Automation of drug distribution: impact on error rate and distribution speed

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Introduction
The human reliability is limited and information technologies have the potential to improve the safety of the medication process. In July 2011, a robot (ROWA®/ARX) was implemented in our hospital pharmacy, to reduce error rates and improve the efficiency of our global drug distribution activity.

Study design
Approximately 52% of the dispensary stock is managed by the robot (1126 articles, 50’000 boxes).

• Distribution errors: content accuracy of random orders was verified before and after the implementation of the robot. Errors were classified in three categories: wrong drug, missing drug/quantity or additional quantity.

• Workload efficiency: time to prepare a sequence of orders manually or with the robot was measured. The distribution time begins from the order form and stops when the box is closed, ready to be picked by carriers.

Objectives
Evaluate the impact of this automation on distribution errors and workload efficiency

Results

<table>
<thead>
<tr>
<th>ERROR RATE</th>
<th>WORKLOAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual distribution (n=5805 ordered lines)</td>
<td>Automated distribution (n=5840 ordered lines)</td>
</tr>
<tr>
<td>0.36% wrong drug</td>
<td>-71%</td>
</tr>
<tr>
<td>0.31% missing drug/quantity</td>
<td>0.27%</td>
</tr>
<tr>
<td>0.34% additional quantity</td>
<td></td>
</tr>
</tbody>
</table>

• The automation avoided more than 4500 errors each year, and therefore contributes to a safer distribution.

• With the robot, wrong drugs were no longer a common error, which represented 38.7% of all errors in the manual distribution.

• Remaining errors are due to the setting of the conveyor’s software. The system will be still improved by the manufacturer.

• With the distribution of 880 boxes of drugs/hour, the robot increased the distribution speed by a factor of 3.

• Prologs (automatic in-stock system) are activated in the afternoon and at night, when most of the distribution is done.

Discussion - Conclusion

• This reorganization contributed to a SAFER AND MORE EFFICIENT global distribution of drugs.

• NO MORE INCORRECT PICKING of medication occurred thanks to the HIGH RELIABILITY OF THE ROBOT.

• Remaining errors could still be reduced by improving the conveyor’s software.

• With one single person operating the robot, 2 full-time equivalents were saved (estimated ROI in 4.5 years).

• For medications remaining outside the robot (i.e narcotics, cold chain or due to the size, shape or weight), a SCANNING SYSTEM will be introduced and evaluated by the same protocol.