Clinical Decision Support (CDS) Content and Health Level 7 (HL7)compliant Knowledge Artifacts (KNARTS)

Cardiology: Chest Pain (CP) / Coronary Artery Disease (CAD) Clinical Content White Paper

DRAFT



Clinical Decision Support (CDS) Content and Health Level 7 (HL7)-compliant Knowledge Artifacts (KNARTS): Cardiology: Chest Pain (CP) / Coronary Artery Disease (CAD) Clinical Content White Paper

Order Set (B5, CLIN0004AA), Documentation Template (B35, CLIN0005AC), Consult Request/Composite (B56, CLIN0006AB)

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1.1. Clinical Context Domains.

VA Subject Matter Expert (SME) Panel

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Introduction

The VA is committed to improving the ability of clinicians to provide care for patients while increasing quality, safety, and efficiency. Recognizing the importance of standardizing clinical knowledge in support of this goal, VA is implementing the HL7 Knowledge Artifact Specification for a wide range of VA clinical use cases. Knowledge Artifacts, referred to as KNARTs, enable the structuring and encoding of clinical knowledge so the knowledge can be integrated with electronic health records to enable clinical decision support.

The purpose of this Clinical Content White Paper is to capture the clinical context and intent of KNART use cases in sufficient detail to provide the KNART authoring team with the clinical source material to construct the corresponding knowledge artifacts using the HL7 Knowledge Artifact Specification. This paper has been developed using material from a variety of sources: VA artifacts, clinical practice guidelines, evidence in the body of medical literature, and clinical expertise. After reviewing these sources, the material has been synthesized and harmonized under the guidance of VA subject matter experts to reflect VA's clinical intent for this use case.

Unless otherwise noted, items within this white paper (e.g., documentation template fields, orderable items, etc.) are chosen to reflect the clinical intent at the time of creation. To provide an exhaustive list of all possible items and their variations is beyond the scope of this work, so these exemplars have been chosen by the subject matter expert team as representative of the clinical intent.

Chapter 1. Chest Pain (CP)/Coronary Artery Disease (CAD)

1. Clinical Context

Patients often present in the primary care setting with chest pain that is thought, possibly, to be cardiac in origin. This poses the problem of separating those with non-cardiac chest pain from those with cardiac chest pain and separating unstable from stable patients. Unstable patients with cardiac chest pain (e.g., those suspected with acute coronary syndrome (ACS), ST-segment elevation or non–ST-segment elevation myocardial infarction) require triage to appropriate emergent care, such as to the emergency department. Stable patients with cardiac chest pain require risk stratification, office-based workup, initiation of disease-specific medications, and subspecialty referral to a cardiologist. The care of patients with clearly non-cardiac chest pain (e.g., chest pain secondary to GI, musculoskeletal or pulmonary causes) is a separate clinical problem not addressed herein. Patients should be risk-stratified to estimate their 10-year cardiovascular disease risk (D'Agostino 2008) and guideline-based options for the ordering of diagnostic tests and therapeutic interventions to facilitate efficient resource utilization and subspecialty referral (Finh 2014).

The Cardiology chest pain (CP) and coronary artery disease (CAD) group of KNARTs are intended to assist primary care providers in the management of adult patients with stable chest pain (with or without known CAD); aid in determining when a cardiology consultation is appropriate; provide guidance for initial noninvasive diagnostic orders (stress testing) and provide a structured documentation template for the process. Stable patients with cardiac chest pain require risk stratification, office-based workup, initiation of disease-specific medications, and subspecialty referral to a cardiologist.

This context excludes emergent patients (new/ongoing/unstable pattern CP). Included are those patients with stable CP with or without known CAD, to be considered for evaluation by cardiology. These context domains are summarized below:

Table 1.1. Clinical Context Domains

Target User	Provider in a Primary Care Clinic
Patient	Adult with stable chest pain being considered for cardiology consultation (excluding unstable symptoms and acute coronary syndromes)
Priority	Routine
Specialty	Primary Care
Location	Outpatient

2. Knowledge Artifacts

This section describes the knowledge artifacts that are intended for users caring for adult patients who might present to a Primary Care Clinic with stable chest pain/CAD. The intent of these artifacts is to ensure a minimum workup is initiated prior to a Cardiology Consultation. Specific constraints for these artifacts are that:

