Teaching High Value Care through a Novel Morning Report Curriculum

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Department of Internal Medicine
Background

• Carolinas HealthCare System
  – 2nd largest non-profit healthcare system in the U.S.

• Carolinas Medical Center
  – 874-bed tertiary care center in Charlotte, NC
  – One of the largest independent academic medical centers in the U.S.
  – Home to 12 residency programs and various fellowships
  – Branch clinical campus for UNC-SOM

• Department of Internal Medicine
  – 42 residents total (12 categoricals/year; 6 prelims)
  – >60 full-time faculty members
  – ACGME fellowship programs in GI and Heme/Onc
Workshop Objectives

• Define and discuss the importance of high value healthcare

• Explore existing resources for teaching high value care

• Examine current residents’ knowledge and attitudes toward high value care

• Demonstrate a novel case-based, interactive high value care morning report curriculum

• Define a method to evaluate residents’ application of cost-conscious principles through measurement of a high value care score
Background

• ~$700 billion of U.S. healthcare spending is wasteful (~30% of total spending)
• Physicians responsible for 87% of wasteful spending
Background

Tests and imaging show most rapid increase in expenditures
# Background

## Exhibit ES-1. Overall Ranking

<table>
<thead>
<tr>
<th>Country</th>
<th>AUS</th>
<th>CAN</th>
<th>FRA</th>
<th>GER</th>
<th>NETH</th>
<th>NZ</th>
<th>NOR</th>
<th>SWE</th>
<th>SWIZ</th>
<th>UK</th>
<th>US</th>
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<tbody>
<tr>
<td>Quality Care</td>
<td>4</td>
<td>10</td>
<td>9</td>
<td>5</td>
<td>5</td>
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<td>7</td>
<td>3</td>
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<td>11</td>
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<tr>
<td>Effective Care</td>
<td>2</td>
<td>9</td>
<td>8</td>
<td>7</td>
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<td>11</td>
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<td>Safe Care</td>
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<td>Coordinated Care</td>
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<td>Patient-Centered Care</td>
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<td>8</td>
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<td>7</td>
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<td>6</td>
<td>11</td>
<td>9</td>
<td>2</td>
<td>1</td>
<td>4</td>
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<td>Access</td>
<td>8</td>
<td>9</td>
<td>11</td>
<td>2</td>
<td>4</td>
<td>7</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>9</td>
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<tr>
<td>Cost-Related Problem</td>
<td>3</td>
<td>9</td>
<td>10</td>
<td>4</td>
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<td>7</td>
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<tr>
<td>Timeliness of Care</td>
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<td>11</td>
<td>10</td>
<td>4</td>
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<td>7</td>
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<td>Efficiency</td>
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<td>6</td>
<td>2</td>
<td>3</td>
<td>10</td>
<td>11</td>
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<tr>
<td>Health Expenditures/Capita, 2011**</td>
<td>$3,800</td>
<td>$4,522</td>
<td>$4,118</td>
<td>$4,495</td>
<td>$5,099</td>
<td>$3,182</td>
<td>$5,669</td>
<td>$3,925</td>
<td>$5,643</td>
<td>$3,405</td>
<td>$8,508</td>
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</tbody>
</table>

Notes: * Includes ties. ** Expenditures shown in US PPP (purchasing power parity); Australian $ data are from 2010. Source: Calculated by The Commonwealth Fund based on 2011 International Health Policy Survey of Sicker Adults; 2012 International Health Policy Survey of Primary Care Physicians; 2013 International Health Policy Survey; Commonwealth Fund National Scorecard 2011; World Health Organization; and Organization for Economic Cooperation and Development, OECD Health Data, 2013 (Paris: OECD, Nov. 2013).
Background

• Multiple national organizations (IOM, ABIM, ACP, ACGME) calling for efforts to reduce inappropriate overuse of healthcare resources

• Movement toward “High Value Healthcare” – Goal to produce the highest quality health outcomes at the lowest cost

• Previously, no real disincentive to curb physician ordering practices
  – Defensive medicine

• New incentives (? penalties) now include:
  – Pay-for-performance policies
  – Bundled-payment strategies
  – Financial risk sharing within accountable care organizations

4/3/2015
Institute for Health Improvement Triple Aim

• Direct relationships between value, patient safety, quality of care, and improvement science
Background

• High Value Healthcare

  – Collective assessment of the benefit of a test, intervention, or procedure, relative to the cost

  – Requires individual MDs, groups, and society to make judgments about what constitutes value, quality, and costs

  – Value = Outcomes / Cost
Background

• Value = Outcomes / Cost

• Cost ≠ Cost of test

• Cost = Cost of test plus downstream benefits and harms

• High-cost interventions may provide good value if they are highly beneficial; conversely, low-cost interventions may have little or no value if they provide little benefit
## Background

