1 Purpose & Objective
This protocol provides evidence-based care recommendations in the screening and treatment of adult patients with chest pain in the primary care setting. The chest pain protocol seeks to improve the effectiveness of evaluation of adult patients with the chief complaint of chest pain. The chest pain protocol should provide primary care physicians and cardiologists with a guide that is cost effective and evidenced based.

2 Scope of Protocol

2.1 Target Population
This protocol was derived from clinical guidelines for individuals in the CCC population diagnosed with chest pain syndrome 18 years of age or older.

2.2 Target Users
This protocol is developed for use in primary care settings. Family physicians, internists, primary care physician assistants and nurse practitioners as well as cardiologists should use this protocol.

2.3 Excluded Topics
This protocol does not address the clinical management of adult patients with suspected life threatening conditions such as acute coronary syndrome, myocardial infarction (STEMI and non STEMI), pulmonary embolism and aortic dissection, and major blunt or penetrating trauma to the chest.
2.4 Related Guidelines


3 Protocol Development & Approval Process

Approval Process

This protocol was adapted from the National Institute for Health and Clinical Excellence Chest Pain Pathway. Led by a cardiologist specializing in Chest Pain, a group of clinical staff met and converged on the items in this document via a Rapid Design Session. In this session, a group extracted evidence-based elements to adequately care for the CCC population impacted by Chest Pain. The above depiction describes the approval and subsequent review process for this protocol.

<table>
<thead>
<tr>
<th>Group Name</th>
<th>Approval Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCC Chest Pain Protocol Subcommittee</td>
<td>6/29/2015</td>
</tr>
<tr>
<td>CCC Clinical Protocols Workgroup</td>
<td>6/29/2015</td>
</tr>
<tr>
<td>CCC Clinical Delivery System Steering Group</td>
<td>8/26/2015</td>
</tr>
<tr>
<td>CCC Advisory Committee</td>
<td></td>
</tr>
<tr>
<td>CCC Board of Directors</td>
<td></td>
</tr>
</tbody>
</table>

- At minimum, will be reviewed annually
- At minimum, will be reviewed annually
- Tracked and reported on a regular, consistent basis
4 Screening Criteria & Risk Factors

4.1 Assessing Risk:

The Duke Chest Pain Score. The Zunis Foundation/Zunis Web Site Map is located at: http://www.zunis.org. Once on this Web Site Page:

1. Click The Cardiology Library link at the bottom of the list
2. Under The Cardiology Library @ Zunis page, under the alphabetical list, look under The Cardiology Calculators and click the link for Duke Chest Pain –CAD Risk Calculator (the Duke Treadmill Test –CAD Predictor is the next following link). This will take you directly to the calculator.

Another alternative is the Chest Pain Syndrome Admission app (accessible via the app store). An ECG will be performed. History will be obtained that describes the characteristics of the chest pain (location, duration and provocation). Traditional risk factors for coronary artery disease will be assessed: diabetes mellitus, hypertension, cigarette smoking and dyslipidemia.

5 Screening Tests:

a. Duke chest pain score
b. Duke Treadmill Score
c. Stress ECG (treadmill test)
d. Stress echo
e. Lexiscan nuclear

6 Criteria for Diagnosis of chest pain

a. History
b. Duke chest pain score
c. Duke Treadmill score
d. Stress test results
   See appendix
7 Medication Treatment, Management & Referrals

CHEST PAIN CARE PATHWAY
CHEST PAIN IN LOW-RISK PATIENTS CARE PATHWAY

1. Non Specific Chest Pain Complaint
   - Reassess for other causes
   - Perform Pre-Test Assessment
     - Low Risk
     - Intermediate Risk
     - High Risk

2. Can the patient ambulate?
   - Yes
     - Stress Test
   - No
     - Lesionan Nuclear Stress Test

3. Risk Scoring Tools
   - Duke Chest Pain Score
   - Low Risk
   - Intermediate Risk
   - High Risk

4. ECG
   - Normal or Near Normal
     - Reassess for other causes
     - Stress ECG
     - Normal
     - Abnormal
     - Equivocal
   - Abnormal or Uninterpretable
     - BBB-bundle branch block or paced
     - Other ECG abnormal
     - Lesionan Nuclear Stress Test
     - Normal
     - Abnormal
     - Stress echo or stress nuclear
     - Normal
     - Abnormal
     - Reassess for other causes
     - Cess
## 8 Protocol Development Team

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mark Hernandez MD *Chief Medical Officer</td>
<td>Community Care Collaborative CCC &amp; Seton Healthcare Family of Hospitals</td>
</tr>
<tr>
<td>George Rodgers MD *Clinical Champion</td>
<td>Seton</td>
</tr>
<tr>
<td>Richard Peavey MD</td>
<td>People’s Community Clinic</td>
</tr>
<tr>
<td>Tracy Angelocci MD</td>
<td>Lone Star Circle of Care</td>
</tr>
<tr>
<td>Lisa Doggett MD</td>
<td>El Buen Samaritano</td>
</tr>
<tr>
<td>Curk McFall, MSN, RN</td>
<td>Community Care Collaborative</td>
</tr>
<tr>
<td>Veronica Buitron-Camacho MSN, RN</td>
<td>Community Care Collaborative</td>
</tr>
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</table>

