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
2011
Identifying the Correct Attending and the Correct Service: “Who Is My Doctor?”
Admission System: ADTR

- Admissions
- Discharges
- Transfers
- Re-Admission

Legacy Front End Computing System
ADTR = Source Truth for EPIC
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>
</tr>
<tr>
<td>GILLINOV, M</td>
<td>Thoracic Surgery</td>
<td>J6-6-04</td>
</tr>
<tr>
<td>LINCOFF, M</td>
<td>Catherization</td>
<td>J3-1-06</td>
</tr>
<tr>
<td>NIEBAUER, M</td>
<td>Clinical Cardiology</td>
<td>J5-2-05</td>
</tr>
<tr>
<td>RICE, T</td>
<td>Thoracic Surgery</td>
<td>J5-2-11</td>
</tr>
</tbody>
</table>

Attending and Service are linked in EPIC via ADTR interface.
Case discussed with Dr. Griffin
SIGNATURE: Barbara Heil, MD
PAGER: 85667

PRIMARY SERVICE: Cardiology: Imaging
Why does it matter?
Case Reports: Patient Care

- 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?

Yes: 45%
No: 45%
Not Identified: 10%

N=222
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
Epic Banner - Visibility

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

- All HVI Announcement: December 3, 2012
- Final Technical Build: November 2012
- Final HVI Rules of Engagement: October 2012
- Initial Technical Build: September 2012
- Project Initiation: April 2012
- Case for Change: Winter 2012
- Presentations: Winter 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: 22% (48)
- Post: 73% (250)
Long-Term Sustainability?
Accuracy of Attending and Service

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

- **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

HVI
CC Main
How Long Is Our Quality Feedback Cycle to Physicians?
2011 Process

Cleveland Clinic CMS Core Measures

1. In-Hospital
   a. “Friendly Reminder” Triggered by Prelim Primary Diagnosis
      i. Coded on M-F Regular Hours - No Weekends/Holidays
      ii. Only Coded on ~50% of Admissions - those paid by DRG
      iii. Delayed a Few Days Depending on Clinical Course
      iv. Sent to “Attending” but this is often wrong
      v. Reminds M.D. on ALL core measures but does tell what is compliant and what is not
      vi. Typically ignored (deleted) by clinicians
      vii. Does not necessarily correspond to final primary DX - Incomplete Triggering

2. After Discharge
   a. Final Coding
      i. Coding determines final primary DX
         1. ~10 Days Post Discharge
      ii. Sent to SoftMed for Billing, Then Epremise
         1. ~20-30 days Post-Discharge
      iii. Sent to UHC Med Measure - Billing Must Be Finalized First
         1. ~30 days Post-Discharge
      iv. Sent to Quality Abstracters, Pull Hard Chart Where Needed
         1. ~45-60 Days Post-Discharge
      v. Failed Measures Sent to “Failed Case Committee”
         1. ~60-90 Days Post-Discharge
      vi. If Nothing Found Sent Back to QIO at Institute/Department, QIO Forwards to Individual Physician
         1. ~90-120 Days
      vii. Can not go through Quality Until Final Billing - Stragglers Come In Over 3-4 Months
         1. ~120 Days Process Complete and Finalized
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 DX</th>
</tr>
</thead>
<tbody>
<tr>
<td>HVI Clinical Cardiology A</td>
<td>19 Patients</td>
<td></td>
<td>50% at 09/06/17 0945</td>
<td></td>
</tr>
</tbody>
</table>

- **Service**: HVI Clinical Cardiology A
- **Attending Physician**: 19 Patients
- **Real Time**: 9:43 AM
- **Quality Measures**: 50% at 09/06/17 0945
- **Problem List DX**: 50% at 09/06/17 0945
1. Prescribe Medication
2. Allergy/Contraindication (Permanent)
3. Contraindication Order (Single Admission)
4. Wait to Decide Later Date While in Hospital
HVI Quality Measures
Yellow Triangle

