PURPOSE

To assure that DOP inmates with Coronary Artery Disease are receiving high quality Primary Care for their condition.

POLICY

All DOP Primary Care Providers and Chronic Disease Nurses are to follow these guidelines when treating inmates with this chronic disease. Deviations from these guidelines are permissible only on a case by case basis. When deviations are made they must be clearly documented in the medical record along with a clear explanation of the rationale for the deviation.

PROCEDURE

CORONARY ARTERY DISEASE

1) ***Initial and follow-up evaluation:*** **Refer to Cardiovascular CD Guideline**
2) **Evaluation of chest pain**
   - **a) Etiology of chest pain in primary care**
     - **i)** 60% **- not due to cardiac, GI, or pulmonary**
     - **ii)** 36% - Musculoskeletal
     - **iii)** 13% - Reflux
     - **iv)** 11% - Stable angina
     - **v)** 1.5% - Acute coronary syndrome
   - **b) Unstable patients should be sent to closest ER via EMS**
     - **i)** Have patient chew **325 mgs of aspirin**
     - **ii)** Give **nitroglycerin** unless BP unstable
     - **iii)** Administer **oxygen**
     - **iv)** If able place an **IV access**
   - **c) History**
     - **i) Quality of the pain**
       - **(1)** CAD patients often deny feeling chest "pain"
       - **(2)** Typical symptoms of CAD: squeezing, tightness, pressure, constriction, strangling, burning, heart burn, fullness in the chest, a band-like sensation, knot in the center of the chest, lump in the throat, ache, heavy weight on chest (elephant sitting on chest), like a bra too tight, and toothache
       - **(3)** CAD patients tend to have the same quality of chest pain with recurrent ischemic episodes
       - **(4)** Patients sometimes cannot qualify the nature of the discomfort but places his or her fist in the center of the chest (the "Levine sign")
       - **(5) Patients** tend to have **the same quality** of chest discomfort with **recurrent ischemic episodes**
         - **(a)** Prior to and with an MI
         - **(b)** Prior to and after revascularization
       - **(6) Not likely ischemic**
         - **(a) Sharp or stabbing** pain is **very unlikely** to be ischemic
         - **(b)** Dull, aching, pins and needles
     - **ii) Region or location of pain**
       - **(1)** Ischemic pain is a diffuse discomfort that may be difficult to localize
       - **(2)** Pain that localizes to a small area on the chest is more likely of **chest wall or pleural origin**
       - **(3)** Larger areas of discomfort were more likely to have an ischemic etiology of pain
     - **iii) Radiation**
       - **(1)** Wide extension of chest pain radiation increases the probability that it is due to MI
       - **(2)** Radiation to the **right or both arms** is a strong predictor of acute MI (however **Right shoulder** is often due to **gall bladder** disease)

(3) Location and radiation of angina is usually the **same each time**

iv) Time/timing

(1) Pain from ischemia

(a) Normally lasts **2 to 5 minutes**, rarely more then 20 minutes, however pain from **infarction** may last much longer

(b) Starts **gradually with increasing intensity** over time

(c) May demonstrate a circadian pattern, it is more likely to **occur in the morning** than in the afternoon, correlating with an increase in **sympathetic tone**

(2) Pain lasting for only a **few seconds or is constant** over days or weeks is **not due to ischemia**

(3) Pain with **abrupt onset of severe pain** is often due to **PE or dissection**

(4) Pain with a **vague onset** is usually **functional or musculoskeletal**

v) Aggravating/alleviating factors

(1) Ischemic pain

(a) Provoked by exertion (esophageal pain may also be) **and relieved by rest**

(b) Also may be provoked by **cold, emotional stress, meals, or sexual intercourse**

(c) Provoked by **lying down** (which results in an increase in venous return and increase in wall stress)**,** relieved by **sitting up** (which reduces venous return and preload)

(d) Relieved by nitroglycerin but this does **not reliably predict ischemia**

(e) Relief by **"GI cocktail"** does **not rule out** ischemia

(f) Does not change with position or respiration

(2) Esophageal/GI

(a) Made worse by **swallowing**

(b) Occurs with **eating (ischemia** only occurs with eating in severe CAD)

(c) Pain that is **reliably and repeatedly palliated** by **antacids or food** is likely of **gastroesophageal**

vi) Associated symptoms

(1) SOB most common

(2) Others

(a) Belching, nausea, indigestion, diaphoresis, dizziness, lightheadedness, clamminess, and fatigue

