CARDIOVASCULAR GUIDELINE

CARDIOVASCULAR EXPERT PANEL MEMBERS

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ABBREVIATIONS

ACR	American College of Radiology
AGREE-II	Appraisal of Guidelines for Research & Evaluation Instrument
AI	Artificial Intelligence
CAR	Canadian Association of Radiologists
CCTA	Coronary Computed Tomography Angiography
CMR	Cardiac Magnetic Resonance Imaging
CT	Computed Tomography
CTA	Computed Tomography Angiography
CTPA	Computed Tomography Pulmonary Angiography
CTV	Computed Tomography Venography
ECG	Electrocardiogram
EP	Expert Panel
EtD	Evidence to Decision
FDG-PET	Fluorodeoxyglucose Positron Emission Tomography
GRADE	Grading of Recommendations Assessment, Development and Evaluation
HRCT	High-Resolution Computed Tomography
MRA	Magnetic Resonance Angiography
MPR	Myocardial Perfusion Imaging
MRI	Magnetic Resonance Imaging
MRV	Magnetic Resonance Venography
MUGA	Multigated Acquisition
NICE	National Institute for Health and Care Excellence
NM	Nuclear Medicine
PET	Positron Emission Tomography
POCUS	Point of care ultrasound
RCR	Royal College of Radiologists
SPECT	Single-Photon Emission Computed Tomography
STEMI	ST Elevation Myocardial Infarction
TEE	Transesophageal Echocardiogram
TTE	Transthoracic Echocardiogram
US	Ultrasound
VQ scan	Ventilation Perfusion Scan
XR	X-Ray/Radiograph

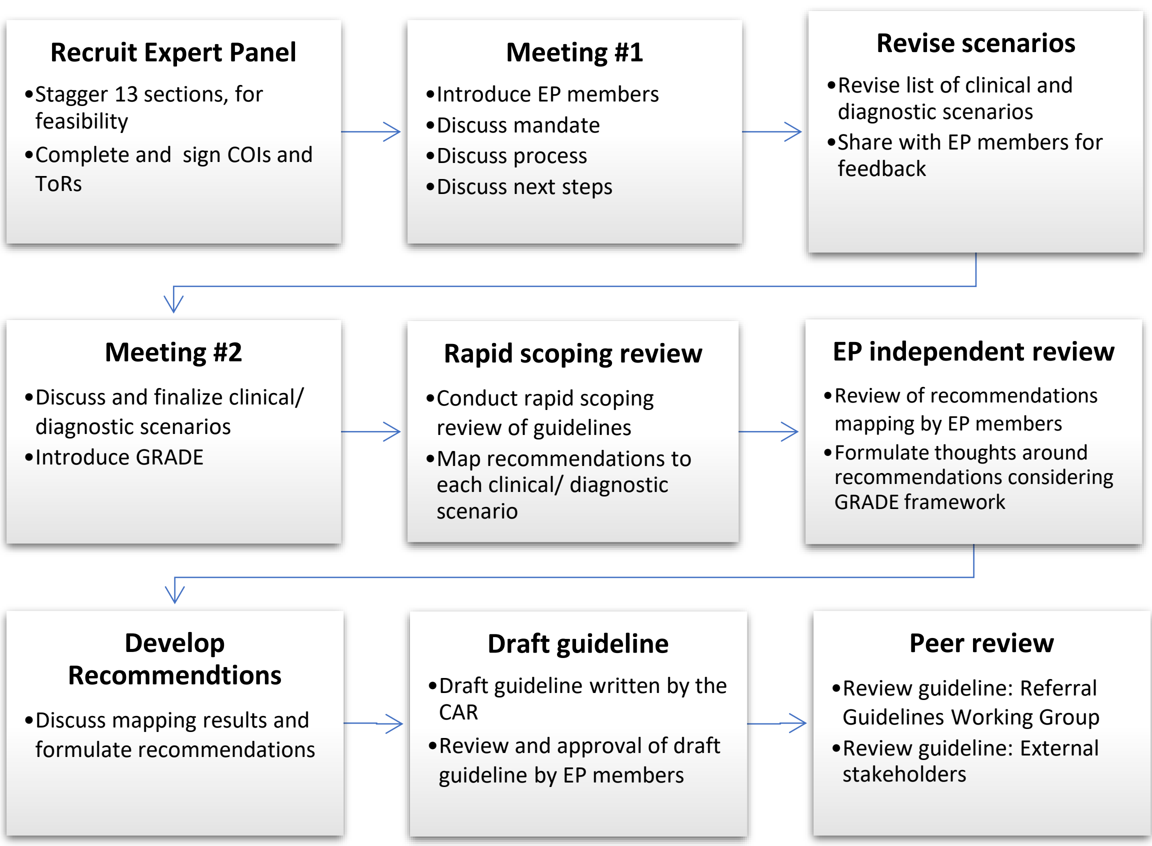
INTRODUCTION

The diagnostic imaging referral recommendations from the Canadian Association of Radiologists (CAR) were published in 2012 (https://car.ca/patient-care/referral-guidelines/). These recommendations were made up of 13 sections, of which one was Cardiovascular. 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 cardiovascular radiologists, an emergency physician, a cardiologist, a patient representative, and an evidence review/ guideline methodologist from across Canada met over a series of two meetings in February and September 2023, with additional offline communication (e.g., email).

The 26 clinical/diagnostic scenarios in the 2012 CAR recommendations were used as the starting point for discussions. After a review and update of these scenarios, a list of 27 clinical/diagnostic scenarios was created (one scenario pointing to the Thoracic guideline), 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, and allied health providers); 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 designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Additionally, 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, the patient's presentation, 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 Cardiovascular EP.

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 modality (e.g., radiograph [XR], magnetic resonance imaging [MRI], computed tomography [CT], ultrasound [US]) 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 in 2018 and onward.

Language of publication: English, for feasibility.

Search

A systematic search strategy was developed by an experience information specialist (**Appendix 1**) using the list of clinical/diagnostic scenarios identified by the Cardiovascular EP members. The search was run in Medline and Embase on March 30, 2023. The search was limited to publications from 2018 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), the National Institute for Health and Care Excellence (NICE), and the Royal College of Radiologists (RCR) 8th Edition (2017).

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 and subsequent consensus. 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 one virtual meeting (September 30th, 2023), 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, for the next imaging modality or an alternative to the first imaging modality, in situations where the first imaging 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 the 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 27 clinical/diagnostic scenarios in the Cardiovascular section (one scenario linked to the Thoracic guideline), which could have included several diagnostic imaging modality comparisons. This would have resulted in a minimum of 27 EtD frameworks, but realistically many more, as we would have had to create an EtD for each comparison (e.g., XR vs US, XR vs CT, MRI vs CT) 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; and
- 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; however 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; however 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; however 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 4378 records were identified through the electronic database searches. After reviewing 1436 records, the AI reviewer excluded the remaining records (n=2942), as 96% of the predicted included records had been identified and the likelihood for inclusion of the remaining records was low (highest remaining prediction score of 6.57%). A second reviewer screened a set of randomly selected records (n=906) for verification (~10% of included and 20% of excluded records). Among these, there were 16 conflicts, 12 between the two human screeners and 4 between the verifying reviewer and AI reviewer. These conflicts were resolved through discussion. Six additional records were added from the supplemental search. The full text for two records were not retrievable, and 22 records were published in non-English languages (**Appendix 4**). Among the remaining 165 full texts that were screened for eligibility, 54 were not guidelines providing diagnostic imaging recommendations for cardiovascular imaging, 9 were not covered by the current guideline, 71 did not use systematic methods or sufficiently describe the methods used in the formulation of the guideline, and seven were excluded for 'other' reasons. A list of excluded records with reasons is available upon request. Recommendations from 46 guidelines (56 publications) were included (Error! Reference source not found. **– PRISMA flow diagram**).

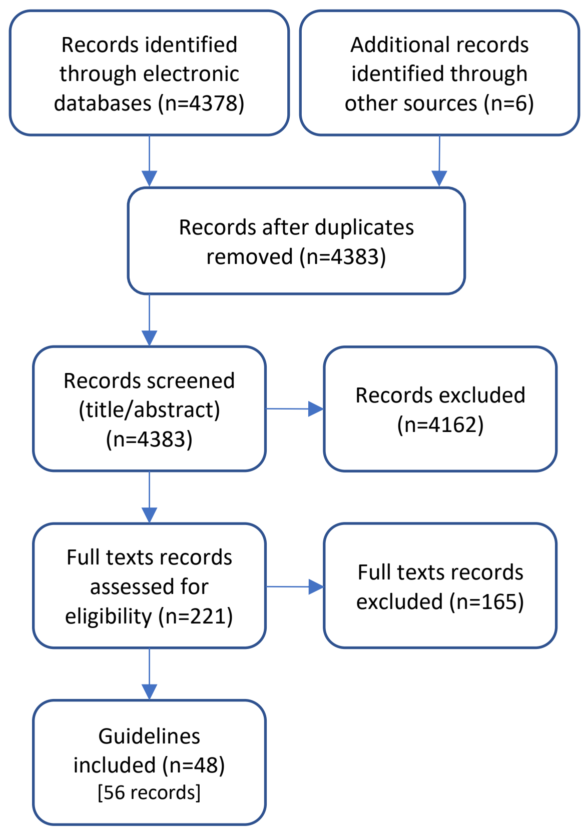


Figure 2 - PRISMA flow diagram

The number of guidelines included per clinical/diagnostic scenario ranged from one to nine. 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**) and Steve Burrell (Nuclear Medicine Radiologist, NS).

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
Charlotte Yong-Hing, BC Cancer, Vancouver, BC
Kaitlin Zaki-Metias, Trinity Health Oakland Hospital, USA

Italicized name is a WG member who was also a member of the Cardiovascular Expert Panel.

CARDIOVASCULAR CLINICAL/DIAGNOSTIC SCENARIOS

CV01. Acute chest pain syndromes
- CV01A. Acute coronary syndrome: ST elevation myocardial infarction
- CV01B. Acute coronary syndrome: non-STEMI
- CV01C. Acute coronary syndrome: unstable angina
- CV01D. Acute aortic syndrome (including aortic dissection, intramural hematoma, and penetrating atherosclerotic ulcer)
- CV01E. Pulmonary embolism
- CV01F. Acute myocarditis
- CV01G. Acute pericarditis
- CV01H. Non-cardiac chest pain

CV02. Chronic chest pain
- CV02A. Suspected chronic ischemic heart disease
- CV02B. Non-cardiac chest pain

CV03. Cardiovascular screening and risk stratification (calcium score CT)

CV04. Pericardial syndromes
- CV04A. Acute pericarditis
- CV04B. Pericardial effusion
- CV04C. Constrictive pericarditis

CV05. Intracardiac/pericardial mass
- CV05A. Normal variant
- CV05B. Masses

CV06. Suspected valvular disease
- CV06A. Aortic valve
- CV06B. Mitral valve
- CV06C. Pulmonary valve
- CV06D. Tricuspid valve

CV07. Cardiomyopathy
- CV07A. Cardiomyopathy: dilated
- CV07B. Cardiomyopathy: hypertrophic
- CV07C. Cardiomyopathy: restrictive
- CV07D. Cardiomyopathy: arrhythmogenic cardiomyopathy

CV08. Aorta
- CV08A. Thoraco-abdominal aneurysm
- CV08B. Vasculitis

CV09. Venous thrombosis

CV10. Peripheral vascular disease
- CV10A. Upper and lower peripheral vascular disease
- CV10B. Vascular malformation
- CV10C. Entrapment and compression syndromes

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. 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

There are clinical/diagnostic scenarios that may pertain to more than one CAR guideline section. For example, non-cardiac chest pain could be relevant to both the Cardiovascular section and the Thoracic section. Where applicable, we have pointed to other guideline sections within the recommendations.

CV01. Acute chest pain syndromes

CV01A. Acute coronary syndrome: ST elevation myocardial infarction (STEMI)

Recommendations

In patients presenting with suspected acute coronary syndrome, imaging should be offered based on clinical results (i.e., ECG and cardiac troponin).

1. In patients meeting criteria for STEMI (i.e., ECG), we recommend **invasive coronary angiography** as the initial imaging modality (↑↑).

↳ **1.1** In cases of diagnostic uncertainty OR if immediate invasive coronary angiography is unavailable, we suggest **chest XR and bedside TTE/POCUS (if available)** to evaluate for other potential causes of chest pain, but this should not delay care (↑).

Recommendations from 7 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR guideline Cardiovascular section [18], the 2019 ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS guideline on multimodality imaging in the assessment of cardiac structure and function in nonvalvular heart disease [19], the 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline on chest pain [20,21], the 2022 AHA/ACC/HFSA guideline on the management of heart failure [22,23], the 2018 NHFS/CSANZ guideline on heart failure [24], the 2020 NICE guideline (NG185) on acute coronary syndromes [25,26], and the 2017 RCR iRefer guideline Chest and Cardiovascular system section [27] (**Appendix 2: Table CV01A**).

CV01B. Acute coronary syndrome: non-STEMI

Recommendations

In patients presenting with suspected acute coronary syndrome, imaging should be offered based on clinical results (i.e., ECG and cardiac troponin).

1. In patients with suspected non-STEMI, we recommend **chest XR** (to rule out other causes of chest pain) **and bedside TTE/POCUS** (if available, to evaluate for ventricular function and rule out pericardial effusion) as the initial imaging modalities (↑↑).

↳ **1.1** In higher-risk patients, we recommend **invasive coronary angiography** as the next imaging modality (↑↑).

↳ **1.2** In lower-risk patients, we recommend **invasive coronary angiography or CCTA** as the next imaging modality, depending on clinical parameters (↑↑).

Recommendations from 7 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR guideline Cardiovascular section [18], the 2019 ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS guideline on multimodality imaging in the assessment of cardiac structure and function in nonvalvular heart disease [19], the 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline on chest pain [20,21], the 2020 ESC guideline on acute coronary syndromes

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. 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.

[28], the 2018 JCS guideline on chronic coronary heart diseases [29], the 2020 NICE guideline (NG185) on acute coronary syndromes [25,26], and the 2017 RCR iRefer guideline Chest and Cardiovascular system section [27] (**Appendix 2: Table CV01B**).

CV01C. Acute coronary syndrome: unstable angina

Recommendations

In patients presenting with suspected acute coronary syndrome, imaging should be offered based on clinical results (i.e., ECG and cardiac troponin).

1. In patients with suspected unstable angina (i.e., negative cardiac troponin), we recommend **chest XR** (to rule out other causes of chest pain) **and bedside TTE/POCUS** (if available, to evaluate for ventricular function and rule out pericardial effusion) as the initial imaging modalities (↑↑).

   ↳ **1.1** For assessment of coronary artery disease and for risk stratification, we recommend **CCTA** (↑↑).

   Depending on regional practice preference and availability, stress echocardiography and NM (stress perfusion) may be considered. Internal medicine/cardiology consultation may also be considered.

2. In patients with suspected unstable angina with ongoing chest pain not relieved with medical management, we recommend **invasive coronary angiography** (↑↑).

Recommendations from 5 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR guideline Cardiovascular section [18], the 2019 ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS guideline on multimodality imaging in the assessment of cardiac structure and function in nonvalvular heart disease [19], the 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline on chest pain [20,21], the 2020 NICE guideline (NG185) on acute coronary syndromes [25,26], and the 2017 RCR iRefer guideline Chest and Cardiovascular system section [27] (**Appendix 2: Table CV01C**).

CV01D. Acute aortic syndrome (including aortic dissection, intramural hematoma, and penetrating atherosclerotic ulcer)

Recommendations

1. For patients with suspected acute aortic syndrome, we recommend **CTA** (preferably cardiac-gated, if available) as the initial imaging modality (↑↑).

   ↳ **1.1** If CTA is contraindicated, we recommend **TEE or MRA** as alternative imaging modalities (↑↑).

Recommendations from 6 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR guideline Cardiovascular section [18], the 2019 ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS guideline on multimodality imaging in the assessment of cardiac structure and function in nonvalvular heart disease [19], the 2022 ACC/AHA guideline on aortic disease [30], the 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline on chest pain [20,21], the 2021 ACR guideline on suspected acute aortic syndrome [31], and the 2017 RCR iRefer guideline Chest and Cardiovascular system section [27] (**Appendix 2: Table CV01D**).

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. 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.

CV01E. Pulmonary embolism

Recommendations

Acute pulmonary embolism

1. In patients with suspected pulmonary embolism with low or intermediate pretest probability (as determined by a structured risk assessment tool) with a negative D-dimer, we recommend **against CTA/MRA/VQ scan** (↓↓).

2. In patients with suspected pulmonary embolism with low or intermediate pretest probability (as determined by a structured risk assessment tool) with a positive D-dimer test, we recommend **CT pulmonary angiography (CTPA)** as the initial imaging modality (↑↑).

↳ **2.1** If immediate CTPA is not available, we recommend **chest XR** as the next imaging modality to exclude other causes of chest pain (↑↑).

↳ **2.2** If CT pulmonary angiography is contraindicated, we suggest **VQ scan or MR pulmonary angiography** as an alternative (↑). [*see recommendation 4 for pregnant patients*]

3. In patients with suspected pulmonary embolism and high pretest probability (as determined by a structured risk assessment tool) or in patients with recurrent pulmonary embolism, we recommend **CTPA** as the initial imaging modality (↑↑).

↳ **3.1** If immediate CTPA is not available, we recommend **chest XR** as the next imaging modality to exclude other causes of chest pain (↑↑).

↳ **3.2** If CT pulmonary angiography is contraindicated, we suggest **VQ scan or MR pulmonary angiography** as an alternative (↑). [*see recommendation 4 for pregnant patients*]

4. For pregnant patients with high pretest probability (as determined by a structured risk assessment tool) of pulmonary embolism, we recommend **chest XR** as the initial imaging modality (↑↑).

↳ **4.1** If chest XR does not explain the clinical presentation and further imaging is required, we recommend **Doppler US** as the next imaging modality (↑↑).

↳ **4.2** If Doppler US is negative, we recommend **CTPA or NM (VQ scan)** as the next imaging modality (↑↑).

In pregnant patients with a high pre-test probability of pulmonary embolism, and normal leg dopplers, some guidelines suggest performing V/Q scan. In practice, however, its availability is limited. CTPA is widely available, has better interobserver agreement, and ability to provide alternative diagnoses for acute chest pain presentation that support its use for evaluation of acute pulmonary embolism in pregnant patients. Mean maternal and fetal radiation dose is typically lower for reduced dose NM perfusion scanning (i.e., no ventilation scanning performed) and breast radiation dose is typically higher with CTPA.

Note: MRI is not recommended for evaluation of pulmonary embolism in pregnant patients because gadolinium should be avoided in pregnant patients [32].

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. 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.

Chronic pulmonary embolism

5. In patients with pulmonary hypertension suspected to be secondary to chronic thromboembolic disease (CTEPH), we recommend **VQ scan** as the initial imaging modality (EP consensus).

↳ **5.1** If VQ scan is non-diagnostic, indeterminate for chronic pulmonary embolism, or unavailable, we recommend **CTPA** as an alternative (EP consensus).

Dual energy CT technology or iodine subtraction maps can increase CTPA sensitivity to detect chronic pulmonary embolism.

Recommendations from 8 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR guideline Cardiovascular section [18], the 2019 ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS guideline on multimodality imaging in the assessment of cardiac structure and function in nonvalvular heart disease [19], the 2022 ACR guideline on pulmonary embolism [33], the 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline on chest pain [20,21], the 2018 ASH guideline on venous thromboembolism [34], the 2019 ESC guideline on acute pulmonary embolism [35], the 2020 NICE guideline (NG156) on venous thromboembolic diseases [36], and the 2017 RCR iRefer guideline Chest and Cardiovascular system section [27] (**Appendix 2: Table CV01E**).

CV01F. Acute myocarditis

Recommendations

1. In patients with suspected acute myocarditis, we recommend **TTE followed by cardiac MRI** as the initial imaging modalities (↑↑).

↳ **1.1** If cardiac MRI does not demonstrate acute myocarditis and if invasive coronary angiography has not been performed, we suggest **CCTA** as the next imaging modality to exclude obstructive coronary artery disease (↑) in appropriately selected patients.

Recommendations from 3 guidelines were used during the discussions and formulation of these recommendations: the 2021 ACR guideline on nonischemic myocardial disease with clinical manifestations [37], the 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline on chest pain [20,21], and the 2017 RCR iRefer guideline Chest and Cardiovascular system section [27] (**Appendix 2: Table CV01F**).

CV01G. Acute pericarditis

Recommendations

1. In patients with suspected acute pericarditis, we recommend **bedside TTE/POCUS or TEE** as the initial imaging modality to assess presence of pericardial thickening, effusion, as well as ventricular function and constrictive physiology (↑↑).

↳ **1.1** If further imaging is required to guide management (i.e., pericardiocentesis), we suggest **CT** (preferably cardiac-gated, if available) as the next imaging modality (↑).

↳ **1.2** If TTE is inconclusive regarding acute pericarditis or constrictive physiology, we suggest **cardiac MRI** as an alternative (↑).

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. 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 from 5 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR guideline Cardiovascular section [18], the 2021 ACR guideline on dyspnea – suspected cardiac origin (ischemia already excluded) [38], the 2021 ACR guideline on nonischemic myocardial disease with clinical manifestations [37], the 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline on chest pain [20,21], and the 2017 RCR iRefer guideline Chest and Cardiovascular system section [27] (**Appendix 2: Table CV01F**).

CV01H. Non-cardiac chest pain

See the CAR Thoracic Diagnostic Imaging Referral Guideline [39], scenarios TH02. Non-specific chest pain, TH14. Suspected pneumothorax (non-traumatic), and TH15. Clinically suspected pleural effusion.

CV02. Chronic chest pain

CV02A. Suspected chronic ischemic heart disease

Recommendations

1. In patients *with established chronic ischemic heart disease* with recurrent chest pain symptoms despite guideline directed medical therapy and intermediate risk/pre-test probability or known non-obstructive CAD, we suggest **anatomical (CCTA), functional (stress NM, stress echo) imaging, or stress MR** as the initial imaging modalities (↑).
   - ↳ **1.1** To identify patients who may benefit from further investigation with invasive coronary angiography, we suggest **CT-fractional flow reserve (CT-FFR)** (↑).
2. In patients *with established chronic ischemic heart disease* with recurrent chest pain symptoms despite guideline directed medical therapy and high risk/pre-test probability, we recommend **invasive coronary angiography** as the initial imaging modality (↑↑).
3. In patients *with established chronic ischemic heart disease* with prior coronary revascularization with percutaneous coronary intervention (PCI) or coronary artery bypass grafts (CABG) and with recurrent chest pain symptoms, we suggest **CCTA** to evaluate for stent (especially if stent > 3mm) or graft patency (↑).
   - ↳ **3.1** If evaluation for ischemia to account for symptoms is important, we recommend **NM (myocardial perfusion scan)** (↑↑).
4. In patients with stable chest pain *without established ischemic heart disease* presenting to the outpatient clinic and at low risk/pre-test likelihood of having obstructive CAD (as determined by a structured assessment tool), **routine imaging investigations** are not recommended (↓↓).
   - ↳ **4.1** In selected patient populations, we suggest **calcium score CT** (for excluding calcified plaque and identifying patients at low likelihood of obstructive CAD) or **exercise ECG** testing (↑).
5. In patients *without established chronic ischemic heart disease* with recurrent stable chest pain symptoms and intermediate or high risk/pre-test probability, we recommend **CCTA** for diagnosis of CAD, risk prognostication and guiding of treatment decisions (↑↑).

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. 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.

↳ **5.1** For diagnosis of myocardial ischemia and estimation of risk of major adverse cardiovascular events (MACE), we recommend **functional imaging (stress echocardiography or PET/SPECT MPI or CMR)** (↑↑).

Recommendations from 10 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR guideline Cardiovascular section [18], the 2019 ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS guideline on multimodality imaging in the assessment of cardiac structure and function in nonvalvular heart disease [19], the 2021 ACR guideline on chronic chest pain [40], the 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline on chest pain [20,21], the 2022 AHA/ACC/HFSA guideline on the management of heart failure [22,23], the 2021 ESC guideline on heart failure [41], the 2019 ESC guideline on chronic coronary syndromes [42], the 2018 JCS guideline on chronic coronary heart diseases [29], the 2018 NHFS/CSANZ guideline on heart failure [24], and the 2017 RCR iRefer guideline Chest and Cardiovascular system section [27] (**Appendix 2: Table CV02A**).

CV02B. Non-cardiac chest pain

See the CAR Thoracic Diagnostic Imaging Referral Guideline [39], scenarios TH02. Non-specific chest pain and TH15. Clinically suspected pleural effusion.

CV03. Cardiovascular screening and risk stratification (calcium score CT)

Recommendations

1. In asymptomatic low-risk adults, we suggest **against routine cardiovascular imaging screening and risk stratification** (↓).
2. In asymptomatic intermediate-risk adults, we recommend **calcium score CT** for optimal risk stratification to guide medical management (↑↑).

In high-risk patients reluctant to initiate optimal medical management, calcium score CT can provide useful information for patient counselling.

Recommendations from 1 guideline was used during the discussions and formulation of these recommendations: the 2017 RCR iRefer guideline Chest and Cardiovascular system section [27] (**Appendix 2: Table CV03**).

CV04. Pericardial syndromes

CV04A. Acute pericarditis

See CV01G. Acute chest pain syndromes (ACPS): Acute pericarditis

CV04B. Pericardial effusion

Recommendations

1. In patients with suspected pericardial effusion, we recommend **TTE** as the initial imaging modality (↑↑).

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. 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.

↳ **1.1** If there is suspected effusive constrictive/constrictive physiology, we suggest **CT** (preferably cardiac-gated, if available) as the next imaging modality to evaluate for pericardial thickness, pericardial effusion, and calcification (↑).

↳ **1.2** If TTE is inconclusive for effusive constrictive/constrictive physiology, we recommend **cardiac MRI** as the next imaging modality (↑↑).

↳ **1.3** If cardiac MRI is inconclusive for effusive constrictive/constrictive physiology, we recommend **cardiac catheterization** (↑↑).

Recommendations from 3 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR guideline Cardiovascular section [18]**,** the 2019 ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS guideline on multimodality imaging in the assessment of cardiac structure and function in nonvalvular heart disease [19], and the 2017 RCR iRefer guideline Chest and Cardiovascular system section [27] (**Appendix 2: Table CV04B**).

CV04C. Constrictive pericarditis

Recommendations

1. In patients with suspected constrictive pericarditis, we recommend **TTE** as the initial imaging modality (↑↑).

↳ **1.1** If there is suspected constrictive physiology, we suggest **CT** (preferably cardiac-gated, if available) as the next imaging modality to evaluate for pericardial thickness and calcification (↑).

↳ **1.2** If TTE is inconclusive for constrictive physiology, we recommend **cardiac MRI** as the next imaging modality (↑↑).

↳ **1.3** If cardiac MRI is inconclusive for constrictive physiology, we recommend **cardiac catheterization** (↑↑).

Recommendations from 2 guidelines were used during the discussions and formulation of these recommendations: ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2019 [19], and the 2017 RCR iRefer guideline Chest and Cardiovascular system section [27] (**Appendix 2: Table CV04C**).

CV05. Intracardiac/pericardial mass

CV05A. Normal variant

Recommendations

1. In patients with a suspected intracardiac or pericardial mass (versus normal variant) detected on chest CT, we recommend **TTE** as the initial imaging modality (↑↑).

↳ **1.1** If further imaging is required, we recommend **cardiac MRI** as the next imaging modality (↑↑).

↳ **1.2** If cardiac MRI is not tolerated, is unavailable, or is contraindicated, we recommend **cardiac CT** as an alternative imaging modality (↑↑).

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. 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.

2. In patients with a suspected intracardiac or pericardial mass (versus normal variant) incidentally detected on TTE, we recommend **cardiac MRI** for further characterization (↑↑).

↳ **2.1** If cardiac MRI is not tolerated, is unavailable, or is contraindicated, we recommend **cardiac CT** as the next imaging modality (↑↑).

Recommendations from 1 guideline was used during the discussions and formulation of these recommendations: ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2019 [19] (**Appendix 2: Table CV05A**).

CV05B. Masses

Recommendations

1. In patients with intracardiac or pericardial mass detected on chest CT, we recommend **TTE** as the initial imaging modality (↑↑).

↳ **1.1** If further imaging is required, we recommend **cardiac MRI** as the next imaging modality (↑↑).

↳ **1.2** If cardiac MRI is not tolerated, is unavailable, or is contraindicated, we recommend **cardiac CT** as an alternative imaging modality (↑↑).

2. In patients with intracardiac or pericardial mass detected on TTE, we recommend **cardiac MRI** for further characterization (↑↑).

↳ **2.1** If cardiac MRI is not tolerated, is unavailable, or is contraindicated, we recommend **cardiac CT** as the next imaging modality (↑↑).

Cardiac PET may be helpful to guide management.

Recommendations from 1 guideline was used during the discussions and formulation of these recommendations: ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2019 [19] (**Appendix 2: Table CV05B**).

