Drug-drug Interactions (DDI) between ciprofloxacin and nitrofurantoin and other medications in Slovenian nursing homes: A point-prevalence nation-wide study

M. Stuhec [1,2], D. Stepan [3], L. Usaj [3], I. Potocin [1], M. Petek Ster [3], B. Beović [4].

1. Faculty of Pharmacy, Department for Biopharmacy and Pharmacokinetics, Ljubljana, Slovenia.
2. Psychiatric Hospital Ormoz, Department for Clinical Pharmacy, Ormoz, Slovenia.
3. Faculty of Medicine Ljubljana, Department of Family Medicine, Ljubljana, Slovenia.
4. Faculty of Medicine Ljubljana, Department of Infectious Diseases, Ljubljana, Slovenia.

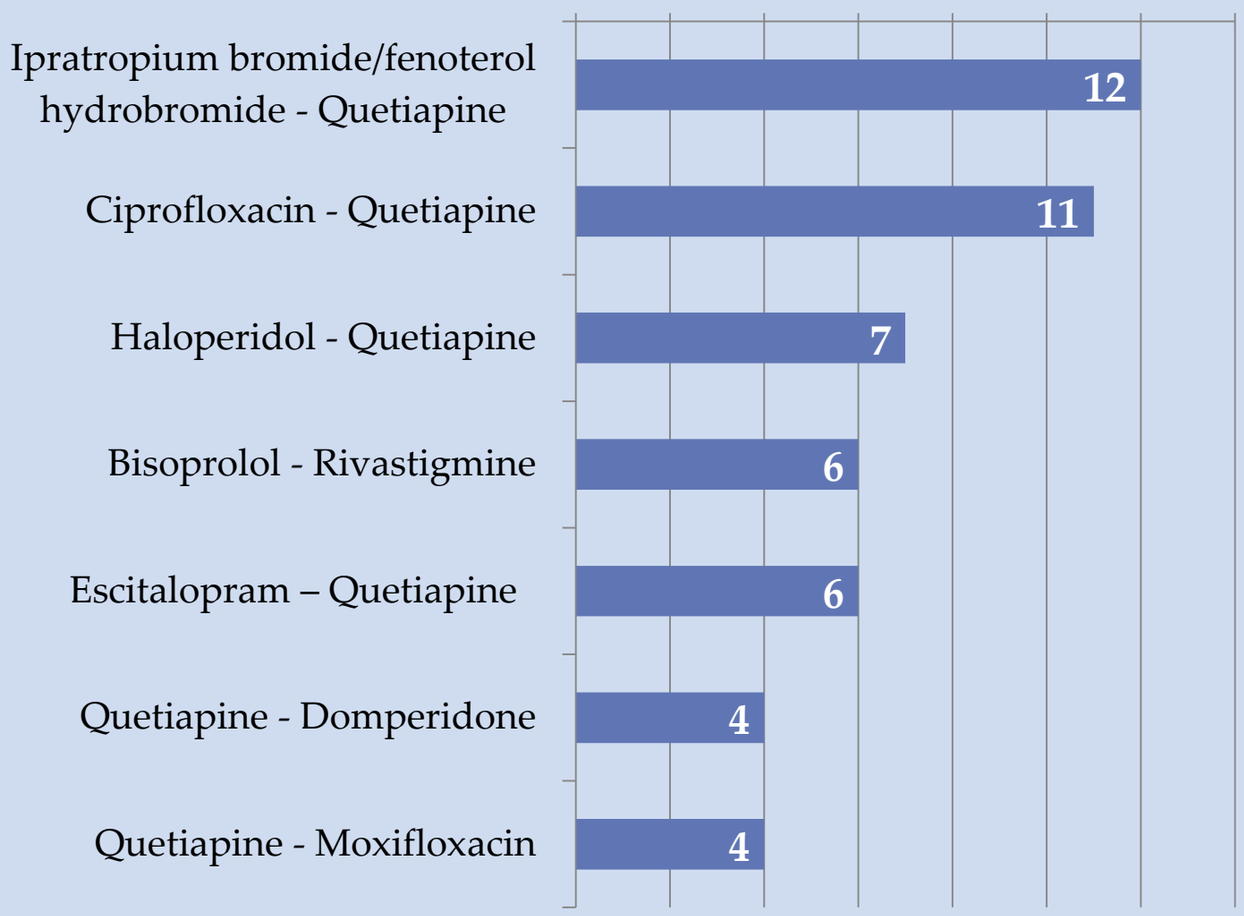
BRIEF INTRODUCTION: Antibiotics have several drug–drug interactions (DDIs) with psychotropic drugs that can lead to adverse events or treatment failure and significantly increase the costs of treatment [1]. DDI may represent an important cause of morbidity. DDIs are common in elderly patients who receive multiple drug treatment. Antibiotic treatment may increase the likelihood of DDIs. Potential X and D DDIs are common in nursing-home residents.

