Welcome to TEAM Loyola! This little notebook is an attempt to help you approach the most common intern calls. BUT, this notebook is only the beginning. Please add to it, change it, cross things out, and make it your own. When in doubt, you are not alone. There are always people around you who can give you a hand.

How to Page or Call to and from Loyola to Hines?
- To page at Loyola: dial 68777 – follow voice prompts
- To call from Loyola to Hines: dial 2276 then last four numbers
- To call Loyola from outside - dial 708-216 then last four numbers
- If ever having trouble reaching an attending to staff a patient, call the hospital operator and ask to have them call their home or cell.
- To page at Hines: dial 9 then 216-8777 – follow voice prompts OR dial 276 68777— follow voice prompts
- To call from Hines to Loyola: dial 276 then all 5 numbers
- To call Hines from outside: dial 708-202-VETS (8387) then dial 5 digit extension
- To change pager status: call pager extension (x68777), press *, then follow prompts. Your pager ID is your pager number and your password should be always kept as “1111”).

How to Consult? The information below will tell you the name/pager # of the person on the consult service.
- At Loyola: in EPIC, go to “Web” — “Web On Call” — “Daily”
- At Hines: in CPRS, go to Tools — Clinician Tools — Clinical Resources (left hand column) — VISN 12 On Call Schedule — Hines-Day On Call Schedule
  - Remember, at Hines, you need to CALL and place an ORDER for the consult
  - Please talk to your Senior Resident before placing a consult (especially on the weekends).

How to know who’s on call & your call schedule?
1. Find a computer with internet access. (not thin CPU)
2. Go to www.Amion.com
3. Password: “LoyolalM”

- Here you will find who is on call each day, including your personal schedules, clinics, and call days for the year

How to find someone’s pager or number in the hospital
- Refer to the Green card for Loyola or the Yellow Card for Hines.
- Alternatively use Loyola intranet phone directory or at Hines while in CPRS, go to Tools— Clinician Tools —Clinical Resources (left hand column)— VISN 12 On Call Schedule —Hines Day On Call Schedule—Phone Book
A DAY IN THE LIFE OF AN INTERN

Each day the intern must juggle hundreds of balls in the air...a perfect intern won’t let any fall. The only way to accomplish this is to find a system to stay organized and efficient.

If you follow these steps to structure your day you’re bound to be a successful, effective, and efficient intern.

1. Change pager status/un-forward pager
2. Get sign-out from cross-coverage
3. Check if any new admissions
4. Handle any ongoing urgent issues if any
5. Print out new list and start making check boxes for the day
6. If on multi-intern team- divide up the patient list if needed
7. Make sure no meds/orders are falling off, renew if appropriate
8. Review any inpatient alerts and take care of them
9. Review chart information over the last 24hrs (should record details and bring with you for rounds):
   a. Nursing notes
   b. Consult team notes
   c. SW / other ancillary staff notes
   d. Review vitals, I/Os, weights
   e. Review medication administration if pertinent
   f. Glycemic control (accuchecks, how much CF insulin given)
   g. Labs—replete electrolytes & adjust insulin right away
   h. Imaging, other studies
10. Pre-round (see ALL of your patients)
11. Attending teaching rounds
12. Place urgent orders and consults
13. Get to noon conference ON TIME! Bring lunch to it.
14. Work on daily discharges
15. Place less urgent orders and calls
16. Get the rest of the work done: other orders, procedures, calls
17. Write progress notes
18. Complete discharge summaries
19. Learn Something!! Teach the med students something!!
20. Follow up on patient care issues as needed
21. Update sign out report
22. Sign out
23. Forward pager to cross coverage
24. Bring home an article to read that night

*Be sure to round with SW, case manager/PCC at scheduled times
HOW to Print Sign Out:
- LUMC/EPIC: Pt Lists tab à Sign Out Report
- HVA/CPRS GUI: While signed into Desktop, Click TOOLS tab à Hand Off Tool
  To Print: Click on Icon of printer + wrench and choose printer (14th floor: HIN-PT200R1443). Then print sign-out from H.O.T.

Components of Sign-Out
1) Age
2) Sex
3) Significant PMH (i.e. CHF with EF 15%, or CKD)
4) Admission date
5) Pertinent presenting signs & symptoms
6) Significant w/u and findings (i.e. CT PE today +)
7) Working Diagnosis/treatments (i.e. heparin gtt)
8) Important events of the Day
9) On Call to do list: use [ ] boxes (if need to f/u with something, give advice what to do with results. (i.e. [] 16:00 Lytes– caution with CKD) (NTD=nothing to do)
10) CODE STATUS (MUST be listed, even if FULL CODE)
11) “Anticipated events” section- use dash marks (-), list things to watch for / what to do
12) Contact info if pertinent (family member #)
13) Watch them forward their pager to you when done signing out

Tips:
- Make sure labs and meds are ordered as desired and not falling off
- If there is a commonly requested treatment that you DON’T want your pt to get, list it in the “anticipated events” section (i.e. -no sleepers, -no changing pain meds, -no IV benedryl, -not allowed to leave AMA, etc)
- If there is no way a result would ever require overnight intervention don’t make it a checkbox!

*BOTTOM LINE- think about what you would want to know if you were on-call caring for the patient.

### Incident Reporting:

At Loyola:
- Should you witness a significant harm event, you should report it immediately to the Risk Manager on call (listed in Web On Call). They will be able to assist you in handling the event and aftermath.

- Otherwise, all incidents and near misses can be reported through the VOICE system found on the portal under the link “Patient Safety Reporting”.

At Hines:
- All incidents and near misses can be reported through the EPER system. The link for this can be found on the Hines VA desktops. Additionally, you should notify your senior resident, attending and fellow as well as the Hines Chief Resident.

### SIGN-OUT

**I-PASS**

<table>
<thead>
<tr>
<th>I</th>
<th>Illness Severity</th>
<th>Stable, “watcher,” unstable</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>Patient Summary</td>
<td>Summary statement, Events leading up to admission, Hospital course, Ongoing assessment, Plan</td>
</tr>
<tr>
<td>A</td>
<td>Action List</td>
<td>To do list, Time line and ownership</td>
</tr>
<tr>
<td>S</td>
<td>Situation Awareness and Contingency Planning</td>
<td>Know what’s going on, Plan for what might happen</td>
</tr>
<tr>
<td>S</td>
<td>Synthesis by Receiver</td>
<td>Receiver summarizes what was heard, Asks questions, Restates key action/to do items</td>
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</tbody>
</table>

### Medication Reconciliation at Hines

***Intended for use MONDAY – FRIDAY from 8AM to 3PM***

All other times please use the regular discharge process
(Not for patients being discharged to ECC, 11 or 2S)

1. Open a new zzPreliminary Discharge Document note.
2. Mark the status of each medication listed and make all necessary medication order changes.
3. Go to Orders tab and SIGN all of your orders.
4. Complete II. Preliminary Discharge Instructions.
5. Click FINISH. A Pharmacy Consult should then pop up.
6. In the Pharmacy Consult, fill in your contact information and accept the consult order.
7. Accept the Anticipated Discharge order
8. SIGN all remaining orders and notes.
10. After talking to Pharmacist, complete zzPatient Discharge (TAKE-HOME) Instruction BETA.
11. Enter and sign discharge order.
12. Under D/C Summary tab, open, complete and sign zzDischarge Summary BETA.
EXPIRING MEDS & LABS
RESTRAINTS ORDERS

- This should be checked every morning and evening prior to leaving for the day.
  - Be mindful that certain antibiotics will fall off if initially approved for a short duration.
  - If ordering medications on admission, set duration for a long period, i.e. 30 days. Patients who have been admitted for a long period may have medications fall off the list.
  - Can order labs for days in advance, e.g. checking a vancomycin level in days.
- At Hines labs need to be entered daily. However, can place certain lab orders for up to 3 days

While cross covering:
1) Who is the primary service?
2) When was the last dose / next dose?
3) Are meds expiring on purpose?
4) Does the patient still need restraints?
5) Can it wait until the primary team is there to renew/assess?

- Restraint orders need to be entered every 24 hours. Should be constantly assessing the need for restraints, i.e. not just every 24 hrs.

HOSPITAL PROPHYLAXIS:

Primum non nocere- First do no harm

Every patient needs to have the following addressed and documented in notes:

- IS (incentive spirometer)
  - order on admission for everyone that isn’t intubated
  - decrease rates of atelectasis and HAP
  - ensure patient knows how to use it (show them)
  - should be used 10 x every waking hour

- GI prophylaxis for stress ulcers (SRMD - stress related mucosal disease)
  - ICU patients have ↑ gastric acid secretion and ↓ protective barriers
  - Current guidelines recommend NO routine proph for Non-ICU med/surg patients
  - In short, give it to all ICU patients, but stop at discharge,

<table>
<thead>
<tr>
<th>PPI Dosing</th>
<th>Loyola</th>
<th>Hines</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO</td>
<td>PO pantoprazole 40mg daily</td>
<td>PO omeprazole 20mg daily</td>
</tr>
<tr>
<td>PO via feeding tube</td>
<td>Lansoprazole 30mg daily per tube</td>
<td>Lansoprazole 30mg daily per tube</td>
</tr>
<tr>
<td>IV (only use if strict NPO)</td>
<td>IV pantoprazole 40mg daily</td>
<td>IV pantoprazole 40mg or IV Famotidine</td>
</tr>
</tbody>
</table>

PPI Dosing: Don’t give a PPI to floor patients unless there’s a good reason.