CV06. Suspected valvular disease

CV06A. Aortic valve

Recommendations

Aortic stenosis

1. In patients with suspected aortic valve stenosis, we recommend **TTE** as the initial imaging modality (↑↑).

↳ **1.1** If the severity of the aortic valve stenosis is unclear (for example in suspected low flow low gradient severe aortic valve stenosis), we recommend **calcium score CT of the aortic valve** as the next imaging modality (↑↑).

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. 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.

↳ **1.2** In patients with suspected aortic valve stenosis where pulmonary edema is suspected, we recommend **chest XR** as the next imaging modality (↑↑).

Aortic regurgitation

2. In patients with suspected aortic valve regurgitation, we recommend **TTE** as the initial imaging modality (↑↑).

↳ **2.1** If further imaging is required due to poor acoustic windows or if information about ventricular size and function is required, we recommend **cardiac MRI** as the next imaging modality (↑↑) or **TEE** if the mechanism or severity of aortic valve regurgitation is unclear.

↳ **2.2** If MRI is not tolerated, is unavailable, or is contraindicated, we recommend **cardiac CT** as an alternative imaging modality for evaluation of ventricular size and function (↑↑).

↳ **2.3** In patients with suspected aortic valve regurgitation where pulmonary edema is suspected, we recommend **chest XR** as the next imaging modality (↑↑).

Infective endocarditis - native valve

3. After completing TTE for aortic valve disease, we recommend **TEE** for suspected infective endocarditis, to further characterize stenosis severity or mechanism of regurgitation, and for ruling out aortic root abscess (↑↑).

↳ **3.1** If there is concern for aortic root abscess and TEE is contraindicated, we recommend **cardiac CT** (↑↑).

Infective endocarditis - prosthetic valve

4. In patients with prosthetic valve, we recommend **TTE and TEE** for suspected infective endocarditis, to further characterize stenosis severity or mechanism of regurgitation, and for ruling out aortic root abscess (↑↑).

↳ **4.1** If there is concern for aortic root abscess and TEE is contraindicated, we recommend **cardiac CT** (↑↑).

Recommendations from 8 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR guideline Cardiovascular section [18], the 2019 ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS guideline on multimodality imaging in the assessment of cardiac structure and function in nonvalvular heart disease [19], the 2018 ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS guideline on valvular heart diseases [43], the 2020 ACC/AHA guideline on valvular heart disease [44,45], the 2021 ACR guideline on dyspnea – suspected cardiac origin (ischemia already excluded) [38], the 2021 ACR guideline on infective endocarditis [46], the 2020 JCS/JSCS/JATS/JSVS guideline on valvular heart disease [47], and the 2017 RCR iRefer guideline Chest and Cardiovascular system section [27] (**Appendix 2: Table CV06A**).

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. 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.

CV06B. Mitral valve

Recommendations

These recommendations are to guide diagnostic imaging of the mitral valve and does not include imaging to guide interventions.

Mitral stenosis

1. In patients with suspected mitral valve stenosis, we recommend **TTE** as the initial imaging modality (↑↑).

↳ **1.1** If intervention is contemplated or required, we recommend **TEE** as the next imaging modality (↑↑).

2. In patients with suspected mitral valve stenosis where pulmonary edema is suspected, we recommend **chest XR** as the next imaging modality (↑↑).

Mitral regurgitation

3. In patients with suspected mitral valve regurgitation, we recommend **TTE** as the initial imaging modality (↑↑).

↳ **3.1** If the mechanism or severity is unclear on TTE, we recommend **TEE** as the next imaging modality (↑↑).

↳ **3.2** If further imaging is required due to poor acoustic windows OR if information about ventricular size and function or confirmation of mitral regurgitation severity is required, we recommend **cardiac MRI** as the next imaging modality (↑↑).

4. In patients with suspected mitral valve regurgitation where pulmonary edema is suspected, we recommend **chest XR** as the next imaging modality (↑↑).

Recommendations from 7 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR guideline Cardiovascular section [18], the 2018 ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS guideline on valvular heart diseases [43], the 2020 ACC/AHA guideline on valvular heart disease [44,45], the 2021 ACR guideline on dyspnea – suspected cardiac origin (ischemia already excluded) [38], the 2021 ACR guideline on infective endocarditis [46], the 2020 JCS/JSCS/JATS/JSVS guideline on valvular heart disease [47], and the 2017 RCR iRefer guideline Chest and Cardiovascular system section [27] (**Appendix 2: Table CV06B**).

CV06C. Pulmonary valve

Recommendations

1. In patients with suspected pulmonary valve disease, we recommend **TTE** as the initial imaging modality (↑↑).

↳ **1.1** If further imaging is required due to poor acoustic windows or if information about ventricular size and function is required (e.g., tetralogy of Fallot), we recommend **cardiac MRI** as the next imaging modality (↑↑).

↳ **1.2** If cardiac MRI is not tolerated, is unavailable, or is contraindicated, we recommend **cardiac CT** as an alternative imaging modality (↑↑).

2. After completing TTE for pulmonary valve disease, we suggest **TEE** for suspected infective endocarditis, to further characterize stenosis severity or mechanism of regurgitation, and for ruling out abscess (↑).

3. In patients with suspected pulmonary valve disease where supra and sub-valvular pathologies are possible based on TTE findings, we recommend **cardiac MRI** as the next imaging modality (↑↑).

↳ **3.1** If cardiac MRI is not tolerated, is unavailable, or is contraindicated, we recommend **cardiac CT** as an alternative imaging modality (↑↑).

Recommendations from 7 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR guideline Cardiovascular section [18], the 2018 ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS guideline on valvular heart diseases [43], the 2020 ACC/AHA guideline on valvular heart disease [44,45], the 2021 ACR guideline on dyspnea – suspected cardiac origin (ischemia already excluded) [38], the 2021 ACR guideline on infective endocarditis [46], the 2020 JCS/JSCS/JATS/JSVS guideline on valvular heart disease [47], and the 2017 RCR iRefer guideline Chest and Cardiovascular system section [27] (**Appendix 2: Table CV06C**).

CV06D. Tricuspid valve

Recommendations

1. In patients with suspected tricuspid valve disease, we recommend **TTE** as the initial imaging modality (↑↑).

↳ **1.1** If further imaging is required due to poor acoustic windows or if information about ventricular size and function is required, we recommend **cardiac MRI** as the next imaging modality (↑↑).

↳ **1.2** If cardiac MRI is not tolerated, is unavailable, or is contraindicated, we recommend **cardiac CT** as an alternative imaging modality (↑↑).

2. After completing TTE for tricuspid valve disease, we suggest **TEE** for suspected infective endocarditis, to further characterize stenosis severity or mechanism of regurgitation, and for ruling out abscess (↑).

Recommendations from 7 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR guideline Cardiovascular section [18], the 2018 ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS guideline on valvular heart diseases [43], the 2020 ACC/AHA guideline on valvular heart disease [44,45], the 2021 ACR guideline on dyspnea – suspected cardiac origin (ischemia already excluded) [38], the 2021 ACR guideline on infective endocarditis [46], the 2020 JCS/JSCS/JATS/JSVS guideline on valvular heart disease [47], and the 2017 RCR iRefer guideline Chest and Cardiovascular system section [27] (**Appendix 2: Table CV06D**).

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. 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.

CV07. Cardiomyopathy

CV07A. Cardiomyopathy: dilated

Recommendations

1. In patients with suspected dilated cardiomyopathy, we recommend **TTE** as the initial imaging modality (↑↑).

↳ **1.1** If ischemic dilated cardiomyopathy is a possibility, we recommend **invasive catheter angiography** for further evaluation (↑↑).

↳ **1.2** If invasive catheter angiography is unavailable, we recommend **CCTA** as an alternative (↑↑).

↳ **1.3** If there is no significant obstructive coronary artery disease based on invasive catheter angiography or CCTA results and further imaging is required, we recommend **cardiac MRI** as the next imaging modality (↑↑).

↳ **1.4** If information about ventricular size and function is required (and if ventricular size/function is unreliable by TTE) and cardiac MRI is not tolerated, is unavailable, or is contraindicated, we recommend **cardiac CT** (↑↑).

↳ **1.5** If cardiac CT is not available, we suggest **NM (MUGA)** (↑).

NM (myocardial perfusion scan) may also be helpful to exclude significant ischemia as a cause of dilated cardiomyopathy.

Recommendations from 5 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR guideline Cardiovascular section [18], the 2019 ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS guideline on multimodality imaging in the assessment of cardiac structure and function in nonvalvular heart disease [19], the 2021 ACR guideline on nonischemic myocardial disease with clinical manifestations [37], the 2022 ESC guideline on ventricular arrhythmias [48], and the 2021 JCS/JHFS guideline on cardiomyopathies [49] (**Appendix 2: Table CV07A**).

CV07B. Cardiomyopathy: hypertrophic

Recommendations

1. In patients with suspected hypertrophic cardiomyopathy, we recommend **TTE** as the initial imaging modality (↑↑).

↳ **1.1** If further imaging is required✧, we recommend **cardiac MRI** as the next imaging modality (↑↑).

↳ **1.2** If information about ventricular size and function or maximum wall thickness is required AND cardiac MRI is not tolerated, is unavailable, or is contraindicated, we recommend **cardiac CT** (↑↑).

↳ **1.3** To rule out obstructive coronary artery disease as a cause of patient symptoms, we recommend **invasive catheter angiography** (↑↑) in carefully selected patients.

↳ **1.4** If invasive catheter angiography is unavailable, we recommend **CCTA** as an alternative (↑↑).

✧ MRI can be helpful when echocardiography is inconclusive, when other diagnoses are possible (e.g., amyloidosis, athlete's heart, storage disease, etc.), or when information about maximum wall thickness, ejection fraction, presence of apical aneurysm or extent of late gadolinium enhancement will influence decision to insert an implantable cardioverter-defibrillator (ICD).

Recommendations from 6 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR guideline Cardiovascular section [18], the 2019 ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS guideline on multimodality imaging in the assessment of cardiac structure and function in nonvalvular heart disease [19], the 2021 ACR guideline on nonischemic myocardial disease with clinical manifestations [37], the 2020 AHA/ACC guideline on hypertrophic cardiomyopathy [50,51], the 2022 ESC guideline on ventricular arrhythmias [48], and the 2021 JCS/JHFS guideline on cardiomyopathies [49] (**Appendix 2: Table CV07B**).

CV07C. Cardiomyopathy: restrictive

Recommendations

1. In patients with suspected restrictive/infiltrative cardiomyopathy, we recommend **TTE** as the initial imaging modality (↑↑).

↳ **1.1** If further imaging is required, we recommend **cardiac MRI** as the next imaging modality (↑↑).

↳ **1.2** If information about ventricular size and function is required and cardiac MRI is not tolerated, is unavailable, or is contraindicated, we recommend **cardiac CT** (↑↑).

↳ **1.3** In patients with suspected cardiac sarcoidosis, we recommend **FDG-PET-CT** (↑↑).

↳ **1.4** In patients with suspected cardiac amyloidosis, if further imaging is required, we recommend **NM (pyrophosphate scan)** as the next imaging modality (↑↑).

Recommendations from 8 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR guideline Cardiovascular section [18], the 2019 ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS guideline on multimodality imaging in the assessment of cardiac structure and function in nonvalvular heart disease [19], the 2021 ACR guideline on nonischemic myocardial disease with clinical manifestations [37], the 2020 ATS guideline on sarcoidosis [52], the 2020 CCS/CHFS guideline on cardiac amyloidosis [53], the 2021 DGK guideline on cardiac amyloidosis [54], the 2022 ESC guideline on ventricular arrhythmias [48], and the 2020 JCS guideline on cardiac amyloidosis [55] (**Appendix 2: Table CV07C**).

CV07D. Cardiomyopathy: arrhythmogenic

Recommendations

1. In patients with suspected arrhythmogenic cardiomyopathy, we recommend **TTE** as the initial imaging modality (↑↑).

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. 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.

↳ **1.1** If further imaging is required, we recommend **cardiac MRI** as the next imaging modality (↑↑).

↳ **1.2** If information about ventricular size and function is required and cardiac MRI is not tolerated, is unavailable, or is contraindicated, we recommend **cardiac CT** (↑↑).

↳ **1.3** If obstructive coronary artery disease needs to be ruled out as the cause for arrhythmia, we recommend **invasive catheter angiography** (↑↑).

↳ **1.4** If invasive catheter angiography is unavailable, we recommend **CCTA** as an alternative (↑↑).

Recommendations from 4 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR guideline Cardiovascular section [18], the 2019 ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS guideline on multimodality imaging in the assessment of cardiac structure and function in nonvalvular heart disease [19], the 2021 ACR guideline on nonischemic myocardial disease with clinical manifestations [37], and the 2022 ESC guideline on ventricular arrhythmias [48] (**Appendix 2: Table CV07D**).

CV08. Aorta

CV08A. Thoraco-abdominal aneurysm

Recommendations

1. In patients with thoracic aortic aneurysm identified by TTE, we recommend **chest CTA** (preferably cardiac-gated) for baseline measurement and surveillance (↑↑).

In younger patients with thoraco-abdominal aortic aneurysm identified by TTE, MRA may be performed for baseline measurement and surveillance. Surgical consultation could be considered for aortas >4.5 cm in size.

2. In patients without underlying aortopathy with suspected abdominal aortic aneurysm (AAA) based on physical examination, we recommend **US** as the initial imaging modality (↑↑).

↳ **2.1** If US demonstrates aortic diameter between 2.5 and 3.0 cm, we suggest re-evaluation with **US** after 10 years (↑↑).

↳ **2.2** If US demonstrates aortic diameter between 3.0 and 3.9 cm, we recommend repeat **US** at 3-year intervals (↑↑).

↳ **2.3** If US demonstrates aortic diameter between 4.0 and 4.9 cm, we recommend annual surveillance with **US or CT** (↑↑).

Surgical consultation could be considered for aortas >4.5 cm in size.

For detailed recommendations for patients with underlying aortopathies and sex specific recommendations, see ACC/AHA guideline [30].

3. In patients with symptoms suspected to be related to thoraco-abdominal aneurysm, we recommend **CT with contrast** (↑↑).

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. 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 from 8 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR guideline Cardiovascular section [18], the 2019 ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS guideline on multimodality imaging in the assessment of cardiac structure and function in nonvalvular heart disease [19], the 2022 ACC/AHA guideline on aortic disease [30], the 2018 ACR guideline on suspected thoracic aortic aneurysm [56], the 2020 NICE guideline (NG156) on abdominal aortic aneurysms [36], the 2022 SICVE guideline on abdominal aortic aneurysms [57], the 2020 SVS guideline on visceral aneurysms [58], and the 2017 RCR iRefer guideline Chest and Cardiovascular system section [27] (**Appendix 2: Table CV08A**).

CV08B. Vasculitis

Recommendations

1. In patients with suspected vasculitis involving the aorta (i.e., aortitis), we recommend **MRA** for baseline measurement and surveillance, especially in young patients (↑↑).

↳ **1.1** If MRA is not tolerated, is unavailable, or is contraindicated, we recommend **CTA** for baseline measurement and surveillance (↑↑).

↳ **1.2** If MRA or CTA results are inconclusive regarding disease activity, we suggest **FDG-PET-CT or MR-PET** (↑).

Recommendations from 5 guidelines were used during the discussions and formulation of these recommendations: the 2021 ACR guideline on noncerebral vasculitis [59], the 2021 ACR/VF guideline on giant cell arteritis and Takayasu arteritis [60], the 202 BSR guideline on giant cell arteritis [61,62], the 2018 EULAR guideline on the management of large vessel vasculitis [63], and the 2018 EULAR guideline on the use of imaging in large vessel vasculitis in clinical practice [64,65] (**Appendix 2: Table CV08B**).

CV09. Venous thrombosis

Recommendations

1. In patients with suspected deep vein thrombosis with <u>low</u> pre-test probability (as determined by a structured risk assessment tool) AND negative D-dimer, we recommend **no imaging** (↓↓).

↳ **1.1** If D-dimer is unavailable, we recommend **interim therapeutic anticoagulation and Doppler US** (↑↑).

↳ **1.2** If US is inconclusive or of poor quality and further imaging is required, we recommend **CTV or MRV** as the next imaging modality, with preference for MRV in younger patients (↑↑).

2. In patients with suspected deep vein thrombosis based with intermediate/high pre-test probability (as determined by a structured risk assessment tool) and/or positive D-dimer, we recommend **Doppler US** as the initial imaging modality (↑↑).

3. In patients with superficial venous thrombosis, we suggest **Doppler US** as the initial imaging modality (↑).

Recommendations from 7 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR guideline Cardiovascular section [18], the 2020 ACR guideline on upper extremity deep vein thrombosis [66], the 2018 ACR guideline on lower extremity DVT [67], the 2019 ASH guideline on venous thromboembolism [34], the 2019 Brazil guideline on superficial venous thrombosis [68], the 2020 NICE guideline (NG158) on venous thromboembolic diseases [69,70], the 2017 RCR

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. 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.

iRefer guideline Chest and Cardiovascular system section [27], and the 2019 THSANZ guideline on venous thromboembolism [71] (**Appendix 2: Table CV09**).

CV10. Peripheral vascular disease

CV10A. Upper and lower extremity peripheral vascular disease

Recommendations

1. In patients with suspected upper or lower extremity peripheral vascular (arterial) disease based on symptoms or other clinical features and an abnormal ankle-brachial index (ABI < 0.9), we recommend **Doppler US** for further evaluation (↑↑).

   ↳ **1.1** If further imaging is required, we recommend **CTA or MRA** as the next imaging modality (↑↑).

2. In patients with established upper or lower extremity peripheral vascular (arterial) disease with recurrent symptoms, we recommend **CTA or MRA** as the initial imaging modality (↑↑).

Recommendations from 4 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR guideline Cardiovascular section [18], the 2021 ACR guideline on noncerebral vasculitis [59], the 2021 American College of Rheumatology/Vasculitis Foundation guideline on polyarteritis nodosa [72], the 2019 ACR guideline on peripheral arterial disease [73], and the 2017 RCR iRefer guideline Chest and Cardiovascular system section [27] (**Appendix 2: Table CV10A**).

CV10B. Vascular malformation

Recommendations

1. In patients with suspected vascular malformation, to further characterize and guide further management, we recommend **time-resolved MRA** as the initial imaging modality (↑↑).

   *In patients presenting with an extremity mass and suspected vascular malformation, **Doppler US** could be performed as the initial test.*

   ↳ **1.1** If MRA is not tolerated, is unavailable, or is contraindicated, we recommend **CTA** as an alternative (↑↑).

   ↳ **1.2** To guide further management for high flow vascular malformations, we recommend **invasive catheter angiography** (↑↑).

Recommendations from 2 guidelines were used during the discussions and formulation of these recommendations: the 2019 ACR guideline on vascular malformation [74] and the 2022 SISAV guideline on venous malformations [75] (**Appendix 2: Table CV10B**).

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. 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.

CV10C. Entrapment and compression syndromes

Recommendations

1. In patients with entrapment and compression syndromes involving the extremities where venous thrombosis is also of concern, we recommend **Doppler US** as the initial imaging modality (↑↑).

↳ **1.1** If Doppler US is negative or indeterminate and additional imaging is required, we recommend **MRA** as the next imaging modality (↑↑).

↳ **1.2** If MRA is not tolerated, is unavailable, or is contraindicated, we recommend or **CTA** as an alternative (↑↑).

Recommendations from 1 guideline was used during the discussions and formulation of these recommendations: the 2019 ACR guideline on peripheral arterial disease [73] (**Appendix 2: Table CV10C**).

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APPENDIX 1. SEARCH STRATEGIES

2023 Mar 30 Ovid Multifile

Database: Embase Classic+Embase <1947 to 2023 March 29>,
Ovid MEDLINE(R) ALL <1946 to March 29, 2023>
Search Strategy:

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1 ST Elevation Myocardial Infarction/ (35538)
2 ((ST elevat* or ST segment elevat*) adj2 (myocardial infarction? or myocardial infarct? or MI or heart infarction? or heart infarct?)).tw,kw,kf. (65287)
3 STEMI?.tw,kw,kf. (51037)
4 Non-ST Elevated Myocardial Infarction/ (17732)
5 ((non-ST elevat* or nonST elevat* or non-ST segment elevat* or nonST segment elevat*) adj2 (myocardial infarction? or myocardial infarct? or MI or heart infarction? or heart infarct?)).tw,kw,kf. (13987)
6 (non-STEMI? or nonSTEMI? or NSTEMI? or N-STEMI?).tw,kw,kf. (14997)
7 exp Angina, Unstable/ (38661)
8 (angina? adj3 ("at rest" or preinfarct* or pre-infarct* or unstab* or instabilit*)).tw,kw,kf. (38469)
9 myo?cardial pre?infarct* syndrome?.tw,kw,kf. (1)
10 exp Aortic Dissection/ (32565)
11 ((aorta? or aortic) adj1 dissection?).tw,kw,kf. (42387)
12 (dissecting adj1 aneurysm?).tw,kw,kf. (8934)
13 exp Pulmonary Embolism/ (167277)
14 ((lung or lungs or pulmonar* or pulmonic*) adj3 (emboli or embolism? or emboli#ation? or embolus or emboly or microembolism? or micro-embolism? or microembolus or micro-embolus or thromboemboli* or thrombo-emboli*)).tw,kw,kf. (151414)
15 ((lung or lungs or pulmonar* or pulmonic*) adj3 (infarct? or infarction?)).tw,kw,kf. (8318)
16 Myocarditis/ (55191)
17 (myocarditis or carditis).tw,kw,kf. (58314)
18 ((cardiomyocyte* or cardio-myocyte* or cardiomyopath* or cardio-myopath* or myocard*) adj3 inflam*).tw,kw,kf. (18671)
19 Myocardial Ischemia/ and Chronic Disease/ (1561)
20 (chronic* adj5 (cardiac* or coronary or heart or myocard* or subendocard* or sub-endocard*) adj2 (anoxia? or hypoxi$2 or isch?emi*)).tw,kw,kf. (9940)
21 ((noncardia* or non-cardia*) adj3 chest pain?).tw,kw,kf. (3095)
22 exp Pericarditis/ (40452)
23 (pericarditis or pleuropericarditis or pleuro-pericarditis or pericard* inflam*).tw,kw,kf. (35176)
24 Pericardial Effusion/ (44454)
25 ((pericard* or peri-card*) adj3 (bleed* or effusion* or fluid? or h?emorrhag*)).tw,kw,kf. (39150)
26 (chylopericard* or chylo-pericard* or h?emopericard* or h?emo-pericard*).tw,kw,kf. (3792)
27 Pericarditis, Constrictive/ (8485)
28 ((pericard* or peri-card*) adj3 constrict*).tw,kw,kf. (9371)
29 ((Pick's disease or Pick disease) adj3 heart?).tw,kw,kf. (0)
30 exp Heart Neoplasms/ (38502)
31 ((atrial or atrium? or cardiac or endocard* or endo-card* or heart? or mitral or myocard* or pericard* or peri-card* or ventric*) adj3 (cancer* or cardinoma* or fibroelastoma* or fibro-elastoma* or mass or masses or metasta* or tumo?r* or neoplas*)).tw,kw,kf. (109873)
32 Heart Valve Disease/ (57626)
33 ((cardia* or heart) adj1 valv* adj3 (abnormal* or defect* or degenerat* or disease? or disorder? or incompeten* or insufficien* or lesion? or regurgitat* or stenoses or stenosi* or syndrome?)).tw,kw,kf. (29680)
34 ((valve or valvular) adj1 (regurgitat* or stenoses or stenosi*)).tw,kw,kf. (41035)
35 (valvulopath* or vitium cordis).tw,kw,kf. (3313)
36 exp Aortic Valve Disease/ (90386)
37 ((aorta? or aortic or subaort* or sub-aort*) adj1 (subvalv* or sub-valv* or supravalv* or supra-valv* or valv*) adj3 (abnormal* or defect* or degenerat* or disease? or disorder? or incompeten* or insufficien* or lesion? or regurgitat* or stenoses or stenosi* or syndrome?)).tw,kw,kf. (44725)
38 ((aorta? or aortic or subaort* or sub-aort*) adj1 (incompeten* or insufficien* or regurgitat* or stenoses or stenosi* or valvulopath*)).tw,kw,kf. (90942)
39 ((hypertrophic or hyper-trophic) adj3 (cardiomyopath* or cardio-myopath* or valvulopath*)).tw,kw,kf. (47652)
40 (Beuren Syndrome or Williams Contiguous Gene Syndrome or Williams-Beuren Syndrome).tw,kw,kf. (1682)
41 Mitral Valve Insufficiency/ (57264)
42 Mitral Valve Stenosis/ (42350)
43 ((mitral or mitralis) adj3 (abnormal* or defect* or degenerat* or disease? or disorder? or incompeten* or insufficien* or lesion? or regurgitat* or stenoses or stenosi* or syndrome? or valvulopath*)).tw,kw,kf. (102068)
44 ((bicuspid or bi-cuspid) adj1 (abnormal* or defect* or degenerat* or disease? or disorder? or incompeten* or insufficien* or lesion? or regurgitat* or stenoses or stenosi* or syndrome? or valvulopath*)).tw,kw,kf. (520)
45 Pulmonary Valve Insufficiency/ (7142)
46 ((lung or pulmonary or pulmonic) adj1 (infundibular or subvalv* or sub-valv* or supravalv* or supra-valv* or valv*) adj3 (abnormal* or defect* or degenerat* or disease? or disorder? or incompeten* or insufficien* or lesion? or regurgitat* or stenoses or stenosi* or syndrome?)).tw,kw,kf. (8550)
47 ((lung arter* or pulmonary arter* or pulmonic arter*) adj1 (infundibular or subvalv* or sub-valv* or supravalv* or supra-valv* or valv*) adj3 (abnormal* or defect* or degenerat* or disease? or disorder? or incompeten* or insufficien* or lesion? or regurgitat* or stenoses or stenosi* or syndrome?)).tw,kw,kf. (100)
48 ((lung or lungs or pulmonar* or pulmonic*) adj1 (regurgitat* or stenoses or stenosi*)).tw,kw,kf. (18149)
49 ((lung arter* or pulmonary arter* or pulmonic arter*) adj1 (regurgitat* or stenoses or stenosi*)).tw,kw,kf. (3313)
50 Cardiomyopathies/ (69688)
51 (cardiomyopath* or cardio-myopath* or myocardiopath* or myocardio-path*).ti,kw,kf. (135062)
52 Cardiomyopathy, Dilated/ (41717)
53 ((cardiomyopath* or cardio-myopath* or myocardiopath* or myocardio-path*) adj3 (dilated or congestive)).tw,kw,kf. (56810)
54 exp Cardiomyopathy, Hypertrophic/ (52213)
55 ((cardiomyopath* or cardio-myopath* or myocardiopath* or myocardio-path*) adj3 (hypertroph* or hyper-troph*)).tw,kw,kf. (49206)
56 (obstructive adj1 (cardio-myopath* or cardiomyopath* or myocardiopath* or myocardio-path*)).tw,kw,kf. (6583)

