Oral Presentation (English)

December 14, 2024 (Saturday) 09:00 ~ 10:30　　　**Venue：Room 1(成杏廳)**

【Oral-1】　　Chair(s)：張哲銘/ Jer-Ming Chang、楊智宇/ Chih-Yu Yang

09:00—09:12　　1. Incidence and Risk Factors of Pregnancy-Related Acute Kidney Injury in High-Income Countries Over the Past Decade
Hung-Wei Liao[1], Chung-Yi Cheng[1], Shang-Yang Lin[2], Jui-Yi Chen[3], Vin-Cent Wu[2]
[1.]Wan Fang Hospital, [2] National Taiwan University Hospital, [3.]Chi Mei Medical Center

09:12—09:24　　2. Personalized Prediction of Chronic Kidney Disease Progression in Patients with Chronic Kidney Disease Stages 3–5: A Multicenter Study using the Machine Learning Approach
Trung Toan Duong[1,2]; Minh Tri Nguyen[3]; Chia-Te Liao[4,5,6]; Ngoc Hoang Le[7]; Thanh Phuc Phan[8]; Chih-Wei Huang[9,10]; Jason C. Hsu[8]; Alex P.A Nguyen[11,*]
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09:24—09:36　　3. Clinical Outcomes in Type 2 Diabetic Patients with Acute Kidney Disease: Evaluating Combined SGLT2 Inhibitor and GLP-1RA Therapy vs. Monotherapy
Jui-Yi Chen[1], Min-Hsiang Chuang[1], Vin-Cent Wu[2]
[1]Division of Nephrology, Department of Internal Medicine, Chi Mei Medical Center;
[2]Department of Internal Medicine, National Taiwan University Hospital

09:36—09:48　　4. Lactoferrin in Pediatric Chronic Kidney Disease and Its Relationship with Cardiovascular Risk
Hsin-Jung Lee[1], Pei-Chen Lu[2], Wei-Ling Chen[3], Wei-Ting Liao[4], Chien-Ning Hsu[5], You-Lin Tain[6]
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09:48—10:00   5. Impact of Remote Patient Monitoring Alerts on Adverse Outcomes in Automated Peritoneal Dialysis Patients: A Retrospective Cohort Study

Chia-Chun Lee[1], Jo-Yen Chao[1], Hsueh-Chi Chou[2], Pei-Jung Wu[2], Mei-Hsien Wu[2], Hui-Ying Lin[2], Wei-Ren Lin[1], Kuan-Hung Liu[1], Te-Hui Kuo[1], Yu-Tzu Chang[1], An-Bang Wu[1], Ming-Cheng Wang[1], Junne-Ming Sung[1], Chin-Chung Tseng[1*]
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10:00—10:12   6. Exploring the Effect of Sodium-Glucose Cotransporter 2 Inhibitors in Primary Aldosteronism Patients with Diabetes Mellitus and Chronic Kidney Disease

Li-Yang Chang[1], Vin-Cent Wu[2], Jui-Yi Chen[3], Chun-Fu Lai[2]
[1] National Taiwan University College of Medicine, [2] Renal Division, Department of Internal Medicine, National Taiwan University Hospital, [3] Chi Mei Hospital Department of Nephrology

10:12—10:24   7. Predictors and Comorbidities of Autonomous Cortisol Secretion in Primary Aldosteronism: a Retrospective Cohort Study and Systematic review

Chieh Huang[1,*]; Li-Yang Chang[1,*]; Jia-Yuh Sheu[2]; Yen-Ta Huang[3]; Jui-Yi Chen[4]; Chun-Fu Lai[5]; Vin-Cent Wu[5,6] on behalf of the Taiwan Primary Aldosteronism Investigators (TAIPAI) study group
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1

Incidence and Risk Factors of Pregnancy-Related Acute Kidney Injury in High-Income Countries Over the Past Decade
過去十年高收入國家妊娠相關急性腎損傷的發病率及危險因素變化

Hung-Wei Liao [1], Chung-Yi Cheng[1], Shang-Yang Lin[2], Jui-Yi Chen[3], Vin-Cent Wu[2]

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Background：

Recent studies have highlighted a resurgence of pregnancy-associated acute kidney injury (PR-AKI) in the high-income countries (HICs). This resurgence may be attributed to increasing maternal age and the prevalence of chronic comorbidities. This study aims to analyze the changing incidence of PR-AKI and its associated risk factors over the last decade in the HICs.

