Chapter 28, Part 2: Cardiology

Part 2: Assessment and Management of the Cardiovascular Patient

Assessment of the Cardiovascular Patient

Scene Size-up and Primary Assessment

- Determine scene safety.
- Determine level of ________________________________
- Airway.
- Breathing:
  - Note ________________________________ sounds indicative of cardiovascular problems.
- Circulation:
  - Note color, temperature, turgor, moisture, mobility, ________________________________.
- Treat life-threatening problems.

Focused History

Common Symptoms:
- Chest Pain
  - ________________________________History of Pain
- Dyspnea
  - Onset
  - ________________________________
  - Provocation/palliation
  - ________________________________
– Cough

6 □ Other Signs/Symptoms

1. Restlessness and anxiety
2. Feeling of impending doom
3. Nausea/vomiting
4. Palpitations
5. Edema
6. Headache
7. Behavioral change
8. Anguished

Atypical Presentation Examples

1. Pain that is ____________________________ or intermittent
• Pain to ________________________________
  (toothache with no inflammation)
• Pain to neck, shoulder, arm or abdomen
• Mostly includes females, ____________________________ and the elderly
• Suspect cardiac event with these S/S

9 □ **Anginal Equivalents**

• Dyspnea
• ________________________________
• Syncope or near syncope
• Generalized weakness with no hx of GI bleed or fever
• ________________________________
• Often, the only S/S presented but may be cardiac in nature

10 □ **Risk Factors for Anginal Equivalents**

• ________________________________
• Hypertension
• ________________________________
• Family history of CAD
• ________________________________
• Stress
• Sedentary life style

11 □ **Acute Coronary Syndrome (1 of 2)**

• The key to forming accurate impression of cardiac event lies in clinical ________________________________.
• Take into account the patient’s physical presentation,
risk factors, and assessment findings
• ________________________________ to the patient

12 □ Acute Coronary Syndrome (2 of 2)
• If ________________________________ equivalents or atypical S/S are present, MONITOR ECG
• If presentation suggests possible coronary event, consider _________________________________ just as with typical chest pain, even if chest pain is absent

13 □ SAMPLE History
• Allergies
• Medications
  • Nitroglycerin, propranolol, digitalis, diuretics, antihypertensives, antidysrhythmics, lipid-lowering agents,
  • ________________________________ meds
  • Nonprescription drugs
  • Cocaine
  • ________________________________
  • Alcohol

14 □ SAMPLE History
Past Medical History:
• Cardiac history
• ________________________________ problems
• Other medical problems
• ________________________________ cardiac history
• Modifiable risk factors for heart disease (smoking, etc.)

15 □ SAMPLE History
Last Oral Intake
- Caffeinated beverages, alcohol, ___________________________drinks, etc

Events Preceding the Incident
- ____________________________, strenuous or sexual activity

16 □ Physical Exam
Inspection of:
- ____________________________position
- ____________________________
- Epigastrium

17 □ Physical Exam
Auscultation:
- ____________________________Sounds
- ____________________________Sounds
  - Normal
  - Abnormal

18 □ Physical Exam
Palpation:
- ____________________________
- Thorax
  - ____________________________
    - Chest Wall Tenderness
- Epigastrium

19 □ Management of Cardiovascular Emergencies
Basic Life Support:
Oxygen and the Cardiac Patient

The AHA recommends that patients with cardiac and/or stroke conditions NOT receive oxygen unless O2 sat is <________% or there are signs of hypoxia.

This is to avoid ____________________________ and oxygen toxicity which can lead to oxidation (loss of electrons) of tissues and organs.

Management of Cardiovascular Emergencies

Advanced Life Support:

- ECG Monitoring
- ____________________________ Maneuvers
- Precordial Thump
- ____________________________ Management
- Defibrillation
- Synchronized Cardioversion
- Transcutaneous Cardiac ____________________________
- Diagnostic (12-Lead) ECG

Monitoring ECGs in The Field

2 main components:

- ECG ____________________________
– May include 12 lead capabilities

• ____________________________

– May include pacing capabilities

23  Components of an ECG Monitor

• Note: Monitors/Defibrillators are different. You should become very familiar with the unit you will be using

• ____________________________ (Oscilloscope or LCD)

• Paper strip recorder

• Battery/Power source

• Patient Cables and

• ____________________________

• Controls for monitoring
  – Lead selection
  – ECG Size

24  Using a Monitor

• ____________________________ monitor appropriately

• Turn on unit

• Prepare patients

• ____________________________
  – Clean, dry, shave excess hair

• Attach 3 or 4 leads

• Ask patient to lie still and

• ____________________________ a strip

• Analyze strip

• Treat the patient NOT the monitor
25  **Causes of Poor Signals**

- Excessive ______________________________, loose or dislodged electrode
- Dried conductive gel, poor placement, diaphoresis
- Patient movement or muscle tremor
- Broken patient ____________________________________________________________________________ or lead wire
- Low battery
- Faulty ______________________________
- Faulty monitor

26  **Troubleshooting a Monitor/Defibrillator**

<table>
<thead>
<tr>
<th>Problem</th>
<th>Check:</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Power</td>
<td>Batteries/Power supply</td>
</tr>
<tr>
<td>Won’t shock</td>
<td>Cables or Synchronize button on</td>
</tr>
<tr>
<td>Artifact</td>
<td>Movement of patient, 60 cycle interference, poor connection of electrodes</td>
</tr>
</tbody>
</table>

