss

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered
CT: computed tomography; **MRI**: magnetic resonance imaging; **PET**: positron emission tomography	

CAR 2012 [18]	**A13. DEMENTIA AND MEMORY DISORDERS, FIRST-ONSET PSYCHOSIS**
	- CT: Indicated: CT is indicated to screen for common causes of these disorders.
	- MRI: Specialized investigation [B]: This is the most sensitive and specific imaging modality to exclude treatable causes.
	- PET: Specialized investigation [B]: Brain FDG-PET is the most sensitive and specific imaging modality to detect and categorize dementia and memory disorders.
	  ○ It is especially recommended in cases of clinical doubt between Alzheimer's disease and fronto-temporal dementia.
	  ○ It can identify among patients presenting with mild cognitive impairment (MCI) which ones are at risk of conversion to Alzheimer's disease.

ACR 2019 [46] (Moonis et al)	**DEMENTIA** - Variant 1. Cognitive decline. Suspected Alzheimer disease. Initial imaging. - Variant 2. Suspected frontotemporal dementia. Initial imaging. - Variant 3. Suspected dementia with Lewy bodies. Initial imaging. - Variant 4. Suspected vascular dementia. Initial imaging.
ACR 2020 [35] (Harvey 2020)	**MOVEMENT DISORDERS AND NEURODEGENERATIVE DISEASES** - Variant 1: Rapidly progressive dementia; suspected Creutzfeldt-Jakob disease. Initial imaging.
Canadian Consensus Conference 2020 [55] (Smith et al)	**DEMENTIA** - MRI - CT

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists

Table CN11. Visual loss

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered
CT: computed tomography; **CTA**: computed tomography angiography; **FDG-PET**: fludeoxyglucose-18 positron emission tomography; **MRA**: magnetic resonance angiography; **MRI**: magnetic resonance imaging; **PET-CT**: positron emission tomography/computed tomography; **US**: ultrasound; **XR**: radiograph	
CAR 2012 [18]	**A14. ACUTE VISUAL LOSS: VISUAL DISTURBANCES** - XR: Not indicated [A] - MRI: Specialized investigation [A]: Specialist can diagnose many cases without imaging. However, if imaging is indicated, MRI is the best imaging modality. - CT: Specialized investigation [A]: CT may be used if MRI is unavailable or contraindicated.
British Society of Rheumatology (BSR) 2020 [57,58] (Mackie et al)	**GIANT CELL ARTERITIS** - US (Strong recommendation, QoE: +++). - FDG-PET, MRA, CTA, axillary artery US (Conditional recommendation, QoE: +).
EULAR 2024 [59] (Dejaco et al)	**LARGE VESSEL VASCULITIS** - US of temporal and axillary arteries (LOE: 1) - High-resolution MRI or FDG-PET (LOE: 1) - FDG-PET, MRI or CT (LOE: 1 (PET), 3 (CT), 5 (MRI)) - MRI (LOE: 3) - FDG-PET, CT, US (LOE: 3 (CT) and 5 (PET and US)) - Conventional angiography (LOE: 5) - US, FDG-PET, MRI (LOE: 5) - MRA, CTA, US (LOE: 5)
Japanese National Research Committee for Behçet's disease 2022 [60] (Nagafuchi et al)	**BEHCET'S DISEASE** - Imaging examinations, such as US and contrast CT (Strength of recommendation: B) - Imaging examinations, such as US, contrast CT, and ankle-brachial index (Strength of recommendation: B) - Contrast thoracic CT, MRI/MRA and angiography (Strength of recommendation: B) - Electrocardiography (ECG), transthoracic echocardiography, coronary CT (Strength of recommendation: B)
Swedish Society of Rheumatology (SSR) 2019 [34] (Turesson et al)	**GIANT CELL ARTERITIS - Cranial GCA & Extracranial GCA** - US, Doppler-US - MRI - PET/CT

Abbreviations: CAR: Canadian Association of Radiologists

Table CN12. Epilepsy and seizure

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered
CT: computed tomography; **MRI**: magnetic resonance imaging	
CAR 2012 [18]	**A15. EPILEPSY (ADULT)** - MRI: Specialized investigation [C]: Imaging is not required in patients with idiopathic generalized epilepsy. If imaging is clinically indicated, MRI is the modality of choice.
ACR 2019 [61] (Lee et al)	**SEIZURES AND EPILEPSY** - Variant 1. New-onset seizure. Unrelated to trauma. Initial imaging.
EANO-ESMO 2021 [62] (Roth et al)	**PRIMARY AND SECONDARY BRAIN TUMOR** - cerebral MRI (EANO: IV, B; ESMO: V, n/a)
NICE 2022 (NG217) [63,64]	**EPILEPSY** - MRI - CT

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists; EANO-ESMO: European Society for Medical Oncology and the European Association of Neuro-Oncology; NICE: National Institute for Health and Care Excellence

Table CN14. Intracranial space-occupying lesions

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered
CT: computed tomography; **MRI**: magnetic resonance imaging; **MRS**: magnetic resonance spectroscopy; **PET-CT**: positron emission tomography-computed tomography; **US**: ultrasound	
CAR 2012 [18]	Not covered in 2012 guideline.
British Society for Haematology (BSH) 2019 [65] (Fox et al)	**PRIMARY CENTRAL NERVOUS SYSTEM LYMPHOMA** - MRI - Contrast-enhanced MRI - PET-CT, contrast-enhanced CT of neck/chest/abdomen/pelvis - testicular US
CNS CMA/ SHM 2022 [66] (Chen et al)	**PRIMARY CENTRAL NERVOUS SYSTEM LYMPHOMA** - MRI (1B) - whole-body PET-CT (2B)
ECSMID 2024 [67] (Bodilsen et al)	**BRAIN ABSCESS** - brain MRI - contrast-enhanced CT
EANO 2021 [68] (Goldbrunner et al)	**MENINGIOMAS** - MRI (Evidence class 4, GPP)
EANO 2021 [69] (Weller et al)	**GLIOMA** - MRI (C: IV; L: B)
EANO-ESMO 2021 [62] (Roth et al)	**PRIMARY AND SECONDARY BRAIN TUMOR** - MRI [EANO: IV, n/a; ESMO: V, n/a]
EANO and European Rare Cancer (EANO-EURACAN) 2019 [70] (Franceschi et al)	**MEDULLOBLASTOMA** - Cerebral MRI (level III A) - Spinal MRI (level II B) - CT of the chest and abdomen, fluorodeoxyglucose PET scan (level III B) - PET, electro encephalography (level III A)
AANS-CNS 2020 [71] (Lundy et al)	**GLIOBLASTOMAS** - MRI - CT - MRS, nuclear medicine imaging (PET 18F-FDG and 11C-MET)
NICE 2021 (NG99) [72]	**PRIMARY BRAIN TUMOR AND BRAIN METASTASES** **Suspected glioma** - MRI **Investigation of suspected meningioma** - MRI

Appendix 2. Evidence tables

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered
CT: computed tomography; **MRI**: magnetic resonance imaging; **MRS**: magnetic resonance spectroscopy; **PET-CT**: positron emission tomography-computed tomography; **US**: ultrasound	
	- CT **Investigation of suspected metastases** - MRI - extracranial imaging
SINch/AINO/SIN 2020 [73] (Ruda et al)	**LOW-GRADE GLIOMAS** - MRI - Amino-acid PET

Abbreviations: AANS/CNS: Joint Tumor Section of the American Association of Neurological Surgeons and the Congress of Neurological Surgeons; CAR: Canadian Association of Radiologists; CNS CMA/SHM: Chinese Neurosurgical Society of the Chinese Medical Association/Society of Hematological Malignancies of the Chinese Anti-Cancer Association; EANO: European Association of Neuro-Oncology; ECSMID: European society of Clinical Microbiology and Infectious Diseases; ESMO: European Society for Medical Oncology; NICE: National Institute for Health and Care Excellence; SINch/AINO/SIN: Italian Society of Neurosurgery Neuro-Oncology Section, Italian Association of Neuro-Oncology, Italian Association of Neurology

