Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
Poster No.：C0123
Abstract Submission No.：APCN20250082

Predicting New-Onset Chronic Kidney Disease in Older Adults Based on Lifestyle and Behavior Using Artificial Intelligence

Da Woon Kim[1]; Yejin Kim[2]; Whanhee Lee[3]; Hyo Jin Kim[4]

[1] Department of Internal Medicine and biomedical research institute, Pusan National University Hospital, Busan, Korea

[2] Department of Information Convergence Engineering, Pusan National University, Yangsan, South Korea

[3] School of Biomedical Convergence Engineering, Pusan National University, Yangsan, South Korea

[4] Department of Internal Medicine, Korea University Guro Hospital, Seoul, South Korea

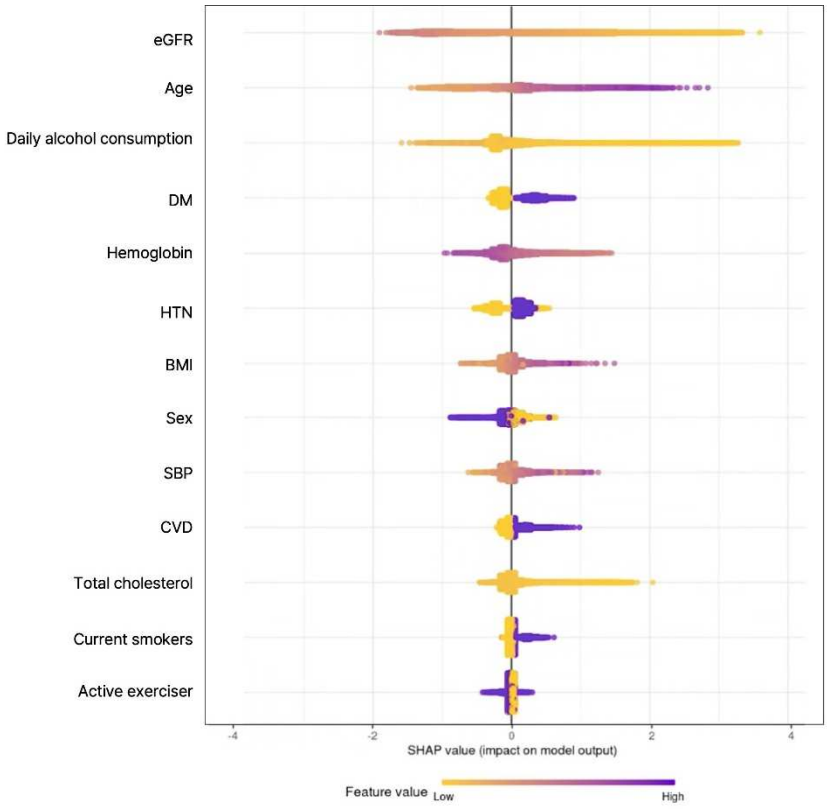
Introduction: Chronic kidney disease (CKD) is an escalating public health concern, particularly among older adults. Although lifestyle behaviors such as smoking, alcohol consumption, and physical activity have been individually linked to CKD, their combined effects and predictive value using artificial intelligence (AI) remain insufficiently studied. This study explores how these behaviors relate to CKD onset and evaluates machine learning models for risk prediction.

Methods: Data were drawn from two large-scale Korean cohorts: NHIS-Senior (primary cohort) and NHIS-HEALS (validation cohort). Individuals aged 60 years or older without prior CKD were included (N=382,337). Baseline data (2015–2019) included lifestyle factors (current smoking status (Yes/No), average daily alcohol consumption (g/day), and physical activity level (active exerciser or not) and clinical covariates. CKD development was defined by estimated glomerular filtration rate (eGFR) <60 mL/min/1.73m² or ICD-10 code N18 diagnosis. Logistic regression and machine learning models—Logistic Regression, Random Forest, XGBoost, and LightGBM—were used for both association and prediction analyses. SHAP (SHapley Additive exPlanations) values were computed to interpret model outputs.

Results: Current smoking was significantly associated with increased CKD risk (OR: 1.353, 95% CI: 1.283–1.427, $p < 0.001$), while active physical activity had a modest protective effect (OR: 0.943, 95 % CI: 0.906–0.981, $p = 0.004$). Alcohol consumption did not show a significant relationship with CKD incidence. Stratified analysis revealed that the adverse effect of current smoking on CKD risk was stronger in inactive exercisers (OR: 1.360, 95% CI: 1.281–1.444, $p <0.001$) than in active exercisers (OR: 1.312, 95% CI: 1.176–1.485, $p <0.001$). Active exercise significantly reduced CKD risk among non-smokers (OR: 0.949, 95% CI: 0.91–0.990, $p = 0.015$) but showed only marginal benefit in current smokers (OR: 0.901, 95% CI: 0.802–1.013, $p = 0.080$). Among the models tested, LightGBM demonstrated the highest predictive performance (accuracy: 0.795; area under the curve: 0.805). No significant associations were found for alcohol consumption across subgroups. SHAP analysis identified baseline eGFR, age, and comorbidities such as diabetes, hypertension, and cardiovascular disease as the top predictors. Lifestyle behaviors, although less influential, also played a notable role in prediction (Figure 1). These patterns were consistent in the validation cohort, though with weaker statistical significance.

Conclusion: Lifestyle factors, particularly smoking and physical activity, significantly impact CKD risk in the elderly. Machine learning models, especially LightGBM, offer accurate and interpretable predictions, suggesting their potential utility in early detection and personalized prevention strategies for CKD.

Keywords：Chronic Kidney Disease, Older Adults, Lifestyle, Smoking, Exercise, Alcohol, Machine Learning


eGFR
Age
Daily alcohol consumption
DM
Hemoglobin
HTN
BMI
Sex
SBP
CVD
Total cholesterol
Current smokers
Active exerciser
-4
-2
0
2
4
SHAP value (impact on model output)
Feature value
Low
High

Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
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The efficiency of community group health education on kidney health awareness

CHANG, HSIAO-LING[1]; CHENG,MEI-CHI[1]; PAN,YOMG-AN[1]; TSAI,YI-CHUN[1,2]

[1] Kaohsiung Municipal Cijin Hospital

[2] Kaohsiung Medical University

Abstract

Background: Chronic kidney disease (CKD) is a global public health concern. Taiwan has the highest prevalence of end stage of kidney disease (ESKD) worldwide. However, the disease awareness is relatively low, further leading to poor efficiency of CKD care in ameliorating rapid kidney progression. The aim of this study is to investigate the effect of group health education on disease knowledge, health literacy and behavior of kidney disease in the community.

Methods: Participants who joined regular activities that prevent and delay disability in Cijin community were enrolled. The structured questionnaires of disease knowledge, self-care behavior, and health literacy were tested before and after group health education. The contents of systemic health education consisted of disease knowledge and behavior of kidney disease.

Results: Of 96 participants who completed three the structured questionnaires before and after group health education, the mean age of 76.9 years, and 21 % was male. The means of disease knowledge, self-care behavior, and health literacy were 16.4 ± 5.5, 45.2 ± 7.2, and 51.2 ± 11.1 before group health education, and 21.0 ± 7.8, 50.9 ± 6.8, 57.2 ± 8.9 after group health education. The significant increases in kidney disease knowledge, self-care behavior, and health literacy were found before and after group health education (p-value < 0.001).

Conclusions: Our findings indicated that systemic health education could improve kidney health awareness including disease knowledge, and health behavior and literacy in the community. We provide feasible model of group health education in kidney health.

Keywords：health education

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The awareness of healthy diet among the elderly in the community

Si-Yi Li[1]; Yi-Ting Chang[1]; Meng-Chuan Huang[2]; Yi-Chun Tsai[1,2]
[1] Taiwan Kaohsiung Municipal Cijin Hospital
[2] Taiwan Kaohsiung Medical University Chung-Ho Memorial

Abstract
Background: The National Nutrition and Health Status Change Survey Report (2017-2020) revealed that the elderly over 65 years-old generally have an unbalanced diet. The aim of the study is to evaluate the awareness of healthy diet among the elderly in the community of Cijin district in Kaohsiung city in Taiwan.
Methods: This study enrolled the elderly (age of 65 years-old or above) in seven community bases in Cijin from February to May 2025. The nutrition questionnaires from the National Health Administration of the Ministry of Health and Welfarehave10questions that includedthe concept of healthy meal combination, the proportions of fruit and vegetable intake, the recommended intake amounts of beans, fish, meat and eggs per meal, the importance of choosing unrefined starch, the types of food rich in dietary fiber, nutrients that help reduce muscle loss, the choice of good fats, the identification of iodized salt, the understanding of high-sodium condiments, and fruits that have the effect of softening food. Subjects who were unable to cooperate with the answers (such as dementia) or unwilling to participate were excluded.
Results: A total of 72 subjects had completed the questionnaires in this study. Only sixsubjects (8.3%) answered all the questions correctly. Among the terms of the questionnaires, 90% of subjects answered the questions of "which fruit can soften food" and "healthy meal combination" correctly. It is worth noting that the correct answer rate of "salt selection (iodized salt)" was only 50%. The correct answer rates of "good fat selection" and "high sodium condiments" was 60%.
Conclusions: The results indicated that the elderly in Cijindistrict have significant knowledge gaps in the understanding of iodized salt, the selection of good fats and the identification of high sodium condiments. The healthydiet awareness needs to be strengthened. In order to improvehealthydiet awareness,it’s necessary to develop easy-to-understand manner with pictures or actual operations to further reinforce basic concepts of nutrition education for the elderly in the Cijin community in the future.

Keywords：Community Health.Nutrition Knowledge.Nutrition Education

Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
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Abstract Submission No.：APCN20250206

Kidney Dysfunction as the Leading Risk Factor for Adverse Outcomes in Global Peripheral Arterial Disease

Heng Wang[1]; Keyi Fan[2]; Chaonan Fan[1]; Min Hu[1]; Natasha Rogers; Honglin Dong[2]; Guoping Zheng[1]

[1] Centre for Transplant and Renal Research, Westmead Institute for Medical Research, The University of Sydney, Sydney, NSW, Australia

[2] Department of Vascular Surgery, The Second Hospital of Shanxi Medical University, Taiyuan, Shanxi, China

Abstract

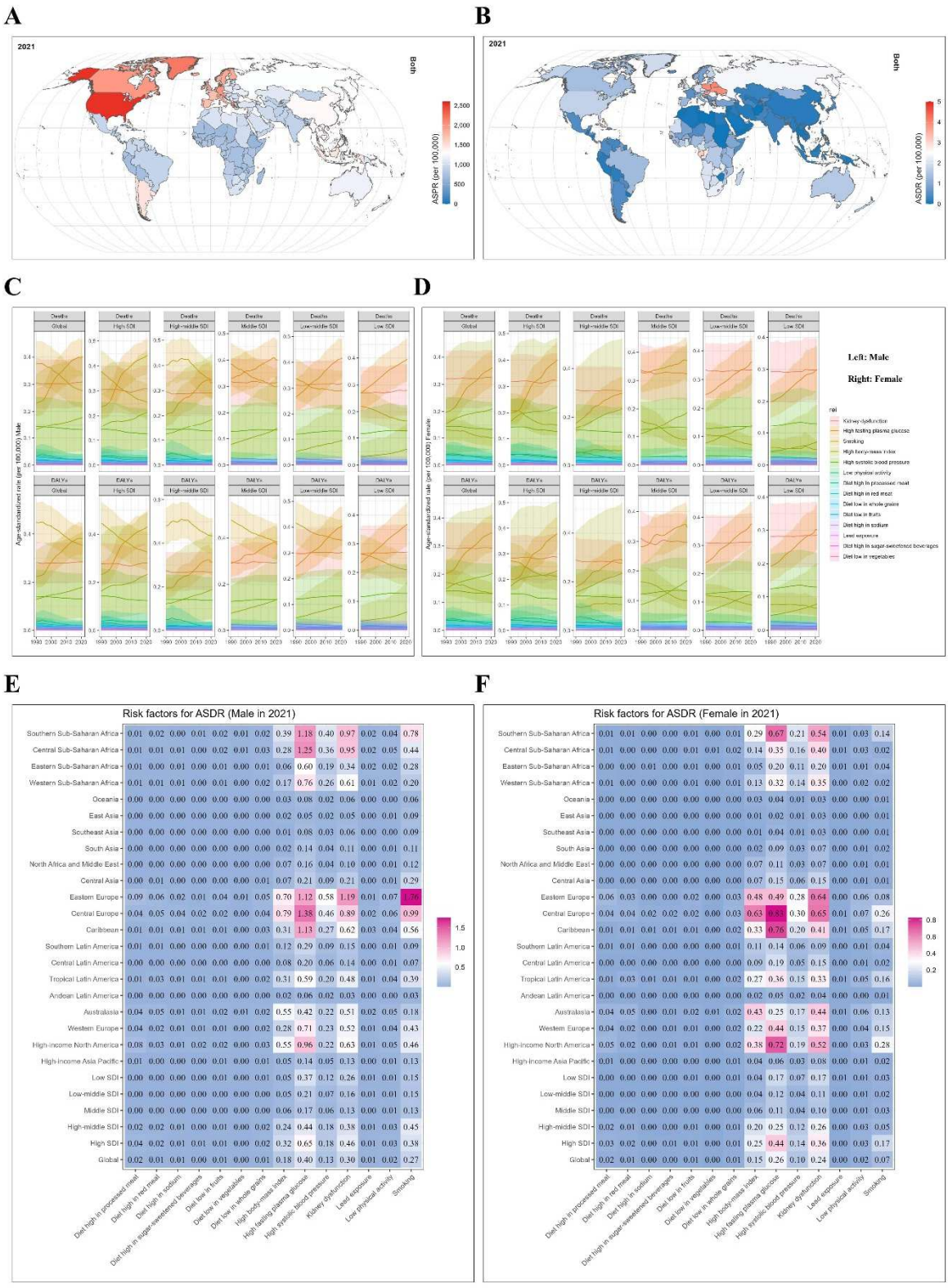
INTRODUCTION: Chronic kidney disease (CKD) is frequently comorbid with peripheral arterial disease (PAD), a condition primarily driven by vascular intimal calcification, chronic inflammation, and mineral metabolism disturbances. Renal function monitoring in patients with PAD is crucial, as it is closely linked to vascular progression and adverse outcomes.

