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Hospital Medicine
A Resource Guide on
Commonly Encountered Inpatient Topics
for Primary Care and Subspecialist Faculty

Core Educator Faculty

Department of Medicine
Inpatient Clinical Staffing Resource for COVID-19
March 2020
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For optimal use this document should be downloaded and cannot be used directly from an attachment in an email client

Note: This resource was collectively developed by the Massachusetts General Hospital (MGH) Inpatient Core Educator Faculty (CEF) to help Internal Medicine trained attendings who are not Hospital Medicine specialists and will be staffing inpatient services during the COVID-19 pandemic. It is not meant to be an all-encompassing resource. Rather, we have focused on some of the most common inpatient clinical topics and developed a section for each topic that collates existing resources. Each topic has links to relevant chapters of the MGH Housestaff Manual (the Whitebook), relevant MGH noon conference series, and some important literature. We have also included rapid diagnostic schema or facts where relevant. We appreciate any feedback on how this resource may be updated so that it could be most useful to our target audience. Please email amulya.nagarur@mgh.harvard.edu with any questions/suggestions.

-Amulya Nagarur, MD on behalf of the MGH Inpatient CEF (Twitter: @MGHCEF)
Inpatient topic | Inpatient heart failure
---|---
Collating author | Amulya Nagarur, MD

**MGH Whitebook (DESKTOP):** [Inpatient Heart Failure](#) and [Advanced Diuresis](#)

**MGH Whitebook (MOBILE):** [Inpatient Heart Failure](#) and [Advanced Diuresis](#)

**Rapid facts:**
- EF<40: Heart Failure with Reduced EF (HFrEF)
- EF 40-50%: Heart Failure with moderately reduced EF
- EF >50%: Heart Failure with Preserved EF (HFpEF)

**Triage considerations:**

<table>
<thead>
<tr>
<th>Low Perfusion at Rest</th>
<th>Congestion at Rest</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>Warm and Dry</td>
<td>Outpatient mgmt</td>
<td>Warm and Wet</td>
</tr>
<tr>
<td>Yes</td>
<td>Cold and Dry</td>
<td>Inotropes (ICU)</td>
<td>Cold and Wet</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tailored Therapy (ICU)</td>
</tr>
</tbody>
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Initial inpatient focus is on decongestion with loop diuretics which have a sigmoidal dose-response curve. Double dose until adequate response achieved:

**Slide or podcast presentations:**
- MGH Noon Conference on Heart Failure by Jennifer Ho
- MGH Noon Conference slide deck on Heart Failure with Preserved Ejection Fraction by Nilay Patel (and video)
- HFpEF Update with Clyde Yancy on Curbsiders Podcast

**Relevant literature:** Numerous links in MGH Whitebook and [2017 ACC/AHA/HFSA Focused Update of Guideline for the Management of Heart Failure](#)
Inpatient topic: Chest pain (with a focus on cardiac chest pain and acute coronary syndromes)
Collating author: Amulya Nagarur, MD

MGH Whitebook (DESKTOP): ECG Interpretation, Chest Pain, Acute Coronary Syndrome, MI Complications, Cardiac Anatomy & Catheterization, and Noninvasive Cardiac Testing
MGH Whitebook (MOBILE): ECG Interpretation, Chest Pain, Acute Coronary Syndrome, MI Complications, Cardiac Anatomy & Catheterization, and Noninvasive Cardiac Testing

Rapid schema/facts:

**ECG:** Compare with prior ECGs & check q10-15m if susp, but <50% sens for dx of acute MI. Check posterior if STD in V1-3 or R/S in V1-2 or R-sided leads (if STE in inferior leads) to better evaluate L CXR RCA

**Non-diagnostic**

- **CXR**
  - Normal
  - Widened mediastinum
  - PNA
  - PTX

**Signs of PE**

- **RAD, New RBBB, TWI, V1-4, S1Q3T3**
  - suggestive of RV strain (Sp, not Sn)

**Consider PE**

- **Consider Aortic Dissection**

**Biomarkers**

- **Non-Invasive Test**
  - **Stress Test** used to rule out ACS if pt's low-intermediate risk (neg biomarkers).
  - **Coronary CTA:** 100% NPV in pt w/ CAD. No. of L CAD or ED d1c rate vs hs-cTn (JACC 2016;67:18). CTA reduces 5yr CHD mortality in pts w/ stable angina (NEJM 2018;379:924).

**High-Sensitivity Troponin (hs-cTn)**

- **MGH ED:** Obtain at 0 and 1hr. Rules in if any cTn ≥52 ng/L or if 1hr Δ ≥5.
- **Rte** if ≤10 (≤2) or ≤12 (≤5) AND 3hr Δ ≤3. If no or rte at 1hr, obtain third cTn 3hrs from the first.
- **MGH Inpatient:** Obtain at 0 and 3hrs. Rte if >10 (≥2) or >15 (≥5), and Δ >7, and either ox of ischemia, ischemia on ECG, or imaging of CAD.
- **High-STEACS Study:** ≥5 ng/L at presentation, Δ ≥3, or ≥60% rise at 3hr showed improved outcomes vs less-strinct criteria.
- **Caveat:** [Intro of hs-cTn, w/ rule in threshold of cTn ≥99% ULN, may not improve 1-yr mortality vs low-sens cTn (Lancet 2018;392:919).]

