1

Objectives

- Review the basics of common medical conditions
  - DM, HTN, COPD, CHF
- Discuss some of the important components that affect EMS care of these conditions in a case-based format

2

Diabetes Mellitus

Type I – beta cell destruction, absolute insulin deficiency
- 10 % cases, young
- Islet autoantibody

Type II – ranges from insulin resistance to secretory defect
- 90% of cases, older, obese
- Higher genetic disposition

- Other types:
  - Genetic defects/chromosome d/o
  - Pancreatitis
  - Cystic fibrosis
  - Trauma/pancreatectomy
  - Neoplasia
  - Cushing's, pheochromocytoma, hy perthyroidism
  - Drug related – dilantin, antipsychotics
  - Infectious – CMV, rubella
  - Gestational

3

Diabetes Mellitus

- Treatment
  - Type I – insulin (long and short acting vs continuous)
    - CGM, insulin pumps, feedback loops, stem cell or pancreas transplant
  - Type II – keep HgbA1c <7 to prevent long-term complications
    - Diet, exercise, weight loss (DiRECT trial – 15 kg weight loss in 24%, 36% DM remission)
    - Pharmacologic therapy
      - Metformin or sulfonylurea (glipizide or glyburide)
      - SGLT2 inhibitor (...-gliflozins)
      - Glucagon-like peptide 1 receptor (GLP-1) (...-aglutides)
      - Dual GLP-1 and glucose-dependent insulinotropic polypeptide (GIP) (tirzepatide)

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Diabetes mellitus – Case # 1

65 yo M called 911 after mechanical fall resulting in R hip pain	Assessment:	Thoughts?
• PMHx – COPD, DM, HTN • Rx – oxygen 2 lpm, metformin, lisinopril	• VS – HR 110, RR 18, BP 168/85, SpO2 92% on 2 lpm n/c • Glucose – 285	

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Diabetes Mellitus – Case # 2

19 yo F with no known past medical history found altered in the morning by roommate after 3 days of progressive worsening nausea and vomiting

Assessment:

VS: HR 135, RR 35, BP 80/40, Temp 36 C, SpO2 95% room air

Glucose: 580

Thoughts?

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Diabetes Mellitus – Case # 2

Diabetic ketoacidosis

- Symptoms: abdominal pain, n/v, poluria, polydipsia, confusion
- Causes: non-compliance, new onset IDDM, infection, drugs/alcohol
- Immediate life-threats: dehydration, electrolyte derangements, metabolic acidosis, encephalopathy, death

Pre-hospital Treatment:

- IVFs, IVFs, IVFs… Anti-emetic
- Insulin?
- Potassium?
- Bicarb?
- Intubation?
- Pediatric?

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Diabetes Mellitus – Case # 3

- Looks and smells like DKA but glucose 150 -->
  - SGLT2 inhibitor "euglycemia DKA"
- Dehydrated, confused and glucose 1800 but normal ETCO2 -->
  - Hyperosmolar hyperglycemic state (HHS)
- Obtunded, unresponsive to narcan, suicide note pinned to shirt and glucose 15, increases to 60 after D50 but drops to 10 fifteen min later -->
  - glipizide
- Confused, tachypneic, low ETCO2 and glucose normal 2 days after an ER visit where CT abd/pelvis performed with IV contrast -->
  - metformin

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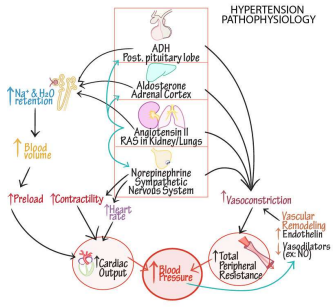
Hypertension



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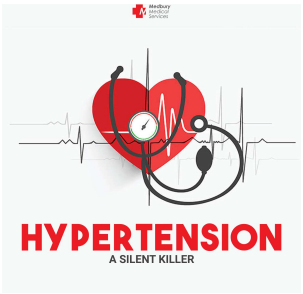
Hypertension