Table CN15. Suspected cerebral venous sinus thrombosis

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered
CT/CTV: computed tomography/venography; **DSA:** Digital subtraction angiography; **MRI/MRV**: magnetic resonance imaging/venography	
CAR 2012 [18]	Not covered in 2012 guideline.
ACR 2023 [21] (Pannell 2023)	**CEREBROVASCULAR DISEASES-STROKE AND STROKE-RELATED CONDITIONS** - Variant 7: Adult. Suspected venous sinus thrombosis. Initial imaging.
Canadian Stroke 2020 [25] (Shoamanesh et al)	**SPONTANEOUS INTRACEREBRAL HEMORRHAGE** - If suspected, CT venography can be performed to evaluate for cerebral venous sinus thrombosis (Evidence Level B).
Chinese Stroke Association (CSA) 2019 [74] (Fan et al)	**CEREBRAL VENOUS SINUS THROMBOSIS** - CT/CTV, MRI/MRV - DSA

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists

Table CN16. Vasculitis

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered
CTA: computed tomography angiography; **DSA:** Digital subtraction angiography; **FDG-PET**: fludeoxyglucose-18 positron emission tomography; **MRA**: magnetic resonance angiography; **MRI**: magnetic resonance imaging; **US**; ultrasound	
CAR 2012 [18]	Not covered in 2012 guideline.
ACR 2021 [22] (Ledbetter et al)	**CEREBROVASCULAR DISEASES-ANEURYSM, VASCULAR MALFORMATION, AND SUBARACHNOID HEMORRHAGE** - Variant 7. Suspected central nervous system (CNS) vasculitis. Initial imaging.
British Society for Rheumatology (BSR) 2020 (Mackie et al) [57,58]	**GIANT CELL ARTERITIS** - US - FDG-PET, MRA, CTA, US
European Stroke Organisation (ESO) 2023 [75] (Pascarella et al)	**PRIMARY ANGIITIS OF THE CENTRAL NERVOUS SYSTEM** - MRA, CTA - DSA
EULAR 2024 [59] (Dejaco et al)	**LARGE VESSEL VASCULITIS** - US of temporal and axillary arteries (LOE: 1) - High-resolution MRI or FDG-PET (LOE: 1) - FDG-PET, MRI or CT (LOE: 1 (PET), 3 (CT), 5 (MRI)) - MRI (LOE: 3) - FDG-PET, CT, US (LOE: 3 (CT) and 5 (PET and US)) - Conventional angiography (LOE: 5) - US, FDG-PET, MRI (LOE: 5) - MRA, CTA, US (LOE: 5)
Japanese National Research Committee for Behçet's disease 2022 [60] (Nagafuchi et al)	**BEHCET'S DISEASE** - US - contrast CT - MRI/MRA - Electrocardiography (ECG), transthoracic echocardiography, coronary CT

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists

Table CN17. Movement disorders/Parkinsonism

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered
CT: computed tomography; **FDG-PET**: fludeoxyglucose-18 positron emission tomography; **MRI**: magnetic resonance imaging; **SPECT**: single-photon emission computed tomography	
CAR 2012 [18]	Not covered in 2012 guideline.
ACR 2020 [35] (Harvey 2020)	**MOVEMENT DISORDERS AND NEURODEGENERATIVE DISEASES** - Variant 2: Chorea; suspected Huntington disease. Initial imaging. - Variant 3: Parkinsonian syndromes. Initial imaging. - Variant 5: Suspected motor neuron disease. Initial imaging.
Canadian Guideline 2019 [76] (Grimes et al)	**PARKINSON'S DISEASE** - PET - ^{123}I-FP-CIT SPECT - CT - MRI

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists

Table CN18. Metabolic and toxic encephalopathies

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered
CT: computed tomography; **MRI**: magnetic resonance imaging	
CAR 2012 [18]	Not covered in 2012 guideline.
European Association for the Study of the Liver (EASL) 2022 [77]	**HEPATIC ENCEPHALOPATHY** - CT - MRI
Chinese Guidelines 2019 [78] (Xu et al)	**HEPATIC ENCEPHALOPATHY IN CIRRHOSIS** - Recommendation 2 (B1) - Recommendation 3 (B1)

Abbreviations: CAR: Canadian Association of Radiologists

Table CN19. Aneurysm screening

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered
CTA: computed tomography angiography; **MRA**: magnetic resonance angiography	
CAR 2012 [18]	Not covered in 2012 guideline.
ACR 2021 [22] (Ledbetter et al)	**CEREBROVASCULAR DISEASES-ANEURYSM, VASCULAR MALFORMATION, AND SUBARACHNOID HEMORRHAGE** - Variant 5. High-risk cerebral aneurysm screening

APPENDIX 3A. CENTRAL NERVOUS SYSTEM SUMMARY OF RECOMMENDATIONS (ENGLISH)

Clinical/ Diagnostic Scenario	Recommendations	Strength of Rec.
CT: computed tomography; **CTA**: CT angiography; **CTV**: CT venography; **MRA**: magnetic resonance angiography; **MRI**: MR imaging; **MRV**: MR venography; **US**: ultrasound; **XR**: radiography **Strength of Recommendation:** ↑↑: strong for; ↑: conditional for; ↓↓: strong against; ↓: conditional against; **EPc**: Expert Panel consensus		
CN01. CONGENITAL DISORDERS OF THE BRAIN		
	1. In adults with suspected congenital disorder of the brain, we recommend **MRI** as the initial imaging modality.	↑↑
CN02. CEREBROVASCULAR DISEASE		
	Acute stroke	
	1. In adults with symptoms of acute stroke who may be eligible for intervention, we recommend a stroke protocol that includes at minimum a **non-contrast CT head and multi-phase CTA** as the initial imaging modalities. *If CT perfusion is available, it may be included.*	↑↑
	Transient ischemic attack	
	1. In adults presenting within 48 hours of symptoms consistent with transient ischemic attack (especially transient focal motor or speech symptoms, or persistent stroke symptoms), we recommend **CT/CTA as soon as possible** as the initial imaging modality.	↑↑
	2. In adults presenting more than 48 hours after symptoms consistent with a transient ischemic attack, we recommend **CT/CTA** as the initial imaging modality.	↑↑
	↳ **2.1** If CTA is unavailable, we suggest **carotid Doppler US** as a suitable interim modality until CTA is available.	↑
	Extracranial carotid stenosis	
	1. In adults with symptomatic✦ carotid stenosis, we recommend **MRA or CTA** as the initial imaging modality. ✦ Ipsilateral carotid-territory cerebral or retinal ischemic event (ischemic stroke, transient ischemic attack, transient monocular blindness, or retinal artery occlusion) within the preceding 6 months [19].	↑↑
	↳ **1.1** If MRA or CTA are unavailable, we suggest **carotid Doppler US** as an alternative for screening.	↑
	↳ **1.2** If revascularization procedures are being considered, we recommend **MRA or CTA**.	↑↑
	2. In adults with asymptomatic carotid stenosis who are being considered for revascularization procedures, we recommend **MRA or CTA**.	↑↑
	Arterial dissection/injury *For traumatic vascular injury, refer to the CAR Trauma guideline* [20]*, scenario T07. Suspected head and neck vascular injury, including penetrating injury.*	

The guideline recommendations are to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring. These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability. We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient.

