Speaker Introduction

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Clinical Integrated Solutions
Mercy
Conflict of Interest

Ursula Wright, MSN/MBA, FNP-BC
Todd Stewart M.D.

Has no real or apparent conflicts of interest to report.
Agenda

• Objectives/Benefits
• Background Mercy Pathways
• Local Problem
• Improvement Goals
• Mercy Pathway Development/Workflow
• Health IT Interventions/Heart Failure Specifics
• Clinician Feedback
• Improvement Outcomes
• Lessons Learned
Learning Objectives

• Discuss the necessary knowledge of the process of interdisciplinary standardized evidence-based clinical pathway design, development and use within an enterprise-wide electronic health record

• Demonstrate that a focus on decreasing variation, evidence based medicine and improved patient outcomes when developing clinical pathways results in care that is also cost effective

• Describe how pathways built into the electronic health record serve as valuable tools to support clinical decision support, evidence-based practice, monitoring, change management and continuous process improvement
How Benefits Were Realized for the Value of Health IT

• Treatment/Clinical
  – Improvement in quality of care through reduction in mortality and advancement in efficiency by expediting administration of medications key to treatment, like diuretics for heart failure patients

• Electronic Information/Data
  – Evidence-based pathways bring clinical decision support triggers and evidence-based links to the point of care for providers and interdisciplinary clinicians

• Savings
  – Demonstrate reduction in direct variable cost of care for patients on the pathway. The heart failure pathway reflects reduction in direct variable cost
An Overview of Mercy

Services & Locations

Headquartered in St. Louis with a multi-state footprint, Mercy is the 5th largest Catholic health system in the US.

1827 founded
43 hospitals
350 outpatient facilities
3,500 integrated providers
40,000 co-workers
>$5B revenue
Top 5 best performing large health system*

Opened the first of its kind virtual care center.
Serving millions each year.

1 Physicians & advanced practice clinicians
2 Truven Health 15 Top Health Systems 2016

[Map of Mercy's locations]
Mercy’s Vision for Pathways

• Develop clinical pathways for high volume conditions
  – Improve quality and outcomes for patients
    • Consistent with mission “bring to life the healing ministry of Jesus through compassionate care and exceptional service”
  – Process improvement tools to decrease variation while promoting evidence-based and cost effective health care
    • Consistent with vision to “pioneer a new model” and “get health care right”
Pathway 40+ Conditions Live

Medical

1. 23 Hour Observation: Syncope
2. Abdominal Pain
3. Cellulitis
4. COPD
5. DKA
6. GI Hemorrhage
7. GI Obstruction Non-Surgical
8. Heart Failure
9. Hyperglycemia
10. Intracerebral Hemorrhage
11. Ischemic Stroke with thrombolytics
12. Ischemic Stroke/TIA
13. Pneumonia
14. Sepsis
15. Subarachnoid Hemorrhage
16. Urinary Tract Infection
17. Wound Care—Prevention
18. Wound Care—Treatment

Labor/Postpartum

19. Cesarean Birth Postpartum
20. Labor, Delivery and Postpartum – Vaginal Birth

Surgical

21. Colectomy
22. Bariatric
23. Laparoscopic Cholecystectomy
24. Hip Fracture/Hip Replacement – Adult
25. Hysterectomy
26. Major Head and Neck Surgery, Clean Post-op
27. Major Head and Neck Surgery, Clean Contaminated Post-op
28. Total Knee Replacement

Cardiac

29. A-Tib
30. CABG and Heart Valve Replacement
31. NSTEMI
32. STEMI
33. Unstable Angina and Chest Pain

Critical Care

34. IPPV Respiratory Failure
35. NPPV Respiratory Failure
36. Pulmonary Edema/ARDS
37. Severe Sepsis
38. Septic Shock

Pediatric

39. Asthma
40. Bronchiolitis
41. Pneumonia
42. Well Newborn – Vaginal Birth
43. Well Newborn – Cesarean Birth
## Utilization and Cost Savings

<table>
<thead>
<tr>
<th></th>
<th>Overall Utilization (all pathways)</th>
<th>Overall Savings (direct variable cost)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY 2015</td>
<td>48%-53%</td>
<td>$10 million</td>
</tr>
<tr>
<td>FY 2016</td>
<td>53%-70%</td>
<td>$14 million</td>
</tr>
</tbody>
</table>
Local Problem

- Heart Failure Mortality Rate: Variation of care across the health system contributed to actual mortality rates at the national average of 5%.
- Contribution margins across health system for heart failure, especially related to DRG based reimbursement.
Intended Improvement

• Evidence-based standardized clinical pathway use for 60-80% of inpatient heart failure patients
• Reduce actual mortality rate below national average
• Reduce average time to diuretic in heart failure patients
• Reduce direct variable cost for heart failure patients
Mercy Pathway Development

Design
Evidence review

Optimize
Analyze data and outcomes

Build
EMR workflow, BPAs

Maintain
Update, review of new evidence

Implement
Change management
Pathway Design

• Decision to Develop a Pathway
  – Formal submission and consideration by Mercy Physician Specialty Council
  – Number of lives touched, resources available, benefits etc.

