Update in Hospital Medicine

Linda Venner MD FACP
UCR Hospitalist CoDirector
UCR Hospitalists

- Riverton
- Intermountain
- LDS Hospital
- CV Hospitalists
- AltaView Hospital
Our national meetings are full of collaborative practice and CMS identified core measures
Teams in the Clinical Program share clinical and administrative strategies while promoting best practices through the use of evidence-based care processes.

**Clinical Program Goals:**

“Improvement of quality of care and clinical outcome, reduction of medical errors and in-patient cost through the use of standardized order sets enterprise wide.”
Clinical Programs Structure

- Intensive Medicine
- Behavioral Health
- Cardiovascular
- Oncology
- Patient Safety
- Pediatric
- Primary Care
- Primary Children’s
- Rural
- Select Health
- Surgical Services
- Orthopedics
- Value Based Purchasing
- Women Newborns
- Homecare
What are we working on?

• Reducing readmissions

• Clinical Programs development
  – Antibiotic Stewardship
  – Sepsis
  – Blood transfusion

• Pulmonary Embolism early discharge study

• Geriatric Hip Fracture Management
Hospital Readmissions Reduction Program

• Readmissions are inevitable BUT…can we decrease the chances?
  • Incomplete transitions of care
  • Poor communication
  • Lack of attention to detail
  • Not providing high quality healthcare
Hospital Readmissions Reduction Program

- There is CMS focus on Acute Myocardial Infarction (AMI), Pneumonia (PN) and Congestive Heart Failure (HF)
- Readmission rates for AMI, PN and HF is a measure of a hospital’s performance
- Additional measures related to COPD, Stroke, and THA/TKA will be added in the future
What counts as a Readmission?

- Defined as readmission to same hospital (or system) within 30 days.
- National Average approximately 20%
- Part of the Affordable Care Act
- CMS began reporting data in 2009
- Reduced Payments for hospitals with excessively high readmission rates
- Start date of October 1, 2012
Can We Predict Readmission Risk?

Goal is to identify high risk patients
Retrospective scoring cannot be used when it is needed the most
Overall intent is to improve transitions of care
Predicting Readmission Risk

Project BOOST

Better Outcomes for Older adults through Safe Transitions

Society of Hospital Medicine

8 P’s

Bundle/Package

Assign interventions based on risk factors
Predicting Readmission Risk

Project RED

Re-Engineered Discharge

Boston University

12 components
LACE Index Score

- Developed in Ontario, Canada
- Based on Administrative Data and not on clinical data
- Score between 0 and 19
- Not validated
LACE Index Score

Length of Stay
Acuity of Admission
Co-morbidities (Charlson Score)
ER visits in last 6 months

- Low Risk < 8
- Medium Risk 8-12
- High Risk >13
## Modified LACE Tool

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Value</th>
<th>Points</th>
<th>Prior Admit</th>
<th>Present Admit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Length of Stay</strong></td>
<td>Less 1 day</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 day</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 days</td>
<td>2</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>3 days</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4-6 days</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7-13 days</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14 or more days</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Acute admission</strong></td>
<td>Inpatient</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Observation</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Comorbidity:</strong></td>
<td>No prior history</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Comorbidity points</td>
<td>DM no complications, Cerebrovascular disease, Hx of MI, PVD, PUD,</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>are cumulative to maximum</td>
<td>Mild liver disease, DM with end organ damage, CHF, COPD, Cancer,</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>of 6 points)</td>
<td>Leukemia, lymphoma, any tumor, cancer, moderate to severe renal dz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dementia or connective tissue</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>disease</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Moderate or severe liver</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>disease or HIV infection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Metastatic cancer</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Emergency Room visits</strong></td>
<td>0 visits</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>during previous 6 months</td>
<td>1 visits</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 visits</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 visits</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 or more visits</td>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Take the sum of the points and enter the total ➔
PLACES Index Score

- Polypharmacy
  &
- Social Situation
  + LACE
Antimicrobial Stewardship

It was on a short-cut through the hospital kitchens that Albert was first approached by a member of the Antibiotic Resistance.
Objectives

• Describe why Antibiotic Stewardship is critical

• Provide an overview of Antibiotic Stewardship at IHC
"This is a major blooming health crisis"

"The last decade has seen the inexorable proliferation of a host of antibiotic resistant bacteria, or bad bugs, not just MRSA, but other insidious players as well. ...For these bacteria, the pipeline of new antibiotics is verging on empty. 'What do you do when you're faced with an infection, with a very sick patient, and you get a lab report back and every single drug is listed as resistant?'"