Clinical/ Diagnostic Scenario	Recommendations	Strength of Rec.
CT: computed tomography; **CTA**: CT angiography; **CTV**: CT venography; **MRA**: magnetic resonance angiography; **MRI**: MR imaging; **MRV**: MR venography; **US**: ultrasound; **XR**: radiography **Strength of Recommendation:** ↑↑: strong for; ↑: conditional for; ↓↓: strong against; ↓: conditional against; **EPc**: Expert Panel consensus		
CN03. MULTIPLE SCLEROSIS AND DEMYELINATING DISEASE		
	1. In adults with suspected multiple sclerosis or demyelinating disease, we recommend **MRI** as the initial imaging modality.	↑↑
CN04. HEADACHE		
For traumatic vascular injury, refer to the CAR Trauma guideline [20]*, scenario T07. Suspected head and neck vascular injury, including penetrating injury.*	**1.** In adults with acute or chronic headache clinically suspected to be a benign primary headache disorder (e.g., migraine, tension headache), we recommend **no routine imaging**.	↓↓
	2. In adults with acute headache with red flags✧, we recommend **CT** as the initial imaging modality. ✧ Such as, severe, sudden onset ("thunderclap"), features of intracranial hypertension or hypotension, new onset or pattern during pregnancy or peripartum period, increasing frequency or severity, fever or neurologic deficit, history of cancer or immunocompromise, older age (>50 years) of onset, or posttraumatic onset [39].	↑↑
	↳ **2.1** If a vascular cause is suspected, we suggest **CTA/CTV** as an additional imaging modality.	↑
	↳ **2.2** If a non-vascular cause is suspected, we suggest **MRI** as an additional imaging modality.	↑
	3. In adults with chronic headache with concerning features✦, we recommend **MRI** as the initial imaging modality. ✦ Such as, recent onset and rapidly increasing frequency and severity of headache, headache causing the patient to wake from sleep, associated dizziness, lack of coordination, tingling or numbness, new neurologic deficit, new onset of a headache in a patient with a history of cancer or immunodeficiency [18].	↑↑
	↳ **3.1** If MRI is unavailable or contraindicated, we recommend **CT** as an alternative imaging modality.	↑↑
CN05. CONCUSSION		
	1. In adults with suspected acute concussion, refer to the CAR Trauma guideline [20], scenario T01. Acute head trauma in adults.	
	2. In adults with post-concussion syndrome, we recommend **no routine imaging**.	EPc
CN06. PITUITARY AND JUXTASELLAR LESIONS		
	1. In adults with pituitary and/or juxtasellar lesions, we recommend **MRI** as the initial imaging modality.	↑↑
CN07. CRANIAL NEUROPATHY, BRAIN STEM SYMPTOMS		
	1. In adults with cranial neuropathy and/or brain stem symptoms, we recommend **MRI** as the initial imaging modality.	↑↑
	↳ **1.1** If MRI is unavailable or contraindicated, we recommend **CT** as an alternate imaging modality.	↑↑
CN08. ALTERED INTRACRANIAL PRESSURE		

The guideline recommendations are to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring. These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability. We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient.

Clinical/ Diagnostic Scenario	Recommendations	Strength of Rec.
CT: computed tomography; **CTA**: CT angiography; **CTV**: CT venography; **MRA**: magnetic resonance angiography; **MRI**: MR imaging; **MRV**: MR venography; **US**: ultrasound; **XR**: radiography **Strength of Recommendation:** ↑↑: strong for; ↑: conditional for; ↓↓: strong against; ↓: conditional against; **EPc**: Expert Panel consensus		
CN08A. Idiopathic intracranial hypertension	**1.** In adults with suspected or known idiopathic intracranial hypertension, we recommend **MRI/MRV or CT/CTV** as the initial imaging modality. *Panel consensus is a preference for MRI/MRV.*	↑↑
CN08B. Spontaneous intracranial hypotension	**1.** In adults with spontaneous intracranial hypotension, we recommend **head MRI with contrast** as the initial imaging modality.	↑↑
	↳ **1.1** If MRI is unavailable or contraindicated, we recommend **CT** as an alternative imaging modality.	↑↑
	↳ **1.2** If head MRI is positive, we recommend **whole spine MRI** as the next imaging modality.	↑↑
CN08C. Hydrocephalus, suspected shunt malfunction	**1.** In adults with hydrocephalus, suspected shunt malfunction, we recommend **head CT and shunt series XR** as the initial imaging modalities.	↑↑
CN08D. Normal pressure hydrocephalus	**1.** In adults with suspected normal pressure hydrocephalus✧, we recommend **MRI or CT**. ✧ Clinical triad for normal pressure hydrocephalus: mental/cognitive impairment, gait disturbance, and incontinence [46]	↑↑
CN09. VESTIBULAR AND COCHLEAR SYMPTOMS		
CN09A. Hearing loss	**1.** In adults with unexplained conductive hearing loss, we recommend **CT temporal bone** as the initial imaging modality.	↑↑
	2. In adults with sensorineural hearing loss, we recommend **MRI** as the initial imaging modality.	↑↑
CN09B. Vertigo	**1.** In adults with brief episodic vertigo, we recommend **no routine imaging**.	↓↓
	2. In adults with <u>persistent peripheral</u> vertigo, we suggest **MRI or temporal bone CT** as the initial imaging modality.	↑
	3. In adults with <u>persistent central</u> vertigo, we recommend **MRI/MRA or CT/CTA** as the initial imaging modality.	↑↑
CN10. MENTAL STATUS CHANGE		
CN10A. Acute (e.g., delirium, first-onset episode)	**1.** In adults with unexplained acute mental status changes, we recommend **CT** as the initial imaging modality.	↑↑
	↳ **1.1** If CT is negative and occult pathology is suspected, we recommend **MRI** as the next imaging modality. *CT and MRI have a low yield in those with new onset psychosis and no neurologic deficit*	↑↑
CN10B. Dementia/	**1.** In adults with suspected dementia (including rapidly progressive dementia), to exclude structural causes or if relevant to clinical decision-making, we recommend **MRI** as the initial imaging modality.	↑↑

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memory loss	↳ **1.1** If MRI is unavailable, we suggest **CT** as a suitable interim modality until MRI is available.	↑
CN11. VISUAL LOSS		
	Etiology of visual loss is often identified on ocular exam [56]. If imaging is required, then:	
	1. In adults with acute visual loss, we recommend **CT/CTA** as the initial imaging modality.	↑↑
	2. In adults with progressive/chronic visual loss, we recommend **MRI** as the initial imaging modality.	↑↑
CN12. EPILESPY AND SEIZURE		
If concern for: - *CNS infection, see CN13. CNS infection* - *cerebrovascular disease, see CN02. Cerebrovascular disease*	**1.** In adults with established epilepsy presenting at an emergency department after a typical seizure, we **recommend no routine imaging**.	↓↓
	↳ **1.1** If there is concern for an acute intracranial injury or a significant change in the pattern of seizures, we recommend **CT or MRI** as the initial imaging modality.	↑↑
	2. In adults with new onset seizure, we recommend **CT or MRI** as the initial imaging modality.	↑↑
CN13. CNS INFECTION		
	1. In adults with suspected CNS infection✧, we recommend **MRI brain with contrast** as the initial imaging modality. ✧For example, meningitis, ventriculitis, encephalitis	EPc
CN14. INTRACRANIAL SPACE-OCCUPYING LESIONS		
	1. In adults with suspected intracranial space-occupying lesions, we recommend **MRI or CT** as the initial imaging modality.	↑↑
CN15. SUSPECTED CEREBRAL VENOUS SINUS THROMBOSIS		
	1. In adults with suspected venous sinus thrombosis, we recommend **MRI/MRV or CT/CTV** as the initial imaging modality.	↑↑
CN16. VASCULITIS		
	1. In adults with suspected CNS vasculitis, we recommend **CT/CTA ± MRI** as the initial imaging modality.	↑↑
	2. In adults with suspected giant cell/temporal arteritis, where biopsy is not performed, we suggest **MRI or US** as the initial imaging modality.	↑
CN17. MOVEMENT DISORDERS/PARKINSONISM		

