Leadership Saves Lives
Innovation in Use of Data to Improve Care for Patients with AMI

The Problem: As the Leadership Saves Lives guiding coalitions began to try to understand and improve care for patients with AMI, they uncovered a problem. Although they were swimming in data, they needed better ways to integrate and communicate data across the care continuum to foster improvement.

The Response: Coalitions began to work together to develop processes and templates for synthesizing and communicating data for improvement projects, first in the root cause analysis stage, and then in the intervention/improvement stage. We present two case examples.

Case Study 1: Holistic mortality review
As one of their first activities together, guiding coalitions from LSL hospitals embarked upon a holistic root cause analysis to identify opportunities to improve outcomes for patients with AMI. Traditional approaches to mortality review provided little useful data to guide improvement. One LSL hospital set out to change this, adapting the Mayo Clinic Mortality Review System to systematically and proactively capture opportunities for improvement. We describe their rationale, the resulting approach, and lessons learned from the implementation experience.

Case Study 2: Case feedback to the full care team
High quality care for patients with AMI requires engagement of healthcare professionals from across the care continuum (from prehospital emergency providers to community based cardiac rehabilitation programs). Once a patient has moved to the next step, it can be difficult to systematically circle back to share outcomes or opportunities for improvement. Several LSL hospitals set out to improve case feedback loops, including more complete immediate feedback on patients with STEMI, and more comprehensive quarterly case review with all ACS care Providers.

In this toolkit
The toolkit includes an editable PowerPoint deck on each of the two case studies, including rationale for the approach, the resulting tool, reflections on implementation experience, and a note about the importance of tailoring this approach to your local hospital context.
Innovation in Data for Improvement:
Holistic Mortality Review
Rationale for the approach

As one of their first activities together, guiding coalitions from LSL hospitals embarked upon a holistic root cause analysis, aiming to integrate perspectives and evidence from across the care continuum to identify opportunities to improve outcomes for patients with AMI.

In many LSL sites, providers felt that there was little room for improvement in mortality rates. Further, traditional approaches to mortality review provided little data to inform them otherwise, due to several limitations:

1. In many settings, mortality reviews were completed only for cases in which something ‘went wrong’

2. In many settings, reviews focused on finding the most proximal preventable reason for a person’s death, rather than identifying all systems opportunities for improvement

3. Few review processes allowed for drawing of patterns ACROSS patient experiences to identify opportunities to improve.
One LSL hospital set out to better capture opportunities for improvement, adapting the Mayo Clinic Mortality Review System for their context.

“We were almost a top performing hospital. The question then became, “What do you do then? How do you improve?” We were at a loss not knowing what we could do. Our LSL facilitator heard all of this. She said, “I think you need to come up with your own strategies for X.” That was a good idea. Then she said, “Well, you’ll have to do a root cause analysis, a mortality chart review, and you have to find an instrument that records X.” I was just saying, “No, I don’t wanna do any of this stuff. This is down the rabbit hole.” But we did.

--- Guiding Coalition Member
3-page review form

For a larger and fully editable version of the form, please refer back to the LSL Toolkit.
“The idea was, as deaths occur, let’s not only review the record, but let’s talk to folks face to face and see what kind of insights we might get. And as we go along, we’ll track this information and determine if there are any negative trends occurring.

The objective was within three days to have (physician) and one of the nurse managers interview the folks directly involved with that case and ultimately determine, “Hey, what could we have done differently? What could we have done better here?”

--- Guiding Coalition Member
Embedding data management tools

“Frankly nobody had really spent much time figuring out how to do a mortality chart review. I think we were the first group in the institution to figure this out. For our own convenience, we put it on this piece of software called REDCap that allowed the reviewers to just enter the stuff in and then allowed us to spreadsheet it and take a look at it. That became the base product that now is going forward institution-wide for mortality chart reviews. Now, all of sudden, that’s become very popular.”

-- Guiding Coalition Member
Frankly, you can do all the mortality chart reviews you want. People are going to be very resistant to actually saying, “This caused this death.” No one is going to. If you look at the published data on it, the incidents of some screw-up or some delay or deficiency causing a death is generally one percent or less…It’s partly because it’s very hard to tell for sure just from reviewing a chart. It’s partly probably because nobody wants to actually go there because it’s a bag of worms.”

The reaction was mixed. There was a lot of resistance that we weren’t acting on data that was comprehensive. If you’re only looking at deaths, you’re looking at small numbers, and you’re looking at a select group. You don’t really know whether you have a deficiency somewhere or whether it just happened in the group that died and it actually isn’t deficient at all.”

--- Guiding Coalition Members
“Then we get a bunch of data, didn’t really know what it meant. I sat down with it and I plugged through it, and I started noticing things. These were only people that died, but I started noticing things....

