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.

Table 1: Key Safety Risks Associated with Centralized Processing of MCAs

- **Themes**
  - MANUAL PROCESSES
    - Cutting of tablets
    - Filling of external medication
    - Movement of items
    - Cell count
    - Over-filling of cells
    - Sealing of compliance packs
  - ROBOT CALIBRATION
    - Unique medication qualities
    - Nozzle suction strength
  - SANITARY PRACTICES
    - Replenishment of cassettes
- **Incident Examples**
  - Misaspirin 81 mg tablet missed by the robot in Wednesday bedtime slot.
  - Extra Metformin missed by the robot in Friday AM slot.
  - Furosemide 40 mg tablet was cut too large.
  - Calcium carbonate was loaded into the robot instead of Janumet® XR.
  - Vitamin D 1000 units tablets were mixed with Avid 5 mg capsules on the robot.
  - One patient’s card needed to be transferred to a larger card.

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

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

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