**Angiography**

- Used to rule ACS in high-risk pts (NIH all pts with confirmed ACS should undergo angiography). Use GRACE, TIMI, HEART and Mayo Clinic CPC score for risk stratification.

**Echo**

- Useful for assessing valvular disease, RV strain (in PE), and EF. TEE first test if evaluating prosthetic MV, suspected proximal aortic dissection (can eval aortic root and valvular function).

**DO YOU SUSPECT STEMI OR ACUTE MI?**

**TRIGGERS FOR STAT 12-LEAD ECG**

- Chest discomfort, acute or worsening shortness of breath, unexplained diaphoresis or nausea
- Acute clinical deterioration (Gray skin-tone, hypotension, hypoxemia, and/or altered mental status)
- ST changes or arrhythmia on telemetry

**WITHIN THE FIRST 10 MINUTES**

- Print ECG & Transmit to MUSE
- Call Rapid Response* x6-3333
- STAT page Responding Clinician: "Suspect Acute MI"

**ONCE OR MORE STEMI CRITERIA MET?**

- **YES**
  - Call CoA STEMI Line x6-8282
  - Print ECG & Transmit to MUSE
  - **UNCERTAIN**
    - STAT page General Cardiology Consult: "Suspect Acute MI"

**SLIDE PRESENTATIONS**

- MGH Noon Conference on ECGs Part I by Dave Dudzinski
- MGH Noon Conference on ECGs Part II with Dave Dudzinski
- MGH Noon Conference on Acute Coronary Syndromes by Nilay Patel

**RELEVANT LITERATURE**

Refer to MGH Whitebook links.
Rapid diagnostic schema: Click here for explanatory video

Slide or podcast presentations:
MGH Noon Conference on Approach to Syncope by Bill Kormos
Curbsiders Podcast: Syncope Deconstructed

Relevant literature: 2017 ACC/AHA/HRS Guideline for the Evaluation and Management of Patients With Syncope
Inpatient topic | Atrial fibrillation
Collating author | Vic Chiappa, MD

MGH Whitebook (DESKTOP): Atrial Fibrillation & Flutter and Narrow & Wide Complex Tachycardia
MGH Whitebook (MOBILE): Atrial Fibrillation & Flutter and Narrow & Wide Complex Tachycardia

Rapid diagnostic schema/facts:

- Major considerations for new-onset Afib (assuming hemodynamic stability and no need for urgent electrical cardioversion):
  - Is there structural heart disease? Recent echocardiogram?
  - What is the trigger?
  - Does patient warrant electrical or chemical cardioversion?
  - For most, rate control for HR <110
  - Anticoagulation in most scenarios with DOAC if CHADS2-VASc score is ≥ 2
  *refer to Whitebook for details

- Treating Afib with rapid ventricular response depends on hemodynamic stability:
  - Unstable: DCCV with 150J
  - Stable: IV/PO nodal agents. If IV, always chase with PO for sustained effect
  - In between (systolic blood pressure ~90): Can attempt nodal agents above or try amiodarone or digoxin

Slide or podcast presentations: MGH Noon Conference on Atrial Fibrillation by Steve Lubitz and Curbsiders Podcast with James Furgerson

Relevant literature: See links in Whitebook for numerous links including anticoagulation risk assessment and choice using Sparctool
Inpatient topic  Venous thromboembolism (VTE)
Collating author  Jeff Greenwald, MD

MGH Whitebook (DESKTOP): VTE Diagnosis and VTE Management
MGH Whitebook (MOBILE): VTE Diagnosis and VTE Management

Rapid schema/facts:
NEJM  2019: Diagnosis of Pulmonary Embolism with d-Dimer Adjusted to Clinical Probability:

Blood 2020: Acute Treatment of Venous Thromboembolism:
**Relevant literature:** Diagnosis of Pulmonary Embolism with d-Dimer Adjusted to Clinical Probability
Inpatient topic | COPD exacerbation
--- | ---
Collating author | Kristian Olson, MD

MGH Whitebook (DESKTOP): [COPD](#)
MGH Whitebook (MOBILE): [COPD](#)

**Rapid diagnostic schema/facts:**

**GOLD ABCD designation for COPD:**

![GOLD ABCD diagram](image)

*mmRC (Modified Medical Research Council) & CAT (COPD Assessment Tool) are baseline symptom assessment tools*

COPD exacerbation: Acute worsening of resp symptoms (increased dyspnea, cough, sputum, wheeze) that requires additional therapy. Causes usual infection (70%). Must consider pneumonia, pulmonary embolism, pneumothorax, pulmonary edema.

