ICD-10-PCS

Drainage

Root Operations That Take Out Solids, Fluids, or Gases from a body part

Example: Thoracentesis, Incision and Drainage, Aspiration, Lumbar puncture.

Explanation: The qualifier Diagnostic is used to identify drainage procedures that are biopsies.

Additional examples of Drainage procedures:
- Routine Foley catheter placement
- Laparoscopy with right ovarian cystotomy and drainage
- Thoracentesis of left pleural effusion
- Endoscopic drainage of right ethmoid sinus

Incision and drainage of external perianal abscess

*Coding guideline B4.1b
If the prefix "peri" is combined with a body part to identify the site of the procedure, the procedure is coded to the body part removed.
ICD-10-PCS Drainage Coding Exercises

Index: Incision, abscess see Drainage

In this case, there is no device and there is no documentation that this was a diagnostic procedure. If a drainage device was used, the sixth character value would be 0.

ICD-10-PCS Drainage Coding Exercises

Open right hip arthroscopy with drain placement

*Pay close attention to all tables. They appear the same, but the difference is the choice for the sixth character, with or without drainage device.

ICD-10-PCS Drainage Coding Exercises

Diagnostic percutaneous paracentesis for ascites

*Paracentesis is a procedure in which a needle or catheter is inserted into the peritoneal cavity to obtain ascitic fluid for diagnostic or therapeutic purposes. In this case, the procedure was performed for diagnostic purposes.

ICD-10-PCS Drainage Coding Exercises

Root Operations That Take Out Solids, Fluids, or Gases from a body part

Extirpation- Taking or cutting out solid matter from a body part.

Examples: Thrombectomy, endarterectomy, choledocholithotomy, excision foreign body.

Extirpation represents a range of procedures where the body part itself is not the focus of the procedure. Instead, the objective is to remove solid material such as a foreign body, thrombus, or calculus from the body part.
**ICD-10-PCS Extirpation**

Additional examples of Extirpation procedures:
- Foreign body removal, skin
- De-clotting of arteriovenous dialysis graft
- Removal of foreign body, left cornea
- Laparoscopy with excision of old suture from mesentery

**ICD-10-PCS Extirpation**

Explanation: The solid matter may be an abnormal byproduct of a biological function or a foreign body; it may be imbedded in a body part, or in the lumen of a tubular body part. The solid matter may or may not have been previously broken into pieces.

**ICD-10-PCS Extirpation Coding Exercises**

Percutaneous mechanical thrombectomy, right common interosseous artery

*Coding guideline B4.2
Where a specific branch of a body part does not have its own body part value in PCS, the body part is coded to the closest proximal branch that has a specific body part value.

**ICD-10-PCS Extirpation Coding Exercises**

Nerves that are not identified by a separate body part value are coded to the closest proximal branch identified by a body part value.

*The Alphabetic Index can be utilized to find the correct body part value.

**ICD-10-PCS Extirpation Coding Exercises**

Forceps removal of foreign body in the left nostril

*There is no alphabetic Index entry for removal of foreign body. It is important that root operation definitions in PCS are followed.

**ICD-10-PCS Extirpation Coding Exercises**

Foreign body removal, skin of right index finger

*If a body system does not contain a separate body part value for fingers, procedures performed on the fingers are coded to the body part value for the hand. The same for toes, procedures performed on the toes are coded to the body part value for the foot.
ICD-10-PCS Fragmentation

Fragmentation- Breaking solid matter in a body part into pieces.

Examples: Extracorporeal shockwave lithotripsy, transurethral lithotripsy

Fragmentation is coded for procedures to break up, but not remove, solid material such as calculus or foreign body. This root operation includes both direct and extracorporeal Fragmentation procedures.

Additional examples:
- Hysteroscopy with intraluminal lithotripsy of left fallopian tube calcification
- Thoracotomy with crushing of pericardial calcifications
- ESWL of left kidney

Explanation: The physical force (for example, manual, ultrasonic) applied directly or indirectly is used to break the solid matter into pieces. The solid matter may be an abnormal byproduct of a biological function or a foreign body. The pieces of solid matter are not taken out.

ESWL, bilateral ureters

*ESWL is an externally applied, focused, high-intensity acoustic pulse using shockwaves to break up stones into small pieces.
ICD-10-PCS Fragmentation Coding Exercises

Coding guideline B4.3
Bilateral body part values are available for a limited number of body parts. If the identical procedure is performed on contralateral body parts, and a bilateral body part value exists for that body part, a single procedure is coded using the bilateral body part value. If no bilateral body part value exists, code each procedure separately using the appropriate body part value.

Index: Lithotripsy, see Fragmentation. The ESWL (extracorporeal shock wave lithotripsy), see Fragmentation. The ESWL is coded to Fragmentation.

