Organized by: Singapore Society of Nephrology

In collaboration with: KDIGO

Endorsed by: ISN International Society of Nephrology

ISN's endorsement is for the promotion of education in general, therefore the specific content of the event/course is the responsibility of the organizer.

13th SINGAPORE SOCIETY OF NEPHROLOGY ANNUAL SCIENTIFIC MEETING 2023

Novel Strategies and Therapeutics in Nephrology

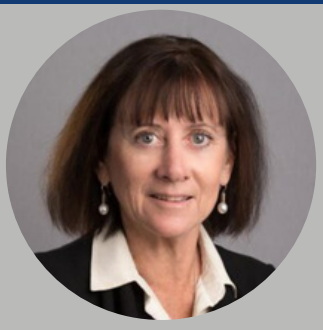
30th September - 1st October 2023

Conrad Centennial, Singapore

PROGRAM BOOKLET

Otsuka

Hope for ADPKD: First FDA approved treatment for ADPKD



Prof Carol Pollock, Speaker

Dr Christopher Leo, Chairperson

1st October, Sunday
12.30pm-1.30pm
Conrad Centennial, Singapore

For More Info

13th SINGAPORE SOCIETY OF NEPHROLOGY ANNUAL SCIENTIFIC MEETING 2023

JINARC® tolvaptan

CONTENTS

KORSUVA®
(difelikefalin) Injection

FOR YOUR HAEMODIALYSIS PATIENTS WITH CKD-ASSOCIATED PRURITUS[1]

TARGET THE SOURCE OF ITCH WITH KORSUVA®

Scan for Korsuva® information

Scan for Korsuva® Prescribing Information

Reference:
1. Korsuva® Injection PI (approved by H.S.A. on 25 Aug 2022)

SG-DFK-2200026 | Date of preparation: April 2023

20 McCallum Street, #20-01 Tokio Marine Centre,
Singapore 069046
+65 6327 5937
info_ap@viforpharma.com

VIFOR FRESENIUS MEDICAL CARE RENAL PHARMA

CSL Vifor

WELCOME MESSAGE

Dear Friends and Colleagues,

On behalf of the organising committee, it is our utmost pleasure to extend a warm welcome to all attendees of the 13th Singapore Society of Nephrology Annual Scientific Meeting. This year's theme, "Novel Strategies and Therapeutics in Nephrology," promises to deliver a captivating and insightful experience. Our 13th SSN ASM 2023 is proudly held in collaboration with Kidney Disease Improving Global Outcomes (KDIGO) and enjoys the support of the International Society of Nephrology (ISN).

The scientific program has been thoughtfully curated to provide an all-encompassing and dynamic experience for every participant. Over the course of two (2) days, you will have the privilege of engaging in a primer course, attending symposia that span a wide spectrum of topics, participating in interactive discussions, and witnessing presentations from esteemed international and local experts.

The success of this conference is the fruit of collaborative efforts from our dedicated organising committee, the remarkable faculty hailing from different corners of the world, and, most importantly, individuals like you, our esteemed delegates. Our primary objective is to offer you an invaluable source of cutting-edge information to enhance your clinical practice or research endeavors. None of this would have been achievable without the generous support of our valued sponsors, whose contributions have been instrumental in making this event a resounding triumph.

Once again, we extend a warm welcome to all participants of 13th Singapore Society of Nephrology Annual Scientific Meeting.

A/Prof Jason Choo
President
Singapore Society of Nephrology

Dr Kwek Jia Liang
Co-Chairperson
Organising Committee

Dr Goh Su Mein
Co-Chairperson
Organising Committee

ORGANISING COMMITTEE

SSN President	**A/Prof Jason Choo**
Scientific Co-Chairpersons	**Dr Kwek Jia Liang** **Dr Goh Su Mein**
Pre-Congress Workshop In-Charge	**Dr Sanmay Low**
Secretary and Awards In-Charge	**Dr Chan Gek Cher**
Abstracts In-Charge	**Dr Ng Chee Yong**
Sponsorship and Exhibition In-Charge	**Dr Clara Ngoh**
Treasurer and Sponsorship and Exhibition In-Charge	**Dr Alvin Tng**
Nursing/Allied Health Track In-Charge	**Ms Michelle Ng**

CONFERENCE INFORMATION

CONFERENCE VENUE

Ballroom, Level 2
Conrad Centennial Singapore
2 Temasek Blvd, Singapore 038982

CONFERENCE REGISTRATION

The Registration Counter is located in the Foyer area outside Ballroom at Conrad Centennial Singapore.

The counter will be open daily from **0830 - 1700 hours.**

CONFERENCE SATCHEL AND NAME BADGE

Upon completing your registration, you will receive a Conference satchel containing your personalized name badge.
It is mandatory to wear your name badge to all sessions and events throughout the conference.
In the event of losing your name badge, please contact the Conference Secretariat for a replacement. Please note that a replacement fee applies.

EXHIBITION

A state-of-the-art exhibition featuring medical equipment and allied applications will take place in the Ballroom Foyer, Level 2, Conrad Centennial Singapore.

