Improving Quality of Care in Diabetes Through a Comprehensive Pharmacist-Based Disease Management Program

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In the U.S., a large percentage of patients with diabetes receive less than optimal care (1). The use of pharmacists, nurse practitioners, and multidisciplinary teams in a variety of settings have led to improvements in disease control in patients with diabetes and other chronic diseases (2–14). This report describes the utility of a pharmacist-run disease management program in improving the care of predominately indigent, Spanish-speaking patients with diabetes and common comorbid conditions.

Research Design and Methods — The study was conducted at El Rio Health Center, which is a federally qualified health center located in Tucson, Arizona. The patient population is comprised mostly of indigent, Spanish-speaking, and sometimes transient patients with primarily type 2 diabetes. The program was implemented in August 2001, using a residency-trained, bilingual PharmD as the provider for patients referred to the pharmacist-based diabetes service by staff physicians. The pharmacist served as the primary care provider for the patients’ diabetes and comorbid conditions, hypertension, and hyperlipidemia. Using medical staff-approved collaborative practice agreements, the pharmacist provided appropriate diagnostic, educational, and therapeutic management services, including prescribing medication and ordering laboratory tests. The collaborative practice agreements were based on national standards of care for diabetes, hypertension, and hyperlipidemia. The pharmacist used a customized Microsoft Access database to facilitate documentation of services and appropriate patient management.

All patients who had an initial visit, plus at least one additional visit over the following 90 days, were included in this analysis. Patients served as their own controls. Comparisons of continuous data from baseline to follow-up, such as lipid parameters, glucose, weight, BMI, blood pressure, and A1C were compared using a paired t test. Changes from baseline to follow-up in percentages or proportions, such as changes in percentage of patients at LDL cholesterol goal, use of aspirin, or patients at blood pressure goal, were compared using CIs and two-proportion testing. Significance for all statistical comparisons were set at \( \alpha = 0.05 \).

Results — Of the 199 patients meeting inclusion criteria, 134 (67%) were female, 148 (74%) were Hispanic, and 191 (96%) had type 2 diabetes. On average, these patients were followed for 274 ± 141 days (means ± SD). Baseline to follow-up means, SDs, and statistical comparisons for cholesterol measures, glucose, A1C, blood pressure, weight, and BMI are shown in Table 1. Follow-up changes in all the parameters measured were statistically different except for HDL cholesterol, weight, and BMI. Regarding attainment of treatment goals, the pharmacist-managed service showed an almost sevenfold increase (6 vs. 41%) in the number of patients at target A1C levels. Increases in the percentage of patients achieving target goals for hypertension and LDL cholesterol levels were more modest at 24 and 17%. All but one patient received annual recommended lab tests (lipid panels, microalbuminuria, and A1C) plus diabetic foot and dilated eye examinations. Compared with baseline data, this represents increases ranging from 11.3 to 46.2%. The use of aspirin increased 53%, and the use of ACE inhibitors or angiotensin receptor blockers increased 25%. Patients managed by the pharmacist were more likely to have attained treatment goals and had recommended examinations, medications, and tests, with all \( P \) values <0.001.

Conclusions — The 2% drop in mean A1C is similar to that achieved in a Veterans Administration pharmacist-based program (6). In the Veterans Administration study, only 26% of patients had their A1C lowered to <8.0% compared with 64% in our study (6). Compared with recently published national data for the first half of the 1990s (1), the results of the pharmacist-managed service provided similar percentages of patients at target A1C and blood pressure and were superior in percentage of patients at target LDL cholesterol levels (57 vs. 11%) and A1C levels >10% (8 vs. 14.9%). The percentages were also superior for patients receiving dilated eye examinations (99.5 vs. 63.3%) and foot examination (99.5 vs. 54.8%) (1).

Because of the unique population and practice setting, application of these findings to other pharmacist-managed programs may be problematic. Thirty-seven states allow pharmacists to prescribe medications. Arizona, along with several other states, require drug- or disease-specific collaborative practice agreements that have been approved by physicians participating in these programs. Pharmacist clinical privileges in this study were defined by such an agreement. The use of a bilingual pharmacist may have contrib-
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<table>
<thead>
<tr>
<th>Parameter</th>
<th>Baseline</th>
<th>Follow-up</th>
<th>Difference</th>
<th>95% CI</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cholesterol (mg/dl)</td>
<td>204.7 ± 51.5</td>
<td>181.2 ± 46.1</td>
<td>23.52 ± 44.3</td>
<td>17.3–29.7</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Triglycerides (mg/dl)</td>
<td>249.5 ± 232.4</td>
<td>191.3 ± 144.9</td>
<td>58.2 ± 192</td>
<td>31.3–85.1</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>HDL cholesterol (mg/dl)</td>
<td>46.6 ± 12.2</td>
<td>46.1 ± 11.6</td>
<td>0.5 ± 11.1</td>
<td>-1 to 2.1</td>
<td>0.513</td>
</tr>
<tr>
<td>LDL cholesterol (mg/dl)</td>
<td>108.7 ± 40</td>
<td>97.6 ± 32.6</td>
<td>11.1 ± 39.4</td>
<td>5.5–16.8</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Blood glucose (mg/dl)</td>
<td>210.3 ± 91.5</td>
<td>169.5 ± 71.7</td>
<td>40.8 ± 90.5</td>
<td>28.1–53.6</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>A1C (%)</td>
<td>9.6 ± 1.8</td>
<td>7.6 ± 1.7</td>
<td>2 ± 2</td>
<td>1.8–2.3</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Systolic blood pressure (mmHg)</td>
<td>126.1 ± 18.1</td>
<td>118.8 ± 21.1</td>
<td>7.3 ± 23.6</td>
<td>4.1–10.6</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Diastolic blood pressure (mmHg)</td>
<td>76 ± 9.8</td>
<td>71.5 ± 17</td>
<td>4.5 ± 11</td>
<td>3–6</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Weight (lb)</td>
<td>192.1 ± 47.9</td>
<td>194.1 ± 53.8</td>
<td>-2 ± 25.9</td>
<td>-5.6 to 1.7</td>
<td>0.285</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>32.8 ± 7.8</td>
<td>33.1 ± 8.7</td>
<td>-0.3 ± 4.2</td>
<td>-0.9 to 0.3</td>
<td>0.261</td>
</tr>
</tbody>
</table>

Data are means ± SD.

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References