Eight Things to Do Differently Tomorrow

The (Lack of) Evidence Behind Common Internist Practices

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GIM Grand Rounds: March 6\textsuperscript{th}, 2012
Learning Objectives

• Appreciate the level of evidence that exists for most medical treatments
• Review the best evidence for eight commonly performed diagnostic tests or treatments
• Consider making changes to our practice based on this evidence

• No Disclosures
What is Non-Evidence Based Medicine?

1. Practices in which we engage where evidence exists that does not support the practice

2. Practices in which we engage where there is a lack of evidence to support the practice
The Benefits of 3000 Common Medical Treatments

BMJ’s Clinical Evidence Website, accessed 2/2012
http://clinicalevidence.bmj.com.hsl-ezproxy.ucdenver.edu/ceweb/about/knowledge.jsp
Topic Selection

• Most Common Diagnoses

• Clinical Evidence Reviews

• Literature Updates

• Colleagues

• Lindenauer et al. NEJM 2007.
Case #1

• A 55 year-old male with pmh including DM, HTN, HLD was admitted 2 days ago with a diabetic foot ulcer. He was initiated on broad-spectrum antibiotics, underwent imaging to evaluate the extent of disease, and had bedside I & D performed. On HD # 3, he has defervesced, exam and leukocytosis are improved; however his creat has increased from 1.5 to 3.1.

• Which test is the least likely to assist in diagnosis?
  1) Renal US
  2) Urine electrolytes
  3) Urine sediment examination
  4) Orthostatic vital signs
• **Acute Kidney Injury Quick Facts**
  – AKI occurs 25 per 1,000 discharges
  – Hydronephrosis identified 1 – 10% of AKI

• **The Study (Arch Intern Med 2010;170)**
  – Cross-sectional study of hospitalized pts with AKI to derive and validate risk factors for HN and avoid unnecessary RUS
  – Derivation cohort of adults with AKI, RUS
    • 100 with HN, 100 without HN
  – Validation cohort
    • 797 RUS studies done in 16 months
Ordering RUS for AKI results

- 7 Variables found most pertinent in predicting HN: (low risk < 2, medium 3, high > 3)
  - h/o HN (high risk group)
  - Recurrent UTIs (1 pt)
  - Diagnosis c/w possible obstruction (1 pt)
  - Nonblack race (1 pt)
  - Absence of: CHF (1 pt), prerenal AKI (1pt), nephrotoxic meds

- Low risk group (28% of patients)
  - 97% negative predictive value
  - 99.6% for HN requiring intervention (1 patient)
Tomorrow I Will ...

• Assess the risk of obstruction as AKI etiology
• Avoid renal US in low-risk patients
  – Alternative tests: PVR, empiric management
  – Test cost $200 (NNS for HN requiring intervention $45,000)
  – No incidental findings in low-risk patients
Case #1

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- Which test is the least likely to assist in diagnosis?
  1) Renal US
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  3) Urine sediment examination
  4) Orthostatic vital signs
Case #2

• A 68 year-old male with pmh including CHF, HTN, HLD, GERD presents after passing out. He reports episodes of dizziness and lightheaded over the last few days. Finally, when getting up to leave a meeting, he passed out and collapsed back into his chair.

• Which is the LEAST cost-effective test to assist with the diagnosis?
  1) Telemetry monitoring
  2) Head CT
  3) Transthoracic Echo
  4) Carotid ultrasound
• Syncope Quick Facts
  – 6% of admissions
  – Unknown etiology 34% of cases (Kapoor, NEJM 2000)

• The Study (Arch Intern Med 2009;169)
  – Retrospective chart review of tests (and there utility) ordered for syncope
  – Patients ≥ 65 years old, admitted with syncope
  – 1920 patients studied, 2106 admissions
### Diagnostic Tests in Syncope Results