- VTE prophylaxis
  - order for every patient hospitalized for an acute medical illness

<table>
<thead>
<tr>
<th>SCDs</th>
<th>Dosing</th>
<th>Contraindications</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5000units q8hrs</td>
<td>• Evidence of leg ischemia from PVD</td>
<td>*Use if anticoagulation is contraindicated</td>
</tr>
<tr>
<td>Heparin sq</td>
<td></td>
<td>• Hx of HIT</td>
<td>Short acting– TID dosing Risk of developing HIT=2.6%.</td>
</tr>
<tr>
<td>LMWH sq</td>
<td>Enoxaparin 40mg daily Dalteparin 5000mg daily</td>
<td>• Creatinine &gt;1.5 • hx of HIT • ↑bleeding risk</td>
<td>Only once daily dosing Risk of developing HIT=0.2%.</td>
</tr>
</tbody>
</table>

- If no contraindication for anticoagulation order heparin sq or LMWH sq

DISCHARGE SUMMARIES

- HVA: Go to “Discharge Summary” Tab, Click on “NEW Discharge Summary”
- Loyola Template: IP Discharge Summary
- MUST be completed within 24 hours of discharge
Include the following:
1. Date of admission and discharge
2. Primary Diagnosis: what was determined to be the diagnosis
3. Secondary Diagnosis: The rest of the medical problems addressed during the hospitalization. If you gave a med for it, include it as a secondary diagnosis.
4. CONCISE summary of the presentation and hospital care: Summary of the main points of the reason for admission with the focus on the hospital course. Refer to key labs/studies as appropriate. NONE SHOULD BE CUT AND PASTED!
5. Discharge medications: Make sure it is clear for both patient and future reader of your discharge summary EXACTLY what the patient is going home on.
6. Follow up: include appointments, labs, studies ordered / scheduled
7. Don’t forget to send a copy to the PCP (this is NOT done automatically)
CPRS/GUI: add PCP as additional co-signer to h/p and d/c summary
Loyola/EPIC: “route” h/p and d/c summary to CPC

Important to include:
- Discharge weight in CHF patients
- Pending studies/results
- NO unapproved abbreviations

Contraindications
- *Heparin contraindications:
  - *Evidence of leg ischemia from PVD
  - *Hx of HIT
  - *↑bleeding risk

Contraindications
- *LMWH contraindications:
  - *Creatinine >1.5
  - *hx of HIT
  - *↑bleeding risk

Comments
- *Use if anticoagulation is contraindicated
- Short acting– TID dosing Risk of developing HIT=2.6%.
- Only once daily dosing Risk of developing HIT=0.2%.
CONSENT (Blood/Procedure)

| 1) Who is the primary service? |
| 2) Is it necessary? |
| 3) Is the patient able to give consent? |

Inform of risk of reaction or infection:
- HIV ~ 1.8 million
- Hep B ~ 1:200,000
- Hep C ~ 1:1.6 million
- Bacteria ~ 1:12,000-500,000
- Febrile or allergic rxn ~ 1:100
- TRALI ~ 1:5000
- Fatal hemolytic rxn ~ < 1:100,000

Hypersensitivity reactions:
- Fatal hemolytic rxn ~ < 1:100,000
- Febrile or allergic rxn ~ 1:100
- Bacteria ~ 1:12,000
- Hep C ~ 1:1.6 million
- Hep B ~ 1:200,000
- HIV ~ 1:1.8 million

Pre-medication: (Tylenol 650mg PO + Benadryl 25-50mg PO/IV)
Consider if previous reaction, but typically avoid in order to see and treat serious reactions early.

| Typical Dosing: |
| PRBCs: 1 unit → ↑Hgb by 1g/dL |
| Platelets: 6 pack → ↑plt ct by ~30K |
| FFP: INR < 2 → 3 units |
| INR > 2 → 5 units |

Immunocompromised: require treated products
- Irradiated for acute leukemia
- Leukocyte filter for PRBC & Platelet
- CMV negative until CMV status known

If Fluid Overload is a Concern:
- Lasix IV between units
- Transfuse slowly (3-4hrs per unit)

| Reactions and Treatments: |
| Mild: chills/rigors |
| Demerol 25-50mg IV |
| Serious: temperature spike, pain, hemodynamic instability, resp failure (TRALI) |
| -STOP transfusion |
| -Supportive care for cardiopulmonary instability |
| -Call Blood Bank |
| -Document in chart |

DEATH

What is the code status? Should you be running a code? Then assess & pronounce.

Assessment:
- Call name loudly
- Noxious stimuli - sternal rub or other
- Carotid pulse and heart sounds
- Breath sounds
- Pronounce "Time of death______".

Also:
1) Notify RN of time of death
2) Contact family and ask if they would want an autopsy
3) Contact primary service attending
4) Talk to clerk/RN if it is a medical examiner case (<24 hour admission, etc) or if the family wants an autopsy about further paper work you need to do.
5) Write the death note:
   - Lumc Template: IP Death Note (document badge # of medical examiner)
   - HVA: Choose the Progress Note Title: DEATH NOTE
6) Sign death certificate within 24hrs (or body can’t be released)

HyperKALEMIA:
Is it real? Hemolysis? (repeat labs)
Causes: Why did it happen?
- ARF / CRF / Type IV RTA
- Meds (spironolactone, ACEIs, ARBs, BPs, Digoxin, etc.)
- K+ in IV infusions / TPN

Emergency if: Rapid increase OR EKG changes (peaked T’s, no P’s, wide QRS, sine wave)

Treatment
Temporary (cellular shift): Use as bridge while waiting for effects of long-term
1) IV Calcium- stabilizes cell membranes (lasts 30 min), essential if EKG changes
   - Ca Gluconate 1-2 Amps (↓ risk of necrosis, but ↓ elemental Ca)
   - Ca Chloride (central line if possible to avoid necrosis)
2) Insulin/Dextrose-10units regular insulin + 1-2 Amps D50 IV push (lasts 2-4 hrs)
3) Bicarb (1-3 Amps IV push - only useful in acidosis)
4) Albuterol neb (lasts 30-90 minutes)

Long-term (Permanent Elimination): Start early
1) Lasix IV- CAUTION as pts often dry, usually need high doses (onset 30min)
2) Hemodialysis
3) Follow up K+ q4-8hrs & treat underlying illness

HypokALEMIA: (Replace if < 4.0)
- Ca: Nausea, vomiting, weakness, muscle cramps. ECG with U waves, ectopy
Causes: Alkalosis (diuresis/vomiting), Acidosis (RTA, DKA), Cellular shifts (Insulin, catecholamines), mineralocorticoid excess

TREATMENT:
Choose route/formulation/dose: Can combine IV & PO if severe deficit.
For every 0.1 MM/L deficit, replace 10mEq of K+
- Tablet= KCI (K-Dur)= preferred, faster, less side effects, less dangerous
  - Max dose = 60 mEq at a time. huge pill = DIFFICULT TO SWALLOW
- Powder= KCl (K-Lor)= same as K-Dur, but TASTES AWFUL, use if feeding tube
- IV= KCI or K+acetate= only use if NPO or severe deficit. Max infusion rate is 10mEq/hr peripherally, 20meq/hr centrally (arrhythmias). Peripheral infusion often BURNS.
  - Note: Avoid dextrose solutions (insulin release and K shift)
- Use K-aceate ONLY if pt has acidosis or hyperchloremia

Monitor/Reassess: Mild - q12hrs, Severe - q6hrs

Note:
- ARF/CKD - be gentle (half dose or less, double interval, or don’t treat)
- DKA - be aggressive (keep K >4-4.5mEq/L)
- Hypermagnesemia causes refractory hyperkalemia
- Caution in replacing K with chemo (Tumor Lysis Syndrome)
ELECTROLYTE DISTURBANCES

hypoMAGNESEMIA: (Replace if <2)
Causes: Alcoholics (renal loss), critically ill, diuretics, DKA, refeeding syndrome

TREATMENT:
- Magnesium sulfate - replace IV: PO causes diarrhea and is erratically absorbed
  - 1 gm IVPB = 8mEq and will increase serum by ~0.1 mg/dL
  - Can give up to 4g IVPB at a time
    - 1.6-2.5mg/dl give 2-4gm IVPB (usually infused at 1mg/hr)
    - 1.0-1.6mg/dl give 4-8gm IVPB total, divide doses BID-TID
    - <1.0mg/dl give 8-12gm IPB total, divide into 3-4 doses
- Unless patient has severe renal disease, err on giving more than less
- Need to have very high Mag levels before any adverse effects

Note:
- DKA/IVdiuresis/EtOH/refeeding - be aggressive (keep Mg >2-2.5mg/dL)
- ARF/CRF - be gentle (half dose, double interval, or don't treat)

hypoPHOSPHATEMIA: (nl = 2.6-4.4)
Causes - refeeding syndrome, DKA, Vit D deficiency, malabsorption, alcoholism, inadequate TPN
Remember you can get Rhabdo when Phos really low (think of 'P' in ATP)