Yellow Triangle Go Live
All Locations Quality Measures
Yellow Triangle

- HVI
- Main Campus
- Non HVI

Yellow Triangle Go Live
AMI & HF Core Measures
2012 - 2015

<table>
<thead>
<tr>
<th>Measure</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</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>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>
<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>99.6</td>
<td>99.6</td>
</tr>
<tr>
<td>AMI-10: Statin at Discharge</td>
<td>99</td>
<td>99.8</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>HF-3: ACEI or ARB for LVSD</td>
<td>97.8</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</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
**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 iPhone/Pager Number for Questions:**

---

**HVI Follow Up Appointment Order**
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
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

B

Readmissions (/100 patients/Month)

- Myocardial infarction related
- Other cardiovascular related
- Non-cardiovascular related

Planned readmission

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

### Admission Date: ______________________

<table>
<thead>
<tr>
<th>Nursing</th>
<th>Date / Initials</th>
</tr>
</thead>
<tbody>
<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; Os</td>
<td></td>
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<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>
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<td>- Initial Introduction</td>
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<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></td>
</tr>
<tr>
<td>? If Nutrition consult not needed: Place Nutrition Screen</td>
<td></td>
</tr>
<tr>
<td>? Seen by Nutrition</td>
<td></td>
</tr>
<tr>
<td>? Pharmacy Education Consult placed for patients admitted w/ primary diagnosis heart failure</td>
<td></td>
</tr>
<tr>
<td>? EXCEPT post-CTS patient</td>
<td></td>
</tr>
<tr>
<td>? Seen by Pharmacy</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Physicians/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>? Near optimal pharmacologic therapy initiated or achieved and any intolerances documented</td>
<td></td>
</tr>
<tr>
<td>? No asymptomatic 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>? Day LIP Appr/30 Day Cardiology MD Appr <strong>BLUE APPT. SHEET COMPLETED</strong></td>
<td></td>
</tr>
<tr>
<td>? Day LIP Appr/30 Day Cardiology MD Appr SCHEDULED (per HUC)</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>
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>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td></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>
</tr>
<tr>
<td>number 30 day readmission</td>
<td>67</td>
<td></td>
</tr>
<tr>
<td>Total 1° dx. HF admissions HVI</td>
<td>273</td>
<td>17.6%</td>
</tr>
<tr>
<td>number 30 day readmission</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>Total 1° dx. HF admissions J7-2 (with and without DC checklist)</td>
<td>145</td>
<td>20.0%</td>
</tr>
<tr>
<td>number 30 day readmission</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>Total 1° dx. HF admissions J7-2 not included in the Pilot (NO checklist)</td>
<td>77</td>
<td>22.1%</td>
</tr>
<tr>
<td>number 30 day readmission</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Total 1° &amp; 2° dx. HF admissions J7-2 included in the Pilot (checklist used)</td>
<td>82</td>
<td>14.6%</td>
</tr>
<tr>
<td>number 30 day readmission</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

Source: Outcomes Readmissions System, Business Intelligence
Subsequent Longitudinal Results

Checklist Stopped

Organizational Goal – 20%

Checklist Restarted
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
DOCUMENTATION
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

InPatient Floor

Patient admitted to J072

Patient does not meet clinical criteria for Heart Failure

Standard inpatient

Assistant Nurse Manager

ANM reviews clinical measures. If meets criteria, enter HF service and problem list dx.

Clinical Measures for HF Service:
1. BNP>500
2. EF<40
3. Medications - Hydralazine isordil
4. Any patient history of heart failure

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)

Staff Nurse

1. Staff nurse complete/s HF education using doc flow sheet.
2. Staff nurse includes HF in patient education nursing note in Epic.

Fellow/NP

1. Fellow/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

Notes

- Staff physicians changes every two weeks.
- Fellows changes 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.
- Yes

Patient admitted to J072

- Standard inpatient

- InPatient Floor

- Assistant Nurse Manager

- Floor Nurse

- Fellow/NP
Checklist Workflow
Define Shared Medical Appointments

Heart Failure Discharge Check List - Administrative

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

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

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.