Dr. Fred Tenover of the Centers for Disease Control and Prevention (CDC).
Science magazine; July 18, 2008
What is Antimicrobial stewardship?

Coordinated interventions designed to improve and measure the appropriate use of antimicrobials by promoting:

• Selection of the optimal antimicrobial drug regimen
• Correct dosing
• Adequate (but not excessive) duration of therapy
• Correct route of administration

IDSA 2014
Why antibiotic stewardship?

Because we have to
“Nightmare Bacteria” Threat

States with one type of drug-resistant infection, carbapenem-resistant Enterobacteriaceae (CRE), in 2001

2013

CRE Reported to CDC

Map of the United States showing states with CRE reported to the CDC.
Why antibiotic stewardship?

• Because we have to
• All antibiotics fail (antibiotic resistance is ancient)
Antibiotic resistance is ancient

Vanessa M. D’Costa\textsuperscript{1,2*}, Christine E. King\textsuperscript{3,4*}, Lindsay Kalan\textsuperscript{1,2}, Mariya Morar\textsuperscript{1,2}, Wilson W. L. Sung\textsuperscript{4}, Carsten Schwarz\textsuperscript{3}, Duane Froese\textsuperscript{5}, Grant Zazula\textsuperscript{6}, Fabrice Calmels\textsuperscript{5}, Regis Debruyne\textsuperscript{7}, G. Brian Golding\textsuperscript{4}, Hendrik N. Poinar\textsuperscript{1,3,4} & Gerard D. Wright\textsuperscript{1,2}
All Antibiotics Fail
Resistance Genes are 30,000 years ahead!
Why antibiotic stewardship?

• Because we have to
• All antibiotics fail (antibiotic resistance is ancient)
• No to minimal development of new antibiotics
10 x 20 Initiative IDSA

Key Global Leaders Needed to Solve the Antibacterial Pipeline Problem:

- The executive branch of the government (both US and global counterparts), including the US Department of Health and Human Service’s Food and Drug Administration, Biomedical Advanced Research and Development Authority, National Institutes of Health, Centers for Disease Control and Prevention, and Department of Commerce
- The US Congress and global counterparts
- The pharmaceutical and diagnostics industries
- Health care providers (including those engaged in cancer care and treatment, surgery, pediatrics, transplantation, and infectious diseases) and their professional societies
- Policy and legal communities (including experts in pharmacoeconomics, intellectual property, and reimbursement policy)
- Medical universities and independent research institutes
- Medical and public health philanthropic organizations
- Affected patient advocacy groups
Total Number of New Antibacterial Agents

1983-1987

1988-1992

09/03/2013 13:30 Quantitative Culture

Stain: GRAM STAIN, No WBC's seen, 1+ Gram Negative Bacilli

FINAL Result: > 100,000 CFU/mL Acinetobacter baumannii multi drug resistant organism

S: colistin
I: ampicillin/sulbactam, meropenem
R: amikacin, cefepime, cefotaxime, ceftazidime, ceftriaxone, ciprofloxacin, gentamicin, levofloxacin, tetracycline, ticar/clavulanic acid, tobramycin, trimeth/sulfa

Method: MIC

1998-2002

ANTIBIOTIC DEVELOPMENT IS DWINDLING

2003-2007

2008-2012

Source: The Epidemic of Antibiotic-Resistant Infections, CID 2008:46 (15 January)
Why antibiotic stewardship?

• Because we have to
• All antibiotics fail (antibiotic resistance is ancient)
• No to minimal development of new antibiotics
• It’s the right thing to do
Antimicrobial Stewardship

• Intermountain has been developing Antibiotic Stewardship programs for several years, with a push to hire pharmacists and physicians specifically for Stewardship.

