Data Visualization and Improving Quality Outcomes: A Davies Story
Session 20, March 6, 2017
Danielle Oryn DO MPH, CMIO, Petaluma Health Center
Shaun Nelson MPH, Senior Data Analyst, Petaluma Health Center
Umesh Khot, MD – Cleveland Clinic
Kathleen Kravitz, MBA – Cleveland Clinic
Tim Sobol, MS – Cleveland Clinic
Conflict of Interest

Danielle Oryn, DO MPH
Shaun Nelson MPH

Umesh Khot, MD
Vice Chairman, Cardiovascular Medicine
Chief Quality Officer, Heart and Vascular Institute

Has no real or apparent conflicts of interest to report
Agenda

• Background about Petaluma Health Center
• Structure of population health program and the role of data and data visualization with the program
• Three clinical examples of the use of analytics to improve population health

Agenda – Heart Failure Checklist

• Foundational Initiatives
• Proof of Concept
• Electronic Multi Disciplinary Documentation
• Multi Level Inclusion Criteria
• Soft/Hard Stop
• Addressing Clinical Reality
• Clinical Impact
• Technology Innovations
Learning Objectives

• Understand how analytics in the outpatient safety net setting can be used to improve care
• Learn how to engage care teams in using data in day to day patient care
• Understand how using data for improvement of one quality measure can become the infrastructure to improve others.
• Planning for discharge begins during the hospitalization
• Emphasis on data accuracy and identification of patients at admission
• Visualization and analytics at the point of care
Petaluma Health Center

Founded in 1996
Became a Federally Qualified Health Center in 2000

Currently caring for 31,000 patients via 150,000 annual visits

Sites:
Petaluma Health Center
Rohnert Park Health Center
Mary Isaak Center – *Homeless Shelter*
San Antonio High School – *School Based Health Center*
Casa Grande High School - *School Based Health Center*
Santa Rosa Junior College Petaluma - *School Based Health Center*
Petaluma Health Center

Full spectrum family centered primary medical care for children and adults

Adult and pediatric dental care

Women’s health including pregnancy care and gynecology consultation

Integrated behavioral health and psychiatry consultation

Wellness services

Specialty Care

FOCUS ON INTEGRATION OF CARE
Recognition

– NCQA Patient Centered Medical Home recognition, 2013 – present
– Joint Commission accreditation for Ambulatory Care with Primary Care Medical Home, 2015 - present
– HRSA Health Center Quality Leaders – 2016
– HRSA National Quality Leaders - 2016
– CDC Million Hearts Champion – 2015
– HIMSS Davies Award - 2017
Quality Improvement Components at PHC

Informatics  
Quality  
Innovation

Structure
Function
Culture
Population Health Structural Cornerstones

1. Huddle
2. Recall
3. Time dedicated to panel management of patients with chronic illness
4. Identifying populations for ancillary services to improve health
Data Mining

Relevant Data Warehouse

Tableau

eClinicalworks EHR

Dentrix EDR

End User Web Applications
Data Presentation

Grounded by QI Plan & PHC measures inventory

Data quality first and ongoing data validation

Data is available online to all care team members at all times

All data is un-blinded and specific to provider and or care team

Dashboards tailored to audience and function
Outline

• Diabetes
  – Care Gaps
  – Recall Campaign
  – Quality measures for population health team time
  – Health Educator report or wellness report specific to diabetes

• Hepatitis C
  – Care Gaps for screening and treatment
  – Quality measures for screening and treatment
  – Report to pull patients who qualify for treatment

• Integrated services reports
  – Integrated Behavioral Health
  – Case Management and Patient Navigation report
  – Care gaps for pediatric or OB dental integration
<table>
<thead>
<tr>
<th>2:00 PM</th>
<th>John Doe</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV</td>
<td>Female 64 years old</td>
</tr>
<tr>
<td>MRN</td>
<td>116883</td>
</tr>
<tr>
<td>PCG</td>
<td>Sean Upton</td>
</tr>
<tr>
<td>Risk Score</td>
<td>2.5</td>
</tr>
</tbody>
</table>

**Care Gaps**

- **Flu Shot (Over 2 Years Old)**  
  *Recommended Intervention*: Give Flu Shot

- **Due for Annual Retinal Eye Exam (Dx of Diabetes)**  
  *Recommended Intervention*: Schedule Eye Exam

- **Due for Comp (DM, Cirrhosis, HTN, taking an ACE inhibitor ARB or diuretic, Over 18 with BMI >= 30, Under 18 with BMI Percentile > 95)**  
  *Recommended Intervention*: Order Comprehensive Metabolic Panel

- **Due for Potassium/Creatinine (DX HTN OR taking an ACE inhibitor ARB or diuretic)**  
  *Recommended Intervention*: Order Comprehensive Metabolic Panel

- **Due for HIV Screening**  
  *Recommended Intervention*: Order HIV Screening Lab

- **Due for Nephropathy Screening (Dx of Diabetes)**  
  *Recommended Intervention*: Order Urine Microalbumin/Creatinine Today

- **Due for Pneumococcal (DX Diabetes)**  
  *Recommended Intervention*: Order Pneumococcal Vaccine

- **Due for A1C (Dx of Diabetes)**  
  *Recommended Intervention*: Complete A1C Test Today
Hemoglobin A1c Campaign

Your message reach
Unique patients vs modality

Your
Messages sent (Last 7 Days)

<table>
<thead>
<tr>
<th>Trend</th>
<th>Modality</th>
<th>Total messages with success</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>eMessage</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>SMS</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Voice</td>
<td>20</td>
</tr>
</tbody>
</table>

Successful delivery: 86.8%
Failed delivery: 13.2%
INCENTIVE - Diabetes: Blood Sugar Control

Compliance: 75%

Compliance trend:

Compliance by Provider Team:
- CB Team 100%
- Petaluma Team 2 78%
- Petaluma Team 3 75%
- Petaluma Team 1 75%
- RP Team 2 75%

Compliance by Provider:
- Clark, Julie 100%
- Richman, Keelin 100%
- Levine, Natalie 95%
- Bello, Michael 85%
- Harwood, Phillip 85%
- Licht, Nuri 85%
- Katz, Rebecca 84%
- Nolte, Anna 84%
- Moore, Jessica 84%
- Chen, Y-Lu Alice 83%
- Williams, Lauren 81%
- Bulta, Carmen 80%
- Wong, Melissa 80%
- Ashcroft, Andrew 72%
- Bonnefay, Louis 78%

Measurement period: January 23, 2017—January 22, 2018
QIP - Diabetes Eye Exam

Compliance: 41% (732 out of 1785, 0 exclusions)

Compliance is 9 percentage points below the organization's target of 50%.

