Outcome Analysis of a Pharmacist-led Warfarin Clinic

Pharmacy Department, Princess Margaret Hospital
Primary Goal of the Clinic:

1. Optimize the anticoagulation control of Warfarin therapy
2. Decrease morbidity and hospitalization with reduced healthcare cost
PMH Pharmacist-led Warfarin Clinic Model

- Established in July 2006
- Referral by cardiologists only
- Referral criteria: on Warfarin without other chronic medications
- Regular follow-up by pharmacists
- 1-2 yearly reassessment by cardiologists
Responsibility of Warfarin Pharmacist

1. Monitor patient’s anticoagulation control

2. Assess and evaluate:
   - Drug compliance level
   - Drug or food interaction
   - Patient’s health status
   - Lifestyle changes

3. Renew and adjust Warfarin dosage according to protocol jointly developed with Cardiologists
Responsibility of Warfarin Pharmacist

4. Order appropriate laboratory investigation (eg. Test for INR)
5. Provide education on Warfarin management
6. Arrange medical consultation for patients in special situations according to protocol
Study design

Regular follow-ups by pharmacist & 1-2 yearly reassessment by cardiologists

- 3rd Month: Pharm follow-up
- 6th Month: Pharm follow-up
- 9th Month: Pharm follow-up
- 12th Month: Doctor follow-up
- 15th Month: Pharm follow-up

Regular follow-ups by cardiologists
- Doctor follow-up
- Doctor follow-up
- Doctor follow-up
- Doctor follow-up
- Doctor follow-up
Outcome measures:

- Retrospective comparison of pharmacist-led VS cardiologist-led Warfarin groups on:
  - Anticoagulation control
  - Incidence of complications
    1. Major thromboembolic & haemorrhagic events
    2. A&E visits
    3. Hospitalisation
  - Patient’s satisfaction on the service
### Patient’s demographics:

<table>
<thead>
<tr>
<th></th>
<th>Pharmacist-led</th>
<th>Cardiologist-led</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. No of patients</td>
<td>24</td>
<td>24</td>
<td>-</td>
</tr>
<tr>
<td>2. Age (mean ±SD)</td>
<td>56.0 ± 8.6</td>
<td>53.4 ± 8.0</td>
<td>0.383</td>
</tr>
<tr>
<td>3. Sex</td>
<td>14(M) 10(F)</td>
<td>16(M) 8(F)</td>
<td>0.555</td>
</tr>
<tr>
<td>4. Target INR ranges:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5 - 2.5</td>
<td>2</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>2 - 3</td>
<td>19</td>
<td>18</td>
<td>0.869</td>
</tr>
<tr>
<td>2.5 - 3.5</td>
<td>3</td>
<td>6</td>
<td>0.317</td>
</tr>
</tbody>
</table>
Patient’s indications for Warfarin:

<table>
<thead>
<tr>
<th>5. Indications:</th>
<th>Pharmacist-led</th>
<th>Cardiologist-led</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF</td>
<td>14</td>
<td>7</td>
<td>0.127</td>
</tr>
<tr>
<td>Heart Valves Replacement</td>
<td>9</td>
<td>10</td>
<td>0.819</td>
</tr>
<tr>
<td>CRHD</td>
<td>8</td>
<td>8</td>
<td>1.000</td>
</tr>
<tr>
<td>DVT</td>
<td>0</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>PE</td>
<td>3</td>
<td>5</td>
<td>0.48</td>
</tr>
<tr>
<td>Others</td>
<td>2</td>
<td>1</td>
<td>-</td>
</tr>
</tbody>
</table>
Anticoagulation Control

1. % patient-time spent within expanded therapeutic INR range (therapeutic $\pm 0.2$ units INR) [using Rosendaal’s Linear Interpolation method]

<table>
<thead>
<tr>
<th>Pharmacist-led (Study group)</th>
<th>Cardiologist-led (Control group)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>84.68%</td>
<td>60.32%</td>
<td>P&lt;0.001</td>
</tr>
</tbody>
</table>

Better anticoagulation control with pharmacist-led group
Anticoagulation Control

2. Time to achieve therapeutic INR after dosage adjustment

<table>
<thead>
<tr>
<th>Pharmacist-led (Study group)</th>
<th>Cardiologist-led (Control group)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>23.43 days</td>
<td>109.84 days</td>
<td>p&lt;0.005</td>
</tr>
</tbody>
</table>

Pharmacist-led group achieve therapeutic INR quicker
# Anticoagulation Control

3. Days between follow-ups:

<table>
<thead>
<tr>
<th>Pharmacist-led (Study group)</th>
<th>Cardiologist-led (Control group)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>62.53 days</td>
<td>75.29 days</td>
<td>p=0.245</td>
</tr>
</tbody>
</table>

Similar follow-up intervals between two groups
# Incidence of complications

<table>
<thead>
<tr>
<th>No of incidence</th>
<th>Pharmacist-led (Study group)</th>
<th>Cardiologist-led (Control group)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major thromboembolic events</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Major haemorrhagic events</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>A&amp;E visits</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Hospitalisation</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

No significant difference between two groups
Patient’s Satisfaction Survey

1. Dosage adjustment:
   - 100% strongly agreed they are well-informed on the arrangement of dosage adjustment

2. Warfarin Knowledge:
   - 80% strongly agreed the clinic had increased their understanding of their medical condition
   - 90% strongly agreed they are well-informed on the diet, TCM & OTC restrictions and thereby made changes in their diet
Patient’s Satisfaction Survey

3. Waiting time:
- 95% satisfied with the shorter waiting time during follow-up clinic

4. Staff attitude:
- 95% rated pharmacists have very good attitude

5. Overall satisfaction:
- Score: 4.8 (5-point likert scale, 1 – lowest; 5 - highest)
Benefits of the Pharmacist-led Warfarin Clinic:

1. Patient’s INR:
   - Better control (more time within target range)
   - Achieve therapeutic INR quicker after dosage adjustment
   - Improved knowledge on Warfarin management

2. Physician:
   - Spend more time with hard-to-manage cases

3. Healthcare resources:
   - Better utilization of pharmacist expertise in the management of Warfarin therapy
Work hand-in-hand

Physician
Medication
Patient
Pharmacist

Apply individual expertise to achieve beneficial outcome!
Thank you!