<table>
<thead>
<tr>
<th>Low Cost</th>
<th>High Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily labs in stable patients</td>
<td>MRI for non-specific LBP</td>
</tr>
<tr>
<td>Annual pap with low risk</td>
<td>CT/MRI etc. for simple syncope with normal neuro exam</td>
</tr>
<tr>
<td>Perioperative CXR for low risk procedure</td>
<td>CTA for low risk patients and (-) D-Dimer</td>
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<tr>
<td>Thorough H&amp;P</td>
<td>ICD placement in appropriate patients</td>
</tr>
<tr>
<td>Vaccines</td>
<td>HAART therapy for HIV</td>
</tr>
<tr>
<td>ASA in CAD</td>
<td></td>
</tr>
</tbody>
</table>

Dine, et al. Less is More: Developing Your Faculty to Implement the High Value Cost-Conscious Care Curriculum

4/3/2015
Existing HVC Resources

• Choosing Wisely®
  – An initiative of the ABIM Foundation
  – Intended to spark conversations between providers and patients to ensure the right care is delivered at the right time
  – Participating organizations created lists of “Things Providers and Patients Should Question”
  – Includes evidence-based recommendations for the most appropriate care based on a patients’ individual situation
1. Don’t obtain screening exercise electrocardiogram testing in individuals who are asymptomatic and at low risk for coronary heart disease.
   In asymptomatic individuals at low risk for coronary heart disease (10-year risk <10%) screening for coronary heart disease with exercise electrocardiography does not improve patient outcomes.

2. Don’t obtain imaging studies in patients with non-specific low back pain.
   In patients with back pain that cannot be attributed to a specific disease or spinal abnormality following a history and physical examination (e.g., non-specific low back pain), imaging with plain radiography, computed tomography (CT) scan, or magnetic resonance imaging (MRI) does not improve patient outcomes.

3. In the evaluation of simple syncope and a normal neurological examination, don’t obtain brain imaging studies (CT or MRI).
   In patients with witnessed syncope but with no suggestion of seizure and no report of other neurologic symptoms or signs, the likelihood of a central nervous system (CNS) cause of the event is extremely low and patient outcomes are not improved with brain imaging studies.

4. In patients with low pretest probability of venous thromboembolism (VTE), obtain a high-sensitive D-dimer measurement as the initial diagnostic test; don’t obtain imaging studies as the initial diagnostic test.
   In patients with low pretest probability of VTE as defined by the Wells prediction rules, a negative high-sensitivity D-dimer measurement effectively excludes VTE and the need for further imaging studies.

5. Don’t obtain preoperative chest radiography in the absence of a clinical suspicion for intrathoracic pathology.
   In the absence of cardiopulmonary symptoms, preoperative chest radiography rarely provides any meaningful changes in management or improved patient outcomes.
Existing HVC Resources

- Developed jointly between ACP and AAIM

- Six Curriculum Topics:
  - Eliminating Healthcare Waste and Over-ordering of Tests
  - Healthcare Costs and Payment Models
  - Utilizing Biostatistics in Diagnosis, Screening and Prevention
  - High Value Medication Prescribing
  - Overcoming Barriers to High Value Care
  - High Value Quality Improvement
ACP Steps Toward High Value, Cost-Conscious Care

1. Understand the benefits, harms, and relative costs of the considered interventions

2. Eliminate care that provides no benefit or may even be harmful

3. Provide medical options that maximize benefits, minimize harms, and reduce costs (using comparative-effectiveness and cost-effectiveness data)

4. Customize a care plan that incorporates the patient’s values and concerns

5. Identify system level opportunities to improve outcomes, minimize harms, and reduce healthcare waste
• SGIM “Bottom Line” Evidence Summaries
  
  – Single page tools distilling current, high impact research findings
  
  – Presents benefits and harms along with clinical “bottom line” recommendation
  
  – Foster clearer communication between patients and their doctors, while enhancing patient understanding

For patients at low to moderate risk of cardiovascular events, aspirin causes more harm (non-trivial bleeding) than benefit (reduced cardiovascular events) when used for primary prevention. Mortality is not reduced by aspirin over an average of 6 years.
Does the training environment matter?

- Sirovich, et al... Described association between the aggressiveness of the training environment and clinical management decisions made by recent graduates

- Defined 2 subscales from 2007 ABIM exam
  - One contained questions for which the correct response reflected appropriate conservative management (ACM)
  - One contained questions for which the correct response reflected appropriate aggressive management (AAM)

- Defined aggressiveness of each examinee’s regional care environment as measured by the End-of-Life Visit Index (EOLVI)
  - EOLVI: based on the mean number of physician visits for Medicare beneficiaries in the last 6 months of life

Residency programs in the lowest-intensity practice environments graduated residents with the highest scores on the ACM subscale.