#### Table 2. Diagnostic Tests Obtained in Evaluation of Syncope Episodes in Older Patients

<table>
<thead>
<tr>
<th>Test</th>
<th>Obtained</th>
<th>Abnormal Findings</th>
<th>Affected Diag</th>
<th>Helped</th>
<th>Affected Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrocardiogram</td>
<td>2081 (99)</td>
<td>438 (21)</td>
<td>147 (7)</td>
<td>153 (7)</td>
<td></td>
</tr>
<tr>
<td>Telemetry</td>
<td>2001 (95)</td>
<td>314 (16)</td>
<td>212 (11)</td>
<td>245 (12)</td>
<td></td>
</tr>
<tr>
<td>Cardiac enzymes test</td>
<td>1981 (95)</td>
<td>108 (5)</td>
<td>31 (2)</td>
<td>29 (1)</td>
<td></td>
</tr>
<tr>
<td>Head CT</td>
<td>1327 (63)</td>
<td>138 (10)</td>
<td>28 (2)</td>
<td>7 (0.5)</td>
<td>28 (2)</td>
</tr>
<tr>
<td>Echocardiogram</td>
<td>821 (39)</td>
<td>516 (63)</td>
<td>25 (4)</td>
<td>13 (2)</td>
<td>36 (4)</td>
</tr>
<tr>
<td>Postural BP recording</td>
<td>808 (39)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strict criteria d</td>
<td></td>
<td>230 (28)</td>
<td>142 (18)</td>
<td>122 (15)</td>
<td>202 (25)</td>
</tr>
<tr>
<td>Loose criteria e</td>
<td></td>
<td>445 (55)</td>
<td>212 (26)</td>
<td>173 (21)</td>
<td>241 (30)</td>
</tr>
<tr>
<td>Carotid US</td>
<td>267 (15)</td>
<td>122 (40)</td>
<td>2 (1)</td>
<td>2 (0.6)</td>
<td>0 (2)</td>
</tr>
<tr>
<td>EEG</td>
<td>174 (8)</td>
<td>68 (39)</td>
<td>2 (1)</td>
<td>1 (0.6)</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Head MRI</td>
<td>154 (7)</td>
<td>46 (30)</td>
<td>20 (13)</td>
<td>3 (2)</td>
<td>19 (12)</td>
</tr>
<tr>
<td>Cardiac stress test</td>
<td>129 (6)</td>
<td>53 (41)</td>
<td>13 (10)</td>
<td>2 (2)</td>
<td>12 (9)</td>
</tr>
</tbody>
</table>

- 25/28 had clinically suspected neuro dx

#### Table 3. Costs of Diagnostic Tests in the Evaluation of Syncope Episodes

<table>
<thead>
<tr>
<th>Tests Obtained</th>
<th>Cost Per Test, $b</th>
<th>Total Cost, $c</th>
<th>Cost per Test Affecting Diagnosis or Management, $d</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEG</td>
<td>1115 × 0.34 =379</td>
<td>65 946 = (379 × 174)</td>
<td>65 946/2=32 973</td>
</tr>
<tr>
<td>Head CT scan</td>
<td>1546 × 0.34 =525</td>
<td>696 675 = (525 × 1327)</td>
<td>696 675/28=24 881</td>
</tr>
<tr>
<td>Cardiac enzymes test</td>
<td>357 × 0.34 =121</td>
<td>694 298 = (121 × 5738 sets)</td>
<td>694 298/31=22 939</td>
</tr>
<tr>
<td>Tropin 1 alone</td>
<td>78 × 0.34 =26</td>
<td>149 188 = (26 × 5738 sets)</td>
<td>149 188/31=4818</td>
</tr>
<tr>
<td>Carotid US</td>
<td>1294 × 0.34 =440</td>
<td>117 480 = (440 × 267)</td>
<td>117 480/6=19 580</td>
</tr>
<tr>
<td>Head MRI</td>
<td>3316 × 0.34 =1127</td>
<td>173 558 = (1127 × 154)</td>
<td>173 558/20=8678</td>
</tr>
<tr>
<td>Cardiac stress test</td>
<td>2492 × 0.34 =848</td>
<td>109 392 = (848 × 129)</td>
<td>109 392/13=84 15</td>
</tr>
<tr>
<td>Echocardiogram</td>
<td>808 × 0.34 =275</td>
<td>225 775 = (275 × 821)</td>
<td>225 775/36=6272</td>
</tr>
<tr>
<td>Electrocardiogram</td>
<td>221 × 0.34 =75</td>
<td>156 075 = (75 × 2081)</td>
<td>156 075/153=1020</td>
</tr>
<tr>
<td>Telemetry</td>
<td>255 × 0.34 =87</td>
<td>174 087 = (87 × 2001)</td>
<td>174 087/241=710</td>
</tr>
<tr>
<td>Postural BP e</td>
<td>5</td>
<td>4040 = (5 × 808)</td>
<td>4040/241=17</td>
</tr>
</tbody>
</table>
Tomorrow I Will ...