• draft guidelines from Joint Commission that have stewardship language but they aren’t currently being cited
Structured program to minimize antibiotic use

- Antimicrobial Indications
- Guidelines and Clinical Pathways
- Education
- Dose optimization
- IV to PO conversion
- Rapid Diagnostics
- Decision Support
- Formulary Restriction
- Prospective Audit
- Antimicrobial Stewardship
Antimicrobial stewards:

• Achieve optimal clinical outcomes related to antimicrobial use
• Minimize toxicity and other adverse events
• Reduce the costs of health care for infections
• Limit the selection for antimicrobial resistant strains
What is sepsis?

- Systemic inflammatory response to infection
- Most commonly from bacteria but also viruses, fungi, parasites
- Most signs of sepsis are a result of the immune reaction to the pathogen
  - Endotoxins - gram negative bacteria
  - Exotoxins - certain gram positive bacteria
- Inflammatory cytokines and factors are released and up-regulated leading to fever, tachypnea, endothelial damage -> clotting (DIC), hypotension, decreased myocardial contractility, and ultimately organ failure
Improving Sepsis Care:

Scope

• Who gets sepsis?
  • 20 million cases worldwide each year
  • > 100,000 fatalities in the US alone
  • Most common in the elderly, immunosuppressed, diabetics, patients with lines and catheters
  • Mortality rates increase with age but still can be as high as 10% in children compared to 38.4% in patients ≥ 85 years old*

Bunnel MD et al IMCP
Improving Sepsis Care: Room for Improvement

- Mortality remains high for patients with severe sepsis and septic shock
  - Published rates anywhere from 25-60% \(^1,2,3,4\)

- Within Intermountain in 2012:
  - 3138 patients with severe sepsis/septic shock
  - 1365 treated on acute care units with 11.3% mortality
  - 1581 admitted ER -> ICU with 14.5% mortality
  - 192 admitted to ICU from the floor with **28.1% mortality**

Bunnel MD et al IMCP
SEPSIS

• Severe Sepsis and Septic Shock are leading causes of mortality in hospitalized patients.
• In-hospital mortality due to severe sepsis ranges from 25% to 60%.
• Intermountain has successfully decreased mortality to around 9% for patients with severe sepsis or septic shock that are admitted directly to the ICU from the emergency department (ED).
What about patients who develop sepsis in the hospital?

- Current focus on patients who are admitted to a general hospital unit with subsequent development of sepsis.
- Mortality for patients who develop severe sepsis on acute care inpatient settings and transfer to ICU can be as high as 40%.
• 2014 development of Clinical Programs floor goal

**Goal Statement:** The following measures will be accomplished:

1. Develop and implement computer-based training (CBT) education for all acute care nursing staff to promote early sepsis recognition and appropriate care. Achieve 95% compliance to CBT.
2. For patients who meet the criteria of severe sepsis or septic shock as defined by the Surviving Sepsis Campaign and who are admitted to the ICU from either the ED or an acute care floor the following measures will be accomplished:
   a) Increase in Sepsis Bundle Compliance from 24 % to 40% with 98% power to detect a statistically significant improvement
   b) Relative decrease in Hospital Mortality in the board goal population by 10% (from 17% to 15.3%)
Bundle Compliance Correlates With Survival:

Am J Respir Crit Care Med Vol 188, Iss. 1, pp 77–82, Jul 1, 2013

Figure 2. P-chart of total bundle compliance and mortality, 2004–2010. (A) Among all subjects, mortality (circles) decreased while all-or-none total bundle compliance (squares) increased over time. The 95% statistical process control limits are represented by dashed lines. (B) Among only subjects with septic shock, mortality (circles) also decreased while all-or-none total bundle compliance (squares) increased over time. The 95% statistical process control limits are represented by dashed lines.
# UCR Acute Care Units
## Adult Severe Sepsis/Septic Shock Bundle Checklist