Relationship held even with results stratified by tier of residency program based on exam takers’ mean ABIM exam knowledge scores.
Residency programs in the lowest-intensity practice environments graduated residents who were equally likely to manage care aggressively when necessary.
Sirovich, et al. (cont.)

• Suggests training environment influences the way MDs care for patients

• Suggests it’s possible to train residents to avoid overuse without leading them to underuse appropriately aggressive treatments

• It’s up to us!

Background

• Studies have shown the MDs have a poor understanding of the costs of tests/meds that they order\(^1\)

• Providing cost data for tests changes ordering behavior\(^2\)


2012 APDIM Survey: 295 IM Programs

- Of those with a curricula:
  - Most common method was didactic teaching (97%) and informal discussion (76.9%)

- Most frequent method of resident assessment was “faculty judgment” (41%) followed by “no assessment” (38.5%)

- 48% felt that their faculty role-modeled cost-conscious care

Background

- ACGME Internal Medicine Reporting Milestone: “Resident identifies forces that impact the cost of health care, and advocates for, and practices cost-effective care”
Background

• As medical educators, we must...
  – Raise awareness of cost-conscious care amongst our learners
  – Role model high value care principles
  – Train our residents and medical students to be appropriate stewards of finite healthcare resources

• Evidence indicates that ability to provide appropriate conservative management correlates with the training environment

• Formative years of residency provide opportunities to shape clinician behavior

OUR HVC PROJECT
Objectives

• Evaluate residents’ current knowledge and attitudes toward cost-conscious care and assess barriers to teaching and measuring high value care principles

• Implement a case-based, interactive high value care Morning Report curriculum using real world case examples

• Define a method to evaluate residents’ application of cost-conscious care principles through the use of a High Value Care scoring algorithm

• Demonstrate the ability to use the Healthcare Bluebook to obtain fair cost information for common healthcare expenditures

• Train our residents to be responsible stewards of finite healthcare resources
High Value Care Curriculum

- IRB approval obtained

- Research study components
  - Resident Survey on healthcare costs
  - Introduction to the Healthcare Bluebook and Choosing Wisely® Campaign
  - Series of High Value Care Morning Reports
  - Calculation of a High Value Care score for each participant
• Free online resource that shows a Fair Price for healthcare products and services to consumers

• Mission: To help consumers save on healthcare expenses while helping Fair Price providers attract cost-conscious consumers

• Pricing customized by zip code

• https://www.healthcarebluebook.com/

• Free smart phone app available

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4/3/2015

Abdomen and Pelvis CT (with and without contrast)

Total Fair Price: $1,102

Fair Price Fee Details

<table>
<thead>
<tr>
<th>Physician Services</th>
<th>Fee: $1,102</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fee Details:</td>
<td>Price includes the total amount for both physician (interpretation) and technical (imaging) fees. Sometimes the test will be billed in two parts but they should add up to the listed price. Physician interpretation and technical imaging combined fee.</td>
</tr>
<tr>
<td>Pricing Agreement:</td>
<td>Printable Detailed Pricing Agreement</td>
</tr>
</tbody>
</table>

Fair Price Information

What does the Fair Price mean?

This is Healthcare Bluebook’s recommended price for healthcare services. The Bluebook price is based on the typical fee that providers in your area accept as payment from insurance companies. This is the price you should have to pay, even if your provider charges more. You can use this price to negotiate with your provider or shop for an in-network provider that charges a Fair Price.

How do I find a Fair Price?

If you have health insurance, you should ask the in-network providers listed in your provider directory what the in-network rate is for this service. Different in-network providers often charge different prices. Call several providers to find one that is willing to accept a Fair Price.

If you do not have health insurance coverage, then you should call providers and ask if they offer discounts for self-pay patients and what their price is for the service.
Pre-Curriculum Resident Survey

• 16 Question survey designed to measure resident knowledge and attitudes of cost-conscious care

• N = 30/40 residents (75% response rate)
Pre-Curriculum Resident Survey

It is essential for physicians to factor cost into patient care decisions.

Physicians should be responsible for knowing the costs of various labs, imaging studies, and procedures and should factor that knowledge into their evaluation and management decisions routinely.
Pre-Curriculum Resident Survey

I am comfortable with my skills of factoring cost into patient care decisions.

I have adequate access to information about the costs of the various labs, imaging studies, and procedures that I order.
Pre-Curriculum Resident Survey

How often do you factor in cost when making patient care decisions?

