Reduce Acute Kidney Injury and Improve PSI10

Aldo Carmona, MD
Sr. VP, Clinical Integration, Chairman, Dept. Anesthesia & Critical Care, St. Luke’s University Health Network

Donna Sabol, RN, MSN, CPHQ
VP & Chief Quality Officer, St. Luke’s University Health Network

Madeleine Biondolillo, MD, MBA
VP of Quality & Safety, Premier Healthcare Solutions, Inc.

December 12, 2018
D4 9:30 am – 10:45 am
E4 11:15 am – 12:30 pm

#IHIFORUM
Presenter Disclosure

- Premier Healthcare Solutions, Inc. provides services to St. Luke’s for which it receives a fee. The presentation materials are for informational purposes only and are not offered as legal or other advice.

- The presenters, Madeleine Biondolillo, Aldo Carmona and Donna Sabol, have no other relevant financial or nonfinancial relationship(s) within the services described, reviewed, evaluated, or compared in this presentation.
Session Objectives

- Discuss a leadership approach that engages providers and achieves systemness and sustainability.
- Describe strategies to reduce AKI on the inpatient population.
- Identify approaches to engage GME leaders, residents and fellows in an organization’s Quality Program.
- Learn how collaboratives inspire, support and guide health systems in embracing their skills to transform the design, quality and performance of care delivery by connecting them with peers, evidence-based practices and data.
Walk With Us

● Problem
  ● AKI is associated with an increase in hospitalization costs that range from $5.4 billion to $24.0 billion. The most expensive patients are those with AKI of sufficient severity to require dialysis, where cost increases relative to patients without AKI range from $11,016 to $42,077 per hospitalization.¹

● How to solve
  ● Using analytics, education and best practices to accelerate performance improvement, with complete transparency within the membership, QUEST® 2020.

● Peer case study
  ● In one year, St. Luke’s University Health Network reduced incidence of AKI by 71% and saved nearly $175,000.³

● What you can do starting today

¹ Samuel A. Silver, et al., “The Economic Consequences of Acute Kidney Injury,” PMC 2017
² Premier Collaboratives Webinar, “Kick Acute Kidney Injury to the Curb!,” PremierConnect®, August 2017
Our Network

10 Hospitals
315 Outpatient Facilities
200+ Physician Offices
14 Urgent Care Centers
50 Physical Therapy Sites

14,000+ Employees
1,400+ Physicians
(1000 Network employees)
1,600+ Volunteers
315 Service Locations
Fully Integrated, Regional, Non-Profit Network

- Admissions & Observations: 72,571
- ED visits: 281,155
- Urgent Care Visits: 89,616
- Primary Care Visits: 603,035
- Outpatient Registrations: 1,256,441
- Revenue: $1.8B
Our Vision

In Comparison to national benchmarks, St. Luke’s University Health Network (SLUHN) will …

• Achieve top decile performance in clinical quality and safety measures
• Provide exceptional service, and
• Be EASY to use by everyone accessing our services
• SLUHN will lead the region in clinical quality and safety performance
St. Luke’s Quality Program
Culture of Performance Improvement

- CQO reports directly to CEO
- Robust Data Monitoring and Analysis
  - Scorecards – Network, Hospital, Service Line, Department, SLPG, Provider
  - PI Team focused on Key initiatives
- Network Performance Improvement Council
- St. Luke’s Care Quality Committee (Clinically Integrated Network)
- Quality and Medical Education Committee (BOT)
- Active member in national quality improvement collaborative
Existing (# residents/fellows)

• Dental Medicine (9)
• Internal Medicine (30)
• General Surgery (20)
• Orthopedic Surgery (10)
• OB/GYN (24)
• Emergency Medicine (36)
• Family Medicine (54)
• Podiatry Medicine/Surgery (10)
• Pharmacy (3)
• Cardiology (9)
• Gastroenterology (6)
• Geriatric Medicine (5)
• Palliative Care Medicine (2)
• Sports Medicine (2)
• Surgical Critical Care (2)

New (# residents/fellows)

• Dermatology (9)
• Emergency Medicine (30)
• Family Medicine (24)
• Internal Medicine (30)
• Neurology (16)
• Otolaryngology (10)
• Psychiatry (24)
• Transitional Year (13)
• Pulmonary Critical Care (6)
The Secret Sauce

“Talent Wins Games, But Teamwork and Intelligence Wins Championships”

-Michael Jordan
A Learning Organization

- We gain insights from national peers
- We teach each other
- We learn from each other
- Support risk taking

- Partners model – Chair & Administration
- 360° for all leaders
- Emerging Leaders Program
- Residents can be a driving force
Why Elective Orthopedic Arthroplasty AKI?

