

ANALYSING UNIVERSITY HOSPITALS' CLINICAL DECISION SUPPORT SYSTEM ALERTS FOR MEDICATION ORDERING PROCESS

Sabrina Ben Aziza, Patient Safety Manager, RN, Bachelor of Engineering, Apotti Oy Ab (sabrine.benaziza@apotti.fi)

Sini Kuitunen, Responsible Pharmacist, (Ph.D.), HUS Pharmacy, Helsinki University Hospital

Lotta Schepel, Chief Medication Safety Officer (Ph.D.), Quality and Patient Safety unit, HUS Joint Resources and HUS Pharmacy, Helsinki University Hospital

Background and importance:

Computerized physician order entry (CPOE) with structured ordering process and clinical decision support system (CDSS) improves medication safety in hospitals (1). However, their implementation require major changes in the workflows. After implementing Epic-based electronic health record system (Apotti) with CPOE and CDSS, ordering and prescribing errors have increased in the Helsinki University Hospital (HUS) (2).

Aim and objectives:

To describe and analyze the clinical decision support alerts of the Apotti EHR system at ordering process for the further development and optimization in HUS (Figure 1).

Materials and methods

This cross-sectional register-based study was targeted to CDSS' alerts of HUS' inpatient orders in 2022. The data was analyzed using descriptive statistics with Microsoft Excel. The cross-sectional study-oriented STROBE checklist was used in the reporting. The alerts displayed for conservative and operative specialties were analyzed separately to identify possible differences.

Results:

In 2022 there were altogether 5,342,217 inpatient medication orders in HUS. For 16% (n = 874,317, Figure 2) of the orders, CDSS produced a soft-limit pop-up alert and 87% (n = 762,746) of these were overridden without changing the original orders. The alerts for operative and conservative specialties covered almost 57% (n = 495,399/874,317) of all order alerts displayed in HUS and there were no major differences between the specialties. Interactions caused the majority of alerts (54–56%, n = 119,838–114,824) and had high override rates (93–94 %). The highest override rate was for alerts regarding geriatric, pregnancy and lactating alerts (94–97 %). The alerts related to drug allergies (55–65% overridden) and duplicate orders (69–88 % overridden) had the highest acceptance rates. (Figure 3)

Conclusions:

The high override rates indicate alert fatigue and a need for optimizing the CDSS' alerts. Based on the results of this study, pop-up alerts for interactions should be limited only to severe interactions. Some of the unnecessary pregnancy and breastfeeding alerts should be filtered. Meds75+ warnings are not meant to be shown as pop-up alerts, and the clinicians should be guided to use the database in other ways. These changes would decrease 30% of the CDSS' pop-up alerts.

