Evaluation of intervention aimed at reducing alteplase returns without compromising clinical care in acute ischemic stroke

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Evaluation of Intervention Aimed at Reducing Alteplase Returns Without Compromising Clinical Care in Acute Ischemic Stroke

Natalie Swearingen, MSN, RN, CNRN, Jillian Myers PharmD, BCPS, Alexandra Lesko, Lindsay Lucas, MS & Elizabeth Baraban, MPH, PhD

Results

- Data from 126 alteplase administered AIS patients were included
- Pre-intervention alteplase returns was 39.5% (15/38) versus 11.3% (10/88) post-intervention (Table 1)
- Post-intervention, the observed number of returned vials was lower than expected (10 vs 35) (Table 1)
- Pre-intervention, expected cost of returned vials ranged from $96,000–$126,000; post-intervention expected cost was $76,800–$100,800, equaling cost-savings of $166,400–$218,400 (Table 1)

- DTN was not significantly different post- vs pre-intervention (median [IQR]=51.0 min [36.6, 68.0] vs 52.0 min [40.0, 68.0]; p=0.996) (Figure 1).
- GoTN was significantly faster post- vs pre-intervention (median [IQR]=10.0 min [8.0, 14.8] vs 16.0 min [11.5, 19.5]; p<0.01) (Figure 1)
- Sub-analysis among post-intervention cases found that DTN and GoTN were not significantly different when pharmacy mixed alteplase in the ED compared to the satellite pharmacy (median DTN [IQR]=45.0 min [35.0, 68.0] vs. 53.0 min [42.0, 68.0]; p=0.701) & median GoTN [IQR]=8.00 min [8.0, 13.0] vs. 11.00 min [9.0, 14.75], respectively.

Conclusions

- Percentage of vials returned decreased substantially following the intervention and resulted in extensive cost savings
- PSCs can reduce overall waste of alteplase and decrease costs without negatively affecting clinical care
- Stroke programs need to stay aware of both the increasing costs of alteplase and changes in replacement policies, including the November 2016 change from 6 hours to 35 days with a physician or pharmacy director signature required for reimbursement
- Continued research is needed to assess the impact of other interventions aimed at reducing DTN times in the ED and its effect on alteplase waste

Background / Objective

- In 2010, the AHAS/ASA’s Target Stroke best practice recommendations to reduce door to needle times (DTN) included early pre-mix of intravenous alteplase.
- Early premixing of alteplase has led to unused vials. The price for replacement vials range from $6,400 to $8,400 per 100mg vial. However, hospitals have largely recouped the cost of wasted alteplase by returning them to the drug manufacture for free replacement vials.
- Our Primary Stroke Center (PSC) had a high return rate prompting our team to implement interventions aimed at ethical stewardship of resources without compromising clinical care.
- Objective: Evaluate whether specific interventions reduced clinical expenses without affecting timeliness of clinical care at our PSC

Methods

- The following intervention was implemented between July–Sept 2015:
  - Establishing a dedicated pharmacist in the ED to mix alteplase at bedside Friday–Tuesday, 12:30–21:00, in addition to existing satellite pharmacy available all other times
  - Implementing single call number from neurology to pharmacist to initiate treatment
  - Educating neurologist on current alteplase waste and cost per vial
- Clinical data were from the American Stroke Association’s Get with the Guidelines database; alteplase vial usage was from the pharmacy’s internal quality tracking database
- Data from Acute Ischemic Stroke (AIS) patients presenting at our PSC emergency room within 4.5 hours of Last Known Well (LKW) and treated with IV-alteplase between Jan–June 2015 & Sept–Nov 2016 were included
- Exclusions: infant strokes or those with diagnoses unrelated to stroke; alteplase mixes during the implementation phase (July–August, 2015)
- Pre-intervention cases (Jan–June 2015) were compared to post-intervention cases (Sept 2015–Nov 2016)
- Primary outcomes:
  - Change in % returned vials (total vials returned/total vials mixed) between pre- and post-intervention time periods
  - Expected number of post-intervention vials that would have been returned using pre-intervention percent returned was calculated to assess costs.
- Secondary outcomes: median DTN and median pharmacy go-ahead call time to needle time (GoTN); Mann Whitney test was used to compare DTN and GoTN between pre and post-intervention time periods
- A sub-analysis of patients treated during the post-intervention time period was used to determine whether GoTN or DTN differed depending on location of alteplase mixing (satellite pharmacy vs ED bedside); Mann Whitney tests were used to determine differences.

Table 1: Cost Savings in the Post-intervention Time Period.  

<table>
<thead>
<tr>
<th>Pre and Post Intervention Retum</th>
<th>Pre-intervention</th>
<th>Post-intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of alteplase mixes</td>
<td>38</td>
<td>88</td>
</tr>
<tr>
<td>Number of alteplase returns</td>
<td>15</td>
<td>19</td>
</tr>
<tr>
<td>Percent Returned</td>
<td>39.5%</td>
<td>11.3%</td>
</tr>
</tbody>
</table>

Post-intervention Expected & Actual returns

<table>
<thead>
<tr>
<th>Number of Vials</th>
<th>Expected Number of Returns</th>
<th>Using Intervention</th>
<th>Percent Returned of 39.5%</th>
<th>Actual Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Post-intervention Cost & Cost Savings Based on Expected & Actual Returns

<table>
<thead>
<tr>
<th></th>
<th>Minimum savings, in $</th>
<th>Maximum savings, in $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total maximum cost, in $</td>
<td>294,000</td>
<td>$75,600</td>
</tr>
<tr>
<td>Minimum savings, in $</td>
<td>166,600</td>
<td>$57,600</td>
</tr>
<tr>
<td>Total minimum cost, in $</td>
<td>224,000</td>
<td>$57,600</td>
</tr>
</tbody>
</table>

Cost Savings = ‘expected’ minus ‘actual’ returns for the post-intervention time period

8
5
0
GoTN
DTN
400
200
0
50
100
Minutes
Pre
Post
P=0.003

Figure 1. Decrease in GoTN Times from Pre to Post-Intervention while DTN Times Remained the Same.

References