57 ((septal hypertroph* or ventricular hypertroph*) adj2 (familial or hereditary or inherit* or obstructive or asymmetric*)).tw,kw,kf. (1821)
58 (Apical-Variant adj1 HCM).tw,kw,kf. (8)
59 Cardiomyopathy, Restrictive/ (3457)
60 ((cardiomyopath* or cardio-myopath* or myocardiopath* or myocardio-path*) adj3 restrictive).tw,kw,kf. (4820)
61 ((cardiomyopath* or cardio-myopath* or myocardiopath* or myocardio-path*) adj3 arrhythmogenic*).tw,kw,kf. (8774)
62 (ACM adj10 (cardiomyopath* or cardio-myopath* or myocardiopath* or myocardio-path* or arrhythmogenic*)).tw,kw,kf. (990)
63 Aortic Aneurysm/ (28635)
64 exp Aortic Aneurysm, Abdominal/ (33649)
65 exp Aortic Aneurysm, Thoracic/ (26394)
66 ((aorta? or aortic) adj3 aneurysm?).tw,kw,kf. (102195)
67 Venous Thrombosis/ (48387)
68 Upper Extremity Deep Vein Thrombosis/ (2233)
69 ((vein? or venous or vena or venal) adj3 (thombo* or thrombus or thrombi)).tw,kw,kf. (13243)
70 ((vein? or venous or vena or venal) adj3 blood clot*).tw,kw,kf. (270)
71 DVT.tw,kw,kf. (38299)
72 ((upper or lower) adj3 (thombo* or thrombus or thrombi or blood clot*)).tw,kw,kf. (1060)
73 effort thromb*.tw,kw,kf. (439)
74 (Paget adj2 Schro?tter*).tw,kw,kf. (1105)
75 May Thurner*.tw,kw,kf. (1650)
76 Peripheral Vascular Diseases/ (29057)
77 (peripheral adj3 (angiopath* or angio-path* or arteriopath* or arterio-path* or vasculopath* or vasculo-path*)).tw,kw,kf. (2170)
78 (peripheral adj3 (vascular or vessel?) adj (disease? or disorder?)).tw,kw,kf. (31792)
79 exp Phlebitis/ (59203)
80 (phlebiti* or periphlebiti* or peri-phlebiti* or postphlebiti* or post-phlebiti* or thrombophlebiti* or thrombo-phlebiti*).tw,kw,kf. (31081)
81 exp Vascular Malformations/ (162048)
82 ((aorta? or aortic or arteriovenous or arterio-venous or arter* or AV or vascular or vein? or venal or venous or vessel?) adj3 (anomal* or aneurysm? or compress* or fistula? or malform*)).tw,kw,kf. (348802)
83 ((compression or entrapment) adj syndrome?).tw,kw,kf. (8592)
84 ((quadrilateral space or thoracic outlet or hypothenar hammer) adj syndrome?).tw,kw,kf. (5828)
85 ((aorta? or aortic or arteriovenous or arterio-venous or arter* or AV or vascular or vein? or venal or venous or vessel?) adj3 entrap*).tw,kw,kf. (2161)
86 Popliteal Artery Entrapment Syndrome/ (234)
87 Vasculitis/ (63246)
88 (vasculitis or angiitis).tw,kw,kf. (110251)
89 (inflam* adj3 (blood vessel? or arterial or artery or arteries or vein or veins or venal or vascula* or vasculitic)).tw,kw,kf. (53392)
90 ((angiitic or vasculitic) adj lesion?).tw,kw,kf. (625)
91 vasculitic syndrome?.tw,kw,kf. (665)
92 or/1-91 [CVD] (1938360)
93 exp Cardiac Imaging Techniques/ (245491)
94 (angiocardiogra* or angio-cardiogra*).tw,kw,kf. (12049)
95 (echocardiogra* or echo-cardiogra* or ECG or EKG).tw,kw,kf. (690855)
96 ventriculogra*.tw,kw,kf. (20016)
97 Diagnostic Imaging/ (285252)
98 dg.fs. [diagnostic imaging] (1425064)
99 (diagnos* adj3 (image? or imaging)).tw,kw,kf. (139505)
100 (x-ray* or xray*).tw,kw,kf. (975088)
101 Image Interpretation, Computer-Assisted/ (91351)
102 exp Imaging, Three-Dimensional/ (214880)
103 ((3D or 3-D or 3-dimension* or three dimension*) adj (image? or imaging)).tw,kw,kf. (49364)
104 exp Ultrasonography/ (1466818)
105 (ultrasound* or ultrasonograph* or ultra-sonograph* or ultrasonic* or ultra-sonic*).tw,kw,kf. (1135499)
106 (echograph* or echo-graph* or echotomograph* or echo-tomograph* or echosonograph* or echo sonograph*).tw,kw,kf. (26335)
107 exp Radiography/ (2658914)
108 (radiograph* or radiographic imag* or roentgenograph* or roentgeno-graph*).tw,kw,kf. (636927)
109 (fluoroscop* or fluoro-scop*).tw,kw,kf. (91492)
110 exp Radionuclide Imaging/ (448682)
111 ((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. (157717)
112 exp Tomography/ (3405184)
113 (tomograph* or tomo-graph*).tw,kw,kf. (1202277)
114 (CAT scan* or CT scan* or PET scan* or PET imag* or PT scan* or PT imag*).tw,kw,kf. (406065)
115 (SPECTCT or SPECT CT or "SPECT/CT").tw,kw,kf. (18062)
116 (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. (1303066)
117 (cineradiograph* or cine-radiograph* or cinefluorograph* or cine-fluorograph* or radiocinematograph* or radio-cinematograph*).tw,kw,kf. (4213)
118 Nuclear Medicine/ (45466)
119 ((nuclear or atomic) adj1 medicine?).tw,kw,kf. (48107)
120 (nuclear adj1 radiolog*).tw,kw,kf. (1312)
121 (sialogra* or salivogra* or sialoscintigra* or sialo-scintigra*).tw,kw,kf. (3373)
122 (enteroclys* or enterogra*).tw,kw,kf. (6379)
123 (esophagra* or oesophagra* or esophagogra* or oesophagogra*).tw,kw,kf. (7240)
124 ((CT or virtual) adj colonoscop*).tw,kw,kf. (1946)
125 (contrast adj (study or studies or medium)).tw,kw,kf. (47315)
126 (cholangiopancreatogra* or cholangio-pancreatogra* or ERCP or MRCP).tw,kw,kf. (57566)
127 cholecystogra*.tw,kw,kf. (5493)
128 (angiograph* or angio-graph* or angiogram* or angio-gram*).tw,kw,kf. (582664)
129 (perfusion adj3 (image? or imaging)).tw,kw,kf. (43411)
130 or/93-129 [IMAGING] (8718756)
131 92 and 130 [CVD - IMAGING] (848562)
132 exp Animals/ not Humans/ (17566205)
133 131 not 132 [ANIMAL-ONLY REMOVED] (690237)
134 (case reports or case series 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. (6952025)
135 133 not 134 [OPINION PIECES, IRRELEVANT PUBLICATION TYPES REMOVED] (547876)
136 exp Guidelines as Topic/ (875478)
137 exp Clinical Protocols/ (307597)
138 Guideline.pt. (16553)
139 Practice Guideline.pt. (30300)
140 standards.fs. (767033)
141 Consensus Development Conference.pt. (12342)
142 Consensus Development Conference, NIH.pt. (801)
143 (consensus or guideline* or guidance? or standards or recommendation*).ti,kw,kf. (550837)
144 (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. (311719)
145 or/136-144 [GUIDELINE FILTER] (2264609)
146 135 and 145 [GUIDELINES] (16421)
147 limit 146 to yr="2018-current" (8590)
148 147 use medall [MEDLINE RECORDS] (1381)
149 ST segment elevation myocardial infarction/ (58166)
150 ((ST elevat* or ST segment elevat*) adj2 (myocardial infarction? or myocardial infarct? or MI or heart infarction? or heart infarct?)).tw,kw,kf. (65287)
151 STEMI?.tw,kw,kf. (51037)
152 non ST segment elevation myocardial infarction/ (20724)
153 ((non-ST elevat* or nonST elevat* or non-ST segment elevat* or nonST segment elevat*) adj2 (myocardial infarction? or myocardial infarct? or MI or heart infarction? or heart infarct?)).tw,kw,kf. (13987)
154 (non-STEMI? or nonSTEMI? or NSTEMI? or N-STEMI?).tw,kw,kf. (14997)
155 exp unstable angina pectoris/ (38661)
156 (angina? adj3 ("at rest" or preinfarct* or pre-infarct* or unstab* or instabilit*)).tw,kw,kf. (38469)
157 myo?cardial pre?infarct* syndrome?.tw,kw,kf. (1)
158 aortic dissection/ (32546)
159 ((aorta? or aortic) adj1 dissection?).tw,kw,kf. (42387)
160 (dissecting adj1 aneurysm?).tw,kw,kf. (8934)
161 lung embolism/ (124172)
162 ((lung or lungs or pulmonar* or pulmonic*) adj3 (emboli or embolism? or emboli#ation? or embolus or emboly or microembolism? or micro-embolism? or microembolus or micro-embolus or thromboemboli* or thrombo-emboli*)).tw,kw,kf. (151414)
163 ((lung or lungs or pulmonar* or pulmonic*) adj3 (infarct? or infarction?)).tw,kw,kf. (8318)
164 exp myocarditis/ (59133)
165 (myocarditis or carditis).tw,kw,kf. (58314)
166 ((cardiomyocyte* or cardio-myocyte* or cardiomyopath* or cardio-myopath* or myocard*) adj3 inflam*).tw,kw,kf. (18671)
167 heart muscle ischemia/ and exp chronic disease/ (950)
168 (chronic* adj5 (cardiac* or coronary or heart or myocard* or subendocard* or sub-endocard*) adj2 (anoxia? or hypoxi$2 or isch?emi*)).tw,kw,kf. (9940)
169 ((noncardia* or non-cardia*) adj3 chest pain?).tw,kw,kf. (3095)
170 exp pericarditis/ (40452)
171 (pericarditis or pleuropericarditis or pleuro-pericarditis or pericard* inflam*).tw,kw,kf. (35176)
172 pericardial effusion/ (44454)
173 ((pericard* or peri-card*) adj3 (bleed* or effusion* or fluid? or h?emorrhag*)).tw,kw,kf. (39150)
174 (chylopericard* or chylo-pericard* or h?emopericard* or h?emo-pericard*).tw,kw,kf. (3792)
175 constrictive pericarditis/ (9353)
176 ((pericard* or peri-card*) adj3 constrict*).tw,kw,kf. (9371)
177 ((Pick's disease or Pick disease) adj3 heart?).tw,kw,kf. (0)
178 exp heart tumor/ (38502)
179 ((atrial or atrium? or cardiac or endocard* or endo-card* or heart? or mitral or myocard* or pericard* or peri-card* or ventric*) adj3 (cancer* or cardinoma* or fibroelastoma* or fibro-elastoma* or mass or masses or metasta* or tumo?r* or neoplas*)).tw,kw,kf. (109873)
180 valvular heart disease/ (57626)
181 heart valve regurgitation/ (1912)
182 heart valve stenosis/ (1978)
183 ((cardia* or heart) adj1 valv* adj3 (abnormal* or defect* or degenerat* or disease? or disorder? or incompeten* or insufficien* or lesion? or regurgitat* or stenoses or stenosi* or syndrome?)).tw,kw,kf. (29680)
184 ((valve or valvular) adj1 (regurgitat* or stenoses or stenosi*)).tw,kw,kf. (41035)
185 (valvulopath* or vitium cordis).tw,kw,kf. (3313)
186 exp aortic valve disease/ (90386)
187 ((aorta? or aortic or subaort* or sub-aort*) adj1 (subvalv* or sub-valv* or supravalv* or supra-valv* or valv*) adj3 (abnormal* or defect* or degenerat* or disease? or disorder? or incompeten* or insufficien* or lesion? or regurgitat* or stenoses or stenosi* or syndrome?)).tw,kw,kf. (44725)
188 ((aorta? or aortic or subaort* or sub-aort*) adj1 (incompeten* or insufficien* or regurgitat* or stenoses or stenosi* or valvulopath*)).tw,kw,kf. (90942)
189 ((hypertrophic or hyper-trophic) adj3 (cardiomyopath* or cardio-myopath* or valvulopath*)).tw,kw,kf. (47652)
190 (Beuren Syndrome or Williams Contiguous Gene Syndrome or Williams-Beuren Syndrome).tw,kw,kf. (1682)
191 exp mitral valve disease/ (90492)
192 ((mitral or mitralis) adj3 (abnormal* or defect* or degenerat* or disease? or disorder? or incompeten* or insufficien* or lesion? or regurgitat* or stenoses or stenosi* or syndrome? or valvulopath*)).tw,kw,kf. (102068)
193 ((bicuspid or bi-cuspid) adj1 (abnormal* or defect* or degenerat* or disease? or disorder? or incompeten* or insufficien* or lesion? or regurgitat* or stenoses or stenosi* or syndrome? or valvulopath*)).tw,kw,kf. (520)
194 exp pulmonary valve disease/ (22461)
195 ((lung or pulmonary or pulmonic) adj1 (infundibular or subvalv* or sub-valv* or supravalv* or supra-valv* or valv*) adj3 (abnormal* or defect* or degenerat* or disease? or disorder? or incompeten* or insufficien* or lesion? or regurgitat* or stenoses or stenosi* or syndrome?)).tw,kw,kf. (8550)
196 ((lung arter* or pulmonary arter* or pulmonic arter*) adj1 (infundibular or subvalv* or sub-valv* or supravalv* or supra-valv* or valv*) adj3 (abnormal* or defect* or degenerat* or disease? or disorder? or incompeten* or insufficien* or lesion? or regurgitat* or stenoses or stenosi* or syndrome?)).tw,kw,kf. (100)
197 ((lung or lungs or pulmonar* or pulmonic*) adj1 (regurgitat* or stenoses or stenosi*)).tw,kw,kf. (18149)

198 ((lung arter* or pulmonary arter* or pulmonic arter*) adj1 (regurgitat* or stenoses or stenosi*)).tw,kw,kf. (3313)
199 cardiomyopathy/ (103313)
200 (cardiomyopath* or cardio-myopath* or myocardiopath* or myocardio-path*).ti,kw,kf. (135062)
201 congestive cardiomyopathy/ (54632)
202 ((cardiomyopath* or cardio-myopath* or myocardiopath* or myocardio-path*) adj3 (dilated or congestive)).tw,kw,kf. (56810)
203 exp hypertrophic cardiomyopathy/ (52213)
204 ((cardiomyopath* or cardio-myopath* or myocardiopath* or myocardio-path*) adj3 (hypertroph* or hyper-troph*)).tw,kw,kf. (49206)
205 (obstructive adj1 (cardio-myopath* or cardiomyopath* or myocardiopath* or myocardio-path*)).tw,kw,kf. (6583)
206 ((septal hypertroph* or ventricular hypertroph*) adj2 (familial or hereditary or inherit* or obstructive or asymmetric*)).tw,kw,kf. (1821)
207 (Apical-Variant adj1 HCM).tw,kw,kf. (8)
208 restrictive cardiomyopathy/ (4247)
209 ((cardiomyopath* or cardio-myopath* or myocardiopath* or myocardio-path*) adj3 restrictive).tw,kw,kf. (4820)
210 ((cardiomyopath* or cardio-myopath* or myocardiopath* or myocardio-path*) adj3 arrhythmogenic*).tw,kw,kf. (8774)
211 (ACM adj10 (cardiomyopath* or cardio-myopath* or myocardiopath* or myocardio-path* or arrhythmogenic*)).tw,kw,kf. (990)
212 aortic aneurysm/ (28635)
213 exp abdominal aortic aneurysm/ (33649)
214 exp thoracic aorta aneurysm/ (26394)
215 thoracoabdominal aorta aneurysm/ (2596)
216 ((aorta? or aortic) adj3 aneurysm?).tw,kw,kf. (102195)
217 vein thrombosis/ (43263)
218 deep vein thrombosis/ (105755)
219 lower extremity deep vein thrombosis/ (2347)
220 upper extremity deep vein thrombosis/ (2233)
221 ((vein? or venous or vena or venal) adj3 (thombo* or thrombus or thrombi)).tw,kw,kf. (13243)
222 ((vein? or venous or vena or venal) adj3 blood clot*).tw,kw,kf. (270)
223 DVT.tw,kw,kf. (38299)
224 ((upper or lower) adj3 (thombo* or thrombus or thrombi or blood clot*)).tw,kw,kf. (1060)
225 effort thromb*.tw,kw,kf. (439)
226 (Paget adj2 Schro?tter*).tw,kw,kf. (1105)
227 May Thurner*.tw,kw,kf. (1650)
228 peripheral vascular disease/ (40241)
229 (peripheral adj3 (angiopath* or angio-path* or arteriopath* or arterio-path* or vasculopath* or vasculo-path*)).tw,kw,kf. (2170)
230 (peripheral adj3 (vascular or vessel?) adj (disease? or disorder?)).tw,kw,kf. (31792)
231 phlebitis/ (15440)
232 (phlebiti* or periphlebiti* or peri-phlebiti* or postphlebiti* or post-phlebiti* or thrombophlebiti* or thrombo-phlebiti*).tw,kw,kf. (31081)
233 congenital blood vessel malformation/ (14027)
234 exp aorta anomaly/ (17804)
235 exp arteriovenous malformation/ (80538)
236 ((aorta? or aortic or arteriovenous or arterio-venous or arter* or AV or vascular or vein? or venal or venous or vessel?) adj3 (anomal* or aneurysm? or compress* or fistula? or malform*)).tw,kw,kf. (348802)
237 ((compression or entrapment) adj syndrome?).tw,kw,kf. (8592)
238 ((quadrilateral space or thoracic outlet or hypothenar hammer) adj syndrome?).tw,kw,kf. (5828)
239 ((aorta? or aortic or arteriovenous or arterio-venous or arter* or AV or vascular or vein? or venal or venous or vessel?) adj3 entrap*).tw,kw,kf. (2161)
240 popliteal artery entrapment syndrome/ (234)
241 vasculitis/ (63246)
242 large vessel vasculitis/ (705)
243 small vessel vasculitis/ (2061)
244 (vasculitis or angiitis).tw,kw,kf. (110251)
245 (inflam* adj3 (blood vessel? or arterial or artery or arteries or vein or veins or venal or vascula* or vasculitic)).tw,kw,kf. (53392)
246 ((angiitic or vasculitic) adj lesion?).tw,kw,kf. (625)
247 vasculitic syndrome?.tw,kw,kf. (665)
248 or/149-247 [CVD] (1957150)
249 cardiac imaging/ (14765)
250 exp angiocardiography/ (151148)
251 (angiocardiogra* or angio-cardiogra*).tw,kw,kf. (12049)
252 exp echocardiography/ (572422)
253 (echocardiogra* or echo-cardiogra* or ECG or EKG).tw,kw,kf. (690855)
254 exp radiocardiography/ (8049)
255 ventriculogra*.tw,kw,kf. (20016)
256 diagnostic imaging/ (285252)
257 (diagnos* adj3 (image? or imaging)).tw,kw,kf. (139505)
258 (x-ray* or xray*).tw,kw,kf. (975088)
259 computer assisted tomography/ (878606)
260 computer assisted diagnosis/ (67644)
261 exp three-dimensional imaging/ (214880)
262 ((3D or 3-D or 3-dimension* or three dimension*) adj (image? or imaging)).tw,kw,kf. (49364)
263 exp echography/ (1466818)
264 (ultrasound* or ultrasonograph* or ultra-sonograph* or ultrasonic* or ultra-sonic*).tw,kw,kf. (1135499)
265 (echograph* or echo-graph* or echotomograph* or echo-tomograph* or echosonograph* or echo sonograph*).tw,kw,kf. (26335)
266 exp radiography/ (2658914)
267 (radiograph* or radiographic imag* or roentgenograph* or roentgeno-graph*).tw,kw,kf. (636927)
268 (fluoroscop* or fluoro-scop*).tw,kw,kf. (91492)
269 exp scintiscanning/ (214115)
270 ((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. (157717)
271 exp tomography/ (3405184)
272 (tomograph* or tomo-graph*).tw,kw,kf. (1202277)
273 (CAT scan* or CT scan* or PET scan* or PET imag* or PT scan* or PT imag*).tw,kw,kf. (406065)
274 (SPECTCT or SPECT CT or "SPECT/CT").tw,kw,kf. (18062)
275 (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. (1303066)

276 (cineradiograph* or cine-radiograph* or cinefluorograph* or cine-fluorograph* or radiocinematograph* or radio-cinematograph*).tw,kw,kf. (4213)
277 nuclear medicine/ (45466)
278 ((nuclear or atomic) adj1 medicine?).tw,kw,kf. (48107)
279 (nuclear adj1 radiolog*).tw,kw,kf. (1312)
280 (sialogra* or salivogra* or sialoscintigra* or sialo-scintigra*).tw,kw,kf. (3373)
281 (enteroclys* or enterogra*).tw,kw,kf. (6379)
282 (esophagra* or oesophagra* or esophagogra* or oesophagogra*).tw,kw,kf. (7240)
283 ((CT or virtual) adj colonoscop*).tw,kw,kf. (1946)
284 (contrast adj (study or studies or medium)).tw,kw,kf. (47315)
285 (cholangiopancreatogra* or cholangio-pancreatogra* or ERCP or MRCP).tw,kw,kf. (57566)
286 cholecystogra*.tw,kw,kf. (5493)
287 (angiograph* or angio-graph* or angiogram* or angio-gram*).tw,kw,kf. (582664)
288 (perfusion adj3 (image? or imaging)).tw,kw,kf. (43411)
289 or/249-288 [IMAGING] (8592775)
290 248 and 289 [CVD - IMAGING] (838908)
291 (exp animal/ or exp animal experimentation/ or exp animal model/ or exp animal experiment/ or nonhuman/ or exp vertebrate/) not (exp human/ or exp human experimentation/ or exp human experiment/) (13126368)
292 290 not 291 [ANIMAL-ONLY REMOVED] (812851)
293 (editorial or letter).pt. or directory/ (3934737)
294 case report/ or exp case study/ (5397199)
295 292 not (293 or 294) [OPINION PIECES, IRRELEVANT PUBLICATION TYPES REMOVED] (482383)
296 conference abstract.pt. (4717038)
297 295 not 296 [CONFERENCE ABSTRACTS REMOVED] (395380)
298 exp practice guideline/ (733075)
299 (consensus or guideline* or guidance? or standards or recommendation*).ti,kw,kf. (550837)
300 (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. (311719)
301 or/298-300 [GUIDELINE FILTER] (1310922)
302 297 and 301 [GUIDELINES] (11823)
303 limit 302 to yr="2018-current" (4680)
304 303 use emczd [EMBASE RECORDS] (3911)
305 148 or 304 [BOTH DATABASES] (5292)
306 remove duplicates from 305 (4454) [TOTAL UNIQUE RECORDS]
307 306 use medall [MEDLINE UNIQUE RECORDS] (1368)
308 306 use emczd [EMBASE UNIQUE RECORDS] (3086)

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APPENDIX 2. EVIDENCE TABLES

Abbreviations

Guideline groups

ACC/ AHA	American College of Cardiology/ American Heart Association
ACC/ AATS /AHA /ASE /ASNC /HRS /SCAI /SCCT /SCMR /STS	American College of Cardiology/ American Association for Thoracic Surgery/ American Heart Association/ American Society of Echocardiography/ American Society of Nuclear Cardiology/ Heart Rhythm Society/ Society for Cardiovascular Angiography and Interventions/ Society of Cardiovascular Computed Tomography/ Society for Cardiovascular Magnetic Resonance/ Society of Thoracic Surgeons
ACR	American College of Radiology
ACR/ VF	American College of Rheumatology/ Vasculitis Foundation
AHA/ ACC/ ASE/ CHEST/ SAEM/ SCCT/ SCMR	American Heart Association/ American College of Cardiology/ American Society of Echocardiography/ American College of Chest Physicians/ Society for Academic Emergency Medicine/ Society of Cardiovascular Computed Tomography/ Society for Cardiovascular Magnetic Resonance
AHA/ ACC/ HFSA	American Heart Association/ American College of Cardiology/ Heart Failure Society of America
ASH	American Society of Hematology
ATS	American Thoracic Society
BSR	British Society for Rheumatology
CAR	Canadian Association of Radiologists
CCS/ CHFS	Canadian Cardiovascular Society/ Canadian Heart Failure Society
DGK	German Cardiac Society
ESC	European Society of Cardiology
EULAR	European League Against Rheumatism
JCS	Japanese Circulation Society
JCS/ JHFS	Japanese Circulation Society/ Japanese Heart Failure Society
JCS/JSCS/JATS/JSVS	Japanese Circulation Society/ Japanese Society for Cardiovascular Surgery/ Japanese Association for Thoracic Surgery/ Japanese Society for Vascular Surgery
NHFA/ CSANZ	National Heart Foundation of Australia/ Cardiac Society of Australia and New Zealand
NICE	National Institute for Health and Care Excellence
RCR	Royal College of Radiologists
SICVE	Italian Society of Vascular and Endovascular Surgery
SISAV	Societa Italiana per lo Studio delle Anomalie Vascolari
SVS	Society for Vascular Surgery
THSANZ	Thrombosis and Haemostasis Society of Australia and New Zealand

Imaging and other terms

AAA	Abdominal aortic aneurysm
AAS	Acute aortic syndrome
ACS	Acute coronary syndrome
CAD	Coronary artery disease
CCTA	Coronary computed tomography angiography
CMR	Cardiac magnetic resonance
COR	Certainty of Recommendation
CTA	Computed tomography angiography
CTPA	Computed tomography pulmonary angiography
CTV	Computed tomography venography
CXR	Chest radiograph
DVT	Deep vein thrombosis
ECG	Electrocardiogram
ECHO	Echocardiography
FDG-PET	Fluorodeoxyglucose-positron emission tomography
GCA	Giant cell arteritis
IV	Intravenous
HF	Heart failure
LoE	Level of Evidence
LV	Left ventricle/ventricular
LVEF	Left ventricular ejection fraction
LVV	Large vessel vasculitis
MPI	Myocardial perfusion
MRA	Magnetic resonance angiography
MRI	Magnetic resonance imaging
MRV	Magnetic resonance venography
MUGA	Multigated acquisition
MVV	Medium vessel vasculitis
NM	Nuclear medicine
NSTEMI	Non-ST elevation myocardial infarction
PE	Pulmonary embolism
PET	Positron emission tomography
POCUS	Point of care ultrasound
PTP	Pretest probability
RV	Right ventricle/ventricular
SoR	Strength of recommendation
SPECT	Single-photon emission computerized tomography
STEMI	ST elevation myocardial infarction
TAA	Thoracic aortic aneurysm
TAK	Takayasu arteritis
TEE	Transesophageal echocardiograph
TTE	Transthoracic echocardiograph
US	Ultrasound
V/Q scan	Ventilation–perfusion scan

CV01. Acute chest pain syndromes

CV01A. Acute coronary syndrome: ST elevation myocardial infarction

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [18]	**E01. Acute chest pain syndromes (ACPS): A) ST elevation Myocardial Infarction (STEMI)** Diagnostic Imaging should be guided by clinical assessment, ECG and biomarkers. - **CXR**: Indicated [B]: A CXR may be obtained for initial evaluation, but it should not delay assessment for immediate revascularization unless the diagnosis of STEMI is in question - **Coronary Angiography**: Indicated [A]: Indicated if primary Percutaneous coronary intervention is the revascularization strategy - **ECHO**: Indicated only in specific circumstances [B]: For assessment of LV function and if post-MI complication is suspected. - **MPI (SPECT or PET)**: Indicated only in specific circumstances [B]: May be used in the assessment of stable patients with late presentation MI; For assessment of LV viability in patients with severe LV dysfunction and guidance regarding the revascularization strategy - **MRI**: Indicated only in specific circumstances [B]: For assessment of LV viability in patients with severe LV dysfunction and guidance regarding the revascularization strategy: most accurate for assessment of LV function and for post-MI complications - **MUGA**: Specialized investigation [B]: For assessment of LV function
ACC/ AATS /AHA /ASE /ASNC /HRS /SCAI /SCCT /SCMR /STS 2019 (Doherty) [19]	**Indication: Acute coronary syndrome** Evaluation of left ventricle function during initial presentation with acute coronary syndrome - TTE - ANG (invasive coronary angiography/ventriculography/aortography)
AHA/ ACC/ ASE/ CHEST/ SAEM/ SCCT/ SCMR 2021 (Gulati) [20,21]	**CHEST PAIN** - Chest radiograph - TTE - Coronary computed tomographic angiography (CCTA) - Invasive coronary angiography (ICA) - Exercise ECG, stress echocardiography, stress PET/SPECT MPI, or stress Cardiovascular magnetic resonance (CMR) - Fractional flow reserve with CT
AHA/ACC/HFSA 2022 (Heidenreich) [22,23]	- Chest x-ray - TTE - Cardiac magnetic resonance [CMR] - Cardiac computed tomography [CT] - Radionuclide imaging

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
NHFA/CSANZ 2018 (Atherton) [24]	- Chest X-ray - Transthoracic echocardiogram - Invasive coronary angiography - Computed tomography (CT) coronary angiography - Cardiac magnetic resonance imaging (CMR) - Non-invasive functional testing (stress echocardiography, single-photon emission CT scan (SPECT), positron emission tomography (PET) and CMR with LGE) - CMR with late gadolinium enhancement - NM (PET, bone scintigraphy)
NICE (NG185) 2020 [25,26]	**Acute coronary syndromes** - Coronary angiography
RCR 2017 [27]	**CC01. Acute chest pain: ST elevation myocardial infarction (STEMI) and subsequent assessment** - CXR [B] - Catheter coronary angiography & intervention [A] - Echocardiography [B] - CT chest [B] - NM (myocardial perfusion imaging) [A] **CC08. Suspected heart failure** - CXR [B] - Echocardiography [A] - MRI (cardiac MRI) [B] - NM (radionuclide SPECT & multigated acquisition [MUGA]) [B] - CT (cardiac CT) [B] - PET-CT [B]

