Association between mortality and in-hospital complications and physician volume of procedures for AICD implantation

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Background
Congestive Heart Failure
• Estimated 2 – 4 million in the US
• Rapid growth of new cases projected
• Causes: CAD, HTN, DM, infiltrative diseases, HCM
• High costs: $38 B direct annual costs
• Frequent re-hospitalizations drive costs
• 5 year mortality estimated at 50%

Causes of Death
• Pump failure: inability to generate adequate cardiac output for tissue perfusion, fluid balance (50%)
• Ventricular arrhythmias: VT and VF leading to sudden death (50%)

AICD
• Developed to reduce sudden arrhythmic death
• Automatic implantable cardiac defibrillator
• Senses VT or VF, delivers countershock

Relationship of Volume to Outcomes
• Previous studies established relationship between procedure volume and outcome
  Lower mortality rates
  Lower LOS
  Fewer complications
• Calls for reimbursement and contracting tied to volume of procedures
• Leapfrog Group

Methods
• Data source: SPARCS (NY State)
• Six years data (1997 – 2002)
• Identify all patients undergoing AICD placement

Data elements
• Primary procedure (AICD / CRT)
• Demographics
• Co-morbidities
• Complications associated with procedure
• Discharge status (mortality rate)
• Re-admissions

Physician volume
• Physician unique identifier associated with each procedure (medical license number)
• Sum annual and six year experience for each procedure

Hospital volume:
• Unique hospital identifier
• Sum annual and six year experience

Results
Table 1. Demographics for Index AICD Admissions in New York State 1997-2002

<table>
<thead>
<tr>
<th>N</th>
<th>Age in Years</th>
<th>Male*</th>
<th>Female*</th>
</tr>
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<tbody>
<tr>
<td>17,979</td>
<td>66.6 ± 13.2</td>
<td>14,082(78.3%)</td>
<td>3,895(21.7%)</td>
</tr>
</tbody>
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* Sex unknown for two individuals

Figure 1. Number of AICD Procedures by Year in New York State

Figure 2. Number of AICD Procedures by Quartile Physician Volume

Figure 3. Median Number of Days to Revision for Low Volume (<1/yr) vs. Other AICD Volume Physicians

Figure 4. Rates of Complications for Low-Volume (<1/yr) vs. Other AICD Volume Physicians

Figure 5. Median Number of Days to Revision for Low Volume (<1/yr) vs. Other AICD Volume Physicians

Conclusions / Further Analysis
• Higher mortality and complication rates for low volume physicians
• Low volume associated with earlier time to AICD revision

Further Analysis:
• Expand years of analysis (1997-2005)
• Adjust for patient demographics and comorbidities
• Include exploration of cut-points for volume
• Include re-admissions within 30, 60 days as complications