

Intern Report:

Case Report on an Overdose

October 8th, 2021

Oliver Clark

Learning Objectives

- Identify common drugs taken in an overdose
- Describe management of a patient after suicide attempt
- Describe management of Ca channel blocker overdose, including high dose insulin therapy and lipid emulsion
- Name complications of Ca channel blocker overdose

What is the most common drug taken in an overdose death?

- a) Acetaminophen
- b) Alprazolam
- c) Fentanyl
- d) Oxycodone
- e) Heroin

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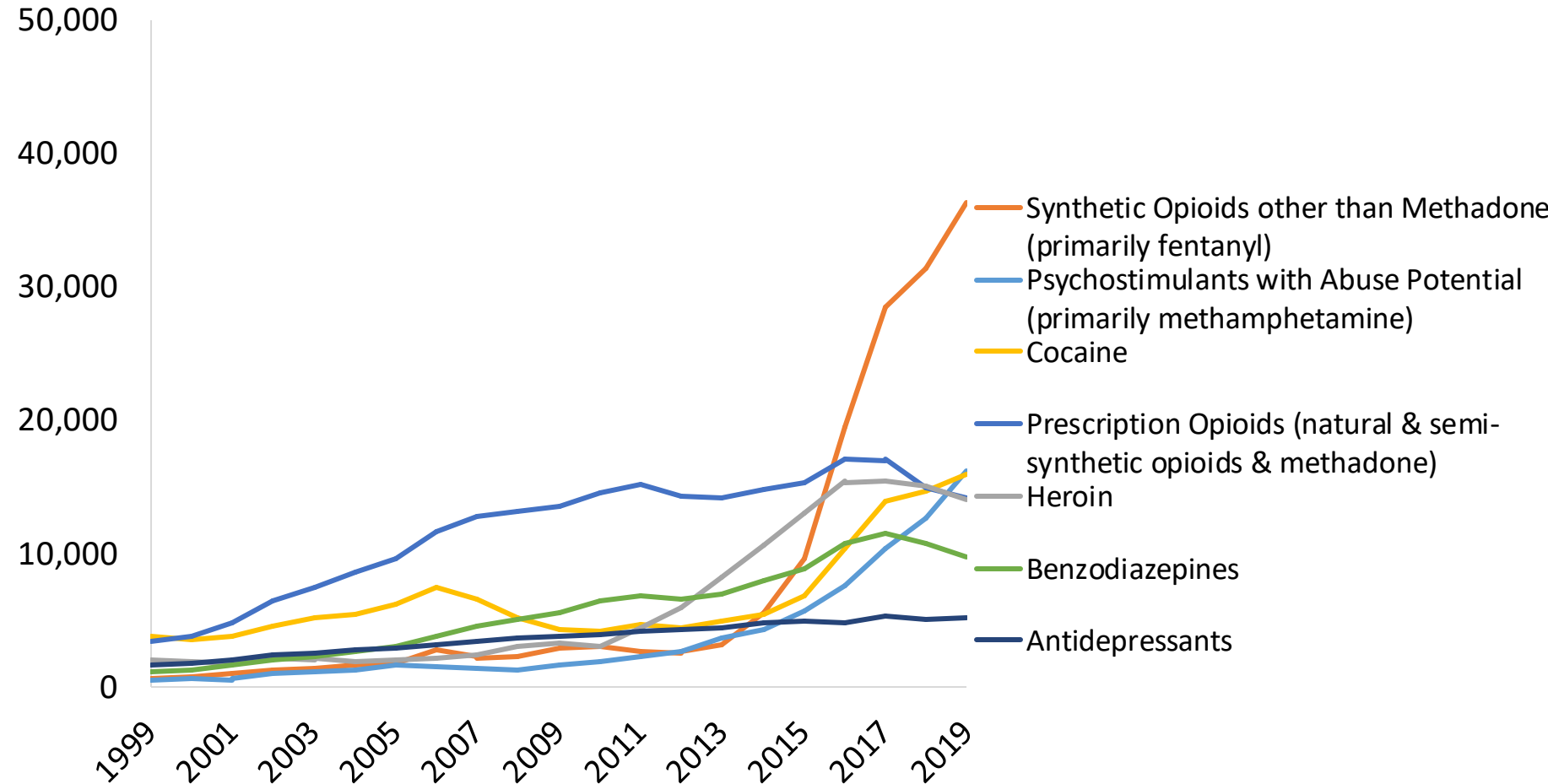
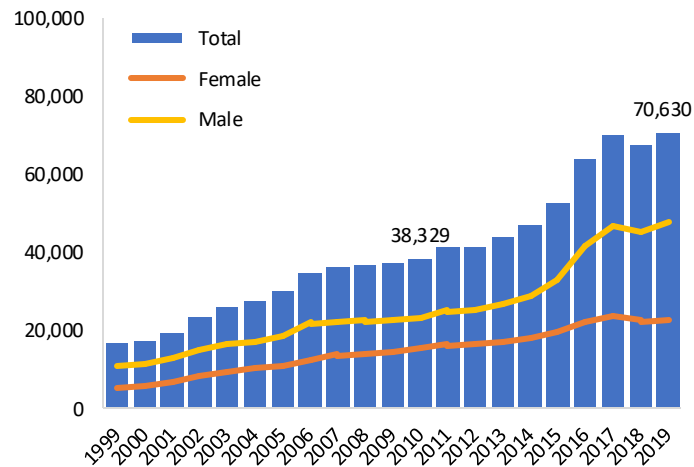
- a) Acetaminophen
- b) Alprazolam
- c) Fentanyl**
- d) Oxycodone
- e) Heroin

Background

- Drug overdose
 - Intentional vs. Unintentional
 - Death vs. no death
- Most drug overdose deaths are unintentional (92%)
- Most common are fentanyl, synthetic or prescription opioids, psychostimulants, cocaine, and benzodiazepines
- Rate increasing and has doubled since 2006
- Synthetic opioids are the main driver of drug overdose deaths with 13-fold increase from 2012 to 2019

National Drug-Involved Overdose Deaths*, Number Among All Ages, 1999-2019

National Drug-Involved Overdose Deaths
Number Among All Ages, by Gender,
1999-2019



*Includes deaths with underlying causes of unintentional drug poisoning (X40–X44), suicide drug poisoning (X60–X64), homicide drug poisoning (X85), or drug poisoning of undetermined intent (Y10–Y14), as coded in the International Classification of Diseases, 10th Revision. Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999-2019 on CDC WONDER Online Database, released 12/2020.

<https://www.drugabuse.gov/drug-topics/trends-statistics/overdose-death-rates>

What is the most common medication taken in an intentional drug overdose?

