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SPA PCP Treatment & Referral Guidelines
Cardiology

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I. Abnormal EKG

Consider referral for non-diagnostic ST-T wave changes if the patient:

- A) Has symptoms suggestive of CAD, is a diabetic, or has two or more risk factors for CAD, and;
- B) Has had a positive or non-diagnostic treadmill
- C) In absence of any risk factors, can do “telephone/fax” referral with cardiologist, without formal visit. This entails previous and ongoing mutual understandings between PCP and Cardiologist.
- D) If risk factors present, refer, or can order treadmill first
- E) Make sure abnormal EKG is sent to cardiologist

II. Hypertension

- A) Diagnostic testing
 - a) Hematocrit, urinalysis, BUN, creatinine, potassium, uric acid, and lipids should be evaluated at the initial diagnosis
 - b) EKG should be obtained if no baseline is available
 - c) Evaluate further if an underlying cause is suggested
- B) Clinical Indications for Referral
 - a) Malignant hypertension
 - b) Inability to achieve control within 6 months using step therapy as per Best Practices in Medicine guideline
 - c) Progressive end organ damage, associated ischemia, cardiomegaly, and/or heart failure

III. Atrial Fibrillation

- A) Diagnostic Testing
 - a) EKG shows absence of P-waves and an irregular ventricular response
 - b) TSH to rule out hyperthyroidism
 - c) Electrolytes
- B) Treatment
 - a) Medical
 - b) Initial therapy is directed toward control of the ventricular rate and the prevention of embolism
 - c) The preferred drugs for rate control are beta-blockers, verapamil HCl and diltiazem HCl (calcium-channel blockers), and digoxin, usually in that order
 - d) Low-risk patients (no evidence of rheumatic mitral valve disease, hypertension, diabetes, heart failure, stroke, or TIA and age under 65 years) can be treated with aspirin 325mg per day
 - e) High risk patients should be anticoagulated with Coumadin to maintain an INR 2.0 - 3.0. Older patients have an increased risk of bleeding and may require closer surveillance of clotting studies
 - f) Patients who cannot safely use Coumadin should be given aspirin

- g) Coumadin can be initiated in the outpatient setting unless the patient has already experienced embolic symptoms. In such cases, heparin should be used until Coumadin has achieved a therapeutic INR. Aspirin and Coumadin should not be used concomitantly because of the risk of bleeding.
- h) If atrial fibrillation is of recent onset (less than 12 months), cardioversion to sinus rhythm should be considered. Cardioversion might be pharmacological or electrical. Anticoagulation with Coumadin should be maintained for three weeks before elective cardioversion, unless the arrhythmia has been present for less than 48 hours. Coumadin should be maintained for four weeks after cardioversion.
- i) Chronic anticoagulation with Coumadin is a safe alternative to cardioversion, especially for patients who have few symptoms.
- j) Anticoagulation in stable chronic atrial fibrillation is less hazardous than frequent cardioversions and relapses if the maintenance of sinus rhythm is unstable.

Note -Anti-arrhythmic drug therapy is complicated and should be initiated only in a monitored setting by a physician who is qualified and current in this field. All these drugs are potentially proarrhythmic and standards of care change. Atrial fibrillation will recur in the majority of patients unless the precipitating cause is removed.

- C) Clinical Indications for Referral
 - a) Rate control is unsuccessful
 - b) Cardioversion is indicated
 - c) Associated heart failure or valve disease
 - d) Recurrent paroxysmal atrial fibrillation

IV. Congestive Heart Failure

- A) Diagnostic Testing
 - a) Hematocrit, renal function and electrolytes, thyroid function, and pulmonary function
 - b) EKG may show evidence of underlying coronary artery disease, arrhythmia, atrial enlargement, or ventricular hypertrophy. It may be normal even with significant disease.
- B) Clinical Indications for Imaging
 - a) Echocardiogram is the ideal diagnostic procedure for evaluation of the size and dynamic function of both ventricles and the heart valves. An echocardiogram should always be performed at the time heart failure is first diagnosed and to evaluate pericardial effusions.
 - b) Chest x-ray may show cardiomegaly, pleural effusion, and/or pulmonary congestion.
- C) Clinical Indications for Referral
 - a) Acute heart failure associated with myocardial infarction, arrhythmia, ischemia, abnormal blood pressure, or unclear etiology
 - b) Valvular or pericardial disease
 - c) Unsatisfactory response to treatment as per Sutter Health Central CHF guidelines
 - d) Confirm diagnosis or rule out treatable primary cause
 - e) Unexplained acute decompensation, including possible ischemia

V. **Hyperlipidemia**

Inability to meet NCEP goal within 1 year using Best Practices in Medicine guideline. Endocrinology referral may be appropriate. Timetable for control is not as important a factor as control itself. Referrals for this should be rare and reserved for cases of combination therapy of magnitude uncomfortable by PCP. Follow up should be done by the PCP.