- They apply to outpatients with stable chest pain with or without prior documented CAD needing cardiology Consultation
- They exclude emergent patients (new/ongoing/unstable pattern CP suggestive of acute coronary syndrom (ACS))

There are three knowledge artifacts that define this clinical use case, and are described in detail in the following sections. They are:

· Consult Request

Chest Pain (CP)/Coronary Artery Disease (CAD)

- · High-level, encompassing artifact meant to communicate the request for cardiology consultation
- Relies upon the documentation template and order set artifacts
- Documentation Template
 - Documents the information provided by the referring provider
 - Includes logic for appropriate display of documentation sections
- · Order Set
 - Orderable items associated with the consult request
 - · Includes logic for appropriate display of the order set

Conventions used within the knowledge artifact descriptions include:

- <obtain>: Indicates a prompt to obtain the information listed
- [...]: Square brackets enclose explanatory text that indicates some action on the part of the user, or general guidance to the clinical or technical teams. Examples include, but are not limited to:
 - ◆ [Begin ...], [End ...]: The start and end of specific areas to clearly delineate them for technical purposes.
 - [Activate ...]: Initiate another knowledge artifact or knowledge artifact section.
 - [Section Prompt: ...]: If this section is applicable, then the following prompt should be displayed to the user.
 - [Section Selection Behavior:]: Indicates technical constraints or considerations for the selection of items within the section.
 - [Attach: ...]: The specified item should be attached to the documentation template if available.
 - [Link: ...]: Rather than attaching, a link to the item should be included in the documentation template.
 - [Clinical Note: ...]: Clinical rationale or notes.
 - [Technical Note: ...]: Technical considerations or notes.
 - [If ...]: The beginning of a conditional section.
 - [Else, ...]: The beginning of the alternative branch of a conditional section.
- Check boxes: Indicates items that should be selected based upon the section selection behavior.

Chapter 2. Composite

1. Knowledge Narrative

[See Clinical Context.]

2. Consult Request

[Technical Note: The following list provides the basic components of the consult request. This is the high-level, encompassing artifact, and must be combined with the documentation template and order set to form a fully functional knowledge artifact.]

[Section Prompt: To request a cardiology consult to evaluate chest pain in a stable patient with or without known history of CAD, please provide the following information.]

- Reason for Consult: Chest pain evaluation (with or without known history of CAD)
- Consult Specialty: Cardiology

[Technical Note: Routine priority, as defined by the implementing institution, is the default for this consult. Other priority levels may need to be defined (e.g., stat, today, urgent, emergent, etc.).]

- Priority: Routine
- <obtain> Referring Physician
- <obtain> Referring Physician Contact Information

[Activate associated documentation template]

3. Evidence

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Chapter 3. Documentation Template

1. Knowledge Narrative

[See Clinical Context.]

2. Clinical Stability

[Section Prompt: This documentation template is not applicable for use with patients who are unstable based on clinician judgement. Examples of unstable patients include, but are not limited to, patients with chest pain pattern suggestive of ACS (e.g., those with new onset resting CP, CP with minimal exertion, new unstable angina pattern, ST-segment elevation, non–ST-segment elevation myocardial infarction on ECG, or suspected aortic dissection), and patients with any of the following symptoms or findings:

- 1. Ongoing resting chest pain for > 20 minutes with ST elevation or depression on ECG
- 2. Onset of new resting chest pain episodes within the past week
- 3. New onset, recurrent chest pain with minimal exertion over the past 2 months
- 4. Previously stable exertional angina now occurring with minimal activity over the past 2 months.

[Consider transferring unstable patients to the nearest emergency department immediately.]

3. Coronary Artery Disease Risk

[Clinical Note: For this documentation template, please assess the patient's 10-year cardiovascular disease risk using either clinical judgement or a risk calculator such as that provided by the AHA.

[Technical Note: Provide a link to the calculator at: http://static.heart.org/riskcalc/app/index.html#!/baseline-risk.]]

• <obtain> Patient's 10-Year Cardiovascular Disease Risk

4. History and Physical

[Technical Note: For this documentation template, the following information should be included, if available.]

