

# Safety and Efficiency of Workflow Automation in Medication Tray Verification

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Pharmacy



## Purpose and Specific Aims

Safety and speed of availability are of utmost importance when it comes to medications in the hospital. One method used to ensure that these two outcomes are achieved is the use of medication trays; trays of medications set aside to be used in high risk situations such as codes and during anesthesia. Manually verifying these code trays is an essential safety step, where pharmacists will go through and verify that the right medications are in the tray and that they aren't adulterated or expired. This often happens periodically or after they are used. This process is often time consuming and doesn't always mitigate errors. Automating this process then has two specific aims:

- Evaluate the impact of technological intervention on errors in the medication tray verification process.
- Evaluate the impact of technological intervention on the efficiency of the medication tray verification process.

## Methods

- **Design:** This study used a pretest-posttest design to determine the impact of a barcoding system on anesthesia tray preparation and verification.
- **Subjects:** Trays were included in our sample if they were prepared and verified by pharmacy staff during either the pre or post periods and logged either on the paper forms in the pretest or in the electronic system during post. A sample of 80 trays were audited for errors in post at random intervals using convenience sampling. Trays not included in any of the above groups were excluded from the study.

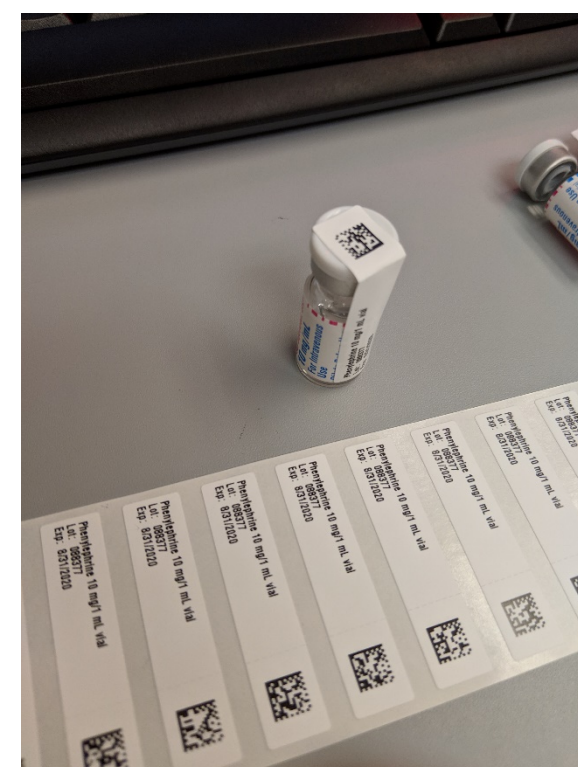


Figure 1: Barcode Labeling of Product



Figure 2: Assembled Medication Tray

## Methods - continued

- **Intervention:** The intervention for this study was the implementation and use of the barcode assisted automation system. Barcodes were affixed to medications that were to be included in the trays. These barcodes were linked in the barcode assisted automation system with the corresponding medication. Post-implementation, the trays were scanned electronically for any missing or expired medications rather than being checked manually by an employee.
- **Measures:** Over a 22 day period prior to the implementation of the barcode assisted automation system, employees reported time spent and errors found in preparing medication trays. Time reporting was done using a modification of an existing check form, with the addition of end times to characterize total time spent. The time spent to prepare a medication tray initially was reported as time, in minutes, to prepare a batch of trays. A second, verifying employee reported the number of errors found during their check as a cumulative tally over the course of the day. Following the implementation of the automation system, over a 22 day period, the time for each tray prep was logged by the system, and trays were randomly audited for errors via convenience sampling. The measured outcomes were calculated using a two-tailed t-test for decrease in average time checked per tray and a reduction in error rates.
- **Data analysis:** Daily means were calculated for tray preparation time in pre- and post-intervention. Error rates were reported as an incidence of errors reported as a percentage of trays checked. The p-values for the measured outcomes were calculated using a two-tailed t-test for difference in average time per tray preparation and a difference in error rates.

## Results

| Table 1. Summary of Results | Trays Checked (n) | Mean Time to Check per Tray (sec) | Error Rate om Errors per Tray(%) |
|-----------------------------|-------------------|-----------------------------------|----------------------------------|
| Pre-Implementation          | 854               | 81.6                              | 11.24                            |
| Post-Implementation         | 1343              | 43.1                              | 0.00*                            |
| Difference**                | ---               | -38.5                             | -11.24                           |

\*in audit of 80 tray sample

\*\* all p-values less than 0.05

## Conclusions

- Automation in the tray verification process proved to improve both safety and efficiency.
- The number of errors found in the trays were reduced significantly after the implementation of the system.
- There was also a significant reduction in the average time to check each tray post-automation implementation, however this reduction did not account for time spent preparing items.

## Limitations

- Project scope did not account for time spent preparing items for placement in the trays.
- Due to the loss of a data collection form, the original study period was reduced from 30 days to 22 days.
- Due to the reliance on manual identification of errors, error rates are likely higher than reported, especially during the preliminary phase.

## References

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## Contact/Disclosures

Kord Catt – nothing to disclose

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