Exhibition Opening Times:
Saturday, 30 September 2023 0830 - 1710 hours
Sunday, 1 October 2023 0830 - 1600 hours

CME / CPE ADMINISTRATION

(Applicable to Singapore registered Healthcare Professionals ONLY)
CME/CPE points will be accorded for attending the Scientific Symposium. Delegates are required to register their attendance daily at the conference registration counter twice; at the beginning of the day and during lunch time.

LOST AND FOUND

For any lost and found items, please approach the Conference Registration Counter.

CONFERENCE LANGUAGE

English will be the primary medium of instruction for the conference

LIABILITY

The Organisers are not liable for any personal accidents, illnesses, loss, or damage to private properties of delegates during the conference. Delegates are advised to make their own arrangements with respect to personal insurance

DISCLAIMER

Whilst every attempt will be made to ensure that all aspects of the Conference will take place as scheduled, the Organising Committee reserves the right to make appropriate changes should the need arises with or without prior notice.

POSTER PRESENTATION

Each presenter will be allocated a poster board (one side only) with an area of 1m x 2m. Each poster board will be marked with a poster panel number. Poster should be set up on Saturday, 30 September 2023 between 0830 - 0900 and removed on Sunday, 1 October 2023 after 1530 hours.

CONFERENCE SECRETARIAT

For any assistance, kindly reach out to the Conference Secretariat, conveniently located at the Registration Counter.

PLENARY SPEAKER

Dr Anissa Widjaja
Assistant Professor
Duke-NUS Medical School
Singapore

OVERSEAS FACULTY

Prof Judy Savige
Professor
Department of Medicine
Royal Melbourne Hospital
Australia

Prof Jolanta Malyszko
Head
Department of Nephrology
Dialysis and Internal Medicine
Warsaw Medical University
Poland

Dr Priscilla Smith
Specialist Nephrologist
Kings College Hospital
United Kingdom

Ms Katherine Clark
Kidney Research UK Stoneygate AHP
Fellow & Research Associate
King's College London
United Kingdom

LOCAL FACULTY

CHENG Peizhi
Senior MSW Programme Manager
Shaw-NKF-NUH Children's Kidney Centre
National University Hospital

CHIN Hui-Lin
Consultant
Division of Genetics and Metabolism
Department of Paediatrics
Khoo Teck Puat - National University Children's Medical Institute
National University Hospital"

HTAY Htay
Senior Consultant
Department of Renal Medicine
Singapore General Hospital

DA Yi
Associate Consultant
Division of Nephrology
Department of Medicine
National University Hospital

HUANG Zhihua
Advance Practice Nurse
Department of Renal Medicine
Singapore General Hospital

Esther LEOW
Consultant
Nephrology Service (Kidney Diseases)
KK Women's and Children's Hospital

Noor Haziah Binte HUSSAIN
Nurse Manager
National University Hospital

Manish KAUSHIK
Senior Consultant
Department of Renal Medicine
Singapore General Hospital

Manish KAUSHIK
Senior Consultant
Department of Renal Medicine
Singapore General Hospital

Umer KHAN
Associate Consultant
National University Hospital

Sreekanth KODURI
Head and Senior Consultant
Department of Renal Medicine
Changi General Hospital

Timothy KOH
Senior Consultant
Department of Renal Medicine
Tan Tock Seng Hospital

Perry LAU
Senior Consultant
Division of Paediatric Nephrology
Dialysis and Renal Transplantation
Department of Paediatrics,
Khoo Teck Puat-National University Children's Medical Institute
National University Hospital

Titus LAU
Senior Consultant
Division of Nephrology
Department of Medicine
National University Hospital

LOCAL FACULTY

Amy LIM
Senior Nurse Clinician
Singapore General Hospital

Cynthia LIM
Senior Consultant
Department of Renal Medicine
Singapore General Hospital

Kelly LIM
Advanced Practice Nurse
Tan Tock Seng Hospital

LIEW Zhong Hong
Associate Consultant
Department of Renal Medicine
Singapore General Hospital

LIU Peiyun
Consultant
Department of Renal Medicine
Singapore General Hospital

Chandramouli NAGARAJAN
Senior Consultant
Department of Haematology
Singapore General Hospital

NG Kar Hui
Senior Consultant
Division of Paediatric Nephrology, Dialysis and Renal Transplantation
Department of Paediatrics
Khoo Teck Puat-National University Children's Medical Institute
National University Hospital

PANG Suh Chien
Consultant
Renal Medicine
Singapore General Hospital

SEE Yong Pey
Senior Consultant
Tan Tock Seng Hospital

TAN Hui Li
Advanced Practice Nurse
Medical Intensive Care Unit
Singapore General Hospital

LIM Eng Kuang
Senior Consultant
Department of Renal Medicine
Khoo Teck Puat Hospital

LIM Ru Sin
Consultant
Department of Renal Medicine
Tan Tock Seng Hospital

Allen LIU
Head of Division & Senior Consultant
Division of Renal Medicine
Department of Medicine
Khoo Teck Puat Hospital

Veronica LOH
Advance Practice Nurse
Alexandra Hospital

NG Chee Yong
Senior Consultant
Department of Renal Medicine
Changi General Hospital

Shilpa RASTOGI
Head of Division & Senior Consultant
Division of Renal Medicine
Department of Medicine
Ng Teng Fong General Hospital

LOCAL FACULTY

Hersharan Kaur SRAN
Senior Consultant
Division of Nephrology
Department of Medicine
National University Hospital