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Clinical/ Diagnostic Scenario	Recommendations	Strength of Rec.
CT: computed tomography; **CTA**: CT angiography; **CTV**: CT venography; **MRA**: magnetic resonance angiography; **MRI**: MR imaging; **MRV**: MR venography; **US**: ultrasound; **XR**: radiography **Strength of Recommendation:** ↑↑: strong for; ↑: conditional for; ↓↓: strong against; ↓: conditional against; **EPc**: Expert Panel consensus		
	1. In adults with movement disorders/Parkinsonism, to exclude structural causes or if relevant to clinical decision-making, we recommend **MRI** as the initial imaging modality.	↑↑
CN18. METABOLIC AND TOXIC ENCEPHALOPATHIES		
	1. In adults with suspected metabolic or toxic encephalopathy, we recommend **against routine imaging**.	↓↓
	↳ **1.1** If there remains diagnostic uncertainty or non-response to treatment, we recommend **CT or MRI** as the initial imaging modality.	↑↑
	↳ **1.2** If there is clinical suspicion of PRES, we recommend **MRI** as the initial imaging modality. PRES: Posterior Reversible Encephalopathy Syndrome	EPc
CN19. ANEURYSM SCREENING		
	1. In adults at high risk✧ for cerebral aneurysm, we recommend **MRI/MRA or CT/CTA** for initial screening. ✧Patients with autosomal dominant polycystic kidney disease [22], patients with ≥2 family members with intracranial aneurysms or subarachnoid hemorrhage. A higher risk of aneurysm occurrence in such families is found in those with a history of hypertension, smoking, and female sex [79].	↑↑

The guideline recommendations are to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring. These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability. We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient.

APPENDIX 3B. CENTRAL NERVOUS SYSTEM SUMMARY OF RECOMMENDATIONS (FRENCH)

Scénario clinique/diagnostique	Recommandations	Force
	ÉCHO : échographie; **IRM** : imagerie par résonance magnétique; **RX** : radiographie; **TDM** : tomodensitométrie **Force de la recommandation :** ↑↑ : fortement recommandé; ↑ : recommandé dans certain cas; ↓↓ : fortement déconseillé; ↓ : déconseillé dans certains cas; **CE** : consensus d'un groupe d'experts	
CN01. ANOMALIE CONGÉNITALE DU CERVEAU		
	1. Dans le cas d'adultes chez qui l'on soupçonne une anomalie congénitale du cerveau, nous recommandons l'**IRM** comme modalité d'imagerie initiale.	↑↑
CN02. MALADIE CÉRÉBROVASCULAIRE		
	Accident vasculaire cérébral aigu	
	1. Dans le cas d'adultes présentant des symptômes d'accident vasculaire cérébral aigu chez qui une intervention est possible, nous recommandons de procéder à un protocole de prise en charge de l'AVC qui inclut au moins **une TDM de la tête avec produit de contraste et une angio-TDM multiphase** comme modalités d'imagerie initiales. *Si la TDM de perfusion est possible, elle peut être réalisée également.*	↑↑
	Accident ischémique transitoire	
	1. Dans le cas d'adultes présentant des symptômes correspondant à un accident ischémique transitoire (en particulier, des symptômes moteurs localisés ou des troubles du langage temporaires, ou des symptômes d'AVC chroniques) depuis 48 h ou moins, nous recommandons **une TDM/angio-TDM le plus rapidement possible** comme modalité d'imagerie initiale.	↑↑
	2. Dans le cas d'adultes se présentant 48 h ou plus après avoir présenté des symptômes correspondant à un accident ischémique transitoire, nous recommandons **une TDM/angio-TDM** comme modalité d'imagerie initiale.	↑↑
	↳ **2.1** Si l'angio-TDM n'est pas possible, nous suggérons l'**ÉCHO Doppler carotidien** à titre d'examen par intérim jusqu'à ce que l'**angio-TDM** soit possible.	↑
	Sténose de l'artère carotide extra-crânienne	
	1. Dans le cas d'adultes présentant une sténose de l'artère carotide extra-crânienne symptomatique✦, nous recommandons **une angio-IRM ou une angio-TDM** comme modalité d'imagerie initiale. ✦ Événement cérébral homolatéral dans le territoire de la carotide ou rétinien ischémique (accident ischémique cérébral, accident ischémique transitoire, cécité monoculaire temporaire ou occlusion artérielle rétinienne) au cours des 6 derniers mois [19].	↑↑
	↳ **1.1** Si l'ARM et l'angio-TDM ne sont pas possibles, nous suggérons l'**ÉCHO Doppler carotidien** comme examen subsidiaire à des fins de dépistage.	↑
	↳ **1.2** Si une procédure de revascularisation est envisagée, nous recommandons **l'angio-IRM ou l'angio-TDM.**	↑↑

Ces recommandations ne sont pas conçues pour être utilisées seules. Les soins médicaux doivent reposer sur des données probantes, le jugement expert d'un clinicien, la situation, les valeurs et les préférences d'un patient, ainsi que sur la disponibilité des ressources. Nous sommes conscients que certaines modalités d'imagerie ne sont pas disponibles partout, en particulier dans les zones rurales et isolées du Canada. Il peut être difficile de décider s'il vaut mieux recommander à un patient de se déplacer pour obtenir l'imagerie recommandée ou d'effectuer localement un autre type d'imagerie; à cet égard, il faut tenir compte des avantages attendus de l'imagerie recommandée, des risques liés au déplacement, des préférences du patient et d'autres facteurs. La présente ligne directrice repose sur des données probantes liées uniquement aux tests d'imagerie diagnostique et non à la gestion clinique du patient.

Scénario clinique/diagnostique	Recommandations	Force
ÉCHO : échographie; **IRM** : imagerie par résonance magnétique; **RX** : radiographie; **TDM** : tomodensitométrie **Force de la recommandation :** ↑↑ : fortement recommandé; ↑ : recommandé dans certain cas; ↓↓ : fortement déconseillé; ↓ : déconseillé dans certains cas; **CE** : consensus d'un groupe d'experts		
	2. Dans le cas d'adultes chez qui l'on envisage le recours à une revascularisation, nous recommandons **l'angio-IRM ou l'angio-TDM**.	↑↑
	Dissection/lésion artérielle *En cas de lésion vasculaire traumatique, se référer aux lignes directrices de la CAR en matière de traumatismes* [20]*, scénario T07. Suspicion de lésion vasculaire de la tête et du cou, y compris plaie pénétrante.*	
CN03. SCLÉROSE EN PLAQUES ET NEUROPATHIE DÉMYÉLINISANTE		
	1. Dans le cas d'adultes chez qui l'on soupçonne une sclérose en plaques ou une neuropathie démyélinisante, nous recommandons l'**IRM** comme modalité d'imagerie initiale.	↑↑
CN04. CÉPHALÉE		
En cas de lésion vasculaire traumatique, se référer aux lignes directrices de la CAR en matière de traumatismes [20]*, scénario T07. Suspicion de lésion vasculaire de la tête et du cou, y compris plaie pénétrante.*	**1.** Chez les adultes présentant des céphalées aiguës ou chroniques que l'on présume être de nature bénigne et primaire (ex. migraine, céphalées de tension), nous **déconseillons le recours à un examen d'imagerie**.	↓↓
	2. Dans le cas d'adultes atteints de céphalées aiguës, en présence de signaux d'alerte✧, nous recommandons la **TDM** comme modalité d'imagerie initiale. ✧ Par exemple, apparition soudaine (« céphalée en coup de tonnerre »), signes d'hypertension ou d'hypotension intracrânienne, apparition nouvelle ou répétitive au cours de la grossesse ou de la période périnatale, augmentation de la fréquence ou de la sévérité, fièvre ou déficit neurologique, historique de cancer ou d'immunovulnérabilité, apparition à un âge avancé (supérieur à 50 ans), ou apparition post-traumatique [39].	↑↑
	↳ **2.1** Si la cause est présumée vasculaire, nous suggérons **l'angio-TDM/l'angio-TDM veineuse** comme modalité d'imagerie supplémentaire.	↑
	↳ **2.2** Si la cause est présumée non vasculaire, nous suggérons l'**IRM** comme modalité d'imagerie supplémentaire.	↑
	3. Dans le cas d'adultes atteints de céphalées chroniques, en présence de caractéristiques inquiétantes✦, nous recommandons l'**IRM** comme modalité d'imagerie initiale. ✦ Par exemple, apparition récente et augmentation de la fréquence et de la sévérité des céphalées, céphalées qui réveillent le patient, étourdissements, problèmes de coordination, fourmillements ou engourdissements, déficit neurologique d'apparition nouvelle, apparition nouvelle de céphalées chez un patient ayant un historique de cancer ou d'immunovulnérabilité [18].	↑↑
	↳ **3.1** Si l'IRM n'est pas possible ou est contre-indiquée, nous suggérons la **TDM** comme modalité d'imagerie subsidiaire.	↑↑
CN05. TRAUMATISME CRÂNIEN		

