The impact of computerized physician order entry on medication errors in chemotherapy

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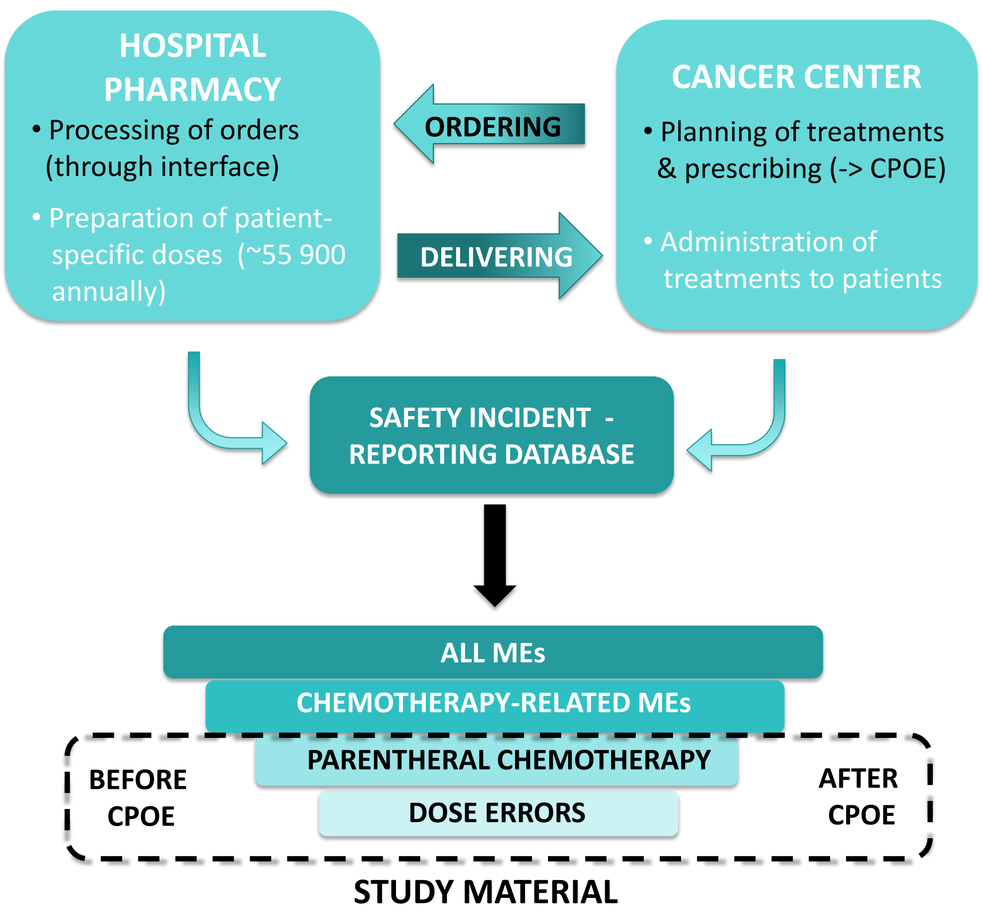
Background & Aim

Antineoplastic agents are considered high-risk medications due to their narrow therapeutic window and high toxicity. The workflow of chemotherapy process is complex with prescribing, ordering, reconstituting and administrating of drugs occurring in distinct steps. Computerized physician order entries (CPOE) are commonly introduced to improve medication safety (1), however, the adoption of a computerized system may elicit novel medication errors (ME) and safety risks (2). We aimed to evaluate the impact of implementation of a CPOE on medication errors in chemotherapy within a tertiary care university hospital.

Materials and Methods



ME reports concerning parenteral chemotherapy were selected for this study. Types and number of ME reports during 12-month study periods before and after CPOE were investigated. The after-period started 9 months after implementation of CPOE. Approximately ~70% of orders were made through CPOE on the after-period. (Figure 1). Qualitative analysis evaluated the causes of MEs and the functionality of safety barriers during prescribing, ordering, and delivering parenteral antineoplastic agents through the CPOE system (Figure 2 and Table 1).

Conclusions

- Adoption of CPOE has the potential to alter the occurrence and type of medication errors
- It is crucial to identify the pitfalls of a computerized system and develop adequate barriers to prevent novel types of errors from reaching patients.

Results

Overall, despite a reduction in MEs related to manual transcribing, total number of reported MEs did not differ before and after CPOE (**Figure 1**).

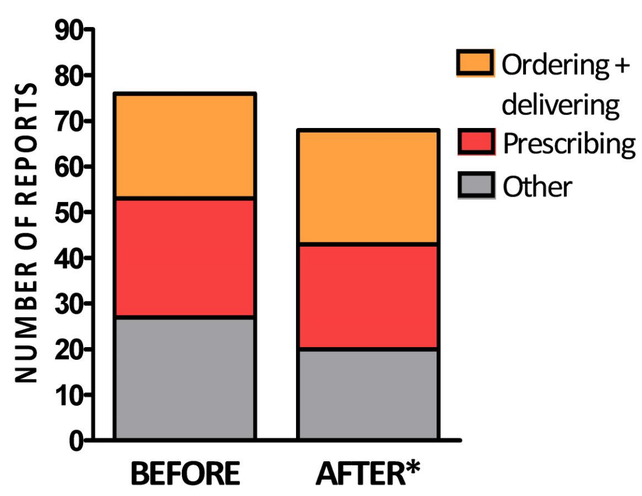


Figure 1. Comparison of the number of ME reports involving a parenteral cytotoxic agent before (n=77) and after the adoption of CPOE (n=68) in the Cancer Center.