TAN Hui Zhuan
Consultant
Department of Renal Medicine
Singapore General Hospital

TAN Li Ling
Senior Consultant
Department of Cardiology
National University Heart Centre

Selene TEOH
Consultant
Department of Renal Medicine
Khoo Teck Puat Hospital

Emmett WONG
Consultant
Division of Nephrology
Department of Medicine
National University Hospital

WONG Siow-Yi
Renal Senior Resident
Tan Tock Seng Hospital

YEO See Cheng
Head of Department
Senior Consultant
Department of Renal Medicine
Tan Tock Seng Hospital

YEONG Hazel
Senior Clinical Dietitian
Department of Nutrition and Dietetics
Khoo Teck Puat Hospital

Pauline TAN
Deputy Director of Nursing Services
The National Kidney Foundation Singapore

TEH Swee Ping
Associate Consultant
Department of Renal Medicine
Sengkang General Hospital

WENG Wanting
Consultant
Department of Renal Medicine
Tan Tock Seng Hospital

WONG Penelope
Consultant
Tan Tock Seng Hospital

YAP Hui Kim
Head & Emeritus Consultant
Division of Paediatric Nephrology
Dialysis and Renal Transplantation
Department of Paediatrics
Khoo Teck Puat-National University Children's Medical Institute
National University Hospital

ZHANG Yao Chun
Senior Research Fellow
Department of Paediatrics
Yong Loo Lin School of Medicine
National University of Singapore

One move can change the outcome[1]

For your patients with CKD associated with T2D, intervene now to deliver dual cardiorenal risk reduction

Reduce the risk of CV events

Slow CKD progression

Kerendia is the first and only selective, nonsteroidal mineralocorticoid receptor antagonist approved to treat CKD associated with T2D. **Why hold back?** Act now with Kerendia to give your patients the protection they need today.

INDICATION: Kerendia, in addition to standard of care, is indicated to reduce the risk of sustained eGFR decline, end-stage kidney disease, cardiovascular death, non-fatal myocardial infarction and hospitalization for heart failure in adults with chronic kidney disease and albuminuria associated with type 2 diabetes.

CKD=chronic kidney disease; CV=cardiovascular;
eGFR=estimated glomerular filtration rate; T2D=type 2 diabetes.

Reference: 1. Kerendia Product Insert approved by HSA October 2021.
Full prescribing information is available on request.

BAYER

PP-KER-SG-0129-1 07/23

Kerendia® finerenone

SCIENTIFIC PROGRAMME

Day 1 - 30th September 2023

0830 0900	**Registration**	
	South West Room	**North East Room**
	Pre-Congress Primer Course *Chairperson: Dr Umer Farooq Khan*	
0900 - 0930	Early Identification and Intervention of CKD In Singapore *Dr Weng Wanting*	
0930 - 1000	Acute Kidney Injury: New Concepts in Prevention and Management *Dr Manish Kaushik*	
1000 - 1030	Onco-Nephrology-An Overview *Dr Jolanta Malyszko*	
1030 - 1100	**Morning Tea Break + Poster Viewing**	
1100 - 1130	Critical Role of Genetics in Kidney Diseases *Prof Judy Savige*	
1130 - 1200	Reproductive Care of Women with CKD *Dr Priscilla Smith*	
1200 - 1300	**Lunch Symposium 1** **Hemodiafiltration Current Status and Future Direction** *Speaker: Dr Nandakumar Mooppil* *(Educational Grant from Fresenius Medical Care)*	**Lunch Symposium 2** **Mission: Impossible I - Navigating the challenges of CKD management in Singapore** *Speaker: Dr Christopher Leo* **Mission: Impossible II - Keeping dialysis at bay for patients with CKD** *Speaker: Dr Alvin Ng Kok Heong* *Chairperson: Dr Tracy Tan* *(Educational Grant from Boehringer Ingelheim)*
1300 - 1310	**President Welcome Address**	
1310 - 1340	**Plenary Lecture: Paradigm shift in the management of kidney diseases: the era of regenerative therapy** *Dr Anissa Widjaja*	
	Medical Track	**Allied Health/ Nursing Track**
	Symposium 1: New Developments in Glomerulonephritis ***Chairperson:*** *Dr Selene Teoh*	**Symposium 1: Paediatric & Early Adulthood Nephrology** ***Chairperson:*** *Ms Noor Haziah Binte Hussain*
1340 - 1410	Clinical Utility of Anti-Nephrin Antibodies in Minimal Change Disease *Prof Yap Hui Kim*	Renal Care in Infancy *Dr Esther Leow*
1410 - 1440	Update on New Therapeutics for the Management of IgA nephropathy *Dr Yeo See Cheng*	Kidney Health in Childhood *Dr Perry Lau*
1440 - 1510	Complement inhibitors in Glomerular Disease *Dr Cynthia Lim*	Psychosocial Management in the Transition of Care from Paediatric Nephrology to Adult Nephrology *Ms Cheng Peizhi*
1510 - 1540	**Afternoon Tea Break + Poster Viewing**	
1540 - 1710	**Symposium 2: KDIGO-SSN Joint Symposium Genetic in Kidney Diseases** ***Chairperson:*** *Dr Lim Ru Sin*	**Symposium 2: Management of Pregnancy in Renal Population** ***Chairperson:*** *APN Esther Huang*
1540 - 1610	Genetics of Alport's and Thin Basement Disease *Prof Judy Savige*	Overview of Chronic Kidney Disease Management in Pregnancy *Ms Katherine Clark*
1610 - 1640	Current Landscape of Genetic Testing in Singapore *A/Prof Ng Kar Hui*	Managing Pregnancy in Patients with Kidney Transplant *Dr Hersharan Kaur Sran*
1640 - 1710	Panel Discussion: Utility of Genetic Testing and Gene Therapy in Kidney Diseases *A/Prof Ng Kar Hui, Prof Judy Savige* *Dr Zhang Yao Chun, Dr Chin Hui-Lin*	Challenges in the Management and Prescribing of Dialysis in Pregnancy *Dr Liu Peiyun*
	End of Day 1	

