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83rd INTERNATIONAL SCIENTIFIC CONFERENCE ON MEDICINE AND HEALTH SCIENCES OF THE UNIVERSITY OF LATVIA: INTERNAL AND CARDIOVASCULAR MEDICINE

On 25 April 2025, the University of Latvia in Rīga is hosting the International Scientific Conference on Medicine organised within the frame of the 83rd International Scientific Conference of the University of Latvia (see for details: Leja, M., Stonāns, I. 83rd International Scientific Conference on Medicine and Health Sciences of the University of Latvia: Basic Medical Science and Pharmacy, p. 19, this issue).

The "Internal and Cardiovascular Medicine" section includes a broad and interdisciplinary collection of abstracts reflecting important clinical and scientific developments in the fields of internal medicine, cardiovascular health, metabolic and autoimmune diseases, and infection management.

Within the area of diabetes and metabolic disorders, the studies provide insights into the interactions between chronic hepatitis C infection and type 2 diabetes, highlighting mechanisms of insulin resistance and glycaemic control challenges. Age-related cardiovascular complications in diabetics are analysed, highlighting the increased risks and necessary preventive strategies in elderly patients. Machine learning-based predictive modelling is applied to diabetes risk, validating the significance of BMI and HbA1c as predictors, thus underscoring the importance of precise and early interventions. Additionally, post-transplantation diabetes mellitus in kidney transplant recipients and continuous glucose monitoring studies reveal novel risk factors and early markers of disease progression, illustrating the need for targeted clinical management and personalised patient care strategies.

The autoimmune and inflammatory conditions cluster highlights advancements in the understanding of complex autoimmune pathologies and their diagnostic profiles. Studies investigate associations between autoantibodies, interstitial lung disease, systemic sclerosis, and systemic lupus erythematosus, emphasising the diagnostic utility of antibody profiles combined with imaging and capillaroscopy data. Furthermore, research on autoimmune liver diseases highlights the high prevalence and significance of concurrent extrahepatic autoimmune diseases and underscores the need for comprehensive diagnostic and treatment protocols in clinical practice.

In cardiovascular medicine, several abstracts present sophisticated prediction models for atrial fibrillation utilising clinical medication data, thereby advancing patient risk stratification and preventive care. Additional contributions focus on heart failure patient profiling, exploring the clinical, biochemical, and echocardiographic characteristics essential for precise clinical assessment. Metabolic and hormonal disorders such as acromegaly are also evaluated, focusing on treatment effectiveness and metabolic comorbidities, further enhancing the understanding of disease management and patient prognosis.

Gastrointestinal and kidney disease management studies address clinical challenges and therapeutic outcomes. Investigations on gastroesophageal reflux disease provide insights into age-related clinical presentations, enhancing patient-specific diagnostic approaches. Additionally, studies on colorectal polyps emphasise early detection through improved screening methods, while research on malnutrition prevalence in dialysis patients stresses the importance of nutritional management to reduce adverse health outcomes. The significant impact of haemodialysis on patient employment and quality of life highlights the broader socioeconomic implications of chronic kidney disease treatment.

Finally, research in infectious diseases examines critical care quality indicators, notably in managing *Staphylococcus* aureus bacteraemia, assessing adherence to treatment protocols, and evaluating patient outcomes. Antimicrobial stewardship initiatives through regular ward rounds demonstrate measurable improvements in antibiotic use and clinical outcomes, reinforcing the importance of multidisciplinary and educational approaches in healthcare practice.

Collectively, these abstracts illustrate the complex research activities that have implications for improving clinical outcomes, promoting innovative diagnostic techniques, and advancing patient-centred care across the disciplines of internal and cardiovascular medicine.