Patient Discharged

- Follow up appointments print/included on the after visit summary.
- After visit summary handed to the patient as home going documentation.
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
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

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| ? Survival Skills Class/EMMI TV Education (Course 560) |
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**

**Paper**

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?  
  [ ] Yes

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

- “Dry Weight” established and patient/caregiver informed of this goal?  
  [ ] Yes

- Near optimal volume status achieved?  
  [ ] Yes

- Stable renal function and acceptable electrolyte panel?  
  [ ] Yes

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

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

### Nursing Consult Order
- **Ordered**: 08/22/17 11:46
- **NURSING CONSULT [1035566669] ONE TIME
- **Comments**: CHF
- **Completed**: Done

### Nutrition Consult Order
- **Ordered**: 09/17/17 11:46
- **NUTRITION CONSULT [1035566669] ONE TIME
- **Comments**: Diet Education

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

### Pharmacy Consult Order
- **Ordered**: 09/22/17 12:00
- **PHARMACY HEART FAILURE EDUCATION [1035566600] ONE TIME
- **Comments**: CHF

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

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

### Heart Failure D/C Checklist Form - Provider
- **Near optimal pharmacologic therapy initiated or achieved and any intolerances documented?**: Yes
- **No symptomatic sepsis or standing hypotension (Orthostatic BP’s require order)**: Yes
- **Dry Weight established and patient/caregiver informed of this goal?**: Yes
- **Near optimal volume status achieved?**: Yes
- **Stable renal function and acceptable electrolyte panel?**: Yes
- **Patient to have Follow Up Appointment with?**: CHFS Physician
- **Home with no post-acute needs**: Yes

### Heart Failure D/C Checklist Form - Care Coordination
- **Post Discharge Arrangements Finalized?**: Yes

### Quality Metrics
- **Ace ARB?**: Yes
- **ASA Extended?**: Yes
- **ASA Within 24 hours?**: Yes
- **Beta Blocker Extended?**: Yes
- **Statin Extended?**: Yes

### Discharge Follow up Order
- **Start**: 09/24/17 07:30
- **FOLLOW UP APPOINTMENT - HVI [1036260308] ONE TIME
- **Comments**: Please change Dr Raymond and D...
# Real Time Check List Report

## Congestive Heart Failure Discharge Checklist

**Patient Info**

<table>
<thead>
<tr>
<th>Sex</th>
<th>DOB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>01/29/1945</td>
</tr>
</tbody>
</table>

**Nursing Patient Education**

- **Heart Failure**: Done

**Nutrition Consult Order**

- **Ordered**: 06/22/17 11:48
- **Start**: 09/22/17 12:00
- **Provider**: NUTRITION CONSULT [1035566599] ONCE
- **Comments**: CHF
- **Question**: Consult Type Answer: DIET EDUCATION

**Nutrition Education Note Completed?**

- **Signed**: Yes

**Pharmacy Consult Order**

- **Start**: 08/22/17 12:00
- **Ordered**: 09/22/17 11:48
- **Provider**: PHARMACY HEART FAILURE EDUCATION [1035566600] ONCE

**Pharmacy Education Note Completed?**

- **Signed**: Yes

**Heart Failure D/C Checklist Form - Provider**

- Near optimal pharmacologic therapy initiated or achieved and any intolerances documented?: Yes
- No symptomatic supine or standing hypotension (Orthostatic BP’s require order?): Yes
- Diamond weight established and patient/caregiver informed of this goal?: Yes
- Near optimal volume status achieved?: Yes
- Stable renal function and acceptable electrolyte panel?: Yes
- Patient to have follow up appointment with?: CCHS Physician

**Heart Failure D/C Checklist Form - Care Coordination**

- Post Discharge Arrangements Finalized?: Yes

**Med Reconciliation Status**

- **Med Rec complete**: Yes

**Quality Metrics**

- AHRQ Allergy/Contra Only & Contraindication Order
- Aspirin 81 mg chewable tab(s)
- **Y**: metoprolol succinate ER 25 mg tab(s) [TOPROL XL]