- Always
- Often
- Sometimes
- Rarely

Please rate your knowledge regarding the costs of common labs, imaging studies, and procedures.

- Excellent
- Good
- Fair
- Poor
Pre-Curriculum Resident Survey

• What sources do you use to obtain cost information for patient care?
  
  – “None”: 67% of respondents
  
  – Google x 3 respondents
  – GoodRx x 1 respondent
  – Handout from faculty member x 1 respondent
  – Up to Date x 1 respondent
  – Epocrates x 1 respondent
  – Wikipedia x 1 respondent
Which of the following interventions is MOST likely to provide HIGH VALUE care?

- Daily self-monitoring of blood glucose in all patients with type 2 diabetes treated with oral medications
- Stress ulcer prophylaxis for all hospitalized patients
- Routine preoperative CXR for pulmonary risk assessment
- Routine head CT for syncope presenting to the ED
- Annual Pap smear screening for all women age 21-65 years
- Highly active anti-retroviral therapy for all patients with HIV
Pre-Curriculum Resident Survey

• What is the approximate cost of a CT angiography of the chest for a hospitalized inpatient (including technical imaging and physician interpretation)?

• **Correct Answer: $768 (Acceptable Range: $614-922)**

• **Range of responses: $300-6000**

• **13% of residents answered within acceptable range**

Reference: Healthcare Bluebook
Pre-Curriculum Resident Survey

• What is the approximate cost for a combined CBC with differential, BMP, serum magnesium level, and serum phosphorus level for a hospitalized inpatient?

• Correct Answer: $93 (Acceptable Range: $74-112)

• Range of responses: $50-600

• 23% of residents answered within acceptable range
Pre-Curriculum Resident Survey

• What is the approximate cost of a brain MRI with and without contrast for a hospitalized inpatient (including technical imaging and physician interpretation)?

• Correct Answer: $1177 (Acceptable Range: $941-1412)

• Range of responses: $700-8000

• 10% of residents answered within acceptable range
Pre-Curriculum Resident Survey

• What is the approximate cost of a trans-thoracic echocardiogram with doppler for a hospitalized inpatient (including technical imaging and physician interpretation)?

• Correct Answer: $470 (Acceptable Range: $376-564)

• Range of responses: $200-4000

• 17% of residents answered within acceptable range
Resident Survey Conclusions

• Residents agree that physicians should know the costs of various labs, imaging, and procedures and should factor that knowledge into decision making

• Residents report poor access to information regarding costs of care

• Residents are uncomfortable with their skills of factoring cost into medical decision making

• Residents’ knowledge of the costs of labs and imaging is poor
High Value Care Morning Report

• Occurs ~2x per month

• Presenting resident chooses case with a focus on cost-conscious, high value medical decision making
  – One week prior, resident reviews guidelines and meets with a faculty member with expertise in the selected case
  – Determines the required diagnostic test(s) (i.e. lab work, imaging, procedures, consultations, etc.) to make the diagnosis and/or rule-out other diagnoses
  – Costs of each test noted using the Healthcare Bluebook as a reference
  – Calculates the total “Best Practice Cost”
  – Examines case for evidence of wasteful spending
Date of Morning Report: ____________________

Resident Name: ____________________

Case Expert Name: ____________________

For your case, please identify:

1. Diagnosis: ____________________

2. Minimum required diagnostic test(s) (i.e. lab work, imaging, procedures, consultations, etc.) to make the diagnosis and/or rule-out other diagnoses [use as many spaces as needed]; Record cost of each item according to the Healthcare Bluebook:
   A. ____________________ Cost: ______
   B. ____________________ Cost: ______
   C. ____________________ Cost: ______
   D. ____________________ Cost: ______
   E. ____________________ Cost: ______
   F. ____________________ Cost: ______
   G. ____________________ Cost: ______
   H. ____________________ Cost: ______

3. Total Best Practice Cost* for workup/diagnosis (i.e. calculate sum of minimum required diagnostic test(s) indicated above):
   ____________________

4. In your review of the case, did you identify any waste in test ordering, etc.? (Please circle)
   A. Yes    B. No

5. If yes, what was the main source of waste?
   ____________________
Tips on case selection

• Can be from inpatient or ambulatory setting

• Avoid choosing a case with a highly complicated past medical history, hospital course, or evaluation

• “Bread and butter” may work best

• Avoid conditions that are so rare there are no published, widely accepted guidelines for evaluation and diagnosis
Tips on case selection

• Potential case examples…

  – Patient presenting with headache (Do I need an MRI or an LP?)

  – Patient presenting with syncope (Does the patient need a head CT, echo, or cardiac event recorder?)