- <obtain> History, Brief describing symptoms, HPI
- <obtain> History of prior cardiac evaluations (e.g., prior hospitalization or evaluations for: chest pain, rule/out MI, angina, heart failure, etc.)
- <obtain> Results of prior cardiac diagnostic procedures performed (resting ECG, echocardiogram, stress testing (echo, nuclear, MRI), CCT or angiography
- <obtain> Physical Exam, Pertinent Positive and Negative Findings
- <obtain> Details of previous invasive diagnostic procedures and resulting interventions (e.g., angiography, PCI/Stents, or CABG)

5. Treatment Provided

[Technical Note: For this documentation template, the following information should be included, if available.]

• <obtain> Pharmacologic Therapy

• <obtain> Other Pertinent Therapy

6. Laboratory Studies

[Technical Note: For this documentation template, the following information should be included (latest value within the past 2 years), if available.]

- <obtain> Basic Metabolic Profile Lab Result
- <obtain> Complete Blood Count Lab Result
- <obtain> Lipid Profile Lab Result
- <obtain> Thyroid Function Testing Lab Result
- <obtain> Troponin Lab Result
- <obtain>Brain Natriuretic Peptide Lab Result
- <obtain> D-dimer Lab Result

7. Imaging and Diagnostic Studies

[Clinical Note: Images and diagnostic studies older than one year are not considered for inclusion in this documentation template.]

[Technical Note: For this documentation template, the following information should be included, if available from the prior 1 year.]

[Technical Note: Image and result text should be attached automatically if they are is provided for the 12-Lead Electrocardiogram Interpretation field.]

- <obtain> resting 12-Lead Electrocardiogram Interpretation
- [Attach or link Images: 12-Lead Electrocardiogram]

[Technical Note: Results should be attached automatically if text is provided for the Stress Electrocardiography Interpretation field.]

- · <obtain> Stress Electrocardiography Interpretation
- [Link Images: Stress Electrocardiography]

[Technical Note: Results should be attached automatically if text is provided for the Resting Echocardiogram/Doppler Interpretation field.]

- <obtain> Resting Echocardiogram/Doppler Interpretation
- [Link Images: Resting Echocardiogram/Doppler Electrocardiography]

[Technical Note: Results should be attached automatically if text is provided for the Stress Echocardiogram Interpretation field. This includes treadmill and dobutamine stress echo.]

- <obtain> Stress Echocardiogram Interpretation
- [Link Images: Stress Echocardiogram]

[Technical Note: Results should be attached automatically if text is provided for the Stress Myocardial Perfusion Imaging (MPI) Interpretation field.]

• <obtain> Stress MPI Interpretation

• [Link Images: Stress MPI]

[Technical Note: Results should be attached automatically if text is provided for the Rest/Stress MRI Interpretation field.]

- <obtain> Rest/Stress MRI Interpretation
- [Link Images: Rest/Stress MRI]

[Technical Note: Result text should be attached automatically if it is provided for the Chest/Coronary/Cardiac CT Angiography (CTA) Interpretation field.]

- <obtain> Chest CT or Coronary/Cardiac CTA Interpretation
- [Link Images: Chest CT or Coronary/Cardiac CTA]

[Technical Note: Result text should be attached automatically if it is provided for the X-Ray Chest Interpretation field.]

- <obtain> X-Ray Chest Interpretation
- [Link Images: X-Ray Chest]

8. Link to Order set

[Activate order set]

[End Document Template.]

9. Evidence

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Chapter 4. Order Set

1. Knowledge Narrative

[See Clinical Context.]

2. Clinical Stability

[Section Prompt: This order set is not applicable for use with patients who are unstable based on clinician judgement. Examples of unstable patients include, but are not limited to, patients with chest pain pattern suggestive of ACS (e.g., those with new onset resting CP, CP with minimal exertion, new unstable angina pattern, ST-segment elevation, non–ST-segment elevation myocardial infarction on ECG, or suspected aortic dissection), and patients with any of the following symptoms or findings:

- 1. Ongoing resting chest pain for > 20 minutes with ST elevation or depression on ECG
- 2. Onset of new resting chest pain episodes within the past week
- 3. New onset, recurrent chest pain with minimal exertion over the past 2 months.
- 4. Previously stable exertional angina now occurring with minimal activity over the past 2 months.

Consider transferring unstable patients to the nearest emergency department immediately.]

