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

Table 1: Baseline Demographics (Pre-implant)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Freq (%)</th>
</tr>
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<tbody>
<tr>
<td>Total Implants</td>
<td>32</td>
</tr>
<tr>
<td>Age at implant (yr)</td>
<td>63.9 ± 14.6 (28-84)</td>
</tr>
<tr>
<td>Male</td>
<td>17 (53.1%)</td>
</tr>
<tr>
<td>Race: Caucasian</td>
<td>22 (68.8%)</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>170.2 ± 9 (152-185)</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>93.5 ± 20.5 (57-129)</td>
</tr>
<tr>
<td>BMI</td>
<td>32.2 ± 6.8 (20.9-45.4)</td>
</tr>
<tr>
<td>LVEF ≥ 40%</td>
<td>30.1 ± 16.3 (10-65)</td>
</tr>
<tr>
<td>LVEF ≥ 40%</td>
<td>8 (25%)</td>
</tr>
</tbody>
</table>

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%)

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

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.