![COPD - Inpatient Care table](image)

**Slide presentation:** [MGH Noon Conference on COPD by Sydney Montesi August 2019](#)

**Relevant literature:**

- [Effect of high flow oxygen on mortality in chronic obstructive pulmonary disease patients in prehospital setting](#), Oral or IV prednisolone in the treatment of COPD exacerbations, Different durations of corticosteroid therapy for exacerbations of chronic obstructive pulmonary disease, Non-invasive positive pressure ventilation for treatment of respiratory failure due to exacerbations of chronic obstructive pulmonary disease, [GOLD Report 2020](#) (Chapter 5), and [Susceptibility to exacerbation in chronic obstructive pulmonary disease](#)
Inpatient topic | Pneumonia
---|---
Collating author | Farrin A. Manian, MD MPH

**MGH Whitebook (DESKTOP):** Community Acquired pneumonia, HAP/VAP & Aspiration, Multidrug Resistant Organisms and MGH Antibiogram

**MGH Whitebook (MOBILE):** Community Acquired pneumonia, HAP/VAP & Aspiration, Multidrug Resistant Organisms and MGH Antibiogram

**Updates not yet included in MGH Whitebook:** 2019 IDSA/ATS CAP guidelines

**Rapid facts based on new guidelines:**

Identify patients at risk of MRSA or *P. aeruginosa* as cause of CAP when any of the following risk factors is present:

- MRSA or *P. aeruginosa* cultured from the respiratory tract within the prior year
- Hospitalization and parenteral antibiotic exposure in the last 90 days (either in or out of the hospital). HCAP is no longer an entity.

Inpatient workup:

- Order sputum and blood cultures in patients with severe CAP OR when empirically treated for MRSA or *P. aeruginosa*
- Order rapid influenza molecular assay (PCR) in preference to antigen test when influenza viruses are circulating in the community
- Don’t routinely order urine antigens for pneumococcal or Legionella antigens, except in severe CAP or in the presence of suggestive epidemiological factors
- Don’t routinely order serum procalcitonin to determine need for initial antibacterial therapy
- Note: Above recommendations focus on adults who are not immunocompromised or did not have recent travel

**Treatment**

1. Select empiric antibiotics based on severity of CAP and risk factors for MRSA and *P. aeruginosa* listed above
2. Treat CAP patients who test positive for influenza with standard CAP antibiotics PLUS oseltamivir irrespective of the duration of symptoms
3. No need for routine anaerobic coverage in aspiration pneumonia unless empyema, lung abscess or large volume aspiration plus poor dentition (latter not in ATS guidelines but reasonable)
4. See tables below for outpatient and inpatient empiric treatment of CAP

**Empiric Treatment of CAP in outpatients (adapted from 2019 ATS/IDSA CAP Guidelines)**

<table>
<thead>
<tr>
<th>Patient factor</th>
<th>Standard Regimen</th>
<th>Comment</th>
</tr>
</thead>
</table>
| No comorbidities or risk factors for MRSA or *P. aeruginosa* (see above) | Amoxicillin 1 g 3x/d or Doxycycline 100 mg 2x/d | Comorbidities include chronic heart, lung, liver or renal disease, DM, alcoholism, malignancy or asplenia  
Note: macrolide is now recommended only if local pneumococcal resistance is <25% |
| With comorbidities | Combination therapy with:  
Amoxicillin/clavulanate (500 mg/125 mg 3x/d, 875 mg/125 mg 2x/d) or cefpodoxime (200 mg 2x/d), or cefuroxime (500 mg 2x/d)  
*plus*  
Azithromycin (500 mg on 1st day then 250 mg daily), or doxycycline (100 mg 2x/d)  
OR  
Monotherapy with levofloxacin (750 mg daily) | Comorbidities include chronic heart, lung, liver or renal disease, DM, alcoholism, malignancy or asplenia |
Empiric Treatment of CAP in inpatients (adapted from 2019 ATS/IDSA CAP Guidelines)

<table>
<thead>
<tr>
<th>Severity</th>
<th>Standard Regimen</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-severe</td>
<td>Ampicillin/sulbactam (1.5 - 3 g every 6 h), or ceftriaxone 1-2 g daily plus Azithromycin 500 mg daily&lt;br&gt;<strong>Extended coverage when MRSA suspected:</strong> Vancomycin (15 mg/kg every 12 h, adjust per levels) or linezolid (600 mg every 12 h)&lt;br&gt;<strong>Extended coverage when P. aeruginosa suspected:</strong> Cefepime 2 g every 8 h, or piperacillin-tazo (4.5 g q every 6 h) or meropenem (1 g every 8 h) or aztreonam (severe penicillin allergy, 2g every 8h)</td>
<td>MRSA or P. aeruginosa risk factors: Prior identification of MRSA or P. aeruginosa in the respiratory tract within the prior year OR hospitalization and parenteral antibiotic exposure in the last 90 days in or out of the hospital. Duration of treatment 7 days when MRSA or P. aeruginosa suspected or proven. In the absence of prior respiratory isolation of MRSA or P. aeruginosa, extended coverage may be held for respective pathogens pending results of diagnostic tests (eg, blood, sputum, PCR for MRSA)</td>
</tr>
<tr>
<td>Severe (defined by 1 major criterion or ≥ 3 minor criteria)</td>
<td>Ampicillin/sulbactam 1.5 - 3 g every 6 h, or ceftriaxone 1-2 g daily plus Azithromycin 500 mg daily OR Ampicillin/sulbactam 1.5 - 3 g every 6 h, or ceftriaxone 1-2 g daily plus levofloxacin 750 mg daily&lt;br&gt;<strong>Extended coverage if MRSA suspected:</strong> Vancomycin (15 mg/kg every 12 h, adjust per levels) or linezolid (600 mg every 12 h)&lt;br&gt;<strong>Extended coverage if P. aeruginosa suspected:</strong> Cefepime 2 g every 8 h, or piperacillin-tazo (4.5 g q every 6 h) or meropenem (1 g every 8 h) or aztreonam (severe penicillin allergy, 2g every 8h)</td>
<td>MRSA or P. aeruginosa risk factors: Prior identification of MRSA or P. aeruginosa in the respiratory tract within the prior year OR hospitalization and parenteral antibiotic exposure in the last 90 days in or out of the hospital. Duration of CAP due to suspected or proven MRSA or P. aeruginosa should be 7 days</td>
</tr>
</tbody>
</table>

