Automated dispensing cabinets and task interruptions: a simulation study to evaluate the impact on dispensing errors

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Abstract number: 2SPD-019

Purpose
- Compare the rates of dispensing errors with/without an automated dispensing system (ADS)
- Evaluate the influence of interruptions on the reliability of this activity

Conclusion
- Errors are mainly due to confusion and lack of knowledge of pharmaceutical formulations.
- This rate decreases thanks to the ADS
- To have a significant reduction the connection with the prescription is mandatory

Background
Drug dispensing is traditionally carried out manually, with a significant risk of errors [1,2]. While medication preparation and administration accounts for 16% of nurses’ activity, more than a quarter of interruptions occur at these moments [3,4]. Any distraction during these activities may increase the risk of errors [5,6].

Method
Volunteer nurses had to prepare 12 pillboxes from a conventional pharmacy (CP) and an automated dispensing system (ADS).
Six standardized interruptions (INT) were generated: noise, discussion (x2), oral prescription, telephone call and physical intrusion. The management of these distracting events were categorized (multitasking, task-switching, break of attention, suspending task, sub-optimal performance, no interruption). Errors were classified (omission, wrong drug, form dosage, patient, time).

Results

<table>
<thead>
<tr>
<th></th>
<th>CP (12 pills)</th>
<th>ADS (12 pills)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error</td>
<td>WITH interruption</td>
<td>WITHOUT interruption</td>
</tr>
<tr>
<td>CP</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>ADS</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

Comparison of interruptions’ management

Comparison of total error rates between CP and ADS with the estimations of prescription

- **CP**
  - Noise
    - 67%
  - Phone call
    - 88%
  - Discussion
    - 69%
  - Physical intrusion
    - 46%

- **ADS**
  - No interruption
    - 83%
  - Task-switching
    - 83%
  - Multitasking
    - 89%

**Conclusion**

**Automated Dispensing System (Pysis Medistation®)**

**Conventional Pharmacy (ScanModul, ScanCell®)**

**Discussion**

- **CP**
  - Suspending task
    - 46%
  - Omission
    - 0%
  - Wrong form
    - 0%
  - Wrong dosage
    - 0%
  - Wrong drug
    - 0%
  - Wrong time
    - 0%

- **ADS**
  - No interruption
    - 50%
  - Omission
    - 0%
  - Wrong form
    - 0%
  - Wrong dosage
    - 0%
  - Wrong drug
    - 0%
  - Wrong time
    - 0%

**Table**

<table>
<thead>
<tr>
<th>Category</th>
<th>CP WITH interruption</th>
<th>CP WITHOUT interruption</th>
<th>ADS WITH prescription (estimation A)</th>
<th>ADS WITHOUT prescription (estimation B)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CP</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ADS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise</td>
<td>1.99% with INT</td>
<td>2.07% without INT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phone call</td>
<td>1.85%</td>
<td></td>
<td>1.42%</td>
<td></td>
</tr>
<tr>
<td>Discussion</td>
<td>0.71%</td>
<td></td>
<td>0.50%</td>
<td></td>
</tr>
<tr>
<td>Physical intrusion</td>
<td>0.50%</td>
<td></td>
<td>0.21%</td>
<td></td>
</tr>
</tbody>
</table>

**Products with the highest error rates**

**Comparison**

- **Do not disturb**
- **Please wait... etc.**
- never expressed by volunteers