TREATMENT:
- 10mmol replacement increases Phos level by ~1.0
- Phos replacement formulations:
  - Neutraphos packet = 8mmol Phos + 7mEq K +
  - IV K + Phos IVPB formulation at VA= 27mmol Phos + 40mEq K +
  - IV Na + Phos IVPB available if need to replace Phos, but already high K +
- Mild/Moderate (1.5-2.4mg/dL)
  - 1-2 packets Neutraphos up to TID
- Severe (<1.5mg/dL)
  - Give 27mmol-40mmol IVPB in K + or Na + formulations over 2-4hrs

hypoCALCEMIA:
- Correct for albumin or check an ionized calcium
- Treat only if:
  1) symptomatic (tingling around lips)
  2) + Chvostek / Trousseau signs
  3) Cardiac arrhythmias

TREATMENT: TUMS PO or call renal / endocrine for IV dosing (risk of necrosis)
Note: Don’t treat in setting of hyperphosphatemia, instead treat the hyperphos

ACID-BASE STATUS

1) Acidemic or Alkalemic? [Normal pH (ABG)=7.40]
2) Primary disturbance respiratory or metabolic or both?
   - HCO3 (BMP): ↑=met. alk.; ↓=met. acid. (normal=24)
   - PaCO2 (ABG): ↑=resp. acid.; ↓=resp. alk. (normal=40)
3) If Respiratory, acute or chronic?
   - Acute acidosis: 10mmHg ↑ PaCO2 → 0.08 ↓ pH
   - Chronic acidosis: 10mmHg ↑ PaCO2 → ≤ 0.03 ↓ pH
   - Acute Alkalosis: expected ↓ HCO3 = 0.2 x ΔPaCO2
   - Chronic Alkalosis: expected ↓ HCO3 = 0.4 x ΔPaCO2
4) If Metabolic Acidosis, is it AG or non-AG?
   - Anion gap = Na + - Cl - - HCO3 - (normal=12)
   - Albumin correction: measured Alb x 2.5 = expected AG
5) If Metabolic acidosis, check for compensation by calculation Winter's formula: Predicted PaCO2 = 1.5 (HCO3 - 3) + 8 (+/- 2)
   - If lower actual PaCO2 → concomitant resp alk present
   - If higher actual PaCO2 → concomitant resp acid present
6) If AG Metabolic acidosis, check for second metabolic disturbance (ΔΔ)
   Determine the Δ in HCO3 from 24 and the ΔAG from 12
   - If ΔHCO3<ΔAG → concomitant met. alk. (HCO3 didn't drop as much as expected in pure AG acid)
   - If ΔHCO3>ΔAG → concomitant NG met. acid. (increased Cl – shrinks some of the gap)
7) If AG Metabolic acidosis: check ketones, if ketones negative check renal function, lactate, tox screen, and osmolal gap
   - Osmolal gap (OG) = measured osmoles - calculated osmoles
   - Calculated osmoles = (2 x Na) + (glucose/18) + (BUN/2.8)
   - Corrected OG for ethanol (mg/dl) / 4.6
   - If corrected OG > 10; suggests of ingestion (methanol / ethylene glycol)

<table>
<thead>
<tr>
<th>Primary Disorder</th>
<th>pH</th>
<th>HCO3</th>
<th>CO2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metabolic ACIDosis</td>
<td>Gain H+ or loss HCO3</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td>Metabolic ALKAlosis</td>
<td>Gain HCO3 or loss H+</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Resp. ACIDosis</td>
<td>Hypoventilation</td>
<td>↓</td>
<td>↑</td>
</tr>
<tr>
<td>Resp. ALKAlosis</td>
<td>Hyperventilation</td>
<td>↑</td>
<td>↓</td>
</tr>
</tbody>
</table>
AG Metabolic Acidosis (MUDPILES):
- Methanol (formic)
- Uremia (sulfuric, phosphoric, uric)
- DKA (acetone, acetoacetate, β-hydroxybuteric)
- Paraldehyde / Propylene glycol
- Isoniazid / Iron overload
- Lactic acidosis (causes: shock, metfomin)
- Ethylene glycol (oxalic → Ca oxalate crystals)/ Ethanol
- Salicylates (salicylic)

Non-AG Metabolic Acidosis (USEDCARS + infusion of acids):
- Ureteral diversions (including fistulas)
- Sniffing glue
- Endocrinopathies (VIPoma)
- Diarrhea
- Carbonic anhydrase inhibitors / Cholestyramine
- Hyperalimentation (TPN)
- Renal tubular acidosis
  - Type: 1 (Distal) ↓H+ secr.; 2 (Prox) ↓HCO3 resorp.; 4 hypoaldosteronism
- Saline
  - Infusion of HCl- or Ammonium Cl-.

Respiratory Acidosis:
1. CNS depression (sedatives, CNS dz, obesity, hypoventilation)
2. Pleural disease (e PTX, or large effusion)
3. Lung disease (COPD, ARDS, PNA, PE)
4. Musculoskeletal (Kyphoscoliosis, Guillain-Barre, MG, botulism, myositis)

Metabolic Alkalosis: (increased HCO3), almost always due to #1, #2, or #3
1. Intravascular volume contraction (loss via GI, renal, resp, skin, or 3rd spacing)
2. Hypokalemia
3. Vomiting / NG suction
4. Increased glucocorticoids or mineralocorticoids
5. Alkali intake (HCO3 infusion, milk alkali syndrome)
6. Bartter’s syndrome (genetic defect in Na/Cl/K pump– acts as loop diuretic)

Respiratory Alkalosis (CHAMPS breathe fast):
- CNS (catastrophic CVA) or Cirrhosis
- Hypoxia / Hyperventilation
- Anxiety / Pain
- Mechanical ventilation
- Progesterone / pregnancy / pulmonary (fibrosis, edema, pneumonia)
- Sepsis / salicylates

DKA

Symptoms: Vomiting, abd pain, tachypnea, shock, coma, polyuria, polydipsia, fatigue, weakness, AMS, etc.

Labs:
- BMP: ↑ AG acidosis  Anion Gap (AG)= Na-(Cl+ HCO3) (nl 12)
- UA: Ketonuria/ ketonemia (Beta-hydroxybutyrate or acetoacetate)
- Hyperglycemia
- Hyperkalemia (acidosis) or Hypokalemia (diarrhea)
- R/o Causes: Ischemia, Infection, Insulin Def, Intra-ab process, Iatrogenic

Treatment: Admit to ICU
1) IVF (0.9NS initially, 0.45NS when euvolemic, add dextrose when glu <200)
2) Potassium (Add KCl to fluids if K < 5.0 - drops fast!)
3) Accuchecks q1hr, electrolytes q2hr initially
4) Insulin Drip (start 0.15 unit/kg bolus, then 0.1unit/kg/hr titrating gtt).
   Cont insulin gtt until AG is closed (if glu <200, but gap still open, keep insulin gtt going, but add dextrose to IVF)

IV insulin drip – based on rate of BS change
Start on algorithm #1 unless: BS>600, on steroids, or TDD at home >80units/day

IV insulin drip to SQ transition
1. Take last drip dose (units/hr) x 20= glargine (basal insulin)
2. D/c drip 2hrs after glargine given.
   - If eating, double TDD, but give 50% as prandial bolus doses.
   - If pt NPO, just give glargine basal insulin + CF
     i.e. 1U/hr drip=20Uglargine daily + 7U lispro x 3meals/d for bolus doses + ISS
**SLEEP DISTURBANCE**

1) What has worked in the past?
2) Any standing order for sleep meds?

**TREATMENT:**
1) Ambien (zolpidem) 2.5-10mg PO = 1st line
2) Benadryl (diphenhydramine) 25-50mg PO/IV (avoid if >65yrs - anticholinergic)
3) Restoril (Temazepam) 7.5-30mg PO (caution in elderly)
4) Haldol 1-2mg IV (useful in delirium, dementia, sundowning)

**Note:**
- Caution in elderly, risk of falls, MS changes, urinary retention
- Avoid in liver failure
- Unless contraindicated, always order a sleep aid PRN

**SLEEP DISTURBANCE**

Vital signs?, Acute vs. Baseline?

Common in-hospital causes:
- Head trauma/fever (CXR, Cx, U/A)
- meds (anticholinergic, sedatives, etc)
- Toxic/ILlicit (UDS)
- Hypoxia
- Hypoglycemia
- Hepatic encephalopathy
- Sundowning
- Uremia
- Other metabolic

**WORKUP:**
1) Neuro exam
2) O₂ sat and Accucheck
3) CT head if ANY focal findings (esp. with head trauma)
4) Other work-up directed suspected etiologies on DDx

**TREATMENT:** Directed at suspected cause. May include:
1) Narcan 0.1-0.2mg IV q3-4mins PRN, if suspect narcotic OD
2) Flumazenil 0.2-0.5mg IV q30-60 seconds PRN, if suspect benzo OD (be careful in chronic benzo pts, alcoholics, seizure history as can predispose to seizure)
3) Haldol 2mg IV/IM/PO if agitated (Do NOT use if QTc >500ms)
4) Turn off TV / lights etc. at night
5) Consider 1:1 sitter or restraints

**ALTED MENTAL STATUS (AMS)**

Vital signs?, Acute vs. Baseline?