- **Primary HTN "essential"** (95%)
  - >130/80
  - 45% of US adults
  - 1300 deaths/day due to HTN (CVA/MI/CHF)
  - Environmental, genetic, social determinants
- **Secondary HTN** (5%)
  - CKD
  - Endocrine/pregnancy
  - Heart disease (valve, fluid overload)
  - Neurologic (OSA, ICP, psych, stress)



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Hypertension

- **Hypertensive urgency "crisis"**
  - >180/120
  - NO end-organ damage
- **Hypertensive emergency " malignant HTN"**
  - >180/120
  - YES end-organ damage
    - AKI, MI, CHF, CVA/ICH
    - AMS, chest pain, low UOP

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Hypertension

Treatment

- Behavioral
  - Diet, exercise, weight loss, smoking cessation, stress management (Premier trial 2006 – decreased HTN prevalence and need for meds by 10-20%)
- Pharmacologic
  - Thiazides, calcium channel and beta blockers, ACE-I/ARBS, alpha blockers, combination

If HTN urgency…

- Resume home medication
- Add additional agent (IV – hydralazine, labetalol, vasotec. PO – clonidine)

If HTN emergency…

- Resume home medication
- Add additional agent (see above +/- gtt --> nicardipine, nitroglycerin, labetalol)
- Goal BP reduction by no > then 25%

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Hypertension – Case # 1

- 30 yo F called 911 for abdominal pain, nausea and vomiting for 12 hrs after eating "spicy Cheetos"
- Assessment:
  - VS – RR 12, HR 72, BP 160/90, SpO2 98%
  - Normal physical exam
- Thoughts?

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Hypertension – Case # 2

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Hypertension – Case # 3

- 25 yo F G1P0 38 weeks pregnant c/o headache and swollen legs, BP 160/80 --> pre-eclampsia
- 8 yo M with shortness of breath, crackles on exam and a BP of 140/90 --> treat with same anti-HTN as adults

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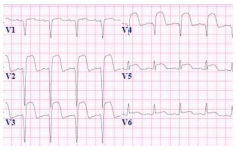
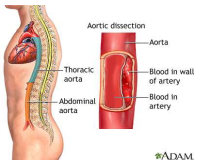
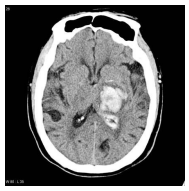
Hypertension – Case # 4

- 19 yo M at a rave when collapses and found obtunded with fixed pupils, posturing, BP 220/180
- Treatment options?







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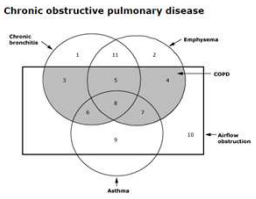
Chronic Obstructive pulmonary disease (COPD)

- Common respiratory disease characterized by airflow limitation
  - In US 10% of individuals >40 yrs old, 3rd cause of death worldwide
- Major subtypes
  - Emphysema – abnormal and permanent enlargement of airspaces
  - Chronic bronchitis – chronic cough x 3 months x 2 years
  - Chronic obstructive asthma – component of asthma does not completely reverse



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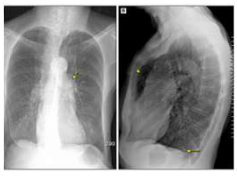

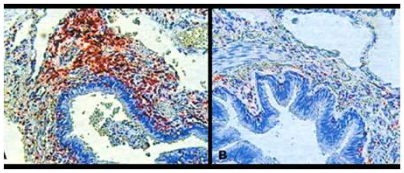

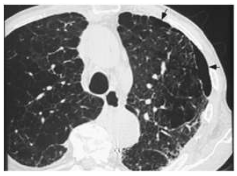

COPD

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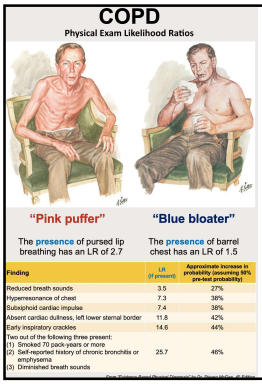