  – Patient presenting with recurrent shortness of breath (Do I really need another BNP and echo or a chest CTA?)
Tips on case selection

• Don’t avoid presenting cases in which getting an expensive test was necessary
  – In these cases, those tests can still be considered “high value” because they were necessary

• Research evidence-based guidelines on diagnosing your condition
  – USPSTF
  – Specialty-society guidelines
  – ABIM Choosing Wisely®
  – SGIM Bottom Line Evidence

• Contact experts to assist you
  – Such as an attending involved with the case or an attending who has regular exposure to the condition
High Value Care Morning Report

• Resident presents the case to his/her peers

• Pre-designated breakpoints in which presenting resident asks, “What would you do now?”

• Participants have an opportunity to list any labs, imaging, procedures, or consultations they would like to order

• Each participant also records what he/she thinks is the most likely diagnosis

• Discussion of “Best Practice Cost” vs. what was actually ordered for that case
High-Value Care Morning Report—Participant Form

Date of Morning Report: ____________________________

Name: __________________________________________

Class (Please circle): PGY-1   PGY-2   PGY-3

Orders (Please write what you would do next at the specified breakpoints in the presentation. In other words, specify what tests including labs, imaging, procedures, and/or consultations, etc. that you would order at each specified breakpoint in the case. You may list as many orders as necessary for each breakpoint):

Breakpoint A: __________________________________________

Breakpoint B: __________________________________________

Breakpoint C: __________________________________________

Breakpoint D: __________________________________________

Diagnosis (Please write what you think is the most likely diagnosis):

______________________________________________________
High Value Care Evaluation

• Participant forms collected

• High Value Care scoring sheet completed for each participant based on his/her responses

• Participants awarded or deducted points for the following:
  – Did he/she get the correct diagnosis?
  – Did he/she “order” the minimum required diagnostic evaluation?
  – Resident cost vs. Best Practice Cost

• High Value Care score is calculated for each participant
High-Value Care Morning Report
Scoring Form

<table>
<thead>
<tr>
<th>Date: ___________________________</th>
<th>Recommended Work-up</th>
<th>Resident Work-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name: __________________________</td>
<td>___________________</td>
<td>__________________</td>
</tr>
<tr>
<td>Resident Diagnosis: ______________</td>
<td>___________________</td>
<td>__________________</td>
</tr>
<tr>
<td>Actual Diagnosis: _______________</td>
<td>___________________</td>
<td>__________________</td>
</tr>
<tr>
<td>Resident Cost: __________________</td>
<td>___________________</td>
<td>__________________</td>
</tr>
<tr>
<td>Best Practice Cost: ______________</td>
<td>___________________</td>
<td>__________________</td>
</tr>
</tbody>
</table>

1. Correct Diagnosis? Yes (+3) _____ No (-3) _____

2. All recommended diagnostics ordered? Yes (+3) _____ No (-3) _____

3. Resident Cost compared to Best Practice Cost (BPC):

   \[
   \begin{align*}
   \leq 100\% \text{ BPC} & : (+4) \quad 101-120\% \text{ BPC} : (-1) \quad >120\% \text{ BPC} : (-4) \\
   \end{align*}
   \]

4. High Value Care Score (HVCS = Score from #1 + #2 + #3): ________

4/3/2015
BPC=Best Practice Cost

Value
HIGH VALUE CARE CASE
HVC Case

- HPI: 41 year old male presented in the summer with fever (103.8°F) and SOB
- 2 day history productive cough which progressed to left pleuritic chest pain and myalgias
- Returned from business trip to urban China 4 days prior
- No leg swelling, hemoptysis, nausea/vomiting, diarrhea, melena, or palpitations
- No known sick contacts
HVC Case

• PMH/PSH:
  – Hypertension
  – Hyperlipidemia
  – Appendectomy

• Meds:
  – Lisinopril 20 mg daily

• Soc Hx:
  – Businessman
  – Smokes 1-2 ppd, 10 pack years
  – 2-3 12 oz. beers daily
  – No illicits

• Fam Hx:
  – Hypertension
  – Brother with Hepatitis C
Physical Exam

- **VS:** T 103.8°F, P 102, R 30, BP 136/83, O₂ 97%RA

- **GEN:** A&Ox4, **uncomfortable, diaphoretic**
- **HEENT:** Sclera anicteric, Moist MM, No pharyngeal erythema
- **NECK:** No JVD, Supple
- **CHEST:** Nontender, **Decreased breath sounds at left mid lung, Increased tactile fremitus**, No wheezes or crackles, No dullness to percussion
- **CV:** **Tachy**, Regular, No m/r/g
- **EXT:** No edema
- **SKIN:** No rash
- **NEURO:** Non-focal
Breakpoint A

• What labs, imaging, or procedures would you order at this point for this patient?
Breakpoint A

- Evaluation done on our patient…

- CBC with Diff ($23)
  - WBC 12.7 (74% PMNs)
  - Hb 13.8/Hct 40
  - Plt 146

- CMP ($30)
  - Na 132, K 2.4, Cl 95, CO2 25
  - BUN 9, Cr 0.8
  - Tbil 1.3, AP 94
  - ALT 58, AST 75

- VBG ($27)
  - pH 7.48, pCO2 38.3, pO2 30,
    HCO3 28.8, Lactate 1.05

CXR ($55): “Left mid lung consolidation most compatible with pneumonia.”
Would you admit the patient to the hospital?

