Standardized Nurse-Driven Protocol for Postoperative Atrial Fibrillation Reduces Length of Stay and Hospital Costs

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Disclosures

• The authors have no relevant financial or nonfinancial relationship(s) within the products or services described, reviewed, evaluated, or compared in this presentation.

• There are no relevant unlabeled/unapproved use disclosures related to this presentation.
Background: Atrial Fibrillation

Atrial fibrillation

Intracardiac thrombi


Background: Postoperative Atrial Fibrillation (POAF)

Postoperative Atrial Fibrillation Rates by Surgery Type

Unadjusted 10-year Survival by Surgery Type

Lee, R. Atrial fibrillation and flutter after cardiac surgery. In: UpToDate, Post, TW (Ed), UpToDate, Waltham, MA, 2015.

Methods: MHI / Abbott Northwestern’s Nurse-Driven POAF Protocol

- In March 2013, a real-time atrial fibrillation inpatient protocol was implemented in the CV surgery postoperative care units.
- The protocol guides beta-blocker, anti-coagulant, and antiarrhythmic therapy by incorporating a real-time decision support tool for dosing and communication.

Methods: Sample Protocol Branch

- First Episode:
  - HR < 130
    - SBP < 100
      - If patient is on beta-blockers, continue beta-blockers.
      - If patient is not on beta-blockers, use atenolol or labetalol.
    - SBP > 100
      - If patient is on beta-blockers, continue beta-blockers.
      - If patient is not on beta-blockers, use atenolol or labetalol.
  - HR > 130
    - SBP < 100
      - If patient is on beta-blockers, continue beta-blockers.
      - If patient is not on beta-blockers, use atenolol or labetalol.
    - SBP > 100
      - If patient is on beta-blockers, continue beta-blockers.
      - If patient is not on beta-blockers, use atenolol or labetalol.

- No antiarrhythmic
  - No beta-blocker
  - No anticoagulant

- Communication & consult support

Care Decision

Medication Timing/Dosing support
- A) Beta Blockers for Rate Control
- B) Amiodarone for rhythm control
- C) Anticoagulants

Heart Rate
Blood Pressure
Duration of POAF
Medication status
Methods: Study Population

1660 CV Surgery Patients between March 2013 and August 2015

274 Patients excluded for unknown atrial fibrillation or protocol status
Methods: Study Population

1660 CV Surgery Patients between March 2013 and August 2015

274 Patients excluded for unknown atrial fibrillation or protocol status

1386 Qualifying CV Surgery Patients w/ known atrial fibrillation & protocol status

899 Patients without POAF
Methods: Study Population

1660 CV Surgery Patients between March 2013 and August 2015

274 Patients excluded for unknown atrial fibrillation or protocol status

1386 Qualifying CV Surgery Patients w/ known atrial fibrillation & protocol status

899 Patients without POAF

233 Patients with POAF Managed with Protocol

274 Patients with POAF Managed without Protocol
## Results: Baseline Characteristics

<table>
<thead>
<tr>
<th>No POAF</th>
<th>POAF w/ Protocol</th>
<th>POAF w/o Protocol</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(n=899)</td>
<td>(n=233)</td>
<td>(n=254)</td>
<td></td>
</tr>
<tr>
<td><strong>Age†</strong></td>
<td>65 (56.72)*</td>
<td>71 (64.76)*</td>
<td>71 (65.77)*</td>
</tr>
<tr>
<td>Male</td>
<td>635 (70.6%)</td>
<td>163 (70.0%)</td>
<td>173 (68.1%)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>242 (26.9%)</td>
<td>68 (28.3%)</td>
<td>76 (29.9%)</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>734 (81.7%)</td>
<td>199 (85.4%)</td>
<td>212 (83.5%)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>663 (73.8%)</td>
<td>172 (73.8%)</td>
<td>196 (77.2%)</td>
</tr>
<tr>
<td>On Dialysis</td>
<td>8 (0.9%)</td>
<td>0 (0.0%)</td>
<td>3 (1.2%)</td>
</tr>
<tr>
<td>PAD</td>
<td>79 (8.8%)</td>
<td>19 (8.2%)</td>
<td>21 (8.3%)</td>
</tr>
<tr>
<td>Cerebrovascular Disease</td>
<td>59 (6.6%)</td>
<td>9 (3.9%)</td>
<td>22 (8.7%)</td>
</tr>
<tr>
<td>History of Premature CAD</td>
<td>105 (11.7%)</td>
<td>34 (14.6%)</td>
<td>28 (11.0%)</td>
</tr>
<tr>
<td>Current Smoker</td>
<td>62 (6.9%)*</td>
<td>12 (5.2%)*</td>
<td>7 (2.8%)*</td>
</tr>
<tr>
<td>Chronic Lung Disease</td>
<td>137 (15.3%)</td>
<td>33 (14.2%)</td>
<td>60 (23.6%)</td>
</tr>
<tr>
<td>Obese (BMI 30+)</td>
<td>364 (40.5%)</td>
<td>99 (42.5%)</td>
<td>107 (42.1%)</td>
</tr>
<tr>
<td>Immunocompromised</td>
<td>50 (5.6%)</td>
<td>8 (3.4%)</td>
<td>16 (6.3%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Procedure Type</th>
<th>No POAF (n=899)</th>
<th>POAF w/ Protocol (n=233)</th>
<th>POAF w/o Protocol (n=254)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CABG</td>
<td>299 (33.3%)</td>
<td>80 (34.3%)</td>
<td>65 (25.6%)</td>
<td>0.083</td>
</tr>
<tr>
<td>Aortic Valve</td>
<td>173 (19.2%)</td>
<td>56 (24.0%)</td>
<td>49 (19.3%)</td>
<td></td>
</tr>
<tr>
<td>Mitral Valve</td>
<td>100 (11.1%)</td>
<td>23 (9.9%)</td>
<td>35 (13.8%)</td>
<td></td>
</tr>
<tr>
<td>Combination/Other</td>
<td>327 (36.3%)</td>
<td>74 (31.8%)</td>
<td>105 (41.4%)</td>
<td></td>
</tr>
</tbody>
</table>