The bilateral ureter body part is not available for the root operation Fragmentation, so the right and left sides are coded as separate procedures.

Transurethral cystoscopy with fragmentation of bladder neck calculus
*Bladder and bladder neck have different body part values. The cystoscopy (inspection) is not separately coded because it is the approach and is performed to achieve the objective of the procedure and is considered an integral component.

ERCP with lithotripsy of common bile duct stone
*ERCP is performed with a scope entering through the mouth to the biliary system via the duodenum, so the approach value is Via Natural or Artificial Opening Endoscopic. This would be considered integral to performing the procedure and would not be separately coded to Inspection.

Index: Lithotripsy, see Fragmentation. The Endoscopic Retrograde Cholangio-pancreatography with lithotripsy is coded to Fragmentation.

There is an entry in the Alphabetic Index for ERCP see Fluoroscopy, Hepatobiliary System and Pancreas BF1.

This would identify the imaging component of this procedure and this would be added to the surgical code if one codes to this degree of specificity with ICD-10-PCS.

The Charge Description Master would most likely assign this component of the procedure.
Objectives

- Review structure and function of heart and cardiovascular system
- Be able to recognize some of the most commonly prescribed medications for cardiac diseases
  - Heart failure
  - Acute coronary syndromes
  - Arrhythmias
- Recall common adverse effects associated with these medications

Heart Disease

- Heart disease leading cause of death in United States
  - About 2,200 deaths per day
- Coronary heart disease most common type of heart disease

Overview of Heart Function

- Blood Pressure = CO x SVR
  - CO: cardiac output
  - SVR: systemic vascular resistance

Heart Failure

What is Heart Failure?
Diastolic vs Systolic HF

- Normal heart
- Hypertrophied heart (diastolic heart failure)
- Dilated heart (systolic heart failure)

Systolic versus Diastolic HF

<table>
<thead>
<tr>
<th>Systolic HF</th>
<th>Diastolic HF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure to contract</td>
<td>Failure to fill</td>
</tr>
<tr>
<td>Pumping defect</td>
<td>Filling defect</td>
</tr>
<tr>
<td>50 – 80% of patients</td>
<td>20 – 50% of patients</td>
</tr>
<tr>
<td>↓ Ejection fraction</td>
<td>← → ↑ Ejection fraction</td>
</tr>
<tr>
<td>Dilated ventricle</td>
<td>Stiff ventricle</td>
</tr>
</tbody>
</table>

Compensatory mechanisms in HF

- Post-ventricular/functional/lobeulsis
  - Increased cardiac output
  - Reduced filling pressure
  - Renal vasoconstriction
  - Activation of renin-angiotensin system

Treatment Options

- Nonpharmacologic
- Pharmacologic
  - ACE inhibitors
  - ARBs
  - Beta-blockers
  - Diuretics
  - Aldosterone antagonists
  - Digoxin
  - Vasodilators
  - Other agents

ACE Inhibitors

- First line therapy for HF
  - Beneficial for all classes of heart failure
  - Prevents formation of angiotensin II
- Benefits
  - Reduce mortality
  - Reduce hospitalizations
  - Improve symptoms
  - Reduce remodeling

ACEI continued

<table>
<thead>
<tr>
<th>Drug</th>
<th>Initial Dose</th>
<th>Target Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Captopril (Capoten®)</td>
<td>6.25 mg TID</td>
<td>50 mg TID</td>
</tr>
<tr>
<td>Enalapril (Vasotec®)</td>
<td>2.5 mg BID</td>
<td>10 – 20 mg BID</td>
</tr>
<tr>
<td>Lisinopril (Zestril, Prinivil®)</td>
<td>2.5 – 5 mg QD</td>
<td>20 – 40 mg QD</td>
</tr>
<tr>
<td>Perindopril (Aceon®)</td>
<td>2 mg QD</td>
<td>8 – 16 mg QD</td>
</tr>
<tr>
<td>Quinapril (Accupril®)</td>
<td>5 mg QD to BID</td>
<td>20 mg BID</td>
</tr>
<tr>
<td>Ramipril (Altace®)</td>
<td>1.25 – 2.5 mg QD</td>
<td>10 mg QD (5 mg BID)</td>
</tr>
<tr>
<td>Trandolapril (Mavik®)</td>
<td>1 mg QD</td>
<td>4 mg QD</td>
</tr>
</tbody>
</table>

- Side effects:
  - Hypotension, ↑ SCR, hyperkalemia, cough, dizziness, GI (diarrhea, nausea, vomiting)
ACEI continued

- Contraindications
  - Pregnancy
  - Angioedema
  - Bilateral renal artery stenosis
  - Acute renal injury