- a) Acetaminophen
- b) Alprazolam
- c) Diazepam
- d) Ibuprofen
- e) Oxycodone
- f) SSRIs
- g) Zopiclone

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Most common medication taken in an intentional overdose

- Among all intentional drug overdoses (non-US)
 - 1 drug used (53%), ≥ 2 drugs (47%), ≥ 3 drugs (23%)
 - < 10 tablets used (25%), > 50 tablets (14%)
 - Acetaminophen (22%), diazepam (14%), zopiclone (10%), alprazolam (4.5%)
- Among intentional drug overdose deaths (US)
 - Oxycodone (13%), Diphenhydramine (11%), Hydrocodone (9%), Alprazolam (9%), Acetaminophen (7%)

Case

Case

- Ms. X is a 67-year-old female
- Prior medical history of depression, anxiety, HTN, T2DM, HLD, peripheral vascular disease, hypothyroidism, morbid obesity s/p gastric bypass, OSA, uric acid nephrolithiasis s/p double-J stent 2014, and new diagnosis of Afib, Acute diastolic heart failure 1 month prior to admission
- Presents to PAH ED via Fire Brigade following intentional drug overdose with:
 - 1800mg (180x10mg) amlodipine
 - 900mg (90x10mg) loratadine
- Complaining of shortness of breath and back pain
- BP 72/38 (MAP 49), HR 75, RR 20, SpO2 100% RA, Temp 36.4°C

History

- Events surrounding intentional drug overdose
 - Before
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 -
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 - During
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 -
 -
 - After
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 -
 -
 - About medications
 -
 -
 -

History

- Events surrounding intentional drug overdose
 - Before
 - 1 month before admission, developed orthopnea and went to Jefferson Cardiology
 - Diagnosed with Afib and acute diastolic heart failure
 - Shortly after, began having thoughts of taking her own life
 - Last 3 nights couldn't sleep, thought this was due to heart failure
 - Unhappy because unable to get new CPAP machine due to insurance issues
 - Did not perform any final acts or precautions
 - During
 - Impulsive decision that "she couldn't go through this again" and she "would just go to sleep"
 - At 12AM, she took 3 bottles amlodipine and 1 bottle loratadine
 - Alcohol or other drugs were not used
 - After
 - The patient woke at 2AM and decided to call 911 because "it wasn't working"
 - The patient arrived at ED 3AM via Fire brigade
 - She endorses pain in her neck and pain in her right leg radiating up to her hip, shortness of breath at rest, and warm, foggy feeling
 - About medications
 - Had been prescribed both amlodipine and loratadine >10 years
 - Amlodipine dose increased 10mg from 5mg 4 months before admission
 - Last refill amlodipine and loratadine was 90-day supply 1 month before admission

History

Suicide Risk Assessment

-

History

- Suicide Risk Assessment

- Intent
 - Intentional, chose meds based on ones that said they caused sleepiness on the bottle
- Perceived seriousness
 - Wanted to “make things go away”
- How do they feel at the time of the assessment
 - Unclear
 - Active suicidal ideation
- Psychiatric conditions
 - Untreated severe depression. Decreased sleep, decreased energy, suicidal ideation
 - States she was in therapy in past at a “family and friends” center but stopped due to insurance issues. Never took any medication for depression
 - Denies any previous diagnoses, inpatient visits, past or current outpatient treatment
- Previous self harm
 - None
- Medical history
 - Depression, Anxiety, HTN, T2DM, HLD, peripheral vascular disease, hypothyroidism, morbid obesity, OSA, uric acid nephrolithiasis s/p double-J stent 2014, and new diagnosis of Afib, Acute diastolic heart failure
- Social history
 - Non-smoker, non-drinker, no other drugs
 - No connection to care
 - Lives alone
 - Employment status unknown
 - Has social network or family as support
- Family history
 - Son took his own life 2 years ago

- Medications

- valsartan 320mg once daily
- amlodipine 10mg tablet once daily
- metformin ER 500mg twice daily
- atorvastatin 80mg once daily
- aspirin 81mg once daily
- pentoxifylline 400mg 3x daily
- rivaroxaban 20mg once daily with dinner
- metoprolol succinate ER 25mg once daily
- furosemide 40mg once daily
- levothyroxine 137mcg once daily
- albuterol HFA 108mcg 1 puff q4hrs prn
- Fluticasone furoate / Vilanterol 200-25mcg 1 puff daily
- allopurinol 300mg q12 hours
- Cholecalciferol 25mcg once daily
- ibuprofen 800mg 3x daily prn
- loratadine 10mg once daily

Suicide Risk Assessment Overview

- Details of the attempt: before, during, and after
- Establish the patient's intent
- Assess the seriousness and perceived seriousness of their attempt
- Assess how they feel about the attempt at the time of assessment
- Psychiatric history, including family, social, drug use, medical/surgical history, and medications
- If applicable, submit 302 form

Physical Exam

- Constitutional
 - She is obese. She is ill-appearing. She is not diaphoretic.
 - Appears uncomfortable in the bed, holding the bed side railing.
- Skin
 - Skin is warm and dry.
- Mouth/Throat
 - Mucous membranes are dry
 - Mouth is clear.
- Eyes
 - Pupils are equal, round, and reactive to light
 - No scleral icterus
- Cardiovascular
 - Normal rate and regular rhythm, normal heart sounds, no murmurs
 - Normal JVP
 - Bilateral pitting edema present up to mid-shin
- Pulmonary
 - Good air exchange and speaking in full sentences
 - Normal breath sounds
 - No accessory respiratory muscle use.
- Abdominal
 - Soft, mild distension, non-tender, no masses
 - Morbid obesity
- Musculoskeletal
 - Tenderness to palpation of neck and right upper leg
- Neurological
 - No focal deficit present.
 - She is alert and oriented to person, place, and time
- Psychiatric
 - Anxious, restless

Labs

- CBC
 - Normal Hb, normal platelets
 - WCC 20.5
- Manual Differential
 - 81% segmented neutrophils, ANC 16.7
 - 0% band neutrophils
 - Echinocytes/burr cells present
- VBG with lactate
 - 7.42/27, lactate 5.4
- BMP shown

Component	Value
Glucose	200 
Sodium	136
Potassium	3.1 
Chloride	98 
Carbon Dioxide	20 
Anion Gap	18 
With hypoalbuminemia, anion gap (AG) = 2.5 * (4 - Albumin). The lab report	
Urea Nitrogen	29 
Creatinine	1.58 
Calcium	10.0