(b) However, may be seen with other etiologies, especially gastrointestinal

d) Physical findings: the following may be present with ischemia and dissipate with resolution

i) Increase in baseline heart rate and blood pressure

ii) New heart sounds: paradoxically split S2, S3 or S4

iii) Precordial pulsation

3) Classification of Chest Pain

a) Typical = meets **all three** of the following

i) Substernal chest discomfort with a characteristic quality and duration

ii) Provoked by exertion or emotional stress

iii) Relieved by rest or nitroglycerin

b) Atypical = meets **two** of the above

c) Non-cardiac = meets **one or none** of the above

4) Estimate probability of CAD (See Tables 1 and 2)

a) Based on: age, sex, cardiovascular risk factors (the **presence or absence** of risk factors makes a **major difference in the likelihood of CAD**), and pain characteristics

b) Tables may **over estimate probabilities** in **primary care** population since they are **based on referral population**

c) Stratify risk for CAD:

i) Low Probability = ≤ 20 %

(1) Stress testing not generally helpful because high percentage of false positives

(2) Evaluate and treat for non cardiac etiologies

(3) Follow clinically and reevaluate if there is no clear etiology and pain persists

ii) Intermediate risk = 21 – 79 %

(1) Stress testing often helpful in further clarifying probability of CAD and helpful in risk stratifying

(2) Consider starting **anti-anginal therapy and risk factor reduction**
(3) Consider **catherization** if stress testing indicates **high risk of death or fails medical therapy**

iii) High Probability = ≥ 80%
(1) Stress testing not helpful in raising or lowering probability of CAD, but is **valuable** in **assessing risk of death**
(2) Start **anti-anginal therapy and risk factor reduction**
(3) Consider **catherization** if stress testing indicates **high risk of death or fails medical therapy**

5) Stress testing
a) Exercise testing
i) **Preferred initial evaluation** in patients who can exercise and that do not have contraindications
ii) Contraindications –
(1) Resting ECG has:
(a) WPW
(b) > 1mm ST depression
(c) LBBB
(2) Evaluate with **echocardiogram** prior to stress testing if clinically has**:**
(a) LV dysfunction
(b) Significant valvular disease
(c) Pericardial disease

b) Pharmacologic imaging: indicated for patients who are otherwise appropriate for stress testing but **unable to exercise**
c) Stress imaging: indicated for patients who are otherwise appropriate for stress testing but have above **ECG contraindications**

6) Diagnosis:
a) Stable angina:
i) Definition: No change in frequency, severity, or duration of pain in the past 6 weeks and generally only involves pain with exertion**.**
ii) Therapy: It is usually safe and reasonable to start medical therapy as an outpatient
b) Unstable angina:
i) Definition: Pain pattern that has significantly worsened recently and/or pain is occurring with minimal or no physical activity**.**
ii) Therapy: Usually should be hospitalized until pain pattern is stabilized**.**

7) Recommended therapies:
a) Anti-platelet therapy:
i) Unless contraindicated **all suspected CAD** patients should be taking 80–162 mg. of coated **aspirin** per day.
ii) There is **no proven clinically significant advantage** of **clopidogrel** over aspirin in stable CAD patients who have not had stenting within the past 12 months.
iii) If unable to take aspirin then clopidogrel should be prescribed.
iv) There is **no role for dipyridamole** in the treatment of angina.
b) Preventive therapy: Most patients should be placed on sufficient medication to control most, if not all their anginal attacks. It is usually best to **start one class** of medication and increase it until **control, side effects or maximum dose** occur. Then if needed a second and/or third class of medication should be added.
i) Beta-blockers: Unless contraindicated these is usually the **first class** of medication that should be tried. This class is ***especially important in patients who have a history of myocardial infarction or CHF***.
(1) General characteristics
(a) All beta-blockers are **equally effective in controlling angina**
(b) Intrinsic ISA beta-blockers should be avoided in patients with history of **prior MI or CHF**
(2) Common side effects:
(a) *Bronchoconstriction*, however, beta blockers, particularly beta selective (atenolol and metoprolol) are safe and effective in patients with mild COPD/asthma who are not taking a beta-2 adrenergic agonist

(b) *Fatigue*, which may be due to the reduction in cardiac output or to direct effects on the central nervous system

(c) *Central side effects* that can occur include nightmares, insomnia, and hallucinations. Although depression is often mentioned as a side effect of beta blockers, this association was **not seen in randomized trials. *Propranolol*** and ***metoprolol*** are lipophilic and enter the CNS readily and are **more prone to cause CNS side** effects