CV01B. Acute coronary syndrome: non-STEMI

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [18]	**E01. Acute chest pain syndromes (ACPS): B) Non-STEMI/ High risk Acute Coronary Syndrome (including unstable angina)** Diagnostic Imaging should be guided by clinical assessment, ECG and biomarkers. - **CXR**: Indicated [B]: If congestive heart failure or diagnosis of NSTEMI/ACS is in question - **Coronary Angiography**: Indicated only in specific circumstances [A]: Studies have demonstrated that patients with NSTEMI and high risk acute coronary syndrome can benefit from the early invasive strategy (early coronary angiography). However decisions to proceed with the early invasive strategy should not be made in isolation but clinicians must weigh the risks and benefits of the early invasive strategy and patient co-morbidities should be considered. - **ECHO**: Indicated only in specific circumstances [B]: For assessment of LV function and if post-MI complication is suspected. - **MPI (SPECT or PET)**: Indicated only in specific circumstances Indicated [B]: Assessment of patients where the conservative (non-invasive) strategy is deemed reasonable. For assessment of LV viability in patients with severe LV dysfunction and guidance regarding the revascularization strategy. - **Stress ECHO**: Indicated only in specific circumstances [B]: Assessment of patients where the conservative (non-invasive) strategy is deemed reasonable. For assessment of LV viability in patients with severe LV dysfunction and guidance regarding the revascularization strategy. It is a feasible modality but requires local expertise - **MRI**: Indicated only in specific circumstances [B]: For assessment of LV viability in patients with severe LV dysfunction and guidance regarding the revascularization strategy. Accurate for assessment of LV function and for post-MI complications - **MUGA**: Specialized investigation [B]: For assessment of LV function - **CTA**: Not indicated [C]: May be considered as an alternative to the early invasive strategy in centres where coronary angiography and SPECT/stress ECHO are not available or feasible, and the diagnosis of acute coronary syndrome remains uncertain but its value in this population remains uncertain.
ACC/ AATS /AHA /ASE /ASNC /HRS /SCAI /SCCT /SCMR /STS 2019 (Doherty) [19]	**Indication: Acute coronary syndrome** Evaluation of LV function during initial presentation with acute coronary syndrome - TTE - ANG (invasive coronary angiography/ventriculography/aortography)
AHA/ ACC/ ASE/ CHEST/ SAEM/ SCCT/ SCMR 2021 (Gulati) [20,21]	**Chest pain** - Chest radiograph - TTE - Coronary computed tomographic angiography (CCTA) - Invasive coronary angiography (ICA) - Exercise ECG, stress echocardiography, stress PET/SPECT MPI, or stress Cardiovascular magnetic resonance (CMR) - Fractional flow reserve with CT
ESC 2020 (Collet) [28]	**Recommendations for imaging in patients with suspected non-ST segment elevation acute coronary syndrome**

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
	- Echocardiography - CCTA - ICA
JCS 2018 (Yamagishi) [29]	**Chronic coronary heart diseases** - MRI (Stress myocardial perfusion MRI, Coronary MRA) - Coronary Angiography
NICE (NG185) 2020 [25,26]	**Acute coronary syndromes** - Coronary angiography
RCR 2017 [27]	**CC02. Acute coronary syndrome: suspected non-STEMI/unstable angina** - CXR [C] - Echocardiography [A] - NM (myocardial perfusion imaging) [A] - CT (including CT coronary angiography) [A] - MRI [B] - Catheter coronary angiography [A]

CV01C. Acute coronary syndrome: unstable angina

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [18]	**E01. Acute chest pain syndromes (ACPS): B) Non-STEMI/ High risk Acute Coronary Syndrome (including unstable angina)** Diagnostic Imaging should be guided by clinical assessment, ECG and biomarkers. - **CXR**: Indicated [B]: If congestive heart failure or diagnosis of NSTEMI/ACS is in question - **Coronary Angiography**: Indicated only in specific circumstances [A]: Studies have demonstrated that patients with NSTEMI and high risk acute coronary syndrome can benefit from the early invasive strategy (early coronary angiography). However decisions to proceed with the early invasive strategy should not be made in isolation but clinicians must weigh the risks and benefits of the early invasive strategy and patient co-morbidities should be considered. - **ECHO**: Indicated only in specific circumstances [B]: For assessment of LV function and if post-MI complication is suspected. - **MPI (SPECT or PET)**: Indicated only in specific circumstances Indicated [B]: Assessment of patients where the conservative (non-invasive) strategy is deemed reasonable. For assessment of LV viability in patients with severe LV dysfunction and guidance regarding the revascularization strategy. - **Stress ECHO**: Indicated only in specific circumstances [B]: Assessment of patients where the conservative (non-invasive) strategy is deemed reasonable. For assessment of LV viability in patients with severe LV dysfunction and guidance regarding the revascularization strategy. It is a feasible modality but requires local expertise - **MRI**: Indicated only in specific circumstances [B]: For assessment of LV viability in patients with severe LV dysfunction and guidance regarding the revascularization strategy. Accurate for assessment of LV function and for post-MI complications - **MUGA**: Specialized investigation [B]: For assessment of LV function - **CTA**: Not indicated [C]: May be considered as an alternative to the early invasive strategy in centres where coronary angiography and SPECT/stress ECHO are not available or feasible, and the diagnosis of acute coronary syndrome remains uncertain but its value in this population remains uncertain.
ACC/ AATS /AHA /ASE /ASNC /HRS /SCAI /SCCT /SCMR /STS 2019 (Doherty) [19]	**Indication: Acute coronary syndrome** Evaluation of LV function during initial presentation with acute coronary syndrome - TTE - ANG (invasive coronary angiography/ventriculography/aortography)
AHA/ ACC/ ASE/ CHEST/ SAEM/ SCCT/ SCMR 2021 (Gulati) [20,21]	**Chest pain** - Chest radiograph - TTE - Coronary computed tomographic angiography (CCTA) - Invasive coronary angiography (ICA) - Exercise ECG, stress echocardiography, stress PET/SPECT MPI, or stress Cardiovascular magnetic resonance (CMR) - Fractional flow reserve with CT
NICE (NG185) 2020 [25,26]	**Acute coronary syndromes** - Coronary angiography

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
RCR 2017 [27]	**CC02. Acute coronary syndrome: suspected non-STEMI/unstable angina** - CXR [C] - Echocardiography [A] - NM (myocardial perfusion imaging) [A] - CT (including CT coronary angiography) [A] - MRI [B] - Catheter coronary angiography [A]

CV01D. Acute aortic syndrome (including aortic dissection, intramural hematoma, and penetrating atherosclerotic ulcer)

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [18]	**E04. Chest pain: aortic dissection** Diagnostic imaging should be guided by clinical assessment including history of predisposing conditions such as hypertension and genetic syndromes. - **CXR**: Indicated [B]: A CXR is indicated primarily to exclude other causes of chest pain. It is rarely diagnostic of aortic dissection. - **CT**: Indicated [B]: CT with IV contrast is readily accessible, rapid and accurate. Cardiac gating should be considered to minimize pulsation artefact and for assessment of the aortic root, sinuses and coronaries. - **US transesophageal echocardiography (TEE)**: Specialized Investigation [B]: TEE is a useful and accurate portable technique for unstable patients, but it is not as good as CT for diagnosing aortic arch or abdominal aorta dissection. It can assess root and provides dynamic information including presence of aortic regurgitation and it accurately identifies the true lumen. - **MRI**: Specialized investigation [B]: MRI is accurate, but practical difficulties limit its use in critically ill or unstable patients. It is most appropriate for assessing stable patients with chronic dissection, and it is Useful for follow-up. It assesses any change in longitudinal extent but practical difficulties can limit imaging potential in critically ill or unstable patients. Can provide dynamic information including the presence of aortic regurgitation.
ACC/ AATS /AHA /ASE /ASNC /HRS /SCAI /SCCT /SCMR /STS 2019 (Doherty) [19]	**Suspected Acute Aortic Pathology Including Acute Aortic Syndrome** - TTE - TEE - CMR - CT
ACC/ AHA 2022 (Isselbacher) [30]	**Aortic Disease** - CT - TEE and MRI *This guideline covers specific diseases as well (e.g., Marfan syndrome), but was not extracted.*
ACR 2021 (Kicska) [31]	**Suspected acute aortic syndrome** ▪ Variant 1. Acute chest pain; suspected acute aortic syndrome.
AHA/ ACC/ ASE/ CHEST/ SAEM/ SCCT/ SCMR 2021 (Gulati) [20,21]	**Chest pain** - Computed tomography angiography (CTA) - TEE - CMR
RCR 2017 [27]	**CC03. Suspected acute aortic syndrome/suspected aortic dissection** - CXR [B]

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
	- Transoesophageal ultrasound (TOE) [B] - CT [A] - MRI [B]

CV01E. Pulmonary embolism

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [18]	**E05. Pulmonary embolism (see also E13)** - **Risk Assessment using Wells Criteria and D-dimer**: Indicated [A]: The Wells criteria for clinical likelihood of PE is extensively validated and triages patients into three pre-test probability groups: low, intermediate and high. A PE can be safely excluded in patients with a low or moderate pre-test probability and a negative ELISA D-dimer. - **CXR**: Indicated [B]: CXR is the best initial imaging modality to demonstrate consolidation and pleural effusion. A CXR might suggest a pulmonary embolus, but does not exclude a pulmonary embolus. - **CT Pulmonary Angiography (CTPA)**: Indicated [A]: CTPA is the best imaging modality for the detection of pulmonary emboli,. It is the best modality for patients with COPD or an abnormal CXR, and may be used following a non-diagnostic V: Q scintigram. - **NM (ventilation / perfusion scintigraphy)**: Indicated [B]: Planar and SPECT Ventilation / perfusion (V:Q) scintigraphy is diagnostic if used selectively in patients without COPD or consolidation on CXR (Normal CXR). A normal perfusion scintigram excludes clinically significant pulmonary emboli. Can be used when CTPA is contraindicated such as contrast allergy or elevated serum creatinine. Should be used for follow-up assessment of pulmonary embolism. - **MRA**: Specialized investigation [B]: May be considered when there is a contraindication to CTPA and abnormal CXR making ventilation/perfusion scintigraphy unlikely to be diagnostic.
ACC/ AATS /AHA /ASE /ASNC /HRS /SCAI /SCCT /SCMR /STS 2019 (Doherty) [19]	Initial evaluation of cardiac mass, suspected tumor or thrombus, or potential cardiac source of emboli - TTE - TEE - CMR - CT
ACR 2022 [33] **(Kirsch)**	**Pulmonary embolism** ▪ Variant 1. Suspected pulmonary embolism. Low or intermediate pretest probability with a negative D-dimer. Initial imaging. ▪ Variant 2. Suspected pulmonary embolism. Low or intermediate pretest probability with a positive D-dimer. Initial imaging. ▪ Variant 3. Suspected pulmonary embolism. High pretest probability. Initial imaging. ▪ Variant 4. Suspected pulmonary embolism. Pregnant patient. Initial imaging.
AHA/ ACC/ ASE/ CHEST/ SAEM/ SCCT/ SCMR 2021 (Gulati) [20,21]	**Chest pain** - CTA
ASH 2018 (Lim) [34]	**Venous thromboembolism: Diagnosis of PE** - Low pretest probability/prevalence (≤5%): Recommendation 1a - Intermediate pretest probability /prevalence (~20%): Recommendation 2a - High pretest probability /prevalence (≥50%): Recommendation 3a

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
	- Recurrent PE: Recommendation 4
ESC 2019 (Konstantinides) [35]	**Acute pulmonary embolism: Suspected PE with haemodynamic instability** - Bedside echocardiography or emergency CTPA - Computed tomographic pulmonary angiography (CTPA) - CT venography - V/Q scintigraphy - V/Q SPECT - Lower-limb CUS - MRA
NICE (NG156) 2020 [36]	**Venous thromboembolic diseases** - Chest X-ray - Proximal leg vein ultrasound scan - Computed tomography pulmonary angiogram (CTPA) - Ventilation/perfusion single photon emission computed tomography (V/Q SPECT) scan, V/Q planar scan
RCR 2017 [27]	**CC04. Suspected pulmonary embolism (PE)** - CXR [B] - CT pulmonary angiography (CTPA) [A] - NM (ventilation-perfusion scintigraphy) [B] - MRI including MR pulmonary angiography [B] **CC31. Suspected pulmonary embolism (PE) in pregnancy** - CXR [C] - US (venous compression Doppler of the leg) [C] - NM (ventilation-perfusion scintigraphy, VQ) [B] - CT pulmonary angiography (CTPA) [B] - MRI/MRA [C]

CV01F. Acute myocarditis

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [18]	See CV07A.
ACR 2021 (Rajiah) [37]	**Nonischemic Myocardial Disease with Clinical Manifestations** ▪ Variant 5. Suspected inflammatory cardiomyopathy. Ischemic cardiomyopathy already excluded. Initial imaging.
AHA/ ACC/ ASE/ CHEST/ SAEM/ SCCT/ SCMR 2021 (Gulati) [20,21]	**Chest pain** - CMR - TTE
RCR 2017 [27]	**CC09. Suspected myocarditis** - CXR [B] - Echocardiography [A] - MRI (cardiac MRI) [B] - CT (cardiac CT) [B] - NM (cardiac scintigraphy) [B] - PET-CT [B]

CV01G. Acute pericarditis

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [18]	*Covered in CV01G/CV04A and CV04B.* **E06. Pericarditis, pericardial effusion** - **ECHO**: Indicated [B]: ECHO is the best initial imaging modality. It can diagnose and assess the size of a pericardial effusion and suitability for drainage. It is also the best modality for follow-up. - **CXR**: Indicated [B]: CXR is indicated to diagnose concomitant pathology (e.g. tumour) or calcification in the pericardium. It should include a left lateral view. - **CT**: Specialized investigation [B]: CT may be ordered to assess pericardial thickening +/- calcification, pericardial effusions and other relevant thoracic pathology. - **MRI**: Specialized investigation [B]: Will show thickening, effusion and can assess for functional impact of pericardial disease and other important cardiac and thoracic findings. Less sensitive for identification of pericardial calcification than CT.
ACR 2021 (Bolen) [38]	**Dyspnea-Suspected Cardiac Origin (Ischemia Already Excluded)** ▪ Variant 3. Dyspnea due to suspected pericardial disease. Ischemia excluded. Initial imaging.
ACR 2021 (Rajiah) [37]	**Nonischemic Myocardial Disease with Clinical Manifestations** ▪ Variant 5. Suspected inflammatory cardiomyopathy. Ischemic cardiomyopathy already excluded. Initial imaging.
AHA/ ACC/ ASE/ CHEST/ SAEM/ SCCT/ SCMR 2021 (Gulati) [20,21]	**Chest pain** - CMR - TTE - cardiac CT
RCR 2017 [27]	**CC05. Suspected pericarditis or pericardial effusion** - Echocardiography [B] - Chest XR [B] - CT [B] - MRI [B]

CV01H. Non-cardiac chest pain

See CAR Thoracic Diagnostic Imaging Referral Guideline [39]

- TH02. Non-specific chest pain
- TH14. Suspected pneumothorax (non-traumatic)
- TH15. Clinically suspected pleural effusion

CV02. Chronic chest pain

CV02A. Suspected chronic ischemic heart disease

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [18]	**E03. Known chronic ischemic heart disease** Diagnostic imaging should be guided by clinical assessment and ECG. Exercise treadmill stress test is currently recommended as the 1st line non-invasive strategy. - **MPI (SPECT or PET)**: Indicated [B]: Assessment of patient prognosis. For assessment of LV viability in patients with severe LV dysfunction and guidance re: revascularization is needed. - **Stress ECHO**: Indicated [B]: Assessment of patient prognosis. For assessment of LV viability in patients with severe LV dysfunction and guidance re: revascularization is needed. - **MRI**: Indicated [B]: For assessment of LV function, viability and possible post-MI complications. - **CXR**: Indicated only in specific circumstances [B]: A CXR should only be obtained if there are signs or symptoms suggestive of CHF. - **ECHO**: Indicated only in specific circumstances [A]: For assessment of LV function. Can be used sequentially, particularly if hemodynamic clinical deterioration is noted. - **Coronary Angiography**: Indicated in specific circumstances [B]: Indicated if patient has uncontrolled symptoms on optimal medical therapy, Canadian Cardiovascular Society 3 or 4 angina, high risk non-invasive testing, suggestion that patient may benefit from revascularization. - **MUGA**: Specialized investigation [B]: For assessment of LV function. **E02. Suspected Coronary Artery Disease (CAD), Non-acute symptoms: A) High pre-test probability** - **CXR**: Indicated only in specific circumstances [B]: May be helpful if signs or symptoms are suggestive of congestive heart failure. - **MPI (SPECT or PET)**: Indicated [B]: Assessment of patient prognosis; For assessment of LV viability in patients with severe LV dysfunction and guidance re: revascularization is needed. - **ECHO/Stress ECHO**: Indicated [B]: For assessment of LV function / Assessment of patient prognosis; For assessment of LV viability in patients with severe LV dysfunction and guidance re: revascularization is needed. - **MUGA**: Indicated only in specific circumstances [B]: For assessment of LV function. - **Stress perfusion MRI**: Specialized investigation [B]: MRI myocardial perfusion with vasodilator stress has been shown to be as good as coronary angiography, PET and Nuclear SPECT and can be superior to stress echo especially in patients with a poor acoustic window. Availability may be limited to large centers. - **Coronary Angiography**: Specialized investigation [B]: Indicated if patient has uncontrolled symptoms on optimal medical therapy, Canadian Cardiovascular Society 3 or 4 angina, high risk non-invasive test results, suggestion that patient may benefit from revascularization. - **Coronary CT**: Not Indicated [C]: Not indicated except for unusual circumstances where invasive angiography cannot be

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
	performed. **E02. Suspected Coronary Artery Disease (CAD), Non-acute symptoms: B) Low to intermediate pre-test probability** - **CXR**: Indicated [B]: Useful to assess heart size and pulmonary vasculature. May show non cardiac causes of chest pain. - **Coronary CT**: Indicated [B]: CT coronary angiography has an excellent negative predictive value and is very useful for excluding coronary obstructive disease in low and intermediate risk populations. Useful for demonstrating coronary anatomy in preoperative cardiac surgery patients at low risk for CAD. - **MPI (SPECT or PET)**: Indicated [B]: Diagnosis and risk stratification of patients when IHD is suspected. - **ECHO/Stress ECHO**: Indicated [B]: For assessment of LV function and risk stratification of patients when ischemic heart disease is suspected. - **MRI**: Indicated only in specific circumstances [B]: Useful for differentiating ischemic from non-ischemic cardiomyopathies and identifying specific causes such as sarcoidosis, amyloidosis, and iron overload. Technique of choice for demonstrating myocarditis.
ACC/ AATS /AHA /ASE /ASNC /HRS /SCAI /SCCT /SCMR /STS 2019 (Doherty) [19]	**Indication: Heart Failure** - TTE - TEE - Stress Echocardiography - Strain/Strain Rate Imaging by speckle or tissue doppler - MPI (SPECT/PET) - CMR - CT - ANG (invasive coronary angiography/ventriculography/aortography) - RVG (radionuclide ventriculography)
ACR 2021 (Litmanovich) [40]	**Chronic chest pain** ▪ Variant 2. Chronic chest pain; high probability of coronary artery disease. Known ischemic heart disease with no prior definitive treatment. Initial imaging *Note: Variant 1. Chronic chest pain; high probability of coronary artery disease. No known ischemic heart disease. Initial imaging. was not extracted*
AHA/ ACC/ ASE/ CHEST/ SAEM/ SCCT/ SCMR 2021 (Gulati) [20,21]	**Chest pain** - CAC testing - Exercise testing without imaging - CCTA - Stress imaging (stress echocardiography, PET/SPECT MPI or CMR) - PET, SPECT
AHA/ACC/HFSA 2022	**Heart Failure**

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
(Heidenreich) [22,23]	- Chest x-ray - TTE - Cardiac magnetic resonance - Cardiac computed tomography - Radionuclide imaging

ESC 2021 (McDonagh) [41]	**Recommended diagnostic tests in all patients with suspected chronic heart failure**
	- Transthoracic echocardiography
	- Chest radiograph (X-ray)
	Recommendations for specialized diagnostic tests for selected patients with chronic heart failure to detect reversible/ treatable causes of heart failure
	- CMR
	- Non-invasive testing:
	  ○ CTCA
	  ○ Non-invasive stress imaging (CMR, stress echocardiography, SPECT, PET)
	- Invasive coronary angiography

ESC 2019 (Knuuti) [42]	**Initial diagnostic management of patients with suspected coronary artery disease** - TTE (Class: I; Level: B) - US (Class: IIa; Level: C) - CMR (Class: IIb; Level: C) - CXR (Class: I; Level: C) **Initial diagnostic management of symptomatic patients with suspected coronary artery disease** - Non-invasive functional imaging or coronary CTA - Functional imaging - Invasive angiography - Coronary CTA - Coronary calcium detection by CT
JCS 2018 (Yamagishi) [29]	**Chronic coronary heart diseases** **Testing Methods to Assess Myocardial Ischemia in Patients With Suspected Stable Coronary Heart Disease** - Exercise testing - Stress imaging - CCTA - Coronary angiography
NHFA/CSANZ 2018 (Atherton) [24]	**Heart Failure** - Chest X-ray

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
	- Transthoracic echocardiogram - Invasive coronary angiography - Computed tomography (CT) coronary angiography - Cardiac magnetic resonance imaging (CMR) - Non-invasive functional testing (stress echocardiography, SPECT, PET, CMR with LGE) - CMR with late gadolinium enhancement - NM (PET, bone scintigraphy)
RCR 2017 [27]	**CC06. Chronic stable angina** - CXR [B] - Echocardiography [B] - CT [A] - MRI with vasodilator or inotropic stress [B] - NM (myocardial perfusion with stress) [A] - Coronary angiography [B] **CC08. Suspected heart failure** - CXR [B] - Echocardiography [A] - MRI (cardiac MRI) [B] - NM (radionuclide SPECT & multigated acquisition [MUGA]) - CT (cardiac CT) [B] - PET-CT [B]

CV02B. Non-cardiac chest pain

See CAR Thoracic Diagnostic Imaging Referral Guideline [39]

- TH02. Non-specific chest pain
- TH15. Clinically suspected pleural effusion

CV03. Cardiovascular screening and risk stratification (calcium score CT)

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [18]	This scenario was not covered by the CAR guideline in 2012.
RCR 2017 [27]	**C11. Assessment of asymptomatic patients for cardiovascular risk** - US (carotid intima-medial thickness) [B] - CT (coronary calcification) [B]

CV04. Pericardial syndromes

CV04A. Acute pericarditis

See CV01G. Acute chest pain syndromes (ACPS): Acute pericarditis

CV04B. Pericardial effusion

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [18]	*Covered in CV01G/CV04A and CV04B.* **E06. Pericarditis, pericardial effusion** - **ECHO**: Indicated [B]: ECHO is the best initial imaging modality. It can diagnose and assess the size of a pericardial effusion and suitability for drainage. It is also the best modality for follow-up. - **CXR**: Indicated [B]: CXR is indicated to diagnose concomitant pathology (e.g. tumour) or calcification in the pericardium. It should include a left lateral view. - **CT**: Specialized investigation [B]: CT may be ordered to assess pericardial thickening +/- calcification, pericardial effusions and other relevant thoracic pathology. - **MRI**: Specialized investigation [B]: Will show thickening, effusion and can assess for functional impact of pericardial disease and other important cardiac and thoracic findings. Less sensitive for identification of pericardial calcification than CT.
ACC/ AATS /AHA /ASE /ASNC /HRS /SCAI /SCCT /SCMR /STS 2019 (Doherty) [19]	**Suspected Pericardial Diseases** - TTE - TEE - Strain/Strain rate imaging by speckle or tissue doppler - CMR - CT
RCR 2017 [27]	**CC05. Suspected pericarditis or pericardial effusion** - Echocardiography [B] - Chest XR [B] - CT [B] - MRI [B]

CV04C. Constrictive pericarditis

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [18]	This scenario was not covered by the CAR guideline in 2012.
ACC/ AATS /AHA /ASE /ASNC /HRS /SCAI /SCCT /SCMR /STS 2019 (Doherty) [19]	**Suspected Pericardial Diseases** - TTE - TEE - Strain/Strain rate imaging by speckle or tissue doppler - CMR - CT
RCR 2017 [27]	**CC05. Suspected pericarditis or pericardial effusion** - Echocardiography [B] - Chest XR [B] - CT [B] - MRI [B]

CV05. Intracardiac/pericardial mass

CV05A. Normal variant

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [18]	This scenario was not covered by the CAR guideline in 2012.
ACC/ AATS /AHA /ASE /ASNC /HRS /SCAI /SCCT /SCMR /STS 2019 (Doherty) [19]	**Initial evaluation of cardiac mass, suspected tumor or thrombus, or potential cardiac source of emboli** - TTE - TEE - CMR - CT

CV05B. Masses

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [18]	This scenario was not covered by the CAR guideline in 2012.
ACC/ AATS /AHA /ASE /ASNC /HRS /SCAI /SCCT /SCMR /STS 2019 (Doherty) [19]	**Initial evaluation of cardiac mass, suspected tumor or thrombus, or potential cardiac source of emboli** - TTE - TEE - CMR - CT

CV06. Suspected valvular disease

CV06A. Aortic valve

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [18]	**E07. Suspected valvular cardiac disease** - **CXR**: Indicated [B]: CXR is indicated for an initial assessment and when there is a change in the clinical picture such as signs suggesting heart failure. - **ECHO**: Indicated [B]: ECHO is the best imaging modality for initial assessment and for follow-up. TEE may be needed to assess prosthetic valves, suspected endocarditis or if there is a poor acoustic window. - **MRI**: Specialized investigation [B]: Complementary to echo especially if difficulty with acoustic windows. Can assess severity of valvular regurgitation and is the most accurate method for assessment of ventricular volumes, function and mass. Rarely contraindicated for prosthetic valves. - **CT**: Specialized investigation [B]: Can assess valve area and degree of valvular calcification with ECG Gated CT. Useful for assessment of aortic root and ascending aortic size.
ACC/AHA 2020 (Otto) [44,45]	**Valvular heart disease** - TTE - Ancillary testing: TEE, CT, CMR, stress testing, Holter monitoring, diagnostic hemodynamic cardiac catheterization, PET-CT
ACC/ AATS /AHA /ASE /ASNC /HRS /SCAI /SCCT /SCMR /STS 2019 (Doherty) [19]	**Suspected Acute Aortic Pathology Including Acute Aortic Syndrome** - TTE - TEE - CMR - CT
ACC/ AATS/ AHA/ ASE/ ASNC/ HRS/ SCAI/ SCCT/ SCMR/ STS 2018 (Doherty) [43]	**Initial Evaluation of an Asymptomatic Patient Reasonable suspicion of valvular heart disease** - TTE - 3D TTE **Bacteremia/Endocarditis** Suspected IE (native valve, prosthetic valve, endocardial lead) AND positive blood cultures or a new murmur - TTE - TEE - 3D TTE **Inadequate TTE Images** - TTE - TEE - CMR - CCT

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
	Suspected Endocarditis with Negative TTE - TEE - FDG-PET - CCT **Aortic Stenosis** Symptomatic, severe AS by calculated valve area (stage D2) AND low flow/low gradient AND low LVEF - TEE - Low-Dose DSE - CMR - CCT: May be Appropriate **Aortic Regurgitation** Dilated aortic sinuses or ascending aorta or a bicuspid aortic valve (stages A and B), to evaluate the presence and severity of AR assuming optimal TTE images - TTE - CMR - CCT **Aortic Regurgitation** Discordance between clinical assessment and TTE about the severity of AR - TTE - Ex.-SE - CMR - CCT - ANG
ACR 2021 (Bolen) [38]	**Dyspnea-Suspected Cardiac Origin (Ischemia Already Excluded)** ▪ Variant 1. Dyspnea due to suspected valvular heart disease. Ischemia excluded. Initial imaging.
ACR 2021 (Malik) [46]	**Infective endocarditis** ▪ Variant 1: Suspected infective endocarditis. Initial Imaging *Did not extract: Variant 2. Known or suspected infective endocarditis. Additional imaging to direct patient management or treatment*
JCS/ JSCS/ JATS/ JSVS 2020 (Izumi) [47]	**Valvular heart disease** - TTE - TEE **Aortic stenosis** - TTE

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
	- Exercise stress test - TEE - Cardiac CT **Aortic regurgitation** - TTE - TEE - Aortic magnetic resonance angiography or CT angiography - Cardiac MRI
RCR 2017 [27]	**CC07. Suspected valvular heart disease** - Echocardiography [B] - CXR [B] - MRI [B] - CT [B]

CV06B. Mitral valve

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [18]	**E07. Suspected valvular cardiac disease** - **CXR**: Indicated [B]: CXR is indicated for an initial assessment and when there is a change in the clinical picture such as signs suggesting heart failure. - **ECHO**: Indicated [B]: ECHO is the best imaging modality for initial assessment and for follow-up. TEE may be needed to assess prosthetic valves, suspected endocarditis or if there is a poor acoustic window. - **MRI**: Specialized investigation [B]: Complementary to echo especially if difficulty with acoustic windows. Can assess severity of valvular regurgitation and is the most accurate method for assessment of ventricular volumes, function and mass. Rarely contraindicated for prosthetic valves. - **CT**: Specialized investigation [B]: Can assess valve area and degree of valvular calcification with ECG Gated CT. Useful for assessment of aortic root and ascending aortic size.
ACC/AHA 2020 (Otto) [44,45]	**Valvular heart disease** - TTE - Ancillary testing: TEE, CT, CMR imaging, stress testing, Holter monitoring, diagnostic hemodynamic cardiac catheterization, PET-CT
ACC/ AATS/ AHA/ ASE/ ASNC/ HRS/ SCAI/ SCCT/ SCMR/ STS 2018 (Doherty) [43]	**Initial Evaluation of an Asymptomatic Patient Reasonable suspicion of valvular heart disease** - TTE - 3D TTE **Bacteremia/Endocarditis** Suspected IE (native valve, prosthetic valve, endocardial lead) AND positive blood cultures or a new murmur - TTE - TEE - 3D TTE **Inadequate TTE Images** - TTE - TEE - CMR - CCT **Suspected Endocarditis with Negative TTE** - TEE - FDG-PET - CCT **Mitral Stenosis**