METHODS: We obtained global data on the burden and risk factors of lower extremity peripheral arterial disease from the Global Burden of Disease (GBD) 2021 database, covering 204 countries/territories, 21 GBD regions, and 5 sociodemographic index (SDI) regions. PAD was defined according to ICD-10 codes I70.2–I70.8 and I73–I73.9. Extracted indicators included age-standardized prevalence rate (ASPR), age-standardized death rate (ASDR) per 100,000 population, disability-adjusted life years (DALYs), and population attributable fraction (PAF) for major risk factors. Uncertainty was expressed using 95% uncertainty intervals (UI). Data visualization was performed using the easyGBDR package.

RESULTS: In 2021, the global ASPR of PAD was 1326.45 (95% UI: 1153.78–1526.53), and the ASDR was 0.85 (0.75–0.93). The United States of America recorded the highest ASPR at 2549.44 (2291.39–2828.56), followed by Denmark and Greenland. Barbados had the highest ASDR at 5.45 (4.49–6.54), followed by Belarus and Poland (Figure 1A, B). Subgroup analysis of risk-attributable PAF by sex and region revealed that in 2021, the leading risk factor for PAD-related mortality globally in both men and women was high fasting plasma glucose, followed by kidney dysfunction, smoking, and high body-mass index (Figure 1C, D). Notably, in high-middle and low SDI regions, kidney dysfunction was the top mortality risk factor for female PAD patients. From 1990 to 2021, the PAF of kidney dysfunction remained persistently high, whereas other risk factors showed greater variability. In 2021, Eastern Europe had the highest ASDR attributable to kidney dysfunction among men (1.19), far exceeding the global average of 0.30 (Figure 1E). Among women, Central Europe recorded the highest ASDR from kidney dysfunction (0.65), compared to the global average of 0.24 (Figure 1F). Notably, high SDI regions showed consistently elevated ASDR attributable to kidney dysfunction in both sexes.

CONCLUSION: This study highlights regional and sex-specific disparities in the global burden and mortality risks of PAD. Mortality attributable to kidney dysfunction remains high and underaddressed, particularly among women and in high SDI regions. These findings emphasize the critical need for renal function assessment and targeted prevention strategies in PAD management.

Keywords：peripheral arterial disease, kidney dysfunction, global burden of disease


A
2021
Both
ASPR (per 100,000)
2,500
2,000
1,500
1,000
500
0
B
2021
Both
ASDR (per 100,000)
5
4
3
2
1
0
C
Deaths
Global
High SDI
High-middle SDI
Middle SDI
Low-middle SDI
Low SDI
DALYs
Age-standardized rate (per 100,000) Male
D
Left: Male
Right: Female
Age-standardized rate (per 100,000) Female
rei
Kidney dysfunction
High fasting plasma glucose
Smoking
High body-mass index
High systolic blood pressure
Low physical activity
Diet high in processed meat
Diet high in red meat
Diet low in whole grains
Diet low in fruits
Diet high in sodium
Lead exposure
Diet high in sugar-sweetened beverages
Diet low in vegetables
E
Risk factors for ASDR (Male in 2021)
Southern Sub-Saharan Africa 0.01 0.02 0.00 0.01 0.02 0.01 0.02 0.39 1.18 0.40 0.97 0.02 0.04 0.78
Central Sub-Saharan Africa 0.01 0.01 0.01 0.00 0.02 0.01 0.03 0.28 1.25 0.36 0.95 0.02 0.05 0.44
Eastern Sub-Saharan Africa 0.01 0.00 0.01 0.00 0.01 0.00 0.01 0.06 0.60 0.19 0.34 0.02 0.02 0.28
Western Sub-Saharan Africa 0.01 0.01 0.01 0.00 0.01 0.00 0.02 0.17 0.76 0.26 0.61 0.01 0.02 0.20
Oceania 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.03 0.08 0.02 0.06 0.00 0.00 0.06
East Asia 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.02 0.05 0.02 0.05 0.00 0.01 0.09
Southeast Asia 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.01 0.08 0.03 0.06 0.00 0.00 0.09
South Asia 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.02 0.14 0.04 0.11 0.00 0.01 0.11
North Africa and Middle East 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.07 0.16 0.04 0.10 0.00 0.01 0.12
Central Asia 0.00 0.01 0.00 0.00 0.00 0.00 0.01 0.07 0.21 0.09 0.21 0.00 0.01 0.29
Eastern Europe 0.09 0.06 0.02 0.01 0.04 0.01 0.05 0.70 1.12 0.58 1.19 0.01 0.07 1.76
Central Europe 0.04 0.05 0.04 0.02 0.02 0.00 0.04 0.79 1.38 0.46 0.89 0.02 0.06 0.99
Caribbean 0.01 0.01 0.01 0.01 0.01 0.00 0.03 0.31 1.13 0.27 0.62 0.03 0.04 0.56
Southern Latin America 0.01 0.01 0.00 0.00 0.00 0.00 0.01 0.12 0.29 0.09 0.15 0.00 0.01 0.09
Central Latin America 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.08 0.20 0.06 0.14 0.00 0.01 0.07
Tropical Latin America 0.01 0.03 0.01 0.01 0.01 0.00 0.02 0.31 0.59 0.20 0.48 0.01 0.04 0.39
Andean Latin America 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.02 0.06 0.02 0.03 0.00 0.00 0.03
Australasia 0.04 0.05 0.01 0.01 0.02 0.01 0.02 0.55 0.42 0.22 0.51 0.02 0.05 0.18
Western Europe 0.04 0.02 0.01 0.01 0.01 0.00 0.02 0.28 0.71 0.23 0.52 0.01 0.04 0.43
High-income North America 0.08 0.03 0.01 0.02 0.02 0.00 0.03 0.55 0.96 0.22 0.63 0.01 0.05 0.46
High-income Asia Pacific 0.01 0.00 0.00 0.00 0.01 0.00 0.01 0.05 0.14 0.05 0.13 0.00 0.01 0.13
Low SDI 0.00 0.00 0.00 0.00 0.01 0.00 0.01 0.05 0.37 0.12 0.26 0.01 0.01 0.15
Low-middle SDI 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.05 0.21 0.07 0.16 0.01 0.01 0.15
Middle SDI 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.06 0.17 0.06 0.13 0.00 0.01 0.13
High-middle SDI 0.02 0.02 0.01 0.00 0.01 0.00 0.02 0.24 0.44 0.18 0.38 0.01 0.03 0.45
High SDI 0.04 0.02 0.01 0.01 0.01 0.00 0.02 0.32 0.65 0.18 0.46 0.01 0.03 0.38
Global 0.02 0.01 0.01 0.00 0.01 0.00 0.01 0.18 0.40 0.13 0.30 0.01 0.02 0.27
1.5
1.0
0.5
Diet high in processed meat
Diet high in red meat
Diet high in sodium
Diet high in sugar-sweetened beverages
Diet low in fruits
Diet low in vegetables
Diet low in whole grains
High body-mass index
High fasting plasma glucose
High systolic blood pressure
Kidney dysfunction
Lead exposure
Low physical activity
Smoking
F
Risk factors for ASDR (Female in 2021)
Southern Sub-Saharan Africa 0.01 0.01 0.00 0.00 0.01 0.00 0.01 0.29 0.67 0.21 0.54 0.01 0.03 0.14
Central Sub-Saharan Africa 0.01 0.00 0.00 0.00 0.01 0.01 0.02 0.14 0.35 0.16 0.40 0.01 0.03 0.02
Eastern Sub-Saharan Africa 0.00 0.00 0.01 0.00 0.01 0.00 0.01 0.05 0.20 0.11 0.20 0.01 0.01 0.04
Western Sub-Saharan Africa 0.01 0.00 0.00 0.00 0.01 0.00 0.01 0.13 0.32 0.14 0.35 0.00 0.02 0.02
Oceania 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.03 0.04 0.01 0.03 0.00 0.00 0.01
East Asia 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.01 0.02 0.01 0.03 0.00 0.00 0.01
Southeast Asia 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.01 0.04 0.01 0.03 0.00 0.00 0.01
South Asia 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.02 0.09 0.03 0.07 0.00 0.01 0.02
North Africa and Middle East 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.07 0.11 0.03 0.07 0.00 0.01 0.01
Central Asia 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.07 0.15 0.06 0.15 0.00 0.01 0.01
Eastern Europe 0.06 0.03 0.00 0.00 0.02 0.00 0.03 0.48 0.49 0.28 0.64 0.00 0.06 0.08
Central Europe 0.04 0.04 0.02 0.02 0.02 0.00 0.03 0.63 0.83 0.30 0.65 0.01 0.07 0.26
Caribbean 0.01 0.01 0.01 0.01 0.01 0.00 0.02 0.33 0.76 0.20 0.41 0.01 0.05 0.17
Southern Latin America 0.01 0.01 0.00 0.00 0.00 0.00 0.01 0.11 0.14 0.06 0.09 0.00 0.01 0.04
Central Latin America 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.09 0.19 0.05 0.15 0.00 0.01 0.02
Tropical Latin America 0.01 0.03 0.01 0.01 0.01 0.00 0.02 0.27 0.36 0.15 0.33 0.01 0.05 0.16
Andean Latin America 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.02 0.05 0.02 0.04 0.00 0.00 0.01
Australasia 0.04 0.05 0.00 0.01 0.02 0.01 0.02 0.43 0.25 0.17 0.44 0.01 0.06 0.13
Western Europe 0.04 0.02 0.00 0.01 0.01 0.00 0.02 0.22 0.44 0.15 0.37 0.00 0.04 0.15
High-income North America 0.05 0.02 0.00 0.01 0.01 0.00 0.02 0.38 0.72 0.19 0.52 0.00 0.03 0.28
High-income Asia Pacific 0.01 0.00 0.00 0.00 0.00 0.00 0.01 0.04 0.06 0.03 0.08 0.00 0.01 0.02
Low SDI 0.00 0.00 0.00 0.00 0.01 0.00 0.01 0.04 0.17 0.07 0.17 0.01 0.01 0.03
Low-middle SDI 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.04 0.12 0.04 0.11 0.00 0.01 0.02
Middle SDI 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.06 0.11 0.04 0.10 0.00 0.01 0.03
High-middle SDI 0.02 0.01 0.00 0.00 0.01 0.00 0.01 0.20 0.25 0.12 0.26 0.00 0.03 0.05
High SDI 0.03 0.02 0.00 0.01 0.01 0.00 0.01 0.25 0.44 0.14 0.36 0.00 0.03 0.17
Global 0.02 0.01 0.00 0.00 0.01 0.00 0.01 0.15 0.26 0.10 0.24 0.00 0.02 0.07
0.8
0.6
0.4
0.2
Diet high in processed meat
Diet high in red meat
Diet high in sodium
Diet high in sugar-sweetened beverages
Diet low in fruits
Diet low in vegetables
Diet low in whole grains
High body-mass index
High fasting plasma glucose
High systolic blood pressure
Kidney dysfunction
Lead exposure
Low physical activity
Smoking

Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
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Computer-aided Diagnosis of Low and High Fuhrman Nuclear Grades of Clear Cell Renal Cell Carcinoma with Machine Learning CT Texture Analysis

JENN-YEU WANG[1,4,5,6,7]; CHUNG-MING LO[2,3]; CHUN-CHANG CHEN[2]

[1] Division of Nephrology, Department of Medicine, Taipei City Hospital, Zhongxiao campus, Taipei City, Taiwan

[2] Graduate Institute of Biomedical Informatics, Taipei Medical University, Taipei City, Taiwan

[3] Graduate Institute of Library, Information and Archival Studies, College of Liberal Arts, National ChengChi University, Taipei City, Taiwan

[4] School of Medicine, National Yang Ming Chiao Tung University, Yangming Campus, Taipei City, Taiwan

[5] University of Taipei, Taipei City, Taiwan

[6] School of Medicine, Mackay Memorial College, New Taipei City, Taiwan

[7] School of Medicine, Fu Jen Catholic University, New Taipei City, Taiwan

Abstract

Fuhrman nuclear grading can add a piece of information to the standard care of patients with clear cell renal cell carcinoma(ccRCC). The aim of the study was to explore the accuracy of texture analysis to distinguish between high-grade and low-grade Fuhrman nuclear grades of clear cell renal cell carcinoma on computed tomography images. In a retrospective case-control design, patients with ccRCC were selected from the"The Cancer Imaging Archive" (TCIA) database. Cross-sectional computerized tomography (CT) images were contoured manually by the expert. Texture analysis was done for each lesion, and reproducibility was examined by validation. Image features regarding morphology features, gray-level histograms, gray-level co-occurrence matrix and Gabor texture features, were assessed. The most relevant features were chosen to generate predictive models using robust classifiers. Diagnostic accuracy of texture features was evaluated by validation. Support Vector Machine (SVM) classifier using 70 features demonstrated optimal area under receiver operating characteristic (AUROC) curve (0.82) statistics. When the morphology features, intensity features and the above texture features were combined in classifiers, a computer-aided diagnosis(CAD) system was generated. The developed CAD system may give suggestions of tumor grading to the urologists as an aid in decision making.