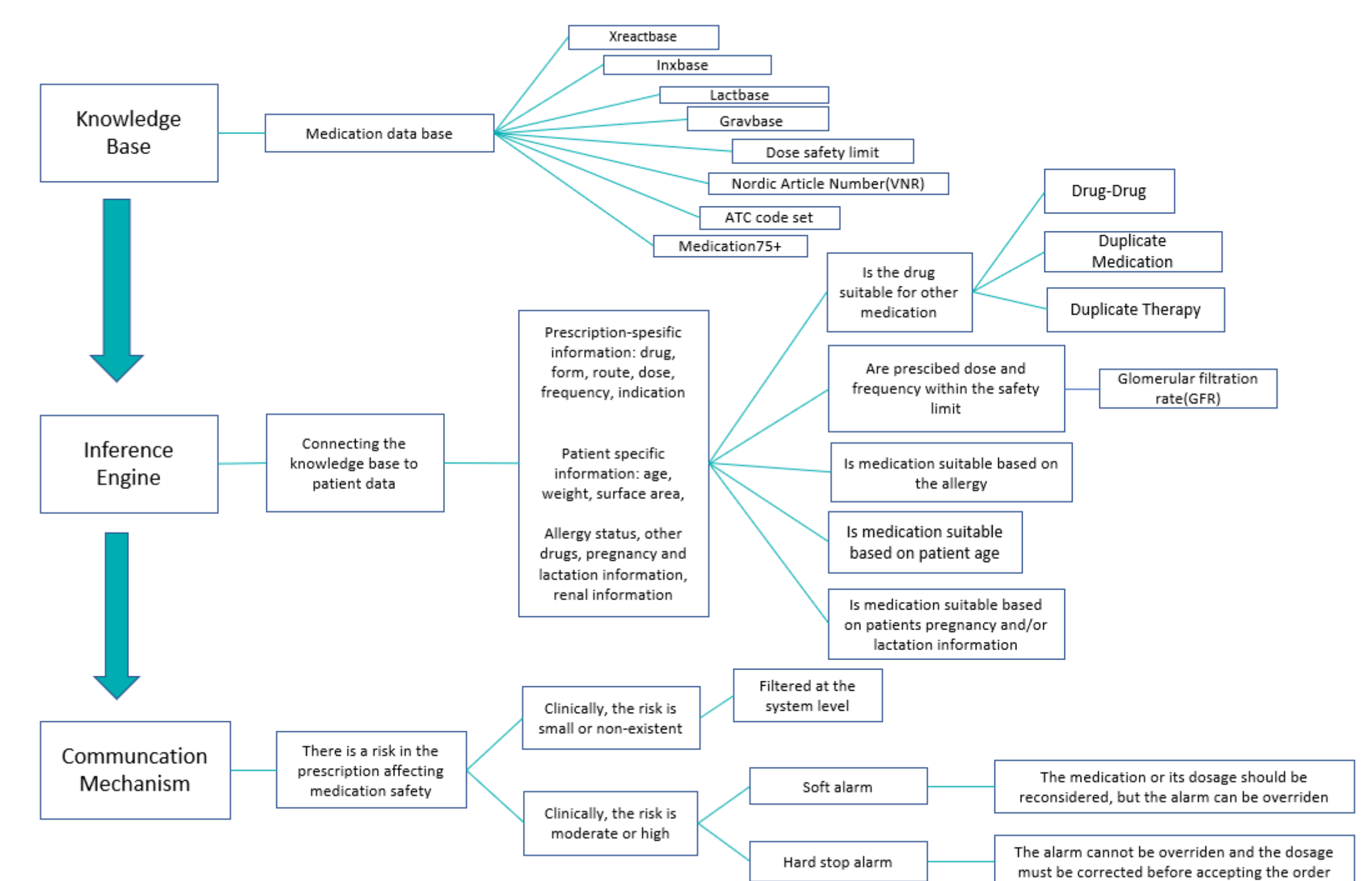


Figure 1. Functionalities of clinical decision support system for ordering and prescribing phase in the APOTTI electronic health record system (adapted from Ruutiainen 2022).