Methods：

We conducted a retrospective cohort study using data from the TriNetX Network, which aggregates electronic medical records from 63 healthcare organizations (HCOs) in the U.S. We included pregnant individuals aged 12 to 60 years, with a total sample size of 4,091,484 females from 2012 to 2022. PR-AKI was defined as either the initiation of acute dialysis or an estimated glomerular filtration rate (eGFR) dropping below 15 ml/min/1.73 m² during pregnancy. Logistic regression analysis was used to identify risk factors associated with PR-AKI. The temporal trends in PR-AKI incidence and risk factors were analyzed.

Results：

The analysis revealed that the overall incidence of PR-AKI was 19.6 cases per 10,000 pregnancies, with a significant increase from 2020 to 2022. The logistic regression analysis identified chronic comorbidities as significant risk factors for PR-AKI: obesity (OR: 1.59, $p < 0.001$), essential hypertension (OR: 1.57, $p < 0.001$), DM (OR: 1.37, $p < 0.001$), hyperlipidemia (OR: 1.32, $p < 0.001$), and COVID-19 infection (OR: 1.15, $p < 0.001$). There was a notable rise in maternal age, essential hypertension, and hyperlipidemia over the study period. Additionally, the prevalence of COVID-19 infection was 6.2% between 2020-2022 in the PR-AKI population compared to 0.9% between 2018-2019.

Conclusions：

The incidence of PR-AKI in the U.S has markedly increased from 2020 to 2022, associated with the COVID-19 pandemic and a rise in chronic comorbidities. These findings highlight the importance of managing chronic health conditions and monitoring pregnant women at higher risk for PR-AKI.

Key words：

PR-AKI, chronic comorbidities, COVID-19, and high-income countries

Personalized prediction of chronic kidney disease progression in patients with chronic kidney disease stages 3–5: A multicenter study using the machine learning approach

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Abstract

Background

Chronic Kidney Disease (CKD) is a progressive condition that can lead to serious complications. Predicting CKD progression is crucial for early intervention and personalized treatment. Machine learning has shown promise in improving prediction accuracy by analyzing complex patient data. This study aims to develop and evaluate machine learning models for predicting CKD progression in patients with stages 3-5, potentially leading to improved patient outcomes through personalized treatment strategies.

Methods

This study utilized a retrospective dataset from the Taipei Medical University clinical research database (TMUCRD), encompassing electronic health records from three affiliated hospitals. The study cohort included patients diagnosed with CKD stages 3-5 between 2005 and 2021, with a maximum follow-up period of one year. The primary outcome was the prediction of two levels of estimated glomerular filtration rate (eGFR) decline: a 5% decline and a 25% decline, within the one-year timeframe. Various machine learning (ML) models were employed. The dataset was divided into training and testing sets. Five-fold cross-validation was implemented to ensure robust model performance. Model evaluation metrics included area under the curve (AUC), sensitivity, specificity, and accuracy.

Results

The dataset used in this study comprised 88,359 records for training and 56,776 records for testing. Key variables included demographic features like age and gender, comorbidities such as myocardial infarction

and congestive heart failure, medications like statins and erythropoiesis-stimulating agents, and laboratory values such as hemoglobin and creatinine. The mean age in the training data was 70.99 years, while in the testing data it was 67.56 years. Additionally, 56.01% of the training data and 57.87% of the testing data were male. For the prediction of a 5% eGFR decline, the LightGBM model emerged as the top performer, achieving an AUC of 0.76 on the external test set. Other models, such as XGBoost and Random Forest, also demonstrated reasonable predictive capabilities with AUCs of 0.76 and 0.74, respectively. In the context of predicting a 25% eGFR decline, the LightGBM model again exhibited superior performance with an AUC of 0.82, followed closely by XGBoost with an AUC of 0.81. The study further employed SHAP (SHapley Additive exPlanations) values to elucidate the contribution of individual features to the model's predictions. This analysis revealed that baseline eGFR, eGFR slope, and blood urea nitrogen (BUN) were the most influential factors in predicting CKD progression.