Relevance!
Total Joint Arthroplasty

- By 2030, total knee replacement surgeries are expected to increase by 673%

- A 2010 study demonstrated that approximately 7 million Americans have had a total hip or knee replacement.

- In 2017 – 400,000 Total Hip Arthroplasties and 700,000 Total Knee Replacements in the U. S. Projections by 2030 – 650,000 total Hip Arthroplasties and 1.3M total Knee Replacements.

- AKI in Orthopedic patients is associated with increased morbidity and mortality.

Kimmel, Laura, et al. Incidence of acute kidney injury following total joint arthroplasty: A retrospective review by RIFLE criteria.

#IHIFORUM
Identifying a Problem

- St. Luke’s Orthopedic Care performs 1000 arthroplasty cases per year
- Non-Narcotic pain regimen implemented to decrease post-operative complications
- AKI and Hypotension rates noted to increase
- No protocols in place to prevent or deal with this issue
## St. Luke’s Baseline
### Population: Elective THR and TKR

<table>
<thead>
<tr>
<th></th>
<th>St. Luke’s Rate</th>
<th>Premier Top Decile Peer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypotension</td>
<td>15.0%</td>
<td>7.17%</td>
</tr>
<tr>
<td>AKI – SLB</td>
<td>7.17%</td>
<td>2.03%</td>
</tr>
</tbody>
</table>
Overlapping Relationships

Orthopedics

Nephrology

Anesthesiology

Quality

Nursing

IT/EMR

CQO
Senior VP
Department Chairs

SUPPORT
The AKI Initiative

Quality Coordinator

CQO & Sr. VP

Multidisciplinary Team

Premier® QualityAdvisor™

High rate hypotension

Approach chart review

Anesthesia

Orthopedics

Renal

Quality

Nursing

Residents

#IHIFORUM
Orthopedic AKI

✧ **Recent literature – AKI after TJR**
  - Nephrology; 2018  7.5%
  - BMC Nephrology; 2015  6.8%
  - Acta Orthopedica Belgica; 2015  9.7%
  - Clinical Kidney Journal; 2015  15.0%
  - British Journal of Anesthesia; 2017  9.4%

✧ **Mortality rates as high as 38%**

✧ **Post-operative AKI associated complications:**
  - Increased short and long term **Mortality**
  - De Novo and worsening **Chronic Kidney Disease**
  - Lower chance of being **Discharged to Home** (40%)
  - Increased **CV morbidity**
  - Increased **LOS & Readmissions**
  - Increased Healthcare associated **Costs**
AKI IMPACT

IMPACT of AKI

LOS
Mortality
Discharge to SNF
Incidence of CKD

INCIDENCE

• 7-15% Incidence
• Under-reporting
• Criteria defining AKI
• Lack of routine surveillance

COST

AKI Severity
Stage 1
2
3
3+ Dialysis

Cost

#IHIFORUM
Defining AKI

- AKI Diagnosis - Based on KDIGO criteria
- AKI Stages are based on Serum Creatinine and Urine Output

<table>
<thead>
<tr>
<th>Stages of AKI</th>
<th>Hazard Ratio</th>
<th>Creatinine</th>
<th>Urine Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>AKI 1</td>
<td>1.46</td>
<td>1.5-1.9x / &gt;/= 0.3</td>
<td>&lt;0.5ml/kg/h/6h</td>
</tr>
<tr>
<td>AKI 2</td>
<td>2.08</td>
<td>2.0-2.9x</td>
<td>&lt;0.5ml/kg/h/12h</td>
</tr>
<tr>
<td>AKI 3</td>
<td>2.77</td>
<td>3.0x or Cr &gt;/=4.0 or HD</td>
<td>&lt;0.3ml/kg/h/24h or anuria &gt;24h</td>
</tr>
</tbody>
</table>

1 Year Survival: **1.28 Hazard Ratio**

Even mortality remote from the initial event affects survival

**AKI is associated with DEATH!**
Creatinine GFR Relationship

**Fig 1: “Renal Reserve”**
Small changes in a normal baseline creatinine confers a large change in GFR
Source: iris-kidney.com