### Definitions of Sepsis

<table>
<thead>
<tr>
<th>Sepsis</th>
<th>Septic Shock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organism and suspected infection with two or more new-onset signs or symptoms among the following:</td>
<td>Organism and suspected infection with two or more new-onset signs or symptoms among the following:</td>
</tr>
<tr>
<td>Fever &gt; 38°C or hypothermia &lt; 36°C</td>
<td>Hypertension, hypotension, or organ dysfunction with lactate &gt; 4 mmol/L</td>
</tr>
<tr>
<td>White blood cell count &gt; 12,000</td>
<td>Multiple organ failure, or shock hypotension with lactate &gt; 4 mmol/L</td>
</tr>
<tr>
<td>CRP &gt; 400 mg/L</td>
<td>Multiple organ failure, or shock hypotension with lactate &gt; 4 mmol/L</td>
</tr>
<tr>
<td>PCT &gt; 50</td>
<td>Multiple organ failure, or shock hypotension with lactate &gt; 4 mmol/L</td>
</tr>
</tbody>
</table>

### Time of Recognition of Sepsis symptoms

- Symptoms recognized on this patient: [ ]

### National mortality rates for Acute Care is 49%. Sepsis recognition and quick actions help save lives.

#### Severe Sepsis Resuscitation Bundle

**Time**
- Time: 1 hour from recognition
- Chart conversation in Problem Charting

**Obtain MD/EP Orders for the following items below:**

1. Measure serum lactate (L, see S below) Lactate level: Time Drawn: __________
2. Obtain blood culture prior to antibiotic administration Time Drawn: __________
3. Obtain a second large-bore IV Time Drawn: __________
4. Broad-spectrum antibiotic administration* (see back) Time Drawn: __________
5. Fluid bolus of NS for MAP < 65 and Lactate > 4 mmol/L Time Drawn: __________

**Maintenance Bundle for continuing care on the Acute Care unit**

6. If initial lactate is > 2, obtain order for repeat lactate after fluid bolus but within 8 hours of last lactate level Repeat Lactate level: Time Drawn: __________

**Transfer**

- Possible transfer criteria: No signs of improvement, MAP < 60 after bolus. Serum lactate is elevated after bolus. Respiratory failure, or progression to severe sepsis or septic shock

*Criteria is not inclusive, may transfer to ICU for other reasons

---

This Form Is Not a Part of the Permanent Medical Record

[Form for Sepsis ICU]

Give completed and crossed form to unit manager

Last modified: 01/14/2014
Treating Sepsis:

Sepsis Bundle in Action
Mission Statement:

Decrease the amount of two unit transfusions and transfusion for Hematocrit > 22.9% to 45.0 % or less average for measurement period January 1, 2014- December 31, 2014 for system and facility while documenting blood ordering and transfusion charting in HELP for at least 80% of transfusions.

Surgical Services Clinical Program Goals, Ott MD et al
Restrictive blood transfusion strategy

- The evidence: Many patients are given allogenic red blood cell transfusions as part of their treatment. However, there are risks associated with exposure to allogenic blood — including infection, allergic reactions, fever, and death — so physicians try to avoid giving blood unless necessary.

- Restrictive red cell transfusion practice is an approach to give transfusion only if certain hematocrit (HCT) and/or hemoglobin (HB) thresholds are met at the time of transfusion.
# Potential PRBC Transfusion Indication Recommendations

<table>
<thead>
<tr>
<th>Indication</th>
<th>Threshold Hct/Hgb</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Asymptomatic</td>
<td>21/7</td>
</tr>
<tr>
<td>• Tachycardia, shortness of breath, tachypnea, orthostasis, and/or syncope with no explanation other than anemia</td>
<td>24/8</td>
</tr>
<tr>
<td>• Marrow suppressive therapy</td>
<td>27/9</td>
</tr>
<tr>
<td>• To reduce cardiac stress in severe CHF</td>
<td>30/10</td>
</tr>
<tr>
<td>• Shock with global tissue ischemia manifested by hemodynamic instability and/or elevated lactic acid (greater than 4 mmol/L)</td>
<td>30/10</td>
</tr>
<tr>
<td>• Local ischemic disease of heart or brain</td>
<td>30/10</td>
</tr>
<tr>
<td>• Acute hemorrhage or blood loss not immediately controllable</td>
<td>Based on hemodynamics not hematocrit</td>
</tr>
</tbody>
</table>
Examined risk for infection associated with PRBC transfusion

Systematic Review

Good quality Meta-analysis
  – 7,593 patients total
  – varying transfusion thresholds
Figure 3. Forest Plot of Risk Ratios for Infection Comparing Restrictive vs Liberal Transfusion Strategies by Patient Type

