The New Priority: Decreasing Readmissions after Cardiothoracic Surgery: How Do We Get There?

Michael Zhen-Yu Tong, MD, MBA
Department of Cardiothoracic Surgery
Cleveland Clinic
• No Disclosures
Plan

• Background and policies on readmission

• Readmission in cardiac surgery, causes and risk factors

• Strategies to decrease readmission
Rehospitalizations among Patients in the Medicare Fee-for-Service Program

Stephen F. Jencks, M.D., M.P.H., Mark V. Williams, M.D., and Eric A. Coleman, M.D., M.P.H.

- 19.7% 30 day readmission rate
- 34% 90 day readmission rate
- $17.4 billion dollars (2004)
- 17% of all medicare payments
Diagnoses and Timing of 30-Day Readmissions After Hospitalization for Heart Failure, Acute Myocardial Infarction, or Pneumonia

Kumar Dharmarajan, MD, MBA
Angela F. Hsieh, PhD
Zhenqiu Lin, PhD
Héctor Bueno, MD, PhD
Joseph S. Ross, MD, MHS
Leora I. Horwitz, MD, MHS
José Augusto Barreto-Filho, MD, PhD
Nancy Kim, MD, PhD
Susannah M. Bernheim, MD, MHS
Lisa G. Suter, MD
Elizabeth E. Drye, MD, SM
Harlan M. Krumholz, MD, SM

Importance To better guide strategies intended to reduce high rates of 30-day readmission after hospitalization for heart failure (HF), acute myocardial infarction (MI), or pneumonia, further information is needed about readmission diagnoses, readmission timing, and the relationship of both to patient age, sex, and race.

Objective To examine readmission diagnoses and timing among Medicare beneficiaries readmitted within 30 days after hospitalization for HF, acute MI, or pneumonia.

Design, Setting, and Patients We analyzed 2007-2009 Medicare fee-for-service claims data to identify patterns of 30-day readmission by patient demographic characteristics and time after hospitalization for HF, acute MI, or pneumonia. Readmission diagnoses were categorized using an aggregated version of the Centers for Medicare & Medicaid Services' Condition Categories. Readmission timing was determined by day after discharge.

Main Outcome Measures We examined the percentage of 30-day readmissions occurring on each day (0-30) after discharge; the most common readmission diagnoses occurring during cumulative periods (days 0-3, 0-7, 0-15, and 0-30) and consecutively in the days 0-30 period; and the type of diagnosis (HF, MI, or pneumonia) with each day after hospitalization for HF, acute MI, or pneumonia.
Heart Failure Hospitalization

25% Readmission: 61% within 15 days
Acute MI

20% Readmission: 68% within 15 days
Pneumonia

18% Readmission: 63% within 15 days
Government Penalties

- CMS Readmission reduction program
- Excess 30-day readmission rate in heart failure, myocardial infarction and pneumonia carry up to 1% penalty
  - Increase to 2% for FY 2014
  - Increase to 3% for FY 2015
  - To include COPD, stroke
- Hospital inpatient quality reporting (IQR) to include CABG readmission rate (2015)
CAUSES OF READMISSION
Predictors of Readmission for Complications of Coronary Artery Bypass Graft Surgery

Edward L. Hannan, PhD
Michael J. Racz, MA
Gary Walford, MD
Thomas J. Ryan, MD
O. Wayne Isom, MD
Edward Bennett, MD
Robert H. Jones, MD

**Context** Risk factors for perioperative mortality after coronary artery bypass graft (CABG) surgery have been extensively studied. However, which factors are associated with early readmissions following CABG surgery are less clear.

**Objective** To identify significant predictors of readmission within 30 days following CABG surgery.

**Design, Setting, and Patients** Causes for readmission within 30 days were investigated for all patients discharged after CABG surgery in the state of New York from January 1, 1999, through December 31, 1999. A variety of patient demographics, preoperative risk factors, complications, operative and postoperative factors, and provider characteristics were considered as potential predictors of readmissions.