27  **Troubleshooting a Monitor/Defibrillator**

<table>
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<th>Problem</th>
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<tbody>
<tr>
<td>Won’t Print</td>
<td>Paper, Paper jam</td>
</tr>
<tr>
<td>Strange looking rhythm</td>
<td>Lead placement</td>
</tr>
<tr>
<td>ECG is very small</td>
<td>Increase lead size</td>
</tr>
</tbody>
</table>

28  **Vagal Maneuvers**

- Indication
  - Stable patient with symptomatic
Maneuvers
- ____________________________________________ maneuvers
- Coughing

Carotid Sinus ____________________________________________
- Avoid in patients with a history of cerebrovascular or carotid artery disease, or patients with carotid bruits.

29 Precordial Thump
Indication:
- ____________________________________________ patient who has a witnessed arrest.
- Most effective when performed ____________________________________________ after onset of VF.
- Not used in pediatric patients.

30 Antidysrhythmic Medications
- Control or suppress ____________________________________________
- Atropine Sulfate
- ______________________________
- Procainamide
- ______________________________
- Amiodarone
- ______________________________
- Cardizem

31 Procainamide (Pronestyl)
- Indications: Significant ______________________________, V-Tach
Contraindications:
- Allergy
- 2nd and 3rd Degree Heart Block

Dosage: __________mg over 5 minutes slow IV push until:
- Suppression
- Max of 500mg given
- QRS complexes broaden by __________%  

32 □ Procainamide (Pronestyl)

- Adverse Reaction:
  - ________________________________, Seizures, Hypotension, Bradycardia, V-Fib

33 □ Cardizem (Diltiazem) (1 of 2)

- Antidysrhythmic
  (____________________________ channel blocker)
- Action: ________________________________ of vascular smooth muscle and slows conduction through the AV node
- Indications: rapid response A-fib and A-flutter and PSVT refractory to Adenosine for unstable patients
- Contraindications:
  ________________________________, cardiogenic shock, wide complex tachycardia (V-tach), WPW

34 □ Cardizem (Diltiazem) (2 of 2)

- Dosage: 0.25mg/kg IVP over 2 minutes
  - Standard dose is ______________mg
  - Followed by a maintenance drip at 5-15mg/hr
(except for PSVTs)

- Adverse Reactions: N/V, headache, dizziness, bradycardia, heart block, hypotension, and asystole
- Should be \____________or disposed of after 1 month at room temperature

35 □ **Sympathomimetic Agents**

- Similar to naturally occurring hormones

- \____________

- Norepinephrine
- Isoproterenol

- \____________

- Dobutamine
- Vasopressin

36 □ **Norepinephrine**

- AKA: \____________

- Indication: Severe

- \____________

- Contraindications: Hypovolemia, profound hypoxia
- Dosage: Initially 8-12mcg/min IV drip with maintenance drip of 2-4mcg/min titrated to maintain BP
- Adverse Reactions: Headache, dizziness,

- \____________

- hypotension, arrhythmias

37 □ **Isoproterenol (Isuprel)**

- Rarely used in prehospital setting
- Indications: Heart

- \____________

- ventricular arrhythmias
Contraindications:
_________________________________________________________________________ or heart blocks caused by Digitalis toxicity
Dosage: 0.02-0.06mg IV with maintenance drip of 5mcg/minute
Adverse Reactions: Palpitations, tachycardia, cardiac arrest, diaphoresis

38 Dopamine
AKA: ____________________________________________
Used regularly in prehospital setting
Indication: Cardiogenic shock with ____________________________
Contraindications: tachyarrhythmias, V-Fib
Dosage: IV drip at ___________ - __________mcg/kg/min to maintain BP
Adverse Reactions: Ectopic beats, dyspnea, necrosis of skin with IV infiltration
Over 20mcg/kg/min will shut off blood flow to kidneys and GI tract

39 Dobutamine (Dobutrex)
Indications: Increases cardiac output in short-term treatment of cardiac decompensation such as ____________________________ shock
Contraindications: Hypertension
Dosage: ___________-_________mcg/kg/min IV drip titrated to affect
Adverse Reactions: Increased heart rate, hypertension, dyspnea
Drugs Used for Myocardial Ischemia

- Treat ischemia or manage

- Oxygen
- Nitrous Oxide

- Morphine Sulfate
- Demerol

Nitrous Oxide (Nitronox)

- Nitrogen and oxygen mixture in a gas state. Medical Nitrous is a _________ - _________ mixture

- Indications: Pain management
- Contraindications: Pneumothorax, bowel obstruction

- Actions: Reduces the perception of pain
- Dosage: administration via held mask. Allow patient to hold mask to prevent over medication

- Nitrous leaves the system within 2 minutes of d/c

Morphine Sulfate

- Opium based narcotic analgesic.

