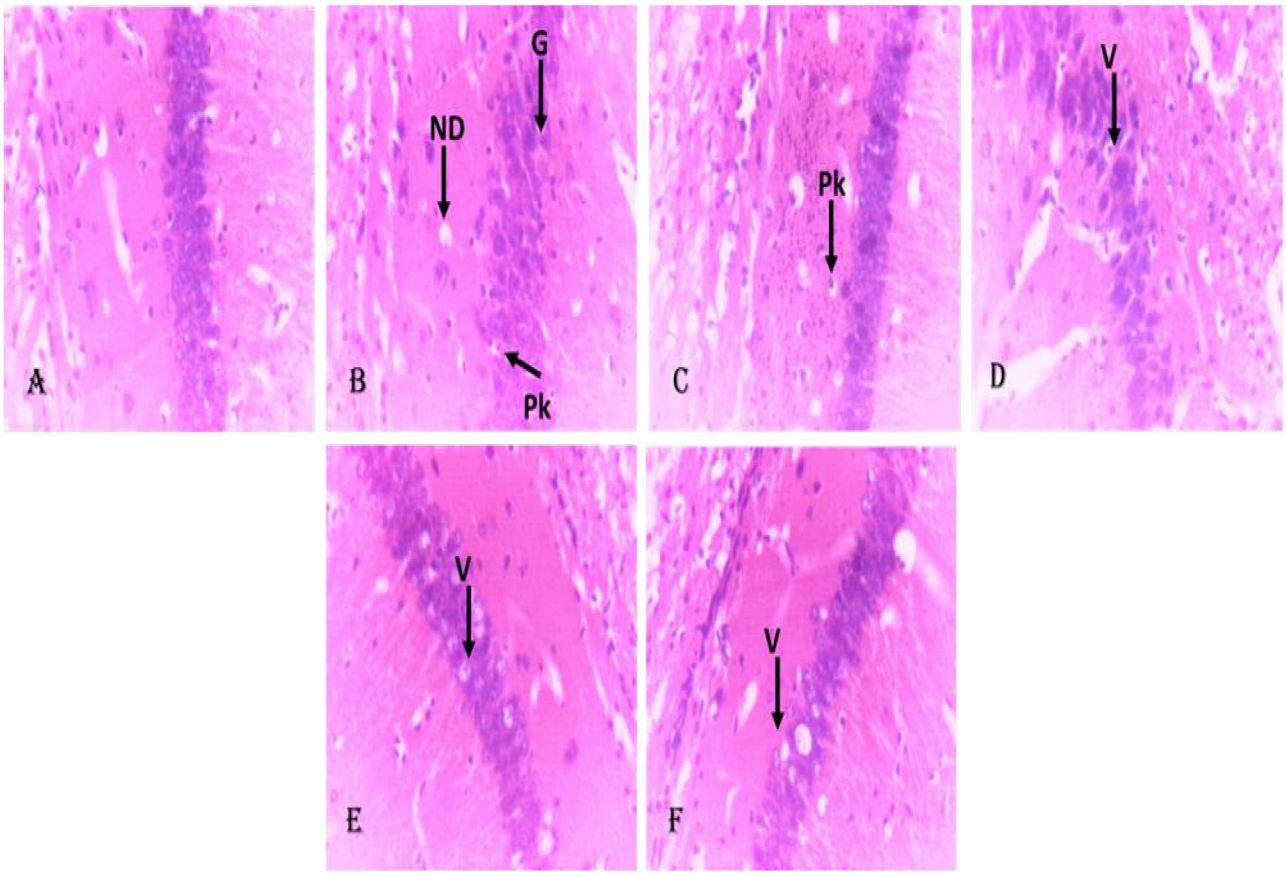

FIGURE 2:3 Plate II: Photomicrograph of the Hippocampal Sections of the Brain Showing the effect of PMCV002 after Scopolamine-induced Amnesia in Mice.

Education

10 | Optimizing pharmacotherapy in coronary heart disease with comorbidities: Impact of an online continuing professional development programme in Ukraine

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Background and Aims

Coronary heart disease (CHD) remains a leading cause of cardiovascular mortality in Ukraine. Patients with multimorbidity frequently require complex pharmacotherapy, increasing the likelihood of polypharmacy and clinically significant drug–drug interactions. Previous studies have revealed both a high prevalence of polypharmacy and insufficient knowledge of clinical pharmacology among physicians [1; 2].