Keywords：computed tomography texture analysis, renal cell carcinoma, feature selection, morphology feature, gray-level histogram, gray-level co-occurrence texture feature, Gabor texture feature

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Clinical Application and Effectiveness of a Real-Time Augmented Intelligence System in Dialysis Care

Tai, Hsin-Ling[1,2]; Yuan-chia Chu[3]; Yang Ho[5,6]; Tz-Heng Chen[4,5]; Der-Cherng Tarng[4,5]; Shuo-Ming Ou[4,5]

[1] Department of Nursing, Taipei Veterans General Hospital, Taipei City, Taiwan

[2] Department of Business Administration,National Taiwan University of Science and Technology , Taipei City, Taiwan

[3] Department of Information Management, Taipei Veterans General Hospital, Taipei City, Taiwan

[4] Institute of Clinical Medicine, National Yang Ming Chiao Tung University, Taipei City, Taiwan

[5] Division of Nephrology, Department of Medicine, Taipei Veterans General Hospital, Taipei City, Taiwan

[6] Department of Clinical Toxicology and Occupational Medicine, Taipei Veterans General Hospital, Taipei City, Taiwan

Abstract

Introduction: Managing dialysis patients involves complex decisions, particularly in real-time monitoring, preventing cardiopulmonary complications, and optimizing anemia control. Augmented Intelligence (AI)-based clinical decision support systems (CDSS) offer substantial promise in transforming nephrology care by enabling predictive analytics and early intervention. This study evaluated the implementation and clinical impact of a real-time AI prediction system at Taipei Veterans General Hospital (TVGH), focusing on clinical decision-making accuracy and patient outcome improvements.

Methods: A retrospective observational study was conducted using a real-time AI-enhanced CDSS integrated into routine dialysis care from 2019 to 2023. The system incorporated four predictive models—congestive heart failure (CHF) prediction, dry weight adjustment, pulmonary edema detection, and renal anemia management—operating across 90 dialysis beds and approximately 7,100 patient-visits monthly. Over 110 million data points were collected continuously at millisecond intervals. Descriptive statistics and time-series trend analysis were used to evaluate clinical outcomes before and after AI implementation.

Results: Following system implementation, mortality from cardiopulmonary complications decreased from 79.3% to 32.5%. CHF incidence dropped from 5.4% to 2.92%, and the dialysis treatment withdrawal rate declined from 15.20% to 13.58%, despite fluctuations during the COVID-19 pandemic. Hemoglobin levels remained stable (10.42 to 10.37 g/dL), while erythropoietin utilization became more precise (76.26μg to 80.86 μg/person). Clinicians reported increased confidence in early identification of high-risk patients, enhanced anemia management decisions, and reduced uncertainty in treatment planning. The system achieved 100% clinical adoption and ISO 27001 information security certification, confirming its reliability and safety in real-world settings.

Conclusion: Integrating AI-driven predictive analytics into dialysis workflows significantly improves patient outcomes and empowers clinical teams with timely, actionable insights. This study demonstrates the feasibility and effectiveness of deploying augmented intelligence systems in nephrology, advocating for their broader adoption in chronic disease management across similar healthcare settings. From a nursing perspective, the system enabled real-time risk alerts and data visualization, allowing dialysis nurses to make earlier and more accurate assessments related to fluid overload, anemia, and cardiopulmonary deterioration. This enhanced situational awareness reduced nursing uncertainty during critical decision-making and allowed for more personalized

patient education and preventive interventions. Additionally, the AI dashboard supported interprofessional communication, improving coordination between nurses, physicians, and case managers. The integration of such technology reinforces the evolving role of dialysis nurses not only as caregivers but as data-informed clinical decision partners in high-acuity care settings.

Keywords：Augmented Intelligence; Dialysis; Clinical Decision Support; Artificial Intelligence; Patient Safety; Predictive Analytics; Real-Time Monitoring

Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
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Abstract Submission No.：APCN20250356

Clinical Study on Integrating ASafe: A Novel Hemostasis Device with Time Alert and Acoustic Analysis in Hemodialysis Care

LU CHARNG-LEH[1]; Mei-Ju Su[1]; JENQ-WEN HUANG[2]; Yen-Ni Hung[3]

[1] Department of Biomedical Engineering, Chung Yuan Christian University, Taiwan

[2] Department of Internal Medicine, National Taiwan University Hospital, Taiwan

[3] Taiwan Medical Intelligent Ltd, Taiwan

Abstract

Introduction

In Taiwan, over 90,000 end-stage renal disease (ESRD) patients rely on hemodialysis, with over 90% using long-term hemodialysis via arteriovenous fistulas (AVFs) or arteriovenous grafts (AV grafts) as vascular access. Vascular access is critical to both treatment quality and patient survival. However, improper post-dialysis hemostasis can lead to various complications, adversely impacting patient outcomes and increasing the burden on healthcare resources. Direct pressure requires over 10 minutes of vertical compression to stop bleeding while preserving vascular access. Tourniquets, applied at 20-30 mmHg above systolic pressure, can impede venous return and risk pseudoaneurysm formation due to parallel pressure distribution. Literature indicates that direct pressure is the preferred post-dialysis hemostasis method due to fewer complications and shorter compression times compared to tourniquets. However, it may increase clinical workload when nurse-assisted compression is needed. Related literature attributes improper hemostasis often due to inadequate technique or knowledge, poor compression practices, and ineffective tools. Improvements include education, standardized materials, and rotating puncture sites. Studies have shown that blood flow generates vibrations, particularly in stenotic areas, which produce detectable acoustic signals. These signals reflect physiological properties and may facilitate early identification of vascular access dysfunction. However, studies on device-based interventions remain limited. This study evaluates a novel wearable device, ASafe, which integrates tourniquet, time alert, and audio recording to assess its effectiveness in vascular access management for hemodialysis patients.

Methods

This study involves a randomized clinical trial conducted in collaboration with a hemodialysis clinic in northern Taiwan. A pre- and post-intervention study will be conducted to compare patients using the ASafe device and those receiving traditional hemostasis methods (such as direct pressure or tourniquet), in order to evaluate clinical effectiveness, adverse reactions, and satisfaction with the intervention. Acoustic signals from vascular access will be analyzed to develop an automated classification model for different stages of vascular access conditions.

Results

Preliminary findings and initial model development indicate that the ASafe device offers more accurate tourniquet time, fewer adverse events, and higher patient satisfaction. Superior outcomes are also expected for vascular access function with the ASafe device.

Conclusion

The use of the ASafe device may enhance vascular access management, reduce complications, and support clinical decision-making, thereby improving the quality of hemodialysis care. This study highlights the potential of smart healthcare technologies in advancing dialysis outcomes and promoting patient well-being.

Keywords：Hemodialysis, Vascular Access, Vascular Access Management

Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
Poster No.：C0130
Abstract Submission No.：APCN20250385

Innovative Application and Effectiveness Analysis of LINE Official Account in Kidney Health Promotion and Kidney Care

JIANG LI-CING[1]; Huang Chih-Ying[1]; Tsai Chun-Chieh [2]; Hsieh Yao-Peng [2]; Wu Yi-Hsiu [3]

[1] CKD education center, Changhua Christian Hospital

[2] Division of Nephrology, Changhua Christian Hospital

[3] Big data and digital promotion center,Changhua Christian Hospital

Abstract

Background and Motivation:

A 2006 study showed that approximately 1 to 1.5 out of every 10 people in Taiwan suffered from chronic kidney disease. To help the public practice kidney health care in their daily lives, Changhua Christian Hospital launched the “Ren Sheng Shen Li Zu” LINE Official Account in June 2024 through a cross-departmental team. By leveraging the most popular social platform, this initiative proactively provides accurate, timely, and easily accessible kidney health information, enhances health literacy and doctor-patient interaction, and builds an innovative digital health community.

Objective:

To establish a digital kidney health community, improve health literacy and enhance the participation and satisfaction of patients and their families.

Marketing Strategies and Methods:

This project focuses on "understanding, communication, and satisfaction" and targets high-risk groups for CKD, kidney patients, their families, and community residents with segmented marketing. Using the LINE official account as a platform, it provides diverse educational materials and integrates automatic replies with real-time customer service interaction. Marketing uses QR codes, posters, on-site invitations and social media, and personalized invitation scripts are designed. The content is concise and eye-catching, and it is posted regularly to strengthen stickiness. The effectiveness is evaluated by data such as the number of people, interaction rate and satisfaction.

Outcomes:

After one year of promotion, the number of people in the LINE group has reached 2,409, and VOOM posts have been followed by 1,376 people. The click-through rate of the picture and text menu is 57.6%, and the message opening rate is as high as 91%, with an average of 76.8%. Inquiries are divided into four categories, with a 100% response rate for live customer service and an average reply time of 1.9 days. The satisfaction rate is as high as 98.9%, and the public feedback is positive, believing that the content is practical and easy to understand, and the quality of interaction is improved, which promotes self-management and healthy behavior changes.

Future Prospects:

The team will continue to optimize the educational materials, integrate current events and needs, and strengthen the teaching of digital tools to enhance the participation and interaction of the elderly. In the future, data will continue to be collected and applied to case management and health education. A replicable innovative model will be established to demonstrate professionalism and innovation, and provide evidence and feasible solutions for the promotion of kidney health.

Keywords：LINE Official Account, health literacy, community management, innovative application, health promotion

Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
Poster No.：C0131
Abstract Submission No.：APCN20250400

Early Prediction of Chronic Kidney Disease in Diabetic Patients: A Critical Review of Artificial Intelligence and Machine Learning Models

Tarun Kumar Suvvari[1]
[1] Department of Medicine, Squad Medicine and Research (SMR), Amadalavalasa, India

Abstract
Background:
Chronic kidney disease (CKD) is a major microvascular complication of diabetes mellitus and a leading contributor to end-stage renal disease worldwide. Early prediction of CKD in diabetic patients enables timely interventions that may delay or prevent progression. In recent years, artificial intelligence (AI) and machine learning (ML) models have emerged as powerful tools to forecast disease onset and progression using electronic health records (EHRs), lab data, and demographic features. We aimed to summarize current applications of AI/ML models for early prediction of CKD in diabetic populations, highlighting commonly used algorithms, predictive performance, and limitations.
Methods:
A comprehensive search was conducted in PubMed, Scopus, Cochrane and Web of Science for studies published between 2015 and 2025 that applied AI or ML to predict CKD among diabetic patients. Eligible studies included retrospective cohort analyses, registry-based modeling, and prospective validation of risk prediction tools.
Results:
Most studies employed supervised ML models such as random forest, XGBoost, support vector machines, logistic regression, and recurrent neural networks. Predictive performance varied, with area under the receiver operating characteristic curve (AUC) ranging from 0.80 to 0.89. Key predictive features included age, HbA1c, serum creatinine, albuminuria, systolic blood pressure, and diabetes duration. Some models demonstrated the ability to forecast CKD onset 12–24 months prior to clinical diagnosis, offering significant clinical utility. However, challenges remain in model generalizability, external validation, explainability, and integration into clinical workflows.
Conclusion:
AI and ML models show strong potential in enabling early prediction of CKD among diabetic patients. While many models achieve high predictive accuracy, widespread implementation will require attention to interpretability, fairness, and real-world validation. Future research should focus on prospective deployment, low-resource setting applicability, and integration with digital health platforms.

Keywords： Chronic Kidney Disease, Artificial Intelligence, CKD, Diabetes, Machine Learning

Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
Poster No.：C0132
Abstract Submission No.：APCN20250430

From Data to Diagnosis: AIs Role in CKD Risk Stratification

Archit Goel[1]
[1] Department of Internal Medicine-Nephrology, All India Institute of Medical Sciences, India

Abstract
Introduction: Artificial Intelligence (AI) is transforming healthcare, offering new possibilities for predictive analytics and clinical decision-making. Chronic kidney disease (CKD) is a growing public health burden in India, driven by rising diabetes and hypertension rates. This study investigates the application of AI-driven natural language processing (NLP) for analyzing clinical notes from electronic health records (EHRs) to improve early detection and risk stratification of CKD. Our goal is to develop an AI model that assists nephrologists in identifying high-risk patients by extracting structured insights from unstructured clinical data.

Methods: Clinical notes were sourced from nephrology department of a tertiary care hospital , covering records up to December 31, 2024. Preprocessing included text normalization, tokenization, and feature extraction using NLP techniques. A multilabel text classification model, utilizing a convolutional neural network (CNN) within the Keras framework, was implemented to predict CKD risk. The model was trained on annotated datasets and validated against expert-labeled cases. Performance was assessed using precision, recall, and F1-score.

Results: The AI model achieved a precision of 59%, recall of 91%, and an F1-score of 72% for CKD classification. The CNN-based ensemble approach significantly enhanced prediction accuracy and risk stratification. Notably, the model successfully identified high-risk patients, demonstrating its potential for early intervention and improved clinical decision-making.

Conclusions: This AI-driven model effectively processes unstructured clinical data, generating real-time alerts for potential CKD cases and supporting early diagnosis. Its application in resource-limited settings across India could help mitigate CKD progression through timely interventions. Future research will integrate additional clinical parameters, demographic factors, and real-world patient outcomes to refine predictive accuracy and drive AI-powered public health solutions.