- Indications: Pain management
- Contraindications: Hypovolemia,
• Dosage: 1-10mg IV push repeated every 5-10 minutes as needed
• MS should be diluted 1:1 prior to administration
• Adverse Reactions:
  __________________________________________depression, sedation, hypotension, N/V
• MS can be reversed with Narcan

43 □ Demerol
• Opioid Narcotic Analgesic
• Indications: Pain management
• Contraindications: Hypovolemia,
  ______________________________________
• Dosage: 25-100mg IV push repeated every 5-10 minutes as needed
• Adverse Reactions: Respiratory depression,
  _______________________________________, hypotension, N/V
• Demerol can be reversed with Narcan

44 □ Fentanyl (Sublimaze) (1 of 2)
• Narcotic Analgesic
• On a weight basis, __________ to 100 times more potent than MS
• Indication: pain management
• Contraindications: hemorrhage, shock, children < 2 yoa
• Dosage __________ - __________mcg slow IV push

45 □ Fentanyl (Sublimaze) (2 of 2)
• Adverse reactions:
  __________________________________________depression,
muscle rigidity, bradycardia
• Fentanyl does not affect the ___________ to the extent of MS
• May be used on trauma victims where dropping of BP is a concern
• Does __________________________ dilate the coronary arteries
• Can be reversed with Narcan

46  Thrombolytic Agents
• Action: to break up blood
  ___________________________________________ blocking a blood vessel (clot busters)
• ___________________________________________
  • Alteplase
  • Relteplase
• Thrombolytics (other than asa) are not routinely given by EMS. However, many patients receiving them are transferred from one facility to another.
• Greatest concern is __________________________ dysrhythmias

47  Other Cardiac Medications

48  Furosemide (Lasix)
• Action: __________________________ that inhibits the reabsorption of sodium in the kidneys. Also causes venous dilation and reduces cardiac preload
• Indications: CHF with pedal and/or pulmonary edema
• Contraindications: Hypovolemia, pregnancy, __________________________ failure
● Dosage: __________ - __________ mg slow IV push
● Adverse reactions: volume depletion, muscle spasm

49  □  **Diazepam (Valium) (1 of 2)**

● Actions: A __________________________________________________________________.
  Sedative-hypnotic, anticonvulsive.
● Used in EMS for sedation and ____________________________
● Indications: Sedation for cardioversion and RSI.
  Seizures
● Contraindications: Coma

50  □  **Diazepam (Valium) (2 of 2)**

● Dosage: : __________ - __________ mg IVP, repeated every 15 minutes to a max of 30mg. Can be given ____________________________ as well.
● Adverse Reactions: Sedation, respiratory depression or arrest, bradycardia

51  □  **Promethazine (Phenergan)**

● Actions: __________________________________________________________________ ,
  sedative, antihistamine, anticholinergic
● Indications: Nausea (for EMS) often needed after administration of narcotic analgesic
● Contraindications: Children <2yoa
● Dosage: __________-__________mg IVP. Drug should be ____________________________ 1:1 to avoid damage to vein. May be repeated as needed
● Adverse reactions: sedation, dry mouth

52  □  **Zofran (Ondansetron) (1 of 2)**
• Actions: Antiemetic, serotonin 5-HT3 receptor blocker
• Does ________________________________ cause the depressed mental status as does Phenergan
• Indications: nausea and/or vomiting
• Contraindications: children < ________ yoa

53  □  Zofran (Ondansetron) (2 of 2)
• Adult Dosage: ___________mg IV push
• Pediatric Dosage: 0.1mg/kg up to 4mg
• Adverse Reactions: Rarely may cause ________________________________pain, hypotension and tachycardia

54  □  Sodium Nitroprusside
• Actions: ________________________________
• Indications: lowers BP and reduces preload and afterload
• Contraindications: hypovolemia, compensatory hypertension, head injuries
• Dosage: ___________ - ___________mcg/kg/min IV drip titrated to BP
• Adverse Reactions: Increased ICP, bradycardia, muscle tremors

55  □  Sodium Bicarbonate
• Actions: Reverses ________________________________
• Indications: Acidosis due to cardiac/respiratory arrest, metabolic acidosis or Crush Syndrome
• Contraindications: Alkalosis, renal failure
• Dosage: ___________mEq/kg of 8.4% solution every 10
minutes as determined by ABGs

● Adverse reactions: metabolic alkalosis, hypokalemia
● Do not use in same IV tubing as ________________________________ drugs. Will cause formation of crystals

56 □ Labetalol

● AKA: ________________________________, Trandate
● Action: Reduces peripheral vascular resistance
● Indications: Severe ________________________________

● Contraindications: Asthma, cardiac failure, cardiogenic shock, bradycardia
● Dosage: _________mg slow IV push repeated at 40-80mg every 10 minutes until hypertension relieved or a max of 300mg given
● Adverse Reactions: Ventricular arrhythmias, N/V, hypotension, bronchospasms

57 □ Digitalis

● AKA: ________________________________, Digoxin
● Not normally given prehospital but presents challenges for EMS
● Used to treat SVTs, ________________________________, A-Flutter, and heart blocks
● Digitalis Toxicity: characterized by arrhythmias and yellow-green ________________________________ around visual images, and bradycardia
Digitalis Toxicity may be life threatening and render some drugs ineffective

### Giving Meds Via ETT

- During an emergency situation, certain drugs can be given down the ET tube.
- IV ________________________________ is always the route of choice over ETT.
- When giving drugs down an ETT, double the amount of drug but do not give more than ______cc at a time.
- If more than 10cc is required to double the dosage, ventilate the patient for a few seconds after first half and then give the second half.

### Defibrillation

**Chest Wall Resistance:**

- Paddle pressure, paddle–skin

  ________________________________, paddle surface area, number of previous countershocks, and inspiratory vs. expiratory phase at time of shock.

