Collateral Benefits of Diabetes Self-Management Associated with Self-Administered Outpatient Parenteral Antimicrobial Therapy

Background
Patients with complex infections like osteomyelitis or endocarditis may receive long-term IV antimicrobial treatment in one of three settings: the hospital, an outpatient clinic, or in the home. Patients without insurance are forced to receive inpatient treatment, placing a significant burden on their home life and productivity, as well as on safety-net hospitals caring for otherwise stable patients. Parkland Memorial Hospital instituted a self-administered outpatient parenteral antimicrobial therapy (S-OPAT) program in 2009 to address this inconvenience to patients and healthcare providers alike. S-OPAT patients are trained to self-administer IV treatment via indwelling catheter in their own homes. Previous research from our group has demonstrated that S-OPAT dramatically reduced healthcare costs at our institution while reducing readmission rates and maintaining high levels of patient satisfaction.

S-OPAT and the Triple Aim

Project Design
Our interdisciplinary OPAT research group comprised of clinical, statistical, and pharmaceutical personnel conducted a before-after retrospective review of diabetic patients receiving S-OPAT. The data analyzed in this retrospective study was sourced from data collected during the S-OPAT pilot phase from 2009 to 2013. Diabetic patients were defined from the total S-OPAT cohort as patients with an HgbA1c >6.7 prior to initiation of S-OPAT. Several parameters of diabetes self-care during the 6 months before and after initiation of S-OPAT were assessed:

- HgbA1c
- All-cause emergency department (ED) encounters
- Inpatient days resulting from ED encounters
- Hospital costs associated with ED encounters
- Medication adherence represented by proportion of days covered (PDC)

Outcomes were tested for statistical significance using paired t-tests.

<table>
<thead>
<tr>
<th>Outcome (mean value per patient)</th>
<th>6 months prior</th>
<th>6 months after</th>
<th>Paired t-test p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HgbA1c (n=195)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ED encounters (n=86)</td>
<td>9.88</td>
<td>7.94</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Inpatient days used following ED encounters (n=86)</td>
<td>2.85</td>
<td>3.06</td>
<td>0.518</td>
</tr>
<tr>
<td>Hospital charges from ED encounters (n=45)</td>
<td>13</td>
<td>7.26</td>
<td>0.001</td>
</tr>
<tr>
<td>PDC Insulin</td>
<td>54%</td>
<td>55%</td>
<td>NS</td>
</tr>
<tr>
<td>PDC Metformin</td>
<td>32%</td>
<td>32%</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>$88,531.20</td>
<td>$35,711.53</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

From the 6 months prior to the 6 months following S-OPAT, diabetic patients experienced a near 2-point drop in HgbA1c. All-cause ED encounters did not change significantly, but inpatient days resulting from admission following ED presentation, as well as hospital charges from associated ED encounters dropped as well. Medication adherence did not demonstrate a significant change following intervention of S-OPAT.

Lessons Learned
Initiation of S-OPAT was associated with a significant improvement in glycemic control among diabetic patients. Our proposed mechanism posits that S-OPAT training and patient engagement may have secondary effects beyond infection control. We tested this hypothesis with a preliminary retrospective study to see if S-OPAT as an intervention was associated with an improvement in diabetes self-care. Our findings show a marked improvement in HgbA1c and a reduction in ED utilization in multiple parameters. We take these results as hypothesis-forming for future studies evaluating the impact of S-OPAT on patient engagement.

Project Aim
OPAT patients often present for treatment of infection with complex pre-existing co-morbidities. Diabetic patients in particular commonly utilize OPAT for cellulitis and osteomyelitis associated with neuropathy resultant from poor glycemic control. Given the demonstrated efficacy of S-OPAT as a self-care intervention, we sought to evaluate if S-OPAT could be associated with improved self-management of diabetes along with self-administration of treatment for infection.

Proposed Mechanism

- Self-administration of antimicrobial therapy
- Resolution of infection
- Improved glycemic control
- Self-management of co-morbid diabetes