Common in-hospital causes:
- Head trauma/fever (CXR, Cx, U/A)
- meds (anticholinergic, sedatives, etc)
- Toxic/ILlicit (UDS)
- Hypoxia
- Hypoglycemia
- Hepatic encephalopathy
- Sundowning
- Uremia
- Other metabolic

**WORKUP:**
1) Neuro exam
2) O₂ sat and Accucheck
3) CT head if ANY focal findings (esp. with head trauma)
4) Other work-up directed suspected etiologies on DDx

**TREATMENT:** Directed at suspected cause. May include:
1) Narcan 0.1-0.2mg IV q3-4mins PRN, if suspect narcotic OD
2) Flumazenil 0.2-0.5mg IV q30-60 seconds PRN, if suspect benzo OD (be careful in chronic benzo pts, alcoholics, seizure history as can predispose to seizure)
3) Haldol 2mg IV/IM/PO if agitated (Do NOT use if QTc >500ms)
4) Turn off TV / lights etc. at night
5) Consider 1:1 sitter or restraints

**PAIN CONTROL**

1) What worked in the past? 2) Acute vs. chronic?

**TREATMENT:** (Always try PO before IV if possible)
Goal: Decrease pain score by 50% (assess 15-30min after 1st dose)

**Non-opioides:**
- Tylenol 325-650mg q4-8hr (max 4g/day, 2g in liver pts.)
- NSAIDs: ibuprofen 200-800mg q6-8hrs (max 40mg/kg/day)
  - Ketorolac (Toradol) IV 15-30mg, IM 30-60mg, PO 5-10mg
- Tramadol: 0.7-2.0 mg/kg PO q4-6hrs

**Opiates:**
- PO Narcotics
  - Codeine 15-60mg PO q4-6 hrs - Vicodin/Norco: 5-10mg/325mg q4-6hrs
  - Morphine IR: PO 7.5mg-30mg q2-4hrs - Morphine MS/ER: PO 15-200mg q8-12hr
  - Dilaudid (Hydromorphone): PO 2-8mg q3-4hrs
- IV Narcotics
  - Morphine: 1-4 mg q 2-4 hrs (careful in renal and liver disease)
  - Dilaudid (Hydromorphone 0.5-4mg IV/IM q2-4 hrs
- Transdermal: Fentanyl patch 12-100mcg/hr, lasts 72 hrs (fever ↑ absorption rate)

**Liver disease:** Avoid tramadol, oxycodone. Fentanyl or dilaudid preferred over morphine. Vicodin/norco okay, but make sure < 2grams acetaminophen q24hrs

**Renal Disease:** Avoid NSAIDs, tramadol dose should be halved. Fentanyl or dilaudid are better than morphine

- When changing routes: cut dose by 50% and titrate up
- Breakthrough Opioids:
  - Use immediate release opioids
  - Dose = 5-15% of 24hr dose
- *Always start a bowel regimen with opioids (docusate +/- sennosides)

**Equianalgesic Table:**

<table>
<thead>
<tr>
<th>Medication</th>
<th>Duration (hr)</th>
<th>T 1/2 (hrs)</th>
<th>IV/IM</th>
<th>PO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Codeine</td>
<td>4-6</td>
<td>3</td>
<td></td>
<td>200 mg</td>
</tr>
<tr>
<td>Morphine</td>
<td>3-7</td>
<td>1.5-2</td>
<td>10 mg</td>
<td>30 mg</td>
</tr>
<tr>
<td>Hydrocodone (Vicodin/norco)</td>
<td>4-8</td>
<td>3-4</td>
<td></td>
<td>30 mg</td>
</tr>
<tr>
<td>Oxycodone</td>
<td>4-6</td>
<td>1.5-6</td>
<td>1.5 mg</td>
<td>7.5 mg</td>
</tr>
<tr>
<td>Hydromorphone (Dilaudid)</td>
<td>4-5</td>
<td>2-3</td>
<td>0.1 mg</td>
<td></td>
</tr>
<tr>
<td>Fentanyl</td>
<td>1-2</td>
<td>1.5-6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Protocol for Management of the Adult Seizing Patient

**At: 0 minutes - Seizure**
- ABCs, vital signs (c5 min), pulse ox, nasal O₂
- Do NOT place anything in mouth except suction, don’t force suction
- Assess safety
  - remove objects that could cause injury, side rails up
  - turn patient on side or suction if vomiting
  - Do NOT “hold patient down”
- Assess Seizure characteristics
- Pay attention to time of the seizure and its duration
- Obtain stat accucheck
  - If glucose < 70 mg/dl (or if unobtainable) administer 25 ml of dextrose 50% IV with 100mg thiamine IV prior to the glucose
- Check CBC, CMP, Mg, Phos, urine toxicology
- Consider calling neurology while above being done - 91516

**Assessment of Seizure Characteristics:**
- Can patient follow commands?
- Can patient speak?
- What part of body is involved with the movements? (face, arm, leg?)
- Are movements unilateral or bilateral?
- Eyes and pupils - Eye deviation?

**Post Seizure Care - Post Ictal Stage**
- Continue to assess until return to baseline status
- Incontinence
- Injury (bruises, fx, lacerations, oral trauma)
- Evaluate for residual deficits:
  - Behavioral change
  - Confusion
  - Language disturbance
  - Poor coordination
  - Weakness, paraparesis
- Document events
- Consider calling neurology

**When in doubt ALWAYS page the neurology team for assistance: 91516**

**At 3 minutes, if seizures persist - Prolonged Seizure**

**Seizure stops**

- Seizure mimickers to consider
  - Posturing: Call neurology
  - Stroke: Call neurology
  - Hypoglycemia
  - Myoclonus
  - Tremor
  - Comulative syncope

**Seizure persists after 1-3 minutes**

- Consider calling neurology

**Post Seizure Care - Post Ictal Stage**
- Continue to assess until return to baseline status
- Incontinence
- Injury (bruises, fx, lacerations, oral trauma)
- Evaluate for residual deficits:
  - Behavioral change
  - Confusion
  - Language disturbance
  - Poor coordination
  - Weakness, paraparesis
- Document events
- NEW ONSET SEIZURE?? Consider calling neurology

**FALLS**

1. Go see the patient
2. Were guard rails up? How high is the bed?

**Assessment:**
1. Neuro exam
2. Consider CT head if: anticoagulated (incl ASA), Head trauma, AMS, Neuro deficits
3. Document incident as a cross-cover / progress note (at VA use Fall template)
4. Ensure Fall precautions are ordered and maintained

**FEVER (> 38 °C/100.4 °F**

1. Is this new?
2. When were last cultures sent?- if not in the last 24hrs, probably want to re-culture
3. Is this neutropenic fever? (ANC < 500, do not rectalize)
4. Are antibiotics already on board? Are there holes in coverage?
5. Has the patient received Tylenol/ibuprofen?

**Causes: “The 5 W's + M”**
- **Wind:** pneumonia, atelectasis
- **Wound:** surgical site, pressure ulcer, IV phlebitis
- **Water:** UTI
- **Walk:** DVT, hematoma
- **Wonder drug:** Carbamazepine, phenytoin, Phenobarb, beta-lactams, nitrofurantoin, sulfia, allopurinol, bleomycin, NMS, serotonin syndrome, etc.

**Malignancy:** lymphomas, renal and hepatic tumors

**WORKUP:** (perform if not done within 24hrs)
1. Blood cultures x 2 different sites (4 bottles total)
2. U/A and urine culture
3. CXR (PA & Lat preferred)
4. Examine external sites (lines, ulcers, wounds)
5. Stool for C. diff if diarrhea
6. Examine perineum and skin
7. **Consider imaging for abscesses**

**TREATMENT:**
1. Tylenol 650mg q4hrs or Ibuprofen 600mg q4hrs
2. If sepsis - refer to Loyola’s SEPSIS PROTOCOL
3. Neutropenic fever - Imipenem 500mg IVPB q 8hrs
   - Add tobramycin if need further gram negative coverage
   - add vanco if need further gram positive coverage
   - consider adding antifungal and antiviral coverage
   - Do NOT rectalize
3. Fix: pull inf. lines, stop offending drugs, fill holes in coverage

**STROKE**

Development of an acute onset neurologic deficit most commonly in the setting of hypertension

**Most common signs / symptoms:**
- Speech / language problems
- Facial asymmetry
- Limb weakness / numbness
- Imbalance / dizziness / clumsiness

**What to do:** ESTABLISH TIME OF ONSET !!! (When was the last time seen normal)
- SECURE Airway – Breathing – Circulation
- Let a nurse know your patient has an emergency
- If onset <12 hrs ago, PAGE 14911= Acute Stroke Team at LUMC (Brain attack pager)
- Accucheck: if hypoglycemic, give thiamine 100mg IV + D50 1 amp IV STAT!
- STAT: CBC, BMP, INR, aPTT, Head CT non-contrast (ask the stroke team before taking patient to scanner).