Keywords：AI, CKD, Data Driven Nephrology

Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
Poster No.：C0133
Abstract Submission No.：APCN20250453

Increase The Rate of Hepatitis B and C Liver Screening For Outpatient Patients With Chronic Kidney Disease

CHEN MEI CHI[1]; CHANG,HSIAO-LING[1]; Miao Yu-Ching[1]
[1] Kaohsiung Municipal Cijin Hospital

Abstract
Purpose: The screening rate of "once-in-lifetime hepatitis B and C screening service" in our hospital has increased from 50.68% to 79.89% after the guidance of the Kaohsiung Municipal Health Bureau since 2023 but it is still lower than the target value set by the Health Bureau. The National Health Insurance Administration has set the inspection rate as a hospital quality management indicator in 2024 that we have worked for finding out the problems and formulating improvement measures by analyze the indicators.
Methods:1.Improve indicators by project improvement methods: To identify the main problems by 80/20 rule.
Applying for system review to collect data, such as telephone interviews to find out the reasons why cases who meet the requirements without inspecting, revise the screening process of the hospital, analyze the current situation and draw a characteristic factor diagram.
2. Benchmark hospital learning: To collect the implementation process of "hepatitis B and C screening" of Kaohsiung Medical University Hospital and Kaohsiung Municipal Xiaogang Hospital.
3. Improvement plan: According to the reasons in the factor diagram to formulate an implementation plan including: process revision, dedicated inquiry, promotion of poster health education and gift card after inspection.
4. Set up information flow: The importance of information reminder after the implementation of the improvement plan that we have set up in cooperation with information personnel.
Results: After the implementation of the plan, 33 people were tested in the first quarter with an achievement rate of 173.7% (33/19). The second quarter planned target was 56 people. There're 57 people have been tested till the end Dec. of 2024 with an achievement rate of 101.8% (57/56) which shows that the screening rate has increased significantly.
Conclusion: In order to achieve the goal of "cooperating with the country to eliminate hepatitis C by 2025", it is recommended that adult chronic disease patients need to be screened for hepatitis C at least once in their lifetime. Therefore, it can not only find potential hepatitis B and C patients in chronic kidney disease patients but also remind patients to be tested, care for patients, enhance the doctor-patient relationship and achieve the goal of holistic care by the case is carried out.

Keywords：Chronic Kidney Disease、B And C Liver Screening

Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
Poster No.：C0134
Abstract Submission No.：APCN20250456

Application of Visual Dashboards (Power BI) in Dialysis Quality Indicators

LI-CHING CHEN[1]; Hui-Yi Wang[1]; Ya-Ju Yu[2]; Cheng-Lun Yang[1]

[1] Division of Hemodialysis , Department of Nursing, Changhua Christian Hospital , Changhua City, Taiwan

[2] Division of Medical Planning , Department of System Operation, Changhua Christian Hospital , Changhua City, Taiwan

Abstract

Background:

Power BI, developed by Microsoft, is a business intelligence tool capable of integrating multiple data sources and generating interactive visual dashboards. According to the Taiwan Society of Nephrology and the Joint Commission of Taiwan's healthcare quality indicators, 16 quality indicators need to be monitored, including URR, albumin, Hb, iPTH, calcium, phosphorus, and others. In our hospital, the average monthly outpatient dialysis patient volume is approximately 325, resulting in at least 1,300 Excel records that require manual processing each month, typically taking one full working day (6–8 hours) to complete. With the advent of the information age, there is a need to leverage digital tools to transform existing workflows into cloud-based systems, thereby reducing manual workload, improving work efficiency, and enhancing patient care quality.

Methods:

In November 2023, the dialysis unit convened a cross-functional team meeting, forming a project group that included medical planning managers and IT specialists. The team refined data sources and module designs for the unit’s quality indicators and attempted to integrate various in-hospital systems, including the laboratory system, dialysis operation system, and admission/discharge system within the Changhua Christian Hospital HIS. By May 2024, data from these disparate sources were successfully loaded into the hospital’s data warehouse. The database output was subsequently cross-validated with manually generated reports, achieving a matching rate of over 90%. The finalized visual dashboard was officially launched on the Changhua Christian Hospital Smart Cloud Platform in October.

Results:

Following the implementation of the new modules, improvements were analyzed from January 2025 to May 2025:

1.Improved efficiency: Manual processing of Excel reports previously required 6–8 hours; with Power BI’s automated data collection and analysis, processing time was reduced to 2 hours, resulting in a 70% improvement in work efficiency.

2.Rapid issue identification: The visual dashboards enable quick identification of abnormalities or trends in quality indicators, allowing for prompt, targeted interventions to address underlying causes.

3.Enhanced communication among healthcare staff: The real-time accessibility of indicator achievement rates on the Smart Cloud Platform facilitates communication and collaboration between medical and nursing staff, promoting joint problem-solving.

Conclusions:

Power BI is a valuable tool that enables the rapid transformation of flat data into interactive dashboards, significantly reducing manpower and time costs. Through visual analytics and trend charts, it supports clinical decision-making, early problem detection, and timely interventions, ultimately improving the quality of patient care.

Keywords：Visual Dashboard/Power BI/Healthcare Quality Indicators

Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
Poster No.：C0135
Abstract Submission No.：APCN20250512

Enhancing Holistic Healthcare Through Smart Technology： An Exploratory Study

Chen chin-jung[1]; Shu-Kuan Kuo[1]; Yueh-Ting Lee[1]; Shang-Chin Liao[1]; Chien-Te Lee[1]
[1] 台灣高雄市立鳳山醫院腎臟血液透析室

Abstract
Purpose：
Taiwan's aging population faces significant challenges from chronic diseases like chronic kidney disese. Hemodialysis, a vital treatment, often creates communication hurdles for patients and staff due to its demanding nature. This study explored how a smart medical electronic whiteboard in a hemodialysis unit could enhance care quality and promote holistic patient well-being.
Methods：
A customized smart whiteboard, developed with the hospital's IT department, became a central hub for real-time information. Located in the patient waiting area and managed from the nursing station, it displayed staff schedules, physician availability, safety procedures, educational videos, and public announcements. This system aimed to boost transparency, communication, and patient education, even broadcasting updates on epidemic prevention and anti-fraud awareness to create a more informed patient community.
Results：
The smart whiteboard significantly improved several aspects of healthcare, fostering a more holistic environment:
(1) Empowered Staff and Patient-Centered Care: Staff satisfaction surged from 66% to 94% due to clearer scheduling and task assignments. Reduced administrative work freed up time for more empathetic, patient-centered interactions, supporting a holistic care model.
(2) Patient Education and Engagement: Consistent educational videos boosted patients' acceptance of health information, leading to a jump in self-care ability from 65% to 88.2%. Patient satisfaction also soared from 60% to 97.3%, with 87% finding scheduling changes easier to understand, reducing inquiries. This fostered greater patient autonomy—a core tenet of holistic health.
(3) Sustainable Healthcare: The whiteboard dramatically cut paper use (from 87% to 62.1%), promoting sustainable and green dialysis practices that benefit both individuals and the environment.
Conclusion：
Smart electronic whiteboards show great promise in improving efficiency, clarity, and patient engagement in dialysis care. In an aging society with healthcare personnel shortages, these solutions efficiently connect information and optimize workflows. This study highlights how technology can support a holistic approach to healthcare, empowering both providers and patients while fostering sustainable practices. Future efforts should expand this technology to other chronic disease areas and integrate AI-driven personalized education for precision health management.

Keywords：Smart Medical Electronic Whiteboard, Hemodialysis, Holistic healthcare

Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
Poster No.：C0136
Abstract Submission No.：APCN20250526

Development of an AI Predictive Model for Recurrent Urinary Tract Infection Prediction

WEI-HUNG LIN[1,2]; Ming-Cheng Wang[2]; Yi-En Ku[3]; Theovin Lautan[3]; Ching-Hao Teng[4]; Shuen-Lin Jeng[3]

[1] Department of Internal Medicine, National Cheng Kung University Hospital, College of Medicine

[2] Division of Nephrology, National Cheng Kung University Hospital, College of Medicine

[3] Department of Statistics and Institute of Data Science, College of Management

[4] Institute of Molecular Medicine, College of Medicine; National Cheng Kung University, Tainan, Taiwan

Abstract

Recurrent urinary tract infection (RUTI) can damage renal function and has impact on healthcare costs and patients' quality of life. This study aimed to explore advanced AI ensemble learning models such as random forest and Xgboost in RUTI prediction.

This is a single-center retrospective cohort study. The study enrolled patients aged 20 years or above who presented with symptoms of UTI in emergency department (ED) or outpatient clinics between August 2009 and December 2021. A total of 1,555 patients were included (UTI: 1,269; RUTI: 287). RUTI was defined as: patients had 2 or more infections in 6 months or 3 or more in 12 months during the study period. The dataset included diverse patient characteristics, comorbidities, UTI-related history, laboratory data, and hospitalization details for analysis. Two probability-threshold-adjusted AI models, random forest and Xgboost, were used to develop the RUTI prediction model. Estimates of sensitivity, specificity, and accuracy were calculated based on the average from 5-fold cross-validation. Using a probability threshold of 0.10 on the full dataset with 286 RUTI cases and 1,269 UTI cases, the prediction accuracy was only 0.67. After adjusting the probability threshold to 0.07, the model's sensitivity improved to 0.81, and specificity was 0.51. For a subgroup of patients aged ≤ 65 years with 0 days of hospitalization (RUTI = 49, UTI = 370), using a probability threshold of 0.03 yielded a prediction accuracy of 0.67. After further adjustment of the probability threshold to 0.008, the model's sensitivity increased to 0.86, with specificity remaining at 0.53. This study provides probability-threshold-adjusted AI Models for prediction of development of RUTI caused by E. coli and K. pneumoniae. The models will be further optimized to increase the prediction accuracy.

Keywords：Keywords: artificial intelligence, recurrent urinary tract infection, machine learning, random forest, Xgboost

Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
Poster No.：C0137
Abstract Submission No.：APCN20250584

Improving the Reverse Osmosis Water Outlet for Hemodialysis in the Intensive Care Unit: A Quality Improvement Project

Chen Chen Wei[1]

[1] Hemodialysis Unit, Department of Nephrology, National Cheng Kung University Hospital, Taiwan

Abstract

Background: Hemodialysis in ICUs is often challenged by space limitations and the presence of life-support equipment. In June 2025, an incident occurred where excessive pulling during connection led to a ball valve break, causing RO water line contamination and service suspension.

Methods: A root cause analysis was conducted focusing on workspace design, tubing flexibility, and human factors. A cross-departmental team involving engineering, dialysis, ICU, and infection control was established to address these issues.

Results: Improvements included repositioning the RO outlet, using flexible extension hoses, replacing with Japanese-standard ball valves (Clean PVC), establishing a standard operating procedure (SOP), and providing regular staff training and simulations. These measures significantly reduced mechanical failure risks and ensured uninterrupted water supply.

Conclusion: This case highlights the importance of integrating ergonomic principles and clinical realities into equipment layout. A systematic, interdisciplinary approach proved effective in enhancing safety and continuity of dialysis care in ICU settings.

Keywords： Reverse osmosis, ICU, Hemodialysis, Equipment safety, Human factors engineering

Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
Poster No.：C0138
Abstract Submission No.：APCN20250587

Implementation of an Automated Alert System to Prevent Hemodialysis Catheter Dislodgement: A Quality Improvement Initiative

Chen Chen Wei[1]

[1] Division of Hemodialysis, Department of Nephrology, National Cheng Kung University Hospital, College of Medicine, National Cheng Kung University, Tainan, Taiwan

Abstract

Background: In isolation wards, hemodialysis poses a high risk of catheter dislodgement due to patient cognitive changes and limited nursing supervision. In 2024, a catheter dislodgement incident occurred when a patient with impaired consciousness attempted to get out of bed unassisted.

Methods: A multidisciplinary team was formed to introduce an automated alert system. High-risk patients were identified through screening, and a blood pump anomaly detection device was installed. Alerts were integrated with the dialysis system and electronic whiteboard for real-time notification. Comprehensive staff training and simulation drills were also conducted.

Results: Within six months, non-human-related dislodgement incidents dropped from one to zero. Nursing response time improved from 45 to 8 seconds. High-risk identification accuracy rose from 62% to 95%, device installation rate reached 100% in isolation dialysis rooms, and staff training completion reached 98%.

Conclusion: Automated alert systems effectively compensate for the limitations of manual monitoring, enhancing dialysis safety. Technological integration and interdisciplinary collaboration are essential for improving patient care in high-risk settings.

Keywords： Dialysis safety, automated alert system, catheter dislodgement, patient monitoring, interdisciplinary collaboration

Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
Poster No.：C0139
Abstract Submission No.：APCN20250600

Comparison Between the Human-Resourced Ellipsoid Method Versus Kidney Volumetry Using Artificial Intelligence in Pol-ycystic Kidney Disease

Jihyun Yang[1]; Young Rae Lee[2]; Hyun Young Youl[1]; Hyun Jung Kim[1]; Tae Young Shin[3,4]; Kyu-beck Lee[1]

[1] Division of Nephrology and Hypertension, Department of Internal Medicine, Samsung Kangbuk Hospital, Sungkyunkwan University School of Medicine, Seoul, Republic of Korea

[2] Department of Radiology, Kangbuk Samsung Hospital, Sungkyunkwan University School of Medicine, Seoul, Korea

[3] Department of Urology, Ewha Womans University Mokdong Hospital, Seoul 07985, Republic of Korea

[4] Synergy A.I. Co., Ltd., Seoul 07573, Republic of Korea

Abstract

Background: The Mayo Imaging Classification (MIC) for polycystic kidney disease (PKD) serves as a crucial basis for clinical treatment decisions; however, volumetric assessment for its evaluation remains tedious and inaccurate. While the ellipsoid method for measuring the total kidney volume (TKV) in patients with PKD provides a practical TKV estimation using computed tomography (CT), its inconsistency and inaccuracy are limitations, highlighting the need for improved, accessible techniques in real-world clinics.