• Experts
  – Lead Physician, Physician Expert Team, Coordinator, Interdisciplinary Experts

• Literature Review
  – Center for Transdisciplinary Learning Methodologies (CTEP) utilized

• Pathway Draft
  – Includes algorithm, orders, outcomes, documentation/tasks, patient education and metrics

• Review & Revise
  – Pathway content is reviewed and revised in light of evidence, complexities and challenges, with an 80/20 approach

• Approval
  – Final approvals include Interdisciplinary Development Team and Physician Specialty Council

• Workflow Process
  – Standard process including evaluation of patient to expected outcomes
## Cycle of Pathway Production

### Cycle of Pathway Production/Review

All workflows (ambulatory, inpatient, post acute etc.) of the pathway goes through each stage of the development or review process but potentially at different times.

<table>
<thead>
<tr>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
<th>Phase 4</th>
<th>Phase 5</th>
<th>Final Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research</td>
<td>Complete First Draft</td>
<td>Review and Revise First Draft</td>
<td>Epic Build Education Development</td>
<td>Review/Testing</td>
<td>Final Build Change Control</td>
</tr>
<tr>
<td><strong>Initial Drafts:</strong></td>
<td><strong>Final Drafts:</strong></td>
<td><strong>Handoff and Content Build in Epic Draft Education</strong></td>
<td><strong>Physician, Pharmacy, and Collaborative Meetings Revisions</strong></td>
<td><strong>Submitted for Change Management Process ~4 weeks</strong></td>
<td></td>
</tr>
<tr>
<td>Pathway Coordinator</td>
<td>Pathway Coordinator</td>
<td>Pathway Coordinator</td>
<td>Pathway Coordinator</td>
<td>Pathway Coordinator</td>
<td>Pathway Coordinator</td>
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<tr>
<td>Lead RN</td>
<td>Lead RN</td>
<td>Lead RN</td>
<td>Lead RN</td>
<td>Lead RN</td>
<td>Lead RN</td>
</tr>
<tr>
<td>Librarian</td>
<td>Librarian</td>
<td>Librarian</td>
<td>Librarian</td>
<td>Librarian</td>
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</tr>
<tr>
<td>Lead Physician</td>
<td>Lead Physician</td>
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<td>Lead Physician</td>
<td>Lead Physician</td>
</tr>
<tr>
<td>Pharmacist</td>
<td>Pharmacist</td>
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<td>Pharmacist</td>
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<tr>
<td>Implementation Lead</td>
<td>Implementation Lead</td>
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<td>Implementation Lead</td>
</tr>
<tr>
<td>SC Physician Team</td>
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<td>SC Physician Team</td>
<td>SC Physician Team</td>
<td>SC Physician Team</td>
<td>SC Physician Team</td>
</tr>
<tr>
<td>Interdisciplinary Members as needed</td>
<td>Interdisciplinary Members as needed</td>
<td>Interdisciplinary Members as needed</td>
<td>Interdisciplinary Members as needed</td>
<td>Interdisciplinary Members as needed</td>
<td>Interdisciplinary Members as needed</td>
</tr>
<tr>
<td>Epic Builders</td>
<td>Epic Builders</td>
<td>Epic Builders</td>
<td>Epic Builders</td>
<td>Epic Builders</td>
<td>Epic Builders</td>
</tr>
</tbody>
</table>
Pathway Algorithm Draft

Draft CHF Emergency Department Algorithm and Inpatient Pathway

Patient presents with symptoms suggestive of heart failure (SOB, LE edema) without CP, Resp. Failure, or Hemodynamic Instability

OR

Patient presents with symptoms suggestive of heart failure (SOB, LE edema) with CP

Diagnostics per protocol:
Troponin, NT Pro-BNP, CMP, Mg ++, ECG, CXR, weight

Initiate CP Protocol

Complete H&P including previous LV function (if available)
Identify reasons for decompensation:
- Noncompliance with medications or diet
- Ischemia
- Arrhythmia
- Worsening concurrent illness
- Other