(d) *Erectile dysfunction* is often a problem

(e) *Decreased heart rate, contractility, and AV node conduction* can cause presyncope, syncope, fatigue, orthostatic symptoms

(f) *Worsening of symptoms of peripheral arterial disease or Raynaud phenomenon*. However, there appears to be **no adverse effect on mild to moderate claudication** symptoms when beta-1 selective blockers are used**.**

(3) Choice of beta-blocker

(a) *Beta-1 selective blockers* are the **drug of choice** in most stable angina patients

(i) ***Atenolol*** has the advantage of being in most patients a truly once a day, very low cost, relatively low in side effects

(ii) ***Metoprolol*** is a good second choice but usually needs to be dosed bid unless a long acting form is used and has a **higher incidence of CNS side effects**

(b) ***Propranolol*** *and other non selective* generally offer no advantage and have higher side effect rates

(c) *ISA* drugs (***pindolol and acebutolol***) may be useful in patients (with no history of MI or CHF) with low pretreatment resting pulses or who develop symptomatic bradycardia on other blockers

(d) ***Alpha blocking*** *activity* drugs are not approved for angina but are probably effective and may be useful in some circumstances

(i) ***Carvadilol*** has been shown to be effective in angina and is indicated for the treatment of CHF

(ii) ***Labetolol*** has less data in angina but has been shown to have positive benefits and is indicated for severe hypertension.

(e) *Improved survival in post MI and CHF* patients

(i) *CHF with systolic dysfunction* patients should be started on ***long acting metoprolol or carvadilol*** since both of these drugs have been shown to significantly decrease mortality in these patients

(ii) *Post MI* patients should be on a beta-blocker, usually a beta selective, unless they are not tolerated or there is a strong contraindication. Studies have shown a clear survival benefit.

(4) Therapeutic goals: The following should be the goal in most angina patients

(a) *Resting heart rate of 50-60*

(b) Reduction in the *frequency and severity of angina* as well as the use of sublingual nitroglycerin

(c) Blunting of the pulse and blood pressure raise with exercise, the pulse should be kept at $\leq$ 75% of the level, if known, that brings on symptoms

ii) Long acting nitrates: These are usually the **second line** of medications added to beta blockers if angina is not adequately controlled on maximally tolerated dose or alternative first line therapy if beta-blockers are contraindicated**.**

(1) While they act as venodilators, coronary vasodilators, and modest arteriolar dilators, the primary antiischemic effect of nitrates is to *decrease myocardial oxygen demand by producing systemic vasodilation* more than coronary vasodilation. This systemic vasodilation reduces LV systolic wall stress

(2) Tolerance

(a) If taken **continuously** most nitrates will **fairly rapidly lose** most of their therapeutic effect

(b) Can be avoided by giving long acting nitrates in such a way as to provide a **daily nitrate free period** but the following are potential problems during the nitrate free period with this strategy:

(i) Deterioration in exercise tolerance

(ii) Rebound angina

(3) Preparations available

(a) ***Nitroglycerin transdermal patch***

(i) Starting dose: 0.2 – 0.4 mg/hour, max dose 0.8 mg/hour

(ii) Apply each AM, remove after 12 – 14 hours to prevent tolerance

(b) ***Isosorbide mononitrate***

(i) Available as short acting and long acting tablets

(ii) Dosing:

1. Short acting: 5 – 20 mg BID *given 7 hours apart*

2. Long acting: 30 – 240 mg QD

(c) ***Isosorbide dinitrate***

(i) Available as short acting and long acting tablets

(ii) Dosing:

1. Short acting: 5 – 40 mg BID (5 – 8 hours apart) or TID (5 hours apart) with a minimum 14 hour nitrate free interval

2. Long acting 40 – 80 mg QD or BID with a minimum 18 hour nitrate free interval

(4) Calcium channel blockers: These are an alternative to nitrates as **second line** of medications added to beta blockers if angina is not adequately controlled on maximally tolerated dose or alternative first line therapy if beta-blockers are contraindicated**.**

(a) Advantages:

(i) Provide **24 hours of control** without any concern for tolerance

(ii) Are as **effective as beta blockers** in controlling angina and there effects are **additive to those of beta blockers** when used in combination

(iii) Available once a day dosing

(iv) Usually well tolerated

(v) Effective in lowering blood pressure

(b) Disadvantages/contraindications:

(i) ***Short acting dihydropyridines*** are associated with **increased death rates** and should be avoided