- 13% 30 day readmission rate
Table 1. Reasons for Hospital Readmission Within 30 Days of Discharge Following CABG Surgery

<table>
<thead>
<tr>
<th>Principal Diagnosis</th>
<th>Readmissions, No. (%)</th>
<th>Length of Time Until Readmission, Median (Interquartile Range), d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infections</td>
<td>598 (28.3)</td>
<td>11 (6-19)</td>
</tr>
<tr>
<td>Heart failure</td>
<td>331 (15.7)</td>
<td>8 (4-16)</td>
</tr>
<tr>
<td>Myocardial ischemia/acute myocardial infarction</td>
<td>166 (7.9)</td>
<td>12 (7-19)</td>
</tr>
<tr>
<td>Arrhythmia</td>
<td>163 (7.7)</td>
<td>8 (3-14)</td>
</tr>
<tr>
<td>Pulmonary thromboembolism/deep venous thrombosis</td>
<td>133 (6.3)</td>
<td>9 (4-17)</td>
</tr>
<tr>
<td>Respiratory and other chest symptoms</td>
<td>118 (5.6)</td>
<td>9 (4-16)</td>
</tr>
<tr>
<td>Stroke</td>
<td>81 (3.8)</td>
<td>7 (4-16)</td>
</tr>
<tr>
<td>Pleurisy</td>
<td>80 (3.8)</td>
<td>9 (4-15)</td>
</tr>
<tr>
<td>Hypertension/hypotension</td>
<td>71 (3.4)</td>
<td>10 (5-16)</td>
</tr>
<tr>
<td>Aspiration pneumonia</td>
<td>66 (3.1)</td>
<td>7 (5-15)</td>
</tr>
<tr>
<td>Gastrointestinal bleeding</td>
<td>64 (3.0)</td>
<td>7.5 (3-13.5)</td>
</tr>
<tr>
<td>Other complications*</td>
<td>240 (11.4)</td>
<td>7 (3-14)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2111 (100)</strong></td>
<td><strong>9 (4-16)</strong></td>
</tr>
</tbody>
</table>

Abbreviation: CABG, coronary artery bypass graft.

*Other forms of heart disease (0.9%), pulmonary edema (0.6%), device, implant, or graft complications (0.4%), genitourinary complications (1.2%), anemia/thrombocytopenia (0.5%), fluid and electrolyte imbalance (1.9%), and other surgical complications (5.9%).
Readmissions After Cardiac Surgery: Experience of the National Institutes of Health/Canadian Institutes of Health Research Cardiothoracic Surgical Trials Network

Alexander Iribarne, MD, MS, Helena Chang, MS, John H. Alexander, MD, A. Marc Gillinov, MD, Ellen Moquete, RN, John D. Puskas, MD, Emilia Bagiella, PhD, Michael A. Acker, MD, Mary Lou Mayer, RN, T. Bruce Ferguson, MD, Sandra Burks, RN, Louis P. Perrault, MD, Stacey Welsh, RN, Karen C. Johnston, MD, MS, Mandy Murphy, RN, Joseph J. DeRose, MD, Alexis Neill, RN, Edlira Dobrev, MS, Kim T. Baio, MSN, Wendy Taddei-Peters, PhD, Alan J. Moskowitz, MD, and Patrick T. O’Gara, MD


• 5158 consecutive patients
• 18.7% Readmission/index discharge
• Average length of admission 5 days
• 11.6% had more than 1 readmissions
Readmission by Surgery

- Isolated CABG: 14.9
- Isolated Valve: 18.3
- CABG + Valve: 25
- LVAD/TX: 35.1
- Thoracic Aortic: 18.1
- Other: 21.5
Causes of Readmission

A. 81% < 30 days
   - N = 672

B. 19% 31-65 days
   - N = 162
Infections

- 16% of total Readmissions
  - 24% superficial
  - 21.3% pneumonia
  - 13.3% Deep surgical site
  - 10.7% Groin
  - 6% blood stream
Risk Factors for Readmissions

- Creatinine: Hazard Ratio 4.5
- COPD: Hazard Ratio 3.5
- LVAD/Tx: Hazard Ratio 3.36
- DM: Hazard Ratio 2.5
- CABG+Valve: Hazard Ratio 1.52
- Thoracic Valve: Hazard Ratio 1.41
- Female: Hazard Ratio 1.35
- Valve: Hazard Ratio 1.33
- Duration Of Case: Hazard Ratio 1.15
- Hemoglobin: Hazard Ratio 0.91
Early readmission for congestive heart failure predicts late mortality after cardiac surgery

Richard Lee, MD, MBA, Natalie Homer, BS, Adin-Cristian Andrei, PhD, Edwin C. McGee, MD, S. Chris Malaisrie, MD, Preeti Kansal, MD, and Patrick M. McCarthy, MD