**When in doubt ALWAYS page the neurology team for assistance: 91516**

**SEIZURE**

- Most common signs / symptoms:
  - Speech / language problems
  - Facial asymmetry
  - Limb weakness / numbness
  - Imbalance / dizziness / clumsiness

- What to do:
  - 3 minutes, if seizures persist
    - Activate the Rapid Response Team
    - Consult neurology - 91516
    - Initiate Medical Treatment:
      - First line agent: Lorazepam (Ativan) 1-2mg IV one time.
      - Can be repeated up to dose of 0.1mg/kg IV at 2mg/min.
      - If no IV access, give IM
      - Must monitor respiratory status closely

- **SEPTIC SHOCK= Above + refractory hypotension or hypoxia**
- **SEVERE Sepsis= Above + end-organ damage or hypotension**
- **SEPIS= SIRS + evidence of infection**

- **The 5 W's + M**
  - Where was the patient last seen normal?
  - When were last cultures sent?
  - What is the patient’s temperature?
  - How was the patient found? (最初是看到哪些症状)
  - Why is this patient?”

**SIRS= 2/4 of: Temp >38 <36, HR >90, RR>20 or PaO2 <32, WBC >12 or <4 or >10% bands**

- **Malignancy:** lymphomas, renal and hepatic tumors

**NOTE:**
- **SIRS= 2/4 of: Temp >38 <36, HR >90, RR>20 or PaO2 <32, WBC >12 or <4 or >10% bands**

- **SEPIS= SIRS + evidence of infection**
- **SEVERE Sepsis= Above + end-organ damage or hypotension**
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**TREATMENT:**
1. Tylenol 650mg q4hrs or Ibuprofen 600mg q4hrs
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   - Add tobramycin if need further gram negative coverage
   - add vanco if need further gram positive coverage
   - consider adding antifungal and antiviral coverage
   - Do NOT rectalize
3. Fix: pull inf. lines, stop offending drugs, fill holes in coverage
**ALCOHOL/DRUG WITHDRAWAL**

1. **When was their last drink?**
2. **What is their risk for withdrawal?**
   - Alcohol consumption > 3 – 4 times per week
   - Consumption of 5+ drinks on one occasion
   - History of morning drinking
   - History of impaired control over drinking
   - History of withdrawal episodes or seizures
   - Current abuse history of other drugs

**Check Retic Index = (retic count x Pts Hct/normal Hct) / maturation factor**

**If +sx or “at risk” for withdrawal, start treatment**

**At Loyola use an order set “IP ICU ALCOHOL WITHDRAWAL PROTOCOL” or “IP NON-ICU ALCOHOL WITHDRAWAL PROTOCOL”**.

Protocol includes:

1. Benzodiazepines, titrate to calm patient
   - Librium 50
   - Ativan 1

2. Fluids and vitamins
   - If can take PO= oral fluids + 100mg PO thiamine + 1mg PO folate + daily MVI
   - If needs IV= Banana bag = 1L D5 + 100mg thiamine + 1mg Folate + IV vitamins

3. Nursing monitoring for s/s of worsening withdrawal or oversedation (CIWA)

Other considerations:

- Elevated BP in the setting of worsening withdrawal sx should be treated as withdrawal with benzos rather than with antihypertensives
- For autonomic instability consider clonidine start 0.1mg PO q6hr, titrate up
- If refractory, use propofol in ICU as last resort

**ANEMIA**

- Major Symptoms:
  - Seizures (6 - 48 hrs)
  - Hallucinations (12 - 48 hrs)
  - Delirium (48 - 96 hrs)
  - Autonomic instability

- Minor Symptoms: (Starts in 6-36 hrs)
  - Tremor
  - Irritability
  - Anorexia / Nausea

**Check Retic Index= (retic count x Pts Hct/normal Hct) / maturation factor**

Maturation factor for given Hct: 45%=1.0, 35%=1.5, 25%=2.0, 20%=2.5

RI >2% HIGH = Increased destruction or loss
   - Hemolysis (high LDH, high bili, low hapto)
   - Acute blood loss (s/s of bleeding)
   - Hemolytic anemia (hemolysis >5%, LDH >2 times normal, bili >1.5 times normal)

RI <2% LOW = Underproduction… Check MCV

- HIGH MCV = Folate def, B12 Def, Liver dz, ETOH, hypothyroid, meds
- NL MCV = Sideroblastic, AoCD, microcytic overlap/pure red cell aplasia
- LOW MCV= IDA, thalassemias, normocytic overlap

<table>
<thead>
<tr>
<th>Fe</th>
<th>TIBC</th>
<th>Ferritin</th>
<th>% Iron sat</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDA</td>
<td>♦</td>
<td>♦</td>
<td>&lt; 18%</td>
</tr>
<tr>
<td>AoCD</td>
<td>♦</td>
<td>♦</td>
<td>&gt; 18%</td>
</tr>
<tr>
<td>Thalassemias</td>
<td>nl</td>
<td>nl</td>
<td>-</td>
</tr>
<tr>
<td>Sideroblastic</td>
<td>♦</td>
<td>nl</td>
<td>-</td>
</tr>
</tbody>
</table>

**TIMI Risk score for NSTEMI**

- **POINT**
- **SCORE**
- **14d mortality**

1. New?
2. Quality/duration/radiation/helps/worsens?
3. Cardiac history?
4. ASA and/or Beta-blocker today?
5. K and Mg levels and when/where they were drawn?

**Life-Threatening Causes:**

- *Acute MI* (CP, diaphoresis, nausea, palpitations, syncope)
- *PE* (SOB, pleuritic CP, hemoptysis, desaturation)
- *Pneumothorax* (absent breath sounds, tracheal deviation)
- *Aneurysm/Dissection* (wide mediastinum, BP discrepancy)
- *Boerhaave’s syndrome* (h/o retching, subQ emphysema)

**Diagnosis:**

1. Serial 12-lead ECGs (q 6 hrs)
2. Serial Troponins (q 6 hrs)
3. CXR (r/o pneumothorax and dissection)
4. O2 saturation
5. ABG
6. CT PE protocol/ D-Dimer/ VQ scan

**If Cardiac:**

- Morphine - 2-5mg IV q5-30min for pain
- Nitroglycerin - 0.3-0.6mg sublingual q5min x 3 (or IV)
- Aspirin - chew 81mg x 2
- Beta-blocker
  - metoprolol PO BID or 5mg IV
  - Goal HR in the 60s

**Also Consider:**

1. Heparin (if no contraindication)
   - 60-70units/kg IV bolus + 12-15units/kg/hr IV
2. CCU eval and nitro drip (10 mcg/min and titrate up)

- If SBP < 90, hold if SBP < 90
- Caution if hypotensive (hold if SBP < 90)
- Severe angina (≥2 episodes/24hrs)
- ST deviation ≥0.5mm

**CAD risk factors:**

- DM
- HTN
- Smoking
- HDL<40
- Fx of CAD
- Age <45
- Age >75

**TIMI Risk score points:***

- **Age ≥65** 1 0-1 5%
- **≥3 CAD risk factors** 1 2 8%
- **Known CAD (stenosis ≥50%)** 1 3 13%
- **ASA use in past 7 d** 1 4 20%
- **Severe angina (≥2 episodes/24hrs)** 1 5 26%
- **ST deviation ≥0.5mm** 1 6-7 41%
- **+ Cardiac enzyme** 1

*TIMI risk score ≥ 3 is high risk. Talk to your senior about starting LMWH, a gpIIb/IIIa inhibitor, or sending for early cath
1) What is the patient’s baseline?  
2) Type of patient? CHF, CVA, HTN crisis  
3) Meds - new, outpatient, recently stopped?  
4) What IV fluids / In’s and Out’s?  
5) Recheck, both arms manually if necessary

When to treat:  
1) SBP>170 or <90, DBP>100, MAP < 60  
2) End organ damage (AMS, ischemia, aortic dissection, epistaxis, visual sx, HA, decreased UOP, hematuria)

**HIGH Blood Pressure:**  
1) Find the cause (pain, anxiety, etc.)  
2) If already on anti-HTN meds, try giving next dose early  
3) Medications: If non-emergent and able, give PO. Try to choose a medication that may be good choice for long term use if able.