Ces recommandations ne sont pas conçues pour être utilisées seules. Les soins médicaux doivent reposer sur des données probantes, le jugement expert d'un clinicien, la situation, les valeurs et les préférences d'un patient, ainsi que sur la disponibilité des ressources. Nous sommes conscients que certaines modalités d'imagerie ne sont pas disponibles partout, en particulier dans les zones rurales et isolées du Canada. Il peut être difficile de décider s'il vaut mieux recommander à un patient de se déplacer pour obtenir l'imagerie recommandée ou d'effectuer localement un autre type d'imagerie; à cet égard, il faut tenir compte des avantages attendus de l'imagerie recommandée, des risques liés au déplacement, des préférences du patient et d'autres facteurs. La présente ligne directrice repose sur des données probantes liées uniquement aux tests d'imagerie diagnostique et non à la gestion clinique du patient.

Scénario clinique/diagnostique	Recommandations	Force
ÉCHO : échographie; **IRM** : imagerie par résonance magnétique; **RX** : radiographie; **TDM** : tomodensitométrie **Force de la recommandation :** ↑↑ : fortement recommandé; ↑ : recommandé dans certain cas; ↓↓ : fortement déconseillé; ↓ : déconseillé dans certains cas; **CE** : consensus d'un groupe d'experts		
	1. Dans le cas d'adultes chez qui l'on présume un traumatise crânien aigu, se référer aux lignes directrices de la CAR en matière de traumatismes [20], scénario T01. Traumatisme crânien aigu chez l'adulte.	
	2. Chez les adultes présentant un syndrome postcommotionnel, nous **déconseillons le recours à un examen d'imagerie**.	CE
CN06. LÉSION DE L'HYPOPHYSE ET LÉSION DE LA RÉGION SELLAIRE		
	1. Dans le cas d'adultes chez qui l'on soupçonne une lésion de l'hypophyse et/ou une lésion de la région sellaire, nous recommandons l'**IRM** comme modalité d'imagerie initiale.	↑↑
CN07. NEUROPATHIE CRÂNIENNE, SYMPTÔMES LIÉS AU TRONC CÉRÉBRAL		
	1. Dans le cas d'adultes chez qui l'on soupçonne une neuropathie crânienne et/ou des symptômes liés au tronc cérébral, nous recommandons l'**IRM** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si l'IRM n'est pas possible ou est contre-indiquée, nous suggérons la **TDM** comme modalité d'imagerie subsidiaire.	↑↑
CN08. ALTÉRATION DE LA PRESSION INTRACRÂNIENNE		
CN08A. Hypertension intracrânienne idiopathique	**1.** Dans le cas de patients adultes chez qui l'on soupçonne une hypertension intracrânienne idiopathique ou ayant reçu un tel diagnostic, nous recommandons **une IRM/angio-IRM veineuse ou une TDM/angio-TDM veineuse** comme modalité d'imagerie initiale. *Selon le consensus du groupe d'experts, l'IRM ou la VRM est à privilégier.*	↑↑
CN08B. Hypertension intracrânienne spontanée	**1.** Chez les adultes présentant une hypertension intracrânienne spontanée, nous recommandons l'**IRM de la tête avec contraste** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si l'IRM n'est pas possible ou est contre-indiquée, nous suggérons la **TDM** comme modalité d'imagerie subsidiaire.	↑↑
	↳ **1.2** Si le résultat de l'IRM de la tête est positif, nous recommandons l'**IRM de la colonne vertébrale entière** comme modalité d'imagerie subséquente.	↑↑
CN08C. Hydrocéphalie, dysfonctionnement présumé d'un shunt	**1.** Chez les adultes présentant une hydrocéphalie ou un dysfonctionnement présumé d'un shunt, nous recommandons **une TDM de la tête et une étude du shunt par RX** comme modalités d'imagerie initiales.	↑↑
CN08D. Hydrocéphalie à pression normale	**2.** Dans le cas d'adultes chez qui l'on soupçonne une hydrocéphalie à pression normale✧, nous recommandons **l'IRM ou la TDM**.	↑↑

Ces recommandations ne sont pas conçues pour être utilisées seules. Les soins médicaux doivent reposer sur des données probantes, le jugement expert d'un clinicien, la situation, les valeurs et les préférences d'un patient, ainsi que sur la disponibilité des ressources. Nous sommes conscients que certaines modalités d'imagerie ne sont pas disponibles partout, en particulier dans les zones rurales et isolées du Canada. Il peut être difficile de décider s'il vaut mieux recommander à un patient de se déplacer pour obtenir l'imagerie recommandée ou d'effectuer localement un autre type d'imagerie; à cet égard, il faut tenir compte des avantages attendus de l'imagerie recommandée, des risques liés au déplacement, des préférences du patient et d'autres facteurs. La présente ligne directrice repose sur des données probantes liées uniquement aux tests d'imagerie diagnostique et non à la gestion clinique du patient.

Scénario clinique/diagnostique	Recommandations	Force
ÉCHO : échographie; **IRM** : imagerie par résonance magnétique; **RX** : radiographie; **TDM** : tomodensitométrie **Force de la recommandation :** ↑↑ : fortement recommandé; ↑ : recommandé dans certain cas; ↓↓ : fortement déconseillé; ↓ : déconseillé dans certains cas; **CE** : consensus d'un groupe d'experts		
	✧ Les trois observations cliniques de l'hydrocéphalie à pression normale sont : trouble cognitif/mental, trouble de la démarche et incontinence [46].	
CN09. SYMPTÔMES VESTIBULAIRES OU COCHLÉAIRES		
CN09A. Perte d'audition (hypoacousie)	**1.** Dans le cas d'adultes chez qui l'on soupçonne une perte d'audition, nous recommandons la **TDM de l'os temporal** comme modalité d'imagerie initiale.	↑↑
	2. Pour les adultes chez qui l'on soupçonne une perte d'audition neurosensorielle, nous recommandons l'**IRM** comme modalité d'imagerie initiale.	↑↑
CN09B. Vertige	**1.** Chez les adultes présentant de brefs épisodes de vertiges, nous **déconseillons le recours à un examen d'imagerie**.	↓↓
	2. Chez l'adulte présentant une atteinte périphérique chronique, nous suggérons **l'IRM ou la TDM de l'os temporal** comme modalité d'imagerie initiale.	↑
	3. Chez l'adulte présentant une atteinte centrale chronique, nous recommandons **une IRM/angio-IRM ou une TDM/angio-TDM** comme modalité d'imagerie initiale.	↑↑
CN10. CHANGEMENT D'ÉTAT MENTAL		
CN10A. Aigu (ex. état confusionnel, premier épisode)	**1.** Chez les adultes présentant un changement d'état mental de cause inconnue, nous recommandons la **TDM** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si les résultats de la TDM sont négatifs et que l'on présume un problème de santé occulte, nous recommandons l'**IRM** comme modalité d'imagerie subséquente. *La TDM et l'IRM offrent un faible rendement diagnostique chez les patients présentant une première atteinte de psychose et aucun déficit neurologique.*	↑↑
CN10B. Démence/perte de mémoire	**1.** Dans le cas d'adultes chez qui l'on soupçonne une démence (y compris une démence à progression rapide), afin d'écarter des causes structurelles ou si c'est pertinent dans le cadre de la prise de décision clinique, nous recommandons l'**IRM** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si l'IRM n'est pas possible, nous suggérons la **TDM** à titre d'examen par intérim jusqu'à ce que l'**IRM** soit possible.	↑
CN11. PERTE DE LA VISION		
	L'étiologie de la perte de la vision est souvent déterminée à l'examen oculaire [56]. Si un examen d'imagerie est nécessaire, alors :	