Conclusion

This study demonstrates the potential of machine learning in predicting CKD progression for patients with CKD stages 3-5. By leveraging a multicenter dataset and employing advanced ML models, the research identified key predictors of eGFR decline, including baseline eGFR, eGFR slope, and BUN. These findings can inform the development of personalized prevention and treatment strategies, facilitating early identification of high-risk individuals and targeted interventions to delay disease progression and improve patient outcomes. Future research should focus on refining these models, incorporating real-time data, and validating their performance in diverse populations to enhance their clinical utility and generalizability.

3

Clinical Outcomes in Type 2 Diabetic Patients with Acute Kidney Disease: Evaluating Combined SGLT2 Inhibitor and GLP-1RA Therapy vs. Monotherapy

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Background

Sodium-glucose cotransporter 2 inhibitors (SGLT2i) and Glucagon-Like Peptide-1 Receptor Agonists (GLP-1RAs) have each been shown to improve cardio-kidney-metabolic risk in patients with type 2 diabetes mellitus (T2DM). However, the precise effects of combined SGLT2i and GLP-1RAs therapy on patients with T2DM and acute kidney disease (AKD) remain unclear.

Methods

This cohort study utilized data from the Collaborative Network via TriNetX. The analysis included adults with T2DM and AKD who were treated with either SGLT2i, GLP-1RAs, or a combination of these therapies, from September 1, 2012, to September 30, 2023. The outcomes evaluated encompassed all-cause mortality, major adverse kidney events (MAKE), major adverse cardiovascular events (MACE), and end-stage kidney disease (ESKD).

Results

In this cohort of 29,269 patients with T2DM and AKD, 1,591 individuals (5.4%) received combined therapy, 6,327 in the SGLT2i group, and 5,968 in the GLP-1RAs group. After matching, the combined group exhibited significantly lower risks of all-cause mortality compared to SGLT2i monotherapy [adjusted hazard ratio (aHR) = 0.53] and GLP-1RAs monotherapy (aHR = 0.43). The combined group showed lower risks of MAKE compared to SGLT2i monotherapy (aHR = 0.70) and GLP-1RAs monotherapy (aHR = 0.45). However, there was no statistically significant difference in the incidence of MACE between the combined therapy group and either monotherapy. The combined therapy group had a higher risk of hypoglycemia (aHR = 1.51), diabetic retinopathy (aHR = 1.59) compared to the SGLT2i monotherapy group.

Conclusions

In our study, the combination of SGLT2i and GLP-1RAs appears to provide superior protection against mortality and kidney events in patients with T2DM and AKD compared to monotherapy. Combined group had higher risk of hypoglycemia, diabetic retinopathy compared to SGLT2i monotherapy, necessitating close monitoring and follow-up.

Keywords

Sodium-Glucose Cotransporter 2 Inhibitors; Glucagon-Like Peptide-1 Receptor Agonists; Acute kidney disease; mortality; major adverse kidney even

Lactoferrin in Pediatric Chronic Kidney Disease and Its Relationship with Cardiovascular Risk

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Background

Pediatric CKD is associated with a high risk of cardiovascular disease (CVD). Early detection of subclinical CVD in childhood CKD can be achieved through various cardiovascular (CV) assessments, including carotid intima-media thickness (cIMT), ambulatory blood pressure monitoring (ABPM), and arterial stiffness indices. Lactoferrin (LF), a key functional glycoprotein found in breast milk, has been linked to several diseases and holds potential as a biomarker.

Methods

In our study of 102 children with CKD stages G1–G4, we explored the relationship between LF and CV risk markers(parameters such as serum Glucose, blood urea nitrogen, creatinine, urine total protein-to-creatinine ratio, total cholesterol, triglyceride, low-density lipoprotein (LDL), sodium, potassium, uric acid, calcium, phosphate, hemoglobin, and hematocrit; ambulatory arterial stiffness index (AASI), left ventricular mass (LVM), LVM index (LVMI), carotid intima-media thickness (cIMT), Augmentation index and PWV.)

Results

We found that LF concentration was not related to the severity or underlying causes of childhood CKD but was positively correlated with overweight/obesity. Lower LF levels were correlated to increased cIMT and elevated arterial stiffness indices. Notably, abnormalities in ABPM profiles were observed in up to 60% of the children with CKD, with low LF levels linked to nighttime hypertension, nocturnal non-dipping, and ABPM abnormalities.