VI. **Coronary Artery Disease/Angina**

A) History

- a) It is essential to get a good history, as the resting EKG is normal in up to 50% of cases
- b) Typically described as substernal chest pain, heaviness, or pressure which may radiate to the neck, jaw, shoulders, or arms (left more commonly than right)
- c) Usually occurs with exertion and is relieved by rest
- d) May be precipitated by stress, cold, or eating

B) Canadian Cardiovascular Classification system

- a) Class I
 - 1) Ordinary activity (walking, climbing stairs) does not cause angina
 - 2) Angina occurs with strenuous, rapid, or prolonged exertion
- b) Class II
 - 1) Slight limitation of ordinary activity
 - 2) Angina occurs walking or climbing stairs or a hill rapidly, after meals, in the cold or wind, and/or under emotional stress
 - 3) Able to walk more than two level blocks and/or more than one flight of stairs at a normal pace
- c) Class III
 - 1) Marked limitation of ordinary is 50-70% activity
 - 2) Angina occurs walking one or two level blocks and/or climbing one flight of stairs at a normal pace
- d) Class IV
 - 1) Inability to carry on any physical activity without discomfort
 - 2) Anginal symptoms may be present at rest

C) Diagnostic Testing

- a) Exercise treadmill test (ETT)
- b) Positive if eletrocardiographic evidenced of ischemia is present during pain or stress testing
- c) ETT is most useful as a diagnostic test in patients who have an intermediate probability of CAD, based on clinical judgement
- d) In patients with an intermediate probability of CAD, a positive ETT greatly increases the chances that CAD is truly present; a negative ETT greatly increases the chances that CAD is not truly present
- e) In patients with clinical signs and symptoms strongly suggestive of angina, stress testing is not necessary to diagnose coronary artery disease. In such patients a normal ETT is most likely a false negative.
- f) In addition to aiding in the diagnosis of CAD, ETT may also be used to:
 - 1) Assess prognosis in patients with known CAD
 - 2) Assess perioperative risk

3) Evaluate response to therapy

An abnormal resting EKG may make the exercise EKG unreliable. In such cases, imaging should be considered (see below).

D) Clinical Indications for Imaging

a) Stress echocardiography

- 1) Cost is about two times that of ETT
- 2) Increases the accuracy of a stress electrocardiogram

b) Nuclear medicine

1) Thallium or technetium sestamibi treadmill test:

- Cost is five to six times that of ETT
- Helpful for localizing ischemia in patient with
 - ❑ Resting hypokinesia
 - ❑ Low ejection fraction
 - ❑ Atrial fibrillation
 - ❑ Left bundle branch block (LBBB)
 - ❑ Large body mass which cannot be imaged well by an echocardiogram
 - ❑ Strong clinical suspicion of ischemia and negative ETT
 - ❑ Patients who cannot exercise – Adenosin cardiolute or persantine scan is recommended

E) Clinical Indications for Referral

- a) Diagnosis in unclear
- b) Diagnostic testing suggests an unfavorable prognosis
- c) Symptoms persist despite maximal medical therapy
- d) Symptoms are unstable or worsening
- e) All patients except those with chronic, stable angina may be candidates for referral

VII. Preoperative Cardiology Evaluation

- A) Candidates for procedures requiring more than local anesthesia who have known coronary artery disease and are symptomatic.
- B) All candidates for peripheral vascular bypass procedures or abdominal aortic aneurysm repair.
- C) Other patients felt to be at high risk from cardiac disease, such as those with a history of MI within the previous 6 months, uncontrolled arrhythmia, or significant valve disease.
- D) **In general, for “high-risk” patients, but minimal procedures, i.e., cataract surgery, etc., no need for referral.**
- E) Stable CHF, stable angina, prior MI and diabetes considered “medium risk”; again, no referral for minimal procedures, yes for complex; can call Cardiologist to see if needs pre-op referral or not. Referral for medium risk procedure if exercise intolerant (such as unable to climb one flight of stairs). Any cardiovascular procedure probably merits Cardiology pre-operative.

- F) “Abnormal EKG” in absence of cardiovascular disease signs or symptoms OK for “moderate complexity” surgery without Cardiology pre-operative eval.

VIII. Endocarditis Prophylaxis

Cardiac Conditions Associated with the Highest Risk of Adverse Outcome from Endocarditis for which prophylaxis is recommended.