Compliance trend

Compliance by Provider Team

Compliance by Provider
### Reports: Diabetes Wellness Group Candidates

**Description**

Active patients with diabetes and an A1C between 7 and 9

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age</th>
<th>Acctno</th>
<th>Language</th>
<th>Provider</th>
<th>A1C</th>
<th>Lastgroup</th>
<th>Grouptype</th>
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</thead>
<tbody>
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<td>John, Jason</td>
<td>66</td>
<td>34241.1</td>
<td>Spanish</td>
<td>Andrew B. Ashcroft, MD</td>
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<td>William, Martha</td>
<td>53</td>
<td>172073</td>
<td>Spanish</td>
<td>Iun-Iu Alien Chen DO</td>
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<td></td>
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<tr>
<td>Linda, Anderson</td>
<td>54</td>
<td>197426</td>
<td>English</td>
<td>Megan Rehder, FNP</td>
<td>8.3</td>
<td></td>
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<tr>
<td>Harry, Smith</td>
<td>51</td>
<td>176818</td>
<td>English</td>
<td>Philippe Edouard, MD</td>
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<td>Jena N. Hoft, PA</td>
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<tr>
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<td>Fadhil Hameed, MD</td>
<td>7.8</td>
<td></td>
<td></td>
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<td>185460</td>
<td>English</td>
<td>Leesa Benenhaley</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Olivia, Patel</td>
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<td>31979.1</td>
<td>English</td>
<td>John D. Pendleton, MD</td>
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<tr>
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<td>Sarah, Adams</td>
<td>57</td>
<td>156906</td>
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<td>Lauren Williams</td>
<td>7.2</td>
<td>02/15/2017</td>
<td>SMV Diabetes</td>
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</table>
**10:30 AM**

**PROC**

**Hguna Ramesh Ramaswmy**  
Male, born 01/02/1945, 56 years old, MRN: 197227, PCG: Amrita Sandhu  
Risk Score: 0.5

**Care Gaps**

- **Flu Shot (Over 2 Years Old)**  
  *Recommended Intervention:* Give Flu Shot

- **Due for HIV Screening**  
  *Recommended Intervention:* Order HIV Screening Lab

- **Not Web-Enabled**  
  *Recommended Intervention:* Web Enable Patient Today

- **Needs Advance Directive**  
  *Recommended Intervention:* Order Advance Directive

- **Due for Colorectal Cancer Screening**  
  *Recommended Intervention:* Order Colonoscopy or Fit Kit Today

- **Due for Hepatitis C Screening**  
  *Recommended Intervention:* Order Hep C Screening Lab Today

**Quality Measure Warnings**

- **Web Enabling for Patients 18 and Older**
9:30 AM

<table>
<thead>
<tr>
<th>Last Name</th>
<th>First Name</th>
<th>DOB</th>
<th>Age</th>
<th>MRN</th>
<th>PCG</th>
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<td></td>
<td>1878.1</td>
<td>Karl Greer</td>
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</table>

**Risk Score:** 5.5

**Care Gaps**

- Flu Shot (Over 2 Years Old)
  
  **Recommended Intervention:** Give Flu Shot

- Due for Hep B Vaccine (Hep C DX - 3 Vaccines total needed)
  
  **Recommended Intervention:** Order Hepatitis B Vaccine Today

- Due for Hep A Vaccine (Hep C DX - 2 Vaccines total needed)
  
  **Recommended Intervention:** Order Hepatitis A Vaccine Today

- Needs Rx for Naloxone (DX: Substance Abuse)
  
  **Recommended Intervention:** Prescribe Naloxone/Clean up Med List

- Due for PAR (Chronic Pain Dx G89.29)
  
  **Recommended Intervention:** Order PAR today

- **Due for HEP C Treatment (DX Hep C)**
  
  **Recommended Intervention:** Complete Work-Up and Refer to SMV Liver Health
Hepatitis C treatment

Pre-treatment

- Up to 8 pts per session
- 1-2x/month
- RN education
- GI-FNP reviews cases with MA prior to visit
- Provider meets 1:1 with patient & MA
- Orders labs, imaging, screening if eligible/ ready for treatment

Initiating Treatment

- 1-2x/month
- provider chart prep/review w/ HCV coordinator
- Education & RX in group setting
- Face to face time is conducted in front of entire group, unless 1:1 time needed
- Vaccines administered
- Lifestyle & global liver health reviewed
- Referred to CERES PROJECT for nutrition/ cooking

Treatment Maintenance

- Up to 10 per group
- 1-2 x/month
- Each cohort starts together regardless of stage of treatment
- Check in, group sharing, discussion of side effects
- Nutritionist, Cooking Demos, Ongoing holistic lifestyle education
- 1:1 if necessary
- Labs ordered & reviewed
- Support, engagement, education
INCENTIVE - Hepatitis C Screening

Compliance: 66%

3556
5403

111 exclusions

Compliance is 8 percentage points above the organization’s target of 58%.

Measurement period: February 22, 2017—February 21, 2018

Compliance trend

Compliance by Provider Team

Compliance by Provider
## APRI/FIB4 Report

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<th>Acct #</th>
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<th>ALT Value</th>
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<td>Choe</td>
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<td>137</td>
<td>129</td>
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<td>2.44</td>
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</tr>
</tbody>
</table>
### Description

Patients with an appointment today who have an A1c > 7, a PHQ-9 > 9, a GAD-7 > 2, a substance abuse diagnosis, positive tobacco screen, OR a chronic pain diagnosis AND have not had a BH visit in the past 3 months. If the patient has had a BH no show in the past 3 months, the date of the no show is also listed.

### Table: Patients with an Appointment Today who Might Benefit from BH

<table>
<thead>
<tr>
<th>Start time</th>
<th>Patient</th>
<th>Phone</th>
<th>A1c</th>
<th>PHQ-9</th>
<th>GAD-7</th>
<th>Substance Abuse</th>
<th>Smoking Status</th>
<th>Chronic Pain</th>
<th>BH No Show</th>
</tr>
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<tbody>
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<tr>
<td>09:15:00</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Reports: High-Risk Patients With An Appointment Today

Description
A list of patients with an appointment today who have a risk score greater than or equal to 6.0.