Ilmārs Stonāns

PREDICTING ATRIAL FIBRILLATION USING MEDICATION DATA: COMPARING LOGISTIC REGRESSION, NEURAL NETWORKS, AND DECISION TREE MODELS

Meļkovs, Aleksejs[1], Erts, Renārs[1], Guiska, Nataļja[1], Andrejeva, Jekaterina[1], Seimane, Sandra[2]

[1] Faculty of Medicine and Life Sciences, University of Latvia, Rīga, LATVIA; medal@inbox.lv

[2] Rīga East University Hospital, Rīga, LATVIA

Background. Atrial fibrillation (AF) is a common arrhythmia associated with increased morbidity and mortality. Predicting AF early can improve clinical decision-making and outcomes. Machine learning (ML) models — logistic regression (LR), neural networks (NN), and decision trees (DT) — offer potential for AF prediction from medication data. Integrating these models into practice requires evaluating performance, interpretability, and implementation challenges. By incorporating medications typically prescribed for other cardiovascular conditions, the model indirectly reflects underlying risk factors, reducing reverse causality. Such tools are intended to complement, not replace, diagnostic methods like ECG.

Aim. To assess and compare LR, NN, and DT models in predicting AF using medication data.

Methods. The dataset, which included 23 medication variables, was split into 70% for training and 30% for testing. LR was used as baseline; variable importance assessed via odds ratios (OR). A NN with one hidden layer (50 neurons, ReLU activation) and a simplified DT (max depth 10, min samples per leaf 10) were developed. Models evaluated using ROC AUC, F1-score, accuracy.

Results. Anonymised data of 520 patients (M = 64.2 years, SD 10.23, 63.1% female). The LR model performed the best (ROC AUC 0.91, accuracy 82.7%, F1-score 82.7%). Key predictors were aspirin (OR = 2.54), P2Y12 antagonists OR = 2.34), and statins (OR = 1.87). NN achieved comparable performance (ROC AUC 0.90, accuracy 82.1%, F1-score 82.0%), confirming similar predictors. Simplified DT provided interpretability with ROC AUC 0.87, accuracy and F1-score at 82.1% (key predictors were aspirin, anticoagulants, statins).

Conclusion. LR is the most effective and easily interpretable model for predicting AF using medication data; NN matched its predictive strength and confirmed key variables. Simplified DT balanced interpretability and accuracy, valuable for clinical support. Integration challenges include model interpretability, clinician acceptance, and system compatibility. Enhancing transparency via explainable AI, training clinicians on ML tools, and collaborating with IT consultants for EHR integration are key strategies to overcome these challenges. Incorporated as an adjunctive tool, these models may facilitate earlier AF suspicion in both in-person and remote settings, ultimately improving patient care.

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EVALUATION OF ANTIBIOTIC EFFECTIVENESS IN CLINICAL LISTERIA MONOCYTOGENES ISOLATES

Misevič, Adam[1], Schneider, Lilian Jenny Babette[2], Slavinska, Anželika[3], Kirkliauskienė, Agnė[4], Kuisienė, Nomeda[3]

[1] Faculty of Medicine, Vilnius University, Vilnius, LITHUANIA; adam.misevic@mf.stud.vu.lt

[2] Vilnius University, Vilnius, LITHUANIA

[3] Life Sciences Centre, Institute of Biosciences, Vilnius University, Vilnius, LITHUANIA

[4] Department of Physiology, Biochemistry, Microbiology, and Laboratory Medicine, Institute of Biomedical Sciences, Faculty of Medicine, Vilnius University, Vilnius, LITHUANIA

Background. *Listeria monocytogenes* is a widely distributed in the environment bacterium, including soil, water, vegetation, animals, and humans. This pathogen is responsible for listeriosis, it usually is foodborne and associated with consumption of contaminated food, such as meat, milk and products of bacteria carrying animals without sufficient thermal preparation. It is also possible to get infected from raw vegetables and water. Due to pathogens ability to survive and grow at refrigeration temperature (4 °C) and in the presence of salt, it poses a huge public health risk, as concentration of the bacteria in contaminated food is usually high. Listeriosis is a relatively rare disease, but the high mortality rates cause concern. In healthy individuals listeriosis manifests as mild gastroenteritis, but in high-risk populations, such as pregnant women, newborns, elderly and immunosuppressed patients, it can lead to severe out-

comes, including septicaemia, meningitis and in utero death. Considering the potential severity of this infection, effective antimicrobial treatment is essential. The usual choice of treatment for *L. monocytogenes* is penicillin or ampicillin, commonly combined with gentamicin. While *L. monocytogenes* remains susceptible to these drugs, constant monitoring is necessary to guarantee the effectiveness of current treatment tactics, and to notice emerging resistance trends.

