A Heart Failure Observation Pilot: Multidisciplinary Lessons

Kismet D. Rasmusson, NP

Michael Woodruff, MD
Co-Chair, iCentra ED CPOE Team; Emergency Physician, Utah Emergency Physicians
A Heart Failure Observation Pilot: Multidisciplinary Lessons

Michael Woodruff, MD
Kismet Rasmusson, DNP
Opportunities to Improve Care

More than readmissions?

Intermountain already has one of the lowest 30 day readmit rates for HF patients

• <20% compared to 24% nationally

2014 Convened multidisciplinary team to identify opportunities to improve care for Acute Decompensated Heart Failure episodes

• MDs (HF, Cardiology, Hospitalist, ED), CV RN Admin, Clinical Programs Admin, HF NP, ED staff, IT
Opportunities to Improve Care

HF 30 Day Readmission rate

- Intermountain: 0.18
- National Avg: 0.24

0.3

0.24

0.18

Intermountain

National Avg
Opportunities to Improve Care
Identifying targets for improvement 2013 Data Review

• 73 - 76% of all HF patients admitted through the ED (0.4% of all ED visits)
• ED admit rate 77% (compares to 80% nationally)
• Admitted patients - 1% had LOS < 12 hrs, 7% <24 hrs
• 24% 2 midnights
• Observation rate 1.2%
Acute Decompensated HF

Process Map

Clinic → ED

ED → HF? → Treat → RS (1) → Home

Home → ED Obs

ED Obs → Inpatient

Inpatient → Hosp Obs

Hosp Obs → RS(2)

Clinic → Homecare

Homecare → Home

Home → Care Mgmt

Care Mgmt → Care Mgmt?
### Admitted Acute Heart Failure Patients Breakdown by APRDGR SOI and Length of Stay

<table>
<thead>
<tr>
<th>APRDGR SOI Score</th>
<th>LOS Group</th>
<th>% of Total Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1-day</td>
<td>2-day</td>
</tr>
<tr>
<td>1</td>
<td>33.04%</td>
<td>30.43%</td>
</tr>
<tr>
<td>2</td>
<td>17.23%</td>
<td>30.91%</td>
</tr>
<tr>
<td>3</td>
<td>9.27%</td>
<td>19.18%</td>
</tr>
<tr>
<td>4</td>
<td>5.88%</td>
<td>7.65%</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>13.07%</strong></td>
<td><strong>22.66%</strong></td>
</tr>
</tbody>
</table>
Targets for Improvement

Specific Aims

Improve the health of Acute HF patients

- Reduce number of patients with an acute heart failure episode who need a hospital admission
- Reduce the number of patients with an acute heart failure episode who need a two-midnight hospital stay
- Reduce return visits (ED and Inpatient) for acute care of heart failure
- Improve adherence to best clinical practice

Reduce per capita cost

- Decrease the cost of acute HF episodes

Improve Patient Experience

- Improve patient satisfaction with care of their acute HF episode
- Reduce ED and inpatient LOS for patients with acute HF
Targets for Intervention
Plan to Pilot at IMC

• ED admission decision: identifying patients who need admission, and who is safe to go home

• Observation unit / fast track process for lower risk patients targeted for decreased LOS and enhanced care efficiency

• Enhanced outpatient followup for discharged patients
Targets for Improvement

Metrics / Data Plan

- ED admit rate [inpatient and observation (obs)]
  - % HF clinic patients admitted
- 30 day return to ED rate for ED discharge, inpatient discharge, obs discharge
- 30 day readmission rate
- Process measures:
  - Adequacy of optimal therapy (ACE/BB/AA) (obs/inpatient only)
  - Orderset use
  - LV function measurement (ED vs Inpatient)
  - Documented patient education- MAWDS-HF
  - Percent compliance with early discharge follow-up
  - Weight loss achieved (optional)
  - Time to diuretic dose (optional)
  - CV consultation
  - Transition planning
- Cost of acute HF episode
- ED length of stay
- Patient experience for acute HF cohort
Formulating the Pilot

Literature review

• Expert consensus and experimental articles suggesting that we over admit HF patients presenting to the ED
• Multiple observation pathways gathered from other institutions