Source
Cardiac
Bracey et al,20 1999
Hajjar et al,21 2010
Cholette et al,22 2011
Cooper et al,23 2011
Shehata et al,24 2012
Carson et al,10 2013
de Gast-Bakker et al,25 2013
Subtotal $I^2 = 0.0\%$, ($P = .78$)

Critical care
Hébert et al,26 1999
LaCroix et al,27 2007
Subtotal $I^2 = 0.0\%$, ($P = .89$)

Gastrointestinal
Villanueva et al,11 2013

Low Birthweight
Kirpalani et al,28 2006

Orthopedic
Carson et al,29 1998
Grover et al,30 2006
Foss et al,31 2009
So-Osman et al,32 2010
Carson et al,33 2011
Gregersen et al,14 2012
Subtotal $I^2 = 0.0\%$, ($P = .82$)

Sepsis
Karam et al,29 2011
Overall $I^2 = 3.7\%$, ($P = .41$)
Restrictive vs Liberal Transfusion Strategies

**Results:**

- Infections 11.8% vs 16.9%
- NNT with restrictive strategy to prevent a serious infection was 38 (95%CI 24-122)
  - When HGB <7 used NNT is 20

**Take home points:**

- NO evidence that liberal strategy is helping
- Associations with harm are real
- Adopt a “rational” strategy for most
Pulmonary embolism (PE) is associated with a considerable degree of annual morbidity and mortality.

- 600,000 people diagnosed with PE each year.
- The overall mortality rate of PE is about 15% in the first three months after diagnosis.

PE treatment costs are formidable.

- The average direct cost of treatment for an episode of PE is estimated at $15,137.
- In the United States, the PE treatment cost is over $9 billion per year.
- This estimate is easily increased by considering the financial burden that patients incur due to lost wages for the days spent in the hospital, as well as due to out-of-pocket costs.
Rapid Risk Stratification for Outpatient Treatment of Low-risk Pulmonary Embolism

- Setting: Two Level 1 trauma centers with combined annual ED census of >130,000 patients/year.

- Participants: New diagnosis of PE, PESI score <86, aged 18-80, non-pregnant, non-prisoner, with reliable social situation.

- Sample size: Assuming a sample size of N=200 and using a one-sided non-inferiority test of significance at $\alpha=0.05$, this study will have 80% power to detect a non-inferior outcome of 90-day mortality.

- Study Design: Prospective cohort, non-inferiority study

Bledsoe, J. Et al
Study aims:
To show that patients with a new diagnosis of PE that are low-risk by PESI score can safely be treated as outpatients after appropriate diagnostics and will have similar mortality rates as patients with PE who receive inpatient treatment.

- Compliance
- Bleeding Events
- Readmission
- Patient satisfaction
- Cost

Bledsoe, J. Et al
Patients with study coordinator for education and enrollment.

Patients must be low risk by PESI score, and Echo, BNP, Troponin, EKG, Lower extremity doppler must be normal.

Patients are discharged on bridging lovenox and coumadin or Xarelto.

Followup is arranged.
## Pulmonary embolism severity index scores: Full and simplified

### Pulmonary embolism severity index (PESI) - Full

<table>
<thead>
<tr>
<th>Clinical feature</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>( x \ (\text{eq. 65}) )</td>
</tr>
<tr>
<td>Male gender</td>
<td>10</td>
</tr>
<tr>
<td>History of cancer</td>
<td>30</td>
</tr>
<tr>
<td>Heart failure</td>
<td>10</td>
</tr>
<tr>
<td>Chronic lung disease</td>
<td>10</td>
</tr>
<tr>
<td>Pulse ( \geq 110 \text{/min} )</td>
<td>20</td>
</tr>
<tr>
<td>Systolic blood pressure (&lt;100 \text{ mmHg} )</td>
<td>30</td>
</tr>
<tr>
<td>Respiratory rate ( \geq 30 \text{/min} )</td>
<td>20</td>
</tr>
<tr>
<td>Temperature (&lt;36^\circ \text{Celsius} )</td>
<td>20</td>
</tr>
<tr>
<td>Altered mental status</td>
<td>60</td>
</tr>
<tr>
<td>Arterial oxygen saturation (&lt;90 \text{ percent} )</td>
<td>20</td>
</tr>
<tr>
<td>Class I</td>
<td>Low risk</td>
</tr>
<tr>
<td>Class II</td>
<td>66 to 85</td>
</tr>
<tr>
<td>Class III</td>
<td>High risk</td>
</tr>
<tr>
<td>Class IV</td>
<td>106 to 125</td>
</tr>
<tr>
<td>Class V</td>
<td>(&gt;125 )</td>
</tr>
</tbody>
</table>

