Remote Hemodynamic Monitoring Program: A Single Center Experience in Reducing Heart Failure Admissions

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Background

Remote hemodynamic monitor with CardioMEMS™ HF System (St. Jude Medical) allows for periodic assessment of pulmonary artery (PA) pressures and heart rate. It is the first & only FDA approved implantable heart failure monitoring system shown to significantly reduce heart failure hospital admissions in NYHA Class III patients.

Objective

To examine the utilization of remote hemodynamic monitoring using the CardioMEMS™ HF system (St. Jude Medical) and its impact on reduction of Heart Failure (HF) inpatient admissions at our hospital.

Methods

A retrospective chart review of patients implanted with CardioMEMS™ HF system from March 2015 to September 2016 was performed. We examined primary coded HF inpatient admission event rates over one year prior to implant compared to primary coded HF inpatient admissions post implant. Patients were followed post implant until death, heart transplant or VAD implant. Poisson regression was used to compare pre implant event rates to post implant event rates. Competing risks was used to estimate time to first HF inpatient admission post implant.

Results

32 patients were implanted between the time periods. The average age at time of implant was 64 ±15 years, with 17 (53%) of patients being male. 24 (75%) of the patients had LVEF <40% (Table 1).

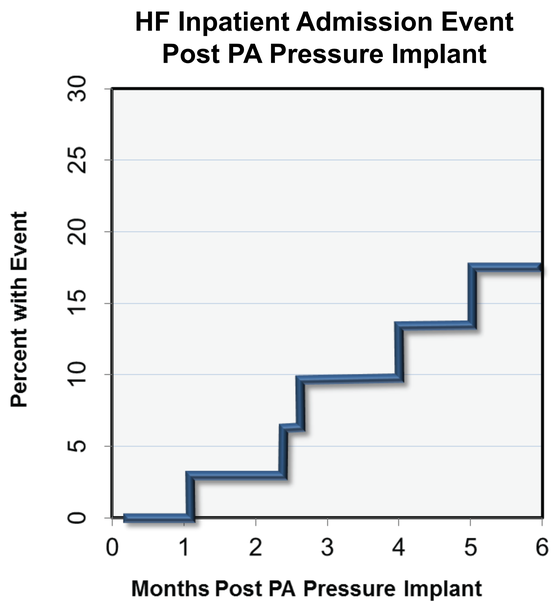
Table 1: Baseline Demographics (Pre-Implant)

Indicator	Freq (%); Mean ± STD (min-max)
Total Implants	32
Age at implant	63.9 ± 14.6 (28-84)
Male	17 (53.1%)
Race: Caucasian	22 (68.8%)
Height (cm)	170.2 ± 9 (152-185)
Weight (kg)	93.5 ± 20.5 (57-129)
BMI	32.2 ± 6.8 (20.9-45.4)
LVEF	30.1 ± 16.3 (10-65)
LVEF≥40%	8 (25%)
Laboratory/Hemodynamic Analysis	
Systolic Blood Pressure	114 ± 12 (91-140)
Diastolic Blood Pressure	68.9 ± 9 (52-84)
Heart Rate (best per min)	77.5 ± 13.3 (54-103)
Pulmonary artery Mean Pressure	28.3 ± 8.1 (13-42)
Serum Creatinine	1.4 ± 0.4 (0.6-2.2)
Creatinine (umol/L)	123.7 ± 36.5 (50.4-198)
Past Medical History	
History of Myocardial Infarction	16 (50%)
CRT/CRT-D	12 (37.5%)
ICD Implant	15 (46.9%)
Ischemic Cardiomyopathy	16 (50%)
Comorbidities	
Hypertension	16 (50%)
Coronary artery disease	16 (50%)
Diabetes Mellitus	13 (40.6%)
Atrial Tachycardia flutter or fibrillation	14 (43.8%)
Chronic Obstructive Pulmonary Disease	6 (18.8%)
Chronic Kidney Disease (II-IV)	15 (46.9%)
Medications	
Angiotensin-converting enzyme inhibitors or angiotensin-receptor blockers	25 (78.1%)
Beta-blocker	30 (93.8%)
Aldosterone antagonist	21 (65.6%)
Loop diuretic	32 (100%)
Hydralazine	2 (6.3%)
Nitrate	7 (21.9%)

Results

Patients were admitted for primary coded HF at rates of 3.1%, 10.0%, and 18.0% at 1, 3, and 6 months post-implant (Figure 1).

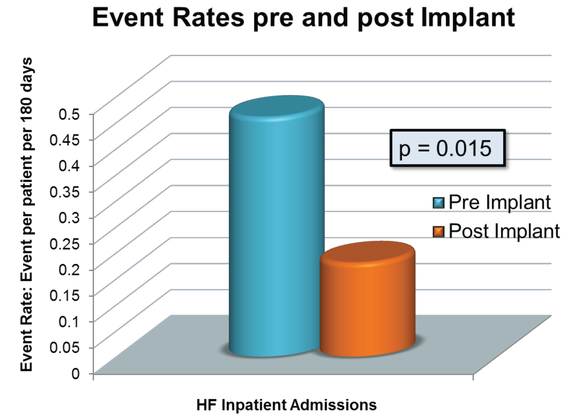
Figure 1: Time to first HF Inpatient Admission post implant



Results

The number needed to treat (NNT) to avoid 1 HF inpatient admission in a 180 day timeframe was 4.8. Overall HF inpatient admissions were significantly reduced in these 32 patients (Figure 2). In the 1 year prior to implant, 30 HF inpatient admissions occurred resulting in an average of 0.46 events per patient per 180 days compared to 8 HF inpatient admissions in the post implant phase resulting in an average of 0.17 events per patient per 180 days, p=0.015 (Figure 2).

Figure 2: Comparison of Event Rates pre and post implant



Discussion

Utilization of remote hemodynamic monitoring via the CardioMEMS™ HF system in monitoring PA pressures has shown to be statistically significant in reducing Heart Failure inpatient admissions at our institution.

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