**Serum Creatinine Is a Misleading Guide to GFR**
Implications of doubling of serum creatinine

Fig 1: Illustrates less GFR lost at higher baseline creatinine level changes compared to normal creatinine levels
Source: slideshare.net
AKI – Multiple Insults

- First hit: Early detection and intervention
- Second hit: (Near) complete recovery, Incomplete recovery, Progressive CKD and ESKD
- Time

1. No
2. Yes
3. Need for RRT
4.
Implementation

- Best Practice Advisories (BPA’s)
- Pre-operative Surgical Scheduling Report
- Nurse Hypotension Protocol
- Automated Reporting

EHR
Three-Fold Approach: Suspected Causes

- **Pre-Operative**
  - Continuation of nephrotoxic agents
  - Lack of screening for high-risk patients

- **Peri-Operative**
  - Continuation of nephrotoxic agents
  - Inadequate blood pressure management in high-risk patients

- **Post-Operative**
  - Continuation of nephrotoxic agents
  - Inadequate volume resuscitation
  - Continuation of blood pressure medications
Standardized preoperative screening and preparation
Standardized perioperative medication, fluid, and blood pressure management
Standardized post-operative medication, fluid, and blood pressure management
Ongoing adherence/compliance monitoring using EMR
EHR – BP Medication Hold Parameter

Hold for systolic blood pressure less than (mmHg): 110

Order Questions/Answers

Hold for systolic blood pressure less than 110 (mmHg)

SBP 90  >>>>>>>>  SBP 110
Pre-Operatively Identifying patients at High Risk for AK

Surgical Optimization Center

Order Sets

- Orthopedics Joint Replacement Pre-op
  - Manage My Version
  - Pre-op
    - General
      - Case Request
      - Ambulatory PAT Labs
      - Ambulatory PAT Referrals
      - Ambulatory PAT Radiology
      - Notify Physician
      - Diet / Nutrition
      - Nursing Assessments
      - Nursing Interventions
      - Physician Consults
    - IV Fluids
      - IV Fluid Infusions
        - sodium chloride 0.9 % bolus
        - sodium chloride 0.9 % infusion
          - 125 mL/hr, Intravenous, Continuous, Starting Today at 1445, Pre-procedure Sign & Hold

Summary

- Education Index
  - Med Instructions
  - Troubleshoot

- ACE/ARB Med Class
  - Do not take this medication the day before and the morning of the day of surgery/procedure.

- NSAID Med Class
  - Stop taking this medication at least 3 days prior to surgery/procedure.
GFR added to Medication Orders

ketorolac (TORADOL) 30 mg/mL injection

Order Inst.:
Not recommended in patients with renal insufficiency, heart failure, uncontrolled HTN, GI ulcer, bleeding, or with use of ACE inhibitor, ARB, or diuretic; reduce dose in patients weighing less than 50 kg or older than 65 y; total duration of ketorolac therapy (injectable and oral) should not exceed 5 days.

Reference Links:
1. Micromedex

<table>
<thead>
<tr>
<th>Creatinine Clearance</th>
<th>Serum Creatinine</th>
<th>Time Elapsed</th>
<th>Patient Height</th>
<th>Patient Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>73.2 mL/min</td>
<td>0.75 mg/dL</td>
<td>1 day ago (02/21/17 0441)</td>
<td>61 in.</td>
<td>54.1 kg (Adjusted)</td>
</tr>
</tbody>
</table>

Lab Test Results

<table>
<thead>
<tr>
<th>Component</th>
<th>Time Elapsed</th>
<th>Value</th>
<th>Range</th>
<th>Status</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>eGFR</td>
<td>1 day (02/21/17 0441)</td>
<td>&gt;60.0 ml/min/1.73 sq m</td>
<td>Final result</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 days (02/17/17 0015)</td>
<td>&gt;60.0 ml/min/1.73 sq m</td>
<td>Final result</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>13 days (02/08/17 1246)</td>
<td>&gt;60.0 ml/min/1.73 sq m</td>
<td>Final result</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Best Practice Advisory - Provider

GFR = Laboratory value that reflects kidney function. GFR < 60 will generate the BPA.
Best Practice Advisory - Nursing

Nurse receives BPA at time of administering NSAID.
Nurse-Driven Hypotension Protocol

Orthopedic Total Joint Hypotension Protocol for Nursing

For Any SBP < 80 mmHg Page Orthopedic Surgery
- SLUHN POST-OP AKI PREVENTION POCKET CARD