Methods: We compared manual ellipsoid and artificial intelligence (AI)-based kidney volumetry methods using a convolutional neural network-based segmentation model 3D Dynamic U-Net for measuring the TKV by assessing 32 patients with PKD in a single tertiary hospital.

Results: The median age and average TKV were 56 years and 1200.24 mL, respectively. Most of the patients were allocated to Mayo Clinic classifications 1B and 1C using the ellipsoid method, similar to the AI volumetry classification. AI volumetry outperformed the ellipsoid method with highly correlated scores (AI vs. nephrology professor ICC: r=0.991, 95% confidence interval (CI) = 0.9780–0.9948, $p < 0.01$; AI vs. trained clinician ICC: r=0.983, 95% CI = 0.9608–0.9907, $p < 0.01$). The Bland–Altman plot also showed that the mean differences between professor and AI volumetry were statistically insignificant (mean difference 159.5 mL, 95% CI = 11.8368–330.7817, $p = 0.07$).

Conclusions: AI-based kidney volumetry demonstrates strong agreement with expert manual measurements and offers a reliable, labor-efficient alternative for TKV assessment in clinical practice. It is helpful and essential for managing PKD and optimizing therapeutic outcomes.

Keywords：polycystic kidney disease; MCI; total kidney volume; ADPKD; AI-based volumetry

Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
Poster No.：C0140
Abstract Submission No.：APCN20250659

AI-Based Prediction of Major Cardiovascular Events in the Hemodialysis Patients

CHENG-HSU CHEN[1,4]; Min-Shian Wang[2,3,5]; Shun-Fang Hou[1]; Shang-Feng Tsai [1,2,4,5]

[1] Division of Nephrology, Taichung Veterans General Hospital, Taichung City, Taiwan

[2] Smart Healthcare Committee, Taichung Veterans General Hospital, Taichung City, Taiwan

[3] Department of Applied Mathematics, National Chung Hsing University, Taichung City, Taiwan

[4] Department of Post-Baccalaureate Medicine, College of Medicine, National Chung Hsing University, Taichung City, Taiwan

[5] Division of Clinical Informatics, Department of Digital Medicine, Taichung Veterans General Hospital, Taichung City, Taiwan

Abstract

Background: Cardiovascular disease (CVD) is the major cause of morbidity and mortality in patients with End-stage Kidney Disease (ESKD) on hemodialysis (HD). Major Adverse Cardiovascular Events (MACE) are common complications of HD patients that include myocardial infarction (MI), stroke, cardiac arrhythmia and heart failure (HF). The objective of the current study was to predict MACE among our HD patients.

Methods: HD patients above 18 years old were recruited 29356 HD sessions for the study between 2014 to 2023 from our hospital database of the TSN-KiDiT (kidney, dialysis, and transplantation integrated software), which is integrated operation management system and quality control for Taiwan Society of Nephrology. Different Machine learning algorithms: including RandomForest (RF), XGBoost, logistic regression (LR), and KNN(K Nearest Neighbor) were employed. Clinical attributes, electrolytes, dialysis adequacy and blood flow (BF), cardiothoracic ratio (CT ratio) and biomarkers were explored in predicting MACE. The feature importance was determined using mean decrease accuracy.

Results: Overall, 28788 HD sessions were included in the analyses, there were 3791 events of MACE within 12-month. The XGBoost Model demonstrated a prediction accuracy of 88.92% with the area under the receiver operating characteristic curve (AUROC) 94.42%, which is higher as compared to the RF 84.54% [AUROC 94.95%], the LR model 65.23% [AUROC 65.23%], however, the KNN has the best accuracy 92.45% [AUROC 93.28%] with less sensitivity 59.47%, respectively. The classification accuracy of the models for cardiac arrhythmia was 89.01%, which was higher than prediction accuracy for acute myocarial infarction (AMI: 83.67%), and heart failure (HF: 82.84%), cardiac arrhythmia (89.01%). Age, CT ratio, glucose, transferrin saturation, albumin, ferritin, alk-P, MCV and PTH, BF were the major predictors of MACE.

Conclusion: The ML models had shown acceptable performance in predicting MACE in HD patients. Age, CT ratio, glucose and other biomarkers were important predictors of MACE, which is consistent between the individual components of MACE, such as cardiac arrhythmia, MI, and HF. These parameters can be calibrated as prognostic parameters of MACE events in HD patients.

Keywords：Major Adverse Cardiovascular Events (MACE) , Machine learning algorithms, cardiothoracic ratio (CT ratio), hemodialysis (HD)

The prediction of MACE: AMI, ischemic stroke, heart failure, hemorrhagic stroke, cardiac shock and cardiac arrhythmia

	Total	Training data	Testing data	True Positive (TP)	False Negative (FN)	Sensitivity
AMI	497 (13.11%)	399	98	82	16	83.67%
Ischemic stroke	552 (14.56%)	459	93	73	20	78.49%
Heart failure (HF)	2134 (56.29%)	1726	408	338	70	82.84%
Hemorrhagic stroke	150 (3.96%)	125	25	19	6	76.00%
Cardiac shock	17 (0.45%)	14	3	2	1	66.67%
Cardiac arrhythmia	441 (11.63%)	350	91	81	10	89.01%
Total	3791	3073	718	595	123	82.87%

Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
Poster No.：C0141
Abstract Submission No.：APCN20250689

Genetic Landscape of Proteinuria-Associated Variants in Patients with Nephrotic Syndrome: Insights from a Large-Scale Targeted Sequencing Study

Cheng Siao Muk[1]; An-Fu Lee[1]; Chih-Chuan Yu[1]; Chi-Yen Chang[1]; Daw-Yang Hwang[1]
[1] National Institute of Cancer Research, National Health Research Institutes, Taiwan

Abstract
Background:
Monogenic causes of nephrotic syndrome are increasingly recognized among individuals presenting with proteinuria. However, the genetic spectrum and clinical relevance of proteinuria-associated variants in Asian populations remain incompletely characterized.
Methods:
We conducted targeted sequencing of 21 known proteinuria-associated genes in a cohort of 1,597 ethnically Chinese patients diagnosed with nephrotic syndrome. Variants were classified according to the ACMG guidelines, and genotype–phenotype correlations were assessed based on renal histopathological diagnoses.
Results:
Pathogenic or likely pathogenic (P/LP) variants were identified in 103 patients (6.5%). Most variants were missense mutations (60.2%), followed by frameshift (23.3%), nonsense (9.7%), and other types. The most frequently affected genes were COL4A4 (32%), COL4A3 (16.5%), and COL4A5 (14.6%), which collectively accounted for over 60% of all P/LP variants. Additionally, one pathogenic and seven missense variants of uncertain significance (VUS) were identified in INF2, all located within the diaphanous inhibitory domain. Notably, discrepancies between genetic findings and histopathological diagnoses were observed in several cases, highlighting potential limitations of biopsy-based diagnosis alone.
Conclusion:
Our study highlights the genetic heterogeneity of nephrotic syndrome in Chinese patients and underscore the limitations of biopsy-based diagnosis alone. Integration of genetic testing into nephrology may improve diagnostic precision, particularly when renal biopsy findings are inconclusive or non-specific.

Keywords：Proteinuria-associated genes, Targeted sequencing

Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
Poster No.：C0142
Abstract Submission No.：APCN20250713

Enhancing Monitoring Efficiency in Chronic Kidney Disease Care Management through Intelligent Visualization Tools

Shih-Yun Lu[1]; Wei Huang[1]; Shu-Hua Hsu[1]; Yi- Li Lin[1]; Chiu Huang Kuo[1]
[1] Division of Nephrology, Hualien Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation, Taiwan

Abstract

Introduction

Chronic Kidney Disease (CKD) is a progressive condition requiring long-term monitoring to prevent deterioration and reduce the risk of end-stage renal disease (ESRD). Traditional care models often rely on static reports and manual data integration, which are time-consuming and insufficient for real-time risk identification. Intelligent visualization tools offer a promising solution to enhance healthcare quality monitoring and clinical decision-making. This study aimed to evaluate a Power BI-based visualization platform for improving data integration, care monitoring, and team coordination in CKD management.

Methods

This study was conducted at a CKD prevention center in eastern Taiwan, where Power BI was implemented as the primary visualization platform. The system integrated data from 2020 to 2025, including CKD case management records, electronic medical records (EMRs), and administrative datasets. Key biochemical indicators, selected based on KDIGO guidelines, were incorporated for risk stratification and disease progression monitoring. The dashboard also featured care volume, new case trends, reimbursement points, and outcome indicators, with interactive filters for time, risk level, referring department, and care provider. It was actively used in case discussions and multidisciplinary care meetings to support clinical analysis and intervention planning.

Results

Following dashboard implementation, data consolidation time decreased from four hours to 15 minutes, significantly improving operational efficiency. Clinical teams could monitor renal function changes in high-risk patients in real time and proactively intervene in cases with missed referrals or incomplete patient education. The system enabled better tracking of care quality and improved continuity of case management. User feedback indicated that the visualization tool enhanced their understanding of complex data and increased confidence in clinical decision-making.

Conclusion

This study demonstrates that intelligent visualization tools, such as Power BI, can significantly enhance the efficiency and responsiveness of CKD care management. By enabling real-time data access and trend visualization, the platform supports proactive case monitoring and improves interprofessional communication. Future enhancements may include the integration of AI-driven predictive models and patient-reported outcomes (PROs) to further personalize care and enable early risk alerts, promoting the broader application of smart health technologies in chronic disease management.

Keywords：Chronic Kidney Disease, Data Visualization, Power BI, Clinical Decision Support, Care Management

Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
Poster No.：C0143
Abstract Submission No.：APCN20250734

Effectiveness of Combining AI Prediction and Nursing Intervention in Reducing Intradialytic Hypotension

Huang Hui-Hsuan[1]; Yi-Ning Yang[1]; Chung-Feng Liu[1]; Yu-Ting Shen[1]; Chia-Jung Chen[1]
[1] Hemodialysis Unit, Chi Mei Medical Center, Tainan, Taiwan

Abstract
Introduction:
Intradialytic hypotension (IDH) occurs in approximately 20–30% of end-stage renal disease (ESRD) patients undergoing hemodialysis. This condition may lead to inadequate organ perfusion, tissue damage, and increased mortality risk. This study aimed to utilize artificial intelligence (AI) with machine learning algorithms to monitor patient and dialysis parameters in real time, generate risk alerts, and support nursing staff in early intervention to enhance the safety and quality of hemodialysis care.
Methods:
This retrospective study analyzed outpatient hemodialysis cases from the dialysis unit at Chi Mei Medical Center between September 1 and December 31, 2020. A total of 30 features—including dialysis machine data, vital signs, weight changes, laboratory values, and patient history—were integrated to develop an AI risk prediction system using multiple machine learning algorithms. Based on AI-predicted risk scores, nursing staff implemented standardized preventive care measures before and during dialysis. Statistical methods including independent t-test, chi-square test, and ANOVA were used to compare IDH incidence before and after implementation of the AI system and nursing intervention.
Results:
A total of 9,652 cases were included after age and sex matching, with a mean age of 65.9 years and 44.5% female. The incidence of IDH was 26.1% from January to April 2021 (before AI implementation), decreased to 16.1% in 2022 (after AI deployment), and further dropped to 12.9% in 2023 after combining AI with a standardized nursing care protocol. Overall, IDH incidence significantly declined by 13.2% ($P < 0.001$). Care quality indicators also showed marked improvements: the proportion of dialysis shifts requiring ≥3 hypotension interventions dropped from 50% to 29%; sessions with ≥2 episodes of hypotension decreased from 59.7% to 20.7%; treatment interruptions due to hypotension >1 time per session decreased from 51.7% to 13.8%; fluid removal target achievement improved from 34.5% to 93.1%; patient-reported IDH symptoms (e.g., dizziness, nausea) were significantly reduced, and overall patient satisfaction reached 100%.
Conclusion:
This study demonstrates that an AI-based prediction system, combined with standardized nursing protocols, effectively identifies high-risk patients and enables timely, individualized interventions. The approach significantly reduced IDH incidence, minimized treatment interruptions, and improved dialysis efficiency and care quality. Beyond enhancing clinical decision-making, AI also contributed to optimized resource allocation. Notably, integrating AI with nursing workflows yielded greater impact than AI alone, indicating the potential of multi-layered strategies in advancing smart healthcare.

