(Management Case Study)
Pharmacist Impact on Discharge of Acute Ischemic Stroke Patients

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Disclosures

All planners, presenters, reviewers, and ASHP staff of this session report no financial relationships relevant to this activity.
Learning Objectives

1. Describe the impact of the pharmacists’ role in the discharge of patients with newly diagnosed acute ischemic stroke
2. Describe the impact of strokes on the United States healthcare system
3. Describe pharmacy provided services that can positively impact the healthcare outcomes in patients with acute ischemic stroke
Self-Assessment Questions

1. Pharmacist-conducted transitions of care (TOC) interventions in patients with acute ischemic stroke at this site have been shown to decrease drug-related problems at discharge (T/F)

2. Strokes are one of the leading causes of death and long-term disability in the United States and are largely preventable (T/F)

3. Examples of transitions of care services include
   a. Prior to admission medication reconciliation
   b. Discharge medication reconciliation
   c. Discharge medication education
   d. All of the above
Stroke – A Big Deal?

- Every **40 seconds**, someone has a stroke\(^1\)
- Every **3 minutes and 45 seconds**, someone dies due to a stroke
- **5\(^{th}\)** leading cause of death in the United States
- **Leading cause** of long-term disability
- Annual healthcare cost of caring for people who suffer a stroke estimated to be **$36.1 – 94.3 billion** in 2015 – 2035
- **80%** of all strokes can be prevented
Importance of TOC

• Every year, preventable medication errors:\(^2\)
  o Impact **7 million patients**
  o **$21 billion** in direct medical costs
  o Contribute to **7,000 deaths**

• Debilitating injuries or high risk medications increase the risk for drug-related problems (DRPs)
  – Acute ischemic strokes
  – Anticoagulants
  – Antiplatelets
Why Focus on Stroke?

• Pharmacist conducted TOC interventions improve healthcare outcomes in the general medicine inpatient setting$^{3-7}$
  – Reduce medication errors upon discharge
  – Reduce readmissions
  – Improve medication literacy and adherence

• No studies have specifically evaluated the impact of pharmacist led TOC activities in patients who suffer an acute ischemic stroke
Cedars-Sinai TOC Processes

1. Patient Admission
2. Pharmacy Staff Conducted Medication History
3. Inpatient Orders Placed
4. Daily Pharmacist Medication Review
5. MD Discharge Medication Reconciliation
6. Discharge Orders Placed
7. Patient Discharge
Study Objective

• Determine the impact of pharmacist conducted discharge medication education and reconciliation on the healthcare outcomes in patients with acute ischemic stroke
Study Design

• A pre-post study
• **Study period**: April 22\textsuperscript{nd} 2017 – March 31\textsuperscript{st} 2018
• **Inclusion criteria**:  
  – Diagnosis of acute ischemic stroke  
  – Admitted to neurological medical floor
• **Exclusion Criteria**:  
  o <18 years old  
  o Discharge to hospice or palliative care
• **Statistical Analysis**:  
  o Odds Ratio, Mann-Whitney U Test and Chi-square test
Pilot Workflow

1. Patient Admission
2. Pharmacy Staff Conducted Medication History
3. Inpatient Orders Placed
4. Daily Pharmacist Medication Review
5. MD Discharge Medication Reconciliation
6. Discharge Orders Placed
7. **Pharmacist/Resident Provided Discharge Medication Reconciliation**
8. **Pharmacist/Resident Conducted Medication Education**
9. Patient Discharge
Endpoints

**Primary Endpoint**

• Incidence and severity of DRPs identified and resolved by pharmacists
  o Severity verified by two independent pharmacists based on Cedars-Sinai prescribing error scale

**Secondary Endpoint**

• 30-day readmission rates
Severity Rating of Drug-Related Problems

CSMC Severity of Prescribing Errors Intercepted (Based on NCC MERP)