Run Report  Expected run time: 2.57 sec.

<table>
<thead>
<tr>
<th>Results table</th>
<th>Petaluma Team 1</th>
<th>Petaluma Team 2</th>
<th>Petaluma Team 3</th>
<th>RP Team 1</th>
<th>RP Team 2</th>
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</tbody>
</table>
Female born 8/7/2012 4 years old  MRN: 158497  PCG: Fasih Hameed
Risk Score: 0.0

9:00 AM

Care Gaps

Flu Shot (Over 2 Years Old)
*Recommended Intervention*: Give Flu Shot

Not Web-Enabled
*Recommended Intervention*: Web Enable Patient Today

Due for Dental Appointment
*Recommended Intervention*: Offer patient a dental appointment

Due for Vaccines
*Recommended Intervention*: Administer appropriate vaccine/Update eCW Chart with data from CAIR
Questions

• Danielle Oryn DO MPH, CMIO danielleo@phealthcenter.org
• Shaun Nelson MPH, Senior Data Analyst shaunn@phealthcenter.org
Please use blank slide if more space is required for charts, graphs, etc.

To remove background graphics, right click on selected slide, choose “Format Background” and check “Hide background graphics”.
Creating Value from Electronic Medical Records: Heart Failure Checklist

- Umesh N. Khot, MD
- Tim Sobol, MS
- Kathleen Kravitz, MBA
- Colette Einloth
- Anita Ullman, RD

- Cheryll Miller, RN
- Brent Hicks
- Corrine Bott-Silverman, MD
- Randall C. Starling, MD
- Lars Svensson, MD
Heart and Vascular Institute-Miller Pavilion
Heart and Vascular Institute
Facts and Figures

- 23 Years - Ranked #1 US News
- 542,702 Outpatient Visits
- 13,364 Patient Admissions
- 422 Inpatient Beds
- 180 Staff Physicians
Identifying the Correct Attending and the Correct Service: “Who Is My Doctor?”
Admission System: ADTR

<table>
<thead>
<tr>
<th>Attend Prov</th>
<th>SERVICE</th>
<th>Bed</th>
</tr>
</thead>
<tbody>
<tr>
<td>BARZILAI, B</td>
<td>Clinical Cardiology</td>
<td>J3-1-01</td>
</tr>
<tr>
<td>TUZCU, E</td>
<td>Catherization</td>
<td>J5-2-06</td>
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<tr>
<td>GILLINOV, M</td>
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<td>LINCOFF, M</td>
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<tr>
<td>RICE, T</td>
<td>Thoracic Surgery</td>
<td>J5-2-11</td>
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</tbody>
</table>

Attending and Service are linked in EPIC via ADTR interface
Why does it matter?
Patient Admitted To EP Service.
Wrong Attending And Wrong Service Are Identified In Epic.
Nursing Unable To Reach Attending Or Service.
8 Hours On The Floor Without Being Seen.
Patient Had Complete Heart Block And Sent For Urgent Procedure.
Case Reports: Patient Safety

- Patient With End-stage Aortic Stenosis Is On Imaging Service.
- He Has Just Been Made DNR By Primary Team.
- Patient’s Vitals Become Unstable.
- Wrong Service Is Listed And Subsequently Contacted.
- “No One On Our Service Is DNR/DNI”.
- Code Is Called. Chest Compression, Intubation, Etc
- Actual Team Arrives And Stops Code.
Select Case Reports: From the Chief Fellow Pager

- Nurse Manager Pages With Unable To Find Team Of Patient Going To Surgery...
- Paged At Home As Unable To Find Team...
- Abnormal Lab Of K=8.9, Cannot Find Physician...
- Prescription Needed At Discharged, Team Is Not Identified...
- CMET Called, Primary Team Not Identified...
- Surgeon At Bedside, Trying To Find Primary Service...
- Patient Admitted, Needs Orders And Service/Attending Is Incorrect...
- Patient Has Positive Blood Cultures, Listed Attending Is Incorrect...
- Consult Team At Bedside And Needs To Talk To Primary Team...

- Patient Ready For Cath, Consent, But Patient Has Not Seen Dr. ...
- Patient Ready For Discharge. No Team Has Seen Patient In 3 Days ...
- New Admission From Yesterday. Needs Orders And H&P ...
- Patient Needs Home O2. No Attending Of Record In EPIC...
- Who Is Taking Care Of ...
- Transfer From Outside Hospital Arrived This Morning. May Need Intubation. Attending Is Out Of Town...
Existing Methods: Attribution

October 5, 2011
Does EPIC Identify the Correct Attending in HVI?

N=222

- Yes: 45%
- No: 45%
- Not Identified: 10%
Does EPIC Identify the Correct Service in HVI?

- Yes: 22%
- No: 78%
- Not Identified: 1%

N = 222
Existing Methods: Main Campus Attribution

November 28, 2011
Does EPIC Identify The Correct Attending In Main Campus?

- Yes: 55%
- No: 36%
- Not Identified: 9%

N = 874
Does EPIC Identify The Correct Service In Main Campus?

- Yes: 30%
- No: 61%
- Not Identified: 9%

N=874
Impact

Attending Physician

Clinical Care
HCAPHS
LOS
Quality
Readmission

45,000 Messages/Day
16.5 Million/Year
To change the Attending Physician that is displayed in the Epic Header, left click Attdg:

*Disclaimer – Terms Epic Banner and Epic Header are used interchangeably and are the same
Attribution Development Arc

- Project Initiation: April 2012
- Case for Change Presentations: Winter 2012
- Initial Technical Build: September 2012
- Final HVI Rules of Engagement: October 2012
- Final Technical Build: November 2012
- All HVI Announcement: December 3, 2012
Compliance

Rule 1 – The accuracy of the attending physician and service information is the responsibility of the clinical team (NP, PA, house staff, staff)

Rule 2 – At any moment in time, whatever information is listed within the Epic banner is the truth and will be acted upon for the purpose of clinical care
Project Impact - Epic Banner
6 Days Post Go Live

- Attending
  - Prior: 45% (100)
  - Post: 94% (319)
- Service
  - Prior: 73% (250)
  - Post: 22% (48)
Long-Term Sustainability?
Accuracy of Attending and Service

