Economic Evaluation of Adding A Drug To The Hospital’s Hazardous Drug List

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BACKGROUND

- Unit dose (UD) packaging involves preparing the drug product in an individually labelled, non-reusable container to hold a quantity of drug intended for administration as a single dose.
- UD packaging is advantageous because the drug is identifiable and the integrity of the dosage form is protected until the container is opened.
- When staff are not properly protected from hazardous drugs, adverse health effects can occur in exposed staff.
- The National Institute for Occupational Safety and Health (NIOSH), a US federal agency that promotes the safety of workplace employees, releases a list of hazardous drugs along with recommendations for safe handling during preparation and administration.
- Several commonly used drugs, including warfarin and phenytoin, have been added to the NIOSH list.
- Although protection of staff from hazardous drugs is very important, the incremental cost for packaging and administration of a hazardous drug must be considered as this list expands.

OBJECTIVE

- Determine the total cost for UD packaging of a drug as a hazardous product based on NIOSH standards.

METHODS

- Literature Search
  - Search terms: hazardous drugs, NIOSH, unit dose, packaging, repackaging, prepackaging, cost, pharmacoeconomic
  - Sources used: PubMed, MEDLINE

Baseline Measurements and Cost Estimation

- Four methods of UD packaging were identified: manual blister packaging, AutoMed, Cadet, and AutoBag were identified as providing suitable potential packaging.
- Two methods for overwrapping packaged hazardous drugs: Ziploc bag and AutoBag were identified.
- Time in motion studies were completed to determine the time to package drugs by each method.
- The cost of labour, material, and personal protective equipment (PPE) for packaging hazardous and non-hazardous drugs for each of the above methods was determined.
- The total cost of administration for clonazepam, phenytoin, and warfarin as hazardous drugs was determined.

RESULTS

**Figure 1.** Primary methods for packaging intact tablets and capsules as hazardous drugs. Method 1 (left) involved manually blister packaging medications, followed by overwrapping with a Ziploc bag. Method 2 (right) involved using the Cadet to UD package, followed by an AutoBag overlap.

**Figure 2.** Cost estimation of adding 27,098 doses of warfarin 2.5mg to the hospital hazardous drug list. Complete cost estimation breakdown shown below in Table 1.

<table>
<thead>
<tr>
<th>PacMed (Baseline)</th>
<th>Blister UD + Ziploc Overwrap</th>
<th>Cadet UD + AutoBag Overwrap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharmacy Cost</td>
<td>$2,091.11</td>
<td>$17,320.09</td>
</tr>
<tr>
<td>Nursing Cost</td>
<td>$0</td>
<td>$5,522.74</td>
</tr>
<tr>
<td>Total Cost</td>
<td>$2,091.11</td>
<td>$22,842.83</td>
</tr>
<tr>
<td>Cost Difference</td>
<td>$18,751.72</td>
<td>$14,541.70</td>
</tr>
<tr>
<td>Cost/UD</td>
<td>$0.07</td>
<td>$0.54</td>
</tr>
</tbody>
</table>

**Table 1.** Cost evaluation of adding 27,098 doses of warfarin 2.5mg to hazardous drug list. PacMed cost represents current baseline cost of packaging and administering doses. Cost will increase to $20,842.83 if manually blister packaging and Ziploc bag overlap. Using the Cadet and AutoBag overlap to package will result in a total increased cost of $14,541.70.

**DISCUSSION**

- The literature search failed to identify any previously published studies that identified the cost to package and / or administer hazardous drugs.
- The PacMed was the most efficient method for UD medication, and thus was selected as the baseline cost for packaging ($0.07 per unit dose package).
- The additional cost of adding a drug to the hazardous drug list is the sum of additional packaging materials, additional labour to overwrap, and nursing and pharmacy PPE.
- The total cost for manually blister packaging and Ziploc bag over wrap was $7.77/UD and packaging with the Cadet and AutoBag $0.54/UD, representing a $0.70/UD and $0.47/UD cost increase from baseline, respectively.
- The cost incurred by adding clonazepam, phenytoin, and warfarin (total of 108,493 doses dispensed in fiscal 2014) to the hospital’s hazardous drug list was $58,236.77, representing a $50,151.45 increase from baseline. The baseline cost is the cost to package the drug as it were not considered hazardous.

**REFERENCES**

- http://www.cdc.gov/niosh/docs/strategic/

**CONCLUSION**

- Preparation and administering hazardous drugs costs an additional $0.47 per unit dose package more than non-hazardous oral tablets or capsules.

**KEY REFERENCES**

- http://www.cdc.gov/niosh/docs/strategic/