* Categories with the same superscripts do not differ. † Reported as Median (25th, 75th)
Results: Clinical Endpoints

Postoperative Stroke

- No POAF: 2.1%
- POAF with Protocol: 3.4%
- POAF without Protocol: 5.9%

p<0.01

Postoperative Stroke: 0.3% 0.4% 0.4%

P=NS (0.972)

Transient Ischemic Attack

- No POAF: 0%
- POAF with Protocol: 2%
- POAF without Protocol: 4%

Mnemosyne Heart Institute
Center for Healthcare Delivery Innovation
Results: Clinical Endpoints

**Postoperative Stroke**

![Bar chart showing postoperative stroke rates for POAF with and without protocol compared to no POAF.](chart)

**ICU Length of Stay (Median, Hours)**

![Bar chart showing ICU length of stay for POAF with and without protocol compared to no POAF.](chart)

**Transient Ischemic Attack**

![Bar chart showing transient ischemic attack rates for POAF with and without protocol compared to no POAF.](chart)

**ICU Readmission**

![Bar chart showing ICU readmission rates for POAF with and without protocol compared to no POAF.](chart)

Note: Values are significantly different at the p=0.05 level.
Results: Cost Endpoints

**Inpatient Length of Stay (Median, Days)**

<table>
<thead>
<tr>
<th>Protocol Status</th>
<th>Inpatient Length of Stay (Median, Days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No POAF</td>
<td>6.1</td>
</tr>
<tr>
<td>POAF with Protocol</td>
<td>6.9</td>
</tr>
<tr>
<td>POAF without Protocol</td>
<td>9.0</td>
</tr>
</tbody>
</table>

p<0.01

**30-Day Readmission Rate**

<table>
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<tr>
<th>Protocol Status</th>
<th>30-Day Readmission Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>No POAF</td>
<td>16.6%</td>
</tr>
<tr>
<td>POAF with Protocol</td>
<td>7.4%</td>
</tr>
<tr>
<td>POAF without Protocol</td>
<td>19.2%</td>
</tr>
</tbody>
</table>

p<0.01
### Results: Cost Endpoints

#### Inpatient Length of Stay (Median, Days)

- **No POAF**: 6.1
- **POAF with Protocol**: 6.9
- **POAF without Protocol**: 9.0

- **p<0.01**

#### 30-Day Readmission Rate

- **No POAF**: 16.6%
- **POAF with Protocol**: 7.4%
- **POAF without Protocol**: 19.2%

- **p<0.01**

#### Total Variable Costs

- **No POAF**: $22,988
- **POAF with Protocol**: $23,366
- **POAF without Protocol**: $30,566

- **p<0.01**

#### Postoperative Consult Ordered

- **No POAF**: 14.9%
- **POAF with Protocol**: 12.5%
- **POAF without Protocol**: 18.9%

- **p<0.13**

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**Note:** Values are significantly different at the p=0.05 level.
Conclusions

• A nurse-driven, real-time decision support protocol successfully standardized treatment of postoperative atrial fibrillation

• Clinical endpoints
  – Postoperative stroke rates were reduced by ~40% (3.4% vs. 5.9%)
  – ICU Length of Stay were shorter (24 hours vs. 53 hours)
  – ICU Readmission rates were reduced (6.0% vs. 9.8%)

• Cost endpoints
  – Length of Stay was reduced (6.9 vs. 9.0 days)
  – Total variable cost was reduced, in line with patients without POAF ($23,366K vs. $30,500)
  – Patients requiring a postoperative cardiology consult was reduced (12.5% vs. 18.9%)

Acknowledgements

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