**Step 1**
- Repeat BP in Opposite Arm
  - SBP < 100 mmHg: Confirm
  - Nursing Communication: Step 1: Repeat BP in opposite arm to confirm
    - Routine, Once First Occurrence Today at 12:01
    - Step 1: Repeat BP in opposite arm to confirm

**Step 2**
- Confirmed SBP < 100 mmHg
  - Give 1000 mL LR bolus over 30 minutes and recheck BP one hour after completed
  - [ ] Give 1000 mL LR over 30 minutes and recheck BP one hour after completed

**Step 3**
- 1 hour re-check: if SBP < 100 mmHg:
  - Give 1000 mL LR bolus over 30 minutes and recheck BP one hour after completed
  - [ ] Give 1000 mL LR over 30 minutes and recheck BP one hour after completed

**Step 4**
- 2 hour re-check: if SBP < 100 mmHg:
  - Call Orthopedic Surgery
    - Routine, Once, Starting 4/28/17
    - Step 4: If SBP still less than 100 mmHg, page orthopedic surgery
      - Routine, Once, Starting 4/28/17
      - Step 4: If SBP still less than 100 mmHg, page orthopedic surgery
BPA for Nurse for Systolic BP ≤100

New BPA

Who?: Inpatient Nurses
What?: New BPA for Systolic BP ≤100

When a patient with a systolic blood pressure ≤100 has an order set used for a total hip replacement post-op or a total knee post-op, and does NOT also have an order for “Ortho Total Joint Hypotension protocol for nursing”, a BPA will fire to prompt the nurse to open order set and accept the protocol, or give a reason as to why they are not initiating the protocol.

The BPA will look like this, giving the nurse the option to open the order set to order the protocol, or choose “do not open”, and an acknowledgement reason must be charted. If the protocol is chosen not to be ordered and documented in this BPA, the BPA will not fire again for one hour. When a choice is made, click Accept. Sign the order with an order mode of “Per Protocol, No Cosign required”.

#IHIFORUM
### Monitoring of the Process

#### BPA's by Specialty

*Click on a specialty and alert desc to see detail data (Grand totals do not provide detailed data)*

<table>
<thead>
<tr>
<th>Specialty</th>
<th>Grand Total</th>
<th>MORPHINE WITH GFR&lt;30</th>
<th>NSAIDS WITH GFR&lt;60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Medicine</td>
<td>104</td>
<td>99</td>
<td>85</td>
</tr>
<tr>
<td>Emergency Medicine</td>
<td>133</td>
<td>58</td>
<td>75</td>
</tr>
<tr>
<td>Critical Care Medicine</td>
<td>36</td>
<td>24</td>
<td>12</td>
</tr>
<tr>
<td>Family Medicine</td>
<td>14</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Medical Surgical</td>
<td>13</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Physician Assistant</td>
<td>13</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>Nurse Practitioner</td>
<td>12</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Orthopedic Surgery</td>
<td>11</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Urology</td>
<td>10</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>General Surgery</td>
<td>8</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Cardiacthoracic Surgery</td>
<td>5</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Intensive Care</td>
<td>5</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Palliative Care</td>
<td>5</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Pulmonary Disease</td>
<td>4</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Perioperative</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Anesthesiology</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Rehabilitation</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Cardiology</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Gastroenterology</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
Results

The Effect of Protocol Implementation and EMR on Clinical Outcome Measures

- Hypotension: Pre-Protocol 13%, Post-Protocol 7.6%, Pre-Post-Protocol 8.3%
- AKI Rate (%): Pre-Protocol 1.2%, Post-Protocol 5.8%, Pre-Post-Protocol 6.3%
- Length of Stay (Average days): Pre-Protocol 2.8, Post-Protocol 2.5, Pre-Post-Protocol 2.5
- Readmission Rate (%): Pre-Protocol 1.9%, Post-Protocol 3.5%, Pre-Post-Protocol 4.2%
- Mortality Rate (%): 0%
AKI REDUCTION – STARTING AT THE END

Akute Kidney Injury (AKI) Reduction – Starting at the End

<table>
<thead>
<tr>
<th>Hypotension</th>
<th>Pre</th>
<th>CY18</th>
<th>2016 Top Decile Peer</th>
<th>Current Top Decile Peer</th>
</tr>
</thead>
<tbody>
<tr>
<td>AKI</td>
<td>14.50%</td>
<td>1.98%</td>
<td>7.17%</td>
<td>1.03%</td>
</tr>
</tbody>
</table>