**Clinical pearls:**


**Relevant literature:** 2019 IDSA/ATS CAP guidelines and Management of adults with hospital-acquired and ventilator-associated pneumonia: 2016 clinical practice guidelines by the IDSA and ATS
Rapid facts:

- The majority of cases of cellulitis are nonculturable and therefore the causative bacteria are unknown.
- The diagnosis of cellulitis is based primarily on history and physical examination.
- Treatment of uncomplicated cellulitis should be directed against Streptococcus and methicillin-sensitive S. aureus.
- Failure to improve with appropriate first-line antibiotics should prompt consideration for resistant organisms, secondary conditions that mimic cellulitis, or underlying complicating conditions such as immunosuppression, chronic liver disease, or chronic kidney disease.
- Refer to whitebook for cellulitis mimics (or pseudocellulitis).
- “Bilateral cellulitis” should prompt an alternative diagnosis.
- **ALT-70 score:** Developed to assist with evaluation of lower extremity redness, which may be inappropriately diagnosed as cellulitis (versus mimickers, or “pseudocellulitis”). Most patients with cellulitis have acute onset, unilateral involvement (usually one leg), and are sick with an elevated white blood cell count, tachycardia, and/or a fever. Validated in a small cohort of 67 patients.

**Slide presentation:** [MGH Noon Conference on Cellulitis and the Other Red Leg by Daniela Kroshinsky](#)

**Relevant literature:**
[JAMA: Cellulitis: A Review](#)

Refer to [ALT-70 score](#) link for linked original literature as well as validation.
Inpatient topic | Decompensated cirrhosis
Collating author | Daniel Restrepo, MD

MGH Whitebook (DESKTOP): Alcohol Related Liver Disease, End-Stage Liver Disease and Hepatorenal Syndrome
MGH Whitebook (MOBILE): Alcohol Related Liver Disease, End-Stage Liver Disease and Hepatorenal Syndrome

Rapid diagnostic schema/facts:

Precipitants

<table>
<thead>
<tr>
<th>HE</th>
<th>Ascites/Edema</th>
<th>HRS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missed lactulose</td>
<td>Missed diuretics</td>
<td>SBP/Infection</td>
</tr>
<tr>
<td>GIB</td>
<td>Sodium intake</td>
<td>Large Volume Paracentesis</td>
</tr>
<tr>
<td>SBP/infection</td>
<td>GIB</td>
<td>GIB</td>
</tr>
<tr>
<td>HypoK</td>
<td>SBP</td>
<td>IV diuretics</td>
</tr>
<tr>
<td>Opioids/BZDs</td>
<td>HCC</td>
<td>Alcoholic Hepatitis</td>
</tr>
<tr>
<td>Constipation</td>
<td>PVT</td>
<td></td>
</tr>
<tr>
<td>PVT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dehydration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIPSS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Slide presentation: Common Complications of Cirrhosis - Part 1 by Michael Thiim (audio) and Common Complications of Cirrhosis - Part 2 by Michael Thiim (audio) and Hepatorenal Syndrome: An Update on AKI in Cirrhosis by Andrew Allegretti (audio)
Relevant literature: Treatment of Patients with Cirrhosis
Inpatient topic | Gastrointestinal bleeding
Collating author | Amulya Nagarur, MD

MGH Whitebook (DESKTOP): **Upper GI Bleeding, Lower GI Bleeding, GERD and Peptic Ulcer Disease**
MGH Whitebook (MOBILE): **Upper GI Bleeding, Lower GI Bleeding, GERD and Peptic Ulcer Disease**

Rapid schema and facts:

**Triage considerations:**

**MGH GI Taskforce Protocol for Acute Upper GI Bleed Management**
- **Criteria:** BP < 90 and HR > 100 x 2 min apart; Hct < 20 regardless of vital signs, and evidence of active significant bleed in 12hrs; requirement of > 2L IVF or 2U P RBCs to prevent instability/keep Hct > 25; ATLS hemorrhagic shock class III; clinical judgment
- **Consults:** page/call GI fellow; call Medical Sr for MICU bed; consult Trauma team and/or Interventional Radiology when needed
- **Resuscitation:** crystalloid IVF via 2 LB IV; pRBCs to keep Hb > 7 or higher if co-morbidities; correct coagulopathy rapidly to therapeutic goal; IV PPI (+ octreotide if suspected portal HTN).
- **Urgent EGD in the ICU:** performed w/in 8 hrs, after effective resuscitation and securing safe airway; If no ICU bed, should be performed in ED Acute (sedation and intubation if needed); IV erythromycin (250mg) is recommended 30 mins prior to EGD