Labs

- Blood labs

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- Urine

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- Other

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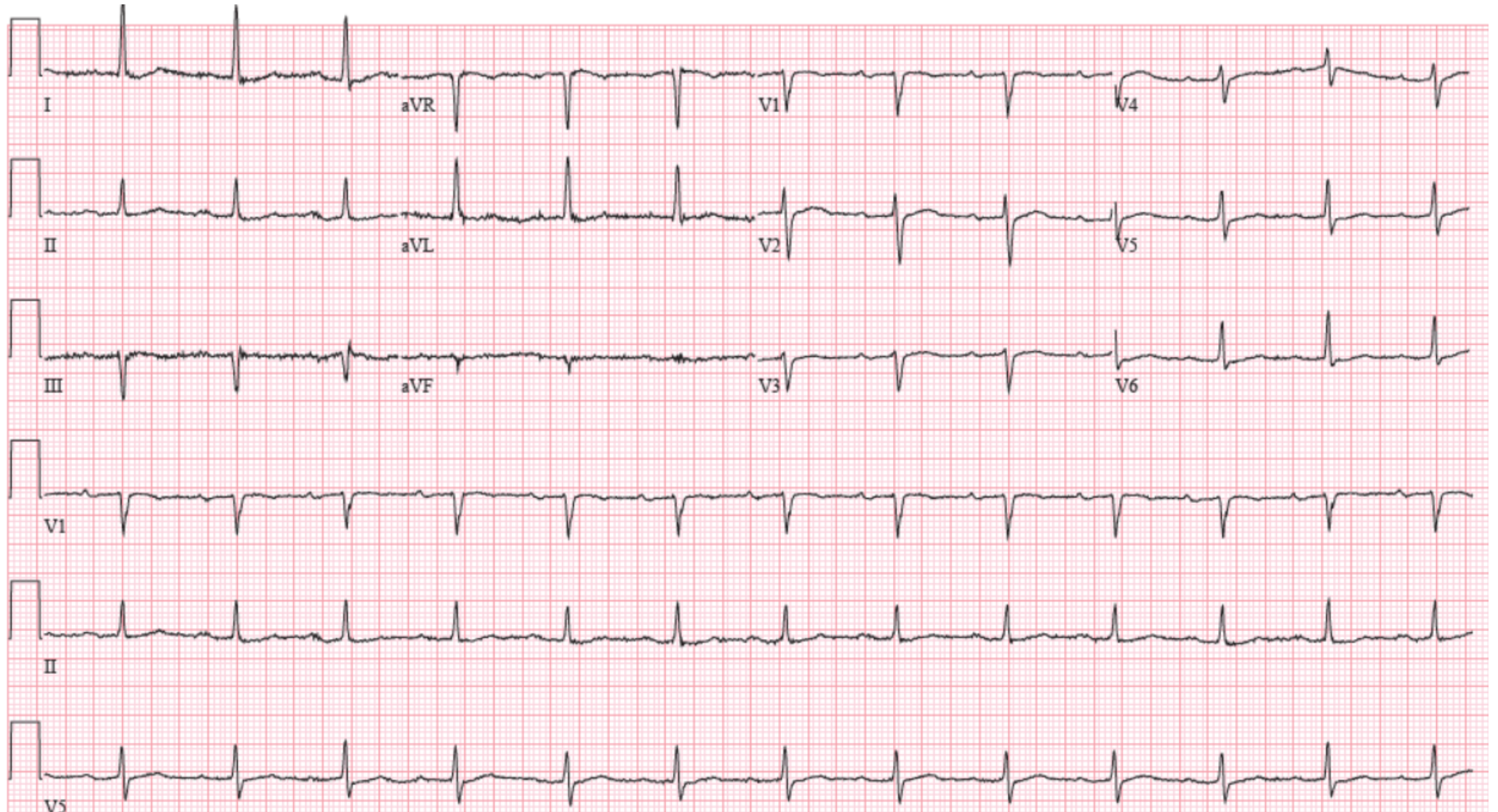
Labs

- Blood labs
 - LFTs
 - Magnesium, phosphate
 - TSH
 - Salicylates, Ethanol, Acetaminophen
 - Troponin T
 - NT pro-BNP
- Urine
 - Urinalysis
 - UDS
- Other
 - Lipid screen
 - ABG