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
	- TEE - 3D TTE - Ex.-SE - CMR - CCT **Mitral Regurgitation** - TEE - 3D TTE - Ex.-SE - CMR - ANG
ACR 2021 (Bolen) [38]	**Dyspnea-Suspected Cardiac Origin (Ischemia Already Excluded)** ▪ Variant 1. Dyspnea due to suspected valvular heart disease. Ischemia excluded. Initial imaging.
ACR 2021 (Malik) [46]: **Infective endocarditis**	*Covered in CV06A, CV06B, CV06C, and CV06D.* ▪ Variant 1: Suspected infective endocarditis. Initial Imaging *Did not extract: Variant 2. Known or suspected infective endocarditis. Additional imaging to direct patient management or treatment*
JCS/JSCS/JATS/JSVS 2020 (Izumi) [47]	**Primary Mitral Regurgitation (MR)** - TTE - TEE - Exercise testing (stress echocardiograph) - 3D-TEE - Cardiac MRI - Coronary angiography **Mitral stenosis** - Exercise testing (stress echocardiography) - TTE
RCR 2017 [27]	**CC07. Suspected valvular heart disease** - Echocardiography [B] - CXR [B] - MRI [B] - CT [B]

CV06C. Pulmonary valve

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [18]	**E07. Suspected valvular cardiac disease** - **CXR**: Indicated [B]: CXR is indicated for an initial assessment and when there is a change in the clinical picture such as signs suggesting heart failure. - **ECHO**: Indicated [B]: ECHO is the best imaging modality for initial assessment and for follow-up. TEE may be needed to assess prosthetic valves, suspected endocarditis or if there is a poor acoustic window. - **MRI**: Specialized investigation [B]: Complementary to echo especially if difficulty with acoustic windows. Can assess severity of valvular regurgitation and is the most accurate method for assessment of ventricular volumes, function and mass. Rarely contraindicated for prosthetic valves. - **CT**: Specialized investigation [B]: Can assess valve area and degree of valvular calcification with ECG Gated CT. Useful for assessment of aortic root and ascending aortic size.
ACC/AHA 2020 (Otto) [44,45]	**Valvular heart disease** - TTE - Ancillary testing: TEE, CT, cardiac magnetic resonance (CMR) imaging, stress testing, Holter monitoring, diagnostic hemodynamic cardiac catheterization, PET-CT
ACC/ AATS/ AHA/ ASE/ ASNC/ HRS/ SCAI/ SCCT/ SCMR/ STS 2018 (Doherty) [43]	**Initial Evaluation of an Asymptomatic Patient** **Reasonable suspicion of valvular heart disease** - TTE - 3D TTE **Bacteremia/Endocarditis** **Suspected IE (native valve, prosthetic valve, endocardial lead) AND positive blood cultures or a new murmur** - TTE - TEE - 3D TTE **Inadequate TTE Images** - TTE - TEE - CMR - CCT **Suspected Endocarditis with Negative TTE** - TEE - FDG-PET - CCT

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
ACR 2021 (Bolen) [38]	**Dyspnea-Suspected Cardiac Origin (Ischemia Already Excluded)** ▪ Variant 1. Dyspnea due to suspected valvular heart disease. Ischemia excluded. Initial imaging.
ACR 2021 (Malik) [46]	**Infective Endocarditis** ▪ Variant 1: Suspected infective endocarditis. Initial Imaging *Did not extract: Variant 2. Known or suspected infective endocarditis. Additional imaging to direct patient management or treatment*
JCS/JSCS/JATS/JSVS 2020 (Izumi) [47]	**Echocardiographic Evaluations** - TTE - TEE **Pulmonary Regurgitation (PR)** - Echo - MRI/cardiac MRI **Pulmonary stenosis** - Echocardiography - cardiac MRI - cardiac CT - cardiac catheterization
RCR 2017 [27]	**CC07. Suspected valvular heart disease** - Echocardiography [B] - CXR [B] - MRI [B] - CT [B]

CV06D. Tricuspid valve

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [18]	**E07. Suspected valvular cardiac disease** - **CXR**: Indicated [B]: CXR is indicated for an initial assessment and when there is a change in the clinical picture such as signs suggesting heart failure. - **ECHO**: Indicated [B]: ECHO is the best imaging modality for initial assessment and for follow-up. TEE may be needed to assess prosthetic valves, suspected endocarditis or if there is a poor acoustic window. - **MRI**: Specialized investigation [B]: Complementary to echo especially if difficulty with acoustic windows. Can assess severity of valvular regurgitation and is the most accurate method for assessment of ventricular volumes, function and mass. Rarely contraindicated for prosthetic valves. - **CT**: Specialized investigation [B]: Can assess valve area and degree of valvular calcification with ECG Gated CT. Useful for assessment of aortic root and ascending aortic size.
ACC/AHA 2020 (Otto) [44,45]	**Valvular heart disease** - TTE - Ancillary testing: TEE, CT, cardiac magnetic resonance (CMR) imaging, stress testing, Holter monitoring, diagnostic hemodynamic cardiac catheterization, PET-CT
ACC/ AATS/ AHA/ ASE/ ASNC/ HRS/ SCAI/ SCCT/ SCMR/ STS 2018 (Doherty) [43]	**Initial Evaluation of an Asymptomatic Patient** Reasonable suspicion of VHD - TTE - 3D TTE **Bacteremia/Endocarditis** Suspected IE (native valve, prosthetic valve, endocardial lead) AND positive blood cultures or a new murmur - TTE - TEE - 3D TTE **Inadequate TTE Images** - TTE - TEE - CMR - CCT **Suspected Endocarditis with Negative TTE** - TEE - FDG-PET - CCT **Severe tricuspid regurgitation (Stages C and D) and suboptimal TTE images, for assessment of RV systolic function and systolic**

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
	and diastolic volumes - CMR - CCT
ACR 2021 (Bolen) [38]	**Dyspnea-Suspected Cardiac Origin (Ischemia Already Excluded)** ▪ Variant 1. Dyspnea due to suspected valvular heart disease. Ischemia excluded. Initial imaging.
ACR 2021 (Malik) [46]	**Infective endocarditis** ▪ Variant 1: Suspected infective endocarditis. Initial Imaging *Did not extract: Variant 2. Known or suspected infective endocarditis. Additional imaging to direct patient management or treatment*
JCS/JSCS/JATS/JSVS 2020 (Izumi) [47]	**Echocardiographic Evaluations** - TTE - TEE **Tricuspid Regurgitation** - TTE - TEE - CMR, real-time 3D echocardiography
RCR 2017 [27]	**CC07. Suspected valvular heart disease** - Echocardiography [B] - CXR [B] - MRI [B] - CT [B]

CV07. Cardiomyopathy

CV07A. Cardiomyopathy: dilated

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [18]	**E09. Suspected cardiomyopathy, myocarditis** - **CXR**: Indicated [B]: Used for initial assessment and when there is a change in the clinical picture such as suggestion of new heart failure. - **ECHO**: Indicated [A]: ECHO is the best modality, allowing clear assessment of dilated, hypertrophic, and constrictive or restrictive cardiomyopathy and associated cardiac abnormalities. It is not as useful for arrhythmogenic RV dysplasia. Transesophageal echocardiography may be required to distinguish constrictive from restrictive cardiomyopathy. - **MRI**: Indicated [B]: MRI may be ordered for differentiating ischemic from non-ischemic cardiomyopathies and for identifying specific etiologies such as sarcoidosis, amyloidosis, Arrhythmogenic Right Ventricular Cardiomyopathy , noncompaction and iron overload. It is the best imaging modality for demonstrating myocarditis, and it is useful for detecting myocardial scars. - **NM MPI (SPECT or PET)**: Indicated [B]: Myocardial perfusion imaging may help to differentiate ischemic and dilated cardiomyopathy and to assess myocardial ischemia in hypertrophic cardiomyopathy. - **MUGA**: Specialized investigation [B]: Rest radionuclide angiography is indicated in the determination of initial and serial LV and RV performance in patients with myocarditis or dilated, hypertrophic and restrictive cardiomyopathy and in patients receiving chemotherapy with doxorubicin.
ACC/ AATS /AHA /ASE /ASNC /HRS /SCAI /SCCT /SCMR /STS 2019 (Doherty) [19]	**Indication: Heart Failure/Cardiomyopathy** **Suspected inherited or acquired cardiomyopathy (e.g. restrictive, infiltrative, dilated, hypertrophic)** - TTE - Strain/Strain rate imaging by speckle or tissue doppler - F-18 FDG PET - Tc-99m PYP - CMR - CT - RVG
ACR 2021 (Rajiah) [37]	**Nonischemic Myocardial Disease with Clinical Manifestations** ▪ Variant 3. Suspected nonischemic dilated and unclassified cardiomyopathy. Ischemic cardiomyopathy already excluded. Initial imaging.
ESC 2022 (Zeppenfeld) [48]	**Recommendations for the management of patients with premature ventricular complex-induced or premature ventricular complex-aggravated cardiomyopathy:** - cardiac magnetic resonance **Recommendations for risk stratification, sudden cardiac death prevention, and treatment of ventricular arrhythmias in dilated cardiomyopathy/hypokinetic non-dilated cardiomyopathy:**

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
	- Cardiac magnetic resonance
JCS/JHFS 2021 (Kitaoka) [49]	**Cardiomyopathies** - Echocardiography - Cardiac MR *Also covers NM, but seems to be further down the pathway (e.g., to predict prognosis)*

CV07B. Cardiomyopathy: hypertrophic

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [18]	**E09. Suspected cardiomyopathy, myocarditis** - **CXR**: Indicated [B]: Used for initial assessment and when there is a change in the clinical picture such as suggestion of new heart failure. - **ECHO**: Indicated [A]: ECHO is the best modality, allowing clear assessment of dilated, hypertrophic, and constrictive or restrictive cardiomyopathy and associated cardiac abnormalities. It is not as useful for arrhythmogenic RV dysplasia. Transesophageal echocardiography may be required to distinguish constrictive from restrictive cardiomyopathy. - **MRI**: Indicated [B]: MRI may be ordered for differentiating ischemic from non-ischemic cardiomyopathies and for identifying specific etiologies such as sarcoidosis, amyloidosis, Arrhythmogenic Right Ventricular Cardiomyopathy , noncompaction and iron overload. It is the best imaging modality for demonstrating myocarditis, and it is useful for detecting myocardial scars. - **NM MPI (SPECT or PET)**: Indicated [B]: Myocardial perfusion imaging may help to differentiate ischemic and dilated cardiomyopathy and to assess myocardial ischemia in hypertrophic cardiomyopathy. - **MUGA**: Specialized investigation [B]: Rest radionuclide angiography is indicated in the determination of initial and serial LV and RV performance in patients with myocarditis or dilated, hypertrophic and restrictive cardiomyopathy and in patients receiving chemotherapy with doxorubicin.
ACC/ AATS /AHA /ASE /ASNC /HRS /SCAI /SCCT /SCMR /STS 2019 (Doherty) [19]	**Indication: Heart Failure/Cardiomyopathy** **Suspected inherited or acquired cardiomyopathy (e.g. restrictive, infiltrative, dilated, hypertrophic)** - TTE - Strain/Strain rate imaging by speckle or tissue doppler - F-18 FDG PET - Tc-99m PYP - CMR - CT - RVG
ACR 2021 (Rajiah) [37]	**Nonischemic Myocardial Disease with Clinical Manifestations** ▪ Variant 1. Suspected hypertrophic cardiomyopathy. Ischemic cardiomyopathy already excluded. Initial imaging.
AHA/ACC 2020 (Ommen) [50,51]	**Hypertrophic cardiomyopathy** - Transthoracic echocardiogram (TTE) - Cardiovascular magnetic resonance - CT
ESC 2022 (Zeppenfeld) [48]	**Recommendations for the management of patients with premature ventricular complex-induced or premature ventricular complex-aggravated cardiomyopathy:** - Cardiac magnetic resonance

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
	Recommendations for risk stratification, sudden cardiac death prevention, and treatment of ventricular arrhythmias in hypertrophic cardiomyopathy: - Cardiac magnetic resonance
JCS/JHFS 2018 (Kitaoka) [49]	**Cardiomyopathies** - Echocardiography - Stress echocardiography - Exercise echocardiography - Cardiovascular Magnetic Resonance - Cardiac Radionuclide Imaging - 99m-Tc pyrophosphate scintigraphy - Gallium scintigraphy, FDG-PET - Myocardial perfusion imaging - Radionuclide angiography - Cardiac Computed Tomography

CV07C. Cardiomyopathy: restrictive

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [18]	*Covered in CV07A, CV07B, CV07C, and CV07D.* **E09. Suspected cardiomyopathy, myocarditis** - **CXR**: Indicated [B]: Used for initial assessment and when there is a change in the clinical picture such as suggestion of new heart failure. - **ECHO**: Indicated [A]: ECHO is the best modality, allowing clear assessment of dilated, hypertrophic, and constrictive or restrictive cardiomyopathy and associated cardiac abnormalities. It is not as useful for arrhythmogenic RV dysplasia. Transesophageal echocardiography may be required to distinguish constrictive from restrictive cardiomyopathy. - **MRI**: Indicated [B]: MRI may be ordered for differentiating ischemic from non-ischemic cardiomyopathies and for identifying specific etiologies such as sarcoidosis, amyloidosis, Arrhythmogenic Right Ventricular Cardiomyopathy , noncompaction and iron overload. It is the best imaging modality for demonstrating myocarditis, and it is useful for detecting myocardial scars. - **NM MPI (SPECT or PET)**: Indicated [B]: Myocardial perfusion imaging may help to differentiate ischemic and dilated cardiomyopathy and to assess myocardial ischemia in hypertrophic cardiomyopathy. - **MUGA**: Specialized investigation [B]: Rest radionuclide angiography is indicated in the determination of initial and serial LV and RV performance in patients with myocarditis or dilated, hypertrophic and restrictive cardiomyopathy and in patients receiving chemotherapy with doxorubicin.
ACC/ AATS /AHA /ASE /ASNC /HRS /SCAI /SCCT /SCMR /STS 2019 (Doherty) [19]	**Indication: Heart Failure/Cardiomyopathy** **Suspected inherited or acquired cardiomyopathy (e.g. restrictive, infiltrative, dilated, hypertrophic)** - TTE - Strain/Strain rate imaging by speckle or tissue doppler - F-18 FDG PET - Tc-99m PYP - CMR - CT - RVG
ACR 2021 (Rajiah) [37]	**Nonischemic Myocardial Disease with Clinical Manifestations** ▪ Variant 2. Suspected restrictive cardiomyopathy or infiltrative disease. Ischemic cardiomyopathy already excluded. Initial imaging. ▪ Variant 5. Suspected inflammatory cardiomyopathy. Ischemic cardiomyopathy already excluded. Initial imaging.
ATS 2020 (Crouser) [52]	**CARDIAC SARCOIDOSIS** - TTE - Cardiac magnetic resonance imaging - PET

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
	- Right heart catheterization
CCS/CHFS 2020 (Fine) [53]	**Cardiac Amyloidosis** - Echocardiography - Cardiovascular MRI - Nuclear scintigraphy
DGK 2021 (Yilmaz) [54]	**Cardiac amyloidosis** - TTE - CMR - 99mTc-phosphate scintigraphy
ESC 2022 (Zeppenfeld) [48]	**Recommendations for the management of patients with premature ventricular complex-induced or premature ventricular complex-aggravated cardiomyopathy:** - Cardiac magnetic resonance
JCS 2020 (Kitaoka) [55]	**Cardiac amyloidosis** - Transesophageal echocardiography - Doppler echocardiography - Tissue Doppler echocardiography - Strain Doppler echocardiography - Speckle tracking echocardiography - cine CMR - cardiac CT - 99mTc-PYP scintigraphy - amyloid PET

CV07D. Cardiomyopathy: arrhythmogenic

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [18]	**E09. Suspected cardiomyopathy, myocarditis** - **CXR**: Indicated [B]: Used for initial assessment and when there is a change in the clinical picture such as suggestion of new heart failure. - **ECHO**: Indicated [A]: ECHO is the best modality, allowing clear assessment of dilated, hypertrophic, and constrictive or restrictive cardiomyopathy and associated cardiac abnormalities. It is not as useful for arrhythmogenic RV dysplasia. Transesophageal echocardiography may be required to distinguish constrictive from restrictive cardiomyopathy. - **MRI**: Indicated [B]: MRI may be ordered for differentiating ischemic from non-ischemic cardiomyopathies and for identifying specific etiologies such as sarcoidosis, amyloidosis, Arrhythmogenic Right Ventricular Cardiomyopathy , noncompaction and iron overload. It is the best imaging modality for demonstrating myocarditis, and it is useful for detecting myocardial scars. - **NM MPI (SPECT or PET)**: Indicated [B]: Myocardial perfusion imaging may help to differentiate ischemic and dilated cardiomyopathy and to assess myocardial ischemia in hypertrophic cardiomyopathy. - **MUGA**: Specialized investigation [B]: Rest radionuclide angiography is indicated in the determination of initial and serial LV and RV performance in patients with myocarditis or dilated, hypertrophic and restrictive cardiomyopathy and in patients receiving chemotherapy with doxorubicin.
ACC/ AATS /AHA /ASE /ASNC /HRS /SCAI /SCCT /SCMR /STS 2019 (Doherty) [19]	**Indication: Heart Failure/Cardiomyopathy** **Suspected inherited or acquired cardiomyopathy (e.g. restrictive, infiltrative, dilated, hypertrophic)** - TTE - Strain/Strain rate imaging by speckle or tissue doppler - F-18 FDG PET - Tc-99m PYP - CMR - CT - RVG
ACR 2021 (Rajiah) [37]	**Nonischemic Myocardial Disease with Clinical Manifestations** ▪ Variant 4. Suspected arrhythmogenic cardiomyopathy (arrhythmia of ventricular origin). Ischemic cardiomyopathy already excluded. Initial imaging.
ESC 2022 (Zeppenfeld) [48]	**Recommendations for the management of patients with premature ventricular complex-induced or premature ventricular complex-aggravated cardiomyopathy:** - Cardiac magnetic resonance **Recommendations for diagnostic, risk stratification, sudden cardiac death prevention, and treatment of ventricular arrhythmias in arrhythmogenic right ventricular cardiomyopathy:** - Cardiac magnetic resonance

CV08. Aorta

CV08A. Thoraco-abdominal aneurysm

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [18]	**E11. Aortic aneurysm: A) Thoracic aneurysm** Imaging surveillance based on size criteria, interval growth and co-existing surgical conditions. If present in isolation, surgical correction is warranted for thoracic aneurysms >5.5-6.0 cm or growing >0.5cm/year. If present with co-existing surgical conditions (CAD, valve disease), surgical correction warranted for thoracic aneurysms > 4.5 cm. - **CXR**: Not Indicated [C]: Low diagnostic accuracy - **CT**: Indicated [A]: Helical multidetector CT allows accurate, reproducible short-axis measurements. Gated study accurately measures root and sinuses. Can also assess for presence of CAD and morphology of aortic valve. - **MR**: Indicated [A]: Typically for younger patients in whom radiation exposure is a concern. Can provide dynamic information including valve morphology and presence of aortic regurgitation. - **US** Transthoracic Echocardiography (TTE): Not Initially Indicated: Limited acoustic window limits visualization of aortic arch. Can provide dynamic information including valve morphology and presence of aortic regurgitation. **E11. Aortic aneurysm: B) Abdominal aneurysm** Imaging screening based on age, gender and family history. Imaging surveillance based on size criteria. - **Abdomen X-Ray**: Not Indicated: Low diagnostic accuracy - **US**: Indicated [A]: US is useful for screening, but it can be limited in obese patients and those with bowel gas. It is imprecise in assessing relationship to renal vessels and measuring aneurysm size for surveillance, but it is portable and low cost. CT is preferable for a suspected leak. - **CT**: Indicated [A]: Accurate for assessing relationship to renal and iliac vessels to guide percutaneous management. High reproducibility is advantageous for surveillance. Accurately assesses rupture. - **MR**: Special Investigation [B]: Similar in accuracy to CT
ACC/AHA 2022 (Isselbacher) [30]	**Aortic Disease** - CT - MRI - TTE - TEE - 18F-FDG positron emission tomography (FDG-PET) **Surveillance of Abdominal Aortic Dilation and Aneurysm** *This guideline covers specific diseases as well (e.g., Marfan syndrome), but was not extracted.*
ACC/ AATS /AHA /ASE /ASNC /HRS /SCAI /SCCT /SCMR /STS 2019	**Suspected Acute Aortic Pathology Including Acute Aortic Syndrome** - TTE - TEE

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
(Doherty) [19]	- CMR - CT
ACR 2018 (Bennett) [56]	**Suspected Thoracic Aortic Aneurysm** ▪ Variant 1. Suspected thoracic aortic aneurysm. Initial imaging.
NICE (NG156) 2020 [36]	**AAA** - US - thin-slice contrast-enhanced arterial-phase CT angiography
SICVE 2022 (Pratesi) [57]	**Suspected ruptured AAA** - CT angiography
SVS 2020 (Chaer) [58]	**Renal artery aneurysm (RAA)** - 1.1: computed tomography angiography - 1.2: magnetic resonance angiography **Splenic artery aneurysm (SAA)** - 1.1: computed tomography angiography - 1.2: magnetic resonance angiography **Celiac artery aneurysm (CAA)** - 1.1 computed tomography angiography - 1.2 magnetic resonance angiography **Gastric and gastroepiploic artery aneurysms** - 1.1: computed tomography angiography - 1.2: magnetic resonance angiography **Hepatic artery aneurysm (HAA)** - 1.1: computed tomography angiography - 1.2: mesenteric angiography **Superior mesenteric artery aneurysm (SMAA)** - 1.1: computed tomography angiography - 1.2: mesenteric angiography **Jejunal, ileal, and colic artery aneurysms** - 1.1: computed tomography angiography - 1.2: magnetic resonance angiography **Pancreaticoduodenal artery aneurysm (PDAA) and gastroduodenal artery aneurysm (GDAA)** - 1.1: computed tomography angiography - 1.2: duplex ultrasound - 1.3: magnetic resonance angiography

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
RCR 2017 [27]	**CC12. Abdominal aortic aneurysm** - US [A] - CT/MRI [A]

CV08B. Vasculitis

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [18]	This scenario was not covered by the CAR guideline in 2012.
ACR 2021 (Aghayev) [59]	**Noncerebral vasculitis** ▪ Variant 1. Suspected large-vessel vasculitis (LVV). Initial imaging.
ACR/ VF 2021 (Maz) [60]	The management of giant cell arteritis (GCA) and Takayasu arteritis (TAK) as exemplars of large vessel vasculitis. **Giant Cell Arteritis** - temporal artery ultrasound - MRI - non-invasive vascular imaging: MR, CT angiography, US, FDG-PET
BSR 2020 (Mackie) [61,62]	**Giant Cell Arteritis** - US - FDG-PET - MRA - CTA
EULAR 2018 (Hellmich) [63]	**Large Vessel Vasculitis** - US - MRI - CT - PET-CT
EULAR 2018 (Dejaco) [64,65]	**Large Vessel Vasculitis** Statements 1 to 9: - Ultrasound of temporal ± axillary - MRI - CT - PET - Conventional angiography

CV09. Venous thrombosis

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [18]	**E12. Deep vein thrombosis (DVT)** - **Risk Assessment using Wells Criteria and D-dimer**: Indicated [A]: The Wells criteria for DVT extensively triages patients in the outpatient population into High and Low pre-test probability groups. Patients with a low pre-test probability and a negative ELISA D-dimer do not require further investigation. - **US (Compression US)**: Indicated [A]: Compression US is the best initial imaging modality for the diagnosis of DVT. It may also show other lesions. - **CTA**: Indicated only in specific circumstances [C]: May be required in cases not technically assessable or equivalent by compression/Doppler ultrasound. - **MRA**: Indicated only in specific circumstances [C]: May be required in cases not technically assessable or equivalent by compression/Doppler ultrasound. - **Venography**: Indicated only in specific circumstances [C]: May be required in cases not technically assessable or equivalent by compression/Doppler ultrasound.
ACR 2020 (Desjardins) [66]	**Deep vein thrombosis** ▪ Variant 1. Suspected upper-extremity deep vein thrombosis. Initial imaging.
ACR 2018 (Hanley) [67]	**Lower extremity DVT** ▪ Variant 1. Suspected lower extremity deep vein thrombosis. Initial imaging.
ASH 2018 (Lim) [34]	**Diagnosis of lower extremity DVT** Low PTP/prevalence (≤10%). - Recommendation 5a. - Recommendation 5b. Intermediate PTP/prevalence (~25%). - Recommendation 6b. High PTP/prevalence (≥50%). - Recommendation 7a. Recurrent DVT (lower extremity). - Recommendation 8. **Diagnosis of upper extremity DVT** Unlikely pretest probability/prevalence (10%). - Recommendation 9a. Likely pretest probability/prevalence (40%). - Recommendation 10a.

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
	- Recommendation 10b.
Brazil Guideline (de Almeida 2019) [68]	**Superficial venous thrombosis** - Ultrasound - Phlebography - Ventilation/perfusion scintigraphy - Pulmonary angiotomography
NICE (NG158) 2020 [69,70]	**Venous thromboembolic diseases** - US
RCR 2017 [27]	**See also CC04. Suspected pulmonary embolism** **CC13. Suspected deep vein thrombosis (DVT)** - US [A] - Venography (MRI/CT/transcatheter) [B]
THSANZ 2019 (Tran) [71]	**Deep vein thrombosis** - US - VQ scan, CTPA

CV10. Peripheral vascular disease

CV10A. Upper and lower extremity peripheral vascular disease

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [18]	**E13. Peripheral vascular disease** - **Angiography**: Specialized investigation [A]: Local policy needs to be determined in agreement with vascular surgeons, especially with regard to therapeutic interventions. US used in some centres as first investigation. - **CTA/MRA**: Specialized investigation [C]: CTA and MRA are increasingly used for diagnosis.
ACR 2021 (Aghayev) [59]	**Noncerebral vasculitis** ▪ Variant 2. Suspected medium-vessel vasculitis (MVV). Initial imaging. (Polyarteritis Nodosa)
ACR 2021 (Chung) [72]	**Polyarteritis Nodosa** - Abdominal vascular imaging
ACR 2019 (Francois) [73]	**Peripheral Arterial Disease** ▪ Variant 2: Suspected External Iliac Artery Endofibrosis. Initial Imaging ▪ Variant 3: Suspected or Known Lower-extremity Inflammatory Vasculitides. Initial Imaging ▪ Variant 4: Suspected or Known Dissection or Connective Tissue Lower-extremity Vascular Diseases. Initial Imaging ▪ Variant 5: Suspected or Known Other Noninflammatory Lower-extremity Vascular Diseases (Such as Fibromuscular Dysplasia, Segmental Arterial Mediolysis). Initial Imaging
RCR 2017 [27]	**CC15. Ischaemic upper limb** - MRA [B] - US [B] - CTA [B] - Angiography [B]

CV10B. Vascular malformation

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [18]	This scenario was not covered by the CAR guideline in 2012.
ACR 2019 (Obara) [74]	**Clinically Suspected Vascular Malformation of the Extremities** ▪ Variant 1. Upper or lower extremity. Suspected vascular malformation presenting with pain or findings of physical deformity including soft-tissue mass, diffuse or focal enlargement, discoloration, or ulceration. Initial imaging.
SISAV 2022 (Stillo) [75]	**Guidelines for Arterio-venous Malformations** - Doppler ultrasound (Strong recommendation in favor, level of evidence 4). - MRI or CT with contrast medium (Strong recommendation in favor, level of evidence 4). **Guidelines for Complex Vascular Malformations** - targeted non-invasive radiological and diagnostic investigations (e.g., Echo color doppler, X-Ray, MRI, angio-CT, lympho-scintigraphy) (Recommendations of good clinical practice, based on the experience of the panel)

CV10C. Entrapment and compression syndromes

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [18]	This scenario was not covered by the CAR guideline in 2012.
ACR 2019 (Francois) [73]	**Peripheral Arterial Disease** ▪ Variant 1. Suspected popliteal entrapment syndrome. Initial imaging.