SCIENTIFIC PROGRAMME

Day 2 - 1st October 2023

	South West Room	North East Room
	Medical Track	**Allied Health/ Nursing Track**
0900 - 0930	**Renal Senior Resident Free Paper Presentation** ***Chairperson:*** *Dr Wong Siow Yi* ***Judges:*** *Dr Sreekanth Koduri, Dr Shilpa Rastogi Dr Allen Liu* Predictors of Post Parathyroidectomy Hypocalcemia in End Stage Renal Disease Patients with Resistant Renal Hyperparathyroidism *Dr Chen Fangxia*	**Symposium 3: Critical Care Nephrology** ***Chairperson:*** *Ms Amy Lim*
0930 - 1000	Schema For Resolution of Genetic Variants of Uncertain Significance in Patients with Suspected Genetic Glomerulopaties in Southeast and South Asians: The Dragon Study *Dr Koh Chee Teck* Traditional Risk Factors and their Severity are Major Determinants of Ethnic Disparities in Singapore Population Kidney Health *Dr Geraldine Boh*	Fluid Assessment, Volume Balance, and Management in Patients with Acute Kidney Injury *Dr Manish Kaushik, Dr (APN) Tan Hui Li*
1000- 1030	Rapid Point-of-Care Test for Diagnosis of Peritonitis in Peritoneal Dialysis Patients *Dr Dorothy Huang* Cost-Effectiveness of Screening for Chronic Kidney Disease in the General Adult Population: A Systematic Review *Dr Wang Hankun* Factors Affecting Unplanned Dialysis Initiation - A Cross Sectional Survey on Patient-Identified Barriers *Dr Samantha Cheong*	Nutrition Management in Patients on Continuous Kidney Replacement Therapy *Ms Hazel Yeong*
1030 - 1100	Honouring End-of-Life Care for The End Stage Kidney Disease on Conservative Non-Dialysis Therapy *Dr Ivan Lee Wei Zhen* Validation of Urine Clusterin and Monocyte Chemoattractant Protein-1 In Predicting Drug-Induced Acute Kidney Injury with A 2-Day Lead Time *Dr Nor Islya Emma*	Antibiotics and Drug Dosing in Sepsis and Continuous Kidney Replacement Therapy *Dr Teh Swee Ping*
1100 - 1130	**Morning Tea break + Poster Viewing**	
1130 - 1140	**SSN Achievement Award 2023 Presentation**	
1140 - 1210	**16th Lim Cheng Hong Lectureship** A Shared Vision: Developing a National Kidney Disease Registry *A/Prof Jason Choo*	
1210 - 1230	**Remembering Dr Gordon Ku**	