Defining problem and goals
Gather Team
Lit Review
ED workflow
Ordersets
Data design
Location of pilot?
Diuretic protocol review
Pilot location selected
Review metrics
Review OBS process
Feedback and metrics review
Pathway revised
Case review
IMCP Conference

Project Timeline

2014

2015

2013 data review
Solidify aims
Clinical Pathway
ED and OBS unit pathways
Data plan review
ED, CV prep review
Pilot start selected
Pilot Start
Review CM involvement
Review ED HF teaching
Metrics review
Acute Exacerbation of Heart Failure Diagnosis

SBP > 160
- Options: NTG (SL or IV) NIPPV IV loop diuretic (if signs of volume overload) Order: "Record Urine output"

SBP 100-160
- Options: NIPPV IV loop diuretic Order: "Record Urine output"

Unstable
ICU
HF MD if established clinic patient, Otherwise general cardiologist

2 Hrs: Disposition Decision*

Did not require NIPPV
- Prompt Diuresis >500 ml
- SBP > 100
- Non-ischemic ECG
- Troponin negative
- Feeling improved
- Able to be seen within 7 days (CM consult)

Partial Diuresis >250ml
- SBP > 100
- HR < 120
- SaO2 >90% 6L NC max
- Non-ischemic ECG
- Troponin negative or at baseline
- Cr < 3.0

Consider Discharge with 7 day followup: HF clinic, PCP, or own cardiologist

Partial Diuresis >250ml
- SBP > 100
- HR < 120
- SaO2 >90% 6L NC max
- Non-ischemic ECG
- Troponin negative or at baseline
- Cr < 3.0

Call CV Hospitalist (or HF on call w/ established patient) Admit to inpatient Status (note in PTS)

Call CV Hospitalist (or HF on call w/ established patient) Admit to inpatient Status (note in PTS)

Under certain circumstances (ex. New Diagnosis of HF, Troponin rise, Cr > 3.0, etc) disposition may be clear sooner than 2 hrs
Acute Exacerbation of Heart Failure Diagnosis

SBP > 160
- Options: NTG (SL or IV) NIPPV IV loop diuretic (if signs of volume overload)
  Order: “Record Urine output”

SBP 100-160
- Options: NIPPV IV loop diuretic
  Order: “Record Urine output”

ICU
HF MD if established clinic patient. Otherwise, general cardiologist

Unstable

Still Requiring NIPPV or unstable VS

2 Hrs: Disposition Decision*

*Note: Decision made based on clinical stability and patient response to initial management.
2 Hrs: Disposition Decision

Did not require NIPPV
- Prompt Diuresis >500 ml
- SBP > 100
- Non-ischemic ECG
- Troponin negative
- Feeling improved
- Able to be seen within 7 days (CM consult)

Partial Diuresis >250ml
- SBP > 100
- HR < 120
- SaO2 >90% 6L NC max
- Non-ischemic ECG
- Troponin negative or at baseline
- Cr < 3.0

New Diagnosis of HF
- Poor Diuresis < 250ml
- SBP < 100 or >210
- HR >120
- O2 requirement > 6LNC
- Ischemic ECG
- Troponin elevated above baseline
- High clinical suspicion of ACS
- Cr > 3.0
- Concomitant Pneumonia

Call CV Hospitalist
- Admit to Observation Status (note in PTS)

Call CV Hospitalist (or HF on call w/ established patient)
- Admit to Inpatient Status (note in PTS)

Consider Discharge
- with 7 day followup: HF clinic, PCP, or own cardiologist

*Under certain circumstances (eg. New Diagnosis of HF, Troponin rise, Cr > 3.0, etc) disposition may be clear sooner than 2 hrs
## Formulating the Pilot
### Developing Observation Plan

<table>
<thead>
<tr>
<th>ED Side:</th>
<th>Hospital Side:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify HF patients</td>
<td>Fast track orders</td>
</tr>
<tr>
<td>Orders</td>
<td>Staff processes:</td>
</tr>
<tr>
<td>Rapid diuretic administration &amp; monitoring</td>
<td>HUC, pharmacist, RN, CNA</td>
</tr>
<tr>
<td>Determine fast track OBS disposition</td>
<td>High Risk identification</td>
</tr>
<tr>
<td>Communicate with admitting team</td>
<td>Enhanced communication</td>
</tr>
<tr>
<td>Contact bed control, ACCU location</td>
<td>Discharge disposition plan</td>
</tr>
</tbody>
</table>
## Heart Failure Observation Pilot Process

