

# Prospective Evaluation of Patients Readmitted After Cardiac Surgery: Analysis of Outcomes and Identification of Risk Factors

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# Hospital Readmissions

- Over 20% of Medicare patients require readmission within 30 days after a hospitalization
- Estimated costs of > \$12 billion per year
- CMS has chosen the 30-day readmission rate as a “pay for performance” metric
- Cardiac surgery likely to be a focus of increased scrutiny given its high profile, cost, and the high at- risk population

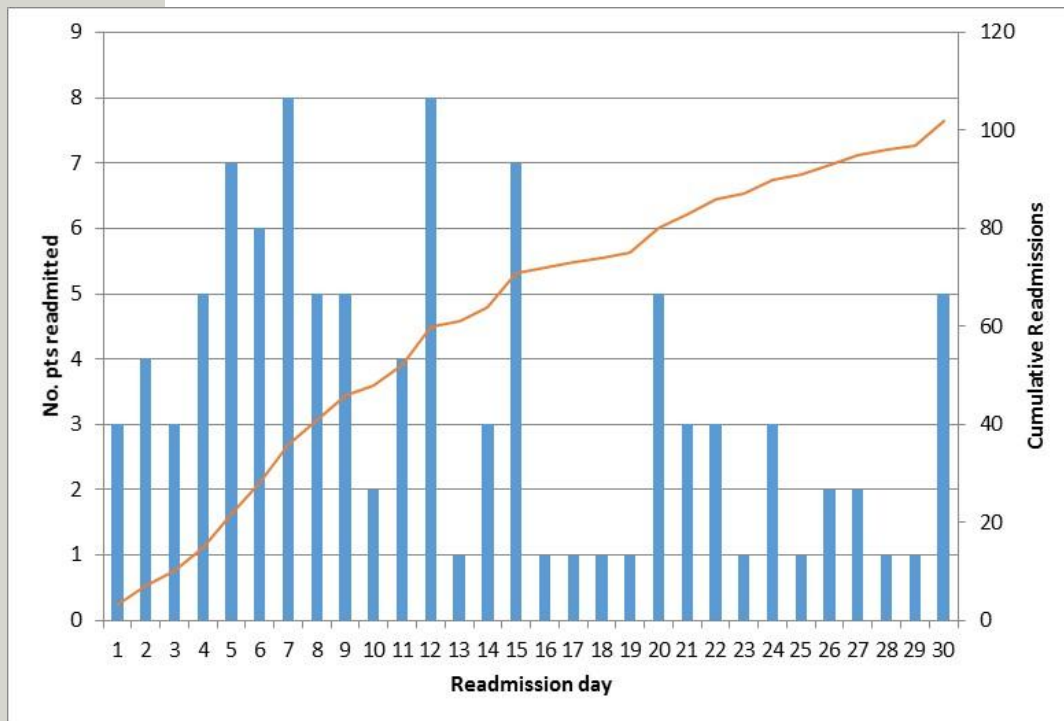
# Study Outline |

- The purpose of this study was to identify risk factors for readmission among patients undergoing cardiac surgery
- April 2011 → March 2012 → March 2013
- 2,096 patients underwent a major cardiac surgical procedure at a tertiary care institution
- Readmitted patients were prospectively identified at time of readmission and medical charts reviewed

# Study Outline |

- Readmitted patients n=102
- Time matched controls n=249
- Chart reviews determined readmission diagnoses
- A detailed questionnaire was administered to all patients to procure non-STS, socioeconomic data
- Comparisons
  - Univariate models identified group differences
  - Multivariate logistic regression for predictors of readmission

# Timing and Reasons for Readmission



## Readmission Diagnoses

- CHF 25% (n=26)
- Infection 23% (n=23)
- Arrhythmia 15% (n=15)
- Bleeding 11% (n=11)