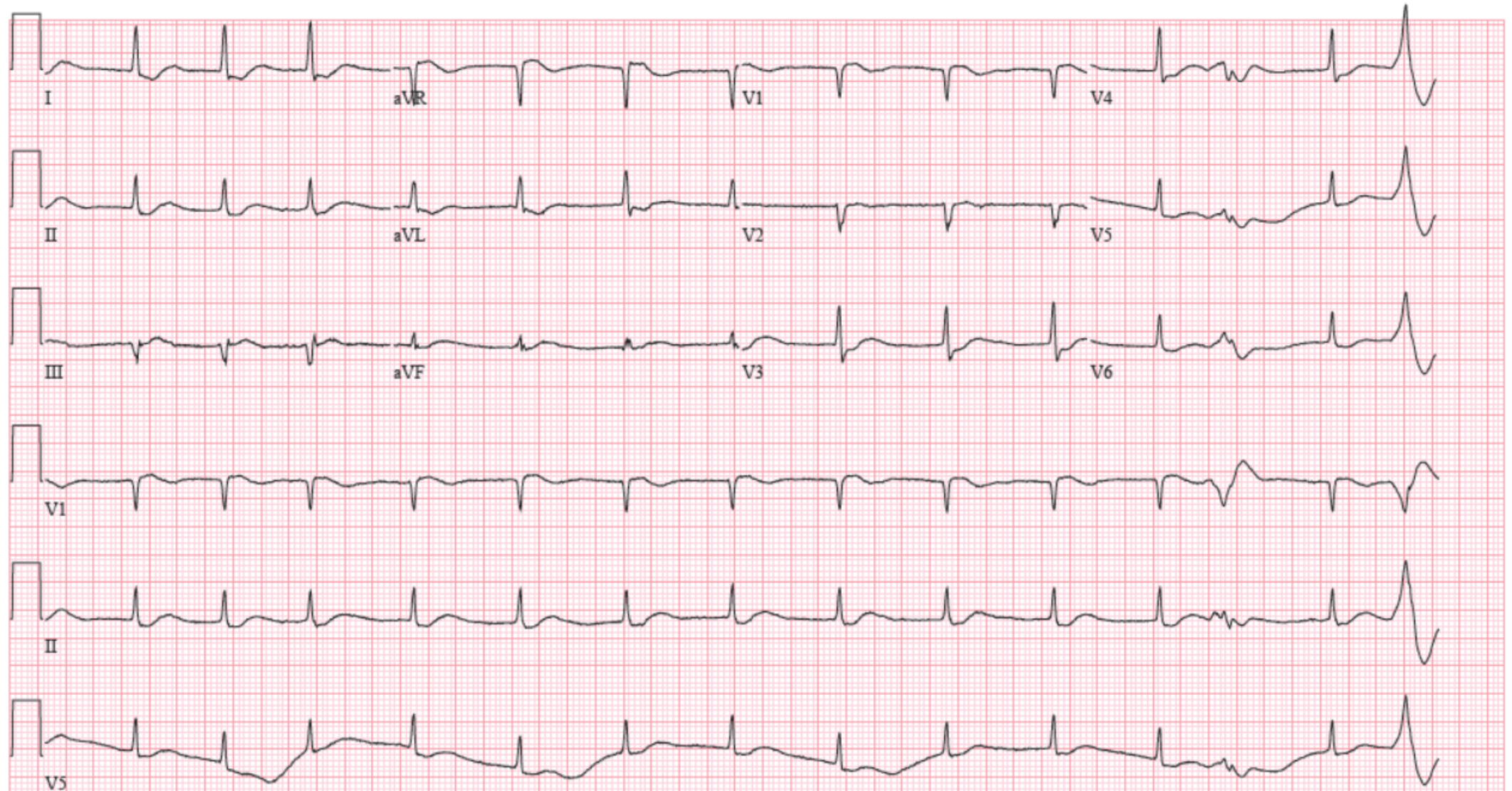
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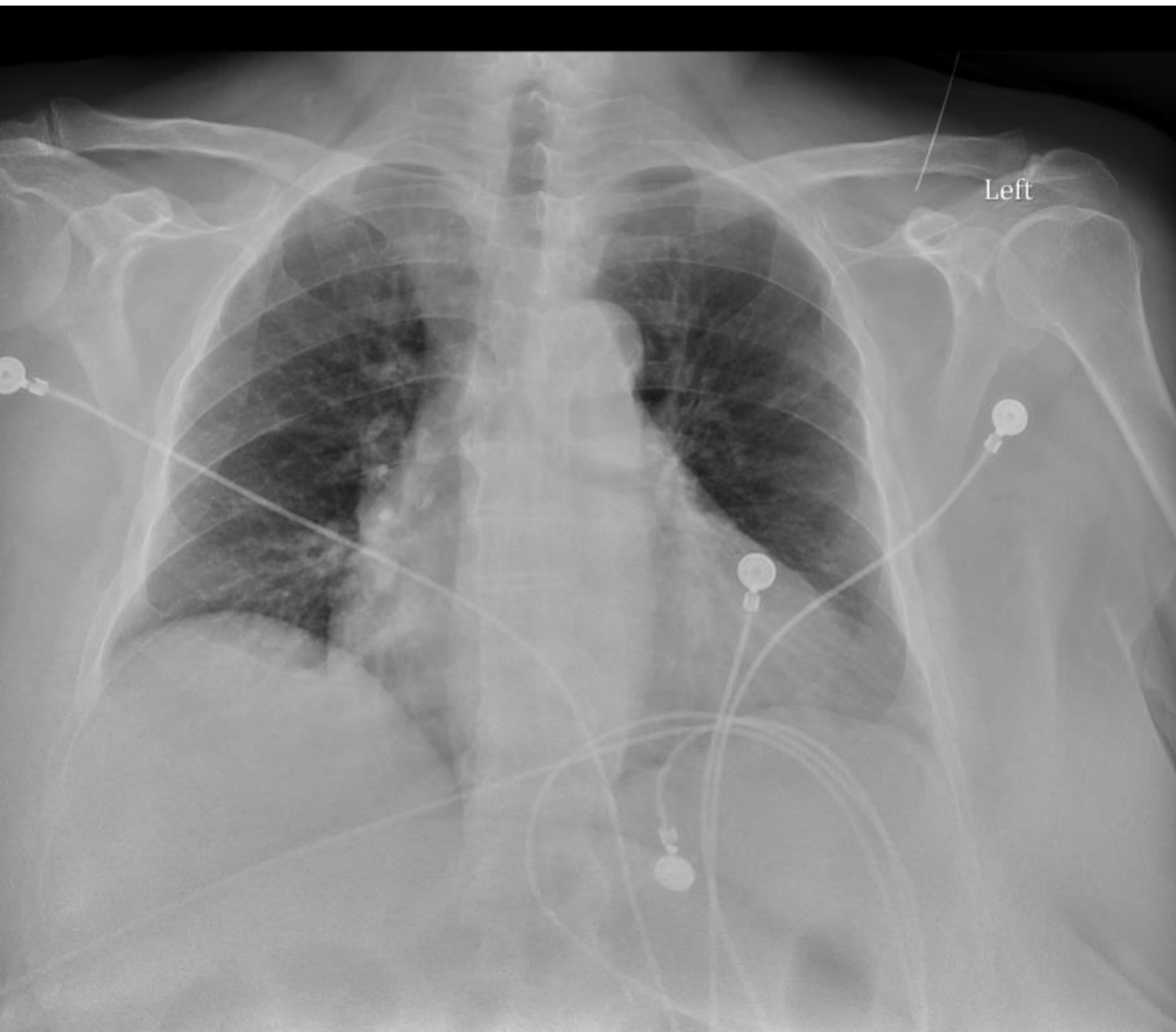
- Blood labs
 - LFTs: normal
 - Magnesium: 1.6, phosphorus: 2.8
 - TSH: 1.63
 - Salicylates, Ethanol, Acetaminophen: normal
 - Troponin T: <0.011
 - NT pro-BNP: 205
- Urine
 - Urinalysis: slightly cloudy, otherwise normal
 - UDS: normal
- Other
 - Lipid screen: triglycerides 181, LDL 14, HDL 25
 - ABG 7.43/27/110, lactate 1.3

EKG @ 3AM



EKG @ 6AM





Series: 1
Acc#: 35813748
7/6/2021, 9:54:17 AM



Series: 1
Acc#: 35847803
7/12/2021, 4:05:44 AM

TTE

- Study difficult due to patient's clinical status and body habitus
- Normal LVEF by visual estimate
- Unable to assess LV diastolic function due to arrhythmia.
- The left atrium is moderately dilated. Anterior-posterior left atrial size is 5.20 cm.
- IVC dilated (diameter >21 mm) and decreases <50% in size with inspiration, suggesting an elevated right atrial pressure of 15 mmHg (range 10-20 mm Hg).

What of the following is incorrect regarding management of amlodipine overdose?