**Planned Start Date: May 1, 2015**

<table>
<thead>
<tr>
<th>Process</th>
<th>Key RN Responsibilities</th>
</tr>
</thead>
</table>
| **Emergency Department** | • Pt identified by ED physician as HF Obs  
• ED notifies flow and puts HF obs admission in PTS under notes  
• ED RN RN report, include time of last diuretic dose and response | • ED RNs report to unit RN about HF Obs status, diuretic dose, response, etc. |
| **Admission** | • CV Hospitalist completes admission orders (Indicate HF Obs status)  
• Hospitalists note expected discharge (am/pm)  
• HUC expedites orders  
• HUC vocera’s bedside RN and pharmacist that orders are in  
• MA’s assist with tracking UOP and notifying RN of response | • Patient Flow Nurse (PFN) will page Charge Nurse with a specific “admission” indicator so the Charge Nurses are clear this is a “quick recover HF patient”  
• RN knows when last diuretic dose was given and when next dose is due  
• RN places yellow “quick recovery” sheet on BR door, with MAWDS-HF poster  
• MAWDS-HF begins on admission |
| **Obs interventions** | • See order set | • Stay focused on diuretic orders and response  
• RN work with pharmacy to expedite all med delivery as ordered |
| **Discharge** | • Plan 7 day f/u with HFRN  
• Plan 72 hr f/u call with HFRN  
• Anticipatory pharmacy education (considering less staff nights/wkend)  
• Scott’s list of local after-hour pharmacies | • D/C education (including medications, especially nights/weekends) |
## Exacerbation of Congestive Heart Failure

### B. Exclusion Criteria

<table>
<thead>
<tr>
<th>Exclusion Criteria</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>EKG evidence of ACS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High clinical suspicion of ACS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unstable vital signs (address RR specifically?)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decreased level of consciousness (GCS &lt; 15)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systolic BP &lt; 90 mm Hg (100mm Collins article)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Low Cardiac output state?)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper limit for Cr, BNP? Lower limit for sodium?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rising troponin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concomitant Pneumonia</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### II. ED Intervention prior to OBS Admit

<table>
<thead>
<tr>
<th>ED Intervention Prior to OBS Admit</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial ECG and CXR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial laboratory studies (CBC/A, CMP, Troponin, PT/INR)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administration of aspirin unless contraindicated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stable period of monitoring and observation (minimum 2 hours)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitoring included: cardiac monitor and pulse oximetry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV diuretic</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Any affirmative means the patient in NOT ELIGIBLE for ER-Based Observation Services.

### III. OBS Unit Interventions

<table>
<thead>
<tr>
<th>EMC Interventions</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous cardiac and pulse oximetry monitoring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid restriction and Urine collection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV diuretic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repeat EKG and Laboratory studies (Troponin, Mag, K, Cr)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potassium / magnesium replacement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Echocardiogram (TTE)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stress testing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardiology evaluation and/or consultation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Care Manager consult</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Staff Processes

• HF fast track patient identified
  • New color used for Kardex- HUC
  • RN/CNA place fast track (“Quick Recovery”) notification in patient’s room
• Medications facilitated by pharmacists
• RN/MD monitoring response
  • Urine output and vital signs
  • Communicate about progress and plans
# Formulating the Pilot

## Developing Observation / Fast Track Plan

### Why are they here?

- Admit Dx: ____________________________
- Surgery/Test/Procedure: ____________________________
- Hx: ____________________________
- DNR/DNI: ____________________________
- Acuity/Concerns: ____________________________

### 2-When are they going?

- Anticipated D/C date: ____________________________

### 6-Disposition

- Where: ____________________________
- Transportation: ____________________________
- Case Manager: ____________________________
- Case Management Issues: ____________________________

### 5-Risk for Re-admission?

- Problem meds/Polypharmacy (10+ meds): ____________________________
- Psych issues: ____________________________
- Physical Limitations: ____________________________
- Poor health literacy: ____________________________
- Poor support: ____________________________
- Prior hospitalization: ____________________________
- Palliative care: ____________________________
- Principle Diagnosis: ____________________________