### Defibrillation

- Defibrillation is the process of passing an electrical current through a
“______________________________” heart to depolarize a critical mass of cardiac cells. This allows them to depolarize uniformly, resulting in an organized fashion.

- Uses direct current (DC)
- ____________________________: the shock’s strength
  - Energy (Joules) = power (watts) \times \text{Duration (seconds)}

62 [ ] Defibrillation

- All CPR, ventilations, treatment, and touching of patient must be ___________________________ when analyzing the rhythm and while shocking
- Make sure no one is ___________________________ the patient and/or cot before shocking.
- Do not shock in ___________________________ or in a wet environment
- If paddles are used, be sure to use appropriate defib gel

63 [ ] Defibrillators

- There must be enough “______________________________” current to reach the heart to defibrillate
- Too much “peak” current can damage the heart
- Monophasic Defibrillators:
  - Current flows in ___________________________ direction only
  - Causes a sharp “peak”
64 Defibrillators

Biphasic Defibrillators:
- Current flows in one direction in the first phase of the shock and then __________________________ for the second phase.
- Research shows biphasic to be more successful
- Creates a __________________________ off “peak”
- Requires less joules: Some defibrillators automatically adjust joules so the 360J setting is still used

65 Defibrillators

Biphasic Defibrillators (continued):
- Biphasic wave forms adjust for __________________________by varying the characteristics of their waveforms thus lowering joules setting
- This tends to ensure that high impedance persons will have the same chance for __________________________as those who are of low impedance
- Most, if not all, new defibrillators are biphasic

66 Monophasic v. Biphasic Defibrillation

67 Defibrillation

Success of defibrillation depends on:
- __________________________ since onset of VF
- Condition of the myocardium
- Heart size and body weight
- __________________________________________________________________________
countershocks
- Proper __________________________________________________________________________ size, placement, interface, and pressure
- Properly functioning defibrillator

68  **Components of an Defibrillator**
- Defibrillation __________________________________________________________________________
  (some models)
  – Defibrillation Gel
- Defibrillation/Pacing Pads (if hands free)
  – Defibrillation Pads
- Defibrillation __________________________________________________________________________
  (on paddles if equipped)
  – Energy setting
  – Discharge Button(s)
  – Synchronized button
- __________________________________________________________________________ or power supply

69  **Using a Defibrillator**
- Turn unit on
- If using paddles, apply defibrillation gel
- Apply defibrillation pads
  – Apex, __________________________________________________________________________
- Charge unit to desired setting
- Say “________________________________________________________________________”
- Visualize that everyone is clear
Using a Defibrillator

- Discharge defibrillator
  - Push ____________________________ button on hands free
  - Push ____________________________ shock button simultaneously on paddles
- Deliver 1 shock at __________J or as recommended by manufacturer
- Do NOT check a pulse after defibrillation, but resume ________________ for 2 minutes, unless patient regains consciousness

Using a Defibrillator

- After __________ minutes of CPR, check monitor
- Do not check pulse unless there is a rhythm change or if seen rhythm is ________________ of producing a pulse

Emergency Synchronized Cardioversion

Indications:
- ____________________________, tachycardic patient
  - Perfusing VT
  - ____________________________
  - Atrial fibrillation with rapid ventricular response (___________) (normally > 150bpm)
  - 2:1 atrial flutter with RVR

Emergency Synchronized Cardioversion
Procedure
● Similar to defibrillation.
● ________________ the patient whenever possible.
● Turn on the ________________ .
● Hold discharge buttons until countershock administered.

74 Transcutaneous Cardiac Pacing
Indications
● ________________, unstable patients who do not respond to pharmacological therapy
  – Symptomatic bradycardias with high-degree AV blocks.
  – Atrial fibrillation with a ________________ ventricular response.
  – Other significant bradycardias

75 External Cardiac Pacing
● Must have 3 or 4 ________________ leads applied
● ________________ if applicable
  – Versed or Diazepam
● Set Mode
  – Demand or Fixed
● Set ________________
● Set voltage
Pacing Bradyarrhythmias

- Set pacer in ____________________________ mode
- Set rate at ________
- Set current at Lowest setting and increase in increments of ________ mA until capture.
- Capture is confirmed by __________________________________ pulse
- Titrate rate to adequate perfusion

Carotid Sinus Massage

- Indications:
  - Paroxysmal supraventricular tachycardia in a ____________________________ patient.
- Complications
  - Do not use in patients with a history of cerebrovascular or ____________________________ artery disease.
  - Do not use in patients having carotid ____________________________.
  - Asystole, PVCs, VT, and VF may occur.
  - Patient may experience bradycardia, nausea, and vomiting.
- Only ____________________________ artery at a time

Managing Specific Cardiovascular Emergencies

General Cardiac Management
Management of the cardiac patient changes significantly at the Paramedic level due to the increased knowledge and ability to manage dysrrhythmias.