**Discharge Follow up Order**

- **Start**: 09/24/17 07:30
- **Ordered**: 09/24/17 07:17
- **Provider**: FOLLOW UP APPOINTMENT - HIV [1035260326] ONCE
- **Comments**: Please change Dr Raymond and Dr...
Challenge

Most Patients Admitted to Hospital Do Not Have Heart Failure
Multi level Inclusion Criteria

**Inclusion Criteria:**
1. Cardiology Service
2. Non-ICU Building Units
3. Problem List Dx of HF

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

### 21 Units

<table>
<thead>
<tr>
<th>J31</th>
<th>J51</th>
<th>J61</th>
<th>J71</th>
<th>J81</th>
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</thead>
<tbody>
<tr>
<td>J32</td>
<td>J52</td>
<td>J62</td>
<td>J72</td>
<td>J82</td>
</tr>
<tr>
<td>J33</td>
<td>J53</td>
<td>J63</td>
<td>J73</td>
<td>J83</td>
</tr>
</tbody>
</table>

### HF DC Check

**List Patients Meet Criteria = 62**

### 22 Services

<table>
<thead>
<tr>
<th>Heart Failure A</th>
<th>EP</th>
<th>Midlevel Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Failure B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinical Card A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinical Card B</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Diagnosis - Thousands

<table>
<thead>
<tr>
<th>AMI</th>
<th>AFIB</th>
<th>Open Heart Thoracic</th>
<th>Heart Failure Vascular</th>
</tr>
</thead>
</table>

### Census

- **344** patients admitted with
- Observation Status
- **Exclusion Criteria**
- **List Patients Meet Criteria = 62**

---

**CTS Team A - E**

**Vasc Surg Blue**

**Vasc Surg Black**

**Vasc Surg Green**
Multi-Level Inclusion

Electronic Multidisciplinary

Proof of Concept

Foundational
Real Time Check List and Visualization

D/C Checklist column provides current status of checklist items

Discharge Checklist complete

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

The following information is missing or may need your attention:

One or more tasks require completion before this patient can be discharged. Please review the D/C Checklist for incomplete data. The DC Checklist can be viewed by log in context CARD HOSP.

Do you want to accept these orders anyway?

Electronic Soft Stop – Order can be bypassed
Electronic Hard Stop

The following information is missing or may need your attention:

One or more tasks require completion before this patient can be discharged. Please review the D/C Checklist for incomplete data. The DC Checklist can be viewed by log in context CARD HOSP.

These orders cannot be signed.

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

J72 Heart Failure Discharge Checklist PILOT

Admission Date

**Nursing**
1. Care Partner Identified
2. Nursing HF Education with Handout
3. Disease Education
   - Handouts given
   - Initial Introduction
   - Reinforcement
   - Teach Back
4. Sunbelt Skills Class/EMR TV Education (Course 550)

**Multi-disciplinary Consults**
1. Transitional Care Consult
   - Age ≥ 65 years
   - If needed, consult for higher risk
   - Seen by Translational Care
   - If Nutrition consult not needed, Place Nutrition Screen
2. Pharmacy Education Consult (Place for patients admitted or primary diagnosis heart failure)
3. EXCEPT pediatrics patient
4. Seen by Primary care

**Physicians-Certified Practitioners**
1. Order for early support services (homecare services, home HF care, home care at home, if indicated)
2. Achieve optimal pharmacologic therapy initiated or achieved and any intolerance documented
3. No symptomatic episode or standing hypotension (Orthostatic BP require action)
4. O2 Use (if indicated and patient/visitor informed of this need)
5. Near optimal volume status achieved
6. Stable renal function and acceptable electrolyte panel
7. Care Measure Status (Completed/Not Completed/Not Applicable;
8. Discharge Medication reconciliation completed