Angiotensin-Receptor Blockers

- Reasonable alternative to ACE-inhibitors
  - Use if intolerant to ACEI
- Only 2 ARBs FDA approved for HF:
  - Candesartan and valsartan
- Similar efficacy to ACE-inhibitors
  - Current Guideline Recommendations:
    - In patients who cannot tolerate ACEI
    - Alternative to ACEI

ARBs continued

<table>
<thead>
<tr>
<th>Drug</th>
<th>Initial Dose</th>
<th>Maximum Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azilsartan (Edarbi®)</td>
<td>40 – 80 mg QD</td>
<td>80 mg QD</td>
</tr>
<tr>
<td>Candesartan (Atacand®)*</td>
<td>4 – 8 mg QD</td>
<td>32 mg QD</td>
</tr>
<tr>
<td>Eprosartan (Teveten®)</td>
<td>400 – 600 mg QD</td>
<td>400 mg Bid</td>
</tr>
<tr>
<td>Irbesartan (Avapro®)</td>
<td>75 – 150 mg QD</td>
<td>300 mg QD</td>
</tr>
<tr>
<td>Losartan (Cozaar®)*</td>
<td>25 – 50 mg QD</td>
<td>50 – 100 mg QD</td>
</tr>
<tr>
<td>Olmesartan (Benicar®)</td>
<td>10 – 20 mg QD</td>
<td>40 mg QD</td>
</tr>
<tr>
<td>Telmisartan (Micardis®)</td>
<td>20 – 40 mg QD</td>
<td>80 mg QD</td>
</tr>
<tr>
<td>Valsartan ( Diovan®)*</td>
<td>20 – 40 mg QD</td>
<td>160 mg QD</td>
</tr>
</tbody>
</table>

- *ARBs that are used in heart failure
- Side effects: hypotension, ↑ SCr, hyperkalemia
- Contraindications same as ACE inhibitors

Beta-Blockers

- Historically not used in HF
- Now one of first line agents used in HF
- Benefits
  - Reduce mortality, improves ejection fraction, reduce HF hospitalizations
  - One of the three β-blockers proven to reduce mortality should be used in all stable patients with EF ≤ 40%

Beta-Blocker Agents

<table>
<thead>
<tr>
<th>Drug</th>
<th>Initial Dose</th>
<th>Target Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bisoprolol (Zebeta®)</td>
<td>1.25 mg QD</td>
<td>10 mg QD</td>
</tr>
<tr>
<td>Carvedilol (Coreg®)</td>
<td>3.125 mg QD</td>
<td>25 mg Bid</td>
</tr>
<tr>
<td>Metoprolol succinate (Toprol XL®)</td>
<td>12.5 – 25 mg QD</td>
<td>200 mg QD</td>
</tr>
</tbody>
</table>

- β₁ selective agents: bisoprolol and metoprolol
- Non-selective (β₁, α₁, α₂): carvedilol
- Side effects: bradycardia, hypotension, depression, sexual dysfunction, hypoglycemia, bronchospasm

Initiation of β-Blocker Therapy

- Patients should have no/minimal evidence of fluid retention
- Start low and titrate slow
  - Rapid titration can cause acute decompensation
- Symptoms may worsen during initiation
  - Improvement seen after 4 to 10 weeks
- Mortality benefit seen even in lowest doses
**β-blocker use in Acute Decompensated HF**

- Beneficial during acute decompensated HF
- Do not discontinue upon HF hospitalization
  - ↑ mortality risk when withdrawing beta-blocker upon admission
- Initiation of therapy prior to discharge improves use without increase in side effects
  - Initiate at very low doses (~ 1/10 target dose)

**Diuretics**

- Used to improve symptoms in HF
- No mortality benefit
  - Reduce morbidity
- Should not be used as monotherapy
- Loop vs thiazide
  - Loop diuretics more potent
  - Thiazides not effective if CrCl < 30 mL/min
- Dose adjustments
  - Based on symptoms and body weight

**Agents**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Initial Dose</th>
<th>Max Total Daily Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Loop Diuretics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bumetanide (Bumex®)</td>
<td>0.5 – 1.0 mg QD-BID</td>
<td>10 mg</td>
</tr>
<tr>
<td>Furosemide (Lasix®)</td>
<td>20 – 40 mg QD-BID</td>
<td>600 mg</td>
</tr>
<tr>
<td>Torsemide (Demadex®)</td>
<td>10 – 20 mg QD</td>
<td>200 mg</td>
</tr>
<tr>
<td><strong>Thiazide Diuretics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chlorothiazide (Diuril®)</td>
<td>250 – 500 mg QD-BID</td>
<td>1000 mg</td>
</tr>
<tr>
<td>Hydrochlorothiazide (HydroDiuril®)</td>
<td>25 mg QD-BID</td>
<td>200 mg</td>
</tr>
<tr>
<td>Indapamide (Lozol®)</td>
<td>2.5 mg QD</td>
<td>5 mg</td>
</tr>
<tr>
<td>Metolazone (Zaroxolyn®)</td>
<td>2.5 mg QD</td>
<td>20 mg</td>
</tr>
</tbody>
</table>