Low Capacity for Harm

- Category A: Circumstances or events that have the capacity to cause error, but an error or omission does not occur.
- Category B: An error could have occurred, but the error or omission does reach the patient.
- Category C: An error could have reached the patient, but the error or omission would not cause patient harm.
- Category D: The identified and intercepted error may have contributed to or resulted in temporary harm to the patient and required intervention to sustain life.
- Category E: The identified and intercepted error may have contributed to or resulted in permanent patient harm.
- Category F: The identified and intercepted error may have contributed to or resulted in the patient’s death.
## Primary Endpoint

<table>
<thead>
<tr>
<th></th>
<th>Control Group</th>
<th>Pre-intervention</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of patients with DRPs</strong></td>
<td>27 (48.2%)</td>
<td>37 (52.9%)</td>
<td>1.20 (0.60 – 2.43)</td>
</tr>
<tr>
<td><strong>Total number of DRPs</strong></td>
<td>46</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td><strong>DRPs/patient</strong></td>
<td>0.82</td>
<td>0.79</td>
<td></td>
</tr>
</tbody>
</table>
### Primary Endpoint

<table>
<thead>
<tr>
<th></th>
<th>Control Group (n = 56)</th>
<th>Post-intervention (n = 70)</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients with DRPs</td>
<td>27</td>
<td>7 (10.0%)</td>
<td>0.12 (0.05 – 0.31)</td>
</tr>
<tr>
<td>Total number of DRPs</td>
<td>46</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>DRPs/patient</td>
<td>0.82</td>
<td>0.10</td>
<td>Mann-Whitney U Test P-value &lt; 0.05</td>
</tr>
</tbody>
</table>
Severity of DRP

Pre-Intervention
- Life Threatening; 4; 7%
- Serious; 16; 29%
- Low; 35; 64%

Post-Intervention
- Serious, 2; 29%
- Low; 5; 71%
## Type of DRP Identified

<table>
<thead>
<tr>
<th>Type of DRP Identified</th>
<th>Control Group (n = 46)</th>
<th>Study Group Pre-intervention (n = 55)</th>
<th>Study Group Post-intervention (n = 7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Omission</td>
<td>31 (67.4%)</td>
<td>26 (47.3%)</td>
<td>1 (14.3%)</td>
</tr>
<tr>
<td>Wrong dose</td>
<td>3 (6.5%)</td>
<td>12 (21.8%)</td>
<td>4 (57.1%)</td>
</tr>
<tr>
<td>Drug-drug interaction</td>
<td>2</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Wrong drug</td>
<td>1</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Extraneous medication</td>
<td>2</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>7</td>
<td>7</td>
<td>2</td>
</tr>
</tbody>
</table>
## Secondary Endpoint

<table>
<thead>
<tr>
<th>Secondary Endpoint</th>
<th>Control Group</th>
<th>Study Group</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-day readmission</td>
<td>6/56 (10.7%)</td>
<td>5/70 (7.1%)</td>
<td>0.48</td>
</tr>
</tbody>
</table>
## Examples of Pharmacist Interventions

<table>
<thead>
<tr>
<th>Case</th>
<th>DRP Identified</th>
<th>Severity Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC: Acute thromboembolic CVA</td>
<td><strong>Incorrect Dose</strong>&lt;br&gt;MD ordered warfarin 5 mg daily at discharge although therapeutic INR on 7.5 mg during admission</td>
<td>Life-threatening</td>
</tr>
<tr>
<td>PMH: prior CVA on warfarin 7.5 mg daily</td>
<td><strong>Intervention:</strong>&lt;br&gt;Contacted MD to modify warfarin to PTA dose 7.5 mg daily. Two days post-discharge, INR was within goal at 2.2.</td>
<td>Prevented sub-therapeutic INR</td>
</tr>
</tbody>
</table>
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<tr>
<td>CC: Ischemic CVA</td>
<td><strong>Omission of Medication</strong>&lt;br&gt;Aspirin was not ordered</td>
<td>Serious</td>
</tr>
<tr>
<td>Pt was to be discharged on aspirin 81 mg</td>
<td><strong>Intervention:</strong>&lt;br&gt;Contacted MD and modified discharge orders to include aspirin</td>
<td>Reduced risk of secondary ischemic stroke event</td>
</tr>
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<tr>
<td>CC: Acute thromboembolic CVA, Pt with atrial fibrillation with well controlled BP off of antihypertensives</td>
<td><strong>Extraneous Medication</strong>&lt;br&gt;MD reordered amlodipine and clonidine for discharge</td>
<td>Serious&lt;br&gt;Prevented risk of hypotension and rebound tachycardia associated with clonidine</td>
</tr>
<tr>
<td><strong>Intervention:</strong> Contacted MD to discontinue amlodipine and clonidine</td>
<td></td>
<td></td>
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</table>
Patient Case