**DMHP** PLEASE LIST PROVIDER/PATIENT IS TO FOLLOW UP WITH (below and on blue autocopy sheet)

**Identify Primary Care Physician—Name**
1. Day 1-60: Cardiology MD
2. Day 61-90: Cardiology MD
3. Day 91-120: Cardiology MD
4. Discharge/Consult

**Clinic/Management**
1. Home Care visit initiated
2. Final post-discharge management made
Clinical and Operational Issues
Clinical/Operational Issues
Clinical/Operational Issues

• Assumed Frontline Was Aware of Checklist And Importance Of Reducing HF Readmissions

• Nutrition Staffing Problems

• Epic Login – Not Logged into CARD HOSP

• Scheduling Patients for HF Class/Shared Medical Appointments
Clinical/Operational Issues

- Our Group Focus Was On Technology – Less Human Factors
  - Concern Checking Boxes Rather Than Delivering Care
  - Explosion In Use Of Checklist On Patients Who Did Not Need It
  - Checklist Avoidance - Change Dx
  - Adversarial Behavior – “I Refuse”
"Appts already requested, no request needed. Patient is not in heart failure; this order is to appease Dr. Khot"
WHY the Heart Failure Checklist?
- Cleveland Clinic HF 30 day readmission rate is high
- Readmissions cost our organization about $2 Million
- Other multiple attempts failed
- Paper based checklist made a significant impact

WHO gets the checklist?
It is automatically assigned in EPIC if the patient meets ALL 3 conditions:
1. Patient admitted to “J” Nursing Unit
2. Patient under care of CVM services
3. Heart Failure Dx. on the hospital problem list

WHAT is the Heart Failure Checklist?
- Ensures care coordination
- Starts at admission-do NOT wait until discharge to complete.
- Ensures discharge readiness
Heart Failure Checklist

WHY

the Heart Failure Checklist?
- Cleveland Clinic HF 30 day readmission rate is high
- Readmissions cost our organization about $2 Million
- Other multiple attempts failed
- Paper based checklist made a significant impact

![Enterprise Goal 20%]

**Target Group**

<table>
<thead>
<tr>
<th>2013</th>
<th>n</th>
<th>rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total 1st dx. HF admissions Main Campus number 30 day readmission</td>
<td>358</td>
<td>18.7%</td>
</tr>
<tr>
<td>Total 1st dx. HF admissions HVI number 30 day readmission</td>
<td>273</td>
<td>17.6%</td>
</tr>
<tr>
<td>Total 2nd dx. HF admissions J7-2 (with and without DG checklist) number 30 day readmission</td>
<td>145</td>
<td>20.0%</td>
</tr>
<tr>
<td>Total 3rd dx. HF admissions J7-2 not included in the Pilot (NO checklist) number 30 day readmission</td>
<td>77</td>
<td>22.1%</td>
</tr>
</tbody>
</table>

**Target Group**

<table>
<thead>
<tr>
<th>2013</th>
<th>n</th>
<th>rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total 1st dx. HF admissions Main Campus number 30 day readmission</td>
<td>339</td>
<td>24.5%</td>
</tr>
<tr>
<td>Total 1st dx. HF admissions HVI number 30 day readmission</td>
<td>243</td>
<td>22.7%</td>
</tr>
<tr>
<td>Total 2nd dx. HF admissions J7-2 (with and without DG checklist) number 30 day readmission</td>
<td>107</td>
<td>25.2%</td>
</tr>
<tr>
<td>Total 3rd dx. HF admissions J7-2 not included in the Pilot (NO checklist) number 30 day readmission</td>
<td>48</td>
<td>25.0%</td>
</tr>
<tr>
<td>Total <em>HF service</em> 1st dx. HF admissions on J7-2 number 30 day readmission</td>
<td>68</td>
<td>26.5%</td>
</tr>
</tbody>
</table>

**J 72 HF 30-day Readmission Rate**

Patients WITH Paper Based Checklist

![Graph showing J 72 HF 30-day Readmission Rate from April 2013 to June 2014]
### WHO gets the checklist?