COPD

- Risks:
  - FHx, smoking, environmental (dusts/toxins), asthma
- Symptoms:
  - SOB, cough, wheeze
- Physical exam:
  - Barrel chest, wheeze, prolonged forced expiratory phase, pursed lip breathing

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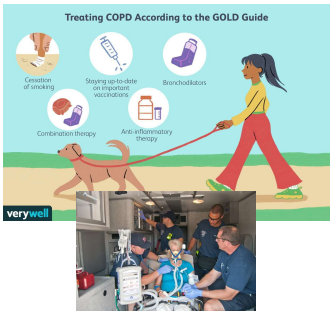
COPD

- Management of exacerbation
  - Respiratory failure (A&B of ABCs)
    - O2 and ventilation (CO_2)
    - SpO_2 goals 88-92% with supplemental O_2
    - BiPAP or intubation
  - Medications
    - Bronchodilators
      - Beta agonists – albuterol or xopenex
      - Anticholinergic - ipratropium
    - Steroids
      - IV vs oral vs inhaled
    - Antibiotics
      - Macrolide (azithromycin) vs cephalosporin
- Adjuncts
  - Magnesium
  - No benefit and potential harm from theophylline, mucoactive (mucomyst), epinephrine



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COPD – Case # 1

72 yo F with 60 pk-yr history, COPD on 4 lpm n/c 24 hrs/day calls 911 for shortness of breath x 2 days

Chronic cough but worsening sputum

Wheezing, chest tightness, using rescue inhaler without improvement

Assessment:

VS – RR 30, BP 180/90, Temp 38.5C, HR 120, SpO_2 68% on 4 lpm n/c

Barrel chested, tripoding, wheezy, accessory muscle use, cyanosis

Thoughts?

22

COPD – Case # 2

Interfacility transfer from Banner Churchill to Saint Mary's in Reno of a 60 yo M with COPD exacerbation on BiPAP

BiPAP settings:

- IPAP 12, EPAP 5, FiO2 100% with TVs 400-500 and SpO2 98%

ABG: pH 7.37, pCO2 78, paO2 120, HCO3 38

Thoughts?

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COPD – Case # 3

89 yo F with end-stage COPD on 6 lpm n/c for years with SOB/wheezing

Assessment:

- VS – RR 8, SpO2 50%, HR 40, SBP 60/40, Temp 35C

Thoughts?

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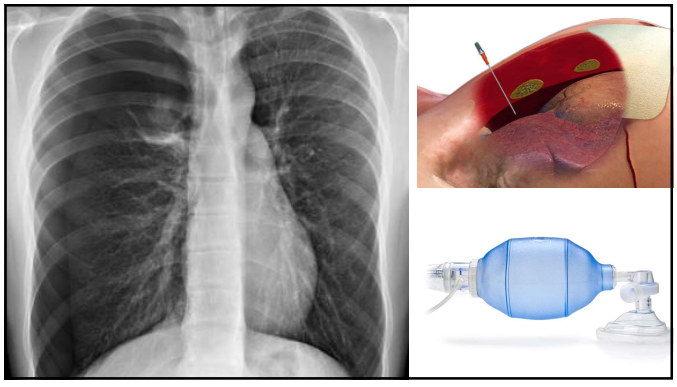

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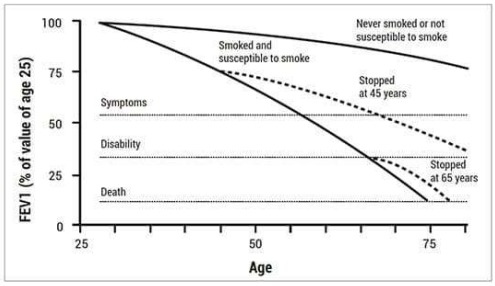