Presentation:
• 93 yo F presents w/ R sided weakness and aphasia
• PMH: HTN, HLD, Afib

Work-up:
• NIHSS = 12
• MRI: Cluster of embolic infarcts likely 2/2 afib
• PTA med list: vit B₁₂, fish oil, alendronate, vit C, aspirin 81 mg, bisoprolol, FeSO₄, tramadol, vit E

Intervention:
• Pharmacist received verbal to order Rx for apixaban and pt received 1st dose prior to d/c
• Discharge med list: vit B₁₂, fish oil, alendronate, vit C, aspirin 81 mg, bisoprolol, FeSO₄, tramadol, vit E, apixaban

Problem:
• Neurology recommendation: Start apixaban 2.5 mg BID and d/c aspirin
• Discharge orders placed w/o apixaban, alendronate, bisoprolol, tramadol
Required Resources and Time Commitment

• Pharmacist, pharmacy technician or pharmacy resident trained to gather an accurate PTA medication history
• Clinical pharmacist or pharmacy resident to complete discharge medication reconciliation and patient education
• Ability to identify and intervene on medication errors prior to patient discharge
Challenges

- Time
- Limited resources
- Patients are discharged throughout the day
- Contacting MD to clarify DRPs prior to patient discharge
Implementation Strategies

• Identify patients at high risk for medication errors and/or re-admissions
• Develop a test of change procedure to have pharmacists and/or residents intervene on the identified “high risk” patients via TOC activities prior to patient discharge
• Assess the healthcare outcomes
• If cost-effective, implement the pharmacist led activities to the standard of care workflow for the identified “high risk” patients
Conclusions

- **52.9%** of patients in the study group had ≥ 1 DRP upon discharge
- After pharmacist intervention, **10%** of patients had ≥ 1 DRP
- There was a trend toward **lower 30-day readmission rates (P = NS)** in patients who were received pharmacist conducted discharge medication reconciliation and education
- Larger studies should further evaluate TOC services for acute ischemic stroke patients across the continuum of care
1. Pharmacist-conducted transitions of care interventions in patients with acute ischemic stroke at this site have been shown to decrease drug-related problems at discharge
   a. True
   b. False
Self-Assessment Answer 1

1. Pharmacist-conducted transitions of care interventions in patients with acute ischemic stroke at this site have been shown to decrease drug-related problems at discharge
   a. True
   b. False
Self-Assessment Question 2

2. Strokes are one of the leading causes of death and long-term disability in the United States and are largely preventable
   a. True
   b. False
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   a. True
   b. False
Self-Assessment Question 3

3. Examples of transitions of care services include
   a. Prior to admission medication reconciliation
   b. Discharge medication reconciliation
   c. Discharge medication education
   d. All of the above
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   b. Discharge medication reconciliation
   c. Discharge medication education
   d. All of the above
Key Takeaways

1) Pharmacists can improve healthcare outcomes in patients who have an acute ischemic stroke
2) Prior to admission and discharge medication reconciliation and patient education are effective tools that can be utilized to decrease medication related adverse events in patients who suffer an acute ischemic stroke
3) Pharmacy residents can be effective members in the transition of care process while gaining valuable experience
References