It is automatically assigned in EPIC if the patient meets ALL 3 conditions:

1. Patient admitted to “J” Nursing Unit
2. Patient under care of CVM services
3. Heart Failure Dx. on the hospital problem list

### EPIC view of HF Checklist shared list

<table>
<thead>
<tr>
<th>DC Checklist</th>
<th>Date</th>
<th>Patient Name/Age</th>
<th>MRIN</th>
<th>Attending</th>
<th>AMI DX/PL</th>
<th>Peak Troponin</th>
<th>Aspirin</th>
<th>Aspirin 24 hrs</th>
<th>Beta Blocker Extended</th>
<th>Statin Extended</th>
<th>HF DX/PL</th>
<th>LVEF %</th>
<th>ACE/ARB Extended</th>
</tr>
</thead>
</table>

#### Patients with completed checklist

<table>
<thead>
<tr>
<th>Patient Name</th>
<th>MRIN</th>
<th>Test Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hanna, M</td>
<td></td>
<td>0.056</td>
</tr>
<tr>
<td>Hanna, M</td>
<td></td>
<td>0.056</td>
</tr>
</tbody>
</table>

#### Patients with incompletely checklist

<table>
<thead>
<tr>
<th>Patient Name</th>
<th>MRIN</th>
<th>Test Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hanna, M</td>
<td></td>
<td>3.000</td>
</tr>
</tbody>
</table>

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

Patients with included service and admitted on J nursing unit, but does not have Heart Failure on problem list and not included in Heart Failure.
is the Heart Failure Checklist?

- Ensures care coordination
- Starts at admission—do NOT wait until discharge to complete.
- Ensures discharge readiness

The various disciplines provide to the patient and document the following care/information:

- Nursing
- Nutrition
- Pharmacy
- Care management
- CVM Physician NP/PA

- Managing Heart Failure/“Zones” education
- Therapeutic diet compliance
- Medication management
- Post discharge arrangements
- Clinical care addresses
  - Euvolemia
  - Evidence based medications
  - Avoiding hypotension
  - Stable renal function/electrolytes
  - Dry weight goal established
  - Medication reconciliation
  - Follow-up appointment

Nursing → Pharmacy → Nutrition → Care Management → CVM Physician NP/PA
Go Live Communication

• Ensures Care Coordination
• Starts At Admission - Do Not Wait Until Discharge To Complete
• Ensure Discharge Readiness
Shared Medical Appointment
Heart Failure Education Class
Shared Medical Appointment

Problem Statement

• Inefficient/Impossible To Complete 60 Individual Classes

• Scaling To All Of HVI – Volume Of Patients Was Greater Than Capacity For Individual Training

• HF Patients Are Admitted – No Method To Schedule Appointments
Goals

• Implementation Of HF Education Order

• Order Routing To Secretary For Scheduling

• Electronic Reporting Of HF Education Class

• Ability To Schedule A “Clinic Visit” For Inpatient Admitted Patient
HF Education Order

HVI Heart Failure Education

Priority: Routine

Frequency: ONCE (l)

For: Occurrences

Starting: 9/28/2017

First Occurrence: Today 1330

Requested HF education date

Process Inst.: Schedule patient in Cadence for Heart Failure Education class.

Comments (FB):

Next Required

Accept Cancel
Patient Feedback

• “I Really Liked The Overall Presentation Being So Relaxed. It Pertained To Everyday Life And Was Very Relevant.”
• “I Was Really Bad About How Much Salt I Ate Before Going To This Class. I Have Found That Since I Don't Use As Much Salt I Have Gotten Used To It And Have Started Using Other Spices And The Food Tastes Really Good.”
• “The Nurse Had Real Menus And Did Such A Good Job Of Going Into Detail To Explain How To Navigate A 2,000 Mg Sodium Restricted Diet Even When I Am Out To Eat.”
• “I Picked Up The American Heart Association Book That They Recommended And It Has Helped Me With Cooking And Managing My Heart Failure.”
• “It Gave Me Good Information On How To Live With Heart Failure.”
<table>
<thead>
<tr>
<th>Operational Costs</th>
<th>Development Hours</th>
<th>Contracted Resource Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Implementation</td>
<td>1,982</td>
<td>$208,375</td>
</tr>
<tr>
<td>Optimization Efforts</td>
<td>117</td>
<td>$5,850</td>
</tr>
</tbody>
</table>

**Total IT Cost**: $214,225
Performance Management and Reporting
Reporting and Visualization

Problem Statement

• How To Display Performance Data In A Meaningful Way?