Utilize Framingham Criteria (see below)

Document 02 Set. on RA as baseline

DBV – Framingham Criteria

Major Criteria:
- Paroxysmal nocturnal dyspnea
- Jugular vein distention
- Cardiomegaly on CXR
- Acute pulmonary edema on CXR
- Positive hepatojugular reflex

Minor Criteria: (acceptable only if not attributed to another medical condition):
- Extremity edema
- Pleural effusion on CXR

Other:
- Nocturnal cough
- Tachycardia > 120/min.
- Hepatomegaly
Health IT Utilization

- Mercy EBP tool
- Order set suggestions/Best Practice Alerts
- Order set design
- Embedded decision support criteria
- Embedded safety parameters
- Built in authorization within scope of practice
- Pathway functionality: patient outcomes
- Pathway functionality: subsequent day orders
- Monitoring tools
Mercy EBP

Mercy EBP is an application for performing Evidence Based Research that is designed to help teams enter PICOT Questions, Evidence and perform Rapid Critical Appraisals. There are three main sections of this application:

**Find a Project**
To get started working on a Project, click on the Find Projects tab above to find the home page of any Projects that you are a member of, or to create new Projects.

You will only find projects that you are currently a member of.

**Evidence Library**
The Evidence Library is a collection of all Evidence that has currently been entered in the system, by any team.

Here you can search for Evidence that has already been entered and evaluated and add it to your project if appropriate.

**Help and Education**
Here you will find training on using this application, as well as education on performing Evidence Based Research.

**PICOT Questions**
In adult patient having TKR surgery, how does TXA (Transesamic Acid) administration compared to no TXA affect blood loss within post-op period?

**Details**

In adult patient having TKR, how does aspirin compared to traditional DVT/PE prophylaxis affect decreased and/or no complications related to DVT or VTE within post-operation period?

**Details**

---

#HIMSS17
**IT Intervention: Order Set Suggestions & Best Practice Alerts**

### Suggestions

<table>
<thead>
<tr>
<th>Advice:</th>
<th>CAR: (PW) HEART FAILURE-ADMIT TO TELEMETRY AND MED SURG</th>
</tr>
</thead>
</table>

### Caution (Advisory: 1)

- **Open Order Set**
- **Do Not Open**

**MED: (PW) SEPSIS/SEPTIC SHOCK ONGOING CARE**

- **NOT a Sepsis Patient**: Defeat to Intensivist

### Quality (Advisories: 4)

#### The patient's chart indicates a diagnosis that requires an ACE inhibitor or ARB therapy at discharge. Please prescribe ACE inhibitor or ARB therapy or if contraindicated, use order below to document contraindication.

<table>
<thead>
<tr>
<th>Order</th>
<th>Do Not Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reason for Not Prescribing ACE/ARB</td>
<td></td>
</tr>
<tr>
<td>REASONS FOR NOT PRESCRIBING ACE / ARB</td>
<td></td>
</tr>
<tr>
<td>captopril (CAPOTEN) 12.5 mg tablet</td>
<td></td>
</tr>
<tr>
<td>lisinopril (PRINIVIL, ZESTRIL) 2.5 mg tablet</td>
<td></td>
</tr>
<tr>
<td>valsartan (DIOVAN) 40 mg tablet</td>
<td></td>
</tr>
<tr>
<td>irbesartan (AVAPRO) 150 mg tablet</td>
<td></td>
</tr>
<tr>
<td>olmesartan (BENICAR) 20 mg tablet</td>
<td></td>
</tr>
<tr>
<td>losartan (COZAAR) 25 mg tablet</td>
<td></td>
</tr>
</tbody>
</table>
Health IT in Heart Failure

- Healthcare Information Technology Interventions and Solutions that impact mortality, average time to diuretic and/or cost
  - **Order set Design** to support evidence based medicine
  - **Clinical Decision Support Criteria Embedded** to *expedite* correct medication dosing and evaluation
  - **Safety Parameters Embedded**
Key Points to Expediting Diuretics

• Order set design
  – Design of order set prevents omissions and inaccuracies in initial orders, thus reducing iterative communications, phone calls and care delays

• Built-in authorization
  – Authorization to take evidence-based actions within the scope of practice of the interdisciplinary team
Order Set Design Examples

Defaulted order to follow pathway

I&O order, Weigh order and Net Diuresis Goal align to pathway outcomes and support expediting diuretic administration
Order Set Design Examples