The Journal of Thoracic and Cardiovascular Surgery • September 2012
Prospective evaluation of patients readmitted after cardiac surgery: Analysis of outcomes and identification of risk factors

Hersh S. Maniar, MD, Jennifer M. Bell, BSN, Marc R. Moon, MD, Bryan F. Meyers, MD, JoAnn Marsala, BSN, Jennifer S. Lawton, MD, and Ralph J. Damiano, Jr, MD

The Journal of Thoracic and Cardiovascular Surgery • March 2014
Summary

• Readmission rates after cardiac surgery almost 20%
• High risk patients
  − Complexity of surgery
  − Renal failure
  − COPD
  − Female
  − Anemia
• Most of readmission occur within the first 2 weeks
Summary

• Most common reasons for readmission
  – Arrhythmias
  – Infection
  – Volume Overload
  – Pleural Effusions
  – Pericardial

• Patients readmitted have a higher risk of long term mortality
DECREASING READMISSIONS: HOW DO WE GET THERE
Arrhythmias

- Increased attention to use of antiarrrhythmic and anticoagulants.
- Close patient monitoring and followup
  - compliance and titration of medications
  - Planned outpatient cardioversion
- Prospective studies are needed
  - CTSN rate vs rhythm control for post op afib.
Fluid Overload

- Blood conservation measures
- Preop blood volume expansion
- Multidisciplinary Team approach to minimize hemodilution of patents
  - Anesthesia volumes
  - Minimize prime volume on CPB circuit/retrograde autologous prime, use of cell saver
  - Meticulous hemostasis
- Crystalloid vs colloid
- Transfusion triggers?
Anemia vs transfusion

![Graph showing the relationship between hematocrit and various outcomes such as respiratory failure, renal morbidity, cardiac dysfunction, mortality, and stroke. The graph indicates that there is a safety zone within the hematocrit range where the risk of morbidity and mortality is minimized.]

Intervention (RBC transfusions, Pharmaceuticals, Reoperation)

Safety Zone
The least of 3 evils: Exposure to red blood cell transfusion, anemia, or both?

Gabriel Loor, MD, a Jeevanantham Rajeswaran, PhD, b Liang Li, PhD, b Joseph F. Sabik III, MD, a Eugene H. Blackstone, MD, a,b Keith R. McCrae, MD, c and Colleen G. Koch, MD, MS, MBA d,e

The Journal of Thoracic and Cardiovascular Surgery • December 2013
Multicenter UK study: 2007 patients

RCT: restrictive (Hgb 7.5) vs liberal (Hgb 9)

Primary outcome: infection, ischemic event, MI, renal injury

restrictive (35%) not superior to liberal (33%)
• Secondary outcome: mortality higher in restrictive (4.2%) than liberal (2.6%)
Infection

• Appropriate timing and dosing of antibiotics,
• Attention to skin preparation,
• Discontinuation of antibiotics after 24h
• Hand washing

• Identification of wound problems early
• Endoscopic saphenous vein harvesting
Other Processes

- **Timely discharge Summaries**
  - Within 24h.

- **Proper handoff process**
  - Communication with cardiologists, GP, rehab facilities, etc

- **Medication reconciliation**

- **Provide medications on discharge**

- **Educating and ensure patient and families understand discharge instructions**
Other Processes

- Identify high risk patients
- Follow up plans in place at time of discharge
  - Early follow-up
  - <7 days for high risk patients if not all patients
  - Robust home care system
  - Titrate medications
  - Identification of issues early
- Telehealth and telemonitoring
Process at Cleveland Clinic

- Pharmacy and medication delivery system prior to discharge
- Confirmed follow up with OPD, GP and cardiologist prior to discharge
- Telephone call on post hospital discharge day 1 and 7
- Follow up in NP clinic <1 week and at 6 weeks
- Cardiology and GP follow-up 4 weeks
Process at Cleveland Clinic

• Printed discharge summary and instructions with the patient at discharge and sent to GP and cardiologist

• 24/7 nurse telephone line
Conclusion

- Programs to decrease readmission need to target the main causes of readmission
- Requires a multidisciplinary team and multipronged approach
  - Patient education
  - Early Follow up for high risk if not all patients
  - Social/Home services
  - Communication and handover with patient care providers
  - Monitoring