Scénario clinique/diagnostique	Recommandations	Force
ÉCHO : échographie; **IRM** : imagerie par résonance magnétique; **RX** : radiographie; **TDM** : tomodensitométrie **Force de la recommandation :** ↑↑ : fortement recommandé; ↑ : recommandé dans certain cas; ↓↓ : fortement déconseillé; ↓ : déconseillé dans certains cas; **CE** : consensus d'un groupe d'experts		
	1. Chez les adultes présentant une altération importante de la vision, nous recommandons **la TDM/l'angio-TDM** comme modalité d'imagerie initiale.	↑↑
	2. Chez les adultes présentant une diminution progressive/chronique de la vision, nous recommandons l'**IRM** comme modalité d'imagerie initiale.	↑↑
CN12. ÉPILEPSIE ET CONVULSION		
S'il existe une inquiétude liée à : - *une infection du CNS, se référer à la section CN13. Infection du SNC* - *une maladie cérébrovasculaire, se référer à la section CN02. Maladie cérébrovasculaire*	**1.** Dans le cas d'adultes atteints d'épilepsie qui se présentent aux services d'urgences en raison d'une convulsion typique, nous **déconseillons le recours à un examen d'imagerie**.	↓↓
	↳ S'il existe une inquiétude liée à une lésion intracrânienne aiguë ou si le profil des convulsions change considérablement, nous recommandons **la TDM ou l'IRM** comme modalité d'imagerie initiale.	↑↑
	2. Chez les adultes présentant une première convulsion épileptique, nous recommandons **la TDM ou l'IRM** comme modalité d'imagerie initiale.	↑↑
CN13. INFECTION DU SNC		
	1. Dans le cas d'adultes chez qui l'on soupçonne une infection du SNC✧, nous recommandons une **IRM du cerveau avec contraste** comme modalité d'imagerie initiale. ✧Par exemple, une méningite, une ventriculite, une encéphalite	CE
CN14. LÉSIONS OCCUPANT L'ESPACE INTRACRÂNIEN		
	1. Dans le cas d'adultes chez qui l'on soupçonne une lésion occupant l'espace intracrânien, nous recommandons **l'IRM ou la TDM** comme modalité d'imagerie initiale.	↑↑
CN15. THROMBOSE DES SINUS VEINEUX INTRACRÂNIENS PRÉSUMÉE		
	1. Dans le cas de patients adultes chez qui l'on soupçonne une thrombose des sinus veineux intracrâniens, nous recommandons **une IRM/angio-RM veineuse ou une TDM/angio-TDM veineuse** comme modalité d'imagerie initiale.	↑↑
CN16. VASCULITE		
	1. Dans le cas de patients adultes chez qui l'on soupçonne une vasculite, nous recommandons **la TDM/l'angio-TDM ± l'IRM** comme modalité d'imagerie initiale.	↑↑

Ces recommandations ne sont pas conçues pour être utilisées seules. Les soins médicaux doivent reposer sur des données probantes, le jugement expert d'un clinicien, la situation, les valeurs et les préférences d'un patient, ainsi que sur la disponibilité des ressources. Nous sommes conscients que certaines modalités d'imagerie ne sont pas disponibles partout, en particulier dans les zones rurales et isolées du Canada. Il peut être difficile de décider s'il vaut mieux recommander à un patient de se déplacer pour obtenir l'imagerie recommandée ou d'effectuer localement un autre type d'imagerie; à cet égard, il faut tenir compte des avantages attendus de l'imagerie recommandée, des risques liés au déplacement, des préférences du patient et d'autres facteurs. La présente ligne directrice repose sur des données probantes liées uniquement aux tests d'imagerie diagnostique et non à la gestion clinique du patient.

Scénario clinique/diagnostique	Recommandations	Force
ÉCHO : échographie; **IRM** : imagerie par résonance magnétique; **RX** : radiographie; **TDM** : tomodensitométrie **Force de la recommandation :** ↑↑ : fortement recommandé; ↑ : recommandé dans certain cas; ↓↓ : fortement déconseillé; ↓ : déconseillé dans certains cas; **CE** : consensus d'un groupe d'experts		
	2. Dans le cas d'adultes chez qui l'on soupçonne une artérite à cellules géantes/artérite temporale et chez qui l'on ne procède pas à une biopsie, nous suggérons **l'IRM ou l'ÉCHO** comme modalité d'imagerie initiale.	↑
CN17. TROUBLES DU MOUVEMENT/PARKINSONISME		
	1. Dans le cas d'adultes présentant un trouble du mouvement/parkinsonisme, afin d'écarter des causes structurelles ou si c'est pertinent dans le cadre de la prise de décision clinique, nous recommandons l'**IRM** comme modalité d'imagerie initiale.	↑↑
CN18. ENCÉPHALOPATHIES MÉTABOLIQUES ET TOXIQUES		
	1. Dans le cas des adultes chez qui on soupçonne une encéphalopathie métabolique ou toxique, nous **déconseillons le recours à un examen usuel d'imagerie**.	↓↓
	↳ **1.1** Si un doute diagnostique subsiste ou s'il n'y a pas de réponse au traitement, nous recommandons **la TDM ou l'IRM** comme modalité d'imagerie initiale.	↑↑
	↳ **1.2** S'il existe un soupçon clinique de SEPR, nous recommandons l'**IRM** comme modalité d'imagerie initiale. SEPR : syndrome d'encéphalopathie postérieure réversible	CE
CN19. DÉPISTAGE DE L'ANÉVRYSME		
	1. Chez les adultes présentant un risque éléve✧ d'anévrysme cérébral, nous recommandons **l'IRM/l'angio-IRM ou la TDM/l'angio-TDM** dans le cadre du dépistage initial. ✧Patients atteints de polykystose rénale autosomique dominante [22], patients dont au moins deux membres de la famille ont présenté des anévrysmes intracrâniens ou des hémorragies sous-arachnoïdiennes. Au sein de telles familles, il existe un risque plus élevé de survenue d'anévrysme chez les membres présentant des antécédents d'hypertension artérielle, les membres fumeurs et les membres de sexe féminin [79].	↑↑

APPENDIX 4. POTENTIALLY RELEVANT NON-ENGLISH GUIDELINES

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APPENDIX 5. AGREE-II ASSESSMENTS