- Side effects: electrolyte abnormalities, ↑ SCr, dehydration, sun sensitivity

**Aldosterone Antagonists**

- Agents
  - Spironolactone (Aldactone®) 25-100 mg daily
  - Eplerenone (Inspra®) 25-50 mg daily
- Benefits
  - ↓ hospitalization and mortality
  - ↓ ventricular remodeling
- Do not initiate unless:
  - Serum K+ < 5.0 mEq/L
  - SCr ≤ 2.5 mg/dL in men and SCr ≤ 2 mg/dL in women
- Adverse Effects: hyperkalemia, gynecomastia

**Digoxin (Lanoxin®)**

- Usual dose: 0.125 to 0.25 mg PO daily
- Low dose (0.125 mg daily or every other day)
  - > 70 years of age
  - Impaired renal function
  - Low lean body mass
- Monitor: level 0.5 – 1 ng/mL, potassium and magnesium level, heart rate, renal function
- Adverse Effects: Cardiac arrhythmias, N/V, visual disturbances, confusion, anorexia

**Vasodilators**

- Hydralazine and isosorbide dinitrate (ISDN)
- Dosing
  - Initiation: hydralazine 37.5 mg and ISDN 20 mg TID
  - Target dose: hydralazine 75 mg and ISDN 40 mg TID
- Benefits
  - ↓ hospitalization and mortality
  - Not as good as ACEIs
- Monitor
  - Blood pressure, heart rate, I & O
- Adverse Effects
  - Lupus-like symptoms, edema, headache, hypotension, dizziness
Acute Coronary Syndromes

**Umbrella term**
- Unstable angina
- Non ST-segment elevation MI (NSTEMI)
- ST-segment elevation MI (STEMI)

Different clinical entities, but the same pathophysiology

Management of ACS

**General**
- Morphine, oxygen, nitrates, β-blocker, statin, ACEI

**Antiplatelets**
- Aspirin
- Clopidogrel (Plavix®)
- Prasugrel (Effient®)
- Ticagrelor (Brilinta®)

**GP IIb/IIIa Inhibitors**
- Abciximab (Reopro®)
- Eptifibatide (Integrilin®)
- Tirofiban (Aggrastat®)

**Anticoagulants**
- Heparin
- LMWH (Lovenox®, Fragmin®)
- Fondaparinux (Arixtra®)
- Bivalirudin (Angiomax®)

**Fibrinolytics**
- Streptokinase (Streptase®)
- Alteplase (Activase®)
- Retevase®
- Tenecteplase (TNKase®)

**Antithrombotic Drugs**

**Antiplatelet Drugs**

**Anticoagulant Drugs**

**Fibrinolytic Drugs**

**General Management**

- Oxygen (If O₂ Sats < 90%)
- Morphine 1 – 5 mg IV
  - For sxs not relieved by NTG
- Beta Blockers
  - Initiated within 24 hrs
  - Reduces myocardial oxygen demand
  - Caution in hemodynamically unstable pts
- Anticoagulant/antiplatelet therapy
  - ASA 160-325mg ASAP!
  - IV UFH, SC enoxaparin, SC fondaparinux

**Nitroglycerin (NTG)**

- Mechanism of action
  - Vasodilator results in reduction of myocardial oxygen demand and increased oxygen delivery
- Ongoing ischemic sxs: SL NTG q5 mins x 3 doses
  - Still have sxs: evaluate need for IV NTG
- IV NTG indicated in first 48 hrs for persistent ischemia, HF, or hypertension
- ADRs: HA, hypotension, reflex tachycardia
Beta Blockers

- Early administration
  - Associated with 40% decrease in mortality for acute MI
- Late administration
  - Associated with 23% reduction in mortality and 32% reduction in recurrent MI

<table>
<thead>
<tr>
<th>Agents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atenolol (Tenormin)</td>
</tr>
<tr>
<td>Bisoprolol (Zebeta)</td>
</tr>
<tr>
<td>Carvedilol (Coreg)</td>
</tr>
<tr>
<td>Labetalol (Trandate)</td>
</tr>
<tr>
<td>Metoprolol (Lopressor, Toprol)</td>
</tr>
<tr>
<td>Nadolol (Corgard)</td>
</tr>
<tr>
<td>Nebivolol (Bystolic)</td>
</tr>
<tr>
<td>Propranolol (Inderal)</td>
</tr>
</tbody>
</table>