• Avoid ordering head CT scans for elderly patients presenting with syncope and no suspected neurologic disease
• Bonus: actually ensure that the orthostatics are completed
Case #2

- A 68 year-old male with pmh including CHF, HTN, HLD, GERD presents after passing out. He reports episodes of dizziness and lightheaded over the last few days. Finally, when getting up to leave a meeting, he passed out and collapsed back into his chair.

- Which is the LEAST cost-effective test to assist with the diagnosis?
  1) Telemetry monitoring
  2) Head CT
  3) Transthoracic Echo
  4) Carotid ultrasound
Case #3

• A 72 yo female with pmh including morbid obesity, diet-controlled DM and polysubstance abuse presents with left lower extremity swelling, erythema, warmth and tenderness. She is unsure if she injured her leg, but reports that it has been getting progressively worse despite two days of Cephalexin from her PCP. Ultrasound of the affected leg shows no DVT.

• Which antibiotic regimen should you choose to initiate?
  1) Vancomycin and Piperacillin-Tazobactam
  2) Trimethoprim-sulfamethoxazole and Ciprofloxacin
  3) Ampicillin-sulbactam
  4) Vancomycin
• Soft Tissue Infection
  – 600,000 admissions annually
  – 2nd most common ID admission
• The Study (Arch Intern Med 2011;171)
  – Multidisciplinary development and test of institutional practice guidelines for uncomplicated cellulitis
    • Use of anti-GNR and anti-anaerobes DISCOURAGED
    • Initial trx with Vanco; dc with orals (recommended: doxycycline, clindamycin, trim-sulfa)
    • Treatment duration: 7 instead of ≥ 14 days
  – Pre/Post assessment after implementation
Antibiotics for Simple Soft-Tissue Infection

### Table 3. Antimicrobial Therapy

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>All Cases</th>
<th>Cellulitis</th>
<th>Cutaneous Abscess</th>
</tr>
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<tbody>
<tr>
<td>Inpatient therapy (received at ≥1 dose)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Penicillin</td>
<td>127 (75)</td>
<td>62 (76)</td>
<td>75 (72)</td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>162 (33)</td>
<td>77 (94)</td>
<td>35 (91)</td>
</tr>
<tr>
<td>Parenteral β-lactam/β-lactamase inhibitorُ</td>
<td>102 (60)</td>
<td>49 (28)</td>
<td></td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>36 (21)</td>
<td>17 (26)</td>
<td>9 (11)</td>
</tr>
<tr>
<td>Levofloxacin</td>
<td>12 (7)</td>
<td>5 (3)</td>
<td></td>
</tr>
<tr>
<td>Amoxicillin-clavulanate</td>
<td>12 (7)</td>
<td>6 (3)</td>
<td></td>
</tr>
<tr>
<td>≥3 Inpatient antibiotics</td>
<td>75 (44)</td>
<td>46 (26)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Total duration of therapy, median (IQR), d^{a}</td>
<td>13 (10-15)</td>
<td>10 (9-12)</td>
<td>&lt;.001^{f}</td>
</tr>
</tbody>
</table>

- Clinical Failure: 7.7% vs. 7.4%

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^{a} | Baseline (n=169) | Intervention (n=173) | P Value | Baseline (n=103) | Intervention (n=93) | P Value |
<table>
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<tr>
<td>P</td>
<td>0.04</td>
<td>0.02</td>
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<tr>
<td>P</td>
<td>0.004</td>
<td>0.004</td>
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</tbody>
</table>
Tomorrow I Will ...

- Stop ordering empiric Gram (-) and Anaerobic antimicrobials for uncomplicated cellulitis and cutaneous abscess
- Treat suspected Staph and Strep for 7 days (Stevens et al. Clin Infect Dis 2005)
Case #3

- A 72 yo female with pmh including morbid obesity, diet-controlled DM and polysubstance abuse presents with left lower extremity swelling, erythema, warmth and tenderness. She is unsure if she injured her leg, but reports that it has been getting progressively worse despite two days of Cephalexin from her PCP. Ultrasound of the affected leg shows no DVT.

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Case #4

• An 83 year-old female with pmh including osteoarthritis, HTN, TIA, and CKD was admitted with a traumatic hip fracture after being hit by a truck during her morning power walk. The orthopedic surgeon asks you if she needs any cardiac tests.