- A) Prosthetic cardiac valve
- B) Previous infectious endocarditis
- C) Congenital heart disease (CHD)*
 - a) Unrepaired cyanotic CHD, including palliative shunts and conduits
 - b) Completely repaired congenital heart defect with prosthetic material or device, whether placed by surgery or by catheter intervention, during the first 6 months after the procedure†
 - c) Repaired CHD with residual defects at the site or adjacent to the site of a prosthetic patch or prosthetic device (which inhibit endothelialization).

- D) Cardiac transplantation recipients who develop cardiac valvulopathy

*Except for the conditions listed above, antibiotic prophylaxis is no longer recommended for any other form of CHD.

† Prophylaxis is recommended because endothelialization of prosthetic material occurs within 6 months after the procedure.

- E) Dental care and oral, upper respiratory tract, and esophageal procedures (including tonsillectomy, bronchoscopy with rigid bronchoscope, and sclerotherapy):
 - a) Follow up dosing is no longer recommended. The total children’s dose should not exceed the adult dose.
 - b) Standard general prophylaxis:
 - 1) Amoxicillin trihydrate 2.0gm (children, 50/mg/Kg) given orally, one hour before the procedure
 - c) If the patient is unable to take oral medications:
 - 1) Ampicillin 2.0 (children, 50mg/Kg) given IM or IV, 30 minutes before the procedure
 - d) If the patient is allergic to penicillin:
 - 1) Clindamycin 600mg (children, 20mg/Kg) given orally, one hour before the procedure
 - 2) Cephalexin or Cefadroxil 2.0gm (children, 50mg/Kg) given orally, one hour before the procedure
 - 3) Axithromycin or Clarithromycin 500mg (children, 50mg/Kg) given IV, 30 minutes before the procedure
 - 4) Cefaxolin 1.0gm (children, 20mg/Kg) given IM or IV, 30 minutes before the procedure
 - 5) Cephalosporins should not be used in patients with an immediate-type hypersensitivity reaction to penicillins
 - e) Gastrointestinal and genitourinary procedures:
 - 1) If the patient is at low or moderate risk:
 - Amoxicillin trihydrate 2.0gm (children, 50mg/Kg) given orally, one hour before the procedure

- Ampicillin 2.0gm (children, 20mg/Kg) given IM or IV, 30 minutes before the procedure
- 2) If the patient is at low or moderate risk and is allergic to penicillin:
 - Vancomycin 1.0gm (children, 20/mg/Kg) given IV over one to two hours with the infusion completed within 30 minutes of starting the procedure
- 3) If the patient is at high risk:
 - Ampicillin 2.0 (children, 50mg/Kg) given IM or IV plus Gentamicin 1.5 mg/kg (maximum 120mg) given IM or IV, 30 minutes before the procedure
 - Six hours later:
 - Ampicillin 1.0gm (children, 25mg/Kg), given IM or IV
 - Amoxicillin trihydrate 1.0 (children, 25mg/Kg) given orally
- 4) If the patient is high risk and is allergic to penicillin:
 - Vancomycin 1.0gm (children, 20mg/Kg) given IV over one to two hours plus Gaentamicin 1.5mg/Kg (maximum 120mg) IM or IV. Complete infusion within 30 minutes of the procedure.

IX. Syncope

A) Diagnosis

Note: Syncope is a transient loss of consciousness due to cerebral hypoperfusion. There is spontaneous recovery without resuscitation, usually within five minutes. It is often abrupt in onset, which may occasionally result in injury. Major causes are:

- a) Impaired vasoconstriction mechanisms
- b) Vasovagal
- c) Autonomic insufficiency
- d) Orthostatic hypotension
- e) Dehydration
- f) Blood loss
- f) Excessive use of antihypertensives, diuretics, or antidepressants
- g) Elderly
- h) Reduction of venous return
- i) Cough
- j) Valsalva maneuver
- k) Micturition
- l) Arrhythmia
- m) Bradycardis (sinus bradycardia, carotid sinus hypersensitivity, heart block, ventricular asystole)
- n) Tachycardia (supraventricular, ventricular)
- o) Sick sinus syndrome
- p) Reduction of cardiac output
- q) Obstruction of left ventricular outflow (aortic stenosis, hypertrophic obstructive cardiomyopathy)
- r) Obstruction of right ventricular outflow (pulmonary stenosis, pulmonary embolism, pulmonary hypertension)
- s) Myocardial ischemia or infarction
- t) Pericardial tamponade

B) History

Vasovagal syncope is most common. It often occurs in young women and results from either excessive vagal tone or impaired reflex venous vasoconstriction. It may be initiated by painful, stressful, or emotional experiences. A prodromal syndrome of nausea, pallor, diaphoresis, lightheadedness, weakness, or dimming vision often precedes the episode.