### Simplified pulmonary embolism severity index (sPESI)

<table>
<thead>
<tr>
<th>Clinical feature</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age ( \geq 80 \text{ years} )</td>
<td>1</td>
</tr>
<tr>
<td>History of cancer</td>
<td>1</td>
</tr>
<tr>
<td>Chronic cardiopulmonary disease</td>
<td>1</td>
</tr>
<tr>
<td>Pulse ( \geq 110 \text{/min} )</td>
<td>1</td>
</tr>
<tr>
<td>Systolic blood pressure (&lt;100 \text{ mmHg} )</td>
<td>1</td>
</tr>
<tr>
<td>Arterial oxygen saturation (&lt;90 \text{ percent} )</td>
<td>1</td>
</tr>
<tr>
<td>Low risk</td>
<td>0</td>
</tr>
<tr>
<td>High risk</td>
<td>(&gt;1 )</td>
</tr>
</tbody>
</table>

Adapted from:
Geriatric Hip Fracture

• ~200,000 fx year

• Time to surgery linked to increased mortality and decreased chance to return to living independently
Geriatric Hip Fracture Program

Goals/Benefits

**Targeted Patient Care Improvement Program**

**Shorter Length of Stay**
- Rapid assessment, optimization & surgical intervention
- Rapid Post-op discharge
- Reduction of inpatient complications
- Improved coordination of care

**Quality Improvement**
- Elimination of variations in care
- Improved staff communication
- Outcomes tracked for recognition
- Improved financial performance
Clinical Pathway

Started as a “Patient Care Improvement Program” through Synthes.

Attributes –

- Leadership
- Quality & Outcomes
- Service Line Strategy
- Finance
- Clinical – ED, Pre & Post-Op
- Education & Training
- Patient Satisfaction
- Continuum of Care
Study Sites

- IMC – Roll Out May 2013
- Dixie – Roll Out Aug 2013
- Utah Valley – Nov 2013
- Logan Regional – Oct 2013
- McKay – Aug 2013
- Alta View – Aug 2013
- LDSH – Pending

Roll-out to remaining Intermountain Facilities
Geriatric Fracture Program

Admit -
1. ED? or
2. Inpatient?

ED Determines:
1. ASA Score
2. Attending

ED Order Set
Case management Consult

Decision to Surgery?
Non-Surgical?
Palliative Care?

Discharge Planning...
Home Health, SNF, Rehab, Hospice?

Readmission Avoidance Pathway

CPOE Post-op Order Set

CPOE Admission Order Set

Patient/Family Education
Development

Objective:
• Improved morbidity and mortality, improved patient experience, reduced cost

Method:
Collaboration to identify patient risk factors, streamline workup, standardize/improve order sets, involve and educate patient and family, improve discharge process
Emergency Department Physician to determine ASA Score...
Development

- Collaboration of multidisciplinary team to develop of standardized workup

- Continued evaluation of each patient for additional workup

**Components**
- CBC/A, CMP, PT/INR, UMAC & UMIC
- Cardiac Monitoring
- Pulse Oximetry
- O2 by NC 2L/min.
- IV to NS Lock
- Femur & Hip Radiograph to affected side
- AP & Lateral
- Case Management Consult
Development

Admission Order Sets
(IMC & Dixie)
Time to Surgery

Since inception of the GHF Program mid 2013, participating facilities have decreased TTS *below* the national benchmark.
Year Trends -
Average Total Cost went from $15,034 to $13,321 ($1,713)
Average Time to Surgery 17.2 hrs now between 12-15 hrs
**Design:** Retrospective, observational, single center