- a) Call poison control at 1-800-222-1222
- b) Consider single dose of activated charcoal
- c) Pressors and IV fluids
- d) Hemodialysis
- e) High dose insulin therapy
- f) Lipid emulsion therapy
- g) Patient may require extra corporeal membrane oxygenation

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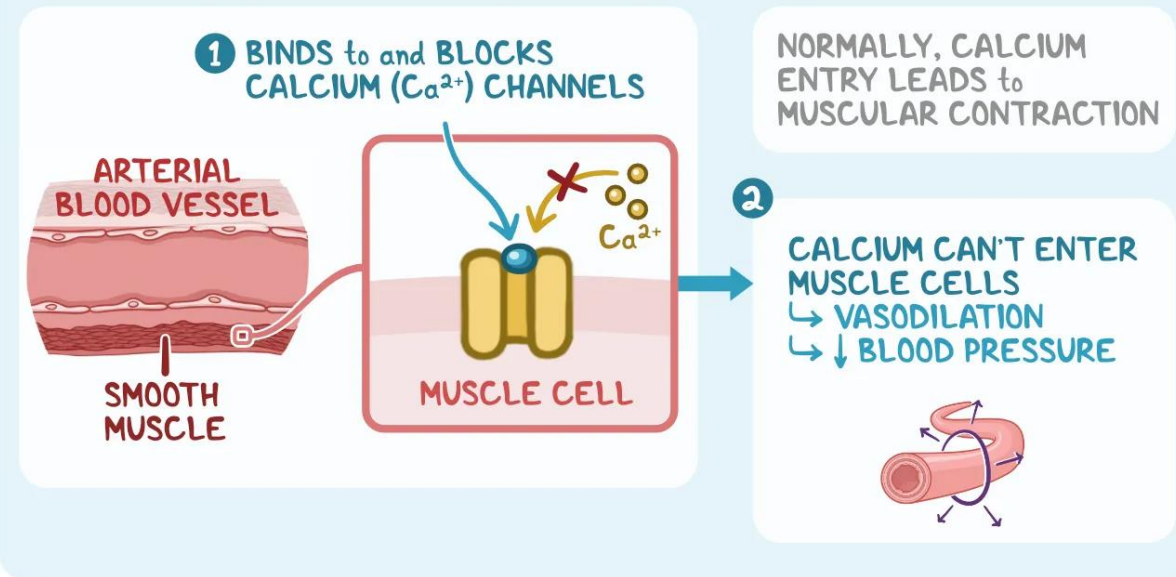
Amlodipine

- Lipophilic dihydropyridine calcium channel blocker
- Inhibits influx through voltage-gated L-type calcium channel
- Prevents depolarization of vascular smooth muscle and myocardial cells
- Results in decreased peripheral vascular resistance
- Once daily medication

Pharmacokinetics/dynamics

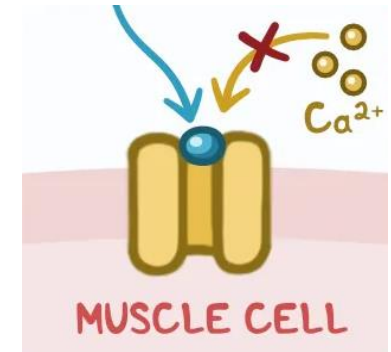
- Bioavailability 60-90% with time to peak 6-12hrs
- Results in significant BP reductions after 24-48 hours
- Hepatic metabolism to inactive metabolites which are excreted in urine
- Half life 30-50 hours
- Poorly dialyzed
- No reversal agent
- Normal steady state plasma concentration ~0.007mg/L
- Plasma concentration after 1800mg dose ~0.54mg/L

HOW do DIHYDROPYRIDINES WORK?



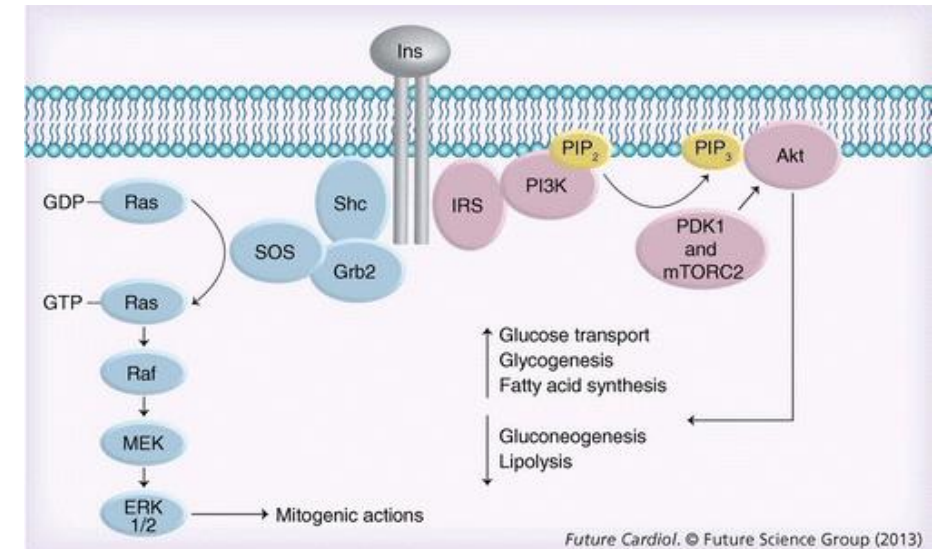
Management of Amlodipine Overdose

- Management of:
 1. Distributive/vasogenic shock
 2. Myocardial depression and bradycardia
- Call poison control at 1-800-222-1222
- Consider single dose of activated charcoal if within 4hrs of ingestion
- Airway and respiratory support, with administration of 1-2L IV fluids
- Vasopressors
- Calcium supplementation
- High-dose insulin euglycemic therapy
- IV lipid emulsion
- For cardiogenic shock, may consider phosphodiesterase inhibitors (e.g. milrinone, amrinone)
- For distributive shock, may consider methylene blue
- If hypotension persists or cardiac arrest occurs despite above, consider extracorporeal membrane oxygenation



High-dose insulin euglycemic therapy

- What
 - High dose insulin infusion (1-10 Units/kg/hr)
 - High dose dextrose infusion (10-50% dextrose)
 - Regular potassium repletion
 - Glucose checks q20-60min, BMP q60min
- How
 - Increased inotropy - increases intracellular transport of glucose, oxygen, and lactate
 - Increased inotropy – increases Ca-dependent inotropic effects through PI3-kinase
 - E.g. increased SERCA activity and cytoplasmic [Ca]
 - May increase vasodilatory activity through endothelial nitric oxide synthase (eNOS) activity
- When
 - Calcium channel and beta blocker toxicity
- A lack of hemodynamic response suggests that other therapies should be considered or that shock is vasodilatory in etiology

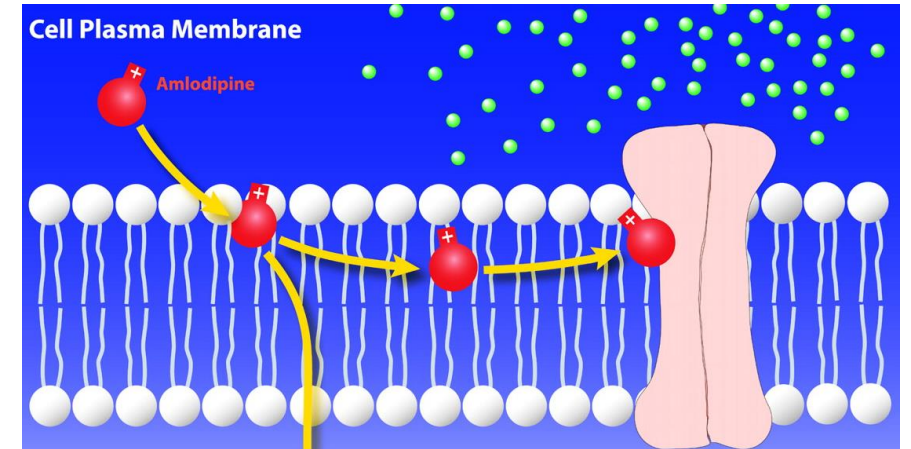


<https://www.tandfonline->

[com.proxy.library.upenn.edu/doi/full/10.3109/15563650.2011.5https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4767195/82471](https://www.tandfonline-com.proxy.library.upenn.edu/doi/full/10.3109/15563650.2011.5https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4767195/82471)