SCIENTIFIC PROGRAMME

Day 2 - 1st October 2023

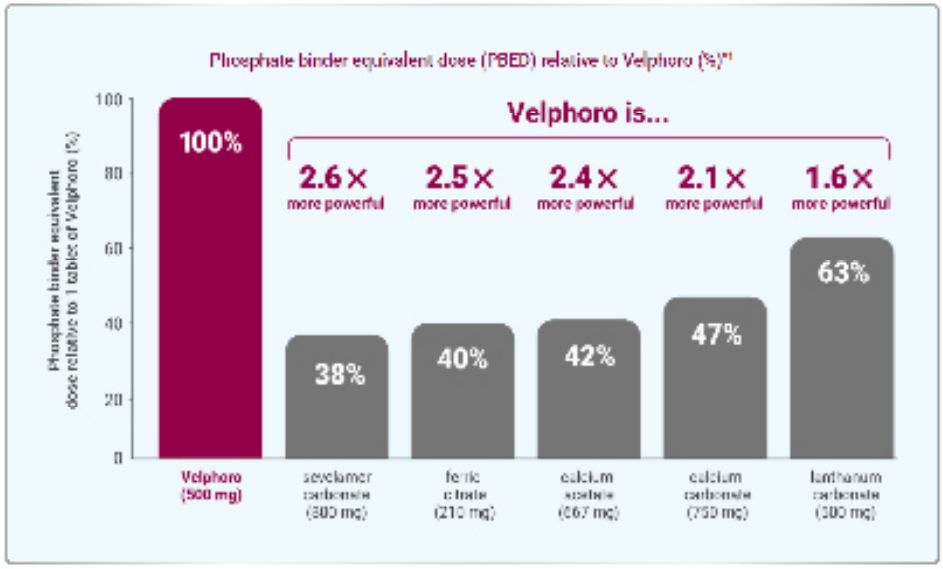
	South West Room	North East Room
1230 - 1330	**Lunch Symposium 3** **Hope for ADPKD: First FDA approved treatment for ADPKD** *Speaker: Prof Carol Pollock* *Chairperson: Dr Christopher Leo* (Educational Grant from Otsuka)	**Lunch Symposium 4** **Advancements in clinical management of CKD-AP, with Difelikefalin (DFK): An anti-itch solution specifically for CKD patients** *Speaker: Prof Gert Johann Mayer* *Chairperson: Dr Derrick Aw Chen Wee* (Educational Grant from CSL Vifor)
1330 - 1500	**Symposium 3: KDIGO-SSN Joint Symposium** **Onco-nephrology** ***Chairperson:*** *Dr Da Yi*	**Symposium 4: Peritoneal Dialysis** ***Chairperson:*** *APN Kelly Lim*
1330 - 1400	Managing Nephrotoxicity in Targeted, Immune and Cellular Oncology Therapy *Dr Jolanta Malyszko*	Wearables in Peritoneal Dialysis *Dr Htay Htay*
1400 - 1430	Approach to Monoclonal Gammopathy of Renal Significance (MGRS) - Case Discussion *Dr Chandramouli Nagarajan*	Home-based Therapy- Is Peritoneal Dialysis Superior to Haemodialysis? *Ms Pauline Tan*
1430 - 1500	Panel Discussion: Management of Onco-Hypertension from Renal and Cardiology Perspective *Dr Jolanta Malyszko, Dr Tan Li Ling, Dr Tan Hui Zhuan*	Achieving Individualised Clearance Goals - Is Incremental Peritoneal Dialysis a Good Choice? *Dr Penelope Wong*
1500 - 1530	**Afternoon Tea Break + Poster Viewing**	
1530 - 1700	**Symposium 4: KDIGO-SSN Joint Symposium** **Chronic Kidney Disease Updates** ***Chairperson:*** *Dr Lim Eng Kuang*	**Symposium 5: Advances in Haemodialysis and Vascular Access** ***Chairperson:*** *APN Veronica Loh*
1530 - 1600	Updates on the Management of Anaemia of CKD *Dr Titus Lau*	Advances and Newer Technology in Dialysis *Dr Timothy Koh*
1600 - 1630	Updates on the Management of Fragility Fractures in elderly CKD patients with MBD-CKD and osteoporosis *Dr Ng Chee Yong*	High Performance Dialyser *Dr Liew Zhong Hong*
1630 - 1700	Updates on the Management of Pregnancy in Patients with Kidney Diseases *Dr Priscilla Smith*	New 'Kid' on the Block - EndoAVF *Dr Pang Suh Chien*
1700 - 1710	**Award Presentation: Best Free Paper Presentation, Best Renal Senior Resident Award, Best Poster Presentation**	
End of Meeting		

FRESENIUS KABI
caring for life

VELPHORO®
sucroferric oxyhydroxide

UNIQUELY VELPHORO: THE MOST POTENT PHOSPHATE BINDER[1]

Velphoro is 2.6x more powerful than 1 tablet of sevelamer[1]



Based on an analysis of comparative clinical studies that roughly established an equivalent dose for phosphate binders relative to the phosphate binding capacity of calcium carbonate.[1]

References: 1. Coyne DW, Larson DS, Delmez JA. Bone disease. In: Daugirdas JT, Blake PG, Ing TS, eds. *Handbook of Dialysis.* 5th ed. Wolters Kluwer Health; 2015:665-692.

FRESENIUS KABI
caring for life

Further information is available upon request
For healthcare professionals only

Fresenius Kabi (Singapore) Pte Ltd
238A Thomson Road
#24-03/05 Novena Square Tower A
Singapore 307684
T +65 6837 2552
F +65 6837 2442

PI/SG/VEL/0823/002

ORAL PRESENTATIONS

Predictors of Post Parathyroidectomy Hypocalcemia in End Stage Renal Disease Patients with Resistant Renal Hyperparathyroidism

Fangxia CHEN[1], Wan Limm LOOI[1], Zi Kheng TAN[1], See Cheng YEO[1], Manohar BAIRY[1]

[1]Tan Tock Seng Hospital, Singapore

Background: Hypocalcemia following parathyroidectomy for resistant renal hyperparathyroidism (rRHPT) is a major complication that is preventable yet highly prevalent despite protocolized management. We aimed to determine the predictors of post-operative hypocalcemia in our centre in order to aid review of the current centre protocol.

Methods: 75 ESRD patients who underwent parathyroidectomy for rRHPT between 05/2016 and 10/2022 were enrolled. We collected patients' demographic data, serum levels of albumin, calcium, phosphate, intact parathyroid hormone(iPTH), alkaline phosphatase(ALP), doses of phosphate binders (calcium-based and non-calcium-based), vitamin D and cinacalcet before and for up to seven days after parathyroidectomy. ROC curves with AUC for iPTH and ALP levels against hypocalcemia were used to determine cutoffs. Multivariable logistic regression model was used to determine the odds ratio. As the incidence rate of the outcome was high, generalized linear models using Poisson regression with robust error variance were used to estimate relative risk.