APPENDIX 3A. CARDIOVASCULAR SUMMARY OF RECOMMENDATIONS (ENGLISH)

Clinical/ Diagnostic Scenario	Recommendation	Strength of Rec.
CCTA: coronary computed tomography angiography; **CMR:** cardiac magnetic resonance; **CT**: computed tomography; **CTA**: computed tomography angiography; **CTV**: computed tomography venography; **ECG**: electrocardiogram; **FDG-PET**: fluorodeoxyglucose-positron emission tomography; **MPI**: myocardial perfusion; **MRA**: magnetic resonance angiography; **MRI**: magnetic resonance imaging; **MRV**: magnetic resonance venography; **MUGA**: multigated acquisition; **NM**: nuclear medicine; **PET**: positron emission tomography; **POCUS**: point of care ultrasound; **SPECT**: single-photon emission computerized tomography; **TEE**: transesophageal echocardiograph; **TTE**: transthoracic echocardiograph; **US**: ultrasound; **V/Q scan**: ventilation-perfusion scan; **XR**: radiography **Strength of Recommendation:** ↑↑: strong for; ↑: conditional for; ↓↓: strong against; ↓: conditional against; **EPc**: Expert Panel consensus		
CV01. ACUTE CHEST PAIN SYNDROMES		
CV01A. Acute coronary syndrome: ST elevation myocardial infarction (STEMI)	In patients presenting with suspected acute coronary syndrome, imaging should be offered based on clinical results (i.e., ECG and cardiac troponin).	
	1. In patients meeting criteria for STEMI (i.e., ECG), we recommend **invasive coronary angiography** as the initial imaging modality.	↑↑
	↳ **1.1** In cases of diagnostic uncertainty OR if immediate invasive coronary angiography is unavailable, we suggest **chest XR and bedside TTE/POCUS (if available)** to evaluate for other potential causes of chest pain, but this should not delay care.	↑
CV01B. Acute coronary syndrome: non-STEMI	In patients presenting with suspected acute coronary syndrome, imaging should be offered based on clinical results (i.e., ECG and cardiac troponin).	
	1. In patients with suspected non-STEMI, we recommend **chest XR** (to rule out other causes of chest pain) **and bedside TTE/POCUS** (if available, to evaluate for ventricular function and rule out pericardial effusion) as the initial imaging modalities.	↑↑
	↳ **1.1** In higher-risk patients, we recommend **invasive coronary angiography** as the next imaging modality.	↑↑
	↳ **1.2** In lower-risk patients, we recommend **invasive coronary angiography or CCTA** as the next imaging modality, depending on clinical parameters.	↑↑
CV01C. Acute coronary syndrome: unstable angina	In patients presenting with suspected acute coronary syndrome, imaging should be offered based on clinical results (i.e., ECG and cardiac troponin).	
	1. In patients with suspected unstable angina (i.e., negative cardiac troponin), we recommend **chest XR** (to rule out other causes of chest pain) **and bedside TTE/POCUS** (if available, to evaluate for ventricular function and rule out pericardial effusion) as the initial imaging modalities.	↑↑
	↳ **1.1** For assessment of coronary artery disease and for risk stratification, we recommend **CCTA**. *Depending on regional practice preference and availability, stress echocardiography and NM (stress perfusion) may be considered. Internal medicine/cardiology consultation may also be considered.*	↑↑
	2. In patients with suspected unstable angina with ongoing chest pain not relieved with medical management, we recommend **invasive coronary angiography** .	↑↑
CV01D. Acute aortic syndrome	**1.** For patients with suspected acute aortic syndrome, we recommend **CTA** (preferably cardiac-gated, if available) as the initial imaging modality.	↑↑
	↳ **1.1** If CTA is contraindicated, we recommend **TEE or MRA** as alternative imaging modalities.	↑↑

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	Recommendation	Strength of Rec.
CCTA: coronary computed tomography angiography; **CMR:** cardiac magnetic resonance; **CT**: computed tomography; **CTA**: computed tomography angiography; **CTV**: computed tomography venography; **ECG**: electrocardiogram; **FDG-PET**: fluorodeoxyglucose-positron emission tomography; **MPI**: myocardial perfusion; **MRA**: magnetic resonance angiography; **MRI**: magnetic resonance imaging; **MRV**: magnetic resonance venography; **MUGA**: multigated acquisition; **NM**: nuclear medicine; **PET**: positron emission tomography; **POCUS**: point of care ultrasound; **SPECT**: single-photon emission computerized tomography; **TEE**: transesophageal echocardiograph; **TTE**: transthoracic echocardiograph; **US**: ultrasound; **V/Q scan**: ventilation-perfusion scan; **XR**: radiography **Strength of Recommendation:** ↑↑: strong for; ↑: conditional for; ↓↓: strong against; ↓: conditional against; **EPc**: Expert Panel consensus		
CV01E. Pulmonary embolism	**Acute pulmonary embolism**	
	1. In patients with suspected pulmonary embolism with <u>low or intermediate</u> pretest probability (as determined by a structured risk assessment tool) with a <u>negative</u> D-dimer, we recommend **against CTA/MRA/VQ scan**.	↓↓
	2. In patients with suspected pulmonary embolism with <u>low or intermediate</u> pretest probability (as determined by a structured risk assessment tool) with a <u>positive</u> D-dimer test, we recommend **CT pulmonary angiography (CTPA)** as the initial imaging modality.	↑↑
	↳ **2.1** If immediate CTPA is not available, we recommend **chest XR** as the next imaging modality to exclude other causes of chest pain.	↑↑
	↳ **2.2** If CT pulmonary angiography is contraindicated, we suggest **VQ scan or MR pulmonary angiography** as an alternative. [*see recommendation 4 for pregnant patients*]	↑
	3. In patients with suspected pulmonary embolism and <u>high</u> pretest probability (as determined by a structured risk assessment tool) or in patients with recurrent pulmonary embolism, we recommend **CTPA** as the initial imaging modality.	↑↑
	↳ **3.1** If immediate CTPA is not available, we recommend **chest XR** as the next imaging modality to exclude other causes of chest pain.	↑↑
	↳ **3.2** If CT pulmonary angiography is contraindicated, we suggest **VQ scan or MR pulmonary angiography** as an alternative. [*see recommendation 4 for pregnant patients*]	↑
	4. For pregnant patients with <u>high</u> pretest probability (as determined by a structured risk assessment tool) of pulmonary embolism, we recommend **chest XR** as the initial imaging modality.	↑↑
	↳ **4.1** If chest XR does not explain the clinical presentation and further imaging is required, we recommend **Doppler US** as the next imaging modality.	↑↑
	↳ **4.2** If Doppler US is negative, we recommend **CTPA or NM (VQ scan)** as the next imaging modality. *In pregnant patients with a high pre-test probability of pulmonary embolism, and normal leg dopplers, some guidelines suggest performing V/Q scan. In practice, however, its availability is limited. CTPA is widely available, has better interobserver agreement, and ability to provide alternative diagnoses for acute chest pain presentation that support its use for evaluation of acute pulmonary embolism in pregnant patients. Mean maternal and fetal radiation dose is typically lower for reduced dose NM perfusion scanning (i.e., no ventilation scanning performed) and breast radiation dose is typically higher with CTPA.* **Note:** MRI is not recommended for evaluation of pulmonary embolism in pregnant patients because gadolinium should be avoided in pregnant patients [32].	↑↑
	Chronic pulmonary embolism	

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	Recommendation	Strength of Rec.
CCTA: coronary computed tomography angiography; **CMR:** cardiac magnetic resonance; **CT**: computed tomography; **CTA**: computed tomography angiography; **CTV**: computed tomography venography; **ECG**: electrocardiogram; **FDG-PET**: fluorodeoxyglucose-positron emission tomography; **MPI**: myocardial perfusion; **MRA**: magnetic resonance angiography; **MRI**: magnetic resonance imaging; **MRV**: magnetic resonance venography; **MUGA**: multigated acquisition; **NM**: nuclear medicine; **PET**: positron emission tomography; **POCUS**: point of care ultrasound; **SPECT**: single-photon emission computerized tomography; **TEE**: transesophageal echocardiograph; **TTE**: transthoracic echocardiograph; **US**: ultrasound; **V/Q scan**: ventilation-perfusion scan; **XR**: radiography **Strength of Recommendation:** ↑↑: strong for; ↑: conditional for; ↓↓: strong against; ↓: conditional against; **EPc**: Expert Panel consensus		
	5. In patients with pulmonary hypertension suspected to be secondary to chronic thromboembolic disease (CTEPH), we recommend **VQ scan** as the initial imaging modality.	EPc
	↳ **5.1** If VQ scan is non-diagnostic, indeterminate for chronic pulmonary embolism, or unavailable, we recommend **CTPA** as an alternative. *Dual energy CT technology or iodine subtraction maps can increase CTPA sensitivity to detect chronic pulmonary embolism.*	EPc
CV01F. Acute myocarditis	**1.** In patients with suspected acute myocarditis, we recommend **TTE followed by cardiac MRI** as the initial imaging modalities.	↑↑
	↳ **1.1** If cardiac MRI does not demonstrate acute myocarditis and if invasive coronary angiography has not been performed, we suggest **CCTA** as the next imaging modality to exclude obstructive coronary artery disease in appropriately selected patients.	↑
CV01G. Acute pericarditis	**1.** In patients with suspected acute pericarditis, we recommend **bedside TTE/POCUS or TEE** as the initial imaging modality to assess presence of pericardial thickening, effusion, as well as ventricular function and constrictive physiology.	↑↑
	↳ **1.1** If further imaging is required to guide management (i.e., pericardiocentesis), we suggest **CT** (preferably cardiac-gated, if available) as the next imaging modality.	↑
	↳ **1.2** If TTE is inconclusive regarding acute pericarditis or constrictive physiology, we suggest **cardiac MRI** as an alternative.	↑
CV01H. Non-cardiac chest pain	See CAR Thoracic Diagnostic Imaging Referral Guideline [39], scenarios: - TH02. Non-specific chest pain - TH14. Suspected pneumothorax (non-traumatic) - TH15. Clinically suspected pleural effusion	
CV02. CHRONIC CHEST PAIN		
CV02A. Suspected chronic ischemic heart disease	**1.** In patients *with established chronic ischemic heart disease* with recurrent chest pain symptoms despite guideline directed medical therapy and intermediate risk/pre-test probability or known non-obstructive CAD, we suggest **anatomical (CCTA), functional (stress NM, stress echo) imaging, or stress MR** as the initial imaging modalities.	↑
	↳ **1.1** To identify patients who may benefit from further investigation with invasive coronary angiography, we suggest **CT-fractional flow reserve (CT-FFR)**.	↑
	2. In patients *with established chronic ischemic heart disease* with recurrent chest pain symptoms despite guideline directed medical therapy and high risk/pre-test probability, we recommend **invasive coronary angiography** as the initial imaging modality.	↑↑
	3. In patients *with established chronic ischemic heart disease* with prior coronary revascularization with percutaneous coronary intervention (PCI) or coronary artery bypass grafts (CABG) and with recurrent chest pain symptoms, we suggest **CCTA** to evaluate for stent (especially if stent > 3mm) or graft patency.	↑

Clinical/ Diagnostic Scenario	Recommendation	Strength of Rec.
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	↳ **3.1** If evaluation for ischemia to account for symptoms is important, we recommend **NM (myocardial perfusion scan)**.	↑↑
	4. In patients with stable chest pain *without established ischemic heart disease* presenting to the outpatient clinic and at low risk/pre-test likelihood of having obstructive CAD (as determined by a structured assessment tool), **routine imaging investigations** are not recommended.	↓↓
	↳ **4.1** In selected patient populations, we suggest **calcium score CT** (for excluding calcified plaque and identifying patients at low likelihood of obstructive CAD) or **exercise ECG** testing.	↑
	5. In patients *without established chronic ischemic heart disease* with recurrent stable chest pain symptoms and intermediate or high risk/pre-test probability, we recommend **CCTA** for diagnosis of CAD, risk prognostication and guiding of treatment decisions.	↑↑
	↳ **5.1** For diagnosis of myocardial ischemia and estimation of risk of major adverse cardiovascular events (MACE), we recommend **functional imaging (stress echocardiography or PET/SPECT MPI or CMR)**.	↑↑
CV02B. Non-cardiac chest pain	See CAR Thoracic Diagnostic Imaging Referral Guideline [39], scenarios: - TH02. Non-specific chest pain - TH15. Clinically suspected pleural effusion	
CV03. CARDIOVASCULAR SCREENING AND RISK STRATIFICATION (CALCIUM SCORE CT)		
	1. In asymptomatic low-risk adults, we suggest **against routine cardiovascular imaging screening and risk stratification**.	↓
	2. In asymptomatic intermediate-risk adults, we recommend **calcium score CT** for optimal risk stratification to guide medical management. *In high-risk patients reluctant to initiate optimal medical management, calcium score CT can provide useful information for patient counselling.*	↑↑
CV04. PERICARDIAL SYNDROMES		
CV04A. Acute pericarditis	See CV01G. Acute chest pain syndromes (ACPS): Acute pericarditis	
CV04B. Pericardial effusion	**1.** In patients with suspected pericardial effusion, we recommend **TTE** as the initial imaging modality.	↑↑
	↳ **1.1** If there is suspected effusive constrictive/constrictive physiology, we suggest **CT** (preferably cardiac-gated, if available) as the next imaging modality to evaluate for pericardial thickness, pericardial effusion, and calcification.	↑
	↳ **1.2** If TTE is inconclusive for effusive constrictive/constrictive physiology, we recommend **cardiac MRI** as the next imaging modality.	↑↑

Clinical/ Diagnostic Scenario	Recommendation	Strength of Rec.
CCTA: coronary computed tomography angiography; **CMR:** cardiac magnetic resonance; **CT**: computed tomography; **CTA**: computed tomography angiography; **CTV**: computed tomography venography; **ECG**: electrocardiogram; **FDG-PET**: fluorodeoxyglucose-positron emission tomography; **MPI**: myocardial perfusion; **MRA**: magnetic resonance angiography; **MRI**: magnetic resonance imaging; **MRV**: magnetic resonance venography; **MUGA**: multigated acquisition; **NM**: nuclear medicine; **PET**: positron emission tomography; **POCUS**: point of care ultrasound; **SPECT**: single-photon emission computerized tomography; **TEE**: transesophageal echocardiograph; **TTE**: transthoracic echocardiograph; **US**: ultrasound; **V/Q scan**: ventilation-perfusion scan; **XR**: radiography **Strength of Recommendation:** ↑↑: strong for; ↑: conditional for; ↓↓: strong against; ↓: conditional against; **EPc**: Expert Panel consensus		
	↳ **1.3** If cardiac MRI is inconclusive for effusive constrictive/constrictive physiology, we recommend **cardiac catheterization**.	↑↑
CV04C. Constrictive pericarditis	**1.** In patients with suspected constrictive pericarditis, we recommend **TTE** as the initial imaging modality.	↑↑
	↳ **1.1** If there is suspected constrictive physiology, we suggest **CT** (preferably cardiac-gated, if available) as the next imaging modality to evaluate for pericardial thickness and calcification.	↑
	↳ **1.2** If TTE is inconclusive for constrictive physiology, we recommend **cardiac MRI** as the next imaging modality.	↑↑
	↳ **1.3** If cardiac MRI is inconclusive for constrictive physiology, we recommend **cardiac catheterization**.	↑↑
CV05. INTRACARDIAC/PERICARDIAL MASS		
CV05A. Normal variant	**1.** In patients with a suspected intracardiac or pericardial mass (versus normal variant) <u>detected on chest CT</u>, we recommend **TTE** as the initial imaging modality.	↑↑
	↳ **1.1** If further imaging is required, we recommend **cardiac MRI** as the next imaging modality.	↑↑
	↳ **1.2** If cardiac MRI is not tolerated, is unavailable, or is contraindicated, we recommend **cardiac CT** as an alternative imaging modality.	↑↑
	2. In patients with a suspected intracardiac or pericardial mass (versus normal variant) <u>incidentally detected on TTE</u>, we recommend **cardiac MRI** for further characterization.	↑↑
	↳ **2.1** If cardiac MRI is not tolerated, is unavailable, or is contraindicated, we recommend **cardiac CT** as the next imaging modality.	↑↑
CV05B. Masses	**1.** In patients with intracardiac or pericardial mass <u>detected on chest CT</u>, we recommend **TTE** as the initial imaging modality.	↑↑
	↳ **1.1** If further imaging is required, we recommend **cardiac MRI** as the next imaging modality.	↑↑
	↳ **1.2** If cardiac MRI is not tolerated, is unavailable, or is contraindicated, we recommend **cardiac CT** as an alternative imaging modality.	↑↑
	2. In patients with intracardiac or pericardial mass <u>detected on TTE</u>, we recommend **cardiac MRI** for further characterization.	↑↑
	↳ **2.1** If cardiac MRI is not tolerated, is unavailable, or is contraindicated, we recommend **cardiac CT** as the next imaging modality. *Cardiac PET may be helpful to guide management.*	↑↑
CV06. SUSPECTED VALVULAR DISEASE		
CV06A. Aortic valve	**Aortic stenosis**	
	1. In patients with suspected aortic valve stenosis, we recommend **TTE** as the initial imaging modality.	↑↑
	↳ **1.1** If the severity of the aortic valve stenosis is unclear (for example in suspected low flow low gradient severe aortic valve stenosis), we recommend **calcium score CT of the aortic valve** as the next imaging modality.	↑↑

Clinical/ Diagnostic Scenario	Recommendation	Strength of Rec.
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	↳ **1.2** In patients with suspected aortic valve stenosis where pulmonary edema is suspected, we recommend **chest XR** as the next imaging modality.	↑↑
	Aortic regurgitation	
	2. In patients with suspected aortic valve regurgitation, we recommend **TTE** as the initial imaging modality.	↑↑
	↳ **2.1** If further imaging is required due to poor acoustic windows or if information about ventricular size and function is required, we recommend **cardiac MRI** as the next imaging modality or **TEE** if the mechanism or severity of aortic valve regurgitation is unclear.	↑↑
	↳ **2.2** If MRI is not tolerated, is unavailable, or is contraindicated, we recommend **cardiac CT** as an alternative imaging modality for evaluation of ventricular size and function.	↑↑
	↳ **2.3** In patients with suspected aortic valve regurgitation where pulmonary edema is suspected, we recommend **chest XR** as the next imaging modality.	↑↑
	Infective endocarditis - native valve	
	3. After completing TTE for aortic valve disease, we recommend **TEE** for suspected infective endocarditis, to further characterize stenosis severity or mechanism of regurgitation, and for ruling out aortic root abscess.	↑↑
	↳ **3.1** If there is concern for aortic root abscess and TEE is contraindicated, we recommend **cardiac CT**.	↑↑
	Infective endocarditis - prosthetic valve	
	4. In patients with prosthetic valve, we recommend **TTE and TEE** for suspected infective endocarditis, to further characterize stenosis severity or mechanism of regurgitation, and for ruling out aortic root abscess.	↑↑
	↳ **4.1** If there is concern for aortic root abscess and TEE is contraindicated, we recommend **cardiac CT**.	↑↑
CV06B. Mitral valve	These recommendations are to guide diagnostic imaging of the mitral valve and does not include imaging to guide interventions.	
	Mitral stenosis	
	1. In patients with suspected mitral valve stenosis, we recommend **TTE** as the initial imaging modality.	↑↑
	↳ **1.1** If intervention is contemplated or required, we recommend **TEE** as the next imaging modality.	↑↑
	2. In patients with suspected mitral valve stenosis where pulmonary edema is suspected, we recommend **chest XR** as the next imaging modality.	↑↑
	Mitral regurgitation	
	3. In patients with suspected mitral valve regurgitation, we recommend **TTE** as the initial imaging modality.	↑↑
	↳ **3.1** If the mechanism or severity is unclear on TTE, we recommend **TEE** as the next imaging modality.	↑↑

Clinical/ Diagnostic Scenario	Recommendation	Strength of Rec.
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	↳ **3.2** If further imaging is required due to poor acoustic windows OR if information about ventricular size and function or confirmation of mitral regurgitation severity is required, we recommend **cardiac MRI** as the next imaging modality (↑↑).	↑↑
	4. In patients with suspected mitral valve regurgitation where pulmonary edema is suspected, we recommend **chest XR** as the next imaging modality.	↑↑
CV06C. Pulmonary valve	**1.** In patients with suspected pulmonary valve disease, we recommend **TTE** as the initial imaging modality.	↑↑
	↳ **1.1** If further imaging is required due to poor acoustic windows or if information about ventricular size and function is required (e.g., tetralogy of Fallot), we recommend **cardiac MRI** as the next imaging modality.	↑↑
	↳ **1.2** If cardiac MRI is not tolerated, is unavailable, or is contraindicated, we recommend **cardiac CT** as an alternative imaging modality.	↑↑
	2. After completing TTE for pulmonary valve disease, we suggest **TEE** for suspected infective endocarditis, to further characterize stenosis severity or mechanism of regurgitation, and for ruling out abscess.	↑
	3. In patients with suspected pulmonary valve disease where supra and sub-valvular pathologies are possible based on TTE findings, we recommend **cardiac MRI** as the next imaging modality.	↑↑
	↳ **3.1** If cardiac MRI is not tolerated, is unavailable, or is contraindicated, we recommend **cardiac CT** as an alternative imaging modality.	↑↑
CV06D. Tricuspid valve	**1.** In patients with suspected tricuspid valve disease, we recommend **TTE** as the initial imaging modality.	↑↑
	↳ **1.1** If further imaging is required due to poor acoustic windows or if information about ventricular size and function is required, we recommend **cardiac MRI** as the next imaging modality.	↑↑
	↳ **1.2** If cardiac MRI is not tolerated, is unavailable, or is contraindicated, we recommend **cardiac CT** as an alternative imaging modality.	↑↑
	2. After completing TTE for tricuspid valve disease, we suggest **TEE** for suspected infective endocarditis, to further characterize stenosis severity or mechanism of regurgitation, and for ruling out abscess.	↑
CV07. CARDIOMYOPATHY		
CV07A. Cardiomyopathy: dilated	**1.** In patients with suspected dilated cardiomyopathy, we recommend **TTE** as the initial imaging modality.	↑↑
	↳ **1.1** If ischemic dilated cardiomyopathy is a possibility, we recommend **invasive catheter angiography** for further evaluation.	↑↑
	↳ **1.2** If invasive catheter angiography is unavailable, we recommend **CCTA** as an alternative.	↑↑
	↳ **1.3** If there is no significant obstructive coronary artery disease based on invasive catheter angiography or CCTA results and further imaging is required, we recommend **cardiac MRI** as the next imaging modality.	↑↑

Clinical/ Diagnostic Scenario	Recommendation	Strength of Rec.
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	↳ **1.4** If information about ventricular size and function is required (and if ventricular size/function is unreliable by TTE) and cardiac MRI is not tolerated, is unavailable, or is contraindicated, we recommend **cardiac CT**.	↑↑
	↳ **1.5** If cardiac CT is not available, we suggest **NM (MUGA)**. *NM (myocardial perfusion scan) may also be helpful to exclude significant ischemia as a cause of dilated cardiomyopathy.*	↑
CV07B. Cardiomyopathy: hypertrophic	**1.** In patients with suspected hypertrophic cardiomyopathy, we recommend **TTE** as the initial imaging modality.	↑↑
	↳ **1.1** If further imaging is required✧, we recommend **cardiac MRI** as the next imaging modality. ✧ MRI can be helpful when echocardiography is inconclusive, when other diagnoses are possible (e.g., amyloidosis, athlete's heart, storage disease, etc.), or when information about maximum wall thickness, ejection fraction, presence of apical aneurysm or extent of late gadolinium enhancement will influence decision to insert an implantable cardioverter-defibrillator (ICD).	↑↑
	↳ **1.2** If information about ventricular size and function or maximum wall thickness is required AND cardiac MRI is not tolerated, is unavailable, or is contraindicated, we recommend **cardiac CT**.	↑↑
	↳ **1.3** To rule out obstructive coronary artery disease as a cause of patient symptoms, we recommend **invasive catheter angiography** in carefully selected patients.	↑↑
	↳ **1.4** If invasive catheter angiography is unavailable, we recommend **CCTA** as an alternative.	↑↑
CV07C. Cardiomyopathy: restrictive	**1.** In patients with suspected restrictive/infiltrative cardiomyopathy, we recommend **TTE** as the initial imaging modality.	↑↑
	↳ **1.1** If further imaging is required, we recommend **cardiac MRI** as the next imaging modality.	↑↑
	↳ **1.2** If information about ventricular size and function is required and cardiac MRI is not tolerated, is unavailable, or is contraindicated, we recommend **cardiac CT**.	↑↑
	↳ **1.3** In patients with suspected cardiac sarcoidosis, we recommend **FDG-PET-CT**.	↑↑
	↳ **1.4** In patients with suspected cardiac amyloidosis, if further imaging is required, we recommend **NM (pyrophosphate scan)** as the next imaging modality.	↑↑
CV07D. Cardiomyopathy: arrhythmogenic	**1.** In patients with suspected arrhythmogenic cardiomyopathy, we recommend **TTE** as the initial imaging modality.	↑↑
	↳ **1.1** If further imaging is required, we recommend **cardiac MRI** as the next imaging modality.	↑↑
	↳ **1.2** If information about ventricular size and function is required and cardiac MRI is not tolerated, is unavailable, or is contraindicated, we recommend **cardiac CT**.	↑↑
	↳ **1.3** If obstructive coronary artery disease needs to be ruled out as the cause for arrhythmia, we recommend **invasive catheter angiography**.	↑↑

Clinical/ Diagnostic Scenario	Recommendation	Strength of Rec.
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	↳ **1.4** If invasive catheter angiography is unavailable, we recommend **CCTA** as an alternative.	↑↑
CV08. AORTA		
CV08A. Thoraco-abdominal aneurysm	**1.** In patients with thoracic aortic aneurysm identified by TTE, we recommend **chest CTA** (preferably cardiac-gated) for baseline measurement and surveillance. *In younger patients with thoraco-abdominal aortic aneurysm identified by TTE, MRA may be performed for baseline measurement and surveillance. Surgical consultation could be considered for aortas >4.5 cm in size.*	↑↑
	2. In patients without underlying aortopathy with suspected abdominal aortic aneurysm (AAA) based on physical examination, we recommend **US** as the initial imaging modality.	↑↑
	↳ **2.1** If US demonstrates aortic diameter between 2.5 and 3.0 cm, we suggest re-evaluation with **US** after 10 years.	↑↑
	↳ **2.2** If US demonstrates aortic diameter between 3.0 and 3.9 cm, we recommend repeat **US** at 3-year intervals.	↑↑
	↳ **2.3** If US demonstrates aortic diameter between 4.0 and 4.9 cm, we recommend annual surveillance with **US or CT**. *Surgical consultation could be considered for aortas >4.5 cm in size.* For detailed recommendations for patients with underlying aortopathies and sex specific recommendations, see ACC/AHA guideline [30].	↑↑
	3. In patients with symptoms suspected to be related to thoraco-abdominal aneurysm, we recommend **CT with contrast**.	↑↑
CV08B. Vasculitis	**1.** In patients with suspected vasculitis involving the aorta (i.e., aortitis), we recommend **MRA** for baseline measurement and surveillance, especially in young patients.	↑↑
	↳ **1.1** If MRA is not tolerated, is unavailable, or is contraindicated, we recommend **CTA** for baseline measurement and surveillance.	↑↑
	↳ **1.2** If MRA or CTA results are inconclusive regarding disease activity, we suggest **FDG-PET-CT or MR-PET**.	↑
CV09. VENOUS THROMBOSIS		
	1. In patients with suspected deep vein thrombosis with <u>low</u> pre-test probability (as determined by a structured risk assessment tool) AND negative D-dimer, we recommend **no imaging**.	↓↓
	↳ **1.1** If D-dimer is unavailable, we recommend **interim therapeutic anticoagulation and Doppler US**.	↑↑
	↳ **1.2** If US is inconclusive or of poor quality and further imaging is required, we recommend **CTV or MRV** as the next imaging modality, with preference for MRV in younger patients.	↑↑
	2. In patients with suspected deep vein thrombosis based with intermediate/high pre-test probability (as determined by a structured risk assessment tool) and/or positive D-dimer, we recommend **Doppler US** as the initial imaging modality.	↑↑
	3. In patients with superficial venous thrombosis, we suggest **Doppler US** as the initial imaging modality.	↑

Clinical/ Diagnostic Scenario	Recommendation	Strength of Rec.
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CV10. PERIPHERAL VASCULAR DISEASE		
CV10A. Upper and lower extremities	**1.** In patients with suspected upper or lower extremity peripheral vascular (arterial) disease based on symptoms or other clinical features and an abnormal ankle-brachial index (ABI < 0.9), we recommend **Doppler US** for further evaluation.	↑↑
	↳ **1.1** If further imaging is required, we recommend **CTA or MRA** as the next imaging modality.	↑↑
	2. In patients with established upper or lower extremity peripheral vascular (arterial) disease with recurrent symptoms, we recommend **CTA or MRA** as the initial imaging modality.	↑↑
CV10B. Vascular malformation	**1.** In patients with suspected vascular malformation, to further characterize and guide further management, we recommend **time-resolved MRA** as the initial imaging modality. *In patients presenting with an extremity mass and suspected vascular malformation, **Doppler US** could be performed as the initial test.*	↑↑
	↳ **1.1** If MRA is not tolerated, is unavailable, or is contraindicated, we recommend **CTA** as an alternative.	↑↑
	↳ **1.2** To guide further management for high flow vascular malformations, we recommend **invasive catheter angiography**.	↑↑
CV10C. Entrapment and compression syndromes	**1.** In patients with entrapment and compression syndromes involving the extremities where venous thrombosis is also of concern, we recommend **Doppler US** as the initial imaging modality.	↑↑
	↳ **1.1** If Doppler US is negative or indeterminate and additional imaging is required, we recommend **MRA** as the next imaging modality.	↑↑
	↳ **1.2** If MRA is not tolerated, is unavailable, or is contraindicated, we recommend or **CTA** as an alternative.	↑↑