Treatment priorities are always:
1. ___________________________ _________________
2. ___________________________ _________________
3. Blood Pressure

Angina Pectoris

Pathophysiology:
- Angina occurs when the heart’s demand for ___________________________ exceeds the blood’s oxygen supply.
- Commonly caused by artherosclerosis.
- May also result from ___________________________ of the coronary arteries (Prinzmetal’s angina).
- Stable vs. ___________________________ Angina

Disease Progression

Angina Pectoris

Causes of Chest Pain:
- ___________________________ , including acute coronary syndrome, pericarditis, or thoracic dissection of the aorta
- ___________________________ , including pulmonary embolism, pneumothorax, pneumonia, and pleural irritation
Musculoskeletal

Angina Pectoris

Field Assessment:

• Signs of inadequate

• Chest Discomfort
  – Typically ________________ onset, which may radiate or be localized to the chest.
  – Patient often denies chest pain.

• Duration
  – Episodes last ______ - _______ minutes.
  – Pain relieved with rest and/or nitroglycerin.

Breathing

History of past episodes of angina:
  – Episodes of angina that are increasing in frequency, ________________ , or severity are significant.

ECG
  – Do not delay scene time.
  – ________________ ECG preferred:
    – Angina typically causes nonspecific ST changes.

Management:

• Relieve ________________ :
– Place the patient in a position of physical and emotional comfort.

- Administer oxygen if O2 sats < __________%.
- Establish IV access, TKO
- Monitor ECG.
- Consider medication administration:
  - ______________________________ tablets or spray
  - Morphine sulfate

85 ☐ **Angina Pectoris**

Special Considerations:
- Patients with ______________________________ or crescendo angina often require hospitalization.
- Symptoms not relieved by rest, nitroglycerin, and oxygen may indicate an overall ______________________________ of the disease or the early stages of a myocardial infarction.
- Patients may refuse transport after pain is relieved, even though the underlying problem is not addressed.

86 ☐ **Myocardial Infarction**

Pathophysiology:
- Death and ______________________________ of heart muscle due to inadequate oxygen supply.
  - Causes may include occlusion, spasm, microemboli, acute volume overload, hypotension, acute respiratory failure, and trauma.
- ______________________________ and size dependent on the vessel involved.
Myocardial Infarction

Effects of a Myocardial Infarction:
- ____________________________
- Heart Failure
- Ventricular Aneurysm

Goals of Treatment:
- ____________________________ Relief
- Reperfusion

Field Assessment:
- Breathing
- Signs of Shock
- Chief Complaint
  - Typically related to chest ____________________________ .
  - Evaluate using OPQRST:
    - Discomfort > _________ minutes.
    - ____________________________ to arms, neck, back, or epigastric region.
  - Patients may minimize symptoms.
  - Feelings of “impending doom.”

Other Symptoms
- Nausea and vomiting
  - ____________________________
- Myocardial Infarctions & the ECG
  - Diagnostic ECGs:
    - 12-lead ECGs
    - ____________________________ segment
  - Pathological Q waves

- Myocardial Infarction

- Dysrhythmias:
  - ____________________________ , PEA, VF, VT.
  - ____________________________ are the leading cause of death in MI.

- Reperfusion Screening for ____________________________ therapy
  - Reperfusion of ischemic/injured tissue.
  - Time from onset to treatment < _______ hours.
  - Absence of history that would exclude thrombolytics.

- Transport
  - Rapid transport indicated when acute MI suspected

- Management:
  - Assess while you ____________________________
  - Administer oxygen if indicated
  - Establish IV access,
Myocardial Infarction

Consider medication administration:
- Do NOT allow patient to walk
- Morphine sulfate for pain if SBP > 90-100
- Promethazine or _________________ for nausea
- Nitrous oxide
- Nubain
- Antiarrhythmia medication as indicated

Myocardial Infarction

Management (Continued):
- Monitor ______________________________ .
- Rapid transport as indicated.
- Avoid patient ______________________________ if possible.
- Identify candidates for thrombolytic therapy.

Myocardial Infarction

In-Hospital Management:
- Diagnostic ECGs.
- ______________________________ levels.
- Risk assessment.
- Treatment:
  - Cardiac ______________________________
and CABG.

97  □ Heart Failure
Left Ventricular Failure:
• Pathophysiology: Results in increased back pressure into the pulmonary circulation.

Signs/Symptoms:
• Labored breathing/cyanosis, coughing, rales
• ____________________________
• ____________________________ in sputum

98  □ Heart Failure

99  □ Heart Failure
Right Ventricular Failure:
• Pathophysiology
  – Results in increased back pressure into the systemic venous circulation. Normally caused by left sided failure

• Signs/Symptoms:
• ____________________________
• ____________________________ neck veins
• ____________________________ edema

100 □ Heart Failure

101 □ Heart Failure
Congestive Heart Failure:
• Pathophysiology
  • Reduction in the heart’s stroke volume causes fluid
throughout the body’s other tissues.

- Manifestation
  - Normally is a process
  - Often caused by an old MI

102 Congestive Heart Failure

Field Assessment:
- Pulmonary Edema:
  - Cough with copious amounts of clear or pink-tinged
    - Labored breathing, especially with
    - Abnormal breath sounds, including
      - rhonchi, and wheezes.

103 Congestive Heart Failure

- Paroxysmal Dyspnea (PND)
- Medications:
  - Medications to increase cardiac contractile force, home oxygen.

104 Congestive Heart Failure

- Mental Status
  - Mental status changes indicate impending respiratory
- Breathing
– Signs of labored breathing.
– ____________________________________________  
  positioning.

● Skin
– ____________________________________________ changes.
– Peripheral and/or pedal edema.

105 □ **Congestive Heart Failure**

Management

● General management:
  – Avoid ____________________________________________  
    positioning.
  – Avoid exertion such as standing or walking.