Other Uses for Beta Blockers

- Hypertension (uncomplicated)
- Stable angina
- Perioperative during surgery
- Arrhythmias
- Essential tremors
- Migraine prophylaxis
- Hypertrophic obstructive cardiomyopathy
- Prevention of variceal bleeding in portal hypertension

Antiplatelet Therapy

- Mainstay of therapy for acute coronary syndromes
- Agents
  - Aspirin, clopidogrel (Plavix®), prasugrel (Effient®), ticagrelor (Brilinta®)
- Adverse Reactions
  - Bleeding, GI (nausea, vomiting, diarrhea)

Antiplatelet Therapy cont

- Medical therapy without stent
  - ASA indefinitely
  - Clopidogrel or ticagrelor at least 1 month, ideally up to 1 year
- Bare-metal stent group
  - ASA indefinitely
  - Clopidogrel, ticagrelor, or prasugrel at least 1 month, ideally up to 1 year
- Drug-eluting stent group
  - ASA indefinitely
  - Clopidogrel, ticagrelor, or prasugrel at least 1 year

GP IIb/IIIa Inhibitors

- Agents
  - Abciximab (Reopro®)
  - Eptifibatide (Integrin®)
  - Tirofiban (Aggrastat®)
- Used as adjunct to PCI or when PCI is planned within 24 hours
- Don't use in patients managed conservatively
- Administered as continuous infusions
- Typically administered for 18 hours after cath lab
GP IIb/IIIa Inhibitors cont

- Mechanism of action

- ADRs
  - Bleeding, hypotension, thrombocytopenia

Thrombolytic Therapy

- Agents:
  - tPA, alteplase (Activase®), reteplase (Retavase®), Tenecteplase (TNKase®), streptokinase (Streptase®)

- Indications
  - Class I for patients presenting within 12 hours of onset of symptoms
  - Class IIa for patients within 12 – 24 hrs after symptoms
  - Also used in acute ischemic stroke and massive PE

- Adverse effects
  - Bleeding, hypotension, allergic reaction

Thrombolytic Therapy Contraindications

- Absolute
  - Prior intracranial hemorrhage
  - Active internal bleeding
  - Ischemic stroke within 3 months; previous intracranial hemorrhage
  - Known structural vascular lesion
  - Suspected aortic dissection

- Relative
  - Blood pressure > 180/110mmHg upon presentation
  - Hx of prior ischemic stroke (> 3 months), dementia
  - Recent bleed (within 2-4 weeks)
  - Traumatic or prolonged (> 10 min) CPR or major surgery (<3 weeks)

Secondary Prevention of ACS

- Antiplatelet therapy
  - Aspirin indefinitely
  - Clopidogrel, prasugrel or ticagrelor depending on stent

- Beta blockers
  - Indefinitely for all patient unless contraindicated

- ACE inhibitors
  - Indefinitely for HF, HTN, or DM unless contraindicated

- Statins
  - Use regardless of baseline LDL

Cardiac Conductive System

Arrhythmias
Arrhythmias

- Normal Sinus
- Bradycardia (HR < 60 bpm)
- Tachycardia (HR > 90 bpm)

- AV Blocks
  - Sinus Bradycardia
  - PVC
  - Mobitz I
  - Mobitz II
  - 3rd Degree

- Supraventricular Tachycardia
- Ventricular Tachycardia
- Atrial Fibrillation
- VT. Fibrillation

Atrial Fibrillation

- Arrhythmias are abnormal heart rhythms
- Most common cardiac arrhythmia
- Found in 2.2 million people
- ~15% of strokes occur in patients with atrial fibrillation
- Causes

Mechanism for Atrial Fibrillation

- Not life threatening but has complications
  - Embolic CVA
- Treatment
  - Rate control
    - Rate is controlled without attention to the underlying rhythm
  - Prevention of thromboembolism
  - Correction of the rhythm disturbance
    - Attempts restoration and maintenance of NSR
    - Attention must also be paid to rate control

Pharmacologic Management

- Antiarrhythmic medications
  - Class Ia: quinidine, procainamide, disopyramide
  - Class IB: lidocaine, mexiletine
  - Class IC: flecainide, propafenone
  - Class II: propranolol, metoprolol
  - Class III: amiodarone, sotalol, ibutilide, dofetilide
  - Class IV: verapamil, diltiazem

- Anticoagulant medications
  - Aspirin
  - Warfarin (Coumadin®)
  - Dabigatran (Pradaxa®)