3. Consults and Referrals

[Section Prompt: Cardiology consult order.]

[Technical Note: Consider other consult modalities which might be available (e.g., e-consult or other rapidly iterative consult method. A simple consult is included here as the overarching clinical intent.]

• \square referral to cardiology to evaluate chest pain (routine)

[Section Selection Behavior: Only one may be selected. At least one must be selected.]

[Section Prompt: Reason for cardiology consultation.]

- typical angina
- □ atypical chest pain
- progressive angina symptoms in a stable patient with known CAD (if the patient is unstable based upon clinical or test results, direct physician-to-physician communication is required)

[Technical Note: If other is selected, the reason must be obtained.]

• □ other: <obtain>Reason for cardiology consultation

[Section Prompt: Specific goal of the cardiology consultations (e.g., cardiology to manage patient, cardiology to risk stratify and recommend management, etc.).]

• goal of cardiology consultaion: <obtain> goal of cardiology consultation

4. Imaging and ECG

Electrocardiogram/Chest X-ray

[Section Prompt: Consider ordering prior to the cardiology consultation. Resting 12-lead electrocardiogram is required if it has not been obtained within the past two months.]

[Section Selection Behavior: More than one may be selected. Optional]

- \square resting 12-lead electrocardiogram to evaluate chest pain (routine)
- \(\subseteq \text{x-ray chest to evaluate chest pain(routine)} \)

Coronary CTA

[Section Prompt: Consider ordering prior to the cardiology consultaion.]

[Technical Note: Coronary CTA (cCTA) is included for completeness, but its availability will be facility dependent.]

[Section Selection Behavior: Optional]

• \square coronary CTA angiogram (cCTA) chest to evaluate chest pain (routine)

Echocardiogram

[Section Prompt: Consider for patients with suspected pericarditis, myocarditis, hypertrophic cardiomyopathy, or pulmonary hypertension.]

[Section Selection Behavior: Optional]

• Resting echocardiogram to evaluate chest pain (routine)

5. Laboratory Tests

[Section Prompt: Consider the following tests to be completed prior to the cardiology consultation.]

[Section Selection Behavior: More than one may be selected. Optional]

- □ basic metabolic profile (routine)
- □ complete blood count (routine)
- □ lipid profile (routine)
- \(\propto \text{ thyroid function testing (routine)} \)
- □ brain natriuretic peptide (routine)

6. Cardiac Risk Stratification

[Section Prompt: For stable patients, these orders may assist in cardiac risk stratification.]

[A link to the ACC/AHA clinical practice guideline for stress testing (Gibbon 2002) should be made available to ordering providers: http://circ.ahajournals.org/content/106/14/1883.long.]

[Section Prompt: Assess for contraindications to stress testing such as: Acute CHF, acute MI or unstable angina, severe aortic stenosis, unstable rhythm, aortic aneurysm/dissection, endocarditis, acute pericarditis, acute pulmonary embolus/infarction, acute systemic illness/infection, severe hypertension, inability to cooperate, Inability to exercise (<5 METs), LBBB, etc.]

Exercise Stress Testing. [Section Prompt: Consider for patients with no known or prior coronary artery disease, low probability for coronary artery disease, ability to exercise, normal electrocardiogram, and heart rate > 60 beats per minute.]

[Section Selection Behavior: Optional.]

• □ exercise ECG (routine)

Stress Testing with Echocardiography. [Section Prompt: Consider for patients with no known or prior coronary artery disease, low to intermediate probability for coronary artery disease, ability to exercise, and no evidence of significant regional wall motion abnormalities or conduction abnormalities (IVCD/bundle branch block or pacing) of 12-lead electrocardiogram.]

[Section Selection Behavior: Optional.]

•

| exercise echocardiography (routine)

Dobutamine Stress Testing with Myocardial Perfusion Imaging (MPI). [Section Prompt: Consider for patients with no known or prior coronary artery disease, intermediate probability for coronary artery disease, inability to exercise, and normal electrocardiogram.]

[Section Selection Behavior: Optional.]

• \(\square\) dobutamine stress myocardial perfusion imaging (routine)

Exercise Stress Testing with MPI. [Section Prompt: Consider for patients with known or prior CAD, ability to exercise, and normal ST-T.]