## 9 Chest Pain Protocol Metrics
<table>
<thead>
<tr>
<th>Metric</th>
<th>Measure Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Appropriate use of Chest Pain Protocol</td>
</tr>
<tr>
<td>4.</td>
<td>Time to resolution of complain and/or diagnosis</td>
</tr>
<tr>
<td>5.</td>
<td>Subsequent emergency department visits (unscheduled emergency visits)</td>
</tr>
<tr>
<td>6.</td>
<td>Patient Satisfaction</td>
</tr>
<tr>
<td>7.</td>
<td>Subsequent admission for STEMI or NSTEMI</td>
</tr>
<tr>
<td>8.</td>
<td>Reduction in Lexiscan Nuclear Exam</td>
</tr>
<tr>
<td>9.</td>
<td>Reduction in Emergency department visits</td>
</tr>
<tr>
<td>10.</td>
<td>Primary care clinic referral to cardiologist</td>
</tr>
<tr>
<td>11.</td>
<td>Percent of negative Caths</td>
</tr>
</tbody>
</table>

10 References


<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACS</td>
<td>Acute coronary syndrome</td>
</tr>
<tr>
<td>STEMI</td>
<td>ST elevation myocardial infarction</td>
</tr>
<tr>
<td>NSTEMI</td>
<td>Non ST elevation myocardial infarction</td>
</tr>
<tr>
<td>CATH</td>
<td>Cardiac Catheterization</td>
</tr>
<tr>
<td>ECG</td>
<td>Electrocardiogram</td>
</tr>
<tr>
<td>V-PACED</td>
<td>Ventricular Paced</td>
</tr>
<tr>
<td>MI</td>
<td>Myocardial Infarction</td>
</tr>
<tr>
<td>CHD</td>
<td>Coronary Heart Disease</td>
</tr>
<tr>
<td>LMS</td>
<td>Left Main Stem Coronary Artery</td>
</tr>
</tbody>
</table>

11 Glossary of Abbreviations
# Duke Treadmill Score: Prediction of Coronary Heart Disease In A Patient with Chest Pain Undergoing A Treadmill Stress Test

### Duke Clinical Score: Prediction of Coronary Heart Disease in a Patient with Chest Pain

- **NOTE:** This score is not applicable if patient is known to have CHD

<table>
<thead>
<tr>
<th>Patient Details:</th>
<th>Enter Age &amp; Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>55</td>
</tr>
<tr>
<td>Sex</td>
<td>Male</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Classification of Chest Pain</th>
<th>Enter Chest Pain Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precipitated by exercise</td>
<td>No</td>
</tr>
<tr>
<td>Brief duration (2-15 min)</td>
<td>No</td>
</tr>
<tr>
<td>Relieved promptly by rest or NTG</td>
<td>No</td>
</tr>
<tr>
<td>Retrosternal</td>
<td>No</td>
</tr>
<tr>
<td>Radiating to jaw, neck or left arm</td>
<td>No</td>
</tr>
<tr>
<td>Absence of other cause</td>
<td>No</td>
</tr>
</tbody>
</table>

- **Chest Pain Categorized as:** None/Non-Anginal
- **Probability of significant CHD (ACCAHA Guidelines):** 20%

<table>
<thead>
<tr>
<th>Risk Factors:</th>
<th>Enter Chest Pain Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking (within past 5 years)</td>
<td>No</td>
</tr>
<tr>
<td>Total Cholesterol</td>
<td>193</td>
</tr>
<tr>
<td>Diabetes</td>
<td>No</td>
</tr>
<tr>
<td>Previous MI</td>
<td>No</td>
</tr>
<tr>
<td>ECG: Q Waves</td>
<td>No</td>
</tr>
<tr>
<td>ECG: ST changes at rest</td>
<td>No</td>
</tr>
</tbody>
</table>

- **Probability of significant CHD (Duke):** 23%
- **(>75% stenosis of at least 1 major coronary artery)**
- **Exercise Test usually not indicated**

## 12 Appendix

- Duke Treadmill & Chest Pain Nomograms

Designed by Dr. John Bayliss (1999-2002) v11   West Hertfordshire Cardiology, Hemel Hempstead Hospital, Herts HP2 4AD
### Exercise Test Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise Time – In Minutes – Standard Bruce Protocol</td>
<td>6 Min</td>
</tr>
<tr>
<td>Maximum ST deviation – In mm – at 80 msec after the J-Point</td>
<td>0 mm (always a positive figure, no matter if positive or negative deviation)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Angina Score During Exercise</th>
<th>None</th>
</tr>
</thead>
</table>

| Duke Treadmill Score                          | 6     |

| Probability of Significant CHD                | 25%   |
| Probability of >75% in at least one coronary artery |       |

| Probability of Severe CHD                    | 20%   |
| Probability of 3 vessel CHD or >75% LMS      |       |

| 5 year Mortality                             | 17%   |

| Overall Risk Subcategory                     | Low Risk |

| Angiography usually not indicated          |       |

Designed by Dr. John Bayliss (1999-2002) v11

References:

   - Study dataset n=2842 (ExECG within 6 weeks of Cor Angio)
   - 70% Male, median age 49yr (10-90% centiles 37-60)
   - Training sample n=1422, Validation sample n=1420

   - Study dataset n=2758 (ExECG within 6 weeks of Cor Angio)
   - 70% Male, median age 49yr, 30% prior MI, 47% typical angina, 61% had significant CHD at Angio
   - Training sample n=2758, Validation sample n=467

ROC for predicting significant CHD = 0.76 for DTS, 0.91 for post-test DTS + Clinical score