Guideline	Domain 1				Domain 2				Domain 3									Domain 4				Domain 5					Domain 6			Overall quality
	1	2	3	Score (%)	4	5	6	Score (%)	7	8	9	10	11	12	13	14	Score (%)	15	16	17	Score (%)	18	19	20	21	Score (%)	22	23	Score (%)	
ACR 2023 [21] (Pannell et al)	3	2	3	8 (89)	3	1	3	7 (78)	3	3	3	3	3	3	3	1	22 (92)	3	3	3	9 (100)	1	1	3	1	6 (50)	3	3	6 (100)	Moderate
ACR 2021 [22] (Ledbetter et al)	3	2	3	8 (89)	3	1	3	7 (78)	3	3	3	3	3	3	3	1	22 (92)	3	3	3	9 (100)	3	1	3	1	8 (67)	3	3	6 (100)	Moderate
AHA/ASA 2022 [23] (Greenberg et al)	3	2	3	8 (89)	3	3	3	9 (100)	3	3	3	3	3	3	3	1	22 (92)	3	3	3	9 (100)	3	3	2	1	9 (75)	3	3	6 (100)	High
AHA/ASA 2021 [24] (Kleindorfer et al)	3	3	3	9 (100)	3	3	3	9 (100)	3	3	3	3	3	3	3	1	22 (92)	2	3	3	8 (89)	3	3	3	1	10 (83)	3	3	6 (100)	High
CSC 2021 [19] (Gladstone et al)	3	3	3	9 (100)	3	3	3	9 (100)	3	3	3	3	3	3	3	3	24 (100)	3	3	3	9 (100)	3	3	1	1	8 (67)	3	3	6 (100)	High
CSBPAC 2021 [25] (Shoamanesh et al)	3	3	3	9 (100)	3	1	3	7 (78)	3	3	3	3	1	3	3	3	22 (92)	3	3	3	9 (100)	1	3	1	1	6 (50)	3	3	6 (100)	Moderate
CSA 2020 [26] (Cao et al)	3	1	3	7 (78)	3	1	3	7 (78)	3	1	1	3	1	3	3	1	16 (67)	3	3	3	9 (100)	1	1	1	1	4 (33)	3	3	6 (100)	Moderate
CSA 2019 [27] (Dong et al)	3	1	2	6 (67)	3	1	3	7 (78)	3	1	3	3	1	3	3	1	18 (75)	3	3	3	9 (100)	1	3	1	1	6 (50)	3	3	6 (100)	Moderate
EAN 2020 [28] (Mancuso et al)	3	2	3	8 (89)	3	3	3	9 (100)	3	3	1	3	1	3	3	1	18 (75)	3	1	3	7 (78)	1	1	1	1	4 (33)	3	3	6 (100)	Moderate
ESO 2021 [29] (Fonseca et al)	3	3	3	9 (100)	3	1	3	7 (78)	3	3	3	3	3	3	3	1	22 (92)	3	3	3	9 (100)	3	3	3	1	10 (83)	3	3	6 (100)	High
JSS 2022 [30] (Miyamoto et al)	3	3	3	9 (100)	3	2	3	8 (89)	3	1	3	1	3	3	3	1	18 (75)	3	3	3	9 (100)	1	3	3	1	8 (67)	3	3	6 (100)	High
NICE (NG128) 2022 [31]	3	3	3	9 (100)	3	1	3	7 (78)	3	3	3	3	3	3	3	1	22 (92)	3	3	3	9 (100)	3	1	3	1	8 (67)	3	3	6 (100)	Moderate
NICE (NG228) 2022 [32]	3	3	3	9 (100)	3	1	3	7 (78)	3	3	3	3	3	3	3	1	22 (92)	3	3	2	8 (89)	1	3	3	1	8 (67)	3	3	6 (100)	High
SNSSGC 2019 [33] (Kayan et al)	3	2	3	8 (89)	3	1	3	7 (78)	3	1	1	1	1	3	3	1	14 (58)	3	3	3	9 (100)	1	1	3	1	6 (50)	3	3	6 (100)	Moderate
SSR 2019 [34] (Turesson et al)	3	1	3	7 (78)	3	1	3	7 (78)	3	3	1	3	1	3	3	1	18 (75)	3	3	1	7 (78)	1	1	1	1	4 (33)	3	3	6 (100)	Moderate
ACR 2020 [35] (Harvey et al)	3	2	3	8 (89)	3	1	3	7 (78)	3	3	3	3	3	3	3	1	22 (92)	3	3	3	9 (100)	3	1	3	1	8 (67)	3	3	6 (100)	High
EAN/PNS 2023 [36] (van Doorn et al)	3	3	3	9 (100)	3	3	3	9 (100)	3	3	1	3	1	3	3	1	18 (75)	3	3	2	8 (89)	1	1	1	1	4 (33)	3	3	6 (100)	Moderate
EAN/PMS 2021 [37] (Van den Bergh et al)	3	3	3	9 (100)	3	3	3	9 (100)	3	3	3	3	3	3	3	1	22 (92)	3	3	3	9 (100)	3	3	3	1	10 (83)	3	3	6 (100)	High
NICE (NG220) 2022 [38]	3	3	3	9 (100)	3	1	3	7 (78)	3	3	3	3	3	3	3	1	22 (92)	3	1	3	7 (78)	3	3	3	1	10 (83)	3	3	6 (100)	High
ACR 2023 [39] (Utukuri et al)	3	2	3	8 (89)	3	1	3	7 (78)	3	3	3	3	3	3	3	1	22 (92)	3	3	3	9 (100)	1	3	3	1	8 (67)	3	3	6 (100)	High

Appendix 5. AGREE-II assessments

Guideline	Domain 1				Domain 2				Domain 3									Domain 4				Domain 5					Domain 6			Overall quality
	1	2	3	Score (%)	4	5	6	Score (%)	7	8	9	10	11	12	13	14	Score (%)	15	16	17	Score (%)	18	19	20	21	Score (%)	22	23	Score (%)	
AHS 2020 [40] (Evans et al)	3	3	3	9 (100)	3	1	3	7 (78)	3	3	3	3	3	3	3	1	22 (92)	3	1	3	7 (78)	1	1	1	1	4 (33)	3	3	6 (100)	Moderate
NICE (CG150) 2021 [41]	3	3	3	9 (100)	3	1	3	7 (78)	3	3	3	3	3	3	3	1	22 (92)	1	1	3	5 (56)	3	3	1	1	8 (67)	3	3	6 (100)	Moderate
ACR 2022 [42] (Rath et al)	3	2	3	8 (89)	3	1	3	7 (78)	3	3	3	3	3	3	3	1	22 (92)	3	3	3	9 (100)	1	1	3	1	6 (50)	3	3	6 (100)	Moderate
EAN 2019 [43] (Bendtsen et al)	3	3	3	9 (100)	3	3	3	9 (100)	3	3	3	3	1	3	3	1	20 (83)	3	3	3	9 (100)	3	3	3	1	10 (83)	3	3	6 (100)	High
ACR 2022 [44] (Hagiwara et al)	3	2	3	8 (89)	3	1	3	7 (78)	3	1	3	3	3	3	3	1	20 (83)	3	3	3	9 (100)	1	1	3	1	6 (50)	3	3	6 (100)	Moderate
SIG 2023 [45] (Cheema et al)	3	3	3	9 (100)	3	3	3	9 (100)	3	1	3	3	1	3	3	2	19 (79)	3	3	2	8 (89)	1	3	3	1	8 (67)	3	3	6 (100)	Moderate
ACR 2020 [46] (Moonis et al)	3	2	3	8 (89)	3	1	3	7 (78)	3	3	3	3	3	3	3	1	22 (92)	3	3	3	9 (100)	1	1	2	1	5 (42)	3	3	6 (100)	Moderate
Japanese Gdln 2021 [47] (Nakajima et al)	3	3	3	9 (100)	3	1	3	7 (78)	3	1	1	3	1	3	3	1	16 (67)	3	3	2	8 (89)	1	3	1	3	8 (67)	3	3	6 (100)	Moderate
ACR 2023 [48] (Wang et al)	3	2	3	8 (89)	3	1	3	7 (78)	3	3	3	3	3	3	3	1	22 (92)	3	3	3	9 (100)	1	1	3	1	6 (50)	3	3	6 (100)	Moderate
MD Gdln 2020 [49,50] (Basura et al)	3	3	3	9 (100)	3	1	3	7 (78)	3	3	3	3	3	3	3	1	22 (92)	3	1	3	7 (78)	3	3	3	1	10 (83)	3	3	6 (100)	Moderate
NICE (NG98) 2023 [51]	3	3	3	9 (100)	3	1	3	7 (78)	3	3	3	3	3	3	3	1	22 (92)	3	1	2	6 (67)	3	1	3	1	8 (67)	3	3	6 (100)	High
SHL Gdln 2019 [52,53] (Chandrasekhar et al)	3	2	3	8 (89)	3	3	3	9 (100)	3	3	3	3	3	3	3	1	22 (92)	3	3	3	9 (100)	3	3	3	1	10 (83)	3	3	6 (100)	High
ACR 2019 [54] (Luttrull et al)	3	2	3	8 (89)	3	1	3	7 (78)	3	3	3	2	3	3	3	1	21 (88)	3	3	3	9 (100)	3	3	2	1	9 (75)	3	3	6 (100)	Moderate
CCCDTD 2020 [55] (Smith et al)	3	2	3	8 (89)	3	3	3	9 (100)	3	3	3	3	1	3	3	1	20 (83)	3	3	3	9 (100)	3	3	1	1	8 (67)	3	3	6 (100)	Moderate
BSR 2020 [57,58] (Mackie et al)	3	3	3	9 (100)	3	3	3	9 (100)	3	3	3	3	3	3	3	1	22 (92)	3	3	3	9 (100)	1	3	3	1	8 (67)	3	3	6 (100)	High
EULAR 2023 [59] (Dejaco et al)	3	3	3	9 (100)	3	3	3	9 (100)	3	3	3	3	3	3	3	1	22 (92)	3	3	3	9 (100)	3	3	3	1	10 (83)	3	3	6 (100)	High
JNRC 2023 [60] (Nagafuchi et al)	3	3	3	9 (100)	2	1	3	6 (67)	3	1	3	3	3	3	3	1	20 (83)	3	3	3	9 (100)	1	3	1	1	6 (50)	3	3	6 (100)	Moderate
ACR 2020 [61] (Lee et al)	3	2	3	8 (89)	3	1	3	7 (78)	3	3	3	3	3	3	3	1	22 (92)	3	3	3	9 (100)	2	3	2	1	8 (67)	3	3	6 (100)	Moderate
EANO-ESMO 2021 [62] (Roth et al)	3	2	3	8 (89)	3	1	3	7 (78)	3	1	1	3	1	3	3	2	17 (71)	3	3	3	9 (100)	1	1	1	1	4 (33)	3	3	6 (100)	Moderate
NICE (NG217) 2022 [63,64]	3	3	3	9 (100)	3	1	3	7 (78)	3	3	3	3	3	3	3	1	22 (92)	3	3	3	9 (100)	3	3	3	1	10 (83)	3	3	6 (100)	High
BSH 2019 [65] (Fox et al)	3	2	3	8 (89)	3	3	3	9 (100)	3	3	1	3	3	3	3	1	20 (83)	3	1	3	7 (78)	1	1	1	1	4 (33)	2	3	5 (83)	Moderate