**Decision Support Guidance on Beta Blocker order and dose.**

**Decision Support Guidance on Lasix dose.**

**Defaulted Diuretic order; including “now” dose expedite.**
# Order Set Design Optimization

<table>
<thead>
<tr>
<th>Category</th>
<th>Original Workflow</th>
<th>Optimized Workflow</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Medication Organization</strong></td>
<td>• Organized alphabetically in therapeutic class sections</td>
<td>• Arranged in logical decision making order</td>
</tr>
<tr>
<td></td>
<td>• Did not follow clinical thought pattern</td>
<td>• Lead with most important therapy for treatment of volume overload</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Include clinical decision support on optimal dosing strategy</td>
</tr>
<tr>
<td><strong>Beta blockers, ACEI/ARBs</strong></td>
<td>• Required sections with hard stops to order or cite a reason for not ordering medications that reduce morbidity and mortality for heart failure i.e. beta blockers and ACEI/ARB on the initial admission order set</td>
<td>• Relocated these medications to subsequent day orders when more clinically appropriate</td>
</tr>
<tr>
<td></td>
<td>• Timing off for initial care that is focused on instability and volume overload</td>
<td>• Organized in order of guideline recommendations, patient considerations and cost</td>
</tr>
<tr>
<td></td>
<td>• Did not take into account medication reconciliation of home medications in these classes</td>
<td>• Eliminated required hard stop in order set and moved to discharge portion of the process with best practice alert if not ordered</td>
</tr>
<tr>
<td><strong>Subsequent Day Orders</strong></td>
<td>• Subsequent day orders repeated many of the initial day orders.</td>
<td>• Organized medications in clinically stable, clinically worsening, and ready for discharge in order of potential clinical need and cost effectiveness</td>
</tr>
<tr>
<td></td>
<td>• Organized in alphabetical order and cumbersome to navigate</td>
<td></td>
</tr>
</tbody>
</table>
### IT Intervention: Expected Outcomes

**INTERDIS PW: HEART FAILURE-ADMIT TO TELEMETRY AND MED SURG**

<table>
<thead>
<tr>
<th>Pathway Day 1</th>
<th>Pathway Day 2</th>
<th>Pathway Day 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>Future</td>
<td>Future</td>
</tr>
<tr>
<td>Today at 2322</td>
<td>Tomorrow at 2322</td>
<td>12/23/16 2322</td>
</tr>
<tr>
<td>1 Day</td>
<td>1 Day</td>
<td>1 Day</td>
</tr>
</tbody>
</table>

**Group by: Order/Documentation Type, Pathway View**

**Collapse All**

**Outcomes**

- **Day 1 Outcomes**
  - **Fluid Management:** Patient met net daily diuresis goal - Last documented as "Not Met" on 12/21/16 2327 by Som Inpatient, Physician, DO.
  - **Respiratory:** Patient's oxygen saturation maintained above 90% unless otherwise specified - Last documented as "Met" on 12/21/16 2327 by Som Inpatient, Physician, DO.
  - **Symptom Management:** Patient reports improvement in symptoms since arrival - Last documented as "Not Met" on 12/21/16 2327 by Som Inpatient, Physician, DO.
  - **Activity:** Patient able to sit up in the chair for greater than or equal to 20 minutes within the first 24 hours. - Last documented as "Not Met" on 12/21/16 2327 by Som Inpatient, Physician, DO.
  - **Hemodynamic:** Patient tolerated cardioprotective meds (beta blocker, ACE, ARB that are currently ordered) - Last documented as "Met" on 12/21/16 2327 by Som Inpatient, Physician, DO.
IT Intervention: Subsequent Day Orders

Ordering from Subsequent Days on the Pathway

1. Go to “Manage Orders”
2. Select “Pathway” tab
3. Go to hyperlink for Active Pathway
4. Select desired orders from subsequent days or discharge
5. Select Condition for suggested related orders

Pathway Day 2
Expected start: Tomorrow at 23:00
Expected end: 12/30/2016 at 00:00

- Clinically Stable Orders
- Clinically Worsening Orders
- Discharge Ready
Average Time to Diuretics