### PO Route (usual starting dose)

<table>
<thead>
<tr>
<th>Drug</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amlodipine 5mg PO</td>
<td>Daily dosing</td>
</tr>
<tr>
<td>Captopril 12.5mg PO</td>
<td>Caution in hyperK+, renal dz, short acting</td>
</tr>
<tr>
<td>Metoprolol 25mg PO</td>
<td>Weak anti-HTNSive. Caution in reactive airway, low HR.</td>
</tr>
<tr>
<td>Labetalol 100mg PO</td>
<td>Same as metoprolol, but is a stronger anti-HTNSive</td>
</tr>
<tr>
<td>Hydralazine 25mg PO</td>
<td>Q6hr–Q8hr dosing</td>
</tr>
<tr>
<td>Clonidine 0.1mg PO</td>
<td>Caution for rebound hypertension</td>
</tr>
</tbody>
</table>

### IV Route (usual starting dose)

<table>
<thead>
<tr>
<th>Drug</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydralazine IV (10mg q6hr)</td>
<td></td>
</tr>
<tr>
<td>Metoprolol IV (5mg) / Esmolol IV</td>
<td>Beta 1 selective blocker</td>
</tr>
<tr>
<td>Labetalol IV (40-80mg q10min)</td>
<td>Blocks alpha 1, beta 1, beta 2</td>
</tr>
<tr>
<td>Nitroglycerin IV (start 5mcg/min)</td>
<td>Tachyphylaxis</td>
</tr>
<tr>
<td>Enalaprilat IV (start with 0.625mg x 1)</td>
<td>Expensive, hard to get</td>
</tr>
<tr>
<td>Nitroprusside IV (start 0.25mcg/kg/min)</td>
<td>Cyanide poisoning if given &gt;48hrs</td>
</tr>
</tbody>
</table>

4) HTN Emergency= elevated BP + end-organ damage.  
   • Decrease MAP by 25% in min-hours using IV meds  
5) HTN Urgency= SBP >210 +/- DBP >120 without end-organ damage or sx  
   • Decrease BP in hours using po meds

**LOW Blood Pressure:**  
- Ensure adequate IV access (18G antecubitals x 2, central line if needs pressors)  
- IVF bolus 0.5-1.0L over 5-30 mins (less if ESRD or CHF)  
- Repeat IVF boluses, if >2-4L, and still not responding, consider:  
  a) septic shock b) bleeding c) adrenal insufficiency  
- Pressors: (Will need Central access and ICU transfer)

1 can of soda = 355 mL

### ECG

#### 1) RATE
- Normal 60-100bpm, Small box = 0.04 sec, Large box = 0.20 sec

#### 2) RHYTHM
- Sinus: upright P wave before every QRS  
- Functional: regular retrograde or hidden P waves all leads  
- A-Fib: irr. irregular, P wave ~350-600bpm, QRS ~120-180bpm  
- A-Flutter: regular or irreg P wave ~250-350bpm, saw tooth  
- PSVT: regular, retrograde P waves, QRS ~150-250bpm  
- MAT: ≥ 3 different P wave morphologies, QRS ~100-200bpm  
- PAC: P wave and QRS are early but morphology normal  
- PVC: QRS early and wide without preceding P wave  
- VT: ≥3 consecutive PVCs, 120-200bpm, unlike PSVT has wide QRS and is slightly irreg. (Non-sustained VT: < 30 sec, Sustained VT: > 30 sec)  
- **Torsades de pointes** (polymorphic VT): spiraling VT

#### 3) AXIS
- Normal (−30° to +90°)  
- Usually normal if + deflection in both I and aVF

#### 4) INTERVALS
- PR 120-200ms

#### 5) QRS 60-120ms  
- Prolonged QT if QTc >440ms, get concerned when >500ms or QT > TQ

#### 6) QRST CHANGES
- ST Elevation DDx:  
  - AMI: Peaked T→TWI→ST elevation→Q waves  
  - Pericarditis: ST and T waves abnormal in ALL leads  
  - Coronary Spasm  
  - Early repolarization  
  - Ventricular aneurysm

- ST Depression DDx: ischemia, digoxin effect, hypokalemia (+/- U wave)  
- Q waves: Significant if: (never normal in V2, V2, or V4 regardless of size)  
  1) > 0.04 sec in duration  
  2) Depth >25% height of R wave in that complex
**ECG**

7) **Blocks**

- **1° AV**: PR>200ms
- **2° AV Mobitz type I** (Wenckebach): progressive PR prolongation before dropped QRS
- **2° AV Mobitz type II**: dropped QRS w/o PR prolongation
- **3° AV**: complete block, P wave/QRS dissociation
- **RBBB**: (precludes RVH diagnosis)
  1) QRS >120ms (incomplete RBBB if QRS <120ms)
  2) RSR' in V1 and V2 w/ ST depression and TWI
  3) Wide S wave in V5, V6, and I
- **LBBB**: (precludes LVH and MI diagnosis; likely LVH if axis borderline)
  1) QRS > 120ms (incomplete LBBB if QRS <120ms)
  2) Broad Rwaves w/ prolonged upstroke V5, V6, and I w/ ST depression and TWI
  3) Displacement of ST and T wave opposite to the major deflection of QRS
  4) Absence of Q in V5, V6, and I
  5) +/- PRWP, LAD, Q waves in inferior leads
- **Left Anterior Hemi-block**
  1) QRS <120ms and no ST or T wave changes
  2) Left axis deviation (axis < -30º)
  3) No LVH or other reason for left axis deviation
  4) qR in I and rS in III
- **Left Posterior Hemi-block**
  1) QRS <120ms and no ST or T wave changes
  2) Right axis deviation (axis > +110º)
  3) No RVH or other cause for right axis deviation
  4) rS in I and qR in III
- **Bifascicular Block**: RBBB + left or right axis deviation

<table>
<thead>
<tr>
<th>Location</th>
<th>Coronary supply</th>
<th>EKG leads</th>
</tr>
</thead>
<tbody>
<tr>
<td>Septum</td>
<td>LAD, posterior interventricular</td>
<td>V1V2</td>
</tr>
<tr>
<td>Anterior</td>
<td>LAD</td>
<td>V3V4</td>
</tr>
<tr>
<td>Lateral</td>
<td>Circumflex, LAD</td>
<td>I, AvL, V5V6</td>
</tr>
<tr>
<td>Inferior</td>
<td>RCA, R marginal</td>
<td>II, AvF, III</td>
</tr>
<tr>
<td>Posterior</td>
<td>Circumflex, RCA, PDA (PDA= Posterior Descending Artery)</td>
<td>AvR</td>
</tr>
<tr>
<td>RA</td>
<td>RCA</td>
<td></td>
</tr>
<tr>
<td>RV</td>
<td>RCA, R marginal, LAD</td>
<td></td>
</tr>
<tr>
<td>LA</td>
<td>Circumflex</td>
<td></td>
</tr>
<tr>
<td>LV</td>
<td>LAD, diagonal, L marginal, circumflex</td>
<td></td>
</tr>
<tr>
<td>Apex</td>
<td>R marginal</td>
<td></td>
</tr>
<tr>
<td>SAN</td>
<td>RCA (60%), LCA (40%)</td>
<td></td>
</tr>
<tr>
<td>AVN</td>
<td>RCA (80%)</td>
<td></td>
</tr>
<tr>
<td>Bundle</td>
<td>LAD</td>
<td></td>
</tr>
</tbody>
</table>

**GROIN CHECK (POST–CATH)**

- The main purpose for groin check is to rule out a large bleed

**Exam:**
- A post-cath groin should be soft, normal-colored, and only mildly tender
- Check for oozing– a small amt is okay– consider bandage change, “Neptune patch”, but call your senior or the cards fellow if concerning
- Check pulses (posterior tibial & dorsalis pedis)- compared to Pre-cath exam H&P note
  - Loss of distal pulses could be compression of femoral a. by large hematoma
- Listen for bruit– suggests fistula
  - If present, may need U/S in AM as determined by primary team
  - Most small bruits resolve spontaneously
- Assess for hypotension or back pain
  - Acute hypotension +/- back pain should be assumed to have RP bleed
    - Apply FIRM (will hurt you and patient), occlusive pressure PROXIMAL to site of needle insertion (is proximal to skin site as needle was directed on 45º angle)
    - CALL cards or interventional fellow IMMEDIATELY if this occurs

<table>
<thead>
<tr>
<th>Location</th>
<th>Coronary supply</th>
<th>EKG leads</th>
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<tbody>
<tr>
<td>Septum</td>
<td>LAD, posterior interventricular</td>
<td>V1V2</td>
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<tr>
<td>Anterior</td>
<td>LAD</td>
<td>V3V4</td>
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<tr>
<td>Lateral</td>
<td>Circumflex, LAD</td>
<td>I, AvL, V5V6</td>
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<tr>
<td>Inferior</td>
<td>RCA, R marginal</td>
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<tr>
<td>Posterior</td>
<td>Circumflex, RCA, PDA (PDA= Posterior Descending Artery)</td>
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<tr>
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<tr>
<td>LA</td>
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<tr>
<td>LV</td>
<td>LAD, diagonal, L marginal, circumflex</td>
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<tr>
<td>Apex</td>
<td>R marginal</td>
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<tr>
<td>SAN</td>
<td>RCA (60%), LCA (40%)</td>
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<tr>
<td>AVN</td>
<td>RCA (80%)</td>
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<tr>
<td>Bundle</td>
<td>LAD</td>
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**CHADS2-VASC Score**

New evidence shows that previous “intermediate” risk patients by CHADS2 may yet have an increased risk for stroke.

If CHADS2 score 2+ then oral anticoagulant recommended (warfarin, apixaban, rivaroxaban).

If CHADS2 is 0-1 then further stratify with CHA2DS2-VASC Risk Score.