Figure 1.4 - Fletcher and Peto's 'Lung Function decline in COPD

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Congestive heart failure (CHF)

"Presence of characteristic symptoms, such as dyspnea and fatigue, AND evidence of cardiac dysfunction as a cause of symptoms" - UpToDate

Types –

LV dysfunction – ischemic or dilated CM	RV dysfunction	Valvular	Pericardial	Obstructive	High-output
•HFrEF (systolic HF) with EF <40% •HFpEF (diastolic HF) with EF >50% (restrictive, hypertrophic)	•Pulmonary hypertension, infarct	•Stenosis or regurgitation	•Pericarditis	•Pericardial tamponade, pulmonary embolism, mass	•Thyrotoxicosis, pregnancy

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CHF

Signs/Symptoms:

- Dyspnea on exertion or rest
- Symmetric leg swelling
- Cough
- Weight gain
- Early satiety
- JVD
- Orthopnea
- Paroxysmal dyspnea
- S4, laterally displaced PMI

Labs/imaging:

- Elevated BNP, troponin
- EKG with LVH, right heart strain, ST depression, Atrial enlargement
- CXR with enlarged heart shadow, pulmonary edema
- Echocardiogram

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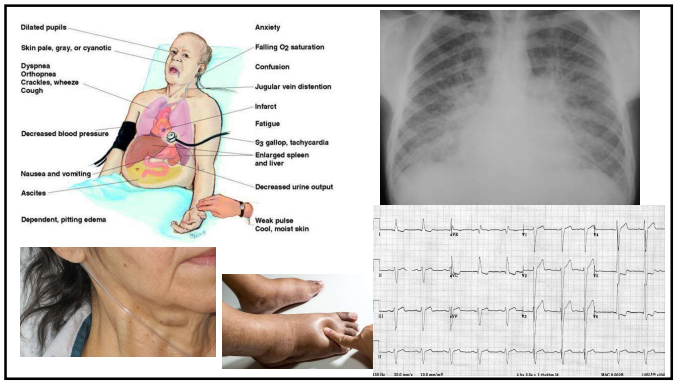

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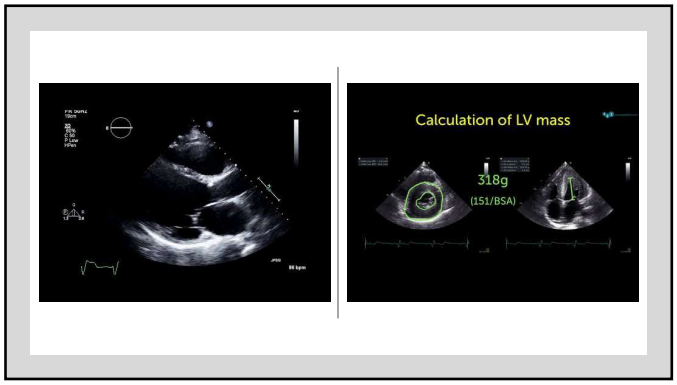

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Comparison of ACCF/AHA Stages of HF and NYHA Functional Classifications

ACCF/AHA stages of HF		NYHA functional classification	
A	At high risk for HF but without structural heart disease or symptoms of HF	None	
B	Structural heart disease but without signs or symptoms of HF	I	No limitation of physical activity. Ordinary physical activity does not cause symptoms of HF.
C	Structural heart disease with prior or current symptoms of HF	I	No limitation of physical activity. Ordinary physical activity does not cause symptoms of HF.
		II	Slight limitation of physical activity. Comfortable at rest, but ordinary physical activity results in symptoms of HF.
		III	Marked limitation of physical activity. Comfortable at rest, but less than ordinary activity causes symptoms of HF.
		IV	Unable to carry on any physical activity without symptoms of HF, or symptoms of HF at rest.
D	Refractory HF requiring specialized interventions	IV	Unable to carry on any physical activity without symptoms of HF, or symptoms of HF at rest.

