

Ontario Clinical Guidance on Patient Selection and Prioritization for Coronary Computed Tomography Angiography (CCTA)

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Introduction

CCTA Definition

Coronary computed tomography angiography (CCTA) is a non-invasive imaging test that diagnoses coronary artery disease (CAD). By identifying plaque and blockages or narrowing (stenosis) of the coronary arteries, it helps detect abnormalities that can alter blood flow to the heart and identify patients at risk for cardiovascular events.

Access to CCTA as a First-Line Test for Diagnosing CAD

Along with other traditional imaging modalities, numerous international medical societies have now endorsed CCTA as a first-line test for the diagnosis of CAD^{1,2,3}. The 2021 Auditor General's report identified the underutilization of CCTA in Ontario, and in response, the province is working to increase access to this important testing option⁴. As a mandate of Ontario's Regional Cardiac Program Framework, our Regional Cardiac Programs are committed to providing timely access to on-site CCTA⁵.

Provincial Clinical Guidance

The purpose of this document is to provide provincial clinical guidance on the appropriate selection of patients for CCTA, as well as guidance on appropriate prioritization and wait times for receiving the test. The scope of this guidance is for the detection and risk assessment of CAD in stable patients. This guidance needs to be considered in context with other cardiac testing options as appropriate.

Selecting appropriate patients for CCTA

General considerations

- Along with other imaging modalities, numerous international medical societies have endorsed the use of CCTA to assess for CAD (Class I) ^{1,2,3}
- Test selection is complex and requires the consideration of numerous factors including: patient factors (pre-test probability, risk factors, co-morbidities/antecedent disease, allergies, etc.), test availability, local imaging expertise, wait-times and cost.
- In general, CCTA may be a more appropriate testing modality for patients who have been assessed as being at lower risk for CAD (in the absence of contraindications).
- Decision support tools have been developed to assist with test selection⁶
- CCTA is not appropriate for every patient, but it provides an important option for a subset of patients. One key benefit of CCTA is that it is minimally invasive. In situations where a patient can be assessed with CCTA instead of invasive coronary angiography (ICA), this avoids the risk of complications from ICA.

Guidance on appropriate patient population

- Symptomatic patients with no known CAD and no prior testing
- Symptomatic patients with no known CAD and with prior testing:
 - Recent CAD testing with results that are incongruent with clinical impression.
 - Inconclusive or potential false positive or false negative stress test
 - Stress imaging (SPECT, PET, echo, or CMR) where the results are inconclusive or the clinician is concerned there is a false positive or false negative result.
- Suspected anomalous coronary anatomy

Determining which patients are not appropriate for CCTA

General considerations

- CCTA should not be used for routine screening of asymptomatic patients.
- Some contraindications to CCTA may be relative, rather than absolute, and depend on a risk/benefit assessment as well as local technology and expertise.
- Consultation with a local imaging expert may assist with appropriate test selection.

Guidance on patient population who may not be appropriate for CCTA

The following factors should be considered in the context of the other testing options that may be available:

- History of coronary artery disease (CAD)
 - History of obstructive CAD ($\geq 50\%$ diameter stenosis)
 - Known significant coronary artery calcification
 - Prior PCI
 - Study accuracy can be limited in patients with small stents (< 3.0 mm), multiple stents, and the presence of severe coronary artery calcification associated with CAD.
 - Prior CABG (if native coronary information is required)
 - Study accuracy can be limited in the native coronary arteries in patients with established CAD.
 - Patients with high-risk non-invasive test results
- Atrial fibrillation
 - Imaging patients with irregularly irregular rhythms may not be possible on all CT scanners. In such patients, consulting with the local imaging expert may assist with assessing suitability based on locally available technology
- Contraindication to nitrates
- Contraindication to heart rate modifying medications
 - e.g. beta blockers, calcium channel blockers, ivabradine
- Contraindications to radiation
 - e.g. pregnancy, very young age, etc.
 - Although the radiation dose associated with CCTA may be acceptable, the risk:benefit ratio should be discussed with the patient using a shared decision-making model and in the context of other available modalities
- Contraindication to contrast
 - e.g. history of severe or anaphylactic reaction, severe renal insufficiency, etc.
 - Patients with mild contrast allergies may be candidates for CCTA if adequately premedicated
- Inability to comply with breath-hold and breath-hold instructions