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>30 Days Prior</th>
<th>7 Days Post</th>
<th>30 Days Post</th>
<th>180 Days Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attending</td>
<td>45%</td>
<td>68%</td>
<td>93%</td>
<td>89%</td>
<td>96%</td>
</tr>
<tr>
<td>Service</td>
<td>22%</td>
<td>23%</td>
<td>73%</td>
<td>68%</td>
<td>90%</td>
</tr>
</tbody>
</table>
Identifying Diagnoses: “What Conditions Do Our Patients Have?”
Acute decompensated heart failure (HCC)

Overview - Patient with NICM, recently discharged from the hospital against medical advice.
- this time coming with N&V, thought to be related to heart failure
- no new SOB, orthopnea or LE swelling
- On examination Warm and dry
- no JVD or crackles, CXR mild interstitial edema

Plan:
- Resume home Hydral and ISDN
- give 500 cc IV fluid bolus
- Hold diuretics for now

• Problem List
• Standardized Documentation
• Diagnosis of Heart Failure
Problem List Use by Year (%)
Go Live May 2009
How Long Is Our Quality Feedback Cycle to Physicians?
## 2011 Process

### Cleveland Clinic CMS Core Measures

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-Hospital</td>
<td>“Friendly Reminder” Triggered by Prelim Primary Diagnosis&lt;br&gt;1. Coded on M-F Regular Hours - No Weekends/Holidays&lt;br&gt;2. Only Coded on ~50% of Admissions - those paid by DRG&lt;br&gt;3. Delayed a Few Days Depending on Clinical Course&lt;br&gt;4. Sent to “Attending” but this is often wrong&lt;br&gt;5. Reminds M.D. on ALL core measures but does tell what is compliant and what is not&lt;br&gt;6. Typically ignored (deleted) by clinicians&lt;br&gt;7. Does not necessarily correspond to final primary DX - Incomplete Triggering</td>
</tr>
</tbody>
</table>
Real-Time Quality Feedback
Core Measure/Yellow Triangle

Integration of:
- Problem List
- Epic Banner
- Standardized Documentation
<table>
<thead>
<tr>
<th>Service</th>
<th>Attending Physician</th>
<th>Real Time</th>
<th>Quality Measures</th>
<th>Problem List</th>
<th>DX</th>
</tr>
</thead>
<tbody>
<tr>
<td>HV1 Clinical Cardiology A</td>
<td>19 Patients</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D/C Check</td>
<td>HF Check</td>
<td>Bed</td>
<td>Attend Prov</td>
<td>Aspirin Extended</td>
<td>Beta Blocker Extended</td>
</tr>
<tr>
<td>AMI DX/PL</td>
<td>Peak Troponin</td>
<td>Aspirin w/24 hr</td>
<td>N</td>
<td>metoprolol tartrate (short acting) 12.5 mg tab(s) (Lopressor)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td>J7-3-12</td>
<td>ABDALLAH, M</td>
<td>Y</td>
<td>aspirin enteric coated 81 mg tab(s) (Aspirin COATEE)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td>J7-2-24</td>
<td>MANSOUR, J</td>
<td>Y</td>
<td>aspirin enteric coated 81 mg tab(s) (Aspirin COATEE)</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td>J6-6-12</td>
<td>MANSOUR, J</td>
<td>&lt;0.010 ng/mL</td>
<td>aspirin enteric coated 81 mg tab(s) (Aspirin COATEE)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td>J6-6-11</td>
<td>UNAI, S</td>
<td>0.678 ng/mL</td>
<td>aspirin enteric coated 81 mg tab(s) (Aspirin COATEE)</td>
<td></td>
</tr>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td>J6-4-11</td>
<td>ABDALLAH, M</td>
<td>2.000 ng/mL</td>
<td>aspirin enteric coated 81 mg tab(s) (Aspirin COATEE)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td>J6-2-12</td>
<td>MANSOUR, J</td>
<td>&lt;0.010 ng/mL</td>
<td>aspirin enteric coated 81 mg tab(s) (Aspirin COATEE)</td>
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<tr>
<td>N/A</td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>
1. Prescribe Medication
2. Allergy/Contraindication (Permanent)
3. Contraindication Order (Single Admission)
4. Wait to Decide Later Date While in Hospital

<table>
<thead>
<tr>
<th>Name</th>
<th>Frequency</th>
<th>Code</th>
<th>Type</th>
<th>Pref List</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTRAINDICATIONS TO ACE INHIBITOR AND ARB</td>
<td></td>
<td>4002382</td>
<td>GENERAL INF</td>
<td>CCF IP MC FACILITY PROCE</td>
</tr>
<tr>
<td>CONTRAINDICATIONS TO ASPIRIN</td>
<td></td>
<td>4002605</td>
<td>GENERAL INF</td>
<td>CCF IP MC FACILITY PROCE</td>
</tr>
<tr>
<td>CONTRAINDICATIONS TO Beta Blockers</td>
<td></td>
<td>4002606</td>
<td>GENERAL INF</td>
<td>CCF IP MC FACILITY PROCE</td>
</tr>
<tr>
<td>CONTRAINDICATIONS TO STATINS</td>
<td></td>
<td>4116048</td>
<td>GENERAL INF</td>
<td>CCF IP MC FACILITY PROCE</td>
</tr>
</tbody>
</table>
AMI & HF Core Measures
2012-2015

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMI-1: Aspirin at Arrival</td>
<td>99.1</td>
<td>99.8</td>
<td>99.8</td>
<td>0</td>
</tr>
<tr>
<td>AMI-2: Aspirin at Discharge</td>
<td>99.7</td>
<td>99.8</td>
<td>99.7</td>
<td>99.7</td>
</tr>
<tr>
<td>AMI-5: Beta Blocker at Discharge</td>
<td>99.1</td>
<td>99.8</td>
<td>99.7</td>
<td></td>
</tr>
<tr>
<td>AMI-10: Statin at Discharge</td>
<td>99</td>
<td>99.8</td>
<td>100</td>
<td>99.6</td>
</tr>
<tr>
<td>HF-3: ACEI or ARB for LVSD</td>
<td>97.8</td>
<td>100</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

ASA at arrival, BB at discharge and ACE/ARB for LVSD is no longer a trackable core measure for The Joint Commission.
When is the patient scheduled for follow up?
Goals of Follow Up Appointment

- Follow Up Appointment Scheduling Starts At Admission
- All Patients Discharged With Scheduled Appointments
HVI Follow Up Appointment Order

FOLLOW UP APPOINTMENT - HVI

Priority: Routine

Reason/Diagnosis for follow up:
- MI
- Open Heart
- Heart Failure
- Arrhythmia
- Other - Specify in comments

Schedule follow up appointment with physician within 14-30 days.