Keywords：Hemodialysis, Intradialytic Hypotension, Artificial Intelligence, Risk Prediction, Nursing Intervention

Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
Poster No.：C0144
Abstract Submission No.：APCN20250746

Virtual Nurse Improves Dialysis Patient Care Outcomes

JIA-XUAN GAO[1]; Lee Yin-Hsuan[1]; Wun Cian-Yun[1]; Lin Hsin-Yin[1]
[1] Division of Nephrology, Hualien Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation, Taiwan

Abstract
Introduction
Patients undergoing hemodialysis often face challenges in nutrition management and medication adherence, which can compromise treatment outcomes and quality of life. The Virtual Nurse system, integrating AI technology, provides real-time interaction and personalized health education, aiming to enhance self-care behavior and treatment compliance. This study evaluated the effectiveness and patient satisfaction of the system in supporting electrolyte control, medication adherence, and self-care capacity in dialysis care.
Methods
This one-group pretest-posttest study was conducted at a hemodialysis center in eastern Taiwan. Fifteen patients aged 20–65 years, receiving stable dialysis for at least three months, were recruited. Exclusion criteria included recent hospitalization, cognitive impairment, or impaired vision (defined as requiring assistance with screen use). The intervention utilized the AI platform “Virti” with a virtual nurse interface providing personalized dietary advice, medication guidance, and self-care suggestions. Interactive content included videos and infographics covering: (1) vascular access self-check, (2) infection control and hand hygiene, (3) high-phosphorus/potassium food recognition and alternatives, (4) fluid intake and weight management. Learning records were stored in the cloud for analysis. A self-developed 5-point Likert questionnaire covering six domains was used: usability, clarity, personalization, interactivity, satisfaction, and recommendation intention. Content validity was reviewed by nephrologists and senior nurses. Paired t-test and Wilcoxon signed-rank test were applied with a significance level of $p < .05$.
Results
A total of 14 patients completed the study (completion rate 93%). All six domains showed significant improvement ($p < .05$): usability (1.6 → 4.5), clarity (1.2 → 4.4), personalization (1.3 → 4.6), interactivity (1.6 → 4.3), satisfaction (1.9 → 4.6), and recommendation (1.3 → 4.5). Wilcoxon signed-rank test showed statistically significant improvements ($W = 0$, $p < .05$), with no participant reporting a decrease in any item. Among 14 respondents, 13 reported improved understanding of diet and medication management; 12 stated increased willingness to adhere to treatment and adopt healthier behaviors.
Conclusion
The virtual nurse system demonstrated promising effectiveness in dialysis care, especially in enhancing personalized education and usability. It supported nurses in delivering focused, repetitive education, reducing workload while reinforcing patient understanding and self-care behaviors. Although the sample was small and included patients more receptive to technology, results support the feasibility of clinical integration. Future studies

Keywords：Keywords Virtual nurse, dialysis, patient education, AI, self-care, satisfaction

Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
Poster No.：C0145
Abstract Submission No.：APCN20250812

Improvement Project to Enhance the Completeness of Information Handover by Hemodialysis Room Nursing Staff

Yuan-Lieng Li[1]
[1] Department of Nephrology, Hemodialysis Room, Tri-Service General Hospital

Abstract
Introduction
In 2024-2025, the first goal for hospital and clinic medical quality and patient safety is to promote teamwork and effective communication among healthcare personnel. According to the 2023 Taiwan Patient Safety Reporting System Annual Report, approximately 26% of patient safety incidents were due to insufficient communication within the medical team. Major incidents such as transfusion, surgery, examination/test/pathology, medication, and anesthesia events were mostly related to poor communication between healthcare team members. Incomplete handover leads to missing crucial information, providing incorrect or inappropriate treatment, thereby affecting patient safety (Liao et al., 2020). Complete handover content helps staff grasp patient information quickly, enhances patient safety and care quality, and achieves continuity of care (Rhudy, 2019). Accurate and complete information transfer promotes effective communication among healthcare workers and reduces care errors. Therefore, implementing correct and complete handover ensures patient safety and enables comprehensive care quality (Chou et al., 2020).
Methods
To identify the reasons for the low handover completeness rate, a structured questionnaire titled "Main Factors Affecting Handover Completeness" was designed and conducted. Results showed the top three reasons were: handover information not integrated requiring manual input, and the absence of clearly defined handover methods and content for dialysis patients. Based on these identified issues, relevant improvement strategies were developed. The hemodialysis room medical team discussed the necessary handover contents, and with the assistance of the Medical Information Management team and the Internet of Things team, an information-based handover function was established.
Results
Through the implementation of the information-based handover system, handover completeness significantly improved, and nursing staff demonstrated better understanding of handover processes and content. The improvement rate of handover completeness reached 93%, greatly enhancing handover efficiency and patient safety. Moreover, satisfaction levels regarding the handover method, process, and time required also increased.
Conclusion
With clinical staffing shortages, standardizing handover processes and utilizing information technology assistance can effectively improve handover completeness, shorten handover time, reduce error rates, and achieve the goal of enhancing patient safety and care quality.
Keywords: Informatization, Patient Safety, Handover Completeness

Keywords：Informatization, Patient Safety, Handover Completeness

Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
Poster No.：C0146
Abstract Submission No.：APCN20250856

Evaluating the Impact of Clinical Simulation Training on Professional Competency in Dialysis Nursing

YING-XUAN LEE[1]; GAO - JIA HSUAN[1]; WUN - CIAN YUN[1]; LIN- HSIN YIN[1]
[1] Division of Nephrology, Hualien Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation

Abstract
Introduction: To ensure the safety and quality of hemodialysis treatment, nursing staff must possess comprehensive skills in vascular access assessment and care. However, traditional teaching methods often lack training in clinical decision-making and communication, leaving new staff underprepared for real-world scenarios. Recent studies have shown that simulation-based teaching can enhance clinical judgment, confidence, and skill application among nurses (Lin, Chang, & Chen, 2022). This study aimed to evaluate the effectiveness of integrating virtual patient simulation in improving dialysis nurses' knowledge and confidence in vascular access care.
Methods: This study used a single-group pretest-posttest design. The participants were newly recruited nurses in the hemodialysis unit of Hualien Tzu Chi Hospital, who had completed dialysis training and had less than three years of clinical experience. Participants underwent a simulation-based training program focused on the assessment of arteriovenous fistula (AVF), including inspection, palpation, auscultation, and clinical response skills. A 10-question multiple-choice test was administered before and after the intervention to evaluate knowledge improvement. The questions were reviewed by three nephrologists to ensure content validity. Descriptive statistics and paired t-tests were used to analyze changes in test scores.
Results: A total of 15 participants completed the course. The overall correct response rate increased from 86.8% pre-intervention to 94.3% post-intervention, with an average improvement of 7.5% ($p = 0.021$). Two questions, 'management of failed puncture' and 'recognition of abnormal bruit,' achieved 100% accuracy post-intervention, indicating significant gains in clinical judgment and vascular access management. Participants reported the simulation scenarios to be realistic, enhancing clinical response capability and reducing stress during actual procedures. The course enabled exposure to diverse case scenarios within a short time, accelerated skill acquisition, and reduced reliance on one-on-one teaching by senior nurses, thereby saving manpower. Overall, the structured and repeatable training model effectively improved learning efficiency and clinical response confidence.
Conclusion: This study demonstrates that virtual patient simulation training effectively enhances the knowledge and clinical response capability of novice hemodialysis nurses in vascular access care. Confidence in assessing AVF function and handling abnormalities significantly improved, and the instructional approach was highly rated by participants. It is recommended that this training model be incorporated into standard orientation programs for new nursing staff, with future studies expanding the sample size and tracking clinical performance to evaluate long-term outcomes.
References: Lin, Y. C., Chang, H. Y., & Chen, Y. J. (2022). Effectiveness of simulation-based training for improving clinical decision-making skills in dialysis nursing: A quasi-experimental study. Journal of Clinical Nursing, 31(5–6), 765–774. https://doi.org/10.1111/jocn.16123

Keywords： Virtual Patient Simulation, Hemodialysis Nursing, Vascular Access Care, Clinical Competency, Simulation-Based Training, Nursing Education

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Factors influence hemodialysis efficiency with digital personalized health concepts by real-time monitoring

YU-FEN TING[1]; SHANG-CHIH LIAO[1]
[1] Kaohsiung Municipal Fong Shan Hospital-Under the Management of Chang Gung Medical Foundation

Abstract
Aim:
Monitoring during dialysis is critical for preventing complications and improving patient outcome. The dynamic changes in fluid balance, blood pressure, electrolytes, and cardiac condition demand continuous evaluation to minimize risks. This study provides a real-time monitoring by dialysis machine. Hence, every single change of the data will be response precisely. Our purpose is to see what kinds of factors that will influence patient to meet the standard of urea reduction ratio (URR) under long term digital monitoring for personalized best policy for dialysis.

Methods:
Through the implementation of a smart dialysis system and automatic data uploading for digital management, real-time monitoring and analysis of patients' dialysis parameters are conducted. The healthcare team can precisely adjust the dialysis prescription based on each patient's physiological characteristics and treatment response, ensuring that every patient can achieve the best personalized treatment plan. The study subjects were 267 patients (45.3% male) who received regular hemodialysis. Independent variables included: dialysis time, blood flow rate, artificial kidney ultrafiltration clearance, artificial kidney surface area, albumin concentration, gender, vascular access type (AV Fistula, Graft, Catheter), and BMI (kg/m²). The dependent variable was URR, and the target value was divided into two groups: ≥ 0.65 (standard) and ≥ 0.7 (ideal standard). SPSS software was used for descriptive statistics, ROC curve analysis to determine the optimal dialysis time to achieve URR standards, and Logistic regression analysis to predict the role of BMI in achieving the ideal URR standard.

Results:
The analysis results showed that URR was significantly positively correlated with the following factors ($p \leq 0.001$): blood flow rate ≥ 270 mL/min, artificial kidney ultrafiltration clearance rate, dialysis time ≥ 3.5 hours. The average URR of female patients was significantly higher than that of male patients. BMI was negatively correlated with URR. Logistic regression showed that for every 1 kg/m² increase in BMI, the probability of achieving URR ≥ 0.7 decreased by 27% (OR = 0.729, 95% CI: 0.638 - 0.834). ROC curve analysis results showed that if the pre-achieved URR ≥ 0.65 is recommended, the dialysis time should be more than 3.6 hours, and it takes 4 hours to achieve URR ≥ 0.7.

Conclusions:
This study provides a solid data to avoid over-medicalization, promotes the rational allocation and utilization of resources, and achieves a higher quality and sustainable kidney care model.

Keywords：hemodialysis、urea reduction ratio (URR)、Artificial kidney ultrafiltration clearance

Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
Poster No.：C0148
Abstract Submission No.：APCN20250895

Predicting Early-Onset Electrolyte Disturbances in Patients Undergoing Chemotherapy Using Machine Learning Methods

Gil Hyo-wook[1]; Nam-Jun Cho[1]; Inyong Jeong; Se-Jin Ahn[2]; Yihyun Kim[2]; Jin-Hyun Park[2]; Jeong Hwan Kim[2,3]; Yeongmin Kim[2]; Byeongsu Kim[2]; Se Won Oh[4]; Hwamin Lee[2]

[1] Department of Internal Medicine, Soonchunhyang University Cheonan Hospital, Cheonan, Republic of Korea

[2] Department of Biomedical Informatics, Korea University College of Medicine, Seoul, Republic of Korea

[3] Department of Otorhinolaryngology-Head and Neck Surgery, Korea University Ansan Hospital, Korea University College of Medicine, Ansan, Republic of Korea

[4] Division of Nephrology, Department of Internal Medicine, Korea University Anam Hospital, Seoul, Korea

Abstract

Introduction

Electrolyte disturbances during chemotherapy can lead to treatment delays and worsened prognosis. As cancer survivorship increases, their prediction and management are becoming more critical. This pilot study developed a machine learning-based model integrating cancer type and treatment information to predict post-chemotherapy electrolyte disturbances, and evaluated its clinical applicability using large-scale, multicenter data.

Methods

We analyzed data from hospitalized patients who received chemotherapy at Korea University Anam Hospital (2015–2021) and Soonchunhyang University Cheonan Hospital (2016–2021). The model was designed to predict eight electrolyte disturbances—hyponatremia, hypernatremia, hypokalemia, hyperkalemia, hypocalcemia, hypercalcemia, hypophosphatemia, and hyperphosphatemia—within four weeks of treatment initiation. Four machine learning algorithms were compared: logistic regression, extreme gradient boosting, categorical boosting (CatBoost), and multilayer perceptron. Model performance was assessed through a five-dimensional framework, including internal, external, and temporal validation, subgroup analysis, calibration, and decision curve analysis.

Results

Among 11,227 patients (6,015 internal; 5,212 external), 74.0% and 84.7% experienced at least one electrolyte disturbance. Among these, in-hospital mortality rates were 35.9% and 32.8%, respectively. The average area under the receiver operating characteristic curve (AUROC) across all targets was 0.798. In external validation, performance declined by an average of 0.11, with the largest drop in hypernatremia (−0.204), while hypercalcemia showed improved performance (+0.023), with CatBoost achieving the best AUROC: 0.907 (internal) and 0.930 (external). Temporal validation confirmed stability with a 7-year AUROC standard deviation of 0.02. Calibration was most accurate for hypercalcemia (Brier score: 0.005; expected calibration error: 0.002), while hyponatremia showed the highest clinical utility (net benefit: 0.221). Subgroup analysis showed better performance in patients <65 years (AUROC: 0.80) than ≥65 years (0.76). Exceptionally high predictive performance (AUROC > 0.99) was observed in breast, bladder, and liver cancers. Risk stratification showed the top 20% high-risk group had a 4.15-fold higher risk of electrolyte disturbances and a 2.02-fold higher in-hospital mortality risk compared to the intermediate group ($p < 0.001$). Shapley additive explanations (SHAP) analysis identified serum albumin, heart rate, renal function markers, and agents such as cisplatin and fluorouracil as key predictors.

Conclusion
This study demonstrated the feasibility of predicting chemotherapy-related electrolyte disturbances using a machine learning model integrating cancer and treatment data. Although internal performance was promising, external validation revealed variation by disturbance type and institution. Despite high discriminative power in certain outcomes, limitations in calibration and clinical utility remain. These findings highlight the need for larger, more diverse datasets and refined modeling approaches to enhance generalizability and clinical adoption.

