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Algorithm for prioritisation of patients for clinical pharmacy medication check: proof of concept

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Background and importance

Our Clinical Pharmacy Department provides its services for more than 35'000 inpatients annually, but the number of clinical pharmacists is insufficient to cover the whole hospital with routine clinical pharmacy services. There has been emerging evidence about the cost-effectiveness of clinical pharmacy services which goes hand in hand with the reduction of prescribing errors and related patient harm [1]. To increase efficacy of our work, we see a potential in a digital solution [2]. Here we evaluated an algorithm to identify patients with increased risk for severe medication error.

Aim and objectives

Based on the results from the previous trial conducted in our intensive care unit (ICU) by *Schlup et al. (2021)*, we were able to statistically identify the following surrogate markers for patients at risk of severe medication errors: reduced estimated glomerular filtration rate (eGFR), number of prescribed drugs and presence of the high-risk medication [3]. Our aim was to test the selection algorithm in more heterogenous population compared to the ICU.

Materials and methods

On an internal medicine ward, we carried out regular medication check and categorised the severity of the medication errors according to the National Coordinating Council for Medication Error Reporting and Prevention [4]. We evaluated whether patients with potentially severe medication errors could have been identified when fulfilling one of the following parameters:

- **eGFR (according to CKD-EPI) ≤40 ml/min/1.73 m²**
- **number of drugs (without reserves) n≥10**
- **presence of pre-defined high-risk medication**

Based on these data we calculated the sensitivity and specificity of the algorithm.

Results

During the period October 2023 - April 2024 we evaluated prescriptions of 222 patients with median age 72 years (range 17-101 years), 64.4% patients (n=143) were in the age group ≥65 years. In 83% of all patients at least one clinical pharmacist's intervention was carried out, the clinical relevance was shown in 82% of the interventions, the rest were cost-related (i.e., clinically irrelevant) interventions. The error rate was 1.86 clinically relevant error per patient. 83% of clinically relevant medication errors were categorised as potentially severe (Tab. 1). The algorithm was able to correctly identify 114 of those patients. In 29 patients, the algorithm delivered false positive result. Its sensitivity and specificity was determined (Fig. 1).

All patients checked by clinical pharmacist	**222**
Patients with at least one intervention by clinical pharmacist	**185**
Patients without any intervention by clinical pharmacist	**37**
Patients with potentially severe medication errors	**158**
Patients with potentially NON-severe medication errors	**27**
All clinical pharmacist's interventions	**504**
Number of clinically relevant interventions	**412**
Number of cost-related interventions (i.e., clinically irrelevant)	**92**
Interventions with potentially severe medication errors	**341**
Interventions with potentially non-severe medication errors	**71**

Table 1. Data on clinical pharmacy interventions, their clinical relevance and severity of medication errors.

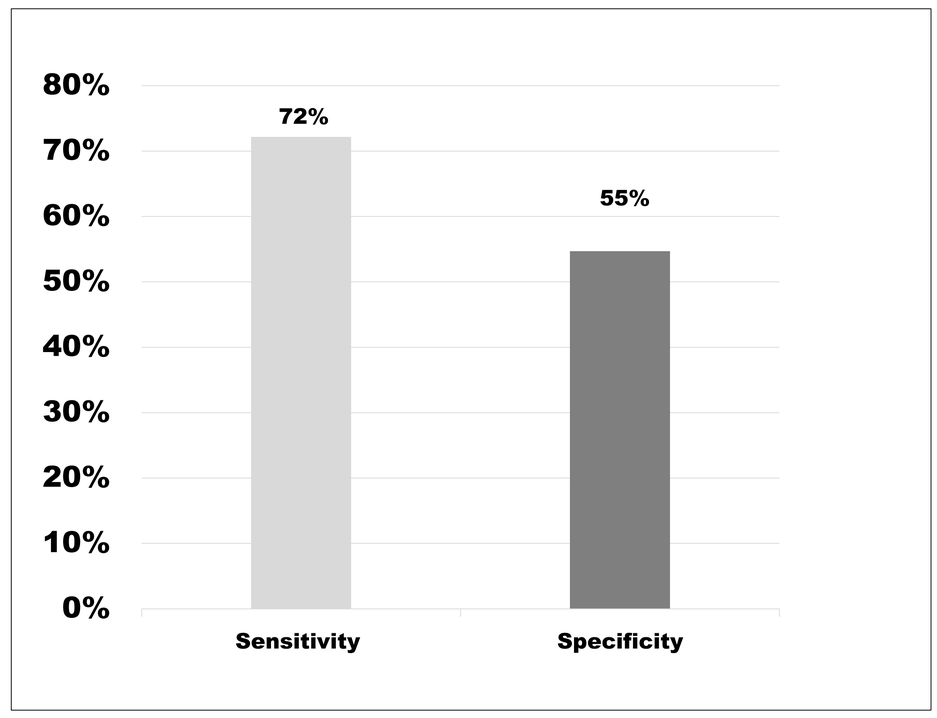

Figure 1. Sensitivity and specificity of the proposed algorithm

Conclusion and relevance

This feasible and simple algorithm, which will be adopted in our clinical software, can help to prioritise patients who would profit the most from the clinical pharmacy services in a cost-effective manner.

References

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