Results: 37 men and 38 women with mean age of 53.8±11.4years at the time of surgery were enrolled. The median serum iPTH and ALP levels were 169.8pmol/L (IQR 113.7, 266.7) and 272U/L (IQR 169, 463) respectively. The mean dialysis vintage was 73.4months. 43(57%) patients developed severe hypocalcaemia (<2mmol/L). Patients with severe hypocalcaemia had higher median pre-operative serum iPTH and ALP levels (216pmol/L vs.129.75pmol/L, 380U/L vs. 220.5U/L respectively) and significantly longer post-operative hospitalization (10.5 vs 4.3days). Pre-operative iPTH level was the only significant predictor of hypocalcemia. iPTH level >166pmol/L had 72% sensitivity and 73% specificity for predicting post-operative hypocalcaemia with a relative risk of 2.00 [95% CI 1.27-3.33], p=0.003.

Conclusion: Pre-operative iPTH levels >166pmol/L can predict post-parathyroidectomy hypocalcemia in ESRD patients. A clinical protocol utilising this iPTH level for risk stratification to determine frequency of calcium level monitoring and calcium and vitamin D supplementation in the perioperative period may help reduce the risk of hypocalcemia.

Schema for Resolution of Genetic Variants of Uncertain Signifance in Patients with Suspected Genetic Glomerulopaties in Southeast and South Asians: The Dragon Study

Chee Teck KOH[1], Yaochun ZHANG[1,2], David Liangjian LU[1], Hui-Lin CHIN[1], Hui Kim YAP[1,2], Kar Hui NG[1,2]

[1] Khoo Teck Puat-National University Children's Medical Institute, National University Health System, Singapore

2 Department of Paediatrics, Yong Loo Lin School of Medicine, National University of Singapore, Singapore

Background and Hypothesis: Multinational studies have reported about 20-30% of children with steroid-resistant nephrotic syndrome with genetic causes. Genetic testing may direct treatment and disease prognostication. As there are no large-scale studies on the genetics of glomerular disease in Asia, we established DRAGoN (Deciphering Diversities: Renal Asian Genetics Network), aimed to describe the genetic and clinical spectrums in Asians. We hope to develop a variant curation pipeline particularly to resolve the variant of uncertain significance (VUS).

Methods: We prospectively studied 124 probands with suspected genetic glomerulopathies from South and Southeast Asia (20% with positive family history and 15% with parental consanguinity). Targeted analysis of 90 glomerular genes was performed. Variant calling and filtering was based on Genome Analysis Tool-kit (GATK) best practice while variant classification was based on the American College of Medical Genetics and Genomics guidelines. VUS with high pathogenic likelihood were curated using a pipeline tailored to the characteristics of the patients and variants. These include literature search, familial variant testing, protein structure assessment, and functional studies (Figure).

Results: We identified 37 (likely) pathogenic variants in 32 (26%) probands. Of these, 24 variants (65%) were excluded due to discordance with modes of inheritance (18 variants) or phenotypes (6 variants). We identified 34 VUS with high pathogenic likelihood in 27 (22%) probands. Further steps for VUS resolution included more detailed phenotype elaboration in 26 variants, parental testing for de-novo status in 16 variants, familial segregation studies in six variants, detailed literature search in one variants and functional study three variants. Two WT1 variants have been upgraded to likely pathogenic status after assumed de-novo status confirmation. Overall, genetic diagnosis was attained in 13 probands (11%), of whom almost one third had Alport syndrome.

Conclusions: A VUS resolution pipeline can allow for systematic analysis and potentially increase diagnostic accuracy and yield.

Traditional Risk Factors and their Severity are Major Determinants of Ethnic Disparities in Singapore Population Kidney Health

Boh Geraldine1, Weng Wanting1,2, Ooi Xi Yan1,2, Yeo See Cheng1,2
1Department of Renal Medicine, Tan Tock Seng Hospital
2Lee Kong Chian School of Medicine, Nanyang Technological University

Background: In Singapore, the prevalence of chronic kidney disease (CKD) and kidney failure is higher in ethnic minorities, compared to Chinese, for which the cause is unknown. Our study aims to examine the traditional, non-traditional, and socio-economic determinants of CKD using a large, ethnically-diverse, representative population cohort.

Methods: Demographics, socio-economic, clinical, and laboratory data were evaluated in a cross-sectional study to evaluate the association of risk factors and its interaction with race, for the primary outcome of advanced CKD (defined as estimated glomerular filtration rate, eGFR<60ml/min/1.73m^2). Causal inference was examined through causal directed acyclic graphs.

Results: 9,931 individuals were included, with mean age±standard deviation (SD) of 54.7±11.7 years and 5,923(59.6%) females. 6,734(67.8%) were Chinese, 939(9.5%) Malays, 1,575(15.9%) Indians and

683(6.9%) other races. Prevalence of hypertension was 20.3%, with diabetes 9.3%, obesity 12.6% and dyslipidaemia 36.2%. The mean eGFR±SD was 94.8±13.9 ml/min/1.73m^2, with eGFR<60ml/min/1.73m^2(95% confidence interval, CI) in 1.6%(1.3-1.8%) (n=156).

