Effect of Glucose Monitoring on Patient and Provider Outcomes in Non-Insulin Treated Diabetes

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Dr. Donahue: UNC has licensed its interest in copyright works to Telcare of a glucose messaging and treatment algorithm for the purposes of commercialization.
Objective

• Review and Interpret findings from the MONITOR SMBG trial

Background

• Guidelines are inconsistent regarding the role of glucose self monitoring (SMBG) in adult patients with non-insulin treated type 2 diabetes

• Recommendations from health care providers vary widely

• Numerous stakeholders have an interest in this debate
SMBG
(Self Monitoring of Blood Glucose)

• Widely practiced in patients with diabetes since 1980s
• Benefits well-established in Type 1 diabetes and Type 2 diabetes on insulin
• Glycemic Benefits are minimal at best
• May improve self-efficacy
• Potential Obstacles - invasive, cost, depressive symptoms
Project Overview

Assess impact of 3 SMBG testing approaches over 1 year
- 450 patients with non-insulin treated T2DM
- 15 primary care practice sites

Group 1: No SMBG Testing

Group 2: Once daily SMBG Testing with standard patient feedback
- Glucose values reported on monitor

Group 3: Once daily SMBG Testing with enhanced patient feedback
- Glucose values reported on monitor plus a tailored feedback message delivered to the patient through the monitor
Study Population

• Primary care patients, Age 30 and over, Type 2 diabetes, not on insulin, A1c 6.5% to 9.5%, English speaking, Non pregnant

Outcomes

Primary: Change in A1c, Health Related Quality of life from baseline to 52 weeks

Secondary:
• Diabetes Related Quality of Life (DSC-R, PAID, DES-SF)
• Diabetes Self-Care (SDSCA)
• Diabetes Treatment Satisfaction (DTS)
• Patient-Provider Communication (CAT)
• Health Care Utilization (Inpatient, Outpatient and ED visits via EMR and self-report)
• Treatment Modification (change in DM meds)
• Hypoglycemia frequency (self report, EHR)
## Baseline Characteristics

<table>
<thead>
<tr>
<th></th>
<th>No Testing n=152</th>
<th>Testing, No Messaging n=150</th>
<th>Testing, with Messaging n=148</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age, mean</strong></td>
<td>60.9</td>
<td>59.9</td>
<td>60.7</td>
</tr>
<tr>
<td><strong>Sex, male, %</strong></td>
<td>48.7</td>
<td>44.7</td>
<td>44.6</td>
</tr>
<tr>
<td><strong>Race, %</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>27.6</td>
<td>36.7</td>
<td>34.5</td>
</tr>
<tr>
<td>White</td>
<td>68.4</td>
<td>59.3</td>
<td>58.1</td>
</tr>
<tr>
<td>Other</td>
<td>3.9</td>
<td>4.0</td>
<td>7.4</td>
</tr>
<tr>
<td><strong>Ethnicity, Non-Latino Hispanic, %</strong></td>
<td>97.4</td>
<td>98.7</td>
<td>98.6</td>
</tr>
<tr>
<td><strong>BMI, mean</strong></td>
<td>33.8</td>
<td>34.1</td>
<td>35</td>
</tr>
<tr>
<td><strong>Years with diabetes, mean</strong></td>
<td>7.7</td>
<td>8.3</td>
<td>8.6</td>
</tr>
<tr>
<td><strong>Current use of SMBG testing, %</strong></td>
<td>75.0</td>
<td>72.0</td>
<td>78.4</td>
</tr>
</tbody>
</table>
Primary Outcomes: No difference in A1c at 1 yr

### A1c Outcomes by Randomization Group

<table>
<thead>
<tr>
<th>Randomization Group</th>
<th>No testing</th>
<th>Testing No Messaging</th>
<th>Testing with Messaging</th>
<th>Overall Pvalue</th>
<th>Contrast Pvalue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Means</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Hemoglobin A1c

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>1 yr Follow-up</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>No testing</td>
<td>7.52</td>
<td>7.55</td>
<td>0.04</td>
</tr>
<tr>
<td>Testing No Messaging</td>
<td>7.55</td>
<td>7.49</td>
<td>-0.05</td>
</tr>
<tr>
<td>Testing with Messaging</td>
<td>7.61</td>
<td>7.51</td>
<td>-0.10</td>
</tr>
<tr>
<td>Means: Overall</td>
<td></td>
<td></td>
<td>0.740</td>
</tr>
<tr>
<td>Contrast Pvalue</td>
<td></td>
<td></td>
<td>0.483</td>
</tr>
</tbody>
</table>

No difference in Quality of Life at 1 year
Secondary Outcomes

• No significant differences for
  ➢ Problem Areas In Diabetes (PAID)
  ➢ Diabetes Symptoms Checklist (DSC)
  ➢ Diabetes Empowerment Scale (DES-SF)
  ➢ Diabetes Treatment Satisfaction

• Communication Assessment Tool

• Summary of Diabetes Self-Care Activities was significant (but related to the blood sugar testing in arms)

Adverse Events: NO study related events
Limitations

• Test of continuing monitoring rather than initiating monitoring
• Not all patients adhered to the group assigned; however no difference in ITT and per-protocol analyses
• Patients belonged to one health care system
• Findings do not apply to patients on insulin
Conclusions

- Over the course of one year, there were no clinically or statistically significant differences in glycemic control or quality of life between patients with non insulin treated DM who perform SMBG compared to those who do not perform SMBG.

- The addition of tailored feedback provided through messaging via a glucometer did not provide any advantage in glycemic control.