[Section Selection Behavior: Optional.]

Exercise stress myocardial perfusion imaging (routine)

Vasodilator Stress Testing with MPI. [Section Prompt: Consider for patients with known or prior CAD and abnormal electrocardiogram/PPM. This subsection should also be made available to the provider for patients with known or prior CAD, abnormal electrocardiogram, and history of prior myocardial infarction or regional wall motion abnormalities.]

[Section Selection Behavior: Only one should be selected. Optional.]

- 🗆 regadenoson (Lexiscan) stress myocardial perfusion imaging (routine)
- \(\sigma\) adenosine stress testing myocardial perfusion imaging (routine)
- \(\square\) dipyridamole stress testing myocardial perfusion imaging (routine)

Dobutamine Stress Testing with Echocardiography or MPI. [Section Prompt: Consider for patients with known or prior CAD, inability to exercise, normal electrocardiogram, and no prior myocardial infarction. Only one should be selected.]

[Section Selection Behavior: Only one should be selected. Optional.]

- \square dobutamine stress testing echocardiography (routine)
- \(\square\$ dobutamine stress testing myocardial perfusion imaging (routine)

Coronary CT Angiogram. [Section Prompt: Consider for patients with no known coronary artery disease, low or intermediate probability for coronary artery disease, especially in presence of a history of prior inconclusive or discrepant diagnostic testing, recurrent symptoms or significant family history of CAD/multiple risk factors in young patients. Additional postprocessing (CT-FFR) or CTA stress perfusion may be ordered where available.]

[Section Selection Behavior: Optional.]

• □ coronary CT angiogram (routine)

7. Medications

[Section Prompt: Based upon clinical judgement, consider initiating a new order for one or more of the following medications prior to the cardiology consultation, if not otherwise contraindicated.]

[Section Selection Behavior: More than one category may be selected. Only one from each category may be selected. Optional.]

•		Antia	nginal	Therapy
---	--	-------	--------	---------

•

- metoprolol tartrate 25 mg tablet oral twice daily (routine)
- \square metoprolol tartrate 25 mg tablet oral twice daily (routine)
- \square metoprolol tartrate 50 mg tablet oral twice daily (routine)
- □ amlodipine 5 mg tablet oral daily (routine)
- Initroglycerin 0.4 mg tablet sub-lingual every 5 minutes as needed for chest pain; maximum 3 tablets (routine)
- Antiplatelet Therapy
 - aspirin 81 mg enteric coated tablet oral daily (routine)
- □ Risk Factor Reduction

•

- □ atorvastatin 20 mg tablet oral daily (routine)
- □ atorvastatin 40 mg tablet oral daily (routine)
- □ simvastatin 20 mg tablet oral daily (routine)
- □ simvastatin 40 mg tablet oral daily (routine)
- □ rosuvastatin 5 mg tablet oral daily (routine)
- □ rosuvastatin 10 mg tablet oral daily (routine)
- □ rosuvastatin 20 mg tablet oral daily (routine)

8. Evidence

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Appendix A. Appendix: Existing VA Artifacts

These artifacts consist of screenshots from the Portland VA cardiology, chest pain/coronary artery disease consult set.

