

Incidents Associated with Centralized Automated Processing of Multi-Medication Compliance Packs

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Introduction

- Multi-medication compliance aids (MCAs) organize medications based on date and time of administration. Benefits of MCAs include improved medication adherence, reduced caregiver stress, and fewer medications stored at home.
- Studies have found that manual preparation of MCAs is associated with an increased risk of medication incidents compared to traditional dispensing.
- Centralized MCA pharmacies utilize automation and standardized workflows to improve efficiency, but few studies have examined the quality and safety of these facilities.
- The objective of this study was to quantify and characterize incidents associated with the preparation of MCAs at the largest centralized prescription filling facility in Canada.

Methodology

- MCAs prepared by nine automated compliance pack preparation machines (i.e. robots) (SynMed® XF or SynMed® Ultra) were checked against the pack labels by pharmacy professionals over an eight-week period from December 2017 to January 2018 (Figure 1).
- Incidents were documented on a reporting form with the following information: the associated robot, the type of pharmacy professional who discovered the incident, the type of incident, and a description of the incident.
- Descriptive statistics and qualitative thematic analysis were performed to determine the incident rate and identify key safety risks that may be associated with each type of incident.

Results

- A total of 121,250 MCAs containing 838,358 prescriptions were prepared during the study period.
- Pharmacy professionals discovered 5,733 incidents affecting 4.73% of MCAs. This corresponds to a prescription incident rate of 0.68%.
- The most common types of incidents were dose transition (19.3%), additional dose (18.6%), and omission of medication (16.0%) (Figure 2).
- Themes and key safety risks identified from qualitative analysis were manual processes, robot calibration, and sanitary practices (Table 1).

Conclusion

- Centralized processing of MCAs achieved a prescription incident rate of 0.68%, which is substantially lower than rates associated with manual preparation.
- Opportunities to improve safety and efficiency were identified and focus on reducing human-involved processes, fine-tuning of robot performance, and reviewing current policies and procedures.
- Centralized automated filling of MCAs represents a safe and efficient alternative to manual preparation of MCAs in community pharmacies.

(References: Available upon request)

FIGURE 1. Preparation of Multi-Medication Compliance Aids (MCAs) at a Centralized Filling Pharmacy