<table>
<thead>
<tr>
<th></th>
<th>Quarter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Q1</td>
</tr>
<tr>
<td>FY15 HF ON PW: Avg Door</td>
<td>10.54</td>
</tr>
<tr>
<td>to Diuretic</td>
<td></td>
</tr>
<tr>
<td>FY15 HF OFF PW: Avg Door</td>
<td>12.92</td>
</tr>
<tr>
<td>to Diuretic</td>
<td></td>
</tr>
<tr>
<td>BASELINE FY14 HF Avg</td>
<td>10.78</td>
</tr>
<tr>
<td>Door to Diuretic</td>
<td></td>
</tr>
<tr>
<td>FY16 HF ON PW: Avg Door</td>
<td>8.97</td>
</tr>
<tr>
<td>to Diuretic</td>
<td></td>
</tr>
<tr>
<td>FY16 HF OFF PW: Avg Door</td>
<td>11.40</td>
</tr>
<tr>
<td>to Diuretic</td>
<td></td>
</tr>
</tbody>
</table>
Summary of IT Interventions

Mercy EBP
- Mercy Intranet Based Software

Decision Support
- Evidence based order set templates

Ayasdi Care
- Big data analytics

Epic EHR
- Standard orders, pathway and triggers

SAP Analytics
- Performance Measures
Mercy Clinicians Feedback
Heart Failure Pathway Utilization

Provider Compliance Trend

Provider Compliance Patients

Primary Pathway

Fiscal Year

2017
2016
Heart Failure Mortality

Mercy Heart Failure Actual Mortality Rates


Heart Failure National

Actual Mortality Percentage

Q1 FY14 Q2 FY14 Q3 FY14 Q4 FY14 Q1 FY15 Q2 FY15 Q3 FY15 Q4 FY15 Q1 FY16 Q2 FY16 Q3 FY16 Q4 FY16

Quarters
Heart Failure Direct Variable Costs

![Graph showing Mercy Heart Failure Direct Variable Costs from July 2014 through March 2016 for Heart Failure ON PW and Heart Failure OFF PW.]

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Heart Failure ON PW</th>
<th>Heart Failure OFF PW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1 FY15</td>
<td>$3,193.00</td>
<td>$3,902.00</td>
</tr>
<tr>
<td>Q2 FY15</td>
<td>$3,330.00</td>
<td>$4,270.00</td>
</tr>
<tr>
<td>Q3 FY16</td>
<td>$3,348.00</td>
<td>$4,017.00</td>
</tr>
<tr>
<td>Q4 FY15</td>
<td>$3,345.00</td>
<td>$3,908.00</td>
</tr>
<tr>
<td>Q1 FY16</td>
<td>$3,202.00</td>
<td>$4,086.00</td>
</tr>
<tr>
<td>Q2 FY16</td>
<td>$4,145.00</td>
<td>$4,739.00</td>
</tr>
<tr>
<td>Q3 FY16</td>
<td>$4,184.00</td>
<td>$5,162.00</td>
</tr>
<tr>
<td>Q4 FY16</td>
<td>$4,410.00</td>
<td>$5,398.00</td>
</tr>
</tbody>
</table>
Lessons Learned

• Focus on quality with awareness of cost = improvements in quality of care and cost effectiveness

• Establish governance structure with representation across the system
  – Key to establishing creditability and supporting processes

• Align compensation and recognition with the utilization of pathways
  – improves adoption

• Develop standard implementation/support plan with flexibility to account for facility-specific needs

• Develop formal communication and education plans/tools
Implementation

Task of the Facility Implementation Team

- Plan project life cycle
- Build the implementation schedule
- Create a communication/education plan
- Define the Facility Implementation Team duties
- Define goals/objectives

- Collect and Submit Pathways Issues
- Suggest Pathway Improvements
- Participate in sub teams to determine optimization and innovation solutions
- Obtain feedback and buy in on proposed optimizations from clinicians

- Review Dashboard, Scorecards and other tools provided
- Plan & Work with Facility Leaders & Physicians to improve utilization
- Review daily Potential Pathway Opportunities report

- Evaluate Facility Status
- Continue Communication and Education
- Confirm support line/pager
- Confirm Super user support
- Attend Go Live Calls
- Escalate issues and concerns

Implementation  Optimization

Utilization  Go-Live
A Summary of How Benefits Were Realized for the Value of Health IT

- **Treatment/Clinical**
  - Improvement in quality of care through great than 50% reduction in mortality and advancement in efficiency by expediting administration of medications key to treatment, like diuretics for heart failure patients administered on average 1-3 hours sooner

- **Electronic Information/Data**
  - Evidence-based pathways bring clinical decision support triggers and evidence-based links to the point of care for providers and interdisciplinary clinicians

- **Savings**
  - Demonstrate reduction in direct variable cost of care for patients on the pathway. The heart failure pathway reflects reduction in direct variable cost of $800 per case on average
Questions?

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• Todd Stewart, M.D.  
  todd.stewart@mercy.net

• References available upon request

• Please complete online session evaluation