We had 11 different domains of things that could go wrong. One of the big ones was delay. Never any delays in STEMI’s, but in NSTEMI’s delays. Then I started looking at, “Okay, what happens to the NSTEMI’s?” These NSTEMI’s that die, why do they die? Where do they die? ... Basically we centered everything around those observations.”

--- Guiding Coalition Member
Disclaimer

The example templates in this Practice Brief were generously shared by the Dartmouth-Hitchcock Medical Center.

They are intended to serve as a starting point for conversations about how to improve use of data to improve care for patients with AMI, and should not be interpreted as an endorsed clinical guideline.

We encourage hospital teams to adapt these approaches to their own needs and local context.
Sample AMI Death Review Form

Reviewer Role: □QA/RN  □ QA/MD  □ RN  □ MD  □ OTHER ____________________________

MRN: ______________ Name: First ___________ MI ___________ Last ___________ Gender: M F, Age:____ LOS:____

Admission:
Date: ____/____/_____ Time:____:_____ Day of week: Mo Tu We Th Fr Sa Su
Admitting Service: ____________________________ Adm. Provider: ____________________________
Chief Complaint: Drop Down
Adm. Source: □ MD; □ Clinic; □ ED; □ SNF transfer; □ Acute care hosp transfer; □ CAH; □ Other Facility of Transfer: ______

Admitting DX: □ STEMI  □ NSTEMI  □ OTHER__________________________

TIMI Risk Scores (circle all that apply and add scores)

<table>
<thead>
<tr>
<th>STEMI</th>
<th>pts</th>
<th>NSTEMI</th>
<th>pts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age ≥ 75</td>
<td>3</td>
<td>Age ≥65</td>
<td>1</td>
</tr>
<tr>
<td>Age 65-74</td>
<td>2</td>
<td>≥3 CAD risk factors</td>
<td>1</td>
</tr>
<tr>
<td>DM or HTN or angina</td>
<td>1</td>
<td>Known coronary stenosis ≥50%</td>
<td>1</td>
</tr>
<tr>
<td>SBP &lt; 100 mmHg</td>
<td>3</td>
<td>Aspirin use in past 7 days</td>
<td>1</td>
</tr>
<tr>
<td>HR &gt; 100 bpm</td>
<td>2</td>
<td>2 angina episodes in prior 24 hrs</td>
<td>1</td>
</tr>
<tr>
<td>Killip Class II-IV</td>
<td>2</td>
<td>Positive cardiac biomarker</td>
<td>1</td>
</tr>
<tr>
<td>Weight &lt;67 Kg (150 lbs)</td>
<td>1</td>
<td>ST deviation ≥0.5 mm on admission ECG</td>
<td>1</td>
</tr>
<tr>
<td>Anterior ST elevation or LBBB</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Time to reperfusion Tx &gt; 4 hrs</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

Total Total

Were there other potential explanations for positive troponin? (mark all that apply)

□ Congestive Heart Failure  □ Pulmonary Embolus  □ Renal failure  □ Cardiac contusion/trauma  □ Defib/ICD/cardioversion shock  □ Myocarditis  □ Stress induced cardiomyopathy  □ Vasospasm  □ Aortic dissection  □ Post PCI  □ None of the listed

Hospitalization:
Rapid Response Team activation: Y N N/A  If yes, how many times?____  Date: ____/____/_____  Date: ____/____/_____
Initial CODE Status: □ DNR  □ Full Code  □ Modified Code
Initial CMO Status:  Y N N/A
Was CODE Status changed? Y N N/A  If yes  Date: ____/____/_____  To what? □ DNR  □ Full Code  □ Modified Code
Was patient made CMO? Y N N/A  If yes  Date: ____/____/_____  

Attending Provider: ____________________________  Consulting Service: ____________________________
Days spent in each: ICU:____  PACU:____  Holding:____  ED:_____  Inpatient Unit:____

Surgeries & Special Procedures (require conscious sedation or higher e.g. endoscopy, IR, cath & EP lab procedures):

- Pre-AMI (1 week) □ No Surgery  □ GI  □ GU  □ Orthopedic  □ Neuro  □ Cardiothoracic  □ Vascular  □ Other
- Post-AMI □ No Surgery  □ GI  □ GU  □ Orthopedic  □ Neuro  □ Cardiothoracic  □ Vascular  □ Other

Death: Date: ____/____/_____  Cause of death: ____________________________
Disch. Service ___________  Disch. Provider: ____________________________
Autopsy: □ Requested/Performed  □ Requested/Family refused  □ ME Case  □ Not Requested/Not Performed
Death within 48 hours of admission  Yes  No
Death occurred during a readmission that was within 30 days of a previous hospitalization  Yes  No
Diagnoses (circle all that apply)