Figure A.1. Cardiology - General

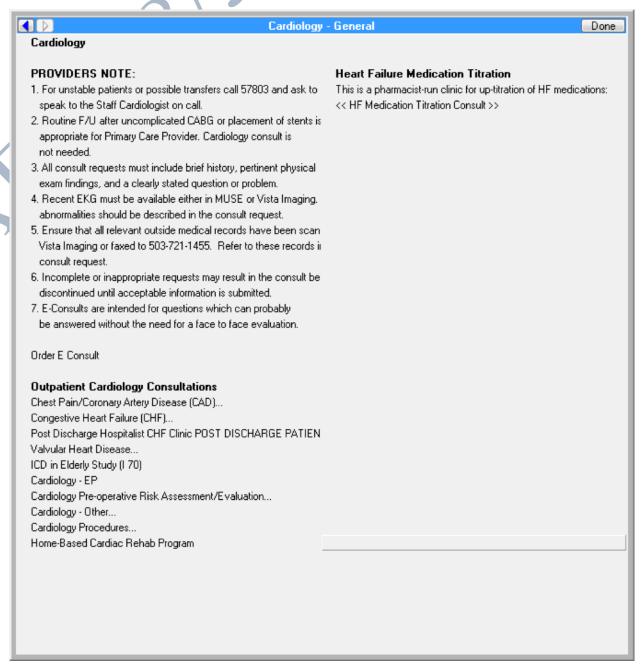


Figure A.2. Chest Pain (CP)/Coronary Artery Disease (CAD) Screenshot

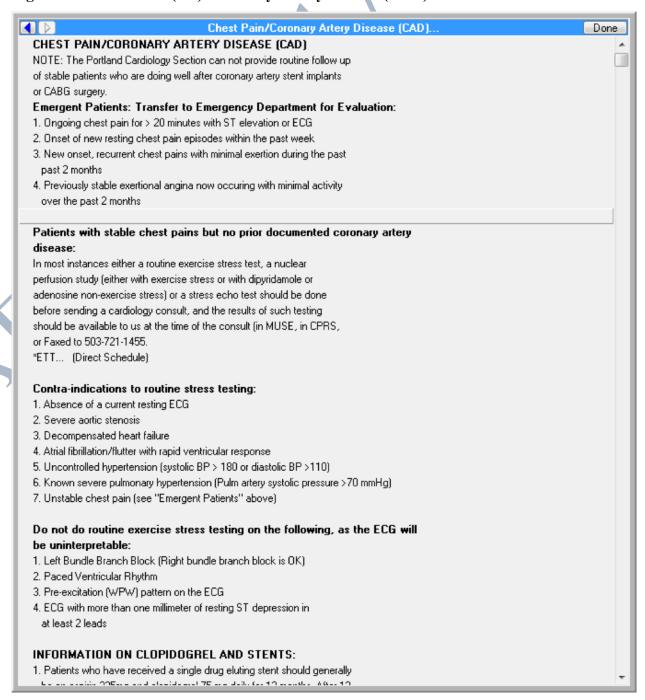


Figure A.3. Chest Pain (CP)/Coronary Artery Disease (CAD) Screenshot with Contraindications