● Maintain the airway.

● Administer ____________________________________________  

● Establish IV access.
  – Limit ____________________________________________  
    administration. Use minidrip or INT

106 □ **Congestive Heart Failure**

● Monitor ECG

● Consider medication administration:
  – Nitroglycerin
  – ____________________________________________ (does not  
    have to have chest pain)
  – ____________________________________________  
  – Dopamine/Dobutamine if hypotensive
  – Promethazine or Zofran if nauseated
  – Nitrous oxide
  – Nebulized breathing treatment if breathing difficulty
and ____________________________________________ noted
● Avoid patient refusals if at all possible.

107  Cardiac Tamponade
Pathophysiology:
● Result of ____________________________________________
  accumulation between visceral pericardium and parietal
  pericardium.
● Increased intrapericardial
  ____________________________________________ impairs
  diastolic filling.
● Typically worsens progressively until corrected.
Epidemiology:
● Acute onset typically the result of
  ____________________________________________ or MI.
● Benign presentations may be caused by cancer,
  pericarditis, renal disease, and hypothyroidism.

108  Cardiac Tamponade
Field Assessment:
● Patient History
  – Determine precipitating causes.
  – Patient relates a history of
    ____________________________________________ and
    orthopnea.
● Exam
  – ____________________________________________, weak
    pulse
  – Decreasing systolic pressure, Narrowing pulse
    pressures
– *Pulsus paradoxus*: drop in BP>__________ torr during inspiration
– Faint, ________________________ heart sounds

109 □ **Cardiac Tamponade**

Management:
● Maintain airway.
● Administer ________________________ if indicated.
● Establish IV access.
● Consider medication administration:
  – Morphine sulfate
  – Nitrous oxide
  – ________________________ if edema present
  – Dopamine/Dobutamine if hypotensive

110 □ **Cardiac Tamponade**

Management (Continued):
● Rapid ________________________
● Pericardiocentesis
  – Pericardiocentesis is the ________________________ treatment.
  – Insertion of a cardiac needle and ________________________ of fluid from the pericardium.
  – Procedure should be performed only if allowed by local protocol.
  – Procedure should be performed only by personnel
Hypertensive Emergencies

Causes:
- Typically occurs only in patients with a history of HTN.
- Primary cause is ________________________________ with prescribed antihypertensive medications.
- Also occurs with ________________________________ of pregnancy.

Risk Factors:
- ________________________________ -related factors
- Race-related factors

Field Assessment:
- Initial Assessment
  - ABCs and ________________________________ in mental state
- Signs & Symptoms
  - ________________________________ accompanied by N/V
  - Blurred vision
  - Shortness of breath
  - ________________________________
  - Vertigo
  - Tinnitus
Hypertensive Emergencies

History:
- Known history of hypertension
- Compliance with medications

Exam:
- BP > 160/90
- Signs of left _______________________________ failure
- Strong, _______________________________ pulse
- Abnormal skin color, temperature, and condition
- Presence of _______________________________

Management:
- Maintain airway.
- Administer _______________________________ as indicated.
- Establish IV access.

Note: Caution must be used when lowering the BP of a chronically hypertensive patient. Over time, the patient adjusts cerebral perfusion to the hypertensive BP. If lowered, cerebral perfusion could be _______________________________ and the brain become ischemic. Always consult local protocols or medical direction before lowering a BP with medications.

If indicated, consider medication administration:
- _______________________________ sulfate
Cardiogenic Shock

Pathophysiology:

- General
  - Inability of the heart to meet the body’s metabolic needs.
  - Often ________________ after correction of other problems.
  - Severe form of ________________ failure.
  - High mortality rate.

Causes:

- Tension pneumothorax and cardiac ________________.
- Impaired ventricular emptying.
- Impaired myocardial ________________.
- Trauma.

Field Assessment:

- Primary Assessment
- Chief Complaint
  - Chief complaint is typically chest pain, shortness of
breath, unconsciousness, or altered mental state.
– Onset may be __________________________________________or progressive.

● History
– History of recent __________________________________________ or chest pain episode.
– Presence of __________________________________________ in the absence of trauma.

119 □ Cardiogenic Shock

● Mental Status
– __________________________________________ progressing to confusion

● Airway and Breathing
– Dyspnea, labored breathing, and cough
– PND, __________________________________________ position, accessory muscle retraction, and adventitious lung sounds

● ECG
– Tachycardia and __________________________________________ dysrhythmias

● Circulation
– Hypotension, Cool, clammy skin

120 □ Cardiogenic Shock
Management:
● Maintain airway.
Administer oxygen as indicated
Identify and treat ___________________________ problem.
Establish IV access, consider fluid challenges if no pulmonary edema.
Consider ___________________________ administration:
  – Vasopressors (Dopamine)
  – Other meds or Fluid Challenge

121 Cardiac Arrest
Causes:
  ● Electrolyte or acid–base imbalances
  ● ___________________________
  ● Drug intoxication
  ● ___________________________
  ● Hypothermia
  ● Pulmonary embolism
  ● ___________________________
  ● Drowning
  ● Trauma
  ● End-stage renal disease and hyperkalemia

122 Cardiac Arrest
Field Assessment:
  ● Initial Assessment
    – Unresponsive,
      ___________________________ , pulseless patient
  ● ECG
History
- Pre-arrest events
- Bystander CPR
- “Down time”

123 Cardiac Arrest
Management:
- Resuscitate unless contraindicated
- General Guidelines
  - CPR.
  - Manage specific
    - Establish IV access
  - Advanced airway management.
- CPR takes priority over defibrillation
  - Avoid of CPR

124 Cardiac Arrest
Postresuscitation Management:
- Manage dysrhythmias and problems as presented.
- Be alert for .
- Manage BP
- Transport :
  - Take care to protect intubation and IV access.