ACCF: American College of Cardiology Foundation; AHA: American Heart Association; HF: heart failure; NYHA: New York Heart Association.

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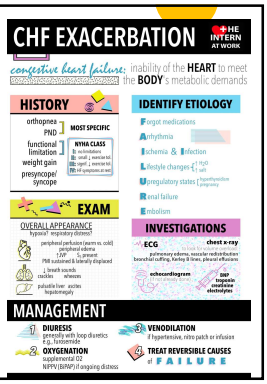
Congestive heart failure

- Treatment
  - Symptom management
    - IV, O2, positioning
    - NIV vs intubation
    - Arrythmia control
  - Pharmacologic therapy
    - Diuretic (lasix 40 mg IV)
    - Afterload reduction (nitroprusside or nitroglycerin)
    - ACE-I vs ARB
    - Beta blocker



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CHF – Case # 1

- 80 yo M with known CHF (EF 20%) calls 911 for worsening shortness of breath and leg swelling for 7 days. Developed some palpitations the day prior to symptoms starting. Compliant with medications
  - Meds – lisinopril 10 mg, coreg 6.5 mg, lasix 20 mg, ASA 81 mg
- Assessment:
  - VS – BP 190/110, HR 150 (irregular), RR 30, SpO2 86% room air, Temp 98F
  - Exam – accessory muscle use, coarse crackles throughout, abd distension, 2 + pitting edema BLEs
- Thoughts?

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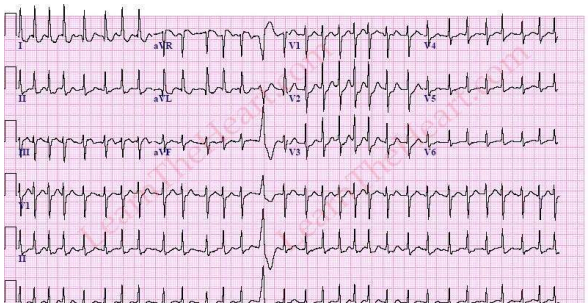

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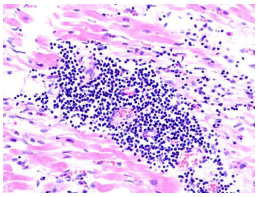
CHF – Case # 2

- 22 yo F with no prior medical history calls 911 for shortness of breath, poor appetite, cough of pink sputum, and leg swelling for 2 weeks after a runny nose, sore throat and muscle aches
- Thoughts?
- Other conditions lead to this?



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CHF – Case # 3

- 56 yo M with history of methamphetamine abuse for years calls 911 for leg swelling, increased weight gain and abdominal distension. Denies chest pain or shortness of breath
- Assessment:
  - Vital signs – 80/60, HR 95, RR 25, SpO2 86% room air, temp 99F
  - Physical exam – BLE 1+ edema, abdominal distension, hepatomegaly, clear lungs
- Thoughts?

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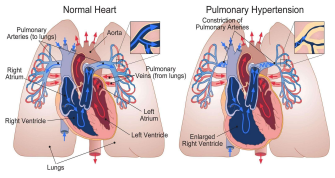
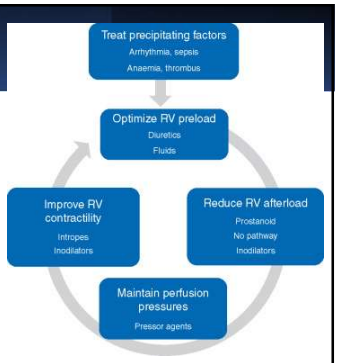
Pulmonary hypertension





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Conclusion

- Reviewed the following conditions with both general treatment and special circumstances
  - Diabetes
  - Hypertension
  - COPD
  - Congestive heart failure

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