- a) Syncope in autonomic dysregulation and orthostatic hypotension usually follows rising from a lying or sitting position
- b) Mechanical cardiogenic syncope usually occurs during or after exertion
- c) Syncope due to cardiac arrhythmia usually has a rapid onset of recovery
- d) History of pre-existing cardiac disease should be addressed, probably need referral, think arrhythmia.
- e) A family history of sudden death or syncope may be present in patients with hypertrophic obstructive cardiomyopathy or prolonged QT syndromes
- f) Testing for orthostatic hypotension
- g) Examination of carotid and other arteries
- h) Evidence of valvular or left ventricular dysfunction
- i) Carotid sinus massage during EKG monitoring (if no bruits are heard) if carotid sinus hypersensitivity is suspected

C) Diagnostic Testing

- a) In patients under 50 without heart disease, diabetes, seizure disorder, or substance abuse, EKG should be done to check for evidence of WPW, prolonged QT, hypertrophic obstructive cardiomyopathy, or LV hypertrophy if these are suspected by history and/or physical examination
- b) In a similar population over age 50:
 - 1) EKG
 - 2) Ambulatory EKG monitoring.
 - 3) Tilt testing; if autonomic dysregulation is suspected
 - 4) Electrophysiological studies in patients with recurrent episodes who have nondiagnostic ambulatory EKG's

D) Clinical Indications for Imaging in Patients with Suspicion of Cardiac Disease

- a) Echocardiogram to assess for mechanical causes in patients with exertional or postexertional syncope or suspicious physical findings

E) Patients with syncope should be warned about driving motor vehicles. Notify County Health Officer (California law).

F) Clinical Indication for Referral

- a) Frequent recurrent syncope or syncope with cardiac disease or history of cardiac disease.

X. Paroxysmal Supraventricular Tachycardia

A) Diagnosis

- a) History
- b) Spontaneous onset of rapid regular heart rate
- c) The duration and frequency of episodes varies
- d) Often associated with dyspnea

- e) Angina, congestive heart failure, or shock may be precipitated if there is underlying myocardial or coronary artery disease

B) Physical Findings

- a) Rapid, regular heart rate in the range of 150-220 beats per minute
- b) Exam is usually negative otherwise

C) Diagnostic Testing

- a) EKG shows a regular rhythm with or without P-waves, QRS complexes are narrow unless there is an intraventricular conduction delay
- b) TSH to rule out hyperthyroidism
- c) Electrolytes
- d) Rule out Wolff-Parkinson-White syndrome by EKG

D) Clinical Indications for Imaging

- a) Echocardiogram. Not routinely indicated in young, otherwise healthy patients who have intermittent episodes. May be indicated in some cases.

E) Treatment

a) Lifestyle

- 1) Alcohol, caffeine, lack of sleep, anorexiant, URIs, and the over-the counter decongestants used to treat them (pseudoephedrine and phenylpropanolamine) have all been associated with this disorder. These should be eliminated when possible.

b) Acute Episode

- 1) Vagal stimulation is effective in up to 50% of cases.
 - Gagging, Valsalva maneuver, and placing the face in ice water are good, safe mechanisms to increase vagal tone.
 - Carotid sinus stimulation is also effective if the above do not work, but is potentially dangerous and should not be attempted for those with carotid bruits or a history of transient ischemic attack or cerebrovascular accident. Firm, gentle pressure over the carotid sinus for five to ten seconds, accomplishes it. Apply pressure to only one side at a time.

c) Drug Therapy

- 1) Verapamil HCl, 80mg orally, may be used to abort an episode before seeking medical attention
- 2) Two intravenous agents will terminate over 90% of episodes. The first choice is intravenous adenosine in a 6mg bolus with a second and third dose of 12mg at one-to two-minute intervals, if necessary. If unsuccessful, try intravenous verapamil HCl 2.5mg with subsequent doses of 2.5-5.0mg every 10-15 minutes up to a total of 20mg.

- d) Cardioversion is used for prolonged, symptomatic episodes not responsive to the above treatments.

F) Prevention:

- a) This is not a dangerous arrhythmia in patients with normal coronary arteries and normal ventricular function, and prophylactic treatment in such patients is at the patient's choice.

- b) Patients with frequent or prolonged episodes may elect prophylaxis. Long-acting verapamil HCl or diltiazem HCl may be used on a continuous basis for prophylaxis. The minimal effective dose should be used. Beta-blockers are also effective.
- c) The risks of more potent antiarrhythmics, such as quinidine, are not justified by the benign nature of this condition.
- d) Radioablation may be alternative.