Odds ratio (OR) of eGFR<60ml/min/1.73m^2 was 1.66 (95%CI:1.19-2.32, p=0.003) for ethnic minorities, compared to Chinese (adjusted for age and gender), with highest OR 2.43 (95%CI:1.45- 4.10) in Malays, followed by OR 2.21 (95%CI:1.27-3.85) in others, and OR 1.19 (95%CI:0.75-1.89) in Indians. Higher prevalence and increased severity of traditional risk factors amongst the ethnic minorities, associates with increased risk for eGFR<60ml/min/1.73m^2 , with no effect modification by race (p for interaction>0.05) (Figure 1). Lower education level, but not income, associates with increased prevalence of eGFR<60ml/min/1.73m^2, with no effect modification by race (p for interaction>0.05). Ethnic minority is no longer associated with increased risk of eGFR<60ml/min/1.73m^2 (OR 0.90, p=0.605), after model adjustment.

Conclusion: Higher prevalence and increased severity of traditional risk factors contribute to higher prevalence of advanced CKD in ethnic minorities, while race (in itself) and socio-economic factors do not. These findings will guide CKD prevention, screening, and treatment strategies in multi-ethnic Singapore.

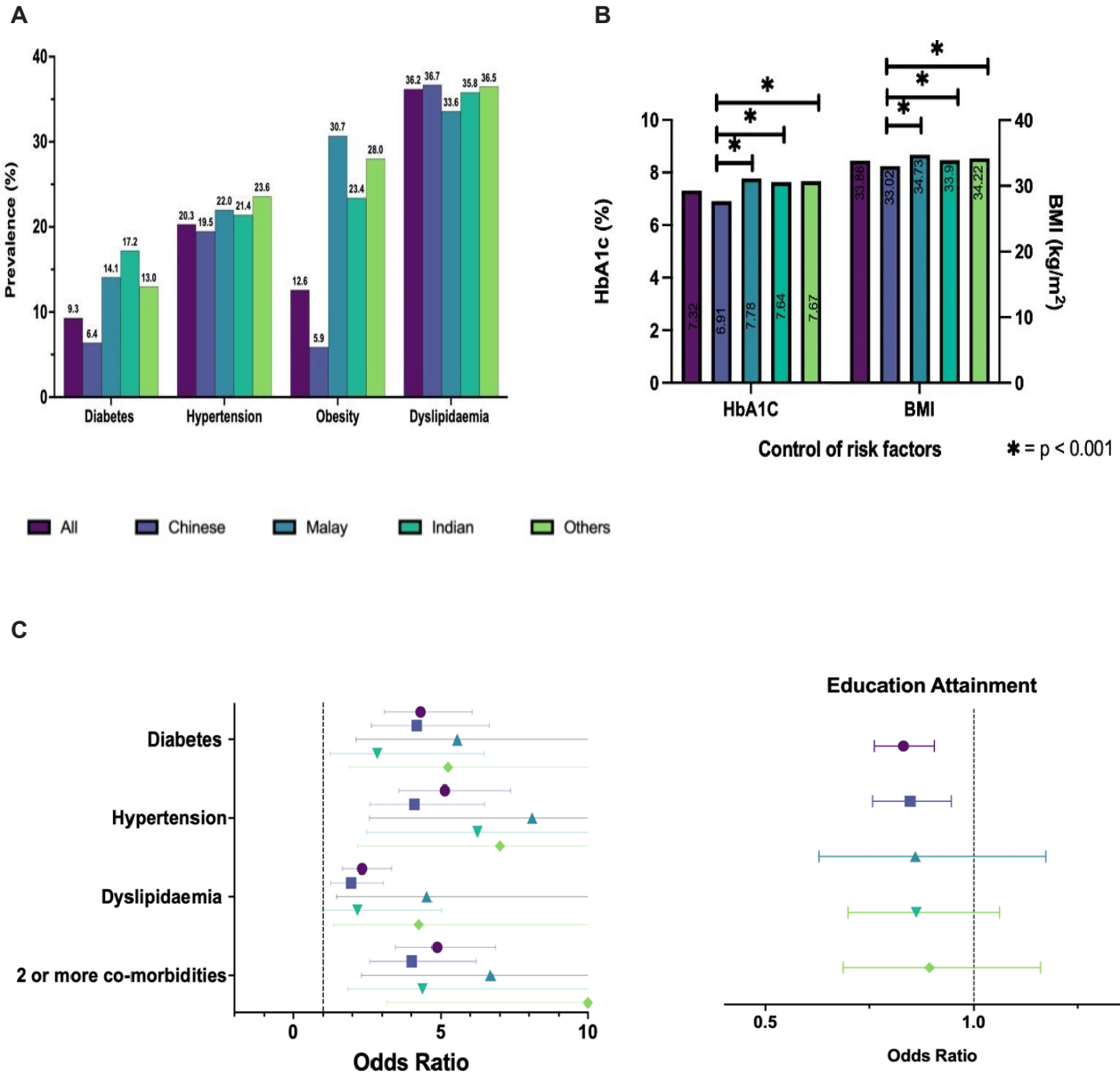


Figure 1 A: Prevalence of traditional risk factors amongst ethnic groups, showing higher prevalence of diabetes, hypertension and obesity in ethnic minorities ($p<0.05$), but not dyslipidemia ($p=0.30$).