PSI/PORT Score: Pneumonia Severity Index for CAP

Estimates mortality for adult patients with community-acquired pneumonia.

<table>
<thead>
<tr>
<th>Age</th>
<th>41 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>Male 0</td>
</tr>
<tr>
<td>Nursing home resident</td>
<td>+10 NO</td>
</tr>
<tr>
<td>Neoplastic disease</td>
<td>+30 NO</td>
</tr>
<tr>
<td>Liver disease history</td>
<td>+20 NO</td>
</tr>
<tr>
<td>CHF history</td>
<td>+10 NO</td>
</tr>
<tr>
<td>Cerebrovascular disease history</td>
<td>+10 NO</td>
</tr>
<tr>
<td>Renal disease history</td>
<td>+10 NO</td>
</tr>
<tr>
<td>Altered mental status</td>
<td>+20 NO</td>
</tr>
<tr>
<td>Respiratory rate &gt; 29</td>
<td>+20 YES II</td>
</tr>
<tr>
<td>Systolic blood pressure &lt; 90 mmHg</td>
<td>+20 NO</td>
</tr>
<tr>
<td>Temperature &lt; 35°C (95°F) or &gt; 39.9°C (103.8°F)</td>
<td>+15 YES II</td>
</tr>
<tr>
<td>Pulse &gt; 124</td>
<td>+10 NO</td>
</tr>
<tr>
<td>pH &lt; 7.35</td>
<td>+30 NO</td>
</tr>
<tr>
<td>BUN &gt; 29</td>
<td>+20 NO</td>
</tr>
</tbody>
</table>

76 points
Risk Class III, 0.9-2.8% mortality. Outpatient or inpatient treatment, depending on clinical judgment.
Would you admit the patient to the hospital?

**CURB-65 Severity Score**


<table>
<thead>
<tr>
<th>Condition</th>
<th>Score</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confusion</td>
<td>+1</td>
<td>NO</td>
</tr>
<tr>
<td>BUN &gt; 19 mg/dL (&gt; 7 mmol/L)</td>
<td>+1</td>
<td>NO</td>
</tr>
<tr>
<td>Respiratory Rate ≥ 30</td>
<td>+1</td>
<td>YES</td>
</tr>
<tr>
<td>Systolic BP &lt; 90 mmHg or Diastolic BP ≤ 60 mmHg</td>
<td>+1</td>
<td>NO</td>
</tr>
<tr>
<td>Age ≥ 65</td>
<td>+1</td>
<td>NO</td>
</tr>
</tbody>
</table>

1 point

Low risk group: 2.7% 30-day mortality.

Consider outpatient treatment.
Breakpoint B

• What, if any, further testing would you order now?
Because of his recent airline travel, SOB, and pleuritic chest pain, a CT chest with contrast was ordered to r/o PE ($768)

CT read: No evidence of PE. Dense consolidative change, anterior segment of left upper lobe extending into the lingula with moderate hilar lymphadenopathy. While the findings could certainly represent an infectious etiology with reactive lymphadenopathy in the hilum, I cannot entirely exclude the possibility of pulmonary neoplasm. F/U to resolution indicated.”
### Wells’ Criteria for Pulmonary Embolism

Objectifies risk of pulmonary embolism.

<table>
<thead>
<tr>
<th>Clinical Signs and Symptoms of DVT</th>
<th>+3</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>PE Is #1 Diagnosis, or Equally Likely</td>
<td>+3</td>
<td>NO</td>
</tr>
<tr>
<td>Heart Rate &gt; 100</td>
<td>+1.5</td>
<td>YES/III</td>
</tr>
<tr>
<td>Immobilization at least 3 days, or Surgery in the Previous 4 weeks</td>
<td>+1.5</td>
<td>YES/III</td>
</tr>
<tr>
<td>Previous, objectively diagnosed PE or DVT</td>
<td>+1.5</td>
<td>NO</td>
</tr>
<tr>
<td>Hemoptysis</td>
<td>+1</td>
<td>NO</td>
</tr>
<tr>
<td>Malignancy w/ Treatment within 6 mo, or palliative</td>
<td>+1</td>
<td>NO</td>
</tr>
</tbody>
</table>

**1.5 points**

Low risk group: 1.3% chance of PE in an ED population. Another study assigned scores ≤ 4 as ‘PE Unlikely’ and had a 3% incidence of PE.