**Etiologies of Upper GIB (Dig Dis Sci 2018;63:1286)**
- Ulcers (~50%): PUD; H. pylori, NSAID, ZE, ETOH
- Varices (~5%): EVB (esophageal) > gastric
- Esophagitis or Gastritis (~30%): GERD, pill, ASA, NSAIDs, clopidogrel, ETOH, infectious
- Vascular lesions (~5-10%): Dieulafoy’s, AVM, GAVE, OW/RHHT, XRT, aortoenteric fistulae
- Traumatic (~5%): Mallory-Weiss, foreign body, Boerhaave’s
- Neoplastic (~5%): primary > metastatic
- Post-procedural (varies): polypectomy, sphincterotomy

**Etiologies of Lower GIB/Hematochezia**
- Diverticulosis (30-65%)
- Ischemic colitis (5-20%)
- Hemorrhoids (5-20%)
- Brisk UGIB (~13%)
- Colorectal polyps or neoplasms (2-15%)
- Angioectasias (5-10%)
- Post-polypectomy (2-7%)
- IBD (3-5%)
- Infectious colitis (2-5%)
- Stercoral ulceration, colorectal varices, radiation proctopathy, NSAID induced colopathy, Dieulafoy’s lesion (0-5%)

**Slide presentation:** [MGH Noon Conference on GI Bleeding with Nneka Ufere](#)

**Relevant literature:** Refer to MGH Whitebook link for original literature including [NEJM 2016: Clinical Practice: Upper Gastrointestinal Bleeding Due to a Peptic Ulcer](#) and [NEJM 2017: Acute Lower Gastrointestinal Bleeding](#)
Inpatient topic: Acute kidney injury (AKI)
Collating authors: Amulya Nagarur, MD and Andrew Fenves, MD

MGH Whitebook (DESKTOP): Acute Kidney Injury and Glomerular Disease and Renal Replacement Therapy
MGH Whitebook (MOBILE): Acute Kidney Injury and Glomerular Disease and Renal Replacement Therapy

Rapid diagnostic schema/facts: Adapted from MGH Whitebook and Clinical Problem Solvers intrarenal AKI diagnostic schema (with accompanying video)

<table>
<thead>
<tr>
<th>PRE-RENAL (21%)</th>
<th>INTRINSIC</th>
<th>POST-RENAL (10%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Absolute ↓ volume</strong></td>
<td><strong>Tubular</strong></td>
<td>Urinary retention</td>
</tr>
<tr>
<td>- Bleeding</td>
<td>- ATN</td>
<td>- BPH, meds,</td>
</tr>
<tr>
<td>- GI or skin loss</td>
<td></td>
<td>neurogenic</td>
</tr>
<tr>
<td>- Diuretics</td>
<td>- Obstruction</td>
<td>- Foley dysfunction</td>
</tr>
<tr>
<td>- Osmotic diuresis</td>
<td></td>
<td>Urinary obstruction</td>
</tr>
<tr>
<td>- Cerebral diuresis</td>
<td>- Ischemic - Nephrotoxicity</td>
<td>(bilateral)</td>
</tr>
<tr>
<td>- Renal failure</td>
<td>- Sepsis - Crystals</td>
<td>- Stones (single</td>
</tr>
<tr>
<td>- Nephrotic syndrome</td>
<td>- Drugs</td>
<td>kidney/transplant)</td>
</tr>
<tr>
<td>- Sepsis / Third-spacing</td>
<td>- Pigment</td>
<td>- Clot</td>
</tr>
<tr>
<td><strong>Effective ↓ volume</strong></td>
<td><strong>Glomerular</strong></td>
<td>- Malignancy</td>
</tr>
<tr>
<td>- CHF / cardiorenal</td>
<td></td>
<td>- Retroperitoneal</td>
</tr>
<tr>
<td>- Cirrhosis / hepatorenal</td>
<td></td>
<td>fibrosis</td>
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<tr>
<td>- Nephrotic syndrome</td>
<td>- Immune Complex</td>
<td>- Nephrotic</td>
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<tr>
<td>- Sepsis / Third-spacing</td>
<td>- ICA and/or C4</td>
<td>- ICA and/or C4</td>
</tr>
<tr>
<td><strong>Δ renal dynamics</strong></td>
<td><strong>Glomerular</strong></td>
<td>- SLE</td>
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<tr>
<td>- NSAIDs / COX-2s</td>
<td>- Idiopathic MPGN</td>
<td>- APS</td>
</tr>
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<td>- ACEI / ARBs</td>
<td>- β-ANCA</td>
<td>- APS</td>
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<tr>
<td>- Abd compart. syndr.</td>
<td>- HSP</td>
<td>- HSP</td>
</tr>
<tr>
<td>Relative hypotension</td>
<td></td>
<td>- SLE</td>
</tr>
</tbody>
</table>

Slide presentations: MGH Noon Conference on Acute Kidney Injury by Andrew Lundquist

Relevant literature: Numerous links in MGH Whitebook and JHM 2015: Before you call renal: AKI for the hospitalist and JHM 2016: Things we do for no reason: Urinary fractional excretion indices in the evaluation of acute kidney injury
Inpatient topic | Hyponatremia
Collating author | Cindy Cooper, MD