Vaughan Williams Classification

<table>
<thead>
<tr>
<th>Class</th>
<th>Mechanism</th>
<th>Examples</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ia</td>
<td>Moderate Na+ channel blockade, non-specific K+ channel blockade</td>
<td>Quinidine, Procainamide, Disopyramide</td>
<td>Prolong repolarization and QT interval</td>
</tr>
<tr>
<td>ib</td>
<td>Fast Na+ channel blockade, ↑ K+ permeability</td>
<td>Lidocaine, Phenytoin, Mexiletine</td>
<td>Shorten repolarization and QT interval</td>
</tr>
<tr>
<td>Ic</td>
<td>Slow Na+ channel blockade</td>
<td>Flecainide, Moricizine, Propafenone</td>
<td>No effect on repolarization or QT interval</td>
</tr>
<tr>
<td>II</td>
<td>β-adrenergic blockade</td>
<td>Metoprolol, Propranolol, Esmolol</td>
<td>Prolong PR interval and ↓ ventricular rate</td>
</tr>
<tr>
<td>III</td>
<td>K+ channel blockade</td>
<td>Amiodarone, Dronedarone, Sotalol, Dofetilide, Ibutilide</td>
<td>Prolong depolarization, repolarization and QT interval</td>
</tr>
<tr>
<td>IV</td>
<td>Ca2+ channel blockade</td>
<td>Verapamil, Diltiazem</td>
<td>Prolong PR interval and ↓ ventricular rate</td>
</tr>
<tr>
<td>Misc.</td>
<td>Various mechanisms</td>
<td>Adenosine, Digoxin</td>
<td>Agent specific effects</td>
</tr>
</tbody>
</table>
Rate Control Approaches

- Beta-blockers
  - Metoprolol or atenolol most common
  - Both β₁ selective at low doses
- Calcium Channel Blockers
  - Diltiazem is generally preferred over verapamil
- Digoxin
  - Not as sole agent

ACC/AHA/ESC 2006 guidelines for management of patients with atrial fibrillation

Class Ia Antiarrhythmics

- Prolong action potential duration by slowing conduction
- Also decreased conductivity and increased refractory period
- Proarrhythmia is dose dependent

Class Ib Antiarrhythmics

- Class Ib agents shorten the action potential duration and reduce refractoriness
- No effect on AV node

Class Ic Antiarrhythmics

- Markedly slow depolarization, but have a minimal effect on the action potential duration
- Most potent sodium channel blocking effects of Class I
- Proarrhythmia is provoked by increased HR (use with BB?)

Class III Antiarrhythmics

- Class III agents predominantly block the potassium channels (thereby prolonging repolarization)
- More efficacious at preventing a tachyarrhythmia than converting someone into normal sinus rhythm
- Proarrhythmia is dose and drug interaction dependent

Amiodarone

- Used to treat ventricular and supraventricular arrhythmias
- Most common and most effective antiarrhythmic

- Dose
  - 6–10 gram load
  - Multiple ways to achieve
  - 200 mg daily for VT and 100 mg daily for AF


VT: ventricular tachycardia
AF: atrial fibrillation

KCC/NHESC 2006 guidelines for management of patients with atrial fibrillation

Lidocaine, Mexiletine, Tocainide, Phenytoin

Propafenone, Flecainide, Mollicine, Ecartine
Amiodarone: Side effects

- Side effects
  - Hypotension
  - Photosensitivity
  - GI: N/V, anorexia, constipation
  - AST or ALT level > 2x UNL
  - CNS: gait disturbance, dizziness, tremor
  - Taste disturbance
  - Proarrhythmia

- Amiodarone Toxicity
  - Thyroid
  - Ocular
  - Lung
  - Skin
  - Hepatitis

Prior to Initiation of Amiodarone

- Pulmonary Function Tests
  - Repeat every 12 months
- Thyroid Function Tests
  - Repeat every 6 months
- Ophthalmologic examination
- LFTS
  - Repeat every 6 months
- History and Physical to access baseline GI symptoms, tremors, photosensitivity

Dronedarone (Multaq®)

- Class III antiarrhythmic
- Developed as alternative to amiodarone
  - Less toxic
  - Less effective
- Indications: Atrial fibrillation/flutter
- Dose
  - 400 mg BID
- ADRs
  - ↑ Scr, GI, weakness, bradycardia

Sotalol (Betapace®)

- Uses
  - Atrial fibrillation/flutter; ventricular arrhythmias
- Dose adjustment for renal impairment
- Adverse Drug Reactions
  - Bradycardia (13-16%), chest pain (3-16%), palpitations (14%)
  - Fatigue (20%), dizziness (20%), lightheadedness (12%)
  - Weakness (13%), dyspnea (21%)

Dofetilide (Tikosyn®)