IV lipid emulsion

- What
 - 1.5 mL/kg 20% lipid emulsion bolus
 - 0.25-10mL/kg/min 20% lipid emulsion infusion
- How
 - Binding of lipophilic chemicals in plasma
 - Unclear if it enhances absorption of lipophilic toxins from the GI tract and paradoxically increases toxicity
- When
 - Lipophilic CCB or BB intoxication
 - Wide range of lipophilic local anaesthetic, pharmaceutical and chemical agents
- Positive response has been reported within 1hr in some cases, and several hours in others
- Adverse effects include lipemic serum interfering with biochemical assays, pancreatitis and acute lung injury



<https://pubmed.ncbi.nlm.nih.gov/17192120/>

<https://pubmed.ncbi.nlm.nih.gov/23530458/>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4767195/>

Medications

- ED starting at 3AM - Called poison control
 - Activated charcoal not given as 3 hours after ingestion
 - IV NS 2L bolus
 - Calcium gluconate 1g IV
- ICU at 6AM - central and arterial line placed
 - Epinephrine 25mcg/min
 - Norepinephrine 60mcg/min
 - Phenylephrine 400mcg/min
 - Vasopressin 0.06 Units/min
 - Dopamine 20mcg/kg/min
 - Calcium chloride 3g IV
 - Calcium gluconate 1g IV
 - Dextrose 20% 200mL/hr
 - Insulin up to 500 units/hr
 - Potassium chloride 100mEq IV total
 - Lipid emulsion 20% 700mL
 - Atropine 1mg IV
 - Glucagon 3mg IV

PAH Hospital Course

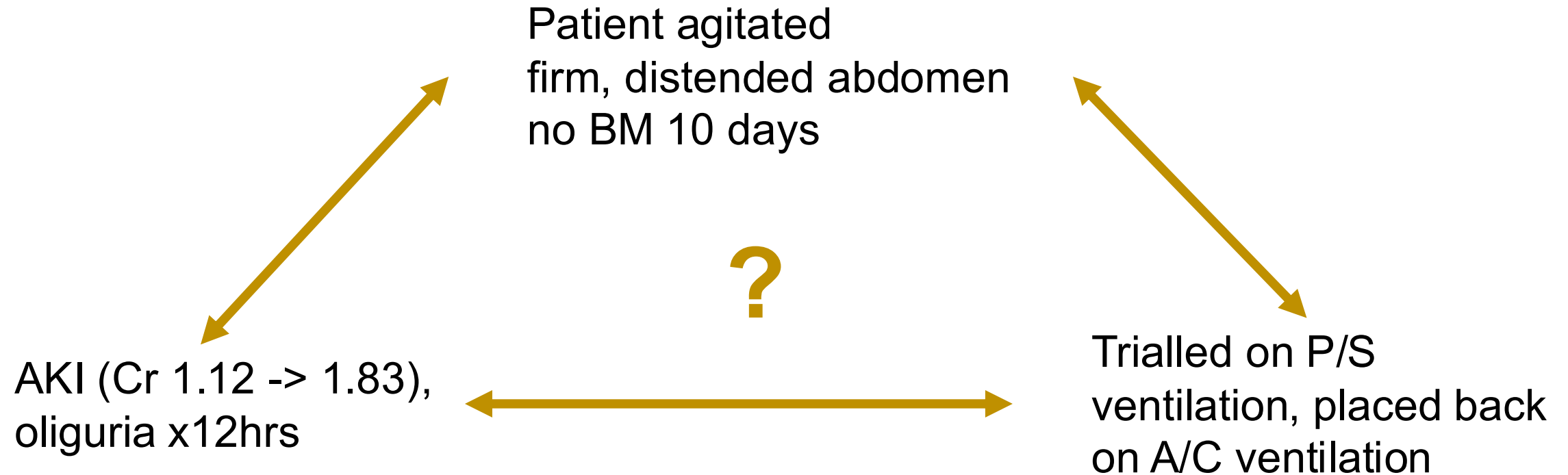
- Later in the morning @ PAH
 - Patient restless and nauseous
 - 10AM ABG 7.17/20/120, lactate 7.5
 - Intubated, received sodium bicarbonate bolus + infusion, fentanyl infusion
 - 11AM ABG 7.09/30/330, lactate 8.6
 - 12PM ABG 7.16/32/86, lactate 9.4
- Afternoon, transferred to Penn Presbyterian
 - Started VA ECMO for cardiogenic/vasodilatory shock
 - Continued intubation with A/C ventilation

Presby Hospital Course

- On VA ECMO for Days #1-5
- Day #5: Trial of ECMO decannulation failed as patient had low O2 sats, placed on VV ECMO
- Day #5: right sided thoracostomy and drainage was performed for right pleural collection
- Day #8: noted to be developing pancreatitis based on elevated lipase and amylase, had normal RUQ ultrasound
- Day #9: grew klebsiella from respiratory cultures, placed on antibiotics, pressure ulcers noted
- Day #13: ECMO decannulation planned but not possible due to patient instability, ongoing pressor requirement

Presby Hospital Course

- Day #13 AM



What is the next best step in management?

- a) Abdominal ultrasound
- b) Consult renal
- c) Measurement of intra-vesical pressure
- d) Serial abdominal examination
- e) Start CRRT

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Abdominal Compartment Syndrome (ACS)