MGH Whitebook (DESKTOP): Hyponatremia
MGH Whitebook (MOBILE): Hyponatremia

Rapid diagnostic schema/facts: Accompanying video here

- Treat acutely symptomatic patients 100cc bolus of 3% saline, aiming to increase SNa by 2-3mEq/L
- Involve renal consult team for severe hypoosmolar hyponatremia SNa <120
- Aim to increase SNa no more than 8 mEq/L/day; no more than 4-6 mEq/L/day if high risk for Osmotic Demyelination Syndrome (ODS)
- Patients at highest risk for ODS include:
  - Serum sodium <105 mmol/L
  - Hypokalemia
  - Alcoholism
  - Malnutrition
  - Advanced liver disease

Slide presentation: MGH Noon Conference on Hyponatremia by Andrew Lundquist

Relevant literature: JASN 2017 Diagnosis and Treatment of Hyponatremia and CJASN 2018 Risk Factors for Osmotic Demyelination Syndrome
Inpatient topic | Urinary tract infection
Collating author | Steven Knuesel, MD

MGH Whitebook (DESKTOP): Urinary Tract Infection and Multidrug Resistant Organisms and MGH Antibiogram
MGH Whitebook (MOBILE): Urinary Tract Infection and Multidrug Resistant Organisms and MGH Antibiogram

Rapid facts:

Our approach to categorizing UTI in adults and adolescents

<table>
<thead>
<tr>
<th>Empiric Antibiotics</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Uncomplicated UTI</strong></td>
<td></td>
</tr>
<tr>
<td>NFT 100mg BID x 5d OR T/S* DS BID x 3d OR Fosfomycin 3g x1; alternatives: Oral β-lactam (e.g. Augmentin, Cefpodox) x7d</td>
<td></td>
</tr>
<tr>
<td>Complicated UTI (includes Pyelo)</td>
<td></td>
</tr>
<tr>
<td>Output: CPO 500mg BID x 5-7d OR LVO 750mg x 5-7d OR T/S DS BID x 7-10d. Can give 1x IV CTX prior to oral b.</td>
<td></td>
</tr>
<tr>
<td>Inpt: CTX OR CEFE, Narrow to oral agent if improving, Add Vanc/Linezolid if c/f GPC inxn (e.g., if GPC on urine G/stain), Duration: 5-14d, depending on clinical course and oral agent chosen (5-7d for FQ; 7-10d for T/S; 10-14d for β-lactam), Alternatives: P/P (if PsA); CBPN if c/f ESBL on micro</td>
<td></td>
</tr>
<tr>
<td>CAUTI [CTX OR FQ] AND VANC (risk of MRSA) Duration: 7d if improving; 10-14d otherwise Alternatives: P/P OR CEFE (if c/f PsA); CBPN if c/f ESBL on micro</td>
<td></td>
</tr>
<tr>
<td>Funguria FLUC 200-400mg (pyelo) PO QD 14d OR conventional AmB 0.3-0.6 mg/kg QD x1-7d if c/f FLUC-R</td>
<td></td>
</tr>
</tbody>
</table>

KEY: NFT-nitrofurantoin; T/S-TMP/SMX; CTX-ceftriaxone; FQ-fluoroquinolone; P/T-piperacillin/tazobactam; CEFE-cefepime; CBPN-carbapenem; AMG-amimoglycoside; P/O-piroxicin; LVO-levofoxacin; FLUC-flucanazole; AmB-ampoterhenin B; R-resistance

Relevant literature:
See Whitebook for numerous links to primary literature.

IDSA 2010 Update on Acute Cystitis and Pyelonephritis in Women
IDSA 2019 Practice Guideline on Asymptomatic Bacteriuria
"Urinary Tract Infection"- Requiem for a Heavyweight
Inpatient topic | Altered mental status (with a focus on delirium)  
Collating author | Amulya Nagarur, MD

MGH Whitebook (DESKTOP): Altered Mental Status and Delirium  
MGH Whitebook (MOBILE): Altered Mental Status and Delirium

Rapid diagnostic schema: Accompanying explanatory video here

“MIST positive AMS”

“MIST Negative AMS”

Slide presentation: MGH Noon Conference on AMS by Eyal Kimchi  
Relevant literature: NEJM 2017: Delirium in Hospitalized Older Adults and Annals 2019: Antipsychotics for Preventing Delirium in Hospitalized Adults: A Systematic Review
Rapid diagnostic schema/facts:

**Table 4**

<table>
<thead>
<tr>
<th>CNS Stimulation (GABA)</th>
<th>Adrenergic Hyperactivity (Glutamate, NMDA)</th>
<th>Dopamine Dysregulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uneasiness</td>
<td>Chills</td>
<td>Disorientation</td>
</tr>
<tr>
<td>Mild tremor</td>
<td>Fever</td>
<td>Delirium</td>
</tr>
<tr>
<td>Restlessness</td>
<td>Diaphoresis</td>
<td>Hyperalertness</td>
</tr>
<tr>
<td>Irritability</td>
<td>Moderate tremor</td>
<td>Impaired reasoning</td>
</tr>
<tr>
<td>Anxiety</td>
<td>Nausea and vomiting</td>
<td>Agitation</td>
</tr>
<tr>
<td>Seizure</td>
<td>Palpitations</td>
<td>Hallucinations</td>
</tr>
</tbody>
</table>