### 3-What are the Barriers?

- Treatments: ____________________________
- PT/CR: ____________________________
- OT: ____________________________
- Speech: ____________________________
- Activity: ____________________________
- Psych/Soc: ____________________________

### 4-Risk for Re-Admission Prevention

- Check with RN to ensure done before discharge:
  - DM teaching: ____________________________
  - MAWDS Gen/HR: ____________________________
  - Pneumo Vac: ____________________________
  - Flu Vac: ____________________________
  - AMI: ____________________________
  - SCIP: ____________________________
  - CVA: ____________________________
  - VTE: ____________________________
  - Clinically Stable: ____________________________
  - F/U appointment: ____________________________
  - Understands Medications: ____________________________
  - Teach back the instructions: ____________________________
  - Knows who to call/when: ____________________________
  - Consents/Referrals made: ____________________________
  - Appropriate Medication Mgmt: ____________________________

### Follow Up Items:

- Partners In Healing: Y____ N____

- Date: ____________________________
- Frequency: ____________________________
- Isolation: ____________________________
- Lab Issue Date: ____________________________
- Other: ____________________________
Formulating the Pilot
Outpatient Followup Plan

• High Risk Heart Failure Pathway:
  • multidisciplinary pathway implementation
• F/U within 7 days of discharge
• F/U call within 72 hours of discharge
  • New call center
  • HF disease specific calls planned for 2016
• Homecare
• Care management for high risk
• Weekend discharge plans
Deployment Plan

Education, Stake Holders and Buy-in

- Solicited Feedback from ED and CV MDs
- Educated Acute Coronary Care Unit Staff
- Educated ED Staff (RN, HUC, Care Mgmt)
- Bed Control
- Inpatient Care Mgmt
- Revenue Integrity
- Educated MDs again
- Educated outpatient clinics
Pilot Data: Early Feedback and Challenges

Adjusting the Process

Solicited feedback from MDs and Staff

• Not enough awareness of protocol
• Urine output measurement not routine for ED RNs
• Not discussing OBS option
• Case review: adjusting parameters (don’t discharge new HF)
Metrics Report
Preliminary Analysis

• Patient cohort
  • Patient 18 years and older with primary diagnosis of Acute heart failure admitted to IMC ED

• Study period (tried to avoid seasonality effect)
  • Pre-pilot phase: May 1, 2014 – Aug 31, 2015
  • Post-pilot phase: May 1, 2015 – Aug 31, 2015

• Outcomes
  • In-patient admission rate
  • Discharge to home rate
  • OBS admission rate
  • 30-day any cause readmission rate in ED discharge home patients
  • 30-day AHF related readmission rate in ED discharge home patients
  • Total cost
ED Admission Rate Pre-Post
May 2014 - Sept 2015
ED Discharge Rate Pre-Post
May 2014 - Sept 2015
OBS Admit Rate Pre-Post
May 2014 - Sept 2015

* Only 4 patients through fast track process *
30 day ED Returns Pre-Post
ED Discharged HF Patients

Before intervention

Post intervention

30 Day Any Cause ED Readmission Rate

30 Day ED HF Related Readmission Rate
30 day ED Returns after Hospital Discharge
Discharged from acute care floor
30 day Hospital Readmissions after ED Discharge
ED Discharged HF Patients

Before intervention

Post intervention

30 Day Any Cause Inpt Readmission Rate

Cases

5/1/14  6/1/14  7/1/14  8/1/14  9/1/14  10/1/14  11/1/14  12/1/14  1/1/15  2/1/15  3/1/15  4/1/15  5/1/15  6/1/15  7/1/15  8/1/15

10.7%  29.1%
30 day Any Cause Hospital Readmissions
Hospital Discharged Patients
Total Cost by Patient Type
May 2014 - Sept 2015

Intervention Start / Month of ESCHRG_DT
Before intervention
Post intervention

Patient Type
- ED
- In-patient
- Out-patient

Avg Total Cost

5/1/14 6/1/14 7/1/14 8/1/14 9/1/14 10/1/14 11/1/14 12/1/14 1/1/15 2/1/15 3/1/15 4/1/15 5/1/15 6/1/15 7/1/15 8/1/15