Was treatment required for:
- Atrial fibrillation
- Ventricular tachycardia
- Cardiac arrest
- Shock or hypotension
- Heart failure
- Stroke
- Recurrent Ischemia
- Acute stent thrombosis
- Hemorrhagic complication of cath
- GI bleeding

Procedures (circle all that apply)

Were any of the following performed:
- Cath
- PCI
- Balloon pump or Impella
- Cardiac surgery
- Pacemaker
- Defibrillator
- Endoscopy
- Dialysis

Was there significant delay? Yes No
(in recognition of the clinical situation or in making the diagnosis or wrong or missed diagnosis)

Contributed to or Caused Death? Yes Possible No

Circle all that apply:
1. Cardiac (ischemia, rupture, valvular, electrophysiologic) Y N
2. Exsanguination Y N
3. Gastroenterology (NOT ischemia) Y N
4. Neurologic (intracranial or spinal) Y N
5. Pulmonary (including OSA) Y N
6. Pulmonary embolus Y N
7. Radiologic finding (fractures, bleeds, infections) Y N
8. Renal/electrolyte Y N
9. Sepsis Y N
10. Vascular (peripheral, mesenteric, etc.) Y N
11. HERT Team Activation Y N
12. Other diagnosis issue Y N

Was there failure in documentation or communication? (circle all that apply) Yes No
Contributed to or Caused Death? Yes Possible No

1. Closing the loop (e.g. after consult) Y N
2. Event documentation Y N
3. Hand-off(s) Y N
4. Pre-hospital/direct admission communication Y N
5. Resuscitation status Y N
6. Attending provider signing within 24 hrs. of admission Y N
7. Other documentation/communication issue Y N

Was there an iatrogenic infection? (Circle all that apply) Yes No
DH Acquired? Yes No

1. Aspiration pneumonia Y N
2. Catheter-associated blood stream infection Y N
3. Catheter-associated urinary tract infection Y N
4. Clostridium difficile disease Y N
5. Healthcare associated pneumonia Y N
6. Surgical site infection Y N
7. Ventilator associated pneumonia Y N
8. Other infection issue Y N

Were there medication errors? Yes No
(administered inappropriately or missed altogether or administered in a substandard way)
Contributed to or Caused Death? Yes Possible No

Circle all that apply:
1. Antibiotic Y N
2. Anticoagulation Y N
3. Chemotherapy Y N
4. Insulin, oral hyperglycemic agent Y N
5. Medication reconciliation Y N
6. Pain, anxiolytic, sleep, or other sedating medication Y N
7. Pro-arrhythmic Y N
8. Other medication issue Y N

Were there any falls or other misadventures? Yes No Other
Contributed to or Caused Death? Yes Possible No
DH Acquired? Yes No

Were there issues with appropriate palliation? (Circle all that apply) Yes No
Contributed to or Caused Death? Yes Possible No

- Appropriate therapies to ease the dying process are not managed in an appropriate or timely manner? Y N
- Lack of clarity or confusion about the prognosis & expectations of care resulting in the patient’s wishes not being met? Y N
Were there Procedural Issues or Complications? (Circle all that apply)  Yes  No
Contributed to or Caused Death?  Yes  Possible  No
1. Anesthesia  Y  N  6. Interventional gastroenterology  Y  N
2. Appliances/minor procedures (ETT, central venous catheter placement, thoracentesis, chest tube)  Y  N
3. Dialysis  Y  N  7. Interventional pulmonary  Y  N
4. Indication  Y  N  8. Interventional radiology  Y  N
5. Interventional cardiology  Y  N  9. Surgically related  Y  N
10. Other procedure issues  Y  N

Was there failure to institute routine prophylactic measures? (Circle all that apply)  Yes  No
Contributed to or Caused Death?  Yes  Possible  No
1. Aspiration  Y  N  4. Venous thromboembolism  Y  N
2. Peptic Ulcer  Y  N  5. Other prophylaxis issues  Y  N
3. Pneumocystis pneumonia  Y  N

Were there issues involving a resuscitation? (Circle all that apply)  Yes  No
Contributed to or Caused Death?  Yes  Possible  No
1. Intervention Intensity  Y  N  Y  N  3. Team activation  Y  N
2. Recognition of patient condition

Was there evidence of inadequate supervision? (Circle all that apply)  Yes  No
Contributed to or Caused Death?  Yes  Possible  No
1. Advanced Allied Health Professional  Y  N  3. Resident/Fellow  Y  N
2. Nursing  Y  N  4. Other Allied Health Provider  Y  N