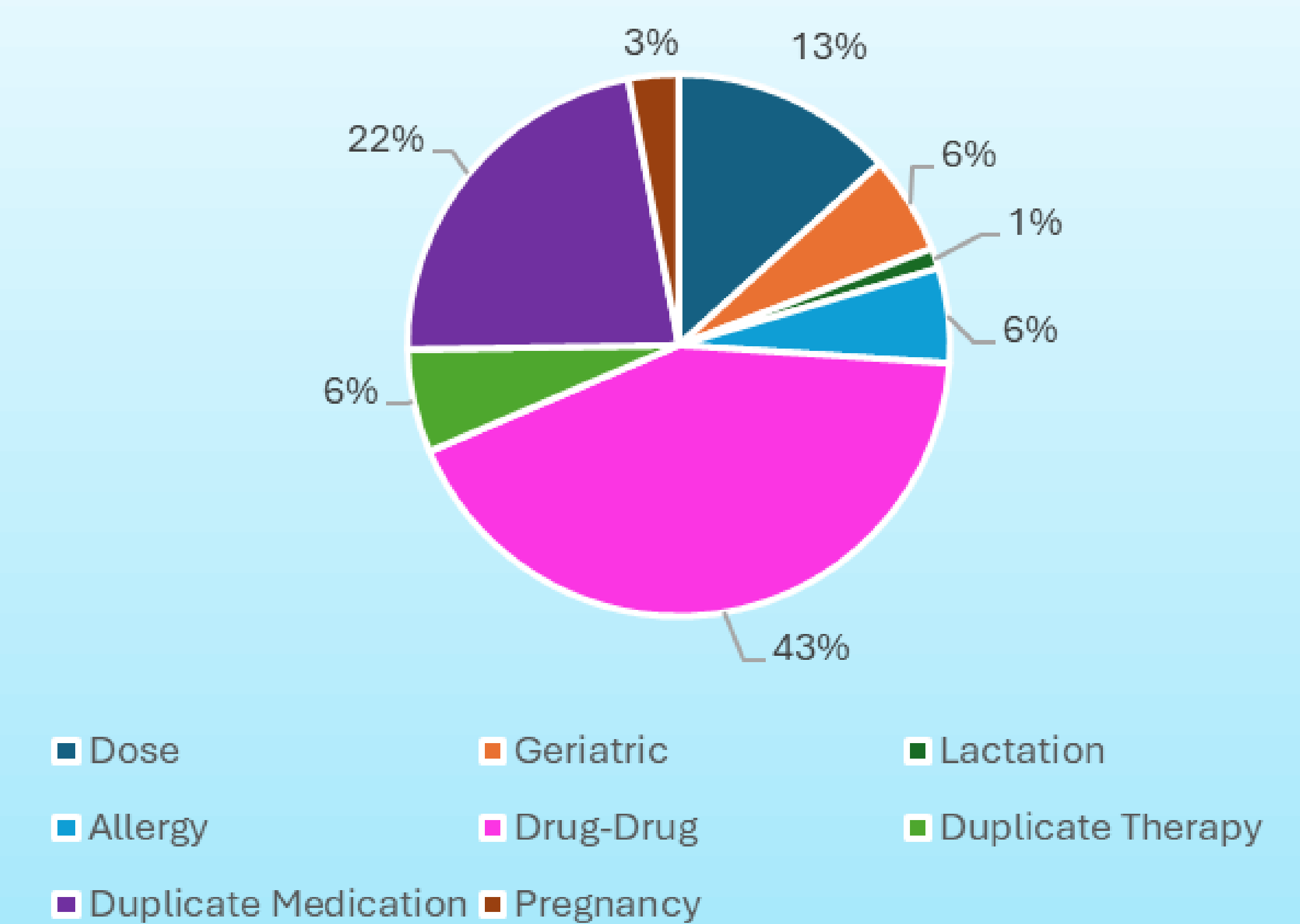


Figure 2. Displayed alerts (n = 874,317) of clinical decision support system for adult patients in the study hospital in 2022.