125 Cardiac Arrest
- Withholding Resuscitation
Cardiac Arrest
Indications for termination of resuscitation:

- Patient over ____________ years old.
- Cause is presumed cardiac in origin.
- Successful endotracheal intubation.
- ____________________________ standards applied throughout the arrest.
- On-scene effort > __________ minutes, or four rounds of drug therapy and ECG remains asystolic or agonal.
- Blunt trauma victims presenting with or developing asystole.

Cardiac Arrest
Contraindications to termination of resuscitation:

- Patient under 18 years old.
- Arrest is of a ____________________________ cause.
- Present or recurring VF/VT.
- Transient return of a pulse.
- Signs of neurological viability.
- ____________________________ arrest.
- Family or others opposed to termination of resuscitation.
- Suspected ____________________________ activity.
128  □  **Cardiac Arrest**

Terminating CPR:
● Always follow local ______________________________________________ related to termination of resuscitation.
● Support the ______________________________________________ or others after termination of resuscitation.
● Coordinate with law enforcement as required
● When in doubt, ______________________________________________ resuscitation

129  □  **Peripheral Vascular and Other Cardiovascular Emergencies**

130  □  **Atherosclerosis**

Pathophysiology:
● Progressive ______________________________________________ disease of the medium-sized and large arteries.
● Results from the buildup of fats on the interior of the artery.
● Fatty buildup results in ______________________________________________ and eventual stenosis of the artery.

131  □  **Aneurysm**

● Pathophysiology:
  – ______________________________________________ of an arterial wall, usually the aorta, that results from a weakness or defect in the wall
● Types:
– Atherosclerotic
– ________________________________
– Infectious
– ________________________________
– Traumatic

132 □ Abdominal Aortic Aneurysm
● Often the result of
______________________________
● Signs and symptoms
  – Abdominal pain
  – Back/_____________________________ pain
  – Hypotension
  – Urge to ________________________________
  – Pulsating mass

133 □ Dissecting Aortic Aneurysm
● Caused by ________________________________
  changes in the smooth muscle and elastic tissue.
● Blood gets between and
______________________________ the wall of
  the aorta.
● Can extend throughout the aorta and into associated
  vessels.

134 □ Acute Pulmonary Embolism
Pathophysiology:
● Blockage of a pulmonary
______________________________ by a blood
  clot or other particle.
The area served by the pulmonary _______________ fails.

Signs and Symptoms:

- Dependent upon size and location of the blockage.
- Onset of severe, unexplained _______________.
- History of recent lengthy immobilization.

135 □ **Acute Arterial Occlusion**

Pathophysiology:

- Sudden _______________ of arterial blood flow due to trauma, thrombosis, tumor, embolus, or idiopathic means.
- Frequently involves the _______________ or extremities.

136 □ **Noncritical Peripheral Vascular Conditions**

Peripheral Arterial Atherosclerotic Disease:

- Can be acute or _______________.
- Often associated with _______________.
- Extremities exhibit pain, coldness, numbness, and pallor.

137 □ **Noncritical Peripheral Vascular Conditions**

Deep Venous Thrombosis

- Blood clot in a _______________.
- Typically occurs in the larger veins of the thigh and calf.
- _______________, pain, and
tenderness, with warm, red skin.

Varicose Veins
● Dilated superficial veins, common with pregnancy and obesity.

138 Wolff-Parkinson-White Syndrome
● WPW is a syndrome of pre-excitation of the ventricles due to an accessory pathway called the Bundle of ________________________________ which is an abnormal pathway from the atria to the ventricles.
● Effects 0.15 to 0.2% of the population
● Normally ________________________________

139 Wolff-Parkinson-White Syndrome
● Risk of sudden death due to tachydysrhythmias (rare)
● Produces a delta wave
  – Slurred upstroke in the QRS complex with a short PRI
  – Type I WPW produces ________________________________ delta waves
  – Type II WPW produces ________________________________ delta waves
● Commonly causes syncope and/or palpitations

140 WPW

141 WPW

142 WPW

143 Wolff-Parkinson-White Syndrome
● If patient experiences episodes of ________________________________, the ECG will
show a rapid polymorphic wide-complex tachycardia and is very dangerous.

- In this case, many antiarrhythmic drugs are ______________________________.

Cardioversion is the treatment of choice for unstable patients

144 Management of WPW

- If unstable tachydysrythmia, ______________________________ is indicated

- If more stable, consider ______________________________ or Adenosine
  - Always consult Medical Direction prior to administering any medications for WPW

145 General Assessment and Management of Vascular Disorders

Assessment:

- Initial Assessment

- Circulatory Assessment
  - ______________________________
  - Pain
  - Pulselessness
  - ______________________________
  - Paresthesia

146 General Assessment and Management of Vascular Disorders

Assessment (Continued):

- Chief Complaint
  - ______________________________
• Physical Exam
  – Prior history of ____________________________________________ problems
  – Differences in pulses or blood pressures

147 □ General Assessment and Management of Vascular Disorders
Management:
• Maintain the airway.
• Administer ____________________________________________ if respiratory distress or signs of hypoperfusion present.
• Consider administration of ____________________________________________.
• Transport rapidly if signs of hypoperfusion present.