- What

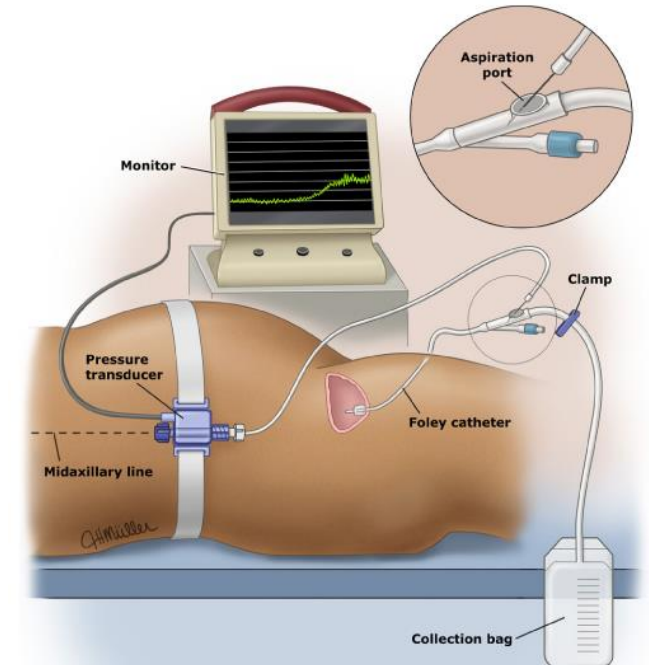
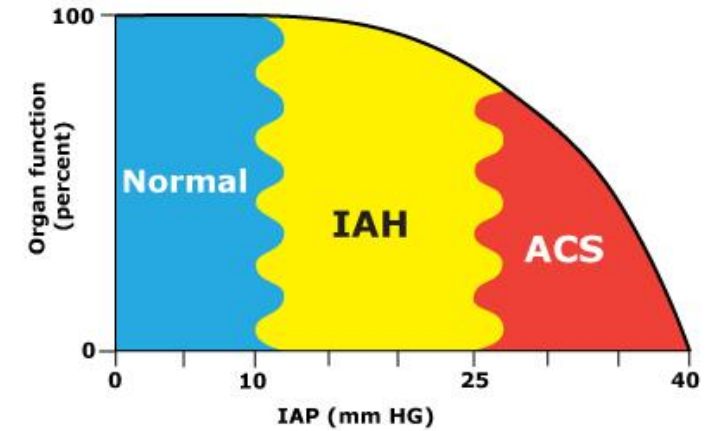
- Organ dysfunction caused by intra-abdominal HTN
- ACS is defined as a sustained intra-abdominal pressure >20 mmHg (normal 5-7 mmHg)
- Occurs in patients with trauma, burns, abdominal conditions (e.g. ascites, surgery, bleeding)
- Can lead to cardiovascular, pulmonary, renal, and GI dysfunction
- Associated with tense abdomen in ~50% in 1 study

- Diagnosis

- Measurement of intra-abdominal pressure (intra-vesical (bladder), intragastric, intracolonic, or inferior vena cava catheters)

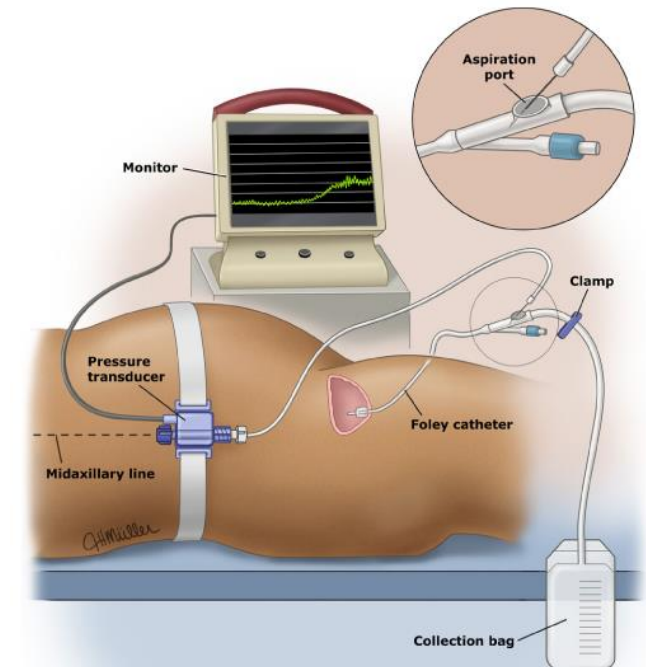
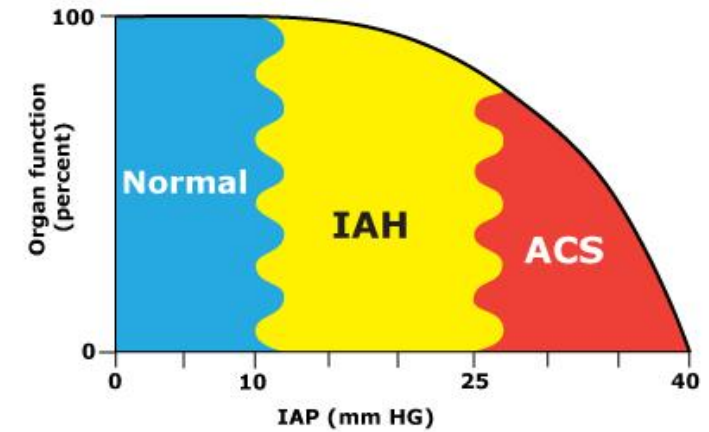
- Management

- Abdominal decompression with temporary abdominal closure
- Following surgery, reopening the abdomen is highly undesirable, and maximal supportive measures are undertaken