XI. Acute Chest Pain

Note: Chest discomfort or pain may be the presenting symptom in a wide variety of clinical problems ranging from acute, life-threatening illness to minor self-limited conditions. It can signal pathology, not only in the cardiac and pulmonary systems, but also in the gastrointestinal, neurological, and musculoskeletal systems. Diagnosing potentially life-threatening acute cardiopulmonary events instead of other possibilities is one of the most important and costly challenges in medicine.

A) Diagnosis

a) History

- 1) The history will often give clues to the etiology of the chest complaint
- 2) Location timing with respect to breathing exertion, or eating; prior episodes of chest discomfort; association with cough; hemoptysis; sputum production of dyspnea; chest wall tenderness; history of prior disease (asthma, COPD, congestive heart failure), trauma, or recent surgery should be considered.
- 3) The presence of significant anginal-type pain or dyspnea should signal the need for emergency investigation and treatment.

b) Physical Findings

- 1) Physical findings may confirm the diagnostic impression formed after history taking; however, the most serious of chest emergencies (myocardial infarction or pulmonary embolism) may have no associated physical findings.

B) Diagnostic Testing

- a) Resting EKG to assess for the acute changes of myocardial infarction, acute rhythm disturbances, or right bundle branch block, which may be seen in pulmonary embolism
- b) Cardiac enzymes, CBC, chem panel
- c) Oximetry or arterial blood gasses in patients with dyspnea as part of the presentation
- d) If stable angina pectoris is suspected and there is no evidence of acute myocardial infarction, consider exercise treadmill test.

C) Clinical Indications for Imaging

- a) Plain x-rays other than regular chest x-ray (i.e., sternum or rib views):
 - 1) Not routinely indicated if the treatment decision will be unaffected (i.e., possible rib fracture but no pneumothorax on chest x-ray)
- b) CT Scan of the chest:
 - 1) Dissecting thoracic aortic aneurysm (some clinicians prefer transthoracic or transesophageal echocardiography if available)
 - 2) Suspected mass and/or mass effect on plain film
- c) Ultrasound

- 1) Lower extremity duplex Doppler may obviate the need for other studies if positive for deep vein thrombosis in patients with suspected pulmonary embolism
 - 2) Localization of pleural effusion for thoracentesis
 - d) Nuclear Medicine
 - 1) V/Q scan for suspected pulmonary embolism (after plain chest x-ray)
 - 2) Bone scan for occult lesions (i.e. rib metastases)
 - e) Contrast GI studies:
 - 1) Esophagram for esophageal obstruction, perforation, or motility disorder
 - f) MRI
 - 1) Not routinely used as the primary diagnostic tool
 - 2) Usually used for problem solving when other examinations are inconclusive
 - g) Imaging not routinely indicated:
 - 1) Nonspecific musculoskeletal pain
 - 2) Rib films for suspected rib fracture
- D) Clinical Indications for Referral
- a) Referral threshold is dependent upon the specific condition diagnosed.
 - b) If very atypical, and no risk factors, probably no need for consult.

XII. Exercise Stress Test

A) Indication

- a) Chest pain or equivalent to diagnose ischemia, especially in patients who have intermediate probability of ischemia.
- b) Prognosis in patients with CAD or to undergo high-risk surgery.
- c) Assess therapy (including medical, surgical, percutaneous intervention).

B) Contraindication

- a) Unstable chest pain or angina
- b) Uncontrolled arrhythmia
- c) Severe AS
- d) Uncontrolled congestive heart failure
- e) Acute myocardial infarction, pulmonary embolic or dissection.
- f) Uncontrolled, severe hypertension.
- g) Unable to use exercise equipment (including severe COPD, severe peripheral vascular disease, general debility, severe arthritis). **PATIENT MAY BE A CANDIDATE FOR ADENOSINE OR PERSANTINE NUCLEAR SCAN.**

- C) Exercise stress test **without imaging** is **less accurate** especially in women, LBBB, digoxin therapy, significant baseline ST changes, significant LVH, and paced rhythm.

D) Imaging

- a) More accurate
- b) Allows localization of ischemia
- c) Allows quantifying of ischemia
- d) Allows estimate of ejection fraction
- e) Shows amount of infarcted tissue (can be used to assess viability, i.e., thallium study).

- E) Stress echo is more difficult if there are poor echo windows, i.e., COPD, obesity, barrel chest.
- F) If unable to exercise, consider adenosine or Persantine myocardial nuclear perfusion study (or dobutamine stress echo).

APPROVAL:


SPA Medical Director

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