APPENDIX 3B. CARDIOVASCULAR SUMMARY OF RECOMMENDATIONS (FRENCH)

Scénario clinique/diagnostique	Recommandations	Force
AGTDM : angiographie par tomodensitométrie; **ARM** : angiographie par résonance magnétique; **CGTDM** : coronarographie par tomodensitométrie; **ÉCG** : électrocardiogramme; **ÉCHO** : échographie; **EGc** : échographie ciblée; **ETO** : échocardiographie transœsophagienne; **ETT** : échocardiographie transthoracique; **IRM** : imagerie par résonance magnétique; **IRMc** : IRM cardiaque; **MN** : médecine nucléaire; **MUGA** : ventriculographie isotopique; **PM** : perfusion myocardique; **RX** : radiographie; **SP** : scintigraphie pulmonaire; **TDM** : tomodensitométrie; **TEMP**: tomographie d'émission monophotonique; **TEP** : tomographie par émission de positons; **TEP-FDG** : tomographie par émission de positons au fluorodésoxyglucose; **VGTDM**: veinographie par tomodensitométrie; **VRM** : veinographie par résonance magnétique **Force de la recommandation :** ↑↑ : fortement recommandé; ↑ : recommandé dans certains cas; ↓↓ : fortement déconseillé; ↓ : déconseillé dans certains cas; **CE** : consensus d'un groupe d'experts		
CV01. SYNDROMES DE DOULEUR THORACIQUE AIGUË		
CV01A. Syndrome coronarien aigu : infarctus du myocarde avec élévation du segment ST (STEMI)	Pour les patients chez qui l'on soupçonne un syndrome coronarien aigu, la modalité d'imagerie doit être proposée en fonction des résultats de l'ÉCG et du niveau de troponine.	
	1. Chez les patients répondant aux critères de STEMI (selon l'ÉCG), nous recommandons la **coronarographie invasive** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** En cas d'incertitude diagnostique OU si une coronarographie invasive n'est pas possible dans l'immédiat, nous suggérons une **RX du thorax** et une **ETT/EGc au chevet du patient (si possible)** afin d'évaluer d'autres causes potentielles de la douleur thoracique du patient. Toutefois, ces procédures ne doivent pas retarder les soins.	↑
CV01B. Syndrome coronarien aigu : infarctus du myocarde sans élévation du segment ST (NSTEMI)	Pour les patients chez qui l'on soupçonne un syndrome coronarien aigu, la modalité d'imagerie doit être proposée en fonction des résultats de l'ÉCG et du niveau de troponine.	
	1. Pour les patients chez qui l'on soupçonne un NSTEMI, nous recommandons la **RX du thorax** (afin d'écarter d'autres causes de douleur thoracique) et l'**ETT/EGc au chevet du patient** (si possible, en vue d'évaluer la fonction ventriculaire et d'écarter la possibilité d'un épanchement péricardique) comme modalités d'imagerie initiales.	↑↑
	↳ **1.1** Chez les patients à très haut risque, nous recommandons la **coronarographie invasive** comme modalité d'imagerie suivante.	↑↑
	↳ **1.2** Chez les patients à moins haut risque, nous recommandons la **coronarographie invasive ou la CGTDM** comme modalité d'imagerie suivante, en fonction des paramètres cliniques.	↑↑
CV01C. Syndrome coronarien aigu : angine de poitrine instable	Pour les patients chez qui l'on soupçonne un syndrome coronarien aigu, la modalité d'imagerie doit être proposée en fonction des résultats de l'ÉCG et du niveau de troponine.	
	1. Pour les patients chez qui l'on soupçonne une angine de poitrine instable (pas d'élévation du niveau de troponine), nous recommandons la **RX du thorax** (afin d'écarter d'autres causes de douleur thoracique) **et l'ETT/EGc au chevet du patient** (si possible, afin d'évaluer la fonction ventriculaire et d'écarter la possibilité d'un épanchement péricardique) comme modalités d'imagerie initiales.	↑↑
	↳ **1.1** En vue d'évaluer la possibilité d'une maladie coronarienne et de déterminer la stratification du risque, nous recommandons une **CGTDM**. *En fonction des préférences particulières au sein du centre et de la disponibilité des modalités d'imagerie, l'échocardiographie d'effort et la MN (en l'occurrence, une perfusion myocardique à l'effort) peuvent être envisagées. Une consultation avec un interniste général ou un cardiologue peut également être envisagée.*	↑↑

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
AGTDM : angiographie par tomodensitométrie; **ARM** : angiographie par résonance magnétique; **CGTDM** : coronarographie par tomodensitométrie; **ÉCG** : électrocardiogramme; **ÉCHO** : échographie; **EGc** : échographie ciblée; **ETO** : échocardiographie transœsophagienne; **ETT** : échocardiographie transthoracique; **IRM** : imagerie par résonance magnétique; **IRMc** : IRM cardiaque; **MN** : médecine nucléaire; **MUGA** : ventriculographie isotopique; **PM** : perfusion myocardique; **RX** : radiographie; **SP** : scintigraphie pulmonaire; **TDM** : tomodensitométrie; **TEMP**: tomographie d'émission monophotonique; **TEP** : tomographie par émission de positons; **TEP-FDG** : tomographie par émission de positons au fluorodésoxyglucose; **VGTDM**: veinographie par tomodensitométrie; **VRM** : veinographie par résonance magnétique **Force de la recommandation :** ↑↑ : fortement recommandé; ↑ : recommandé dans certains cas; ↓↓ : fortement déconseillé; ↓ : déconseillé dans certains cas; **CE** : consensus d'un groupe d'experts		
	2. Pour les patients chez qui l'on soupçonne une angine de poitrine instable souffrant de douleurs thoraciques persistantes que la prise en charge en vigueur ne permet pas de soulager, nous recommandons une **coronarographie invasive.**	↑↑
CV01D. Syndrome aortique aigu	**1.** Pour les patients chez qui l'on soupçonne un syndrome aortique aigu, nous recommandons l'**AGTDM** (de préférence au moyen d'une synchronisation cardiaque) comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si une AGTDM est contre-indiquée, nous recommandons **l'ETO ou l'ARM** comme modalité d'imagerie subsidiaire.	↑↑
CV01E. Embolie pulmonaire	**Embolie pulmonaire aiguë**	
	1. Pour les patients chez qui l'on soupçonne une embolie pulmonaire de probabilité <u>faible ou intermédiaire</u> selon les résultats du prétest (un outil structuré d'évaluation du risque) et ayant obtenu un taux <u>normal</u> de D-dimères, nous **déconseillons le recours à l'AGTDM, l'ARM ou la SP**.	↓↓
	2. Pour les patients chez qui l'on soupçonne une embolie pulmonaire de probabilité <u>faible ou intermédiaire</u> selon les résultats du prétest (un outil structuré d'évaluation du risque) et ayant obtenu un taux <u>élevé</u> de D-dimères, nous recommandons l'**angiographie pulmonaire par tomodensitométrie (AGPTDM)** comme modalité d'imagerie initiale.	↑↑
	↳ **2.1** Si une AGPTDM n'est pas possible dans l'immédiat, nous recommandons la **RX du thorax** comme modalité d'imagerie suivante en vue d'écarter d'autres causes possibles des douleurs thoraciques.	↑↑
	↳ **2.2** Si une AGPTDM est contre-indiquée, nous recommandons **la SP ou l'angiographie pulmonaire par résonance magnétique** comme modalités d'imagerie subsidiaires. [*Dans le cas d'une patiente enceinte, se référer à la recommandation 4.*]	↑
	3. Pour les patients chez qui l'on soupçonne une embolie pulmonaire de probabilité <u>élevée</u> selon les résultats du prétest (un outil structuré d'évaluation du risque) ou en cas d'embolie pulmonaire récurrente, nous recommandons l'**AGPTDM** comme modalité d'imagerie initiale.	↑↑
	↳ **3.1** Si une AGPTDM n'est pas possible dans l'immédiat, nous recommandons la **radiographie du thorax** comme modalité d'imagerie suivante en vue d'écarter d'autres causes possibles des douleurs thoraciques.	↑↑
	↳ **3.2** Si une AGPTDM est contre-indiquée, nous recommandons **la SP ou l'angiographie pulmonaire par résonance magnétique** comme modalités d'imagerie subsidiaires. [*Dans le cas d'une patiente enceinte, se référer à la recommandation 4.*]	↑
	4. Pour les patientes enceintes chez qui l'on soupçonne une embolie pulmonaire de probabilité <u>élevée</u> selon les résultats du prétest (un outil structuré d'évaluation du risque), nous recommandons la **RX du thorax** comme modalité d'imagerie initiale.	↑↑
	↳ **4.1** Si les résultats de la RX du thorax ne permettent pas de tirer des conclusions et si un examen d'imagerie supplémentaire est nécessaire, nous recommandons l'**ÉCHO Doppler** comme modalité d'imagerie subséquente.	↑↑
	↳ **4.2** Si les résultats de l'ÉCHO Doppler sont négatifs, nous recommandons **l'AGPTDM ou la SP** comme modalité d'imagerie subséquente.	↑↑

Scénario clinique/diagnostique	Recommandations	Force
AGTDM : angiographie par tomodensitométrie; **ARM** : angiographie par résonance magnétique; **CGTDM** : coronarographie par tomodensitométrie; **ÉCG** : électrocardiogramme; **ÉCHO** : échographie; **EGc** : échographie ciblée; **ETO** : échocardiographie transœsophagienne; **ETT** : échocardiographie transthoracique; **IRM** : imagerie par résonance magnétique; **IRMc** : IRM cardiaque; **MN** : médecine nucléaire; **MUGA** : ventriculographie isotopique; **PM** : perfusion myocardique; **RX** : radiographie; **SP** : scintigraphie pulmonaire; **TDM** : tomodensitométrie; **TEMP**: tomographie d'émission monophotonique; **TEP** : tomographie par émission de positons; **TEP-FDG** : tomographie par émission de positons au fluorodésoxyglucose; **VGTDM**: veinographie par tomodensitométrie; **VRM** : veinographie par résonance magnétique **Force de la recommandation :** ↑↑ : fortement recommandé; ↑ : recommandé dans certains cas; ↓↓ : fortement déconseillé; ↓ : déconseillé dans certains cas; **CE** : consensus d'un groupe d'experts		
	Chez les patientes enceintes présentant une forte probabilité d'embolie pulmonaire selon les résultats du prétest et des résultats normaux lors d'une ÉCHO Doppler des jambes, certaines lignes directrices suggèrent de réaliser une SP. En pratique, cependant, la possibilité de réaliser un examen de SP est souvent limitée. L'AGPTDM est largement accessible, présente une plus forte concordance entre observateurs et permet de fournir des diagnostics alternatifs expliquant les douleurs thoraciques aiguës des patients. Pour ces raisons, son utilisation lors de l'évaluation de la possibilité d'une embolie pulmonaire aiguë chez les patientes enceintes est préconisée. La dose moyenne de rayonnement chez la patiente et le fœtus est généralement plus faible lors d'une SP de perfusion à dose réduite (c'est-à-dire sans scintigraphie de ventilation); la dose de rayonnement mammaire est généralement plus élevée lors d'une AGPTDM. **Remarque :** Le recours à l'IRM n'est pas recommandé en vue de l'évaluation de la possibilité d'une embolie pulmonaire chez les patientes enceintes, car le gadolinium doit être évité chez ces dernières [32].	
	Embolie pulmonaire chronique	
	5. Pour les patients souffrant d'une hypertension pulmonaire présumée liée à une maladie thrombo-embolique chronique, nous recommandons la **SP** comme modalité d'imagerie initiale.	CE
	↳ **5.1** Si la technique de SP accessible ne permet pas de poser de diagnostic d'embolie pulmonaire chronique ou si la réalisation de cet examen n'est pas possible, nous recommandons l'**AGPTDM** comme modalité d'imagerie subsidiaire. *La technologie de TDM à double énergie ou le recours à la soustraction pour obtenir une cartographie iodée peuvent augmenter la sensibilité de l'AGPTDM en vue de détecter une embolie pulmonaire chronique.*	CE
CV01F. Myocardite aiguë	**1.** Pour les patients chez qui l'on soupçonne une myocardite aiguë, nous recommandons **l'ETT suivie de l'IRMc** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si l'IRM cardiaque ne met pas en évidence une myocardite aiguë et si une coronarographie invasive n'a pas été réalisée, nous suggérons la **CGTDM** comme modalité d'imagerie suivante en vue d'écarter la possibilité d'une maladie coronarienne obstructive chez certains patients, selon leur situation.	↑
CV01G. Péricardite aiguë	**1.** Pour les patients chez qui l'on soupçonne une péricardite aiguë, nous recommandons **l'ETT/EGc au chevet du patient ou l'ETO** comme modalité d'imagerie initiale en vue d'évaluer la présence d'un épaississement ou d'un épanchement du péricarde ainsi qu'évaluer la fonction ventriculaire et l'état de constriction.	↑↑
	↳ **1.1** Si un examen d'imagerie supplémentaire est nécessaire en vue de guider la prise en charge (p. ex. une péricardiocentèse), nous suggérons la **TDM** (de préférence au moyen d'une synchronisation cardiaque) comme modalité d'imagerie subséquente.	↑
	↳ **1.2** Si l'ETT ne permet pas de poser un diagnostic de péricardite aiguë ou de problème lié à la constriction, nous suggérons l'**IRMc** comme modalité d'imagerie subsidiaire.	↑

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
AGTDM : angiographie par tomodensitométrie; **ARM** : angiographie par résonance magnétique; **CGTDM** : coronarographie par tomodensitométrie; **ÉCG** : électrocardiogramme; **ÉCHO** : échographie; **EGc** : échographie ciblée; **ETO** : échocardiographie transœsophagienne; **ETT** : échocardiographie transthoracique; **IRM** : imagerie par résonance magnétique; **IRMc** : IRM cardiaque; **MN** : médecine nucléaire; **MUGA** : ventriculographie isotopique; **PM** : perfusion myocardique; **RX** : radiographie; **SP** : scintigraphie pulmonaire; **TDM** : tomodensitométrie; **TEMP**: tomographie d'émission monophotonique; **TEP** : tomographie par émission de positons; **TEP-FDG** : tomographie par émission de positons au fluorodésoxyglucose; **VGTDM**: veinographie par tomodensitométrie; **VRM** : veinographie par résonance magnétique **Force de la recommandation :** ↑↑ : fortement recommandé; ↑ : recommandé dans certains cas; ↓↓ : fortement déconseillé; ↓ : déconseillé dans certains cas; **CE** : consensus d'un groupe d'experts		
CV01H. Douleur thoracique non cardiaque	Se référer aux lignes directrices de la CAR relatives aux demandes d'examen en imagerie diagnostique du thorax[39], en particulier les scénarios suivants : - TH02. Douleur thoracique non spécifique - TH14. Soupçon de pneumothorax (non traumatique) - TH15. Soupçon clinique d'épanchement pleural	
CV02. DOULEUR THORACIQUE CHRONIQUE		
CV02A. Cardiopathie ischémique chronique présumée	**1.** Chez les patients *ayant reçu un diagnostic de cardiopathie ischémique chronique*, présentant des symptômes récurrents de douleur thoracique malgré un traitement médical conforme aux recommandations et présentant un <u>risque intermédiaire</u> (selon les résultats de prétest) ou un diagnostic de coronaropathie non obstructive, nous suggérons **l'examen d'imagerie anatomique (CGTDM), l'examen d'imagerie fonctionnelle (perfusion myocardique à l'effort, échocardiographie à l'effort) ou l'IRM cardiaque de stress** comme modalités d'imagerie initiales.	↑
	↳ **1.1** Afin de cerner les patients chez qui un examen plus approfondi par coronarographie invasive serait nécessaire, nous suggérons de recourir à la **mesure non invasive de la chute de pression post-sténose coronaire (ou FFR-CT, *fractionnal flow reserve – computed tomography*)**.	↑
	2. Chez les patients *ayant reçu un diagnostic de cardiopathie ischémique chronique*, présentant des symptômes récurrents de douleur thoracique malgré un traitement médical conforme aux recommandations et présentant un <u>risque élevé</u> (selon les résultats de prétest), nous recommandons la **coronarographie invasive** comme modalité d'imagerie initiale.	↑↑
	3. Chez les patients *ayant reçu un diagnostic de cardiopathie ischémique chronique*, ayant déjà subi une revascularisation coronarienne par intervention coronarienne percutanée (ICP) ou par chirurgie de pontage coronaire et présentant des symptômes de douleurs thoraciques récurrentes, nous suggérons la **CGTDM** afin d'évaluer la perméabilité de l'endoprothèse coronaire (en particulier si son diamètre est plus grand que 3 mm) ou du greffon.	↑
	↳ **3.1** Dans le cas où une évaluation de la possibilité d'une ischémie serait de mise en vue d'expliquer les symptômes, nous recommandons la **MN (scintigraphie de perfusion myocardique)**.	↑↑
	4. Chez les patients souffrant de douleurs thoraciques stables *n'ayant pas reçu de diagnostic de cardiopathie ischémique*, qui se présentent en consultation externe et qui ont un <u>faible risque</u> (selon les résultats du prétest) d'avoir une maladie coronarienne obstructive (tel que déterminé par un outil d'évaluation structuré), les **examens d'imagerie usuels** ne sont pas recommandés.	↓↓
	↳ **4.1** Dans certaines populations de patients, nous suggérons un **score calcique** (en vue d'écarter la possibilité de plaques de calcium et de définir les patients présentant une faible probabilité de maladie coronarienne obstructive) ou un **ÉCG à l'effort**.	↑

Scénario clinique/diagnostique	Recommandations	Force
AGTDM : angiographie par tomodensitométrie; **ARM** : angiographie par résonance magnétique; **CGTDM** : coronarographie par tomodensitométrie; **ÉCG** : électrocardiogramme; **ÉCHO** : échographie; **EGc** : échographie ciblée; **ETO** : échocardiographie transœsophagienne; **ETT** : échocardiographie transthoracique; **IRM** : imagerie par résonance magnétique; **IRMc** : IRM cardiaque; **MN** : médecine nucléaire; **MUGA** : ventriculographie isotopique; **PM** : perfusion myocardique; **RX** : radiographie; **SP** : scintigraphie pulmonaire; **TDM** : tomodensitométrie; **TEMP**: tomographie d'émission monophotonique; **TEP** : tomographie par émission de positons; **TEP-FDG** : tomographie par émission de positons au fluorodésoxyglucose; **VGTDM**: veinographie par tomodensitométrie; **VRM** : veinographie par résonance magnétique **Force de la recommandation :** ↑↑ : fortement recommandé; ↑ : recommandé dans certains cas; ↓↓ : fortement déconseillé; ↓ : déconseillé dans certains cas; **CE** : consensus d'un groupe d'experts		
	5. Chez les patients souffrant de douleurs thoraciques stables et récurrentes, *n'ayant pas reçu de diagnostic de cardiopathie ischémique* et présentant un risque intermédiaire ou élevé (selon les résultats du prétest) d'infarctus du myocarde, nous recommandons une **CGTDM** en vue de poser un diagnostic de la maladie coronarienne, d'établir le pronostic du risque et d'orienter les décisions thérapeutiques.	↑↑
	↳ **5.1** En vue de poser un diagnostic d'ischémie myocardique et d'estimer le risque d'événements cardiovasculaires indésirables majeurs, nous recommandons **un examen d'imagerie fonctionnelle (échocardiographie d'effort, TEP/TEMP de perfusion myocardique ou IRMc)**.	↑↑
CV02B. Douleur thoracique non cardiaque	Se référer aux lignes directrices de la CAR relatives aux demandes d'examen en imagerie diagnostique du thorax[39], en particulier les scénarios suivants : - TH02. Douleur thoracique non spécifique - TH15. Soupçon clinique d'épanchement pleural	
CV03. DÉPISTAGE CARDIOVASCULAIRE ET STRATIFICATION DU RISQUE (SCORE CALCIQUE)		
	1. Chez les adultes asymptomatiques à faible risque, nous suggérons **de ne pas procéder à un dépistage systématique par imagerie cardiovasculaire ni à une stratification du risque**.	↓
	2. Chez les adultes asymptomatiques à risque modéré, nous recommandons un examen de **score calcique** en vue d'une stratification optimale du risque afin de guider la prise en charge médicale. *Dans le cas d'un patient à haut risque qui hésite à entreprendre une prise en charge médicale, l'examen de score calcique peut fournir des informations utiles en vue de lui offrir des conseils.*	↑↑
CV04. TROUBLES DU PÉRICARDE		
CV04A. Péricardite aiguë	Voir CV01G. Syndromes de douleur thoracique aiguë : péricardite aiguë	
CV04B. Épanchement péricardique	**1.** Pour les patients chez qui l'on soupçonne un épanchement péricardique, nous recommandons l'**ETT** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** En cas de physiologie constrictive ou effusive présumée, nous suggérons la **TDM** (de préférence au moyen d'une synchronisation cardiaque) comme modalité d'imagerie subséquente en vue d'évaluer l'épaisseur du péricarde, l'épanchement péricardique et la calcification.	↑
	↳ **1.2** Si les résultats de l'ETT ne permettent pas de confirmer une physiologie constrictive ou effusive, nous recommandons l'**IRMc** comme modalité d'imagerie subséquente.	↑↑

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
AGTDM : angiographie par tomodensitométrie; **ARM** : angiographie par résonance magnétique; **CGTDM** : coronarographie par tomodensitométrie; **ÉCG** : électrocardiogramme; **ÉCHO** : échographie; **EGc** : échographie ciblée; **ETO** : échocardiographie transœsophagienne; **ETT** : échocardiographie transthoracique; **IRM** : imagerie par résonance magnétique; **IRMc** : IRM cardiaque; **MN** : médecine nucléaire; **MUGA** : ventriculographie isotopique; **PM** : perfusion myocardique; **RX** : radiographie; **SP** : scintigraphie pulmonaire; **TDM** : tomodensitométrie; **TEMP**: tomographie d'émission monophotonique; **TEP** : tomographie par émission de positons; **TEP-FDG** : tomographie par émission de positons au fluorodésoxyglucose; **VGTDM**: veinographie par tomodensitométrie; **VRM** : veinographie par résonance magnétique. **Force de la recommandation :** ↑↑ : fortement recommandé; ↑ : recommandé dans certains cas; ↓↓ : fortement déconseillé; ↓ : déconseillé dans certains cas; **CE** : consensus d'un groupe d'experts		
	↳ **1.3** Si les résultats de l'IRMc ne permettent pas de confirmer une physiologie constrictive ou effusive, nous recommandons un **cathétérisme cardiaque**.	↑↑
CV04C. Péricardite constrictive	**1.** Pour les patients chez qui l'on soupçonne une péricardite constrictive, nous recommandons l'**ETT** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** En cas de physiologie constrictive présumée, nous suggérons la **TDM** (de préférence au moyen d'une synchronisation cardiaque) comme modalité d'imagerie subséquente en vue d'évaluer l'épaisseur et la calcification du péricarde.	↑
	↳ **1.2** Si les résultats de l'ETT ne permettent pas de confirmer une physiologie constrictive, nous recommandons l'**IRMc** comme modalité d'imagerie subséquente.	↑↑
	↳ **1.3** Si les résultats de l'IRMc ne permettent pas de confirmer une physiologie constrictive, nous recommandons un **cathétérisme cardiaque**.	↑↑
CV05. MASSES DU CŒUR OU DU PÉRICARDE		
CV05A. Variante anatomique normale	**1.** En cas de masse intracardiaque ou péricardique présumée (qui pourrait aussi correspondre à une variante anatomique normale) détectée sur TDM du thorax, nous recommandons l'**ETT** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si des examens supplémentaires sont nécessaires, nous recommandons l'**IRMc** comme modalité d'imagerie subséquente.	↑↑
	↳ **1.2** Si une IRMc n'est pas tolérée par le patient, n'est pas accessible ou est contre-indiquée, nous suggérons la **TDM cardiaque** comme modalité d'imagerie subsidiaire.	↑↑
	2. En cas de masse intracardiaque ou péricardique présumée (qui pourrait aussi correspondre à une variante anatomique normale) détectée de manière fortuite sur l'ETT, nous recommandons une **IRMc** en vue d'une caractérisation plus poussée.	↑↑
	↳ **2.1** Si une IRMc n'est pas tolérée par le patient, n'est pas accessible ou est contre-indiquée, nous suggérons la **TDM cardiaque** comme modalité d'imagerie suivante.	↑↑
CV05B. Masses	**1.** En cas de masse intracardiaque ou péricardique détectée sur TDM du thorax, nous recommandons l'**ETT** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si des examens supplémentaires sont nécessaires, nous recommandons l'**IRMc** comme modalité d'imagerie subséquente.	↑↑
	↳ **1.2** Si une IRMc n'est pas tolérée par le patient, n'est pas accessible ou est contre-indiquée, nous suggérons la **TDM cardiaque** comme modalité d'imagerie subsidiaire.	↑↑
	2. En cas de masse intracardiaque ou péricardique détectée sur l'ETT, nous recommandons l'**IRMc** en vue d'une caractérisation plus poussée.	↑↑
	↳ **2.1** Si une IRMc n'est pas tolérée par le patient, n'est pas accessible ou est contre-indiquée, nous suggérons la TDM cardiaque comme modalité d'imagerie suivante.	↑↑

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
AGTDM : angiographie par tomodensitométrie; **ARM** : angiographie par résonance magnétique; **CGTDM** : coronarographie par tomodensitométrie; **ÉCG** : électrocardiogramme; **ÉCHO** : échographie; **EGc** : échographie ciblée; **ETO** : échocardiographie transœsophagienne; **ETT** : échocardiographie transthoracique; **IRM** : imagerie par résonance magnétique; **IRMc** : IRM cardiaque; **MN** : médecine nucléaire; **MUGA** : ventriculographie isotopique; **PM** : perfusion myocardique; **RX** : radiographie; **SP** : scintigraphie pulmonaire; **TDM** : tomodensitométrie; **TEMP**: tomographie d'émission monophotonique; **TEP** : tomographie par émission de positons; **TEP-FDG** : tomographie par émission de positons au fluorodésoxyglucose; **VGTDM**: veinographie par tomodensitométrie; **VRM** : veinographie par résonance magnétique. **Force de la recommandation :** ↑↑ : fortement recommandé; ↑ : recommandé dans certains cas; ↓↓ : fortement déconseillé; ↓ : déconseillé dans certains cas; **CE** : consensus d'un groupe d'experts		
	Une TEP cardiaque peut être utile en vue d'orienter la prise en charge.	
CV06. VALVULOPATHIE PRÉSUMÉE		
CV06A. Valve aortique	**Sténose aortique**	
	1. Pour les patients chez qui l'on soupçonne une sténose de la valve aortique, nous recommandons l'**ETT** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si la sévérité de la sténose de la valve aortique n'est pas définie (par exemple en cas de sténose sévère de la valve aortique à faible débit et faible gradient présumée), nous recommandons le **score calcique de la valve aortique** comme modalité d'imagerie suivante.	↑↑
	↳ **1.2** Pour les patients chez qui l'on soupçonne une sténose de la valve aortique et un œdème pulmonaire, nous recommandons la **RX du thorax** comme modalité d'imagerie subséquente.	↑↑
	Régurgitation aortique	
	2. Pour les patients chez qui l'on soupçonne une valve aortique régurgitante, nous recommandons l'**ETT** comme modalité d'imagerie initiale.	↑↑
	↳ **2.1** Si un examen d'imagerie supplémentaire est nécessaire en raison de fenêtres acoustiques de faible qualité ou si des informations sur la taille et la fonction ventriculaires sont requises, nous recommandons l'**IRMc** comme modalité d'imagerie suivante, ou l'**ETO** si le mécanisme ou la sévérité de la régurgitation de la valve aortique ne sont pas définis.	↑↑
	↳ **2.2** Si une IRM n'est pas tolérée par le patient, n'est pas accessible ou est contre-indiquée, nous recommandons la **TDM cardiaque** comme modalité d'imagerie subsidiaire en vue d'évaluer la taille et la fonction ventriculaires.	↑↑
	↳ **2.3** Pour les patients chez qui l'on soupçonne une valve aortique régurgitante et un œdème pulmonaire, nous recommandons la **RX du thorax** comme modalité d'imagerie subséquente.	↑↑
	Endocardite infectieuse - valve native	
	3. Après la réalisation d'une ETT en vue d'évaluer la possibilité d'un trouble de la valve aortique, nous recommandons l'**ETO** si une endocardite infectieuse est présumée, afin de caractériser davantage la sévérité de la sténose ou le mécanisme de la régurgitation, et pour écarter la possibilité d'un abcès de la racine aortique.	↑↑
	↳ **3.1** Si l'on craint un abcès de la racine aortique et qu'une ETO est contre-indiquée, nous recommandons la **TDM cardiaque**.	↑↑
	Endocardite infectieuse - prothèse valvulaire	
	4. Pour les patients porteurs d'une prothèse valvulaire chez qui l'on soupçonne une endocardite infectieuse, nous recommandons **l'ETT et l'ETO** afin de caractériser davantage la sévérité de la sténose ou le mécanisme de la régurgitation, et pour écarter la possibilité d'un abcès de la racine aortique.	↑↑