To address these challenges, the Ukrainian Association of Primary Care Cardiovascular Diseases developed a postgraduate continuing education programme. The aim of this study was to assess the effectiveness of an online continuing professional development (CPD) programme in improving prescribing quality and evaluating drug compatibility in patients with CHD and comorbid conditions.

Summary of Work and Outcomes

We analysed prescribing patterns in CHD patients with comorbidities. Drug regimens were assessed for interactions using 'Drug Interaction Checkers' (Drugs.com, Medscape) in two independent cohorts: 2017–2018 ($n = 225$) and 2024–2025 ($n = 135$).

Between September 2024 and September 2025, 10 monthly interactive online lectures (total 2 ECTS credits) were delivered via the WebCardioOrg platform. The curriculum integrated evidence-based data, pharmacokinetics, pharmacodynamic interactions, toxicological aspects of drug interactions, and systemic outcomes of adverse drug reactions. Each session included live Q&A, knowledge testing and CPD certification.

Pharmacists and clinical pharmacists participated, although their outcomes were not measured. Two separate, independent groups of physicians participated in the study: a control group, which did not receive training, and an experimental group, which underwent training. To compare the outcomes between these groups, the Mann–Whitney *U* test was employed.

Null hypothesis (H0): The distributions of outcomes in both groups are identical. That is, there is no statistically significant difference between the groups, indicating that the training had no effect.

Alternative hypothesis (Ha): The outcomes in the trained group are statistically significantly better (lower) than those in the control group. Intergroup comparisons (control *vs*. intervention) were performed using the Mann–Whitney *U* test, with significance set at $p < .05$. Data were processed using STATISTICA 13 and IBM SPSS Statistics.

All procedures were performed in accordance with the Declaration of Helsinki and the International Ethical Guidelines for Biomedical Research Involving Human Subjects (2016). Written informed consent was obtained from all participants prior to enrolment.

Discussion

Implementation of the educational programme led to measurable improvements in the rationality of complex pharmacotherapy. The number of prescribed agents in multidrug regimens decreased due to broader use of fixed-dose combinations and polypills. Positive effects were observed in pharmacodynamic synergism and overall drug compatibility. However, no substantial improvements were found in reducing pharmacodynamic antagonism, toxicity from drug interactions or dosing errors (Table 1).

Participants reported that interactive elements and real-time clinical discussions enhanced engagement and supported the integration of pharmacological principles into routine clinical decision-making.

Conclusions

The CPD programme significantly improved prescribing practices for patients with CHD and comorbidities, reducing polypharmacy and drug interactions. Structured clinical pharmacology education should be included in continuing professional development curricula. Future interventions should address remaining concerns, particularly regarding pharmacodynamic antagonism, drug-induced toxicity and dosing errors.

References

1. Dolzhenko MM, Bilousova NA, Yakovenko LI, Nesukai VA, Kozhuharyova NA. The impact of polypharmacy on adherence to pharmacotherapy for coronary heart disease with comorbid conditions: insights from the EUROASPIRE V observational study in Ukraine. Modern Medical Technology. 2025;17(2):91–101. doi:10.14739/mmt.2025.2.322403.

2. Bilousova NA, et al. The influence of gender characteristics, polypharmacy, anxiety and depression on adherence to treatment in patients with ischemic heart disease and comorbid conditions. Hypertension. 2025;18(1):5–13. doi:10.22141/2224-1485.18.1.2025.374.

TABLE 1 Key educational methods incorporated into the CPD program.

Learning method	Description	Expected outcome
Interactive online lectures	Monthly 90-min sessions with real-time Q&A	Knowledge acquisition and clinical relevance
Case-based discussions	Clinical scenarios integrating pharmacokinetics and pharmacodynamics	Improved decision-making in complex regimens
Online testing	Short post-lecture assessments	Immediate reinforcement and progress tracking
CPD certification	Awarded after successful completion	Professional recognition and motivation
Open-access resources	Materials stored on YouTube & MedUA app	Continuous access to evidence-based guidelines