Conclusion

LF shows promise as a biomarker for detecting subclinical CVD in children with CKD, although further research is needed to clarify the underlying mechanisms.

Keywords

Lactoferrin, pediatric CKD, CVD, obesity, lipid profile

Impact of Remote Patient Monitoring Alerts on Adverse Outcomes in Automated Peritoneal Dialysis Patients: A Retrospective Cohort Study
遠程病患監測警訊對自動腹膜透析患者不良預後的影響：回顧性隊列研究

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Background：

Remote patient monitoring (RPM) systems, especially in automated peritoneal dialysis (APD) patients, have shown promise in improving clinical outcomes through continuous monitoring and timely intervention. However, the specific impact of RPM alerts, including alarms and events, on adverse outcomes remains underexplored. This study evaluated the association between alarm and event frequencies with adverse outcomes among APD patients using RPM at National Cheng Kung University Hospital (NCKUH). The study aimed to understand how different levels of alarms and events affect three-year outcomes, including peritonitis, hospitalization, and PD dropout in patients receiving APD therapy.

Methods：

We conducted a retrospective cohort study of APD patients who utilized RPM between September 2019 and December 2020 for more than six months. Patients were classified into tertiles based on their average monthly number of alarms and events. The outcomes measured were peritonitis, hospitalization, and PD dropout within three years. Cox proportional hazards and logistic regression models were used to evaluate the risk of adverse outcomes, adjusting for key covariates such as sex, age, PD duration, comorbidities, and dialysis adequacy. Statistical analysis was conducted using R software (version 4.2.2).

Results：

The study included 69 patients with a mean age of 44.16 ± 13.59 years and a mean PD duration of 4.38 ± 3.44 years; 62.3% were male. Comorbidities included diabetes mellitus (20.3%), hypertension (78.3%), coronary artery disease (8.7%), and congestive heart failure (11.6%). Residual urine volume was low, with a median of 0.0 mL (IQR 0.0 - 200.0 mL), and the mean Kt/V was 2.10 ± 0.36. The median peritonitis rate was 0.000 episodes per year (IQR 0.000 - 0.167). PET results showed 50.7% were high-average, 13.0% high, 26.1% low-average, and 10.1% low. The average monthly alarm frequency was 0.515 alarms/month: low tertile 0.024, medium tertile 0.293, and high tertile 1.239 alarms/month. The average event frequency was 2.784 events/month: low tertile 0.262, medium tertile 1.325, and high tertile 6.765 events/month.

Clinically, 27.5% of patients developed peritonitis, 46.4% required hospitalization, and 13.0% experienced PD dropout within three years. The alarm tertile classification was associated with increased risk of adverse outcomes. The adjusted odds ratio (OR) for peritonitis was 2.42 (95% CI: 1.01 - 5.81, p = 0.04), and the hazard ratio (HR) for PD dropout was 5.34 (95% CI: 1.22 - 23.31, p = 0.02). Compared to the lowest tertile, the highest tertile had a significantly increased OR of 5.33 (95% CI: 1.07 - 36.07) for peritonitis and an HR of 20.0 (95% CI: 1.08 - 370.1) for PD dropout.

Conclusions：

High alarm frequency in RPM is significantly associated with an increased risk of PD dropout and PD-associated peritonitis in our APD patients. In contrast, event frequency alone did not significantly predict adverse outcomes. These results suggest that frequent alarms may serve as a valuable predictor of poor prognosis in APD patients.

Key words：

Remote patient monitoring, automated peritoneal dialysis, alarm, peritonitis, peritoneal dialysis dropout

6

Exploring the Effect of Sodium-Glucose Cotransporter 2 Inhibitors in Primary Aldosteronism Patients with Diabetes Mellitus and Chronic Kidney Disease
SGLT2 抑制劑在合併糖尿病與慢性腎臟病的原發性醛固酮症患者之臨床效益

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Background: Patients with primary aldosteronism (PA) have an increased risk of mortality and are more prone to developing cardiovascular, renal, and metabolic complications. Literature shows that sodium-glucose cotransporter-2 (SGLT2) inhibitors offer survival and cardiorenal benefits in patients with diabetic mellitus (DM). We hypothesized that integrating SGLT2 inhibitors in PA management may have synergistic effects with mineral receptor antagonists (MRA).