Summary of Guidance for Patient Selection

| Patients appropriate for CCTA | Patients not appropriate for CCTA |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Symptomatic patients with no known CAD and no prior testing | History of coronary artery disease (CAD) <ul style="list-style-type: none"> • History of obstructive CAD ($\geq 50\%$ diameter stenosis) • Known significant coronary artery calcification • Prior PCI <ul style="list-style-type: none"> ○ Study accuracy can be limited in patients with small stents (< 3.0 mm), multiple stents, and the presence of severe coronary artery calcification associated with CAD • Prior CABG (if native coronary information is required) <ul style="list-style-type: none"> ○ Study accuracy can be limited in the native coronary arteries in patients with established CAD • Patients with high-risk non-invasive test results |
| Symptomatic patients with no known CAD and with prior testing: <ul style="list-style-type: none"> • Recent CAD testing with results that are incongruent with clinical impression. • Inconclusive or potential false positive or false negative exercise stress test • Stress imaging (SPECT, PET, echo, or CMR) where the results are inconclusive, or the clinician is concerned there is a false positive or false negative result. | Atrial fibrillation (depending on scanner) |
| | Contraindication to nitrates |
| | Contraindication to heart rate modifying medications |
| | Contraindications to radiation |
| | Contraindication to contrast |
| Suspected anomalous coronary anatomy | Inability to comply with breath-hold and breath-hold instructions |

Timeliness

Timely access to CCTA is critical in order to:

- reduce the bias of test selection due to wait times
- provide timely test results to guide patient care
- fulfill the criteria for Regional Cardiac Programs to provide timely access to on-site CCTA

Wait time targets for all Ontario CT scans (including CCTA) are based on priority levels as follows:

- **Priority 1 Emergent** – Target of 24 Hours. An examination necessary to diagnose and/or treat disease or injury that is immediately threatening to life or limb.
- **Priority 2 Urgent** – Target of 48 Hours. An examination necessary to diagnose and/or treat disease or injury and/or alter treatment plan that is not immediately threatening to life or limb. Includes all inpatients except where imaging is unrelated to patient admission based on clinical indication.
- **Priority 3 Semi-urgent** – Target of 10 Days. An examination necessary to diagnose and/or treat disease or injury and/or alter treatment plan, where provided clinical information requires that the examination be performed sooner than the P4 benchmark period.
- **Priority 4 Non-urgent** – Target of 28 days. An examination necessary to diagnose/treat disease or injury, where the provided clinical information does not require the study to be performed within the Semi-Urgent time frame (P3 benchmark period of 10 days)

One aspect of ensuring timely access to CCTA is appropriate prioritization of referrals within the above priority level framework. Based on the most recent evidence, an update has been made as to which types of patients referred for CCTA should be assigned Priority Level 3 versus Priority Level 4. Clinical guidance to distinguish between Priority 3 and Priority 4 CCTA referrals is outlined below.

Updated Guidance on Priority Level Assignment for CCTA

| Priority 3 (10 days) | Priority 4 (28 days) |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"> 1. Frequent symptoms and/or recurrent visits (e.g. clinic, Emergency Department etc.). 2. Symptoms and recent CAD testing results that were incongruent with clinical impression. 3. Symptomatic patients where there is equipoise between multiple tests, and expediting CCTA would allow the avoidance of a higher risk test/procedure. 4. Patient requires CCTA prior to semi-urgent/urgent procedure. | <ol style="list-style-type: none"> 1. Stable symptomatic patients. 2. Stable asymptomatic patients who have an indication for testing. |

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