• Multiple Clinical Roles In One Report View

• Ability To Scale
Operational Success

Technical – Reporting and Visualization

• Implementation Of New Reporting And Visualization Tool Called Tableau
• Flexible And Easy To Use
• Ability To Customize Views And Criteria
• Aligns With Activity Completed In EMR
Reporting and Visualization

Documentation in Electronic Medical Record

Tableau Performance Metrics

Cleveland Clinic

HVI HF Discharge Checklist

<table>
<thead>
<tr>
<th>Category</th>
<th>Indicator</th>
<th>Actual</th>
<th>N Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process of Care</td>
<td>Hard Stop Compliance</td>
<td>81.9%</td>
<td>651</td>
</tr>
<tr>
<td></td>
<td>DC Checklist Compliance (Overall)</td>
<td>70.7%</td>
<td>651</td>
</tr>
<tr>
<td></td>
<td>Care Management Compliance</td>
<td>97.5%</td>
<td>651</td>
</tr>
<tr>
<td></td>
<td>Nursing Compliance</td>
<td>92.9%</td>
<td>651</td>
</tr>
<tr>
<td></td>
<td>Nutrition Compliance</td>
<td>95.4%</td>
<td>651</td>
</tr>
<tr>
<td></td>
<td>Pharmacy Compliance</td>
<td>97.1%</td>
<td></td>
</tr>
<tr>
<td>Quality</td>
<td>Provider Compliance</td>
<td>75.1%</td>
<td></td>
</tr>
<tr>
<td>Patient Experience</td>
<td>% of Patients DC Home</td>
<td>87.7%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pain Management (Domain)</td>
<td>81.5%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Communication - Doctor</td>
<td>82.1%</td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>Indicator</td>
<td>Actual</td>
<td>N Size</td>
</tr>
<tr>
<td>------------------------</td>
<td>------------------------------------</td>
<td>----------</td>
<td>--------</td>
</tr>
<tr>
<td>Process of Care</td>
<td>Hard Stop Compliance</td>
<td>81.9%</td>
<td>481</td>
</tr>
<tr>
<td></td>
<td>DC Checklist Compliance (Overall)</td>
<td>70.7%</td>
<td>481</td>
</tr>
<tr>
<td></td>
<td>Care Management Compliance</td>
<td>97.9%</td>
<td>481</td>
</tr>
<tr>
<td></td>
<td>Nursing Compliance</td>
<td>92.9%</td>
<td>481</td>
</tr>
<tr>
<td></td>
<td>Nutrition Compliance</td>
<td>95.4%</td>
<td>481</td>
</tr>
<tr>
<td></td>
<td>Pharmacy Compliance</td>
<td>97.1%</td>
<td>481</td>
</tr>
<tr>
<td></td>
<td>Provider Compliance</td>
<td>75.7%</td>
<td>481</td>
</tr>
<tr>
<td>Quality</td>
<td>% of Patients DC Home</td>
<td>87.7%</td>
<td>481</td>
</tr>
<tr>
<td>Patient Experience</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Communication - Doctor</td>
<td>82.1%</td>
<td></td>
</tr>
</tbody>
</table>

Overall Performance By Team

Drill down to Patient Level Detail:
- Hard Stop Compliance
- Overall Compliance
- Care Management
- Nursing Compliance
- Nutrition Compliance
- Pharmacy Compliance
- Provider Compliance
- Patient DC Home
Clinical Impact
Short Term
Heart Failure Checklist
Patient Volume By Month

