HOSPITAL PHARMACIST'S CONSULTING ACTIVITIES

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1 INTRODUCTION AND OVERVIEW

- Despite advances in pharmacology and medicine, drug-related problems (DRPs) continue to occur and may negatively affect patient health outcomes, prolong the length of hospital stay, and increase healthcare costs
- The identification and resolution of these problems represent key aspects of the work of clinical pharmacists
- The Pharmaceutical Care Network Europe (PCNE) classification provides a precise definition of DRPs, clearly defined categories, and is validated and applicable in clinical practice. A drug-related problem is defined as an event or circumstance involving pharmacotherapy that actually or potentially interferes with the desired outcome of therapy. Drug-related problems may therefore be actual or potential

2 OBJECTIVES

- To analyse drug-related problems in hospitalised patients, propose solutions to identified drug-related problems to physicians through consultative activities, and subsequently implement these solutions into pharmacotherapy
- To identify and evaluate the association between the number of medications used and the number of identified clinically significant drug interactions in a patient
- To evaluate the effectiveness of the pharmacist's intervention

3 METHODS

DATA COLLECTION
October 2024 – February 2025
SÚSCCH – Dep. of Angiology, Dep. of Cardiology 1 and 2, Dep. of Cardiac Surgery, Dep. of Anesthesiology and Intensive Care Medicine

STUDY POPULATION
n = 60 patients
(33 men, 27 women; mean age: 70 years)

INCLUSION CRITERIA FOR PATIENT ENROLLMENT
- Excessive polypharmacy
- At least one clinically significant drug–drug interaction

IDENTIFIED DRPs WERE DIVIDED INTO 4 GROUPS USING THE PCNE CLASSIFICATION (VERSION 9.1):
1. DRPs related to drug selection
2. DRPs related to dose selection
3. DRPs related to treatment duration
4. DRPs related to drug form

IDENTIFICATION OF PIMs IN ELDERLY PATIENTS
Beers Criteria
EU(7) - PIM list
Drug interaction database DrugAgency

EVALUATION OF DRUG INTERACTIONS
UpToDate- Lexidrug, Drug interaction database DrugAgency, SPC- ŠÚKL, Recent clinical studies

ASSOCIATION BETWEEN THE NUMBER OF MEDICATIONS USED AND CLINICALLY SIGNIFICANT DRUG INTERACTIONS IN A PATIENT
Data were statistically analysed using Student's (t) test

4 RESULTS

A total of **209** drug-related problems were identified.

DRPs RELATED TO DRUG SELECTION – DRUG INTERACTIONS

A total of 119 clinically significant drug interactions were identified. The clinical consequences of these interactions were manifested in 32 cases, of which in 21 cases were associated with severe outcomes.

Drug interaction	Consequence of the drug interaction	Pharmacist's intervention (recommendation)	Acceptance of the pharmacist's intervention	Result of intervention
Clarithromycin-Quetiapine-Diphenhydramine-Escitalopram	During antibiotic therapy in one patient, QT interval prolongation was observed QTc: 457 ms	I recommend modifying the antibiotic therapy by using an antibiotic without QT-interval–prolonging potential (selection based on culture results); other medications should be reviewed in consultation with a psychiatrist)	A 1.1	1
Citalopram-Tramadol	In one female patient, symptoms of serotonin syndrome were observed (agitation, tremor, hyperthermia)	Immediately discontinue tramadol and use an alternative analgesic (metamizole or paracetamol)	A 1.1	1
Eplerenone-Potassium chloride-Trandolapril	Occurrence of severe hyperkalemia	Discontinue potassium chloride from the therapy	A 1.1	1
Ciprofloxacin-Prednisone	In one female patient, Achilles tendon inflammation developed	Discontinue ciprofloxacin and replace it with another antibiotic (selection based on culture results, excluding fluoroquinolones).	A 1.1	1
Diclofenac-Acetylsalicylic acid	Gastric bleeding due to mucosal injury	Discontinue diclofenac; for pain management, use paracetamol, or tramadol if necessary.	A 1.1	1
Aceclofenac-Furosemide-Perindopril	After dose escalation of furosemide (250 mg/day) and perindopril (8 mg/day), acute renal failure occurred	I recommend discontinuation of aceclofenac due to unclear indication. I recommend discontinuation (temporary interruption) of furosemide and reassessment of the perindopril dose.	A 1.1	1

All interventions were accepted and fully implemented into therapy, resulting in an improvement in the patients' clinical condition

DRPs RELATED TO DRUG SELECTION – ELDERLY PATIENTS

- A total of 38 cases of PIMs were identified
- The most frequently identified inappropriate medications were naftidrofuryl (6 cases), tiapride (4 cases), amiodarone (4 cases), and doxazosin (4 cases), medications identified 3x included omeprazole, alprazolam, rilmenidine, and urapidil, while pantoprazole was identified twice

DRPs RELATED TO DRUG SELECTION – UNCLEAR INDICATION

- In 14 medications, no documented indication for use was found in the patient medical records
- In 4 cases, proton pump inhibitors were involved (omeprazole, pantoprazole), and in 3 cases, antihistamines (desloratadine, levocetirizine), additionally we identified medications included allopurinol, itopride, betahistine, metamizole, famotidine, pramipexole a aceclofenac.
- Pharmacist's recommendation: Discontinue medication with unclear indication.