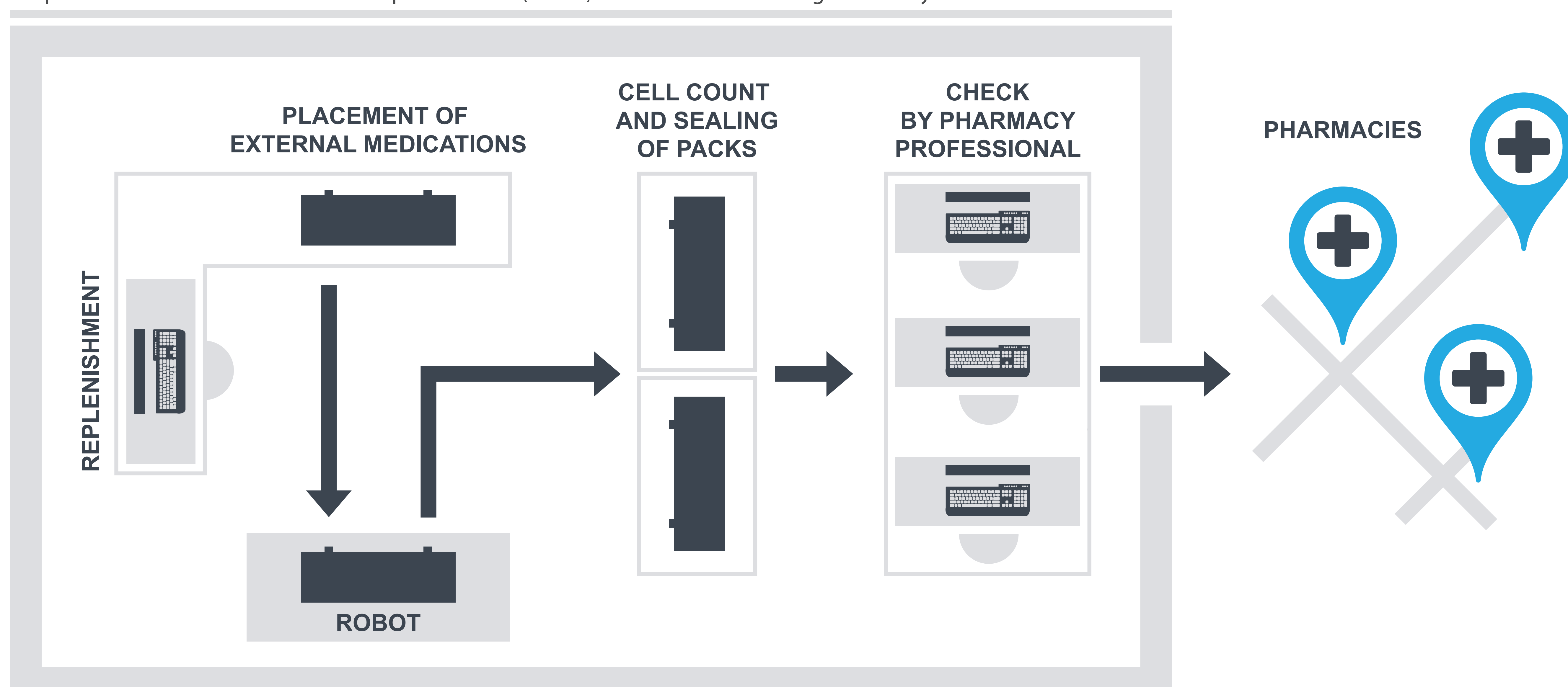
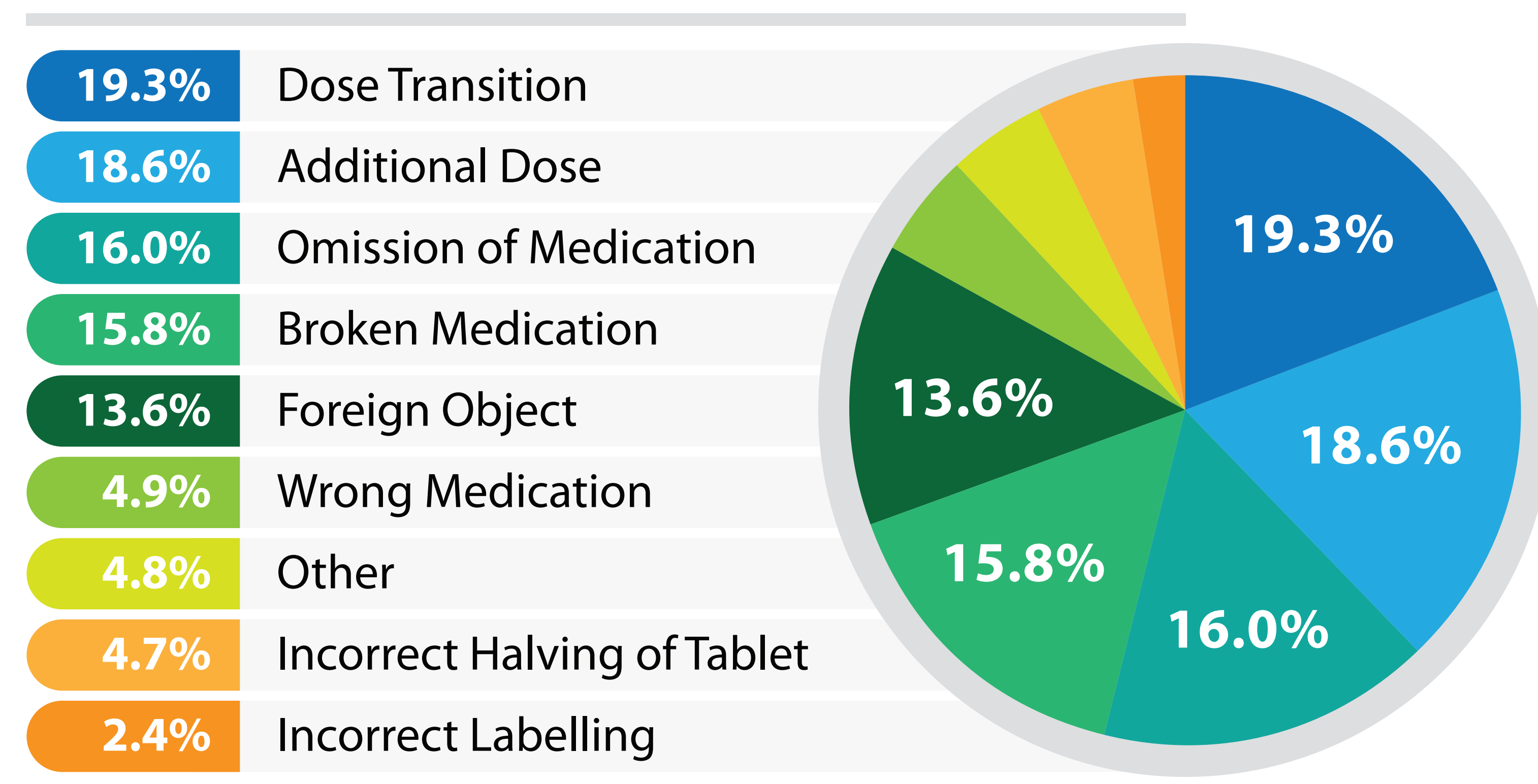


FIGURE 2. PROPORTION OF INCIDENTS BY TYPE ($n = 5,733$)



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TABLE 1. Key Safety Risks Associated with Centralized Processing of MCAs

Themes	Incident Examples
MANUAL PROCESSES <i>Key Safety Risks:</i> <ul style="list-style-type: none"> Cutting of tablets Filling of external medication Movement of trays Cell count Overfilling of cells Sealing of compliance packs 	<ul style="list-style-type: none"> Mirtazapine 30 mg ¼ tablet instead of ½ tablet in Wednesday bedtime slot. Extra Metolazone (manual addition) tablet in Friday AM slot. Furosemide 40 mg ½ tablet was cut too large. Calcium carbonate was loaded into the robot instead of Janumet® XR. Vitamin D 1000 units tablets were mixed with ASA 81 mg tablets in the robot. Rivaroxaban 20 mg jumped from Wednesday at dinner to Thursday at dinner. Card not sealed correctly. One patient's card needed to be transferred to a larger card.
ROBOT CALIBRATION <i>Key Safety Risks:</i> <ul style="list-style-type: none"> Unique medication qualities Cassette opening Nozzle suction strength 	<ul style="list-style-type: none"> Vitamin D3 gel capsules stuck together in Friday lunch slot. Broken Perindopril 8 mg in Tuesday and Wednesday bedtime cells. Missing Quetiapine 25 mg from Sunday morning slot.
SANITARY PRACTICES <i>Key Safety Risks:</i> <ul style="list-style-type: none"> Person protective equipment Replenishment of cassettes 	<ul style="list-style-type: none"> Hair in Wednesday morning slot. All bedtime slots contained dust. Lint ball found in Friday lunch slot.