148 □ 12 Lead ECG
• Provides much better analysis of ECG
• Most 12 Lead machines have interpretation software:
  Do ____________________________________________ rely solely on computer
• Patient must be ____________________________________________
• Do NOT ____________________________________________ treatment or transport to obtain 12 lead
• Normally a left sided ECG, but a right sided ECG can also be performed

149 □ 12 Lead ECG
10 Leads:
• Conventional 4 ____________________________________________ Leads
– Right Arm
– Left Arm
– Right Leg
– Left Leg
● 6 _______________ Leads
  – V1: 4th Intercostal space just to right of sternum

150  □ 12 Lead ECG
6 V Leads (Continued)
● V2: 4th intercostal space just to
  ________________________________ of sternum
● V3: In line ________________________________
  between V2 and V4
● V4: Midclavicular line in 5th intercostal space
● V5: Anterior ________________________________
  line at same level as V4
● V6: Midaxillary line at same level as V4

151  □ 12 Lead Lead Placement

152  □ Prehospital ECG Monitoring

153  □ Prehospital ECG Monitoring

154  □ Prehospital ECG Monitoring

155  □ Prehospital ECG Monitoring

156  □ Prehospital ECG Monitoring

157  □ Prehospital ECG Monitoring

158  □ Prehospital ECG Monitoring
159 □ **Right Sided 12 Lead**

- To perform a right sided ECG, simply ________________ all V-leads to the right side.
- Use the same locations, just on the right side instead of the left
- ________________ use the monitor’s interpretation

160 □ **VAD**

- Ventricular Assist Device
- Electromechanical device for assisting ________________ that is designed to assist in heart failure
- Sometimes used on patients awaiting heart transplant
- Most common is ________________ VAD or LVAD
- Most will also have a ________________

161 □ **LVAD**

162 □ **LVAD**

- Pump is implanted into ________________ left abdominal quadrant and produces a humming sound
- A functioning pump is paramount for the patient’s survival
- Chest compressions may ________________ pump and
could cause patient to bleed to death

- Several manufacturers with different recommendations on CPR

### Dealing With LVAD Patients

- Patient will have a ________________ that has been trained in trouble shooting; listen to them
- All patients have a VAD coordinator available 24/7, always contact him/her
- Follow the ________________ of the coordinator and relay instructions to receiving facility
- Listen for ________________ pump to verify pump operation

### Assessing a LVAD Patient

- ________________ to family and coordinator
- Listen for pump operation in upper left abdominal quadrant. If functioning you should hear a humming sound
- Most patients will NOT have a ________________ ; even if pump is functioning properly
- Cardiac arrest may be determined only by unconsciousness and apnea
- Determine if patient has ________________

### Treatment Differences for VAD Patients
● If pump is not functioning and patient is unconscious and apneic, check/replace battery. If still not functioning, then begin CPR with compressions no greater than ____________ inches
● Never use ____________________________________________
● LVAD patients are pre-load dependent and fluid boluses often reverse hypoperfusion
● Avoid drugs that can ________________________________ pre-load

166  Drugs to Avoid in LVAD Patients
● Anti-dysrhythmic (Amiodarone, Diltiazem, and Lidocaine) unless in cardiac arrest
● ________________________________ (aspirin, Plavix)
● Anti-hypertensives (Labetalol, Procardia)
● ________________________________ (Diazepam, Lorazepam, Midazolam)
● Magnesium Sulfate

167  Drugs to Avoid in LVAD Patients
● ________________________________ (Epinephrine, Dopamine, Repeated doses of nebulized beta-agonists) unless in cardiac arrest
● ________________________________ medications (Nitro, Morphine)

168  Key Points for LVAD
● Take all ________________________________ with patient (batteries, owners manual, charger, etc.)
● Call ________________________________ ASAP
• Take family member/caregiver with you in EMS unit
• _________________________________ to coordinator and caregiver
LEFT SIDED V-LEAD PLACEMENT

V₁: Right 4<sup>th</sup> intercostal space
V₂: Left 4<sup>th</sup> intercostal space
V₃: Halfway between V₂ and V₄
V₄: Left 5<sup>th</sup> intercostal space, mid-clavicular line
V₅: Horizontal to V₄, anterior axillary line
V₆: Horizontal to V₅, mid-axillary line

In an emergent situation and time does not permit a complete right sided EKG, move V₄ to the V₄<sub>R</sub> position to confirm a right ventricular infarct.
RIGHT SIDED V-LEAD PLACEMENT

$V_1R$: Left 4th intercostal space

$V_2R$: Right 4th intercostal space

$V_3R$: Halfway between $V_2$ and $V_4$

$V_4R$: Right 5th intercostal space, mid-clavicular line

$V_5R$: Horizontal to $V_4$, anterior axillary line

$V_6R$: Horizontal to $V_5$, mid-axillary line

In an emergent situation and time does not permit a complete right sided EKG, move $V_4$ to the $V_4R$ position to confirm a right ventricular infarct.