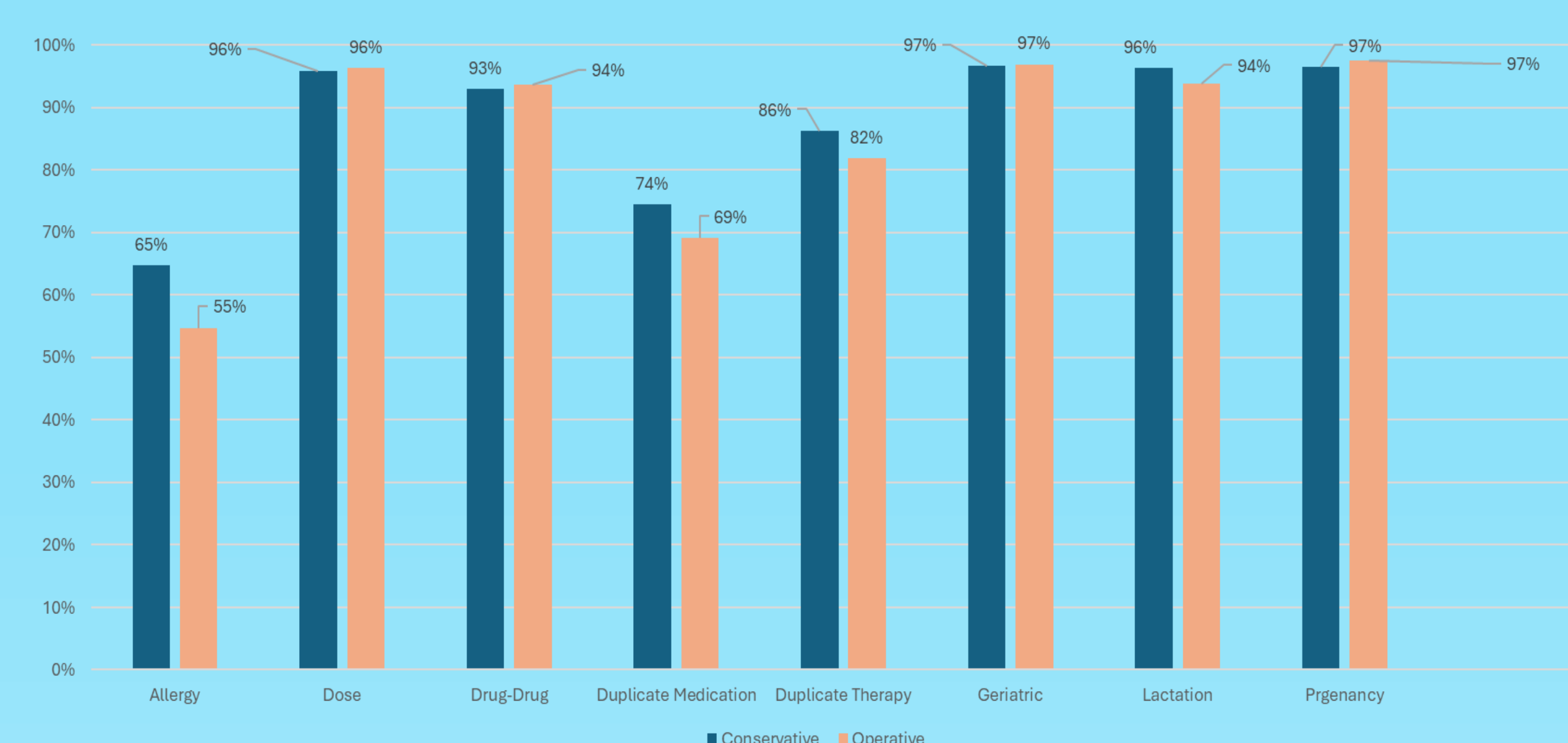


Figure 3. Percentage of overridden alerts (n=495,399) at conservative and operative specialties.



References:

- Sutton, R. T., Pincock, D., Baumgart, D. C., Sadowski, D. C., Fedorak, R. N. & Kroeker, K. I. 2020. An overview of clinical decision support systems: benefits, risks, and strategies for success. *Npj Digital Medicine* 3, 17.
- Lindén-Lahiti, C.; Kivivuori, S.-M.; Lehtonen, L.; Schepel, L. Implementing a New Electronic Health Record System in a University Hospital: The Effect on Reported Medication Errors. *Healthcare* 2022, 10, 1020.
- Ruutiainen, H. 2022. Tietokoneistetut terveydenhuollon toimijan määräysjärjestelmät ja kliininen päätöksenteki lasten lääkemääräysten annosvirheiden estämisessä: systemaattinen kirjallisuuskatsaus. Helsinki: Helsingin yliopisto, Farmasian tiedekunta. Pro gradu -tutkielma. Saatavilla: <http://hdl.handle.net/10138/347363>.