Hypotension,

| Hypotension | .40% | .72% | 2.03%                | 0.72%                  |

Project Implementation

Initiated Electronic Nurse Hypotension Protocol

Failures in Protocol

Network Dissemination

Hypotension

AKI

#IHIFORUM
Key Takeaways

- Identify a problem before you act
- *Simple* measures done well and consistently can have a huge positive impact
- Keep your eye on the ball or results can slip
- Identify group that writes most of the orders for a particular team – educate and monitor them
- Empowering nurses works; relationships are important
- “Top-down support; bottom-up execution”
- Utilize EMR to drive adherence/compliance
- Integrate house staff
- Keep up with education because of resident, AP and MD turnover
After Today, Keep Learning

Organizations with a sophisticated approach to employee development averaged **3x higher growth** from 2008 to 2011.¹

High-performance learning organizations are **8x more likely to be viewed as strategically valuable** by executives.²

84% of employees at the best performing organizations are receiving the training they need compared to only 16% at the worst performing ones.³

---

² Ibid.

www.PremierInc.com/Quality-Improvement
Drive Improvement with Ongoing Learning

Part 1: Successful Quality Improvement Leadership Strategies to Implement Across an Academic System

Part 2: Kick Acute Kidney Injury to the Curb

Part 3: QualityAdvisor™-Based Metrics Overview for the Academic Collaborative Dashboard

Part 4: Project Perspectives and Medical Staff Outcomes

A Leadership Approach to Reducing Acute Kidney Injury in the Inpatient Population

www.PremierInc.com/Quality-Improvement
Build Structure with Process Maps
Gain Insight Nationally and Next Door

“In half the country, you can find a QUEST Hospital near you!”

- Chief Quality Officer

www.PremierInc.com/Quality-Improvement
**Create Differentiated Performance**

**QUEST® 2020 members**
- **perform 29% better** in receiving **VALUE-BASED PURCHASING INCENTIVE PAYMENTS** than like peers\(^1\)
- **2%** Win, **34%** Lose, **64%** Non-Exempt

**Non-QUEST**
- **2%** Lose, **44%** Non-Exempt, **48%** Win

---

**With less penalties, QUEST® 2020 members**
- **perform 23% better** in the **HOSPITAL-ACQUIRED CONDITION REDUCTION PROGRAM**\(^2\)
- **44.2%** QUEST 2020 performance, **55.8%** Non-QUEST performance

---

**QUEST® 2020 members**
- **perform 8% better** in the Centers for Medicare & Medicaid Services’ **HOSPITAL QUALITY STAR RATINGS**\(^3\)
- **3.24** QUEST 2020, **2.99** Non-QUEST

---

\(^1\) Premier analysis using a national matched sample comparison (n=242), found QUEST® 2020 members had a 29% greater proportion of "winners" in CMS’ 2018 VBP program using the formula: 
\[
\frac{(0.64 - 0.48)}{(0.64 + 0.48) / 2} = 0.2857
\]

\(^2\) Premier analysis using a nationally representative sample of fiscal year 2018 patient safety data obtained from CMS, found QUEST® 2020 members (n=38) received 23% lower percentage of HAC penalties using the formula: 
\[
\frac{(0.558 - 0.442)}{(0.558 + 0.442) / 2} = 0.2300
\]

\(^3\) Premier analysis using the 2018 CMS Star Ratings hospital performance index, found QUEST® 2020 members (n=196) performed 8% higher (3.24 vs. 2.99; p=0.0208) in mean CMS Star Rating score in comparison with a nationally matched sample [(3.24 - 2.99) / ((3.24 + 2.99) / 2) = 0.0803].
Contact Information

Aldo Carmona, MD
Aldo.Carmona@sluhn.org

Donna Sabol, RN, MSN, CPHQ
Donna.Sabol@sluhn.org

Madeleine Biondolillo, MD, MBA
Madeleine.Biondolillo@premierinc.com
Appendix
Additional Next Steps

- General Surgery
- GYN Surgery
- Outpatient AKI Risk Score
- CT Surgery
- Geriatric Bundle
- Vascular Surgery
- Interventional Cardiology
- Urology
Next Steps Continued

- Automated E-Learning
- Centralize Pre-op management - SOC
- PCP education and collaboration