• Which test is the most likely to affect management?
  1) Lipid panel
  2) Chemical stress test
  3) Post-operative troponin
  4) Carotid ultrasound
• Noncardiac Surgery Quick Fact
  – 200 million procedures annually

• The Study (Ann Intern Med 2011;154)
  – Cohort study of POISE trial participants to assess for the frequency and characteristics of periop MI
    • Noncardiac surgery
    • > 45 years old
    • Known, or risk for, CAD
  – Serial post-op ECG and Cardiac enzymes
Perioperative MI Results

• POISE trial included 8351 pts
• 415 (5%) had periop MI w/i 30 days
  – 98% had biomarker elevation
  – 2/3rds noted w/i 48 hours of surg
• 30 day Mortality:
  – 12% (MI) vs. 2% (no MI)
  – ≥ 50% of MI deaths occurred w/i 48 hours
Tomorrow I Will ...

- Consider checking postoperative troponins in patients with known CAD, or at risk of CAD undergoing non-cardiac surgery
Case #4

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Case #5

• A 79 year-old male with pmh including CHF, DM, HTN, COPD presents with volume overload. Workup reveals ECG with no ischemic changes, normal intervals; hematocrit of 35%; ferritin 85; TTE with EF of 25%, no new wall motion abnormalities.

• Which therapy will have the least morbidity and/or mortality benefit?
  1) Spironolactone
  2) IV Iron repletion
  3) AICD implantation
  4) Cardiac resynchronization therapy
• Iron Deficiency in Heart Failure Quick Facts
  – 14 – 70% of inpatients with HF found to have anemia
    • 20% iron-deficiency
    • Anemia in HF associated with higher morbidity and mortality (Anand, JACC 2008; Ezekowitz, Circ 2003)
  – HF may predispose to iron deficiency
• The Study (NEJM 2009;361)
  – Randomized, double-blind trial comparing IV iron vs. placebo on Quality of Life and NYHA class
  – CHF with NYHA II or III, impaired EF
  – Hgb 9.5 – 13.5 g/dL and iron deficiency (ferritin < 100 or 100 – 299 with transferrin sat < 20%)
  – Significant liver or renal dysfunction excluded
IV Iron for HF Results

- 459 patients enrolled

- Primary Endpoints (wk 24):
  - 50% vs. 28% much or moderately improved
  - 47% vs. 30% NYHA class I or II

- Secondary Endpoints:
  - Improvement in 6-min walk and quality of life assessments
  - Rates of death, hospitalization, adverse events similar

- Findings independent of anemia status
Tomorrow I Will ...

• Evaluate my patients with NYHA II and III heart failure for iron deficiency
  – Serum Ferritin < 100 μg/L or
  – 100 – 299 μg/L, with transferritin sat < 20%

• Consider initiating IV iron therapy
Case #5

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Case #6

• A 54 year-old female with pmh including smoking, depression presents with productive cough and dyspnea. Exam reveals increased WOB, RA O2 sats of 85%, rhonchi in the mid-right lung field. CXR shows right-sided infiltrate.

• Which is likely to be the most effective treatment plan?
  1) Empiric Ceftriaxone and Azithromycin, finish 7 day total course with Moxifloxacin at discharge
  2) Check sputum GS and Culture, start empiric Levofloxacin, tailor therapy based on GS and culture results
  3) Check urine Legionella and Pneumococcal antigens, start empiric Moxifloxacin, tailor therapy based on urinary antigen results
  4) Check procalcitonin level, if normal prescribe Trimethoprim-sulfamethoxazole and Levofloxacin for 10 days
• CAP Quick Facts
  – Most frequent (non-maternal) admission to hospital
  – 2.9% of all hospital discharges
    (AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 1997 and 2007)
• The Study
  – RCT of adults presenting to hospital with suspected PNA
  – Empiric abx treatment (EAT) vs. pathogen directed (PDT)
    • Ceftazadime and Erythromycin for EAT
    • GS, Sputum, pneumococcal/legionella ag from fluid/urine, serologies
  – Outcomes:
    • Primary: LOS
    • Secondary: therapeutic failure, 30d mortality, abx duration, adverse events
Empiric vs. Directed Therapy for CAP Results

- 303 patient included
- No pathogen: 37% (PDT) vs. 46% (EAT)
  - 18/22 (82%) of ICU patients’ pathogens were identified
- 60% of patients produced sputum sample
  - 28% had adequate specimen for GS
- No significant overall difference in: LOS, Mortality, Clinical Failure
  - ICU admissions:
    - Mortality: 5/11 PDT vs. 10/11 EAT
  - Patients randomized to PDT
    - Mortality: 2/72 (3%) syndromic vs. 8/62 (13%) pathogen directed
Tomorrow I Will ...