Keywords：Onconephrology, Electrolyte disturbance, Chemotherapy, machine learning-based model

Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
Poster No.：C0149
Abstract Submission No.：APCN20250900

Enhancing Pharmaceutical Care in Pre-End-Stage Renal Disease Through a Digital Case Management System and Interactive Data Visualization

CHANG, YA-CHING[1]; Mei-Chiu Shen[1]; Shang-Jyh Hwang[2]; Shu-Fang Cheng[3]

[1] Department of Pharmacy, Kaohsiung Medical University Hospital, Kaohsiung Medical University, Kaohsiung City, Taiwan

[2] Division of Nephrology, Department of Internal Medicine, Kaohsiung Medical University Hospital, Kaohsiung Medical University, Kaohsiung City, Taiwan

[3] Department of Medical Technology, Kaohsiung Medical University Hospital, Kaohsiung Medical University, Kaohsiung City, Taiwan

Abstract

Introduction:

Implementing a digital case management system can help standardize and streamline pharmacist-led care by minimizing information gaps during case identification and enrollment, while enhancing overall care workflow. This study applied such a system, integrated with Microsoft Power BI, to improve data consistency, clinical visibility, and care quality for Pre-End-Stage Renal Disease (Pre-ESRD) patients in a pharmacist-led outpatient clinic. Due to the impact of COVID-19, a comparison was conducted between two periods (2022 vs.2024) to assess differences in medication adherence and NSAID reduction.

Methods:

The system connects to internal hospital databases and screens patients based on pharmacist-defined criteria: (1) use of ≥10 medications, (2) ≥2 comorbidities beyond CKD, (3) recent NSAID use, or (4) physician referral. It integrates clinical data, enables automatic form population and duplication, tracks follow-ups, and generates claim files with built-in validation codes to prevent submission errors. Power BI dashboards visualize patient demographics, high-risk medication use, and pharmacist interventions.

Results:

From Nov 2021 to Apr 2025, 1,096 patients received 2,916 pharmacist care visits. New enrollments totaled 116 in 2021, 500 in 2022, 334 in 2023, 99 in 2024, and 47 in 2025. Medication adherence scores averaged 13.09 (newly enrolled), 12.75 (follow-up), and 12.59 (annual), with an overall improvement of 0.36 points. Of 155 pharmacist recommendations, 138 were accepted. Main interventions were medication education (84%) and disease self-care (44.2%). In the COVID-period comparison, adherence scores slightly declined from 2022 to 2024 (13.12 to 12.72 for newly enrolled; 13.06 to 12.67 for follow-up), while the overall improvement score shifted from -0.06 to 0.09, indicating a positive reversal. The NSAID reduction rate also increased from 6.76% to 11.39%, suggesting a stronger downward trend post-COVID.

Conclusion:

The system improved case identification accuracy and care continuity. Power BI enabled real-time tracking and rapid comparison across time periods, highlighting post-COVID trends of enhanced NSAID reduction and stable medication adherence.

Keywords：Pre-End-Stage Renal Disease (Pre-ESRD); Pharmaceutical Care; Digital Case Management; Clinical Dashboard; Power BI; Pharmacist-Led Care

Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
Poster No.：C0150
Abstract Submission No.：APCN20250912

EMR-Based Fracture Risk Prediction in Dialysis Patients Using Explainable Machine Learning: A Retrospective Cohort Study

HUANG CHIH WEI[1,2,3]; Phung Anh Nguyen[3,4,5,6]; Hsuan-Chia Yang[1,2,3,7]; Wu Li-Min[8]; Cai Mei Zheng[9,10,11]

[1] International Center for Health Information Technology (ICHIT), College of Medical Science and Technology, Taipei Medical University, Taipei, Taiwan

[2] Graduate Institute of Biomedical Informatics, College of Medical Science and Technology, Taipei Medical University, Taipei, Taiwan

[3] Clinical Big Data Research Center, Taipei Medical University Hospital, Taipei Medical University, Taipei, Taiwan

[4] Graduate Institute of Data Science, College of Management, Taipei Medical University, Taipei, Taiwan

[5] Clinical Data Center, Office of Data Science, Taipei Medical University, Taipei, Taiwan

[6] Research Center of Health Care Industry Data Science, College of Management, Taipei Medical University, Taipei, Taiwan

[7] Research Center of Big Data and Meta-Analysis, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan

[8] Department of Nursing, Shuang Ho Hospital, Taipei Medical University, Taipei, Taiwan

[9] Department of Internal Medicine, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan

[10] TMU Research Center of Urology and Kidney (TMU-RCUK), Taipei Medical University, Taipei, Taiwan

[11] Division of Nephrology, Department of Internal Medicine, Shuang Ho Hospital, Taipei Medical University, Taipei, Taiwan

Abstract

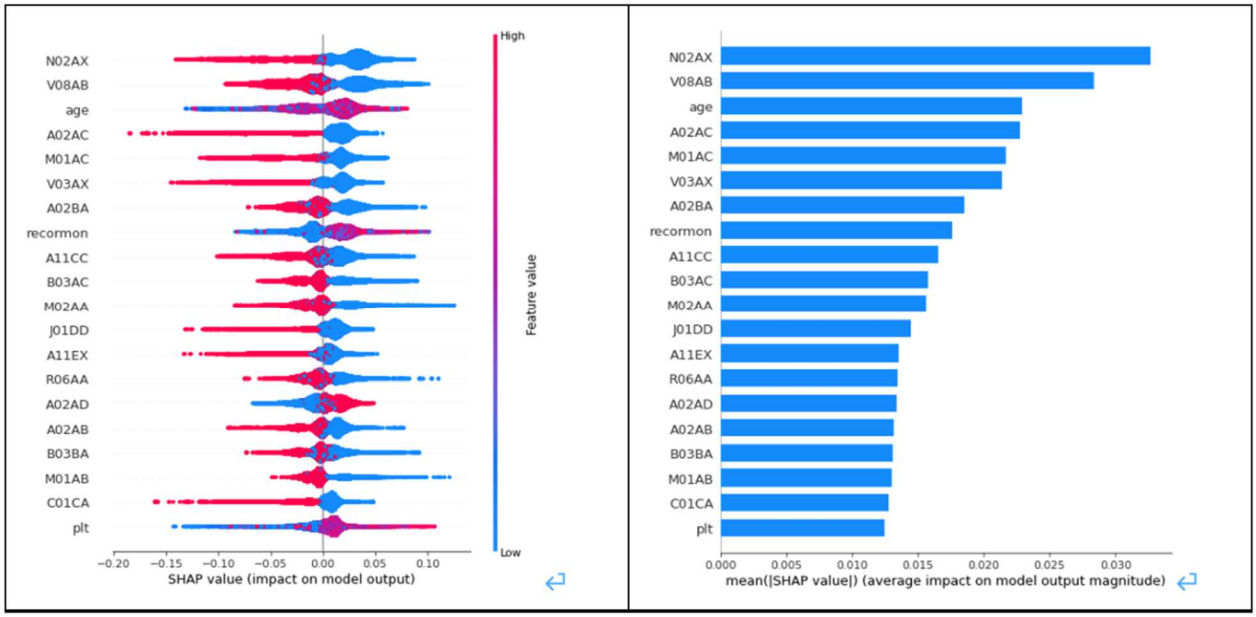
Fragility fractures represent a clinically relevant complication in patients undergoing dialysis and are associated with increased morbidity, hospitalization, and mortality. The risk of fracture in this population is influenced by multiple factors, including age, comorbid conditions, polypharmacy, and markers of nutritional and inflammatory status. Although bone mineral density (BMD) has been used in the general population for fracture risk assessment, its predictive value in dialysis patients is limited, and routine assessment is often not performed due to accessibility and interpretation challenges in the context of CKD-related bone disorders.

This study aimed to develop and evaluate a machine learning model using routinely collected electronic medical record (EMR) data to estimate fracture risk after dialysis initiation. We conducted a retrospective cohort analysis of 916 incident dialysis patients from the Taipei Medical University Clinical Research Database (TMUCRD) between 2015 and 2018. Among them, 523 patients (57.1%) experienced a documented fracture during the follow-up period. Clinical data, including demographics, medication use (coded by ATC classification), and laboratory test results, were extracted for model training.

Five supervised machine learning algorithms were developed and compared, including logistic regression, decision tree, random forest, XGBoost, and LightGBM. Model performance was evaluated using area under the receiver operating characteristic curve (AUROC), accuracy, and F1-score.

Among the models, random forest showed the highest AUROC value of 0.976.
To enhance model interpretability, SHapley Additive exPlanations (SHAP) values were used to rank the top predictors contributing to fracture risk. The top 20 most influential features included: N02AX (central analgesics), V08AB (iodinated contrast media), age, A02AC (proton pump inhibitors), M01AC and M01AB (non-steroidal anti-inflammatory drugs), V03AX (other therapeutic agents), A02BA, A02AD, and A02AB (acid-suppressing medications), Recomon (epoetin beta, B03XA02), A11CC and A11EX (vitamin D and B-group vitamins), B03AC and B03BA (iron and folic acid preparations), M02AA (topical NSAIDs), J01DD (third-generation cephalosporins), R06AA (sedating antihistamines), C01CA (cardiac glycosides), and platelet count. These variables collectively reflect multiple clinical dimensions, including disease complexity, comorbidity burden, nutritional deficiencies, polypharmacy patterns, and healthcare utilization intensity.
In conclusion, this study presents a clinically interpretable and technically feasible approach for the early identification of dialysis patients at high risk for fractures. These findings highlight the potential of machine learning models informed by medication and lab data to augment clinical decision-making and personalize preventive care. Future directions include prospective validation in external cohorts, integration with alert-based systems in dialysis units, and exploration of causal relationships between specific medications and fracture outcomes.

Keywords：Dialysis; Fragility fractures; Machine learning; Electronic medical records; Risk prediction



Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
Poster No.：C0151
Abstract Submission No.：APCN20250985

Google Trends as a Surveillance Tool for Public Interest in Chronic Kidney Disease to Support Kidney Health Education in Indonesia

Bintoro, Bagas Suryo[1,2]

[1] Department of Dept. Health Behavior, Environment, and Social Medicine, FM-PHN, UGM (Indonesia), Indonesia

[2] Center for Health Behavior and Promotion, FM-PHN, UGM (Indonesia), Indonesia

Abstract

Objectives:

Chronic Kidney Disease (CKD) is a growing public health concern in Indonesia, with prevalence increasing from 0.2% in 2013 to 0.3% in 2018, though the true burden may be underestimated. Kidney replacement therapy (KRT) cases have also risen sharply, surpassing 132,000 in 2018. Google Trends (GT), a publicly available tool for analyzing search behavior, has emerged as a novel method to monitor public interest in health issues. This study aims to explore Google Trends data to assess national and regional patterns in CKD-related searches in Indonesia from 2020 to 2025, to inform educational campaigns and strengthen public health strategies.

Methods:

We analyzed GT data using CKD-related search terms in both English and Bahasa Indonesia, such as “kidney failure,” “dialysis,” and “cuci darah.” Search volume was indexed from 0 to 100, with 100 indicating peak search interest. Regional interest was examined across selected provinces: Jakarta, Yogyakarta, North Sumatera, and Bali. These provinces were chosen for their diverse health infrastructure, population density, and varying digital literacy levels—providing insights into both urban and semi-urban health information-seeking behavior.

Results:

Search interest in “kidney failure” peaked in mid-October 2022 (SVI 100), coinciding with the surge in reported Acute Kidney Injury (AKI) cases among children under five, as reported by the Indonesian Ministry of Health and the Indonesian Pediatric Society (IDAI). Another spike occurred in July–August 2024, aligning with World Kidney Day activities that emphasized the increasing burden of CKD in young adults. Regionally, Jakarta consistently showed the highest search interest, suggesting greater awareness or concern among urban populations. Yogyakarta and Bali also displayed periodic increases, particularly during public health campaigns and media coverage.

Conclusions:

The alignment between GT search activity and public health events demonstrates its potential as an early indicator of community concern. Using common, everyday language in search terms (e.g., “cuci darah”) is critical to understanding public discourse and improving health communication. Integrating real-time search data into public health strategy allows for timely, targeted education and outreach. Beyond Google Trends, digital listening should also extend to social media platforms—the most active spaces for health-related conversations—to comprehensively capture public sentiment and improve CKD awareness, early detection, and prevention efforts in Indonesia.

Keywords： CKD, dialysis, digital health surveillance, community engagement, public health analytics

Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
Poster No.：C0152
Abstract Submission No.：APCN20251058

Implementing Subspecialty-Based Care and Flexible Bed Management in a Nephrology Ward: A Practical Experience

鄭碧薇 [1]

[1] Ministry of Health and Welfare Taoyuan Hospital Taiwan

Abstract

Introduction:

With an aging population and increasing burden of kidney disease, establishing a stable and flexible subspecialty care model has become essential to improve patient outcomes and nursing quality. In Taiwan, internal medicine wards commonly admit patients across various specialties to meet occupancy targets, influenced by national insurance and accreditation policies. This practice undermines the implementation of true subspecialty care, resulting in fragmented workflows, diluted nursing expertise, and inconsistent quality. Nephrology patients—often requiring complex care, dialysis, and multidisciplinary support—are especially vulnerable to discontinuity. To address this, our hospital implemented a reform in November 2024, adopting subspecialty-based admissions and a dynamic bed management system to optimize occupancy while enhancing care quality and patient safety.