Were there Triage effectiveness issues? (Circle all that apply)  Yes  No
Contributed to or Caused Death?  Yes  Possible  No
1. Direct admission  Y  N  3. Transfers  Y  N
2. Discharge  Y  N  4. Other Triage issues  Y  N

Death was:
□ Preventable (An event or complication that is an expected or unexpected sequela of a procedure, disease, illness or injury that could have been prevented or substantially ameliorated) (further review required)
□ Potentially preventable (An event or complication that is a sequela of a procedure, disease, illness or injury that has the potential to be prevented or substantially ameliorated) (further review required)
□ Non-preventable (An event or complication that is a sequela of a procedure, disease, illness or injury for which reasonable and appropriate preventable steps have been taken)

Supporting Comments (required):

Recommmended Disposition of Case:
□ No indication of clinical, quality of care or system issues, therefore, no further review necessary

□ Further review required:
□ Departmental review, specify department(s)
□ Peer review, specify
□ Quality assurance review
□ Other, specify

Remediation recommendation (e.g., counseling, monitoring, education, restriction of privileges):

Reviewer: ________________________________ Date: ____________________
Reviewer: ________________________________ Date: ____________________
Innovation in Data for Improvement: STEMI Case Feedback
The Problem

High quality care for patients with AMI requires engagement of healthcare professionals from across the care continuum, from emergency medical transport, to emergency department triage and STEMI identification, to in-hospital transport, to the cardiac cath lab, to the step-down unit and beyond.

For patients with ST-Elevation Myocardial Infarction, the handoffs from one level of care to the next must be especially quick and effective.

Once a patient has moved to the next step, it can be difficult to systematically circle back with providers earlier in the process to share patient outcomes or opportunities for improvement.
Several LSL hospitals set out to improve the case feedback they provided to healthcare professionals across the care continuum.

For the Billings Clinic and St. Elizabeth Healthcare, this included more complete case feedback on STEMI transfers, as well as more comprehensive review and education with all ACS Care Providers.
For hospitals with very large referral areas, like the Billings Clinic, improving pre-hospital treatment and transfer practices was a priority.
The team developed a more complete case review that included:

1. Presentation and diagnosis
2. Care partners
3. EKG
4. Treatment and outcomes
5. Timing of key intervals
Another LSL hospital included images from the reperfusion to give pre-hospital providers a complete picture of care in a standard template that was shared within 24 hours of the case.
“We also started doing a feedback loop. We were giving them information back on how their patients did, where their times actually were, so they could gauge and maybe work towards improvements. Sometimes I think you’re just not quite aware of exactly where your timelines were for door to needle, door in your facility, door out your facility. And then, also, how their patients did. Saying, “This went really well and your patient did really well.””

--- Guiding Coalition Member
Implementation experience

- Implementation of the STEMI feedback forms were well received across hospital settings.

- In some sites, providing structured feedback helped to reinforce state and receiving hospital processes and protocols.

- Due to increases in number of transfer cases, some sites found it difficult keep up with their goal of sending feedback reports within 24 hours of the case.
St. Elizabeth Healthcare expanded their pre-hospital feedback to include:

- EMS Case of the Month and Crew of the Quarter recognition programs
- Responsive educational offerings (Monthly EMS/Nursing Lecture Series, Mobile educational simulation service, St. Elizabeth EMS course)
St. Elizabeth also invested in equipping providers both within and beyond their healthcare system with Pulsara, new technology for standardized communication via smartphone, including secure EKG transmission and one-touch activation of the Cath Lab.
At the Billings Clinic, quarterly case review, open to all ACS providers across the care continuum, provided an opportunity for learning, reflection, and development of relationships. Continuing education credit helped reinforce participation.
“A lot of our guys don't get to see what happens in the hospital. Once the patient is discharged, we'll get a 911 call. They'll say, "I just got discharged from the hospital for a heart attack." Then we just bring them back. But now we see how they discharge their patients, how they do follow up with their patients. That was an interesting thing to learn.”

“They go over every patient that month, and I think those are really good. I learn a lot. It's interesting to see how well they all flow together, because most of the EMSs now are doing EKG's on scene, and they are radioing ahead. If they're a STEMI, they're bypassing the ER altogether and going straight to the cath lab, which I think is wonderful.”

“They’re coming out with Pulsara. They want to continue with working with the EMS to find out if there’s departments that have issues in the transmission of EKG. They want to assist them whether it's finding funding for them for equipment or getting them equipment.”

“We start off with an education type seminar... we offered [EMS] the opportunity to come through the cath lab so they could see real-time events unfold, and what happens to the patient once they get here, so they know what to expect when they do bring a patient. We'd got feedback that that was not the best situation, so we opened the channels of feedback so they feel very comforted to call us with questionable EKG's so we can help answer those scenarios.”

--- Guiding Coalition Members
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