Methods: We extracted patient data from Feb. 1, 2014, to Feb. 1, 2024, in the TriNetX database. PA patients treated with MRAs within three months before or after diagnosis, without adrenalectomy, were selected. Among them, those with DM and an eGFR between 15 and 60 cc/min/1.73m2 were divided into SGLT2i-user and non-user groups. The primary outcome is all-cause mortality within 1-year follow-up. Other outcomes include major adverse cardiovascular events (MACEs) and major adverse kidney events (MAKEs). We applied the Cox proportional hazards model to calculate the hazard ratios (HRs) of two groups with 1:1 ratio propensity score matching.

Results: Among the 4,952 PA patients with DM and chronic kidney disease enrolled, 939 were SGLT2i users, and 4,013 were non-users. The numbers are reduced to 915 in both groups after PPM (Users vs. non-users: Mean [SD] age, 64.5 [10.8] vs. 65.1 [11.0] years; Men 52.2% vs. 52.3%; Mean [SD] follow-up time, 303.6 [106.6] vs. 312.2 [107.0] days). The age of index, gender percentage, ethnicity, medications (Diuretics, beta-blockers, other oral hypoglycemic agents), and laboratory data (plasma sodium, plasma potassium, bicarbonate, creatinine, HbA1C) are well-matched (Std diff < 0.1). The SGLT2 users exhibited a significantly reduced risk of all-cause mortality when compared to the control group (Hazard Ratio [HR] = 0.68 [0.50-0.92], p=0.01). Furthermore, the risk of secondary endpoints MACE (HR = 0.65 [0.46-0.90], p=0.01) and MAKE (HR = 0.67 [0.53-0.84], p<0.01) were also lower in the SGLT2i group. Positive outcome control (Genital infection) and negative outcome control (Substance abuse, conjunctivitis, influenza, traffic accident, appendicitis) all showed desirable outcomes.

Discussion: Our study suggests the cardiorenal benefit of combining SGLT2i with MRAs in non-surgical PA medical management.

Keywords: Conn syndrome, Empagliflozin, Mineralocorticoid Receptor Antagonist, Renal Failure.

7

Predictors and Comorbidities of Autonomous Cortisol Secretion in Primary Aldosteronism: a Retrospective Cohort Study and Systematic review

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Background:

Emerging evidence has suggested a significant prevalence of autonomous cortisol secretion (ACS) among patients diagnosed with primary aldosteronism (PA). However, ACS's clinical characteristics and implications in PA patients remain largely unexplored.

Methods:

874 PA patients with dexamethasone suppression test (DST) results were retrospectively included in the Taiwan Primary Aldosteronism Investigators (TAIPAI) cohort between February 2011 and February 2024. Additionally, a systematic review and meta-analysis (CRD42023486755) incorporating data from the TAIPAI cohort and 11 other studies published between 2013 and 2024, with a total of 3772 PA patients, was conducted.

Results:

In the TAIPAI cohort, 19.8% of PA patients exhibited ACS. These patients tended to be older (59.43 ± 11.84, $P<0.001$), had higher aldosterone levels [34.49(23.81, 57.04), $P=0.01$], lower baseline estimated glomerular filtration rates (87.12 ± 29.60, $P<0.001$), a higher incidence of adrenal tumor (55.49%, $P<0.001$), and larger adrenal tumor sizes (1.86 ± 0.76, $P<0.001$). The pooled prevalence of ACS among PA patients in the TAIPAI cohort and 11 other studies was 22.8% (95%CI: 20.2, 25.6). ACS was significantly associated with chronic kidney disease [pooled odds ratio (OR)=2.09; 95%CI: 1.62, 2.70], diabetes mellitus (pooled OR=1.63; 95%CI: 1.20, 2.20), and cardiovascular diseases (pooled OR=1.35; 95%CI: 1.04, 1.74) among PA patients.

Conclusions:

The strong association of ACS with comorbidities in PA patients underscores the importance of close monitoring and early detection. Clinical features such as advanced age, severe PA, adrenal tumors, impaired kidney function, diabetes, and cardiovascular diseases can help identify candidates for ACS screening.

Keywords:

Primary aldosteronism, autonomous cortisol secretion, Cushing's syndrome, dexamethasone, chronic kidney disease, diabetes, cardiovascular disease, prevalence, diagnosis, prognosis