Schedule follow-up appointment with (Last Name, First Name):

Schedule follow-up appointment with mid-level within 4-7 days.
No mid-level follow up.

Schedule with above physician's mid-level:
- Yes
- No - specify below

Specific mid-level (Last Name, First Name):
N/A (HISTORY)

Ordering Provider's Phone/Pager Number for Questions
Follow Up Order Communication

Order Routed to Scheduling Pool

Physician Places Order

Text Page Routed to Physician

CCF PAGER Follow up appointment for patient Johnson scheduled 05/27/15 at 2:15 pm
Patient Communication

- Scheduled appointment information included on Discharge Summary
Follow Up Appointment Order
Order Count - All HVI Services
Foundational Initiatives

- Integration of:
  - Epic Banner
  - Data Attribution
  - Problem List
  - Standardized Documentation
  - Follow Up Appointment Order
Scope of the Problem

- Readmissions Named Highest Enterprise Priority
- Readmissions Project Fails To Reduce Main Campus Readmissions
- 2012 Enterprise $2 Million CMS Penalty
- HVI Requested To Take Greater Involvement And Leadership
- HVI Proposed Discharge Checklist
Risk of Readmission after Myocardial Infarction (MI)
Risk of Readmission All Cause

![Graph showing the risk of readmission over time for different causes, including myocardial infarction related, other cardiovascular related, non-cardiovascular related, and planned readmission. The graph plots readmissions per 100 patients/month against months after discharge.]
HVI Data

- Preventable Readmissions Occur Early
- More Outpatient Followup = More Readmissions
- Discharge Followup Phone Calls = No Impact
- Telemonitoring = No Impact
- Hypothesis: “Defect” Is In-hospital Or In Transition At Discharge
- HVI Proposes Discharge Checklist And In-hospital Care Metrics
Discharge Checklist Pilot

**J72 Heart Failure Discharge Checklist PILOT**

<table>
<thead>
<tr>
<th>Admission Date: ______________________</th>
<th>Date / Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing</td>
<td>Date / Initials</td>
</tr>
<tr>
<td>? Care Partner Identified</td>
<td></td>
</tr>
<tr>
<td>? Nursing HF Education with Booklet</td>
<td></td>
</tr>
<tr>
<td>? Disease Education</td>
<td></td>
</tr>
<tr>
<td>? Daily Weights (patient calendar)</td>
<td></td>
</tr>
<tr>
<td>? Activity level</td>
<td></td>
</tr>
<tr>
<td>? I &amp; Us</td>
<td></td>
</tr>
<tr>
<td>? Low Sodium Diet</td>
<td></td>
</tr>
<tr>
<td>? Fluid Restriction</td>
<td></td>
</tr>
<tr>
<td>? Medications</td>
<td></td>
</tr>
<tr>
<td>- Hand-outs given</td>
<td></td>
</tr>
<tr>
<td>- Initial Introduction</td>
<td></td>
</tr>
<tr>
<td>- Reinforcement</td>
<td></td>
</tr>
<tr>
<td>- Teach Back</td>
<td></td>
</tr>
<tr>
<td>? Survival Skills Class/EMMI TV Education (Course 560)</td>
<td>Date / Initials</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Multidisciplinary Consults</th>
<th>Date / Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>? Transitional Coach Consult</td>
<td></td>
</tr>
<tr>
<td>\ age &gt;65 years</td>
<td></td>
</tr>
<tr>
<td>? if needed, consult for high risk</td>
<td></td>
</tr>
<tr>
<td>? Seen by Transitional Coach</td>
<td></td>
</tr>
<tr>
<td>? If identified on Nursing Assessment; Nutrition consult placed</td>
<td>Date / Initials</td>
</tr>
<tr>
<td>? If Nutrition consult not needed: Place Nutrition Screen</td>
<td>Date / Initials</td>
</tr>
<tr>
<td>? Seen by Nutrition</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pharmacists/Nurse Practitioners</th>
<th>Date / Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>? Order for social support services/home care services/Heart Care at Home, if indicated</td>
<td></td>
</tr>
<tr>
<td>? Order for social support services/home care services/Heart Care at Home, if indicated</td>
<td></td>
</tr>
<tr>
<td>? No symptomatic supine or standing hypotension (Orthostatic BPs require order)</td>
<td></td>
</tr>
<tr>
<td>? &quot;Dry Weight&quot; established and patient/caregiver informed of this goal</td>
<td></td>
</tr>
<tr>
<td>? Near optimal volume status achieved</td>
<td></td>
</tr>
<tr>
<td>? Stable renal function and acceptable electrolyte panel</td>
<td></td>
</tr>
<tr>
<td>? Core Measure status Completed: Yellow Triangles Cleared</td>
<td></td>
</tr>
<tr>
<td>? Discharge medication reconciliation completed</td>
<td></td>
</tr>
</tbody>
</table>

**MD/NP: PLEASE LIST PROVIDER PATIENT IS TO FOLLOW UP WITH (below and on blue appt. sheet)**

<table>
<thead>
<tr>
<th>Identify Primary Care Physician - Name</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Case Management</th>
<th>Date / Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>? Discharge Needs identified</td>
<td></td>
</tr>
<tr>
<td>? Home care visit offered</td>
<td></td>
</tr>
<tr>
<td>? Final post-discharge arrangements made</td>
<td></td>
</tr>
</tbody>
</table>

MD/NP: PLEASE LIST PROVIDER PATIENT IS TO FOLLOW UP WITH (below and on blue appt. sheet)
Methods

• Paper-Based Checklist
• Heart Failure Patients On Heart Failure A & B Service
• Expected 12 Week Design
• Intention-To-Treat Analysis
• Concurrent And Historical Controls
## 30 Day Readmission Rates