• Abstain from ordering microbiologic tests in patients admitted to the floor with CAP
  – Joint Commission still requires BCx as a core measure
  – Immunocompromised patients excepted
  – IDSA guidelines recommend sputum if it can be reliably obtained and will change management
• Severe, or at risk of non-typicals
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Case #7

- A 44 year-old female with RAD presents with SOB, wheezing, and cough. She is admitted for RAD exacerbation.

- Which of the following is NOT a potential complication of medicine prescribed for stress ulcer prophylaxis?
  1) Bronchospasm
  2) Clostridium difficile infection
  3) Aspiration pneumonia
  4) Pancytopenia
• Stress Ulcer Quick Facts
  – Risk Factors: major trauma, severe head injury, MODS, coagulopathy, prolonged mechanical vent, significant burns, major surgical procedures
  – PPI risks: C. diff, pneumonia, osteoporosis
  – H2B risks: pancytopenia

(Hussain et al., S Med J 2010)

• The Study
  – Systematic review of general med patients to assess frequency and utility of prescribing stress ulcer ppx
Use of Stress Ulcer Ppx Results

- 4085 citations led to 5 studies for review
- Frequency of Ppx: 29 – 54% of hospitalized pts
  - Low risk patients, receiving ppx 20 – 25%

Authors’ Conclusion: The literature provides only sparse guidance on this issue... further study is needed.
Tomorrow I Will ...

• Avoid prescribing stress ulcer ppx for most patients
  – Consideration may be given to patients with:
    • major trauma, severe head injury, MODS, coagulopathy, prolonged mechanical vent, significant burns, major surgical procedures
Case #7

• A 44 year-old female with RAD presents with SOB, wheezing, and cough. She is admitted for RAD exacerbation.

• Which of the following is NOT a potential complication of medicine prescribed for stress ulcer prophylaxis?
  1) Bronchospasm
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  3) Aspiration pneumonia
  4) Pancytopenia
Case #8

- An 87 year-old male with pmh including severe COPD presents with dyspnea, cough, change in sputum. He reports symptoms started after recent URI. Exam reveals increased WOB and diffuse wheezing. CXR shows no infiltrates or effusions.

- Bronchodilators delivered via nebulizers provides greater improvement in lung function than delivery via Metered Dose Inhalers for acute COPD exacerbation.
  1) True
  2) False
• Acute COPD Quick Facts
  – 9th most common non-maternal admitting dx
  – Nebulized delivery of bronchodilators nearly 2x cost*
  – Nebulized delivery associated with > tachycardia, tremor, and hypokalemia

• The Study
  – NHS commissioned review of trx for RAD and COPD
Comparison of Delivery Types for COPD Results

• Objective pulmonary function (FEV1)
  – 13 Studies included for review
  – Most were unblinded and small
  – No difference between Nebs vs. MDIs for bronchodilators

• Proper use of device
  – 32 Studies included
  – At baseline, use of Nebs by patients was more appropriate
  – After teaching: no difference
Tomorrow I Will ...

• Prescribe bronchodilators via MDIs for acute COPD exacerbations
Case #8

• An 87 year-old male with pmh including severe COPD presents with dyspnea, cough, change in sputum. He reports symptoms started after recent URI. Exam reveals increased WOB and diffuse wheezing. CXR shows no infiltrates or effusions.

• Bronchodilators delivered via nebulizers provides greater improvement in lung function than delivery via Metered Dose Inhalers for acute COPD exacerbation.
  1) True
  2) False
Summary – Do’s

• Do check Post-op Trops

• Do assess iron status for HF patients, consider IV iron

• Do use MDIs instead of Nebs for COPD
Summary – Don’t’s

- Don’t check RUS for AKI
- Don’t order head CT scans for syncope
- Don’t prescribe empiric GNR coverage for soft tissue infxn
- Don’t check sputum Cx for uncomplicated CAP
- Don’t prescribe stress ulcer ppx for floor patients
Acknowledgements

• Jeff Glasheen – topic of the talk

• VA Hospitalist Colleagues – topic inclusion, slide review
  – Mel Anderson
  – Cliff Zwillich
  – Alexis Shanahan
  – Bob Burke
  – Kate Jennings

• Melanie Stickrath – topic inclusion, slide review, support

• Maren Stickrath – Curious George suggestion
References

2. Anker SD et al.. Ferric carboxymaltose in patients with heart failure and iron deficiency. NEJM 2009;361.
7. Ezekowitz JA, et al.. Anemia is common in heart failure and is associated with poor outcomes; insights from a cohort of 12, 065 patients with new-onset heart failure. Circ 2003;23.