*Note: Increased HR, BP, RR refers to heart rate, blood pressure increasing.*

**Abbreviations:** BP, blood pressure; HR, heart rate; RR, respiratory rate.

**Table 5**

<table>
<thead>
<tr>
<th>DSM IV-TR alcohol withdrawal syndromes</th>
<th>Early Withdrawal (First 48 hours After Cessation of Drinking)</th>
<th>Late Withdrawal (&gt;48 h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uneasiness</td>
<td>DTs</td>
<td></td>
</tr>
<tr>
<td>Tremor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restlessness</td>
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<td>Diaphoresis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nausea and vomiting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased HR, BP, RR</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note: Alcohol hallucinations and Wernicke encephalopathy.*

**Abbreviations:** BP, blood pressure; HR, heart rate; RR, respiratory rate.

**Slide presentation:** MGH Noon Conference on Alcohol Withdrawal by Kathleen Finn and MGH Noon Conference on DTs and Phenobarbital by Kathleen Finn

**Relevant literature:** Inpatient Alcohol Withdrawal Review

**Useful EPIC Tip:** Place Addiction Consult Team (ACT) consult to help with inpatient management and aftercare planning.
<table>
<thead>
<tr>
<th><strong>Inpatient topic</strong></th>
<th><strong>Inpatient diabetes management</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Collating author</td>
<td>Margaret Chapman, MD</td>
</tr>
</tbody>
</table>

**MGH Whitebook (DESKTOP):** [Inpatient Management of Diabetes](#) and [DKA & HHS](#)

**MGH Whitebook (MOBILE):** [Inpatient Management of Diabetes](#) and [DKA & HHS](#)

**Stepwise approach:**

| Guiding principles | • You can manage almost everything you need to with fingersticks, glargine, and lispro  
|                   | • Start Low – Go Slow – hypoglycemia is worse than hyperglycemia, short-term  
|                   |   ○ Risk factors for hypoglycemia: nausea/vomiting/malaise leading to less PO intake than anticipated, NPO for test or procedure leading to less PO intake than anticipated, they don’t use their home meds as much as prescribed  
|                   | • Use the Epic order set “Adult Basal/Bolus Insulin”. It contains every order you need for inpatient AND important safety meds. Do NOT order each part separately.  

**Step 1: On Admission**

| • Obtain medication history  
| ○ What agents?  
| ○ Approximate idea of how well blood sugars are controlled at home (if they check)?  
| ○ For Type 1: do they use a pump? How do they manage sliding scale? Last few days of blood sugars?  
| • Order an A1c (*this will come in handy for discharge below*)  
| • Order QID fingerstick glucomes (before each meal and at bedtime)  

**Step 2: Initial Orders**

| Patients who use **ORAL hypoglycemics** (e.g. anything other than insulin)  
| ○ Is this a very straightforward admission where the patient is expected to eat and drink normally, have minimal testing, and discharge within 48 hours? Consider continuing home agents  
| ○ For everyone else:  
|   • Stop home oral hypoglycemics (and injectables other than insulin)  
|   • Start a LOW DOSE sliding scale insulin (uses lispro insulin)  
|   • Order “Carbohydrate Managed” diet  
| Patients who use **INSULIN** at home  
| ○ Is this a very straightforward admission where the patient is expected to eat and drink normally, have minimal testing, and discharge within 48 hours AND they can tell you they have good control at home? Consider continuing home agents at home dosing  
| ○ For everyone else:  
|   • Start their home insulin regimen  
|   • Consider dose reducing by 25% on day 1 to minimize risk of hypoglycemia  
|   • Order Sliding Scale insulin  
|   ○ LOW dose for anyone using <40 units of insulin TOTAL per day  
|   ○ MEDIUM dose for anyone using 40+ units of insulin TOTAL per day  
|   ○ *For patients using a pre-mix insulin (e.g. 70/30), consult pharmacy or endocrinology  
| For **TYPE 1 diabetes**  
| ○ Do NOT hold basal insulin – even if NPO!  
| ○ Restart the patient’s home insulin  
| ○ If they use a pump, contact endo to help get the orders set up. It’s safer to use the patient’s pump than it is to switch their insulin regimen in most cases  

**Step 3: Daily Adjustments**

| Review the **FASTING** blood sugar (aka the “pre-breakfast” blood sugar)  
| ○ <100: reduce basal insulin by 25-50% to avoid hypoglycemia  
| ○ 100-180: no changes needed  
| ○ 180+: change basal insulin  
|   ○ Already on glargine? Consider increase of 10-25%  
|   ○ Not on glargine? Your patient probably needs scheduled insulin rather than just sliding scale  
|   ○ Total daily units of insulin = patient’s body weight * 0.25units/kg/day |
- 50% of the total units of insulin will be glargine – schedule this to be given at 2200 (basal is given the night before)
- 50% of the total units will be divided up by 3 and given at each meal
- For example: 80kg person → total units insulin=20 → 10 units glargine at 2200, 3 units lispro with each meal