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<th>Risk Factor</th>
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<td>CHF or LVEF ≤ 40%</td>
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<td>HTN</td>
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<td>Age ≥ 75</td>
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<td>Diabetes</td>
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<td>Stroke/TIA/Thromboembolism</td>
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<td>Vascular Disease</td>
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<td>Age 65-74</td>
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<td>Female</td>
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**Total Score**

Recommended Treatment

- 0: ASA or nothing
- 1: Oral anticoagulant or ASA
- 2+: Oral anticoagulant

*Warfarin decreases CVA risk by 60-68%*

*ASA decreases CVA risk by 20-44%*

*All valvular AFib pts should get Warfarin*

---

**Brugada criteria for Vtach:** Sensitivity: 98%, specificity 96% (go in order, if yes to any -> favors Vtach over SVT w/ aberrancy)

1. absence of RS in all V1-V6
2. R to bottom of S wave >100ms in 1 precordial lead
3. AV dissociation present
4. “Classic Morphology Criteria”

If no to all-> rhythm is SVT with aberrancy

**Other features to favor Vtach:**

- Fusion beats
- Capture beats (spontaneous antegrade conduction via AVN in slow Vtach)
- QRS >140 ms

**Features to favor SVT with aberrancy:**

- Premature P waves at onset
- Slowing or breaking of rhythm with adenosine or vagal maneuvers

---

**Peri-operative cardiac evaluation for non-cardiac surgery**

**Need for emergency surgery?**

- Yes: Proceed with surgery (optimized medical therapy as time permits)
- No: Proceed with surgery

**Active cardiac conditions?**

- Yes: Delay surgery for further evaluation/treatment
- No: Proceed with surgery

**Low-risk surgery? (Cardiac risk % = risk of death or MI)**

- Yes: Proceed with surgery
- No: Proceed with surgery

**Intermediate risk (1-5%):** Intraperitoneal, intrathoracic, CEA, ortho, prostate, head/neck, endovascular aortic aneurysm repair

**Vascular (>5%):** Major vascular surgery including PV surgery

**Low-risk surgery? (Cardiac risk % = risk of death or MI)**

- Yes: Proceed with surgery
- No: Proceed with surgery

**Adequate functional capacity (≥4METs) without symptoms?**

- Yes: Proceed with surgery (but consider noninvasive testing in pts undergoing vascular surgery with 1 or more risk factors if it will change management)
- No: Proceed with surgery

**How many clinical risk factors?**

- None: Proceed with surgery
- 1-2: Proceed with surgery; consider perioperative HR control and/or noninvasive testing (if it will change management)
- 3+: Consider noninvasive testing if it will change management

---

**Peri-operative cardiac risk stratification**

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<td>3+</td>
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</table>
1) Recent sedatives/narcotics?
2) Recent respiratory treatments?
3) In’s and Out’s?
4) Hypercapnea?- Pulse ox correlate with the pulse? Test on your finger.
5) Do they have “the look”?

Main Concerns:
- PE
- Pneumothorax
- COPD/Asthma
- CHF/Pulm edema
- Large effusion
- Pneumonia/aspiration

Diagnosis:
1) Listen to patient’s story
2) Focused exam
3) Stat CXR
4) ABG (hypoxia, hypercapnea)
5) Trial on oxygen: Don’t give excess O2 for COPD! (hypercapneic resp failure)

Treatment: Depends on etiology/severity
1) Duoneb (Alb 2.5-5mg / Ipatropium 0.5mg) up to q 2 hrs
2) Supp oxygen: NC / face mask → Ventimask → NRB → CPAP/BIPAP → Intubate
   • Caution with high O2 in COPD pt as they are CO2 retainers and thus can cause increase in dead space
   • Diuresis if overloaded - 40-80mg IV Lasix
1) If severe tension PTX= emergency- call surgery for chest tube or if delayed, place a 14G IV catheter in 2nd or 3rd intercostal space at mid-clavicular line.
2) BIPAP (start at IPAP 10cmH2O / EPAP 5cmH2O) considered in the following:
   a) COPD exacerbation
   b) Pulm edema in CHF
   c) Pulm infiltrates in the bone marrow unit
   d) AVOID BIPAP if AMS or excessive secretions
6) Intubation / call a code / call senior resident (See Ventilator section, pg 26)
   • Make sure is not DNI prior to intubation, if code status needs to be addressed- do it BEFORE the patient is too somnolent or becomes emergent!
   • Consider if PaO2 <55-60, increasing PaCO2, decreasing pH, AMS, respiratory fatigue. **Ultimately intubate if they have “the look”!**

HEMOPTYSIS

1) How much? (>200mL="massive hemoptysis")
2) History of esophageal varices / liver disease?
3) Hemodynamically stable?
4) On anticoagulation?

WORKUP:
1) Check Hgb / Coags
2) CXR
3) Consider CT chest/ CT PE if stable

TREATMENT:
1) Stabilize / ABC’s
2) Adequate IV access
3) Type and screen
4) Fluids / transfusions as indicated
5) Possible intubation to protect airway
6) If massive, call for MICU eval, may need emergent IR embolization/CV surgery.
   If scant, consider pulmonary consult in am.

Initial Post-intubation Settings:
- **Mode** A/C
- **Rate** 12 (ideally, pt should take 4 breaths over vent/min)
- **VT** 500 (6 cc/kg)
- **Flow** 60
- **FiO2** 100% (titrate down in hrs, <60% if possible, lower is better)
- **PEEP** 5

Pressures & Calculations:
- **PIP= Peak inspiratory pressure.** (nl <45) *pressure in large airways with flow
- **Plateau** Plateau pressure (keep <30) *pressure seen by alveoli without flow (measure with “inspiratory pause”)
- Compliance (mL/cmH2O) = Vc/(Plateau - PEEP) (nl >60, bad is <20)
- Resistance (cmH2O/L/sec) = [(Peak - Plateau)/Vmax] x 60 (nl <10)

Trouble Shooting:
1) Rule #1 - STOP THE BEEPING
2) Call RT for help if needed or senior
3) While waiting:
   • Exam - bilateral breath sounds
   • Check pressures as above
   • Check tubes
   • Suction
   • Ensure adequate sedation analgesia
   • Stat CXR - r/o pneumothorax, main stem ET tube, mucous plug
4) If all else fails, disconnect vent and bag the patient
5) If can’t bag, call for help / code

Note:
- **If ↑ Peak with normal Plateau= ↑ airway resistance problem**
  • DDx: clogged tubing, mucous plug, biting ETT, Bronchospasm
  • Tx possibilities: suction, nebs, call RT, increase sedation
- **If ↓ Peak with ↑ Plateau= ↓ compliance problem**
  • DDx: Vt too high, ARDS, Infection, Pulm edema, PNA
  • Tx possibilities: get CXR, ↓Vt, treat cause

Weaning Methods:
1) Patient awake, following commands, able to clear secretions/cough
2) Minimum vent settings (FiO2 < 40%, PEEP < 5)
3) Rapid shallow breathing index (RSBI=RR/Vt in liters) (want < 100)
4) Negative inspiratory force (NIF) (want < -30)
5) If above ok, 30min T-piece trial w/o perspiration/SCM use/tracheal tug
6) After a 30 min T-piece trial- MAKE THE DECISION (extubate or stop trial), don’t extend T-piece trial past 30 minutes.
**PULMONARY FUNCTION TESTING**

**Spirometry:**

- FVC (%predicted):
  - 80-120 NL
  - 60-80 Mild
  - 40-60 Moderate
  - <40 Severe

- FEV1 (%predicted): *determines SEVERITY/STAGE of obstruction (Asthma & COPD)
  - Stage I/Mild ≥80%
  - Stage II/Moderate 50-79%
  - Stage III/Severe 30-49%
  - Stage IV/Very severe <30% or <50% + chronic resp or right heart failure

- COPD Classes
  - Mild intermittent ≥80%, nl b/l flares
  - Mild persistent ≥80%
  - Moderate persistent 60-80%
  - Severe persistent <60%

**Volumes**

- TLC (%predicted):
  - >180 severely increased
  - 150-180 moderately increased
  - 120-150 mildly increased
  - 80-120 NL
  - 60-80 Mildly restricted
  - 40-60 Moderately restricted
  - <40 Severely restricted

- RV (%predicted):
  - >180 severe air trapping
  - 150-180 moderate air trapping
  - 120-150 mild air trapping
  - 80-120 NL
  - 60-80 Mildly reduced
  - 40-60 Moderately reduced
  - <40 Severely reduced

- RV/TLC: RV should be 1/3 of TLC. 1RV/TLC is air trapping

- DLCO (%predicted): surrogate for amt of lung tissue available for gas exchange
  - should be corrected for Hgb
  - DL/VA corrects for lung volumes (DLCO and DL/VA cut-offs are the same)
  - 80-120 NL
  - 60-80 Mild
  - 40-60 Moderate
  - <40 Severe

**Flow Loops Diagrams**

- Normal
- Obstructive
- Restrictive

**GI BLEED**

1. Upper (hematemesis, melena) vs. Lower bleed (BRBPR)- though some overlap
2. Hemodynamically stable (HR, BP)? Orthostatics

*Tachycardia occurs before hypotension, if orhestotic consider ICU evaluation

**WORKUP:**

1. CBC (Hgb, plts) / Coags / CMP/Type&Screen
2. NG lavage (see box)
3. Treat as needed
4. Transfuse as needed
5. PPI drip (pantoprazole 80 mg bolus x 1 + 8mg/hr IV x 72 hrs)
6. Call GI Fellow
7. Start octreotide gtt if +portal HTN
8. Call General surgery if > 6 units transfused
9. Dispo: Non-urgent → floor, Urgent → ICU, Emergent → scope ASAP


**Don’t Miss:**

1. Acute abdomen- Get acute abd series (upright CXR + 3 views of abd), Gen Surg consult
2. Ischemic bowel (pain > exam findings)
3. C. diff (send stool samples)