# Preoperative Variables

	Readmitted (N=102)	Non- Readmitted (N=249)	P value
Age (years)	64 ± 15	63± 14	0.54
Female gender	42 (41%)	85 (34%)	0.21
COPD	23 (23%)	23 (9%)	0.0008
CRI	26 (25%)	24 (10%)	0.0001
NYHA III OR IV	69 (67%)	112 (45%)	0.0001
PVD	38 (37%)	65 (26%)	0.04
EF (%)	44.3 ± 17.8	56 ± 13.4	<0.0001
<b>INCOME</b>			0.009
<\$50,000	17 (17%)	21 (8%)	
\$50,000 – 100,000	85 (83%)	222 (89%)	
>\$100,000	0	6 (2%)	
<b>EDUCATION</b>			<0.0001
Less than high school	32 (31%)	37 (15%)	
High school graduate	53 (52%)	118 (47%)	
More than high school	17 (17%)	94 (38%)	
Established Physician Prior	89 (87%)	234 (94%)	0.03

# Perioperative Variables

	Readmitted (N=102)	Non-Readmitted (N=249)	P value
<b>OPERATIVE TYPE</b>			0.006
Isolated CABG	28 (27%)	68 (27%)	
Isolated valve	23 (23%)	75 (30%)	
CABG/valve	19 (19%)	59 (24%)	
Aortic surgery	8 (8%)	13 (5%)	
Arrhythmia surgery	1 (1%)	7 (3%)	
Transplant/VAD	18 (18%)	11 (4%)	
Surgery duration (hours)	4.8 ± 1.7	4.7 ± 1.7	0.65
Total LOS (days)	12.6 ± 7.6	8.5 ± 6.0	<0.0001
Ventilator time (hours)	28 ± 36	17 ± 26	<0.0001
Re-exploration	5 (5%)	4 (2%)	0.13
CVA	3 (3%)	5 (2%)	0.70
ARF requiring HD	2 (2%)	3 (1%)	0.63
IABP	7 (7%)	5 (2%)	0.05
Re-intubation	4 (4%)	9 (4%)	1.0
Arrhythmia	27 (26%)	82 (33%)	0.23

# Discharge Variables

	Readmitted (N=102)	Non- Readmitted (N=249)	P value
<b>DISCHARGE LOCATION</b>			<0.0001
ECF	35 (34%)	37 (15%)	
Home	67 (66%)	212 (85%)	
<b>DISCHARGE MEDICATIONS</b>			
Aspirin	92 (90%)	226 (91%)	0.87
Beta blocker	68 (67%)	178 (71%)	0.37
Warfarin or analog	41 (40%)	63 (25%)	0.006
Diuretic	84 (82%)	191 (77%)	0.24
Medication compliance	93 (91%)	243 (98%)	0.02
Seen by MD early after discharge	34 (33%)	188 (76%)	<0.0001



# Multivariate Logistic Regression

Variable	OR	95% CI for OR	incremental r2 (selection order)	P value
<b>PREOPERATIVE</b>				
COPD	2.00	0.98, 4.06	0.24 (4)	0.05
EF %	0.80	0.74, 0.87	0.15 (1)	<0.0001
Education level	0.52	0.36, 0.76	0.21 (2)	0.0001
Established Physician Prior	0.41	0.16, 1.002	0.22 (3)	0.03
<b>POSTOPERATIVE</b>				
Transplant/VAD procedure	2.37	0.88, 6.39	0.31 (4)	0.09
LOS	1.56	1.12, 2.18	0.28 (2)	0.009
Discharge location other than home	2.09	1.11, 3.92	0.30 (3)	0.02
Seen by MD early after discharge	0.18	0.11, 0.31	0.21 (1)	<0.0001

# Conclusion

- Most common reasons for readmission were CHF exacerbation and infection
- Lower EF, COPD and longer LOS were more prevalent and independent risk factors for readmission
- Socioeconomic status was significantly associated with readmission specifically with respect to income, education, and lack of established health care
- Seeing a physician early post-discharge was associated with a reduced need for readmission