<table>
<thead>
<tr>
<th>Target Group</th>
<th>2013</th>
<th></th>
<th>2012</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Rate</td>
<td>n</td>
<td>Rate</td>
</tr>
<tr>
<td>Total 1° dx. HF admissions Main Campus</td>
<td>358</td>
<td>18.7%</td>
<td>339</td>
<td>24.5%</td>
</tr>
<tr>
<td>number 30 day readmission</td>
<td>67</td>
<td>18.7%</td>
<td>83</td>
<td>24.5%</td>
</tr>
<tr>
<td>Total 1° dx. HF admissions HVI</td>
<td>273</td>
<td>17.6%</td>
<td>242</td>
<td>22.7%</td>
</tr>
<tr>
<td>number 30 day readmission</td>
<td>48</td>
<td>17.6%</td>
<td>55</td>
<td>22.7%</td>
</tr>
<tr>
<td>Total 1° dx. HF admissions J7-2</td>
<td>145</td>
<td>20.0%</td>
<td>107</td>
<td>25.2%</td>
</tr>
<tr>
<td>(with and without DC checklist)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>number 30 day readmission</td>
<td>29</td>
<td>20.0%</td>
<td>27</td>
<td>25.2%</td>
</tr>
<tr>
<td>Total 1° dx. HF admissions J7-2 not included</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>in the Pilot (NO checklist)</td>
<td>77</td>
<td>22.1%</td>
<td>48</td>
<td>25.0%</td>
</tr>
<tr>
<td>number 30 day readmission</td>
<td>17</td>
<td>22.1%</td>
<td>12</td>
<td>25.0%</td>
</tr>
<tr>
<td>Total 1° &amp; 2° dx. HF admissions J7-2 included</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>in the Pilot (checklist used)</td>
<td>82</td>
<td>14.6%</td>
<td>68</td>
<td>26.5%</td>
</tr>
<tr>
<td>number 30 day readmission</td>
<td>12</td>
<td>14.6%</td>
<td>18</td>
<td>26.5%</td>
</tr>
</tbody>
</table>

Source: Outcomes Readmissions System, Business Intelligence
Subsequent Longitudinal Results

J 72 HF 30-day readmission rate
Patients WITH checklist

Checklist Stopped

Checklist Restarted

Organizational Goal – 20%
Paper HF Checklist

Pilot Issues

• Paper-based Checklist
• Manually Intensive
• Limited Reporting Capabilities
• Could Not Scale Paper Process To Other Areas
MULTI-LEVEL INCLUSION
MULTI-DISCIPLINARY
PROOF OF CONCEPT

Foundational

Proof of Concept

SOFT/HARD STOP

HEART FAILURE

DISCHARGE CHECKLIST
Transition From Paper To Electronic
Not So Simple
Paper Check List

Workflow

1. Show The Paper Checklist
2. Locate Paper Checklist In Room
3. Update Paper Checklist In The Patient’s Room
4. Display Paper Checklist In The Patient’s Room
Checklist Workflow

Define Clinical Workflow

**Clinical Measures for HF Service:**
1. BNP > 500
2. EF < 40
3. Medications - Hydralazine, isordil
4. Any patient history of heart failure
5. H&P - physician documentation of chief complaint

**At patient admission**
1. Review IP shared list
2. Release appropriate Consult order/individual for:
   - Nutrition
   - Pharmacy
   - Case Management (order set updating for conditional order status)

**Patient does not meet clinical criteria for Heart Failure**

- Standard inpatient

---

**Notes**
- Staff physicians change every two weeks.
- fellows change monthly
- Dr. Bott-Silverman educates new staff and new fellows using/involved with the new check list process. Education session is 10-15 minutes per education session.
- Items not completed on paper check list are not completed/blank on the paper check list.

---

**Staff Nurse**
1. Staff nurse completes HF education using doc flow sheet.
2. Staff nurse includes HF in patient education nursing note in Epic.

---

**Fellows/NP**
1. Fellows/NP completes each item on check list.
2. Once check list item is complete, Fellow/NP will initial and date the check list item.
3. Fellow/NP may or may not include actual documentation in EpicCare.
Checklist Workflow
Define Shared Medical Appointments

Heart Failure Discharge Check List - Administrative

HUC
7 and 30 day appointment scheduling coordinated by HUC.

Schedule follow up at Cleveland Clinic?

HUC contacts appt center to coordinate the appointment scheduling process.

Follow up appts scheduled

Patient Discharged

Quality Director

Weekly
1. ANM faxing/scan paper discharge check list to QD.
2. Data capture of check list documented onto master spreadsheet.

Appointment Center

Post Discharge
1. Documents daily patient discharge/s.
2. 30 days post discharge, QD is verifying patient readmission.
3. Reporting/data capture of each check list category is being documented/captured.
Transition from Paper to Electronic Planning and Design
Transition Requirements

- Governance Structure For Electronic Checklist
- Funding For Contracted Resources
- Identifying The Key Roles On The Paper Check List And Where The Documentation Will Be Completed In The Electronic Medical Record
- Define Electronic Documentation Clinical Workflow
HF Check List Governance

Cleveland Clinic Executive Team

Clinical Leadership
Khot/Bott-Silverman/Starling/Pengel/Svensson

Multi-Disciplinary Working Team
Nursing  Quality  I.T.  Nutrition  Pharmacy  Care Management
## Identifying the Who

### Nursing Activities

- **For Each Role:**
  - Identify Who Is Documenting
  - Where The Work Activity Is Being Completed In The EMR
  - What Work Activity Satisfies The Activity

<table>
<thead>
<tr>
<th>Nursing</th>
<th>? Care Partner Identified</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>? Nursing HF Education with Booklet</td>
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<td>? Disease Education</td>
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<td>? &amp; Os</td>
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<td>- Reinforcement</td>
</tr>
<tr>
<td></td>
<td>- Teach Back</td>
</tr>
<tr>
<td>? Survival Skills Class/EMMI TV Education (Course 560)</td>
<td></td>
</tr>
</tbody>
</table>
Example – Nursing Documentation

Discrete Data Capture Of Nursing Documentation In The Patient Chart
Example – Pharmacy Documentation

Paper

| Pharmacy Education Consult placed for patients admitted w/ primary diagnosis heart failure |
| EXCEPT post-CTS patient |
| Seen by Pharmacy |

Discrete Data Capture Of Pharmacy Documentation In The Patient Chart
Example – Care Management Documentation

Discrete Data Capture Of Care Management Documentation In The Patient Chart
Example – Physician Documentation

Discrete Data Capture Of Physician Documentation In The Patient Chart

HF D/C Checklist

Heart Failure Discharge Checklist

- Near optimal pharmacologic therapy initiated or achieved and any intolerances documented?
  - No