- Used to treat atrial fibrillation or flutter
- Restricted
  - Must be a registered physician to prescribe
  - Dispensing pharmacy must be registered
  - Must be in hospital for 6 doses during initiation
- Controls AF about 50% of time at one year
- Don’t use with:
  - Verapamil, cimetidine, HCTZ, trimethoprim, itraconazole, ketoconazole, megesterol, prochlorperazine
Determining Stroke Risk

- The CHADS<sub>2</sub> score is easy to remember and to use

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>C CHF</td>
<td>1</td>
</tr>
<tr>
<td>H HTN</td>
<td>1</td>
</tr>
<tr>
<td>A Age ≥ 75 years</td>
<td>1</td>
</tr>
<tr>
<td>D Diabetes</td>
<td>1</td>
</tr>
<tr>
<td>S History of stroke or TIA</td>
<td>2</td>
</tr>
</tbody>
</table>

- 0 points: low risk
  - Aspirin daily
- 1 point: moderate
  - Aspirin or OAC
- ≥ 2 points: high risk
  - OAC

CHF: Congestive Heart Failure
HTN: Hypertension
TIA: Transient Ischemic Attack
OAC: Oral Anticoagulant (warfarin)

Oral Anticoagulants

- Agents
  - Warfarin (Coumadin®)
  - Dabigatran (Pradaxa®)

- Recommended over aspirin for patients with high stroke risk
- New guidelines suggest dabigatran over warfarin therapy

Warfarin (Coumadin®)

- Vitamin K antagonist
  - Depletes vitamin K-dependent clotting factors
    - Factors II, VII, IX, X
  - Depletes proteins C and S
- Onset of action
  - Initial effects on International Normalization Ratio (INR) 2-5 days
- Mainstay of oral anticoagulation therapy
  - ~2 million Americans start warfarin each year
- Established effectiveness

Indications for Warfarin

- Prevention or treatment of venous thrombosis/pulmonary embolism.
- Prevention or treatment of thromboembolic complications associated with atrial fibrillation or heart valve replacement.
- Reduction of systemic thromboembolic risk after myocardial infarction.
- Reduction of risk of death, recurrent myocardial infarction, and thromboembolic events after stroke

Dabigatran (Pradaxa®)

- Oral direct thrombin inhibitor
- Indication
  - Prevention of stroke and systemic embolism in nonvalvular atrial fibrillation
- Dose: 150 mg PO BID
- Must take twice daily!
- Adverse Events
  - Bleeding
  - Gastrointestinal

In Summary

- Lots of cardiac medications!
- Medications associated with
  - Heart Failure
  - Acute Coronary Syndromes
  - Arrhythmias
Common Cardiac Medications

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Clinical Pharmacist
Providence Hospital
November 2, 2012

**DIVISION**

- **Definition** – Cutting into a body part without draining fluids and/or gases from the body part in order to separate or transect a body part.
- **Explanation** – All or a portion of the body part is separated into two or more portions.
- **Examples** – Spinal cordotomy, osteotomy, neuotomy

**RELEASE**

- **Definition** – Freeing a body part from an abnormal physical constraint.
- **Explanation** – Some of the restraining tissue may be removed but none of the body part is taken out.
- **Examples** – Adhesiolysis, carpal tunnel release

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**Division vs. Release**

- **Division** is coded when the objective of the procedure is to cut into, transect or otherwise separate all or a portion of a body part.
- **Release** is coded when the objective is to free a body part from abnormal constraint.

**Coding Guidelines**

- **Release Procedures**
  B3.13 In the root operation Release the body part value coded is the body part being freed not the tissue being manipulated or cut to free the body part.
  Example: Lysis of intestinal adhesions is coded to the specific intestine body part value.
Coding Guidelines

Release vs. Division
B3.14 If the sole objective of the procedure is freeing a body part without cutting the body part the root operation is Release. If the sole objective of the procedure is separating or transecting a body part the root operation is Division.

Examples: Freeing a nerve root from surrounding scar tissue to relieve pain is coded to Release. Severing a nerve root to relieve pain is coded to Division.

Coding Problems - Division

1. Open Osteotomy of capitate, right hand
   ICD-10-PCS Code: ________

2. Percutaneous division of left Achilles tendon
   ICD-10-PCS Code: ________

Coding Problems - Release

1. Right shoulder arthroscopy with coracoacromial ligament release
   ICD-10-PCS Code: __________

2. Laparoscopy with freeing of bilateral ovaries and fallopian tubes
   ICD-10-PCS Code: __________

Coding Problems - Release

3. Right open carpal tunnel release
   ICD-10-PCS Code: __________

4. Achalasia treated with a laparoscopic Heller myotomy
   ICD-10-CM Code: __________
   ICD-10-PCS Code: __________
### PCS Coding Exercises Case # 1
- **Preoperative diagnosis:** Ankyloglossia
- **Postoperative diagnosis:** Same
- **Procedure performed:** Frenulotomy

### PCS Coding Exercises Case # 2
- **Preoperative Diagnosis:** Calculi of the right lacrimal duct.
- **Postoperative Diagnosis:** Same
- **Procedure performed:** Open incision with removal of right lacrimal duct stone.