(ii) ***Verapamil*** when **added to a beta blocker** can cause **symptomatic bradycardia**, **heart block** or **heart failure**

(iii) Have **not** been shown to **reduce** cardiac mortality

(c) Agents available

(i) ***Verapamil***

1. Immediate release tablets and sustain release preparations (which are just as effective as immediate release in controlling angina)

2. Very effective alternative to beta blockers

3. **Avoid** use with **beta blockers** and in **severe CHF**

(ii) ***Diltiazem***

1. Immediate release tablets and sustain release preparations (which are just as effective as immediate release in controlling angina)

2. **No negative inotropic** effect

3. Has **less effect on SA and AV** node then verapamil

(iii) ***Amlodipine***

1. Has a long half life

2. **No negative iontropic or chrontropic** effects

3. Can generally be **safely** used in combination with **beta blockers**

c) Abortive therapy: All angina patients should have **immediate access to Nitroglycerin** (NTG) tablets. Educate all patients on the appropriate use of NTG:

i) Strongly reinforce that NTG is **not an analgesic, repeated use is not harmful**, and that it relieves pain by ***stopping the damage being done to the heart due to lack of blood flow.***

ii) If having chest pain: sit down, get out NTG, place one tablet under tongue

iii) Wait 3 – 5 minutes and if still having pain repeat

iv) Wait another 3 – 5 minutes and if still having pain repeat again.

v) Wait another 5 minutes and if pain not relieved declare an emergency and go to the nearest medical facility (usually best to call 911).

vi) Get a new bottle of medicine within 3 months of opening bottle
vii) Do not to keep in hot places (i.e. pants pockets).

d) Risk factor reduction: Major emphasis should be placed on modifying those risk factors which research has shown that when reduced **lead to lower incidence of coronary events**. They are as follows:

i) Cigarette smoking: Smoking patients should be encouraged at every health care encounter to stop smoking.

ii) LDL cholesterol: All patients with CAD who have LDL >100, should be treated with diet, exercise, weight loss, and/or medications as needed to lower their LDL to <100.

(1) LDL = 100 – 130: It is reasonable **to start with life style modifications**. Whether to add medications at this level is a judgement call.

(2) LDL > 130: Most of these patients will need medication to control their LDL in addition to the life style modifications.

(3) Monitoring: If on medication for cholesterol control they should have a lipid panel checked every 6 months and hepatic panel every 12 months.

iii) Hypertension: Good BP control, particularly in patients with LVH, can significantly reduce CAD death rates and symptomatic angina. See Hypertension Guidelines. Consider also checking for excessive rises in BP with activity in those patients who have normal resting BP, but continue to have signs of hypertensive disease and/or poor anginal control.

iv) Left Ventricular Dysfunction: Consider **ACE-inhibitor therapy** in all patients who have LV Systolic dysfunction (EF < 40%) and beta-blocker therapy in those with diastolic dysfunction:

v) Post MI: Beta-blocker therapy should be given to all unless contraindicated in the first 6 months post MI. **ACE-inhibitors** should be given in the first three months post MI particularly in patients with anterior MI, EF < 40%, or signs of Congestive Heart Failure (CHF). These drugs should be continues past the above time limits when indicated for control of BP, angina, LVH, and/or CHF.

5/26/11

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Appendix

Tables may *over estimate* probabilities in primary care population since they are based on referral population

Table 1. **Likelihood (%) of Coronary Artery Disease in Symptomatic Patients, according to Age and Sex**

Age	Non-cardiac Chest Pain		Atypical Chest Pain		Typical Chest Pain	
	Men	Woman	Men	Woman	Men	Woman
30-39	4	2	34	12	76	26
40-49	13	3	51	22	87	55
50-59	20	7	65	31	93	73
60-69	27	14	72	51	94	86

Table 2. **Percentage of Symptomatic Patients with Normal Resting ECG who have CAD in *University Centers***

Age	Non-cardiac CP				Atypical CP				Typical CP			
	Men		Woman		Men		Woman		Men		Woman	
	No risk	With risk	No risk	With risk	No risk	With risk	No risk	With risk	No risk	With risk	No risk	With risk
35	3	35	1	19	8	59	2	39	31	88	10	78
45	9	47	2	22	21	70	5	43	50	92	20	79
55	23	59	4	25	45	79	10	47	80	95	38	82
65	49	69	9	29	71	86	20	51	93	97	56	84

No Risk = no diabetes, smoking, or hyperlipidemia
With risk = one or more of the above

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