**A/B/D/V**

**Treatment:**

**Nausea / Vomiting**

1. Prochlorperazine (Compazine) 5-10mg IV q6hrs PRN
2. Ondansetron (Zofran) 4-8mg PO/IV q4-6hrs PRN
3. Metoclopramide (Reglan) 10mg PO/IV q6-8hrs PRN
4. Consider Ativan
5. Consider NG tube if intractable emesis

**Diarrhea:** Loperamide 4 mg PO (avoid if infectious etiology)

**Constipation**

1. Docusate (Colace) 100mg PO x2 daily (prevents, doesn't treat)
2. Docusate/sennosides 1-2 tabs (50mg/8.6mg)
3. Bisacodyl (Dulcolax) 5-15mg PO/Suppository PRN
4. Polyethylene glycol (Miralax)
5. Milk of Magnesia 15-30mL PO (avoid in renal patients)
6. Lactulose 15-30mL PO/PR
7. Magnesium Citrate 150-300mL (avoid in renal patients)
8. Enemas (Fleet, tap water, soapuds)
URINE OUTPUT (Low <1ml/kg/hr)

Classification:
- Oliguria < 500 cc/day
- Anuria < 50cc/day

Concern:
1) Foley? Improvement with flushing?
2) In's and Out's
3) Incontinent / diaper?
4) Bathroom privileges?
5) Weight - now vs. admission?

Evaluation:
1) Review or recheck BUN/Cr, electrolytes
2) Review for history of BPH
3) Review or recheck FeNa, FeUrea
4) R/o post-obstructive with measuring Post-Void Residual (PVR) via bladder scan or straight cath, if PVR > 200cc, leave Foley in
5) Urine indices if ARF (Urine lytes, osm, protein, cre; calc FeNa, FeUrea)

Treatment:
1) If dry, replace fluids
2) If intrinsic renal, work up
3) If obstruction, place Foley. If has Foley, flush to assess patency

Common Pages:
Try to trouble-shoot prior to calling Urology Consult
1) Unable to place a Foley
   - Attempt to place yourself. Stretch penis to ceiling / Try a Coude catheter
2) Foley pulled out with balloon inflated and bleeding
   - Call Urology. In meantime, have pt sit on rolled-up towels to tamponade bleeding
3) Patient can’t urinate
   - Bladder scan, then straight cath or place Foley if >200-400 cc PVR
     (make sure pt was told to void prior to measuring PVR!)
4) Hematuria
   - Urology can see pt. in am unless massively bleeding
5) Scrotal pain
   - Get a scrotal US then call Urology

Note: Call urology immediately for urologic emergencies:
- Fournier's gangrene, Testicular torsion, priapism, Paraphimosis, Obstructing kidney stone

EQUATIONS

Ohm’s Law:
Current (I) = voltage (V) / resistance (R)
Flow (V) = change in pressure (ΔP) / airway resistance (R)

A-a Gradient: (units are mmHg)
A-a = FiO2(713) - (PaCO2/RQ) - PaO2
- FiO2 = 21% on RA, ↑ ~3-4% per L nasal cannula
- 713 = [760 (P_atmosphere) - 47 (P_water_vapor)]
- ABG provides PaCO2 and PaO2
- Respiratory Quotient (RQ) = 0.8 (diet dependent)

Estimated normal A-a = (Age/4) + 4

Fick Cardiac Output:
Oxygen consumption (L/min)= CO (L/min) x arteriovenous (AV) oxygen difference
(must be measured, approx 125 ml/min/m²)
** Cardiac Output (L/min)= oxygen consumption/[Hb x 13.6 x (S_o2-S_vo2)]

Others:
- Mean arterial pressure (MAP)= [SBP + (DBP×2)]/3
- Minute Ventilation (VE)= tidal volume (VT) x RR   (nl 4-6 L/min)
- Corrected Calcium= Measured calcium + [(4 - measured albumin) x 0.8]
- Corrected Na in Hyperglycemia= Measured Na + [2.4 x (measured glu - 100)/100]
- Anion Gap (AG)= Na-(Ci+ HCO3) (nl 12)
- Osmolar Gap (OG)= Measured osmoles—calculated osmoles (normal <10)

UROLOGIC PROBLEMS

Antiarrhythmics

Class I: Bind sodium channel, decrease speed depolarization
   1a) slow upstroke / prolong action potential, decr conductivity, increase refractoriness (e.g. Quinidine, procainamide)
   1b) short duration of action potential (e.g. Lidocaine, mexiletine)
   1c) marked slowing of upstroke of action potential but minimal effect on duration, marked decr conductivity (e.g. Flecainide, propafenone)
 ***DO NOT USE IF PT HAS CAD - increases risk for ventricular arrhythmias***

Class II: Block catecholamine effects at Beta1-adrenergic receptors, affect SA/AV node (e.g. atenolol, metoprolol, carvedilol, propranolol, etc)

Class III: Block potassium channels, increase action potential duration but prolonging repolarization and refractory period (e.g. amiodarone, sotalol, dofetilide)

Class IV: Slow calcium channel blockers: decrease conduction through AV node and shorten plateau phase (e.g. verapamil, diltiazem)
**ACLS: PULSELESS ARREST**

**Drug Therapy:**
- **Epinephrine IV/IO**
  - Dose: 1mg q3-5min
- **Vasopressin IV/IO**
  - Dose: 40units replace 1st or 2nd dose of epinephrine
- **Amiodarone IV/IO:**
  - 1st dose 300mg bolus
  - Second dose: 150mg

**Reversible Causes:**
(H’s and T’s)
- Hypovolemia
- Hypoxia
- Hydrogen ions (acidosis)
- Hypo/Hyperkalemia
- Tension pneumothorax
- Toxins
- Thrombosis, pulmonary
- Thrombosis, coronary

**Defibrillators:**
- **Loyola (biphasic):**
  - 200 – 300 – 360 J
  - (pads placed over sternum & in L mid-axillary line)
- **HVA (biphasic):**
  - 120 – 150 – 300 J
  - (pads placed over sternum & b/w scapulas)

**ACLS: TACHYCARDIA**

**Assess appropriateness for clinical condition.**
- Heart rate typically ≥150/min if tachyarrhythmia.

**Identify and treat underlying cause:**
- **Maintain patent airway, assist breathing as necessary**
- **Oxygen (if hypoxemic)**
- **Cardiac monitor to identify rhythm; monitor blood pressure and oximetry**

**Persistent tachyarrhythmia causing:**
- Hypotension?
- Acutely altered mental status?
- Signs of shock?
- Ischemic chest discomfort?
- Acute heart failure?

**Synchronized cardioversion:**
- Consider sedation
- If regular narrow complex, consider adenosine

**Doses/Details**

**Synchronized Cardioversion**
- Initial recommended doses:
  - Narrow regular: 50-100 J
  - Narrow irregular: 120-200 J biphasic or 200 J monophasic
  - Wide regular: 100 J
  - Wide irregular: defibrillation dose (NOT synchronized)

**Adenosine IV Dose:**
- First dose: 6 mg rapid IV push; follow with NS flush.
- Second dose: 12 mg if required.

**Antiarhythmic Infusions for Stable Wide-QRS Tachycardia**
- **Procainamide IV Dose:**
  - 20-50 mg/min until arrhythmia suppressed, hypotension ensues.
  - QRS duration increases >50%, or maximum dose 17 mg/kg given.
  - Maintenance infusion: 1-4 mg/min. Avoid if prolonged QT or CHF.
- **Amiodarone IV Dose:**
  - First dose: 150 mg over 10 minutes. Repeat as needed if VT recurs. Follow by maintenance infusion of 1 mg/min for first 6 hours.
- **Scotaol IV Dose:**
  - 100 mg (1.5 mg/kg) over 5 minutes. Avoid if prolonged QT.
**ACLS: BRADYCARDIA**

**ADMISSION LOG**

**Assess appropriateness for clinical condition.** Heart rate typically <50/min if bradyarrhythmia.

**Identify and treat underlying cause**
- Maintain patent airway; assist breathing as necessary
- Oxygen (if hypoxemic)
- Cardiac monitor to identify rhythm; monitor blood pressure and oximetry
- IV access
- 12-Lead ECG if available; don’t delay therapy

**Persistent bradyarrhythmia causing:**
- Hypotension?
- Acutely altered mental status?
- Signs of shock?
- Ischemic chest discomfort?
- Acute heart failure?

**Monitor and observe**

**No**

**Yes**

**Atropine**
If atropine ineffective:
- Transcutaneous pacing
  OR
- Dopamine infusion
  OR
- Epinephrine infusion

**Doses/Details**
**Atropine IV Dose:**
First dose:
0.5 mg bolus
Repeat every
3-5 minutes
Maximum: 3 mg
**Dopamine IV Infusion:**
2-10 mcg/kg per minute
**Epinephrine IV Infusion:**
2-10 mcg per minute

Consider:
- Expert consultation
- Transcutaneous pacing

**Name:** ________________________________________

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**ADMISSION LOG**

Intern Admit/H&P Tracking Form

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**PROCEDURE LOG**

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Central Line

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Name: ________________________________________
**PROCEDURE LOG**

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NOTES: GOOD LUCK!