Methods:

Starting November 2024, nephrology ward admissions were limited to patients with CKD, acute or chronic renal failure, dialysis-related complications (e.g., inadequate dialysis, vascular access issues), and urinary tract disorders with renal impairment. The head nurse coordinated daily discharge forecasting and collaborated with physicians to pre-assign beds, while liaising with nursing administration for cross-unit transfers. Monthly indicators included: (1) nephrology patient admission rate, (2) bed turnover efficiency, and (3) care quality metrics such as handover frequency, staff and patient satisfaction. Unit meetings were held to review data and inform continuous improvement.

Results:

By January 2025, the nephrology admission rate increased from 52% to 100%. Average monthly patient transfers dropped from 18 to fewer than 5, enhancing continuity and handover efficiency. Daytime admissions rose, easing night shift workload. Staff satisfaction with nephrology care improved from 3.6 to 4.5 (out of 5), while patient satisfaction also increased, particularly regarding care continuity and nursing professionalism.

Conclusion:

This subspecialty-based care model with flexible bed allocation effectively improved admission efficiency, care quality, and workforce satisfaction without compromising bed utilization. The model is practical, scalable, and offers a valuable reference for other subspecialty units aiming to strengthen functionally stratified care and operational resilience.

Keywords：Keywords: Subspecialty care, Nephrology ward, Bed management, Chronic kidney disease, Care continuity, Nursing quality

Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
Poster No.：C0153
Abstract Submission No.：APCN20251100

Explore the willingness to continue using digital health education tools at home

Lu,chiao Hsin[1]
[1] Nursing Department Ministry of Health and Welfare Taoyuan Hospital

Abstract
Objective: The impact of the technological era has led to the active application of digital tools in disease care, and traditional diabetes education has gradually transformed into a trend of remote care or online self-learning. To explore a set of diabetes education tools that can help patients learn to manage sugar stabilization information at home and continue to use them.
There are three questions to explore:
1. Investigate the "Suger Helper" diabetes education tool.
2. The reliability and validity of "trust (T), ease of use (E), usefulness (U), satisfaction (S) and continued use (K)".
3. Explore each dimension and the factors affecting the willingness to continue to use digital education tools.
Methods: The questionnaire was compiled for each dimension (T), (E), (U), (S) and (K), and the reliability and validity analysis was conducted with 5 experts and scholars. A random sample of patients with type 2 diabetes in our hospital was surveyed from March to September 2014, using descriptive statistics, Pearson product-moment correlation analysis, Cronbach's α coefficient test, confirmatory factors and other statistics.
Results: 79 pre-test questionnaires were collected, and the average reliability coefficients of the T facet were 0.958; the E facet was 0.953; the U facet was 0.985; the S facet was 0.960 and the K facet was 0.970, and the Cronbach's α coefficients were all above 0.70. The structural equation model (SEM) showed that the facets had good fit with the empirical evidence. The 125 formal questionnaires were discussed as follows: 77 females (61.60%) and 48 males (38.40%); Likert scale was 5 points, with a full score of 5 points. Trust score was 4.64 (92.6%) first, satisfaction score was 4.61 (92.2%) second, usefulness score was 4.58 (91.6%) third, ease of use was 4.5 (90%) fourth, and continuous use score was 4.38 (87.6%) the lowest. The results show that r=0.84 for T and (U), r=0.7896 for U and (S), r=0.776 for T and (S), and r=0.710 for E and (T)(U) respectively. (K) is least correlated with other dimensions: r=0.491.
Conclusion: All dimensions of this health education tool are highly consistent and have validity. Trust, satisfaction and ease of use are key factors affecting continued use. The more convenient and trustworthy it is, the more likely it will be used for a long time. It is recommended to optimize the information interface, strengthen the transmission of health education information with pictures and voice experience, and enhance the willingness to continue using digital tools.

Keywords：Digital health education tools

Poster Presentation：Augmented Intelligence, Digital Health, and Data Science
Poster No.：C0154
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Comparative Analysis of XGBoost, Random Forest, and Support Vector Machine Models for Predicting Morbidity in Women with End-Stage Renal Disease

Fussy Mentari Dirgantara[1,2]; Utari Nur Alifah[3]

[1] School of Electrical Engineering, Telkom University, Indonesia

[2] IT Convergence Engineering, Kumoh National Institute of Technology, South Korea

[3] Emergency Department, Welas Asih Regional Hospital of West Java Province, Indonesia

Abstract

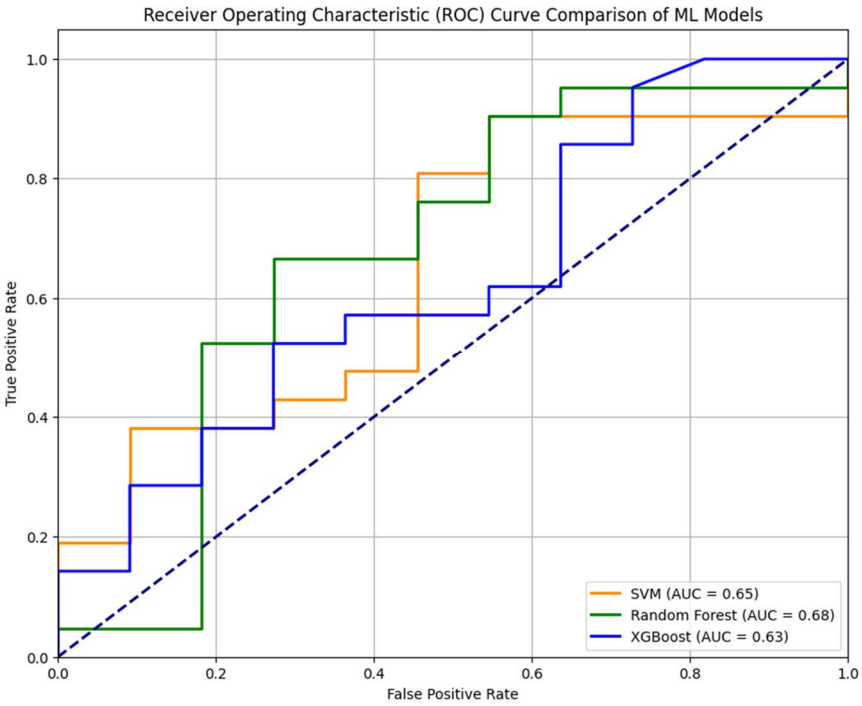
Introduction: Chronic Kidney Disease (CKD) poses a significant burden on Indonesia's National Health Insurance. In women, CKD has a different development than in men due to differences in sex hormones. Hormonal shifts, particularly those associated with aging in women, can lead to substantial adverse outcomes and complications. Forecasting of morbidity in these patients can facilitate early intervention and improve quality of life. This study evaluates the effectiveness of machine learning algorithms in predicting morbidity in women with end-stage renal disease (ESRD).

Methods: We gathered 125 patient data sets from a regional hospital in May and June 2025, which comprised clinical features of women diagnosed with end-stage renal disease (ESRD), including age, blood pressure, biochemical markers, comorbidities, and medication history. Subsequent to data preprocessing in Microsoft Excel, we implemented the Random Forest, Extreme Gradient Boosting (XGBoost), and Support Vector Machine (SVM) models. The evaluation of performance utilized multiple confusion matrices to assess true positives, false positives, true negatives, and false negatives for each model, thereby aiding in the prediction of cardiovascular morbidity among ESRD patients.

Results: The Random Forest method outperformed the other two models in predicting patient cardiovascular morbidity, as evidenced by its highest Area Under the Receiver Operating Characteristic Curve (AUC-ROC) of 0.6753. The Support Vector Machine (SVM) demonstrated moderate efficacy, producing an AUC-ROC of 0.6537. XGBoost exhibited the lowest AUC-ROC of 0.6299. The Random Forest and XGBoost models effectively identified the most significant features related to cardiovascular morbidity prediction.

Conclusion: This research developed and evaluated machine learning models for predicting cardiovascular morbidity in women with end-stage renal disease (ESRD). For predicting cardiovascular morbidity in women with end-stage renal disease (ESRD), Random Forest had the most balanced and well-classified model out of the three evaluated. The findings suggest that Random Forest modeling is an effective tool for clinical decision-making, enabling early identification and proactive management of women at high risk for ESRD. Future research ought to investigate additional data features or new methods to enhance morbidity predictions and broaden the model's applicability in practical healthcare environments.

Keywords：ESRD, Cardiovascular morbidity, Women's health, Machine learning


Receiver Operating Characteristic (ROC) Curve Comparison of ML Models
True Positive Rate
False Positive Rate
0.0
0.2
0.4
0.6
0.8
1.0
SVM (AUC = 0.65)
Random Forest (AUC = 0.68)
XGBoost (AUC = 0.63)

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Optimizing Medical Care for Peritoneal Dialysis Patients through BCM Data Visualization

SONG, YI-JING[1]; LI-WEI WANG[1]; Chiu-Huang Kuo[1]; SIN-YING LIN[1]
[1] Nephrology, Hualien Tzu Chi Hospital, Buddhist, Hualien City, Taiwan

Abstract
Introduction: Fluid control is a crucial treatment indicator for end-stage renal disease. Fluid overload can increase hospitalization and mortality rates in peritoneal dialysis patients. However, currently, no accurate real-time fluid monitoring tool exists for the clinical setting. Therefore, we employed the Body Composition Monitor (BCM) to conduct multiple measurements and used POWER BI (Power Business Intelligence) to visualize a large amount of data to achieve comprehensive and real-time adjustments to dialysis prescriptions.
Methods: This research is a case study starting from May 2024. We conducted several BCM tests on peritoneal dialysis patients at three-month intervals to collect physiological parameters such as weight, body fat percentage, and muscle quality. We adopted the hospital's existing medical information system and combined it with Microsoft Power BI for data analysis. In addition, we utilized Chat GPT to establish Data Analysis Expressions (DAX) to realize the visualization of big data.
Results: From May 2024 to November 2024, 112 peritoneal dialysis patients underwent BCM examinations, with 325 test results. The proportions of patients with excess fluid were 24.18%, 10.53%, and 13.64%, respectively .BCM visualization charts created through Power BI included cards, tables, cross-analysis filters, and donut charts. For 16.06% (N = 44) patients with fluid overload, suggestions were made to modify dialysis prescriptions, including adjustments to dialysate concentration, dry weight, and treatment for hypoalbuminemia.
Conclusion: The visualization of BCM examination results allows the medical team to promptly identify abnormal fluid status, adjust treatment plans in a timely manner, and thereby reduce patients' risk for complications. For administrators, it allows the real-time monitoring of anomalies and the formulation of overall quality improvement plans.

Keywords：Body composition monitor, Data visualization, Peritoneal dialysis

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Telehealth and Remote Monitoring in Kidney Transplant Care: Optimizing Outcomes with AI Enabled Digital Health Solutions

Jeremi Malee[1], Ryan Christopher Harliman[1], Abimanyu Sakh[1], Jeffano Davinka[1], Fadhlan Muhammad Al Faza[1], Jonathan Kho[1], Amos Immanuel Chandra[1], Andree Kurniawan[2]
Faculty of Medicine, University of Pelita Harapan, Indonesia[1], Department of Medicine, University of Pelita Harapan, Indonesia[2]

Background: Kidney transplant recipients require continuous and proactive monitoring to detect early signs of graft dysfunction, infection, and rejection. Traditional in person follow up is often limited by logistical, geographic, and resource constraints, which can delay timely interventions and compromise outcomes. The integration of telehealth, remote patient monitoring (RPM), and artificial intelligence (AI) has enabled digital health solutions that offer a transformative approach to enhance post transplant care by improving access, adherence, and early detection of complications.
Method: A systematic review and meta analysis were conducted to evaluate the impact of telehealth and AI enabled RPM interventions on clinical and patient centered outcomes in kidney transplant recipients. Thirteen studies published between 2015 and 2025 were included, involving telemedicine platforms, wearable devices, mobile health applications, and AI driven decision support systems. Primary outcomes assessed were graft function (serum creatinine, estimated glomerular filtration rate), medication adherence, blood pressure control, hospitalization rates, and patient reported satisfaction.
Result: Telehealth interventions, including AI supported platforms such as the MACCS system, demonstrated significant improvements in kidney transplant care. The MACCS platform led to a 22% increase in medication adherence and a 30% reduction in hospitalization rates within six months ($p < 0.05$). Remote patient monitoring achieved normalization of blood pressure with a mean reduction of 11.5 mmHg systolic and 7.2 mmHg diastolic, along with stabilization of blood glucose within six weeks post transplant. Additionally, home based blood pressure monitoring combined with teleconsultation reduced systolic BP variability by 18% and improved patient satisfaction scores by 25% compared to standard care. AI driven analytics facilitated earlier detection of graft dysfunction, shortening the time to clinical intervention by an average of 3.5 days. Across studies, these digital solutions not only improved clinical outcomes but also demonstrated potential to reduce healthcare costs by an estimated 15–20% annually per patient through decreased readmissions and optimized resource utilization.
Conclusion: AI enhanced telehealth and remote monitoring represent promising strategies to optimize outcomes in kidney transplantation by enabling earlier detection of complications, improving adherence, and fostering greater patient engagement. To translate these findings into practice, we propose the development and multi center pilot testing of an integrated AI driven telehealth platform tailored for kidney transplant recipients. This approach holds the potential to reduce hospitalizations, enhance quality of care, and achieve cost effective scalability within diverse healthcare systems. Further large scale studies are warranted to validate long term clinical benefits and economic impact.

Keywords: Kidney Transplantation, Telemedicine, Artificial Intelligence