**Patients:** Elective spine fusion, TKA, THA
- >21 yrs, eval in pre-anesthesia clinic
- Clinic recommended taking ACE-I/ARB DOS
- Included the 922 pts who had documented vitals and labs (798 had labs to look at AKI)
- 343 taking AAB
ACE-I/ARB on day of surgery

• **Primary Outcomes:**
  – Post-induction hypotension
  – Intraop hypotension
  – Post-op AKI (Cr >0.3 or >50% increase from preop)

• **Secondary:**
  – Hospital LOS
  – 2yr mortality if AKI found

• **Statistics:** multivariable logistic regression
Results: AAB vs none

• Post-induction hypotension:
  – 12.2% vs 6.7% (P=0.005)
  – After multivariate logistic regression Odds Ratio 1.93 (95% CI 1.10-3.41 p=0.023)

• Intra-op hypotension:
  – Not significantly different

• AKI:
  – 8.3% vs 1.7%
  – After Logistic regression OR still 2.68 (95% CI 1.08-6.69 p=0.034)
  – Also independent of intra-op hypotension OR 2.66 (95% CI 1.06-6.64 p=0.037)
  – LOS 5.76 days vs 3.28 days
Results: AAB vs none

• Post induction hypotension:
  – 12.2% vs 6.7% (p=.005)
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  – LOS 5.76 vs. 3.28
Aspirin in Geriatric Hip fracture patients

The NEW ENGLAND JOURNAL of MEDICINE

Aspirin in Patients Undergoing Noncardiac Surgery

POISE-2 (Perioperative Ischemic Evaluation 2)

- Evaluated the effect of low dose aspirin vs. placebo Death or nonfatal MI at 30 days

- Design: Randomized placebo controlled trial
  - 10,000 patients undergoing non-cardiac surgery
  - 135 hospitals, 23 countries

NEJM 370;16 April 17, 2014
POISE-2

• Inclusion:
  – History of CAD, PAD, Stroke, major vascular surgery
  – Or 3 of
    • Age >70
    • Prior CHF
    • Prior TIA
    • Diabetes
    • Hypertension
    • Creatinine >2 pre-op
    • Smoking
    • Emergency Surgery
POISE-2

• Exclusion:
  – Allergy to aspirin
  – ASA within 72 hours
  – SBP < 105
  – HR < 55
  – PUD or GI bleed within 6 weeks
  – ICH within 6 months, SAH, epidural bleed
  – DES < 1yr or BMS < 6 weeks
  – Thienopyridine or ticagrelor in 72 hours
  – Planned therapeutic anticoagulation
  – Intracranial or retinal surgery
  – No consent
POISE-2

- **Treatment:** ASA 200mg x1 and 100mg daily

- **Results:**
  - 10,010 enrolled (met power)
  - 4382 in ASA continuation arm
  - Well randomized groups

- **Results: 1° outcome**
  - 351/4998 (7%) vs 355 / 5012 (7.1%)
  - HR 0.99; 95%CI 0.86-1.15

- **Safety: major bleeding**
  - 230 (4.6%) vs188(3.8%)
  - HR 1.23 95% CI 1.01-1.49

- **P=0.04**
  - NNH ~120
POISE-2

Take home points:

For patients undergoing noncardiac surgery:

- no data to support using ASA for prevention of death or MI during non-cardiac surgery
- ASA does increase risk of major bleeding
- Consider stopping aspirin 3 days before surgery and resuming 8-10 days after

NEJM 370;16 April 17, 2014
WHEN TO STOP PRE-OP

• Aspirin
  – Stop 3-5 days before

• Clopidogrel, prasugrel
  – Stop 7 days before

• Ticagrelor
  – Stop 5 days before

• Dabigatran
  – Stop 24-48 hrs (48-72 CKD)

• Rivaroxaban
  – Stop 24 hrs (48 hr CKD)

• Apixiban
  – Stop 24 hrs (48 hr CKD)
Final points

1. Collaboration with *measured metrics* is the name of the game (Sepsis, Geriatric Hip Fracture)

2. Be an Antibiotic steward

3. Transfuse patients using a restrictive strategy

4. Hold Aspirin and ACE/ARB’s perioperatively but don’t forget to restart!

5. Be comfortable managing low risk PE patients after early discharge from the hospital
Thank You!

Linda.Venner@imail.com