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
AGTDM : angiographie par tomodensitométrie; **ARM** : angiographie par résonance magnétique; **CGTDM** : coronarographie par tomodensitométrie; **ÉCG** : électrocardiogramme; **ÉCHO** : échographie; **EGc** : échographie ciblée; **ETO** : échocardiographie transœsophagienne; **ETT** : échocardiographie transthoracique; **IRM** : imagerie par résonance magnétique; **IRMc** : IRM cardiaque; **MN** : médecine nucléaire; **MUGA** : ventriculographie isotopique; **PM** : perfusion myocardique; **RX** : radiographie; **SP** : scintigraphie pulmonaire; **TDM** : tomodensitométrie; **TEMP**: tomographie d'émission monophotonique; **TEP** : tomographie par émission de positons; **TEP-FDG** : tomographie par émission de positons au fluorodésoxyglucose; **VGTDM**: veinographie par tomodensitométrie; **VRM** : veinographie par résonance magnétique **Force de la recommandation :** ↑↑ : fortement recommandé; ↑ : recommandé dans certains cas; ↓↓ : fortement déconseillé; ↓ : déconseillé dans certains cas; **CE** : consensus d'un groupe d'experts		
	↳ **4.1** Si l'on craint un abcès de la racine aortique et qu'une ETO est contre-indiquée, nous recommandons la **TDM cardiaque**.	↑↑
CV06B. Valve mitrale	Ces recommandations visent à orienter l'imagerie diagnostique de la valve mitrale et n'incluent pas l'imagerie d'intervention.	
	Rétrécissement mitral	
	1. Pour les patients chez qui l'on soupçonne une sténose de la valve mitrale, nous recommandons l'**ETT** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si une intervention est envisagée ou nécessaire, nous recommandons l'**ETO** comme modalité d'imagerie subséquente.	↑↑
	2. Pour les patients chez qui l'on soupçonne une sténose de la valve mitrale et un œdème pulmonaire, nous recommandons la **RX du thorax** comme modalité d'imagerie subséquente.	↑↑
	Régurgitation mitrale	
	3. Pour les patients chez qui l'on soupçonne une valve mitrale régurgitante, nous recommandons l'**ETT** comme modalité d'imagerie initiale.	↑↑
	↳ **3.1** Si les résultats de l'ETT ne permettent pas de déterminer le mécanisme ou la sévérité de la régurgitation, nous recommandons l'**ETO** comme modalité d'imagerie suivante.	↑↑
	↳ **3.2** Si un examen d'imagerie supplémentaire est nécessaire en raison de fenêtres acoustiques de faible qualité ou si des informations sur la taille et la fonction ventriculaires ou sur la régurgitation mitrale sont requises, nous recommandons l'**IRMc** comme modalité d'imagerie subséquente (↑↑).	↑↑
	4. Pour les patients chez qui l'on soupçonne une valve mitrale régurgitante et un œdème pulmonaire, nous recommandons la **RX du thorax** comme modalité d'imagerie subséquente.	↑↑
CV06C. Valve pulmonaire	**1.** Pour les patients chez qui l'on soupçonne une affection de la valve pulmonaire, nous recommandons l'**ETT** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si un examen d'imagerie supplémentaire est nécessaire en raison de fenêtres acoustiques de faible qualité ou si des informations sur la taille et la fonction ventriculaires sont requises (par exemple, une tétralogie de Fallot), nous recommandons l'**IRMc** comme modalité d'imagerie suivante.	↑↑
	↳ **1.2** Si une IRMc n'est pas tolérée par le patient, n'est pas accessible ou est contre-indiquée, nous suggérons la **TDM cardiaque** comme modalité d'imagerie subsidiaire.	↑↑
	2. Après la réalisation d'une ETT en vue d'évaluer la possibilité d'un trouble de la valve pulmonaire, nous suggérons l'**ETO** si une endocardite infectieuse est présumée, afin de caractériser davantage la sévérité de la sténose ou le mécanisme de la régurgitation, et pour écarter la possibilité d'un abcès.	↑

Scénario clinique/diagnostique	Recommandations	Force
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	3. Pour les patients chez qui l'on soupçonne un trouble de la valve pulmonaire et pour lesquels les résultats de l'ETT révèlent la possibilité d'affections supra-valvulaires et sous-valvulaires, nous recommandons l'**IRMc** comme modalité d'imagerie subséquente.	↑↑
	↳ **3.1** Si une IRMc n'est pas tolérée par le patient, n'est pas accessible ou est contre-indiquée, nous suggérons la **TDM cardiaque** comme modalité d'imagerie subsidiaire.	↑↑
CV06D. Valve tricuspide	**1.** Pour les patients chez qui l'on soupçonne une affection de la valve tricuspide, nous recommandons l'**ETT** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si un examen d'imagerie supplémentaire est nécessaire en raison de fenêtres acoustiques de faible qualité ou si des informations sur la taille et la fonction ventriculaires sont requises, nous recommandons l'**IRMc** comme modalité d'imagerie suivante.	↑↑
	↳ **1.2** Si une IRMc n'est pas tolérée par le patient, n'est pas accessible ou est contre-indiquée, nous suggérons la **TDM cardiaque** comme modalité d'imagerie subsidiaire.	↑↑
	2. Après la réalisation d'une ETT en vue d'évaluer la possibilité d'un trouble de la valve tricuspide, nous suggérons l'**ETO** si une endocardite infectieuse est présumée, afin de caractériser davantage la sévérité de la sténose ou le mécanisme de la régurgitation, et pour écarter la possibilité d'un abcès.	↑
CV07. CARDIOMYOPATHIE		
CV07A. Cardiomyopathie dilatée	**1.** Pour les patients chez qui l'on soupçonne une cardiomyopathie dilatée, nous recommandons l'**ETT** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si une cardiomyopathie dilatée ischémique est possible, nous recommandons un **cathétérisme cardiaque** en vue d'une évaluation plus approfondie.	↑↑
	↳ **1.2** Si un cathétérisme cardiaque ne peut pas être réalisé, nous recommandons la **CGTDM** comme solution subsidiaire.	↑↑
	↳ **1.3** Si les résultats du cathétérisme cardiaque ou de la CGTDM ne révèlent pas de signes significatifs de maladie coronarienne obstructive et qu'un examen d'imagerie supplémentaire est nécessaire, nous recommandons l'**IRMc** comme modalité d'imagerie subséquente.	↑↑
	↳ **1.4** Si des informations sur la taille et la fonction ventriculaires sont nécessaires (et si celles obtenues au moyen de l'ETT ne sont pas fiables) et si l'IRMc n'est pas tolérée par le patient, n'est pas accessible ou est contre-indiquée, nous recommandons la **TDM cardiaque**.	↑↑
	↳ **1.5** Si une TDM cardiaque ne peut pas être réalisée, nous recommandons la **MN (une MUGA)**. *La MN (scintigraphie de perfusion myocardique) peut également être utile en vue d'écarter la possibilité*	↑

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	d'une ischémie importante comme cause de la cardiomyopathie dilatée.	
CV07B. Cardiomyopathie hypertrophique	**1.** Pour les patients chez qui l'on soupçonne une cardiomyopathie hypertrophique, nous recommandons l'**ETT** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si des examens supplémentaires sont nécessaires✧, nous recommandons l'**IRMc** comme modalité d'imagerie subséquente. ✧ L'IRM peut être utile lorsque l'échocardiographie ne permet pas de tirer de conclusions, lorsque d'autres diagnostics sont possibles (par exemple, une amylose, un cœur d'athlète, une maladie liée au stockage de certaines molécules, etc.), ou lorsque des informations sur l'épaisseur maximale de la paroi, la fraction d'éjection, la présence d'un anévrisme apical ou l'étendue du rehaussement tardif après injection de gadolinium influenceront la décision de poser un défibrillateur implantable.	↑↑
	↳ **1.2** Si des informations sur la taille et la fonction ventriculaires ou l'épaisseur de paroi maximale sont nécessaires et que l'IRMc n'est pas tolérée par le patient, n'est pas accessible ou est contre-indiquée, nous recommandons la **TDM cardiaque**.	↑↑
	↳ **1.3** En vue d'écarter une maladie coronarienne obstructive comme cause possible des symptômes du patient, nous recommandons un **cathétérisme cardiaque** chez des patients soigneusement sélectionnés.	↑↑
	↳ **1.4** Si un cathétérisme cardiaque ne peut pas être réalisé, nous recommandons la **CGTDM** comme solution subsidiaire.	↑↑
CV07C. Cardiomyopathie restrictive	**1.** Pour les patients chez qui l'on soupçonne une cardiomyopathie restrictive (infiltrative ou non), nous recommandons l'**ETT** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si des examens supplémentaires sont nécessaires, nous recommandons l'**IRMc** comme modalité d'imagerie subséquente.	↑↑
	↳ **1.2** Si des informations sur la taille et la fonction ventriculaires sont nécessaires et que l'IRMc n'est pas tolérée par le patient, n'est pas accessible ou est contre-indiquée, nous recommandons la **TDM cardiaque**.	↑↑
	↳ **1.3** En cas de sarcoïdose cardiaque présumée, nous recommandons la **TEP-FGD**.	↑↑
	↳ **1.4** Pour les patients chez qui l'on soupçonne une amylose cardiaque, si un examen d'imagerie complémentaire est nécessaire, nous recommandons la **MN (scintigraphie au pyrophosphate)** comme modalité d'imagerie subséquente.	↑↑
CV07D. Cardiomyopathie arythmogène	**1.** Pour les patients chez qui l'on soupçonne une cardiomyopathie arythmogène, nous recommandons l'**ETT** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si des examens supplémentaires sont nécessaires, nous recommandons l'**IRMc** comme modalité d'imagerie subséquente.	↑↑
	↳ **1.2** Si des informations sur la taille et la fonction ventriculaires sont nécessaires et que l'IRMc n'est pas tolérée par le patient, n'est pas accessible ou est contre-indiquée, nous recommandons la **TDM cardiaque**.	↑↑

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	↳ **1.3** Si une maladie coronarienne obstructive doit être exclue des causes possibles de l'arythmie, nous recommandons un **cathétérisme cardiaque**.	↑↑
	↳ **1.4** Si un cathétérisme cardiaque ne peut pas être réalisé, nous recommandons la **CGTDM** comme solution subsidiaire.	↑↑
CV08. AORTE		
CV08A. Anévrisme de l'aorte thoraco-abdominale	**1.** Pour les patients chez qui l'on observe un anévrisme de l'aorte thoracique sur les résultats d'examen d'ETT, nous recommandons l'**AGTDM du thorax** (de préférence au moyen d'une synchronisation cardiaque) afin de recueillir les données de référence et d'assurer une surveillance. *Chez les patients plus jeunes présentant un anévrisme de l'aorte thoraco-abdominale confirmé par ETT, l'ARM peut être réalisée à des fins de surveillance et de recueil de données de référence. Une consultation en chirurgie peut être envisagée dans le cas de patients dont l'aorte a un diamètre supérieur à 4,5 cm.*	↑↑
	2. Pour les patients ne présentant pas d'aortopathie sous-jacente et chez qui l'on soupçonne un anévrisme de l'aorte abdominale sur la base de l'examen clinique, nous recommandons **l'échographie abdominale** comme modalité d'imagerie initiale.	↑↑
	↳ **2.1** Si l'échographie abdominale montre un diamètre aortique compris entre 2,5 cm et 3,0 cm, nous suggérons une réévaluation par **échographie abdominale** après 10 ans.	↑↑
	↳ **2.2** Si l'échographie abdominale montre un diamètre aortique compris entre 3,0 cm et 3,9 cm, nous recommandons de répéter **l'échographie abdominale** à des intervalles de 3 ans.	↑↑
	↳ **2.3** Si l'échographie abdominale montre un diamètre aortique compris entre 4,0 cm et 4,9 cm, nous recommandons une surveillance annuelle par **échographie abdominale ou TDM**. *Une consultation en chirurgie peut être envisagée dans le cas de patients dont l'aorte a un diamètre supérieur à 4,5 cm.* Se référer aux lignes directrices de l'American College of Cardiology et de l'American Heart Association pour obtenir des recommandations détaillées concernant les patients atteints d'aortopathies sous-jacentes et des recommandations particulières selon le sexe du patient[30].	↑↑
	3. Pour les patients dont les symptômes sont présumés être liés à un anévrisme de l'aorte thoraco-abdominale, nous recommandons la **TDM avec agent de contraste**.	↑↑
CV08B. Vascularite	**1.** Pour les patients chez qui l'on soupçonne une vascularite touchant l'aorte (c'est-à-dire une aortite), nous recommandons l'**ARM** en vue d'obtenir des données de référence et d'assurer une surveillance, en particulier chez les jeunes patients.	↑↑
	↳ **1.1** Si l'ARM n'est pas tolérée par le patient, n'est pas accessible ou est contre-indiquée, nous recommandons l'**AGTDM** en vue d'obtenir des données de référence et d'assurer une surveillance.	↑↑

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	↳ **1.2** Si les résultats de l'ARM ou de l'AGTDM ne permettent pas de tirer de conclusions en ce qui concerne l'activité de la maladie, nous suggérons la **TEP-FGD ou la TEP-IRM**.	↑
CV09. THROMBOSE VEINEUSE		
	1. Pour les patients chez qui l'on soupçonne une thrombose d'une veine profonde et qui présentent une <u>faible</u> probabilité (selon les résultats de prétest, déterminé par un outil structuré d'évaluation du risque) ET un taux normal de D-dimères, nous recommandons de **ne pas recourir à l'imagerie**.	↓↓
	↳ **1.1** Si le niveau de D-dimères ne peut pas être réalisé, nous recommandons **la prise provisoire d'anticoagulants** et l'**ÉCHO Doppler**.	↑↑
	↳ **1.2** Si l'ÉCHO Doppler ne permet pas de tirer de conclusions ou est de mauvaise qualité et qu'un examen d'imagerie supplémentaire est nécessaire, nous recommandons **la VGTDM ou la VRM** comme modalités d'imagerie suivantes; chez les patients plus jeunes, procéder de préférence à une VRM.	↑↑
	2. Pour les patients chez qui l'on soupçonne une thrombose d'une veine profonde et qui présentent une probabilité modérée ou élevée (selon les résultats de prétest, déterminé par un outil structuré d'évaluation du risque) et/ou un élévation du niveau de D-dimères, nous recommandons l'**ÉCHO Doppler** comme modalité d'imagerie initiale.	↑↑
	3. Chez les patients présentant une thrombose d'une veine superficielle, nous recommandons l'**ÉCHO Doppler** comme modalité d'imagerie initiale.	↑
CV10. MALADIE VASCULAIRE PÉRIPHÉRIQUE		
CV10A. Membres supérieurs et inférieurs	**1.** Pour les patients chez qui l'on soupçonne une maladie vasculaire périphérique des membres supérieurs ou inférieurs sur la base de symptômes ou d'autres caractéristiques cliniques et d'un indice tibio-brachial anormal (< 0,9), nous recommandons l'**ÉCHO Doppler** pour un examen plus approfondi.	↑↑
	↳ **1.1** Si des examens supplémentaires sont nécessaires, nous recommandons **l'AGTDM ou l'ARM** comme modalité d'imagerie subséquente.	↑↑
	2. Chez les patients ayant reçu un diagnostic de maladie vasculaire périphérique des membres supérieurs ou inférieurs et présentant des symptômes récurrents, nous recommandons d'utiliser **l'AGTDM ou l'ARM** comme modalité d'imagerie initiale.	↑↑
CV10B. Malformation vasculaire	**1.** Chez les patients suspectés de malformation vasculaire, pour mieux caractériser et guider la prise en charge, nous recommandons l'**ARM résolue dans le temps** comme modalité d'imagerie initiale. *Pour les patients présentant une masse à la hauteur d'un membre et chez qui l'on soupçonne une malformation vasculaire, une **ÉCHO Doppler** peut faire office d'examen initial.*	↑↑
	↳ **1.1** Si l'ARM n'est pas tolérée par le patient, n'est pas accessible ou est contre-indiquée, nous suggérons l'**AGTDM** comme	↑↑

Scénario clinique/diagnostique	Recommandations	Force
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	modalité d'imagerie subsidiaire.	
	↳ **1.2** En vue d'orienter la prise en charge des malformations vasculaires à haut débit, nous recommandons une **angiographie invasive**.	↑↑
CV10C. Syndromes de piégeage et compression	**1.** Chez les patients souffrant du syndrome de l'artère poplitée piégée ou d'un autre type de compression touchant les membres et pour lesquels une thrombose veineuse est également à craindre, nous recommandons l'**ÉCHO Doppler** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si le résultat de l'ÉCHO Doppler est négatif ou ne permet pas de tirer de conclusions et qu'un examen d'imagerie supplémentaire est nécessaire, nous recommandons l'**ARM** comme modalité d'imagerie subséquente.	↑↑
	↳ **1.2** Si l'ARM n'est pas tolérée par le patient, n'est pas accessible ou est contre-indiquée, nous suggérons l'**AGTDM** comme modalité d'imagerie subsidiaire.	↑↑

APPENDIX 4. POTENTIALLY RELEVANT NON-ENGLISH GUIDELINES

1. Albricker ACL, Freire CMV, Dos Santos SN, De Alcantara ML, Saleh MH, Cantisano AL, Teodoro JAR, Porto CLL, Do Amaral SI, Veloso OCG, Pereira Petisco ACG, Barros FS, De Barros MVL, De Souza AJ, Sobreira ML, De Miranda RB, De Moraes D, Verrastro CGY, Mancano AD, Leao Lima RS, Muglia VF, Matushita CS, Lopes RW, Coutinho AMN, Pianta DB, Damas Dos Santos AASM, Naves BL, Vieira MLC, Rochitte CE. Joint Guideline on Venous Thromboembolism. *Arquivos Brasileiros de Cardiologia.* 2022; 118(4):797-857.

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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 (%)	
ACC et al. 2019 [19]	3	3	2	8 (89)	3	3	3	9 (100)	3	3	3	3	2	3	3	2	22 (92)	2	3	2	7 (78)	1	1	2	1	5 (42)	1	3	4 (67)	Moderate
AHA et al 2021 [20,21]	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)	1	3	3	3	10 (83)	3	3	6 (100)	High
AHA/ACC/HFSA 2022 [22,23]	3	3	3	9 (100)	3	3	3	9 (100)	3	3	3	3	3	3	3	2	23 (96)	3	3	3	9 (100)	3	3	3	3	12 (100)	3	3	6 (100)	High
NHFA-CSANZ 2018 [24]	3	3	3	9 (100)	3	3	3	9 (100)	3	2	3	3	3	3	3	1	21 (88)	3	3	3	9 (100)	3	3	1	1	8 (67)	3	3	6 (100)	High
NICE 2020 (NG185) [25,26]	3	3	3	9 (100)	3	3	3	9 (100)	3	1	3	3	1	3	1	1	16 (67)	3	1	2	6 (67)	1	2	1	1	5 (42)	1	3	4 (67)	Moderate
RCR 2017 [27]	3	3	3	9 (100)	3	3	3	9 (100)	3	3	3	3	3	1	3	1	20 (83)	3	3	3	9 (100)	3	2	3	1	9 (75)	2	2	4 (67)	High
ESC 2020 [28] (Collet)	2	3	3	8 (89)	3	3	3	9 (100)	3	3	3	3	2	3	3	2	22 (92)	3	3	3	9 (100)	2	3	2	1	8 (67)	3	3	6 (100)	High
JCS 2021 [29]	3	3	1	7 (78)	3	3	3	9 (100)	3	1	3	3	3	3	3	1	20 (83)	3	3	3	9 (100)	2	3	3	3	11 (92)	3	3	6 (100)	High
ACC/AHA 2022 [30]	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	3	1	1	7 (58)	3	3	6 (100)	Moderate
ACR 2021 [31]	3	2	3	8 (89)	3	1	3	7 (78)	3	2	3	2	2	3	3	1	19 (79)	3	3	3	9 (100)	2	2	2	1	7 (58)	3	3	6 (100)	Moderate
ACR 2022 [33]	3	3	3	9 (100)	3	1	3	7 (78)	3	2	3	2	3	3	3	1	20 (83)	3	3	3	9 (100)	1	3	2	1	7 (58)	1	3	4 (67)	Moderate
ASH 2018 [34]	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)	2	3	3	1	9 (75)	3	3	6 (100)	High
ESC 2019 [35]	3	3	3	9 (100)	3	3	3	9 (100)	3	1	3	3	3	3	3	2	21 (88)	3	3	3	9 (100)	3	3	3	3	12 (100)	3	3	6 (100)	High
NICE 2020 (NG156) [36]	3	3	3	9 (100)	3	3	3	9 (100)	3	3	3	3	1	3	1	1	18 (75)	3	1	3	7 (78)	3	1	3	3	10 (83)	3	3	6 (100)	Moderate
ACR 2021 [37]	2	3	3	8 (89)	3	1	3	7 (78)	3	2	3	2	3	3	3	1	20 (83)	3	3	3	9 (100)	1	3	2	3	9 (75)	3	3	6 (100)	High
ACR 2022 [38]	2	3	3	8 (89)	3	1	3	7 (78)	3	2	3	2	3	3	3	1	20 (83)	3	3	3	9 (100)	1	1	2	3	7 (58)	3	3	6 (100)	Moderate
ACR 2021 [40]	3	2	3	8 (89)	3	1	3	7 (78)	3	2	3	2	3	3	3	1	20 (83)	3	3	3	9 (100)	2	2	2	1	7 (58)	3	3	6 (100)	Moderate
ESC 2022 [41]	3	3	3	9 (100)	3	3	3	9 (100)	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)	High
ESC 2019 [42]	3	3	3	9 (100)	3	3	3	9 (100)	3	1	3	3	2	3	3	2	20 (83)	3	3	3	9 (100)	2	2	1	1	6 (50)	3	3	6 (100)	Moderate
ACC et al 2018 [43]	2	1	2	5 (56)	3	1	3	7 (78)	3	1	3	3	3	3	3	1	20 (83)	2	3	3	8 (89)	1	1	2	1	5 (42)	3	3	6 (100)	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 (%)	
ACC/AHA 2020 [44,45]	3	2	3	8 (89)	3	3	3	9 (100)	3	2	3	1	1	3	3	1	17 (71)	3	3	3	9 (100)	2	1	2	3	8 (67)	3	3	6 (100)	Moderate
ACR 2021 [46]	3	3	3	9 (100)	3	1	3	7 (78)	3	2	3	2	3	3	3	1	20 (83)	3	3	3	9 (100)	2	2	2	2	8 (67)	3	3	6 (100)	High
JCS et al 2020 [47]	2	3	3	8 (89)	3	3	3	9 (100)	3	1	3	2	2	3	3	1	18 (75)	3	3	3	9 (100)	1	3	3	3	10 (83)	3	3	6 (100)	High
ESC 2022 [48]	3	3	3	9 (100)	3	3	3	9 (100)	3	3	3	3	3	3	3	2	23 (96)	3	3	3	9 (100)	1	3	3	2	9 (75)	3	3	6 (100)	High
JCS/JHFS 2021 [49]	3	3	3	9 (100)	3	3	3	9 (100)	3	1	3	3	3	3	3	1	20 (83)	3	3	3	9 (100)	1	3	3	2	9 (75)	3	3	6 (100)	High
AHA/ACC 2020 [50,51]	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	3	3	12 (100)	3	3	6 (100)	High
ATS 2020 [52]	3	3	3	9 (100)	2	3	3	8 (89)	3	3	3	3	2	3	3	2	22 (92)	3	3	3	9 (100)	3	1	3	2	9 (75)	1	3	4 (67)	High
CCH/CHFS 2020 [53]	3	3	3	9 (100)	3	1	3	7 (78)	3	3	3	3	2	3	2	1	20 (83)	3	3	3	9 (100)	2	3	3	1	9 (75)	1	3	4 (67)	Moderate
DGK 2021 [54]	3	2	3	8 (89)	3	1	3	7 (78)	3	2	1	2	3	3	3	1	18 (75)	2	3	2	7 (78)	3	3	2	2	10 (83)	3	3	6 (100)	Moderate
JCS 2020 [55]	2	3	2	7 (78)	3	3	3	9 (100)	3	1	3	3	3	3	3	1	20 (83)	3	3	3	9 (100)	1	3	2	3	9 (75)	3	3	6 (100)	High
ACR 2018 [56]	2	3	3	8 (89)	3	1	3	7 (78)	3	2	3	2	3	3	3	1	20 (83)	3	3	3	9 (100)	2	2	3	1	8 (67)	3	3	6 (100)	Moderate
SICVE 2022 [57]	3	3	3	9 (100)	3	3	3	9 (100)	3	2	3	3	3	3	3	1	21 (88)	3	3	3	9 (100)	3	1	3	1	80 (67)	3	3	6 (100)	High
SVS 2020 [58]	3	3	3	9 (100)	1	1	3	5 (56)	3	3	3	3	3	3	3	1	22 (92)	3	3	3	9 (100)	2	1	1	3	7 (58)	1	3	4 (67)	Moderate
ACR 2021 [59]	2	3	3	8 (89)	3	1	3	7 (78)	3	2	3	2	3	3	3	1	20 (83)	3	3	3	9 (100)	1	2	2	2	7 (58)	3	3	6 (100)	Moderate
ACR 2021 [60]	3	3	3	9 (100)	2	3	3	8 (89)	3	3	3	3	1	3	3	1	20 (83)	3	3	3	9 (100)	3	3	2	1	9 (75)	1	3	4 (67)	High
BSR 2020 [61,62]	3	3	3	9 (100)	3	3	3	9 (100)	3	3	3	3	3	3	3	1	22 (92)	3	3	2	8 (89)	2	2	3	1	8 (67)	3	3	6 (100)	High
EULAR 2020 [63]	3	2	1	6 (67)	3	3	2	8 (89)	3	2	3	3	1	3	3	1	19 (79)	2	3	3	8 (89)	1	1	2	1	5 (42)	3	3	6 (100)	Moderate
EULAR 2018 [64,65]	3	3	2	8 (89)	3	3	2	8 (89)	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 2020 [66]	3	3	3	9 (100)	3	1	3	7 (78)	3	2	3	2	3	3	3	1	20 (83)	3	3	3	9 (100)	1	2	2	1	6 (50)	3	3	6 (100)	Moderate
ACR 2018 [67]	2	3	3	8 (89)	3	1	3	7 (78)	3	2	3	2	3	3	3	1	20 (83)	3	3	3	9 (100)	2	1	2	1	6 (50)	3	3	6 (100)	Moderate
Brazil Gdln 2019 [68]	3	3	3	9 (100)	1	1	1	3 (33)	3	2	3	3	1	2	3	1	18 (75)	2	3	2	7 (78)	3	1	1	1	6 (50)	3	3	6 (100)	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 (%)	
NICE 2020 (NG158) [69,70]	3	3	3	9 (100)	3	3	3	9 (100)	3	3	3	1	1	3	1	1	16 (67)	3	3	3	9 (100)	1	3	1	3	8 (67)	1	3	4 (67)	Moderate
THSANZ 2019 [71]	3	3	3	9 (100)	2	1	3	6 (67)	3	1	3	2	3	3	3	1	19 (79)	3	3	2	8 (89)	3	3	1	1	8 (67)	1	3	4 (67)	Moderate
ACR 2021 [72]	3	3	3	9 (100)	2	3	3	8 (89)	3	3	3	3	1	3	3	1	20 (83)	2	1	3	6 (67)	1	1	1	1	4 (33)	3	3	6 (100)	Moderate
ACR 2019 [73]	2	3	3	8 (89)	3	1	3	7 (78)	3	2	3	2	3	3	3	1	20 (83)	3	3	3	9 (100)	2	1	2	1	6 (50)	3	3	6 (100)	High
ACR 2019 [74]	2	3	3	8 (89)	3	1	3	7 (78)	3	2	3	2	3	3	3	1	20 (83)	3	3	3	9 (100)	1	2	2	1	6 (50)	3	3	6 (100)	High
SISAV 2022 [75]	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	3	3	12 (100)	3	3	6 (100)	High

Abbreviations: **ACC**: American College of Cardiology; **ACR**: American College of Radiology; **AHA**: American Heart Association; **ASH**: American Society of Hematology; **ATS**: American Thoracic Society; **BSR**: British Society for Rheumatology; **CAR**: Canadian Association of Radiologists; **CCH/CHFS**: Canadian Cardiovascular Society/Canadian Heart Failure Society; **DKG**: German Cardiac Society; **ESC**: European Society of Cardiology; **EULAR**: European League Against Rheumatism; **HFSA**: Heart Failure Society of America; **JCS**: Japanese Circulation Society; **JHFS**: Japanese Heart Failure Society; **NHFA-CSANZ**: National Heart Foundation of Australia and Cardiac Society of Australia and New Zealand ; **NICE**: National Institute for Health and Clinical Excellence; **RCR**: Royal College of Radiologists; **SICVE**: Italian Society of Vascular and Endovascular Surgery; **SISAV**: Italian Society for the Study of Vascular Anomalies; **SVS**: Society for Vascular Surgery; **THSANZ**: Thrombosis and Haemostasis Society of Australia and New Zealand