- No symptomatic supine or standing hypotension (Orthostatic BPs require order)?
  - No

- "Dry Weight" established and patient/caregiver informed of this goal?
  - No

- Near optimal volume status achieved?
  - No

- Stable renal function and acceptable electrolyte panel?
  - No

- Patient to have Follow Up Appointment with (select one)
  - CCHS Physician
  - Outside CCHS Physician
Electronic Unified Documentation

• Multi-disciplinary, Multiuser
  • Physician
  • Nursing
  • Nutrition
  • Pharmacy
  • Care Management

• Check List Report Updates **Immediately** As Items Are Completed
# Real Time Check List Report

## Congestive Heart Failure Discharge Checklist

### Nursing
- **Nursing Patient Education**
  - Heart Failure
  - Ordered: 06/21/17 11:46
  - Start: 06/21/17 12:00
  - Comments: CHF

### Nutrition
- **Nutrition Consult Order**
  - Ordered: 08/22/17 11:46
  - Start: 09/22/17 12:00
  - Comments: Consult Type: Access, Diet Educ.

### Pharmacy
- **Pharmacy Consult Order**
  - Ordered: 09/22/17 11:46
  - Start: 09/22/17 12:00
  - Comments: Pharmacy Heart Failure Education

### Care Management
- **Post Discharge Arrangements Finalized?**
  - Yes
- **Med Reconciliation Status**
  - Yes
- **Quality Metrics**
  - | Metric | Details |
  - |-------|--------|
  - | Ace ARB? | ARB Allergy/Contra Only & Contraindication Order |
  - | ASA Extended? | aspirin 81 mg chewable tab(s) |
  - | ASA Within 24 hours? | Y |
  - | Beta Blocker Extended? | metoprolol succinate ER 25 mg tab(s) (TOPROL XL) |
  - | Statin Extended? | Allergy/Contra |

### Discharge Follow up Order
- **FOLLOW UP APPOINTMENT - HVI [103626038] ONCE**
  - Comments: Please change Dr Raymond and D...
### Congestive Heart Failure Discharge Checklist

**Patient Info**
- **Sex:** Male
- **DOB:** 01/29/1945

**Nursing Patient Education**
- **Heart Failure:** Done

**Nutrition Consult Order**
- **Ordered:** 06/22/17 11:46
- **Start:** 09/22/17 12:00
- **NUTRITION CONSULT [1035666599] ONCE**
- **Notes:** CHT, Question: Consult Type Answer: DIET EDUCATION

**Nutrition Education Note Completed?**
- **Signed:**

**Pharmacy Consult Order**
- **Start:** 08/22/17 12:00
- **Ordered:** 09/22/17 11:46
- **PHARMACY HEART FAILURE EDUCATION [1035666600] ONCE**

**Pharmacy Education Note Completed?**
- **Signed:**

**Heart Failure DC Checklist Form - Provider**
- **Post Discharge Arrangements Finalized?**
- **Med Reconciliation Status:** Home with no post acute needs
- **Quality Metrics**
  - **Amitriptyline?**
  - **ASA Extended?**
  - **ASA Within 24 hours?**
  - **Beta Blocker Extended?**
  - **Statin Extended?**

**Discharge Follow up Order**
- **Start:** 08/24/17 01:30
- **FOLLOW UP APPOINTMENT - HVI [1035660398] ONCE**
- **Comments:** Please change Dr Raymond and D.
MULTI-LEVEL INCLUSION

Electronic Multidisciplinary

Proof of Concept

Foundational

HEART FAILURE

DISCHARGE CHECKLIST
Challenge

Most Patients Admitted to Hospital Do Not Have Heart Failure
Inclusion Criteria:
1. Cardiology Service
2. Non-ICU J Building Units
3. Problem List Dx of HF

Exclusion Criteria:
1. Patients Admitted with Observation Status
## Technology Enablement

### 21 Units
- J31
- J32
- J33

### HF DC Check

#### List Patients Meet Criteria = 62

### 22 Services
- Heart Failure A
- Heart Failure B
- Clinical Card A
- Clinical Card B
- EP
- Midlevel Intervention
- Imaging
- ICU
- CTS Team A - E
- Vasc Surg Blue
- Vasc Surg Black
- Vasc Surg Green

### Diagnosis
- AMI
- AFIB
- Open Heart Thoracic
- Heart Failure Vascular

### Census
- 344

### Exclusion Criteria
- Patients admitted with Observation Status
Multi-Level Inclusion

Electronic Multidisciplinary

Proof of Concept

Foundational

SOFT/HARD STOP

HEART FAILURE

DISCHARGE CHECKLIST
Real Time Check List and Visualization

D/C Checklist column provides current status of checklist items

- Discharge Checklist complete
- Discharge Checklist not complete
Real Time Check List and Visualization

Hover over red stop sign shows which check list items are not complete.

<table>
<thead>
<tr>
<th>D/C</th>
<th>HF DC Checklist</th>
<th>Bed</th>
<th>Patient Name/Age/Sex</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image.png" alt="Image" /></td>
<td><img src="image.png" alt="Image" /></td>
<td><img src="image.png" alt="Image" /></td>
<td>24 Patients</td>
</tr>
</tbody>
</table>

- D/C Checklist Form: Incomplete
- Med Rec: Incomplete
- Follow Up Order: Not Filed

(33 year old M)
Documentation Compliance

- **Electronic Soft Stop**
  - Temporary
  - Can Bypass Check List Logic

- **Electronic Hard Stop (05/13/14)**
  - Force Check List Compliance
  - Cannot Write DC Order
Electronic Soft Stop – Order can be bypassed
Electronic Hard Stop

Electronic Hard Stop – Order cannot be bypassed
Multi-Level Inclusion
Electronic Multidisciplinary
Proof of Concept
Foundational

SOFT/HARD STOP
HEART FAILURE
DISCHARGE CHECKLIST
Check List Evolution
Paper to Electronic