Dose errors are among the most hazardous type of MEs related to chemotherapy. When comparing CPOE to the paper-based process, dose errors were more frequently reported, and erratic doses were more often delivered to patients in the CPOE process (**Figure 2**).

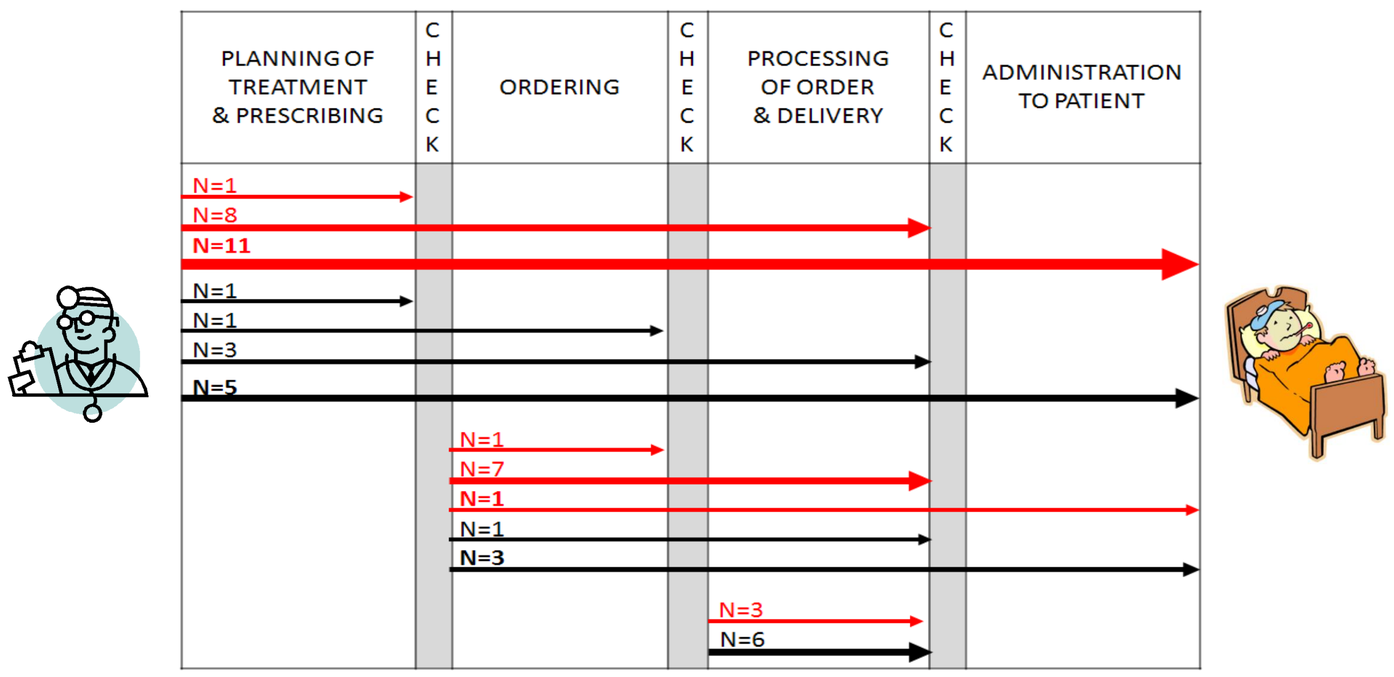


Figure 2. Red = CPOE (n=32), black = manual process (n=20). Erratic doses that passed all 3 manual or automated checkpoints (grey bars) during the process were delivered to patients. Reports were from up to 21 months after adoption of CPOE in the Pharmacy and Cancer Center.

Qualitative analysis of MEs revealed that both the usage skills and usability of the CPOE system were critical factors during adoption of CPOE.

Table 1: Causes of medication errors (ME) after adoption of CPOE*

Problem	ME (examples)
Usage skills of CPOE (n=18)	Erratic user input (dose, patient weight) Omission of data (dose, order, schedule of dose) Extra data (extra dose) Lack of data updating
Usability of CPOE (n=7)	Features of CPOE Slow data updating (patient weight changed and dose calculation delayed) Replicating data in interface (wrong product)

*Data in table are collected from 12 months after the adoption of CPOE.

References
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2) Mattsson TO, Holm B, Michelsen H, Knudsen JL, Brixen K, Herrstedt J. Ann.Oncol., 2015, 26, 5, 981-986.