09/2013-04/30/14
Paper Check List

April 9
J72

July 24
J7’s Hard

Oct 1
J Building

Total Electronic Heart Failure Check List Patients = 1,505
Compliance by CareTeam
April 2014 – March 2015

- Care management: 69.5%
- Nursing: 87.9%
- Nutrition: 87.8%
- Pharmacy: 59.8%
- Provider: 69.5%
- Overall electronic compliance: 97.3%

Log in Context issue

- Paper Pilot
- Overall electronic compliance
Readmission Rate per Month

Electronic Checklist Criteria

Enterprise target = 20%
Heart Failure Readmission Rates

Patients on Discharge Checklist per Criteria

Goal < 20%

Sept '13
Oct '13
Nov '13
Dec '13
Jan '14
Feb'14
Mar'14
April '14
May'14
June'14
July '14
Aug '14
Sept'14
Oct '14
Nov '14
Dec '14
Jan '15
Feb '15
Mar '15

Rate
12.1%
20.0%
14.7%
4.9%
11.1%
11.1%
17.2%
4.9%
11.1%
11.1%
17.2%
22.7%
22.7%
22.2%
29.4%
16.1%
31.0%
18.9%
19.4%
18.5%
21.9%
19.6%
15.7%
18.5%

Patient Count
33
30
34
41
36
27
29
22
45
34
56
71
53
278
189
192
189
166
211

30 day readmit
4
6
5
2
4
3
5
5
10
10
9
22
10
54
35
42
37
26
39

3 Phases

Paper Checklist

Electronic Checklist

Full Deployment

Paper

Electronic

Roll out

Full Deployment

Enterprise Readmission Target

04/09/14

HF Go Live

10/01/14

J Building Activation

Paper Checklist

Electronic Checklist

Full Deployment

Goal ≤ 20%

Rate

Patient Count

30 day readmit
Clinical Impact
Long Term
HF 30d Readmissions per Year
2012 – 2017 Q1

Paper to Electronic Heart Failure Checklist

- 2012: 22.70%
- 2013: 19.30%
- 2014: 23.10%
- 2015: 20.10%
- 2016: 20.10%
- 2017 (Q1): 19.50%

Source: Outcomes Review and Tableau data
FY Comparison: Main Campus Excess Hospital Readmission Ratio

Adjustment Factor >1= Penalty
Adjustment Factor <1= Not included in the Readmission Adjustment Factor

<table>
<thead>
<tr>
<th>FY 2014</th>
<th>FY 2015</th>
<th>FY 2016</th>
<th>FY 2017</th>
<th>FY 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY 2014</td>
<td>FY 2015</td>
<td>FY 2016</td>
<td>FY 2017</td>
<td>FY 2018</td>
</tr>
<tr>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
</tr>
<tr>
<td>1.0687</td>
<td>1.0678</td>
<td>1.0713</td>
<td>1.0635</td>
<td>1.0073</td>
</tr>
</tbody>
</table>

Initiation of HF Paper & Electronic Checklist
Main Campus
Hospital Readmission Reduction Program
Payment Adjustment Factor

FY 2014  Time Period:
July 1, 2009 through June 30, 2012

FY 2015  Time Period:
July 1, 2010 through June 30, 2013

FY 2016  Time Period:
July 1, 2011 through June 30, 2014

FY 2017  Time Period:
July 1, 2012 through June 30, 2015

FY 2018  Time Period:
July 1, 2013 through June 30, 2016

Full Initiation of HF paper & electronic checklist

Penalty Reduction= $304,973
Acknowledgements

Tim Sobol
Kathleen Kravitz
Colette Einloth
Anita Ullman
Cheryll Miller
Brent Hicks
Randall Starling, MD
Corrine Bott-Silverman, MD
Josalyn Meyer
Debbie Brosovich
Gary Kish
Joy Yuhas
Molly Loy
Bonnie Javurek
Mike Militello
Eric Sokn
Kate Sibila
Sue Gatchel
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
Cleveland Clinic

Every life deserves world class care.