Aim. This study aims to determine if *L. monocytogenes* is susceptible to commonly used antibiotics in clinical practice.

Methods. A total of 69 *L. monocytogenes* isolates were obtained from clinical samples. The isolates were cultured on brain heart infusion agar, incubated at 37 °C for 24 hours. The susceptibility of *L. monocytogenes* isolates to selected antibiotics (penicillin, ampicillin, meropenem, erythromycin) were determined using the Bruker MICRONAUT-S system containing serial dilutions of antibiotics commonly used for *L. monocytogenes* treatment. Testing was performed following manufacturer's instructions. Bacterial suspensions were made using MICRONAUT-H medium, adjusted to McFarland standard 0.5, inoculated into MICRONAUT-S plates. The plates were incubated at 37 °C for 18–20 hours, MIC values were determined based on bacterial growth inhibition and compared to established clinical breakpoints from EUCAST version 15.0 guidelines.

Results. All isolates (n = 69) demonstrated susceptibility to each of four antibiotics. The MIC values for the isolates were consistently below established breakpoints as defined by EUCAST guidelines. No isolates (n = 0) exhibited resistance to any of the tested antibiotics.

Conclusion. These results suggest that, within the tested sample set, *L. monocytogenes* maintain a high level of susceptibility to the antibiotics commonly used during treatment.

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IMPACT OF HAEMODIALYSIS ON PATIENTS' WORK ABILITY

Panfilovs, Artjoms[1], Popova, Anna[2], Motivāne, Maija[2], Vasiļvolfa, Aiga[1,3], Erts, Renārs[1]

[1] Faculty of Medicine and Life Sciences, University of Latvia, Rīga, LATVIA; artem432@inbox.lv

[2] Department of Internal Diseases, Pauls Stradiņš Clinical University Hospital, Rīga Stradiņš University, Rīga, LATVIA

[3] Pauls Stradiņš Clinical University Hospital, Rīga, LATVIA

Background. Chronic kidney disease (CKD) is a prevalent condition worldwide, affecting approximately 10% of the global population. As CKD progresses to its terminal stage, dialysis becomes necessary to perform organism vital function of filtering blood. While life-saving, dialysis can significantly impact an individual's daily life, particularly their ability to work. This issue is of paramount importance, as employment is a crucial aspect of personal identity and well-being.

Aim. The primary objective of this study was to examine the impact of haemodialysis on individuals' work abilities.

Methods. Patients with end-stage kidney disease (ESKD) undergoing haemodialysis (HD) procedures at Pauls Stradiņš Clinical University Hospital Nephrology Centre were enrolled in the study. An anonymous survey was conducted among these patients. Patients were asked to assess their work ability before and after the initiation of dialysis procedures using a subjective scale (0–10). Additionally, they were requested to describe their employment status before and after starting dialysis. Statistical analysis was performed using SPSS Statistic 29.0, with a p-value of less than 0.05 considered indicative of statistical significance.

Results. A total of 41 patients participated in the study with undergoing haemodialysis (HD) procedures. There were 26 men (63%) and 15 women (37%). The mean age of participants was M = 59.7; SD = 13.6 years, with a median age of 61 years, minimal age of 22 years, maximal age of 82 years.

The first parameter assessed was the Working Ability (WA) scale. The mean WA score before initiating dialysis was 7.7 (SD = 1.8), which decreased to 5.4 (SD = 2.3) after the commencement of dialysis. A paired sample t-test revealed a statistically significant decline in WA scores (95% CI 1.22–3.37) before and after dialysis in HD group ($p < 0.001$).

The second parameter evaluated was working status. Before dialysis 27 (66%) participants worked, 14 (34%) did not work; after the commencement of dialysis 17 (41.5%) indicated they continue work, 24 (58.5%) didn't work. The McNemar test indicated a statistically significant difference in working status before and after the initiation of dialysis ($p < 0.05$).

Conclusion. The study's findings indicate a significant decline in self-reported work ability and employment status among patients after initiating dialysis treatment.