**BACKGROUND**

Medication errors are a leading factor associated with hospital readmissions and ED visits.16
- Adverse events occur in at least 1 in 3 patients.
- Over two-thirds of the adverse events are related to drugs.
- Adverse drug events (ADEs) result in significant morbidity and mortality in the US each year.17
- Leading to 2.2 million hospitalizations & 106,000 deaths, costing $85 billion, and contributing to 30-day hospital readmission rates.
- Estimated that 20.1% of all outpatient experience an ADE.8

Pharmacists managed Medication Admission Prevention (MAP) Clinic was created to improve medication management in high-risk patients to optimize patient care and cost effectiveness.14, 18
- High-risk patients:
  - Multiple comorbidities
  - History of medication nonadherence
  - Elderly
  - Undergoing transitions of care, polypharmacy with "high-risk" medications (insulin, clonidine + asprin, anti-coagulant, cardiac anti-arrhythmics, digoxin).
- Identification of high-risk patients:
  - Recent hospital discharge, requests from providers
  - Clinic goals:
    - Resolve drug related problems (DRPs) before ADE occurs
    - Prevent medication related hospitalizations or ED visits
  - Decrease polypharmacy, improve patient's understanding of and compliance with medications
- Modality of visits:
  - Face-to-face, Clinical Video Telehealth (CVT), telephone

**OBJECTIVES**

Evaluate the healthcare utilization of patients seen in the MAP Clinic in the 12-month period preceding and following the initial clinic visit

Primary endpoints:
- Mean changes in hospitalizations, ED visits, and days spent at home

Secondary endpoints:
- Effect of visit modality and presence of "high-risk" medications on primary objectives
- Cost avoidance, survival correlations

**METHODS**

Design:
- Retrospective chart review comprised of one cohort
- Data collected during FY14 (10/30/2013 - 09/30/2014)

MAP Clinic visit:
- 12 Months Before
- 12 Months After

Inclusion criteria:
- Scheduled MAP Clinic appointment during FY14

Exclusion criteria:
- No hospitalization or ED visit in the 12 months prior to the MAP Clinic appointment

Statistical analysis:
- 199 patients needed to detect a difference in primary objective with α = 0.05 and 80% power
- Primary endpoint – two-sample t-test
- Secondary endpoints – analysis of covariance (ANCOVA); logistic regression

**RESULTS**

**Table 1. Baseline characteristics**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n = 239 patients</th>
<th>Age, yrs (mean ± SD)</th>
<th>Female (%)</th>
<th>Male (%)</th>
<th>Race</th>
<th>Caucasian (%)</th>
<th>African-American (%)</th>
<th>Death</th>
<th>Death within 12 mo of MAP visit (%)</th>
<th>Survival within 12 mo of MAP visit (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(12.8 ± 8.3)</td>
<td>7 (2.9)</td>
<td>232 (97.1)</td>
<td></td>
<td>220 (92.1)</td>
<td>19 (7.9)</td>
<td></td>
<td>17 (7.1)</td>
<td>222 (92.9)</td>
</tr>
</tbody>
</table>

**Table 2. Map healthcare utilization over two 12-month periods**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Total hospital admissions</th>
<th>Total ED visits</th>
<th>Total days at home</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before MAP visit</td>
<td>0.992 ± 1.17</td>
<td>3.55 ± 2.70</td>
<td>356.14 ± 11.25</td>
</tr>
<tr>
<td>After MAP visit</td>
<td>0.623 ± 1.06</td>
<td>2.76 ± 2.94</td>
<td>358.43 ± 9.81</td>
</tr>
</tbody>
</table>

**Table 3. Mean changes in clinical endpoints**

<table>
<thead>
<tr>
<th>Endpoint</th>
<th>Pre-MAP visit</th>
<th>Post-MAP visit</th>
<th>P-value</th>
<th>CI 95%</th>
<th>Confidence Interval</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduction in hospital admissions</td>
<td>0.828 ± 0.001</td>
<td>0.807 ± 0.001</td>
<td>0.0001</td>
<td>0.190 - 0.055</td>
<td>0.0001</td>
<td></td>
</tr>
<tr>
<td>Reduction in ED visits</td>
<td>0.795 ± 0.187</td>
<td>0.201 ± 0.398</td>
<td>0.0001</td>
<td>1.300 - 0.190</td>
<td>1.201</td>
<td></td>
</tr>
<tr>
<td>Difference in days at home</td>
<td>-2.398 ± 1.300</td>
<td>0.008 ± 3.189</td>
<td>0.000</td>
<td>-5.065 - -0.164</td>
<td>-0.14</td>
<td></td>
</tr>
</tbody>
</table>

**Table 4. Cost avoidance associated with reductions in primary outcomes**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Total No. of 12 mo preceding</th>
<th>Total No. of 12 mo following</th>
<th>Percent reduction or increase</th>
<th>Absolute difference</th>
<th>Monetary savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital admissions</td>
<td>239</td>
<td>189</td>
<td>37.1%</td>
<td>88</td>
<td>$1,626,841</td>
</tr>
<tr>
<td>ED visits</td>
<td>849</td>
<td>669</td>
<td>22.2%</td>
<td>190</td>
<td>$236,550</td>
</tr>
<tr>
<td>Days at home</td>
<td>85,118</td>
<td>85,664</td>
<td>0.6%</td>
<td>546</td>
<td></td>
</tr>
</tbody>
</table>

**DISCUSSION**

MAP Clinic was associated with statistically significant reductions in unexplained healthcare use and associated costs.

- Reductions in hospitalizations, reduction in ED visits, increase in number of days at home.
- Cost savings: $1,626,841 in hospitalization costs, $236,550 in ED visit costs.
- Cost avoidance: $643,934 in prevention of ADEs.

The results demonstrate the importance of medication management during transitions of care and identify the pharmacist's role in increasing safety and quality of patient care during transitions.

**CONCLUSION**

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**REFERENCES**