### PCS Coding Exercises Case # 3
- **Preoperative Diagnosis:** Calcification of the pericardium
- **Postoperative Diagnosis:** Same
- **Procedure performed:** Thoracotomy with crushing of pericardial calcifications.

### PCS Coding Exercises Case # 4
- **Preoperative Diagnosis:** Large left pleural effusion.
- **Postoperative Diagnosis:** Same
- **Procedure performed:** Thoracentesis of left pleural effusion.

### PCS Coding Exercises Case # 5
- **Preoperative Diagnosis:** Severe Low Back Pain.
- **Postoperative Diagnosis:** Same
- **Procedure performed:** Percutaneous Sacral Rhizotomy. (surgical procedure in which spinal nerve roots are cut; done to relieve intractable pain).

### PCS Coding Exercises Case # 6
- **Final Diagnoses:**
  1. Bilateral atherosclerotic PVD and ischemic gangrene of the LLE
  2. Schizophrenia
  3. Chronic anemia
  4. Alcoholic hepatitis
  5. Moderate protein calorie malnutrition
  6. Tobacco dependence
Procedure: Above the knee amputation

Description: The patient was prepped & draped in a sterile manner in the supine position. The marking pen was used to outline the fishmouth type incision in the upper third of the left upper extremity above the area of the blistered skin. Dissection was carried through the subcutaneous tissue and muscle. The femur was exposed and transected with a Gigli saw. The wound was closed primarily and sterile dressing was applied. The patient tolerated the procedure well.

ICD-10-CM Codes:

ICD-10-PCS Codes:

Preoperative Diagnosis: Bronchial alveolar cell carcinoma of the left lung, Type II Diabetes
Postoperative Diagnosis: Same
Operation: Exploratory thoracotomy
A standard posterior lateral left thoracotomy incision was made and the chest was opened. There was a large diffuse lesion on the left upper lobe. The lesion had been previously biopsied. It was decided to do a complete pneumonectomy to avoid entering the tumor which was a possibility with a lobectomy. His PFTs prior to surgery were satisfactory for a pneumonectomy. The left pneumonectomy was completed and the skin was closed in layers.

ICD-10-CM Codes:

ICD-10-PCS Codes:

Preoperative diagnosis: Rectal mass, Change in bowel habits
Postoperative diagnosis: Rectal prolapse, Tubular adenoma of sigmoid colon, biopsies x 2, Sigmoid diverticulosis, Nonspecific colitis

Procedure: Colonoscopy performed to level of cecum. The patient was prepped in the usual fashion and placed in the left lateral decubitus position. Endoscope was passed through the rectum and advanced to the level of the cecum. The scope was slowly retracted and colitis was noted. The patient also has significant sigmoid diverticulosis and several small polyps in the sigmoid colon area. There was also a large prolapsing mass of mucosa 5 cm inside the rectum. Two of the small polyps were biopsied using the cold biopsy forceps and sent to pathology. The remainder of the exam was unremarkable and the patient tolerated the procedure well.

ICD-10-CM Codes:

ICD-10-PCS Codes:
### Case # 9

**Preoperative diagnosis:** Elevated prostate specific antigen  
**Postoperative diagnosis:** Prostate carcinoma  
**Specimens:** 6 core needle biopsies of the prostate  
**Description:** The patient was placed in the lateral decubitus position and general anesthesia was administered. The prostate was smooth and benign feeling on digital exam. The ultrasound probe was inserted in the rectum and six core needle specimens of the prostate, one each from the right base, the right mid and the right apex followed by one each from the left base, the left mid and left apex. The patient tolerated the procedure well with minimal blood loss.

**ICD-10-CM Codes:**

**ICD-10-PCS Codes:**

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### Case # 10

**Preoperative diagnosis:** Persistent menorrhagia, leiomyoma of uterus  
**Postoperative diagnosis:** Persistent menorrhagia, leiomyoma of uterus  
**Procedure:** Total abdominal hysterectomy, BSO  
**Description:** Under general anesthesia the patient was placed in the supine position and the abdomen was prepped & draped in the usual fashion. A Pfannenstiel incision was made and the subcutaneous fascia was opened transversely. The abdominal peritoneum was entered and the bowel was packed to the upper abdomen. There were multiple small subserosal fibroids in the fundus and the whole uterus was enlarged.

**ICD-10-CM Codes:**

**ICD-10-PCS Codes:**

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