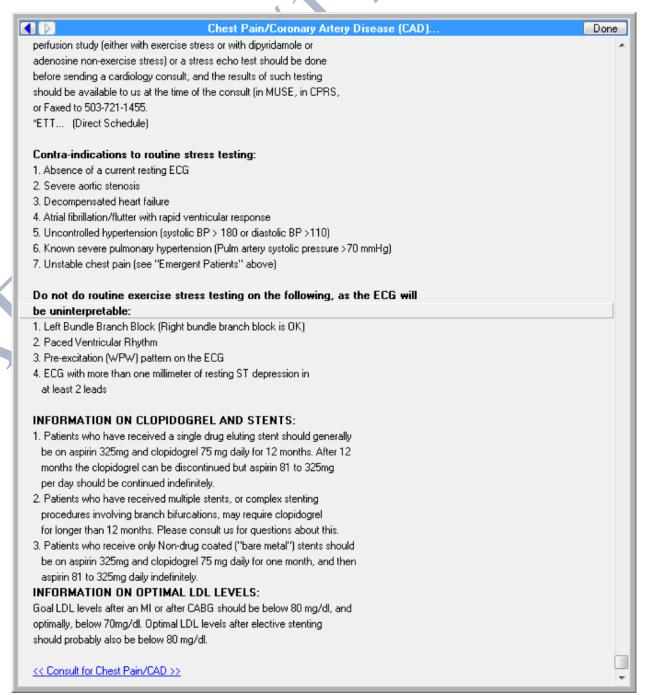


Figure A.4. Cardiology ETT Procedure



Figure A.5. Order a Procedure

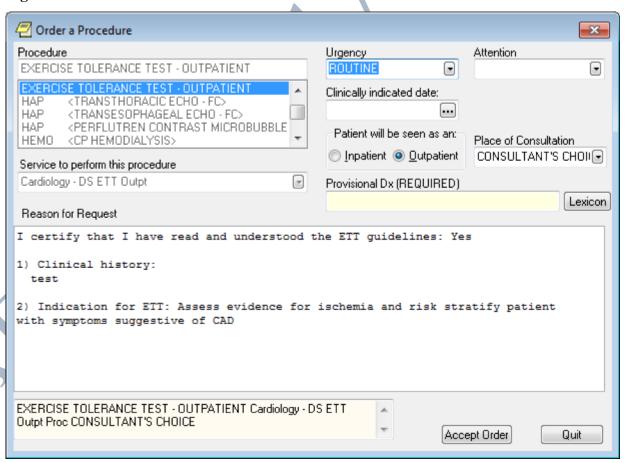


Figure A.6. ETT Request Screenshot

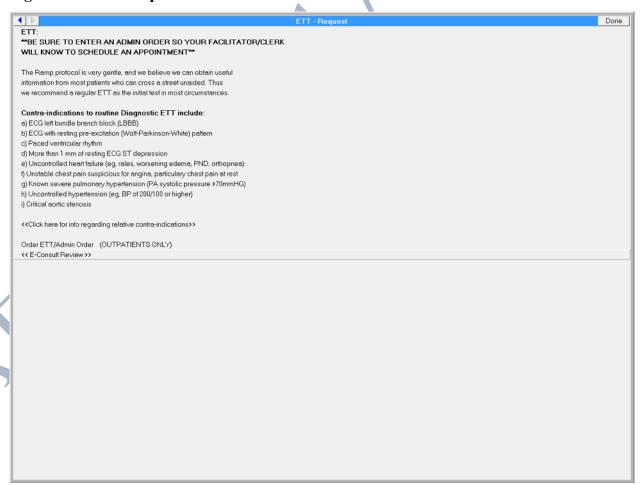


Figure A.7. Reason for Request: Cardiology - General Output

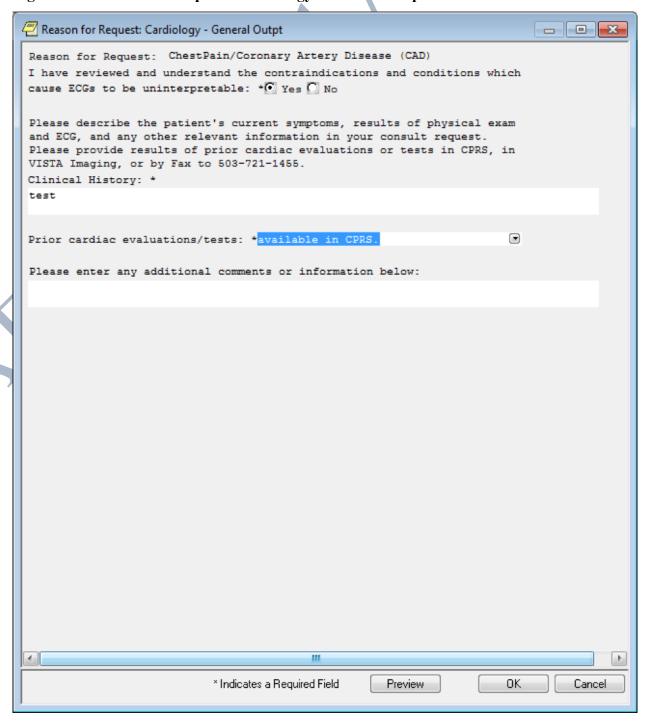


Figure A.8. Order a Consult Screenshot for Cardiology

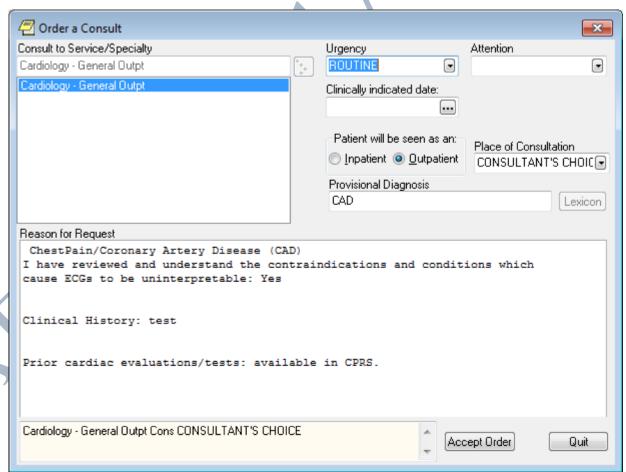


Figure A.9. Consult to Service/Specialty Screen