DRPS RELATED TO DOSE SELECTION

- At the dosage level, 15 drug-related problems were identified.
- In all cases, the issue was use of an excessively high dose. In 6 cases, this involved antibiotics, most often in relation to impaired renal function, requiring dose adjustment (colistin, amoxicillin and clavulanate, ciprofloxacin, meropenem, ampicillin, rifampicin)

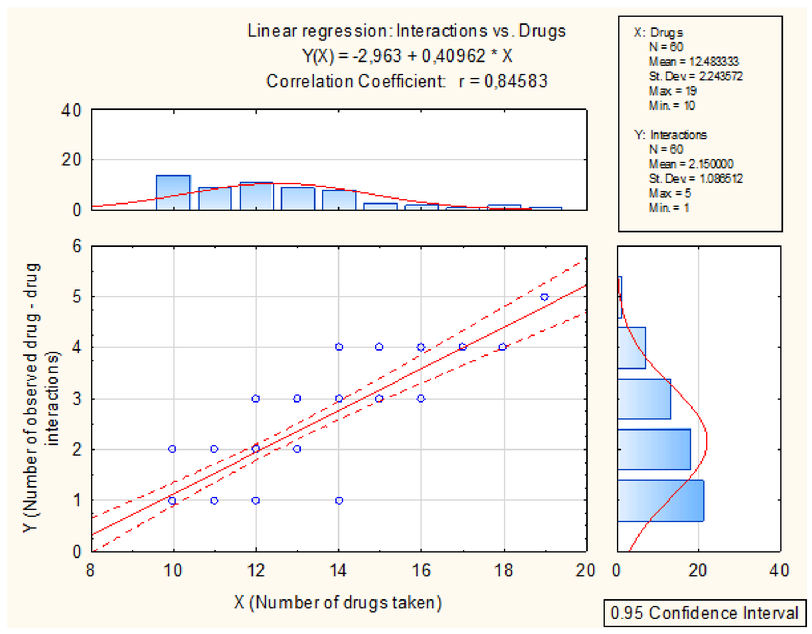
DRPS RELATED TO TREATMENT DURATION

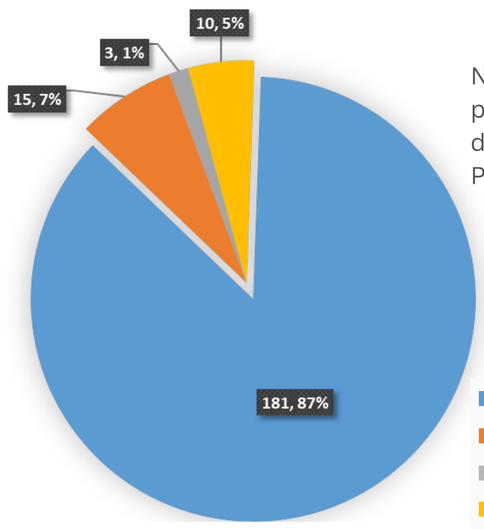
- At the level of therapy duration, 10 drug-related problems were identified. In every instance, the therapy was excessively prolonged.
- In 6 cases, proton pump inhibitors were involved (omeprazole, pantoprazole), additionally other medications included itoprid (2x), desloratadine, and levocetirizine.

DRPs RELATED TO DRUG FORM

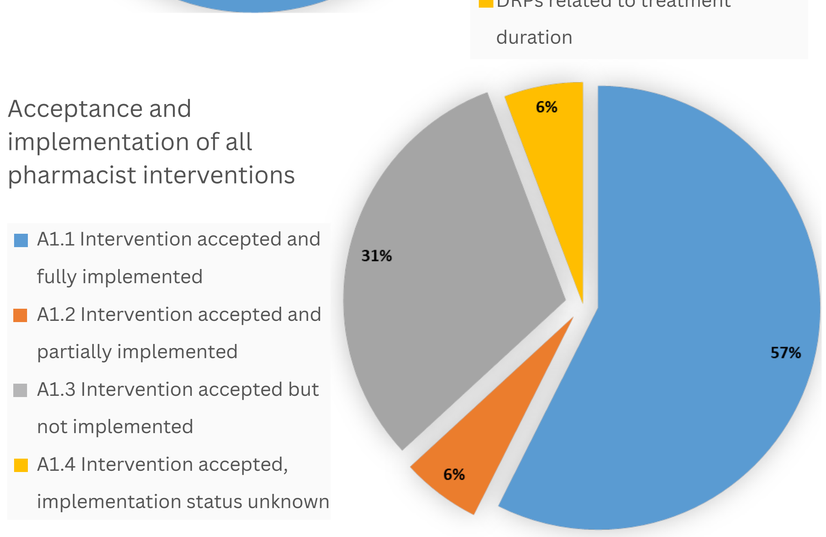
- At the level of drug form, 3 drug-related problems were identified
- In 2 patients, potassium chloride in the form of a modified-release hard capsule was used. In patients with delayed gastric emptying, particularly when combined with anticholinergic therapy, this formulation may cause gastric mucosal irritation or ulceration. The pharmacist recommended liquid or effervescent potassium formulations.
- In one patient with renal impairment, we recommended switching from intravenous to oral voriconazole (tablets) to avoid the accumulation of the intravenous catheter (SBECD).

Statistical analysis demonstrated a highly significant correlation between the number of medications used and the occurrence of clinically significant drug–drug interactions (p = 0.0001).





Number of DRPs in the entire patient population n=60, distribution according to PCNE classification



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Conclusion

- The results show that clinical pharmacist involvement can significantly optimise pharmacotherapy, reduce the risk of adverse effects, and improve treatment safety
- Trust among physicians in pharmacists as full members of the multidisciplinary team is still developing, which may limit the acceptance and implementation of pharmaceutical recommendations in clinical practice.
- It is therefore essential to strengthen interdisciplinary collaboration between physicians and pharmacists.