Patient Type
- ED
- In-patient
- Out-patient

3,490 2,097 14,715 13,613 661 1,903
ED Length of Stay Pre-Post
May 2014 - Sept 2015

![Graph showing ED Length of Stay pre and post intervention. The graph indicates a decrease in average ED LOS from 4.7 hours pre-intervention to 5.0 hours post-intervention.]
## Metrics Pre-Post

<table>
<thead>
<tr>
<th>Patient group</th>
<th>Pre-pilot</th>
<th>Post-pilot</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All IMC ED visits with AHF (N=364)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-patient admission</td>
<td>44/164 (26.8%)</td>
<td>50/200 (25.0%)</td>
<td>0.6916</td>
</tr>
<tr>
<td>OBS admission</td>
<td>5/164 (3.1%)</td>
<td>10/200 (5.0%)</td>
<td>0.3514</td>
</tr>
<tr>
<td>Discharged to home</td>
<td>37/164 (22.6%)</td>
<td>37/200 (18.5%)</td>
<td>0.3381</td>
</tr>
<tr>
<td><strong>IMC ED discharged home patients (N=74)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-day AHF related ED readmission</td>
<td>5/13.5%</td>
<td>5/16.2%</td>
<td>0.2424</td>
</tr>
<tr>
<td>30-day any cause ED readmission</td>
<td>8/21.6%</td>
<td>12/32.4%</td>
<td>0.2951</td>
</tr>
<tr>
<td><strong>ED LOS in hrs</strong></td>
<td>4.8 ± 1.6</td>
<td>5.0 ± 1.5</td>
<td>0.3108</td>
</tr>
</tbody>
</table>
## Cost Pre-Post
### May 2014 - Sept 2015

<table>
<thead>
<tr>
<th>Patient group</th>
<th>Pre-pilot</th>
<th>Post-pilot</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>All IMC ED visits with AHF (N=364)</td>
<td>ED discharged n=74</td>
<td>1,081 ± 277</td>
<td>976 ± 282</td>
</tr>
<tr>
<td>In-patient n=272</td>
<td>12,430 ± 10,992</td>
<td>14,681 ± 20,147</td>
<td>0.2705</td>
</tr>
<tr>
<td>OBS n=16</td>
<td>3,411 ± 1,001</td>
<td>2,892 ± 796</td>
<td>0.2782</td>
</tr>
</tbody>
</table>
Recent Feedback
Adjusting the Process

MD feedback:

• Streamlines process and facilitates discussion
• Some education still needed for urine output monitoring
• Need more communication around who will be admitted to rapid recovery pathway
Stabilizing the Process
Decreasing variation?
Stabilizing the Process
Decreasing variation?

In-patient Admission in ED HF Patient
Region Central Region
Hospital Intermountain Medical Center

Month of DSCHRG_DT

Cases

3/1/14 4/1/14 5/1/14 6/1/14 7/1/14 8/1/14 9/1/14 10/1/14 11/1/14 12/1/14 1/1/15 2/1/15 3/1/15 4/1/15 5/1/15 6/1/15 7/1/15 8/1/15

0% 20% 40% 60% 80% 100%

In-patient Adm.
Next Steps
Improving the Process — Do we continue?

Track Metrics closely

Improve OBS admit rate - MD education, better process for tagging patients as OBS, improve branding of fast track process

Review ED returns

Enhance outpatient f/u for HF patients discharged from ED

Once process is stabilized, consider implementation at large hospitals, system-wide
Team Members:

Deborah Budge - CV Clinical Program Heart Failure Prevention and Treatment Team
Kismet Rasmusson - CV Clinical Program Heart Failure Prevention and Treatment Team
Don Lappe - CV Clinical Program
Colleen Roberts - CV Clinical Program
Troy Creer – CV Director Intermountain Medical Center
Teresa Garrett – Integrated Care Management
Nancy Nelson - Intensive Medicine Clinical Program
Jose Benuzillo – CV Clinical Program
Lydia Dong - Intensive Medicine Clinical Program
Nancy Gundersen - Cardiovascular Hospitalist Lead
Arthur Petersen - Compliance
Amber Vanderstappen - ED Care Management
RJ Bunnell - Hospitalist Development Team
Mike Woodruff - ED Development Team, ED Quality Director