AIM: The prevalences of potential DDIs between ciprofloxacin (CIP), and nitrofurantoin (NIT) in nursing home residents were investigated in a point-prevalence study.

METHODS USED: A point-prevalence study was performed from April 2016 to June 2016 in all Slovenian nursing homes. DDIs were determined by different interaction classes with Lexicomp Online™ 19.0 version and only X (major interactions and should be avoided) and D (minor interactions and avoid if it is possible) were included. Only X DDIs were highlighted in detail. DDIs among all types of medications in each patient were included. PRISCUS list was used to determinate potentially inappropriate antibiotics. An odds ratio (OR) with, 95% CI was used to calculate odds between different groups. Lexicomp categorizes each potential DDI according to clinical significance in 5 groups: X, D, C, B, and A. DDIs of level D and X were considered clinically significant and were included in this study. Only X DDIs were highlighted in detail. This study was approved by the National Medical Ethics Committee of the Republic of Slovenia.

RESULTS: 68.4% of Slovenian nursing homes with 13,022 inhabitants responded to the invitation to the study. On study day, 317 (2.4%) inhabitants were receiving antibiotics. Complete sets of data were available for 233 patients (age=83.5, SD=9.8). The average number of medication per patient on antibiotic was 10.9 (SD=3.9). Thirty-nine (16.7%) patients were treated with CIP and 7 patients (3.0%) with NIT. At least one potential X interaction was found in 72 (30.9%) and at least one potential D interaction was found in 172 (73.8%) patients. At least one X DDIs between antibiotics and other drugs was found in 27 patients (11.5%) (17/39 patients CIP, 6/8 moxifloxacin, 3/5 azithromycin and 1/4 levofloxacin and 0 NIT). Quetiapine and CIP was most frequent X DDIs which occured in 12 patients treated with CIP (12/17), followed by CIP-escitalopram and CIP-duloxetine in 2 cases. Other drugs with potential X DDIs with CIP were amiodarone, domperidone, ivabradine, and sotalol. Most of the X DDIs were pharmacodynamic (QTc prolongation) followed by pharmacokinetic DDIs (Table 1). According to PRISCUS list, nitrofurantoin was the only antibiotic which may be potentially inappropriate. OR for at least one X DDIs in patient treated with CIP was 1.95, 95% CI 0.95-3.95 and 0.36, 95% CI 0.43-3.01 for NIT.

Absolute frequencies of drug-drug interactions



CONCLUSIONS

- **Potential X and D DDIs are common in nursing-home residents.**
- **NIT, which is included in the PRISCUS list of potentially inappropriate antibiotics in elderly appeared to be a safe drug in terms of DDIs.**
- **Ciprofloxacin use should be avoided in patients who are being treated with CYP1A2 substrates (e.g., mirtazapine, duloxetine, or olanzapine).**
- **According to our results, a pharmacotherapy review done by clinical pharmacist and education from this topic would be a highly recommended to avoid important DDIs in elderly patients treated with CIP.**

DISCLOSURE

The authors have no personal affiliations, financial relationship or any commercial interest to disclose relative to this article.

Table 1: Antibiotics and Psychotropic Drugs Received by Patients with Potential Drug–Drug Interactions. The number of potential DDIs are given according to the total number of patients with infections.

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University of Ljubljana

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