---

**Don’t image for suspected pulmonary embolism (PE) without moderate or high pre-test probability of PE.**

While deep vein thrombosis (DVT) and PE are relatively common clinically, they are rare in the absence of elevated blood d-Dimer levels and certain specific risk factors. Imaging, particularly computed tomography (CT) pulmonary angiography, is a rapid, accurate and widely available test, but has limited value in patients who are very unlikely, based on serum and clinical criteria, to have significant value. Imaging is helpful to confirm or exclude PE only for such patients, not for patients with low pre-test probability of PE.
Breakpoint C

- What, if any, further testing would you order now?
Breakpoint C

• Evaluation done for our patient…
  – Blood Cultures ($24)
  – Sputum Culture ($12)
  – Respiratory DFA Panel ($153)
  – Urinary Legionella Ag ($46)
  – Urinary Pneumococcal Ag ($200)

CBC $23
CMP $30
VBG $27
CXR $55
  $135+
CTA $768
  $903+

BCx $24
SCx $12
Resp DFA $153
Legion $46
Pn Ag $200
  $1338
IDSA Guidelines 2007

Table 5. Clinical indications for more extensive diagnostic testing.

<table>
<thead>
<tr>
<th>Indication</th>
<th>Blood culture</th>
<th>Sputum culture</th>
<th>Legionella UAT</th>
<th>Pneumococcal UAT</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensive care unit admission</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X^a</td>
</tr>
<tr>
<td>Failure of outpatient antibiotic therapy</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Cavitary infiltrates</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leukopenia</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Active alcohol abuse</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Chronic severe liver disease</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Severe obstructive/structural lung disease</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asplenia (anatomic or functional)</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Recent travel (within past 2 weeks)</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X^c</td>
</tr>
<tr>
<td>Positive Legionella UAT result</td>
<td>X</td>
<td></td>
<td></td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Positive pneumococcal UAT result</td>
<td>X</td>
<td>X</td>
<td></td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Pleural effusion</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X^e</td>
</tr>
</tbody>
</table>

Note: Case discussed with our ID faculty who felt there was little benefit to ordering pneumococcal antigen testing. At our facility, this is a send-out lab and results would not return for several days. ID faculty opinion on legionella antigen testing was mixed, but the majority felt it was unnecessary.
Breakpoint D

• Radiology interpretation of our patient’s CT chest included “…While the findings could certainly represent an infectious etiology with reactive lymphadenopathy in the hilum, I cannot entirely exclude the possibility of pulmonary neoplasm…”

Master Radiologist Able to Hedge on Every Possible Medical Condition

• What, if any, further evaluation would you do now?
Breakpoint D

• What, if any, further evaluation would you do now?

• Guidelines for repeat CXR at 6-12 weeks:
  – If meets 1 of the factors below…
    • Non-responders
    • >50 yr old
    • Smokers
HVC Case

Best Practice Cost
- CBC: $23
- BMP: $30
- CXR: $55
- Blood Cx: $24
- Sputum Cx: $12
- +/- Legionella Ag: +/- $46
- F/U CXR: $55

Total: $199-245

Minimum Required Evaluation
- CBC
- BMP
- CXR
- Blood Cx
- Sputum Cx
- F/U CXR

Potential Waste
- VBG: $27
- CTA chest: $768
- Resp DFA panel: $153
- Pneumococcal Ag: $200
- Malignancy W/U: ???

Total: $1148+

Note: Total does not include the price of an inpatient admission, MD charges, etc.
Diagnosis

• What is the most likely diagnosis?
# HVC Scoring

<table>
<thead>
<tr>
<th>High-Value Care Morning Report Scoring Form</th>
</tr>
</thead>
</table>

**Date:** 2/27/15

**Recommended Work-up**
- CBC, BMP
- CXR
- Blood, Sputum Cx
- +/- Legionella Ag
- F/U CXR

**Resident Work-up**

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBC</td>
<td>$23</td>
</tr>
<tr>
<td>BMP</td>
<td>$30</td>
</tr>
<tr>
<td>CXR</td>
<td>$55</td>
</tr>
<tr>
<td>Blood Cx</td>
<td>$24</td>
</tr>
<tr>
<td>Sputum Cx</td>
<td>$12</td>
</tr>
<tr>
<td>+/- Leg Ag</td>
<td>$46</td>
</tr>
<tr>
<td>F/U CXR</td>
<td>$55</td>
</tr>
</tbody>
</table>

