Antihypertensive Medication Adherence and Blood Pressure Control Among Central Alabama Veterans

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Medication Adherence

• Adherence: taking medication as prescribed
• One in four prescriptions never filled
• Half of patients discontinue antihypertensives within 1 year
• Nonadherence more likely for chronic, asymptomatic conditions

Adherence and Outcomes

Medication adherence associated with:

- Better blood pressure control
- Fewer emergency visits
- Decreased hospitalization rates
- Lower mortality
- Lower health care costs

Costs

- $1/3–2/3$ of all medication-related hospital admissions from poor adherence
- Costs $100 billion per year
- Adherence lowers annual medical costs by $4,337 per patient with hypertension
  - Cost-benefit ratio 1:10

Hypertension

- Estimated 30% of U.S. adults have hypertension
  - 66.9 million people
- 47% with hypertension have blood pressure (BP) controlled
- Among those taking any antihypertensive, 60% controlled
- Even modest elevation of BP increases risk for heart disease and stroke


Data Review

- Describe among Central Alabama veterans:
  - Antihypertensive medication dispensed
  - Medication adherence
  - BP control
- Assess relationship between adherence and BP control
Methods

- Central Alabama Veterans Health Care System (CAVHCS) electronic health record data during fiscal year 2015
- Patients prescribed at least one antihypertensive:
  - Beta blockers (BB)
  - Thiazide diuretics
  - Angiotensin converting enzyme inhibitors (ACEI)
  - Fixed combinations of above
- Adherence: ≥80% days covered by antihypertensive
- BP control: <140/90
- Also collected age and calculated body mass index
Results

- 33 antihypertensives dispensed
- 79,178 prescription fills
- 17,889 patients
- Mean 1.8 antihypertensive medication classes per patient by 4.4 fills during year with mean 83.5 days supply each

Antihypertensive classes:
- 45.2% patients received one class
- 35.4% two classes
- 16.0% three classes
- 3.5% ≥4 classes
Antihypertensive Medication Classes Dispensed — Central Alabama Veterans Health Care System, FY 2015

- ACEI: 52.5%
- CCB: 40.0%
- BB: 38.8%
- Thiazide diuretic: 37.5%
- ARB: 13.1%
Adherence and Blood Pressure Control—Central Alabama Veterans Health Care System, FY 2015

<table>
<thead>
<tr>
<th>% Patients Treated with Antihypertensive</th>
<th>Adherent</th>
<th>Nonadherent</th>
<th>BP Controlled</th>
<th>BP Not Controlled</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>75.1</td>
<td>24.9</td>
<td>66.1</td>
<td>33.9</td>
</tr>
</tbody>
</table>
## Blood Pressure by Adherence Status

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Adherent</th>
<th>Non-adherent</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic blood pressure, mean mmHg (range)</td>
<td>133.2 (80–215)</td>
<td>135.0 (81–229)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Diastolic blood pressure, mean mmHg (range)</td>
<td>77.9 (42–132)</td>
<td>79.7 (41–125)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Blood pressure controlled, %</td>
<td>67.4</td>
<td>62.0</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Adherent patients 9% more likely to have BP controlled compared with nonadherent patients

- Relative risk **1.09**
- 95% confidence interval: 1.06–1.12
### Blood Pressure Control

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>BP Controlled</th>
<th>BP Not Controlled</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic blood pressure, mean mmHg (range)</td>
<td>124.8 (80–139)</td>
<td>150.9 (111–229)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Diastolic blood pressure, mean mmHg (range)</td>
<td>75.3 (41–89)</td>
<td>84.3 (49–132)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Adherent to antihypertensive medication, %</td>
<td>78.0</td>
<td>73.6</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
## Multivariable Logistic Regression Model for BP Control

<table>
<thead>
<tr>
<th>Factor</th>
<th>Adjusted Odds</th>
<th>95% CI</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adherent to medication</td>
<td>1.33</td>
<td>1.22–1.44</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Age</td>
<td>1.00</td>
<td>0.997–1.003</td>
<td>0.85</td>
</tr>
<tr>
<td>Body mass index</td>
<td>1.01</td>
<td>1.00–1.02</td>
<td>0.002</td>
</tr>
<tr>
<td>Number of antihypertensive medication fills</td>
<td>1.04</td>
<td>1.02–1.05</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Number of antihypertensive drug classes</td>
<td>0.71</td>
<td>0.67–0.76</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
Summary

- 3/4 adherent to antihypertensive regimen
- 2/3 with BP controlled
- Adherent patients 33% more likely to have BP controlled
- Those without BP control also highly adherent
Next Steps

- CAVHCS initiated pilot program of patient education
- Multidisciplinary group sessions
- One-on-one counseling by pharmacist
Limitations

- Veteran facility limits generalizability
  - Minimal copayment
  - Mail order available
- Medication fills serve as proxy for medication consumption
- Discontinuation or switch to nonincluded med not captured
- Antihypertensive medication prescribed for other reason
- Patient relocation or use of other sources underestimates adherence
- Other factors not considered
  - Comorbid conditions, illness severity, substance use, SES, etc.
Recommendations for Clinic Practices

- Simplify medication regimens
- Facilitate refills
- Recognize and manage inadequate BP control
- Offer open access to complimentary BP checks
- Adopt BP treatment algorithm
Recommendations for Clinic Interventions

- Institute team-based care
- Consider nurse-managed patient education, coaching, and telephone support of home BP monitoring
- Explore pharmacist-led counseling and medication management
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