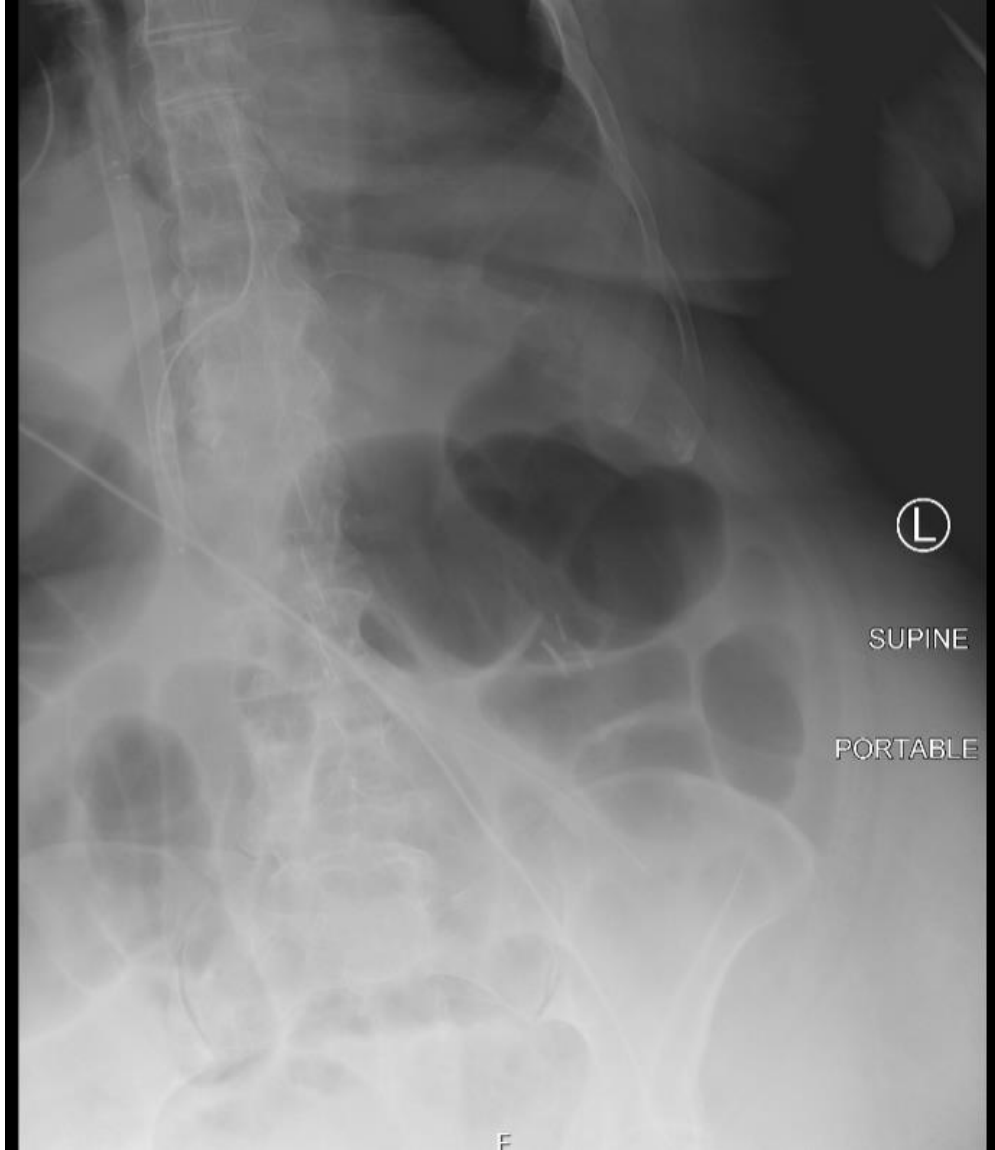


Abdominal Compartment Syndrome (ACS)

- Our patient
 - Bladder pressure 36mmHg
 - Renal and GI surgery consulted
 - Plain abdominal film
 - Moderate diffuse distension of small bowel and colon consistent with adynamic ileus
 - CT chest, abdomen, pelvis w/o IV contrast
 - Pneumatosis involving the distal ileum, cecum, and ascending colon
 - Hyperdense fluid adjacent to the cecum which could represent proteinaceous/hemorrhagic fluid.
 - Family discussions and recommendations for palliative consult



Abdominal Compartment Syndrome



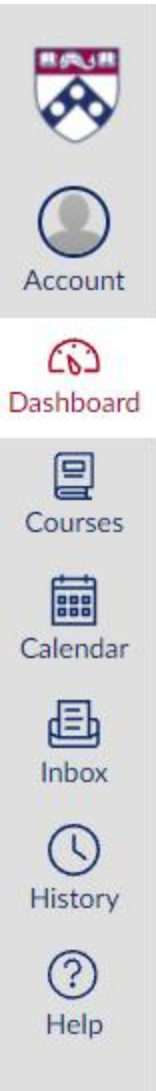
Presby Hospital Course

- Day #13: Underwent ex-lap with resection of 60cm of ischemic bowel from distal ileum through mid-transverse colon and temporary abdominal closure
- Day #15: Abdominal washout with ABThera dressing placed
- Day #15: Slow continuous ultrafiltration (SCUF) started with aim to reduce fluid overload
- Day #17: SCUF transitioned to CRRT due to AKI
- Day #19: Underwent another surgery, 10cm resection of small intestine, abdomen left open
- Day #22 patient had Hb drop with no clear cause. Underwent another surgery with removal of >1L bloody fluid, noted further dusky bowel and perforation at anastomosis. Also multiple adhesions with significant portions of non mobile small and large bowel. Given these findings, the general surgery team felt patient was in a terminal situation due to numerous areas of bowel ischemia
- Days #22-26: multiple discussions were had with Ms. X's family conveying the severity of her illness. Decision was made to advance code status to DNR and to transition to comfort-measures only. Patient expired with family at bedside

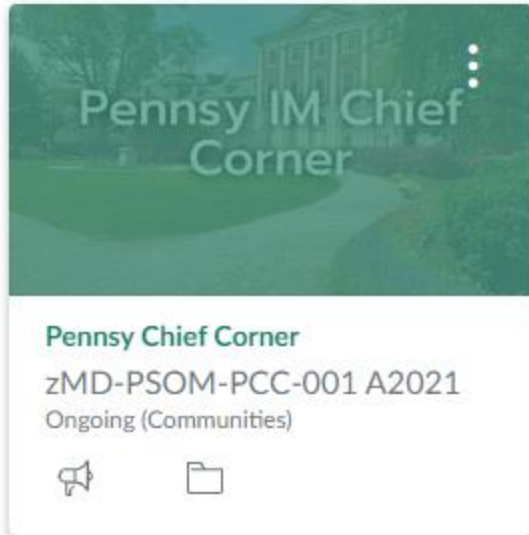
Learning Objectives

- Identify common drugs taken in an overdose
- Describe management of a patient after suicide attempt
- Describe management of Ca channel blocker overdose, including high dose insulin therapy and lipid emulsion
- Name complications of Ca channel blocker overdose

Canvas Wellness Page



Dashboard



Wellness, Mental Health, Mindfulness, and Resilience

Introduction

Residency is a notoriously challenging time in every physician's career; residents work long hours, care for sick people, and have disrupted sleep schedules. Beyond residency, most attending physicians are still learning to manage their own burnout and mental health - we are all in this together. We in program leadership are committed to developing work structures which support resident well-being, maintaining a non-judgmental open-door policy for support, and building a community which cares for each other.

The goal of this webpage is to provide a list of free resources for residents who are looking for anything from mindfulness training through psychologic referral. Please remember, your chiefs and program director are available to talk any time, day or night; this site is not meant to supplant that important personal contact, but is meant to be a resource for anyone who prefers to seek help independent of the program. Additionally, **Sonia Shah** is an additional attending resource in the Department, and is our identified wellness champion; she is available anytime if you need to talk with someone, but would prefer to not speak with the program for any reason. We have also created a screening tool for Depression and Burnout, based on the validated WHO-Five model, which be found [here](#) ↓.

Penn-Specific Resources

Employee Assistance Program (EAP) - The EAP is a free service for residents which provides in-person or virtual psychology services. Each resident is eligible for up to 8 free counseling sessions per issue of concern. Interested residents should call (888) 321-4433 for the intake line, and will be guided to a local provider based on their specific need. Note that your personal health information is confidential, and nothing from the EAP will be fed back to the residency program unless as part of a signed health record disclosure agreement.

Staff Support Coordinator - Jessie Jarmon is our staff support coordinator, and may be contacted to meet individually or with small groups to seek support on issues such as moral distress, compassion fatigue, burnout, bereavement, resiliency, COVID-fatigue, and self-care. She can be reached at 215-519-5215, or Jessica.jarmon@penmedicine.upenn.edu. A full pamphlet about her services is linked [here](#) ↓.