Appendix 5. AGREE-II assessments

Guideline	Domain 1				Domain 2				Domain 3									Domain 4				Domain 5					Domain 6			Overall quality
	1	2	3	Score (%)	4	5	6	Score (%)	7	8	9	10	11	12	13	14	Score (%)	15	16	17	Score (%)	18	19	20	21	Score (%)	22	23	Score (%)	
CNS/SHM 2022 [66] (Chen et al)	3	3	3	9 (100)	3	2	3	8 (89)	3	3	3	3	3	3	3	1	22 (92)	3	3	3	9 (100)	1	1	1	1	4 (33)	3	3	6 (100)	Moderate
ESCMID 2023 [67] (Bodilsen et al)	3	3	3	9 (100)	3	3	3	9 (100)	3	3	3	3	3	3	3	3	24 (100)	3	3	3	9 (100)	2	1	3	1	7 (58)	3	3	6 (100)	High
EANO 2021 [68] (Goldbrunner et al)	2	2	3	7 (78)	3	1	2	6 (67)	3	3	2	3	1	3	3	1	19 (79)	3	1	3	7 (78)	1	3	1	1	6 (50)	3	3	6 (100)	Moderate
EANO 2021 [69] (Weller et al)	3	2	3	8 (89)	3	1	3	7 (78)	3	3	3	3	1	3	3	1	20 (83)	3	2	3	8 (89)	1	3	1	1	6 (50)	3	3	6 (100)	Moderate
EANO-EURACAN 2019 [70] (Frenceschi et al)	3	2	3	8 (89)	3	1	3	7 (78)	3	1	3	1	1	3	3	1	16 (67)	3	3	2	8 (89)	1	1	1	1	4 (33)	3	3	6 (100)	Moderate
AANS/CNS 2020 [71] (Lundy et al)	3	3	2	8 (89)	3	1	3	7 (78)	3	3	3	3	1	3	3	1	20 (83)	3	3	2	8 (89)	1	1	1	1	4 (33)	3	3	6 (100)	Moderate
NICE (NG99) 2021 [72]	3	3	3	9 (100)	3	1	3	7 (78)	3	3	3	3	3	3	3	1	22 (92)	3	3	3	9 (100)	3	3	3	1	10 (83)	3	3	6 (100)	High
SINch/AINO/SIN 2020 [73] (Rudà et al)	3	2	3	8 (89)	3	1	3	7 (78)	3	3	3	3	3	3	3	1	22 (92)	3	3	3	9 (100)	3	3	3	1	10 (83)	3	3	6 (100)	High
CSA 2020 [74] (Fan et al)	2	2	3	7 (78)	3	1	3	7 (78)	3	1	1	1	1	3	3	1	14 (58)	3	3	3	9 (100)	1	3	1	1	6 (50)	3	3	6 (100)	Moderate
ESO 2023 [75] (Pascarella et al)	3	3	3	9 (100)	3	1	3	7 (78)	3	3	3	3	1	3	3	1	20 (83)	3	3	3	9 (100)	1	3	1	1	6 (50)	3	3	6 (100)	High
Canadian Gdln 2019 [76] (Grimes et al)	3	2	3	8 (89)	3	3	3	9 (100)	3	3	3	3	3	3	3	1	22 (92)	2	3	3	8 (89)	2	1	1	1	5 (42)	2	3	5 (83)	Moderate
EASL 2022 [77]	3	3	3	9 (100)	3	3	3	9 (100)	3	3	3	3	3	3	3	1	22 (92)	3	3	3	9 (100)	3	1	3	1	8 (67)	3	3	6 (100)	High
HE Gdln 2019 [78] (Xu et al)	3	2	3	8 (89)	3	1	3	7 (78)	3	1	3	1	3	3	3	1	18 (75)	3	3	2	8 (89)	1	3	1	1	6 (50)	3	3	6 (100)	Moderate

Abbreviations: AANS/CNS: Joint Tumor Section of the American Association of Neurological Surgeons and the Congress of Neurological Surgeons; ACR: American College of Radiology; AHA/ASA: American Heart Association/American Stroke Association; AHS: American Headache Society; BSH: British Society for Haematology; BSR: British Society of Rheumatology; CCCDTD: Canadian Consensus Conference on Diagnosis and Treatment of Dementia; CNS/SHM: Chinese Neurosurgical Society of the Chinese Medical Association and the Society of Hematological Malignancies of the Chinese Anti-Cancer Association; CSA: Chinese Stroke Association; CSBPAC: Canadian Stroke Best Practices Advisory Committee; CSC: Canadian Stroke Consortium; EAN: European Academy of Neurology; EAN/PNS: European Academy of Neurology/Peripheral Nerve Society; EANO: European Association of Neuro-Oncology; EANO-ESMO: European Association of Neuro-Oncology and the European Society for Medical Oncology; EASL: European Association for the Study of the Liver; ESO: European Stroke Organisation; ESCMID: European society of Clinical Microbiology and Infectious Diseases; EULAR: European Alliance of Associations for Rheumatology; HE: Hepatic Encephalopathy; JNRC: Japanese National Research Committee for Behçet's disease; JSS: Japan Stroke Society; MD: Meniere's Disease; NICE: National Institute for Health and Care Excellence; SHL: Sudden Hearing Loss; SIG: Special Interest Group; SINch/AINO/SIN: Italian Society of Neurosurgery Neuro-Oncology Section, Italian Association of Neuro-Oncology, Italian Association of Neurology; SNSSGC: Society of NeuroInterventional Surgery Standards and Guidelines Committee; SSR: Swedish Society of Rheumatology