<table>
<thead>
<tr>
<th>J72 Heart Failure Discharge Checklist PILOT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Admission Date:</strong> ______________________</td>
</tr>
<tr>
<td><strong>Hanging</strong></td>
</tr>
<tr>
<td>1. Care Partner Identified</td>
</tr>
<tr>
<td>2. Nursing HF Education with Booklet</td>
</tr>
<tr>
<td>3. Disease Education</td>
</tr>
<tr>
<td>4. Daily Weight (patient calendar)</td>
</tr>
<tr>
<td>5. Activity level</td>
</tr>
<tr>
<td>6. &amp; 7. Low Sodium Diet</td>
</tr>
<tr>
<td>8. Fluid Restriction</td>
</tr>
<tr>
<td>9. Medications</td>
</tr>
<tr>
<td>10. Handouts given</td>
</tr>
<tr>
<td>11. Initial introduction</td>
</tr>
<tr>
<td>12. Reinforcement</td>
</tr>
<tr>
<td>13. Teach Back</td>
</tr>
<tr>
<td>14. Sunbelt Skills Check EMR TV Education (Course 929)</td>
</tr>
<tr>
<td><strong>Multidisciplinary Consults</strong></td>
</tr>
<tr>
<td>1. Transitional Case Consult</td>
</tr>
<tr>
<td>2. Age &gt;65 years</td>
</tr>
<tr>
<td>3. If needed, consult for high risk</td>
</tr>
<tr>
<td>4. Site by Transitional Case</td>
</tr>
<tr>
<td>5. Identified on Nursing Assessment; Nutrition consult placed</td>
</tr>
<tr>
<td>6. If nutrition consult not needed, place Nutrition Screen</td>
</tr>
<tr>
<td>7. Seen by nutrition</td>
</tr>
<tr>
<td>8. Pharmacy Education Consult placed for patient admitted w/primary diagnosis heart failure</td>
</tr>
<tr>
<td>9. EXCEPT pt with CTE</td>
</tr>
<tr>
<td>10. Seen by Pharmacist</td>
</tr>
<tr>
<td><strong>Physician/Staff/Providers</strong></td>
</tr>
<tr>
<td>11. Order for and support bedside devices care services/lead Care at Home if indicated</td>
</tr>
<tr>
<td>12. Basic optimal pharmacologic therapy initiated or achieved and any intolerance documented</td>
</tr>
<tr>
<td>13. No symptomatic cause of standing hypotension (Chest/Back pain, rapid heart)</td>
</tr>
<tr>
<td>14. Day 1/2: establish and patient/guardian informed of this goal</td>
</tr>
<tr>
<td>15. Nutritional volume status achieved</td>
</tr>
<tr>
<td>16. Stable renal function and accept clinical diuretic panel</td>
</tr>
<tr>
<td>17. Care Measure Status (Complete, Yellow Triangle Cleared)</td>
</tr>
<tr>
<td>18. Discharge medication reconciliation completed</td>
</tr>
<tr>
<td><strong>ICP:</strong> PLEASE LIST PROVIDER/PATIENT IS TO FOLLOW UP WITH below on blue sheet</td>
</tr>
<tr>
<td>19. Identity: Primary Care Physician – Name</td>
</tr>
<tr>
<td>20. Day 1, Lipid/30 Day Cardiology MD Apta-PHLEB PUR SHEET COMPLETED</td>
</tr>
<tr>
<td>21. Day 1, Lipid/30 Day Cardiology MD Apta-PHLEB SCHEDULED (See ACL)</td>
</tr>
<tr>
<td><strong>Post Discharge Management:</strong></td>
</tr>
<tr>
<td>22. Discharge summary identified</td>
</tr>
<tr>
<td>23. Discharge summary included</td>
</tr>
<tr>
<td>24. Discharge summary included</td>
</tr>
<tr>
<td>25. Final post-discharge arrangements made</td>
</tr>
</tbody>
</table>
Multi-Level Inclusion

Electronic Multidisciplinary

Proof of Concept

Foundational

Soft/Hard Stop

Addressing Clinical Reality
## Program Costs
### Operational

<table>
<thead>
<tr>
<th></th>
<th>Development Hours</th>
<th>Contracted Resource Cost</th>
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</thead>
<tbody>
<tr>
<td><strong>Initial Implementation</strong></td>
<td>1,982</td>
<td>$208,375</td>
</tr>
<tr>
<td><strong>Optimization Efforts</strong></td>
<td>117</td>
<td>$5,850</td>
</tr>
</tbody>
</table>

**Total IT Cost**: $214,225
<table>
<thead>
<tr>
<th>Acknowledgements</th>
<th></th>
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<tbody>
<tr>
<td>Tim Sobol</td>
<td>Debbie Brosovich</td>
</tr>
<tr>
<td>Kathleen Kravitz</td>
<td>Gary Kish</td>
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<tr>
<td>Colette Einloth</td>
<td>Joy Yuhas</td>
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<tr>
<td>Anita Ullman</td>
<td>Molly Loy</td>
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<tr>
<td>Cheryll Miller</td>
<td>Bonnie Javurek</td>
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<tr>
<td>Brent Hicks</td>
<td>Mike Militello</td>
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<tr>
<td>Randall Starling, MD</td>
<td>Eric Sokn</td>
</tr>
<tr>
<td>Corrine Bott-Silverman, MD</td>
<td>Kate Sibila</td>
</tr>
<tr>
<td>Josalyn Meyer</td>
<td>Sue Gatchel</td>
</tr>
</tbody>
</table>
Technology Summary
Ten Information Technology Innovations

- Patient Banner
- Problem List
- Real Time Core Measures
- Multidisciplinary Documentation
- Multi Level Inclusion Criteria
Ten Information Technology Innovations

✓ Follow Up Appointment
✓ Electronic Order Hard Stop
✓ Shared Medical Appointments
✓ Tableau Reporting
✓ Hover Over
Heart Failure Checklist

✓ Technical And Operational Success With 100% HVI Implementation

✓ Important Lesson: We Underappreciated The Importance Of Human/Technology Interface

✓ Reflects True Multidisciplinary Coordination Of Care

✓ Decrease In Readmissions Locally And Public Reporting
Heart Failure Checklist

- Clinical Impact
- Addressing Clinical Reality
- Soft/Hard Stop
- Multi Level Inclusion
- Electronic Multi Disciplinary
- Proof of Concept
- Foundational
Questions

• Speaker Contact Information
  • Umesh Khot – khotu@ccf.org
  • Kathleen Kravitz – kravitk@ccf.org
  • Tim Sobol – sobolt@ccf.org

• Please complete online session evaluation
Please use blank slide if more space is required for charts, graphs, etc.

To remove background graphics, right click on selected slide, choose “Format Background” and check “Hide background graphics”.