**Total** $199-245

**Potential Waste**
- VBG $27
- CTA chest $768
- Resp DFA panel $153
- Pneumococcal Ag $200
- Bronchoscopy $1886
- VQ scan $341
- Lung biopsy $805

**Best Practice Cost**
- CBC $23
- BMP $30
- CXR $55
- Blood Cx $24
- Sputum Cx $12
- +/- Leg Ag $46
- F/U CXR $55

**HVC Scoring**

1. Correct Diagnosis?  
   - Yes (+3)  
   - No (-3)

2. All recommended diagnostics ordered?  
   - Yes (+3)  
   - No (-3)

3. Resident Cost compared to Best Practice Cost (BPC):  
   - ≤ 100% BPC (+4)  
   - 101-120% BPC (-1)  
   - >120% BPC (-4)

4. High Value Care Score (HVCS = Score from #1 + #2 + #3): ______

**4/3/2015**
HVC Scoring

1. Correct Diagnosis?  Yes (+3)   No (-3)

2. All recommended diagnostics ordered?  Yes (+3)   No (-3)

3. Resident Cost compared to Best Practice Cost (BPC):
   -100% BPC (+4)   101-120% BPC (-1)   >120% BPC (-4)

4. High Value Care Score (HVCS = Score from #1 + #2 + #3): _____

![Recommended Test(s) Ordered Diagram]

BPC = Best Practice Cost
HVC SCORE REPORTS
## Individual HVC Score Reports

### % Correct Diagnosis

<table>
<thead>
<tr>
<th>Resident A</th>
<th>100.0%</th>
</tr>
</thead>
<tbody>
<tr>
<td>PGY1</td>
<td>80.0%</td>
</tr>
<tr>
<td>PGY2</td>
<td>76.5%</td>
</tr>
<tr>
<td>PGY3</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

**Total:** 83.7%

### Average of Correct Diagnosis

<table>
<thead>
<tr>
<th>Resident A</th>
<th>3.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>PGY1</td>
<td>1.80</td>
</tr>
<tr>
<td>PGY2</td>
<td>1.59</td>
</tr>
<tr>
<td>PGY3</td>
<td>3.00</td>
</tr>
</tbody>
</table>

**Total:** 2.02

### % Recommended Tests Ordered

<table>
<thead>
<tr>
<th>Resident A</th>
<th>50.0%</th>
</tr>
</thead>
<tbody>
<tr>
<td>PGY1</td>
<td>15.0%</td>
</tr>
<tr>
<td>PGY2</td>
<td>41.2%</td>
</tr>
<tr>
<td>PGY3</td>
<td>50.0%</td>
</tr>
</tbody>
</table>

**Total:** 32.7%

### Average of Recommended Tests Ordered

<table>
<thead>
<tr>
<th>Resident A</th>
<th>0.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>PGY1</td>
<td>-2.10</td>
</tr>
<tr>
<td>PGY2</td>
<td>-0.53</td>
</tr>
<tr>
<td>PGY3</td>
<td>0.00</td>
</tr>
</tbody>
</table>

**Total:** -1.04

### % Resident Cost vs Best Practice Cost

<table>
<thead>
<tr>
<th>Resident A</th>
<th>75.0%</th>
</tr>
</thead>
<tbody>
<tr>
<td>PGY1</td>
<td>85.0%</td>
</tr>
<tr>
<td>PGY2</td>
<td>82.4%</td>
</tr>
<tr>
<td>PGY3</td>
<td>83.3%</td>
</tr>
</tbody>
</table>

**Total:** 83.7%

Resident A is at or below BPC for 75% of cases.
Figure 1: Percent of time that respondents listed the correct diagnosis
Figure 2: Percent of time that respondents ordered all of the minimum recommended tests
HVC Score Data

Figure 3: Percent of time that respondents were at or below Best Practice Cost
HVC Score Data

Figure 4: High Value Care Scores over time by individual resident, PGY-class average, and total residency class average
Future Directions

• Post-curriculum resident survey to measure changes in resident knowledge, skills, and attitudes

• Measure cost per case for 5 most common inpatient diagnoses before and after HVC curriculum

• HVC Smart Phone App development for use in AM report to calculate HVC scores in real-time
Summary

• There is an increasing need to teach high value care principles to our trainees

• Utilize existing HVC resources to your program’s advantage

• Our innovative HVC morning report curriculum is an effective way to teach HVC using real-world case examples

• Our HVC scoring tool may be an effective way to assess residents’ understanding and application of HVC principles

• We all must become more responsible stewards of our nation’s limited healthcare resources
QUESTIONS / COMMENTS

Thank you for attending our workshop!

Please fill out the session evaluation form!