- Review the MEAL-TIME blood sugars
  - If the patient is already on scheduled meal-time insulin
    - If you have adjusted the basal glargine that day → consider waiting until the next day to adjust prandial (to avoid hypoglycemia)
    - If all three readings are >180, increase prandial dose by 10-25%
  - If the patient isn’t already on scheduled meal-time insulin → go back to scheduling insulin instructions above

### Step 4: Discharge
- Is the A1c 6.5-8.5%: discharge back onto the patient’s home regimen
- Is the A1c <6.5%: dose reduce by 25% to avoid home hypoglycemia AND close follow up with primary care
- Is the A1c>8.5%: consider increased dosing OR close follow up with primary care
- Is the A1c>10%: consider new insulin start
- If a type 1
  - Well controlled – restart home regimen
  - Poorly controlled – talk to PCP, endocrinologist or inpatient Diabetes Management Consult
- New insulin start?
  - Discharge with diabetes supplies: Use Epic Order Set is called “Insulin/Diabetes Supplies Discharge”. It is available in the D/C Order Rec section of the discharge navigator.
    - Include: glucometer, lancets, test strips, alcohol prep pads
  - Discharge with insulin
    - If insulin pens – will need pens and pen needles prescribed
    - If insulin vials – will need vials, syringes, and needles prescribed
  - Ask nurses to do bedside teaching

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**Slide presentation:** [MGH Noon Conference on Inpatient Diabetes by Nancy Wei](#) and [MGH Noon Conference on DKA by Nancy Wei](#)

**Relevant literature:** [Management of Hyperglycemia in the Inpatient Setting](#) and Things We Do For No Reason: Sliding Scale Insulin as Monotherapy for Glycemic Control in Hospitalized Patients
1) Perioperative cardiac risk gets more attention than other categories of risk, but other complications like postoperative delirium, pneumonia, and renal failure can have serious consequences. Clinical judgement remains paramount in evaluating patients prior to surgery. Think carefully about the whole patient, including chronic medical problems, medications, and current health status. Does the patient seem well enough to withstand the stress of surgery? Are there particular things to look out for in the postoperative period?

2) Vascular surgery carries much higher risk than other non-cardiac surgery. Consider Cardiology consultation for patients undergoing vascular surgery.

3) Surgery in patients with cirrhosis is associated with very high morbidity and mortality. Surgery in patients with MELD scores (type .MELD in Epic note to get MELD score) 15 and above associated with very high mortality and is generally avoided unless the surgery is transplantation.

4) Preoperative albumin is an independent risk factor for postoperative morbidity and mortality. Surgery in patients with low albumin carries high risk.

5) Preoperative BNP can be helpful in risk stratifying patients.

**Slide presentation:** [MGH Noon Conference on Perioperative Cardiovascular Management by David Dudzinski](#)

**Relevant literature:** Refer to MGH Whitebook for numerous links as well as Perioperative Evaluation and Management of Patients with Cirrhosis, Surgical Risk in Patients with Cirrhosis, Preoperative Serum Albumin Level as a Predictor of Operative Mortality and Morbidity, Preoperative N-Terminal Pro-B-Type Natriuretic Peptide and Cardiovascular Events After Noncardiac Surgery.
Physical Therapy, Occupational Therapy, Speech and Language Pathology, Nutrition, and Social Work consults available to guide discharge planning

**Slide presentation:** [MGH Noon Conference on Post-Acute Care by Melissa Mattison](#)

**Relevant literature:** [Assessment of Patients' Competence to Consent to Treatment](#)
Best Practices in Clinical Teaching: Teaching On-Service

Apply Adult Learning Theory ———— Ideas for Inspiration

1. Involve Adult Learners
   - Residents create educational agenda & assign topics
   - Learning builds upon prior patient experiences

2. Engage Prior Knowledge
   - Clinical Reasoning
     - Journal Club, E&M
     - Diagnostic Time Outs
   - Team Teaching
     - Chalk Talks w/ Feedback
     - 1 min Clinical Pearls

3. Immediate Relevance
   - Problem-Centered
   - Clinical Q’s or Approaches to Problems preferred over Disease Overviews
   - Patient-centered learning with topics inspired by patients on service

4. Problem-Centered
   - Humanism
     - Narrative Medicine
     - Perspective Pieces
     - Sharing Personal Stories
   - Bedside Rounds
     - Physical Exam
     - FOCUS
     - GOC discussions
     - Group Procedure
   - Field Trips
     - Radiology
     - Peripheral Smear
     - Pathology
     - Consultant Rounds

Best Practices in Clinical Teaching: Resident Autonomy & Coaching

Strategies

Empower & Reinforce
- Set expectation of resident as team leader
- Redirect questions & presentations to resident (verbally & using gaze)

Destigmatize Feedback
- Make the purpose & intentions of feedback transparent
- Try framing with Deliberate Practice & Growth Mindset

Benefits of Autonomy
- Engages & Motivates
- Improves Confidence
- Solidifies Knowledge w/ Active Learning
- Hones Leadership & Teaching Skills
- Allows Attendings to Assess
- Autonomy is Essential for Coaching

Key Points

- Autonomy ≠ Trust
  - Autonomy is the sense of volition, agency & choice, which all trainees need. Supervision may vary based on competency.

- Feedback for All
  - Reserving feedback only for "struggling learners" stigmatizes feedback and inhibits lifelong learning & growth mindset.