B: Severity of traditional risk factors amongst ethnic groups shows higher HbA1C amongst diabetics and higher BMI amongst those with obesity in ethnic minorities ($p<0.001$). C: Odds ratio of advanced CKD according to traditional risk factors by race ($p>0.05$ for interaction). D: Odds ratio of advanced CKD by education attainment according to race ($p>0.05$ for interaction).

BMI, body mass index; CKD, chronic kidney disease; HbA1C, glycated haemoglobin

Rapid Point-of-Care Test for Diagnosis of Peritonitis in Peritoneal Dialysis Patients

Dorothy HUANG1, Marjorie Wai Yin FOO1, Jason Chon Jun CHOO1, Mathini JAYABALLA1, Riece KONIMAN1, Elizabeth Ley OEI1, Chieh Suai TAN1, Sin Yan WU1, Htay HTAY1

1Singapore General Hospital

Background and Hypothesis: Peritonitis is a serious complication of peritoneal dialysis, and delayed diagnosis and treatment is associated with increased technique failure and mortality. Periplex® is a rapid point-of-care test based on the detection of Interleukin 6 (IL-6) or matrix metalloproteinase-8 (MMP-8) in the effluent to diagnose peritonitis. This study evaluated the performance of Periplex® at the time of presentation as well as at recovery of peritonitis.

Methods: The study was a single-center study, conducted in Singapore General Hospital between 2019 and 2022. PD patients presenting with symptoms suspicious of peritonitis were recruited. Periplex® was performed at presentation and again within 2 weeks after completion of antibiotics (recovery of peritonitis). Peritonitis was diagnosed per ISPD Guidelines criteria. Primary outcomes were sensitivity and specificity of Periplex® at presentation. The positive and negative predictive values of tests were also assessed.

Results: A total of 120 patients were included in the study. The mean age was 60.9 ± 14.9 years, 53% were male, 79% were Chinese, and 47.5% had diabetes mellitus. Periplex® was positive in all patients with peritonitis (n=114) regardless of the types of PD solutions used; sensitivity of 100%; 95% confidence interval (CI): 100 -100%. Periplex® was falsely positive in 3 patients with non-infective eosinophilic peritonitis, resulting in low specificity of 50%; 95% CI: 41.1 - 59.0%. Periplex® had a positive predictive value (PPV) of 97.4% and a negative predictive value (NPV) of 100%. During recovery from peritonitis, Periplex® had high specificity (93.6%) and NPV (98.7%) to indicate resolution of infection. MMP-8 was more sensitive than IL-6 in detecting peritonitis.

Conclusions: Periplex® had high sensitivity, positive and negative predictive values in the diagnosis of peritonitis and can be considered as a screening tool for peritonitis. Given its high specificity and negative predictive value, it may also be used to document the resolution of peritonitis.

Cost-Effectiveness of Screening for Chronic Kidney Disease in the General Adult Population: A Systematic Review

Hankun Wang1, See Cheng Yeo1, Yee Gary Ang2, Chee Kong Lim3, Xi Yan Ooi1

1Department of Renal Medicine Tan Tock Seng Hospital, Singapore

2Health Services & Outcome Research National Healthcare Group, Singapore

3National Healthcare Group Polyclinic, Singapore

Background and Hypothesis: Chronic kidney disease (CKD) is a significant public health problem, with rising incidence and prevalence. Early identification and treatment of CKD can slow progression and prevent complications, but it is unclear if CKD screening is cost-effective. This study aims to conduct a systematic review of the cost-effectiveness of CKD screening strategies in adult populations, and to identify drivers of cost-effectiveness in CKD screening.

Methods: Systematic literature search on studies comprising health economic evaluations of CKD screening strategies, compared against no screening or usual-care strategy, was performed. The primary outcome is the incremental cost-effectiveness ratio (ICER) of CKD screening, in cost per quality-adjusted life year (QALY) and life-year gained (LYG), expressed in 2022 US dollars equivalent.

Results: 21 studies were identified. The cost-effectiveness of screening for CKD varied widely, with ICERs ranging from $113 to $430,595, with a median of $26,662 per QALY, and from $6,516 to $38,372, with a median of $29,112 per LYG. Based on the pre-defined cost-effectiveness threshold of $50,000 per QALY, majority of the studies found CKD screening cost-effective. ICERs of selected subpopulations and screening strategies are shown in Figure 1. Cost-effectiveness improved when screening is performed in high-risk patients (diabetics, high-risk ethnic groups, older adults). Home-based programmes using home urinalysis screening demonstrated cost savings of $2,884 per patient per lifetime. Inclusion of cardiovascular consequences of CKD in economic analysis further improved cost-effectiveness. Existing studies incorporate only the effects of angiotensin-converting enzyme inhibitor and angiotensin-receptor blockers. With recent therapeutic advances including sodium-glucose cotransporter-2 inhibitors, nonsteroidal selective mineralocorticoid receptor antagonists, and glucagon-like peptide 1 receptor agonists, slowing CKD progression and reducing cardiovascular complications have become increasingly effective, and may further improve cost effectiveness of screening.

Conclusions: Screening for CKD is cost-effective, especially in high-risk patient groups. Newer therapeutics and rethinking screening approaches to include home-based screening may further improve cost-effectiveness.

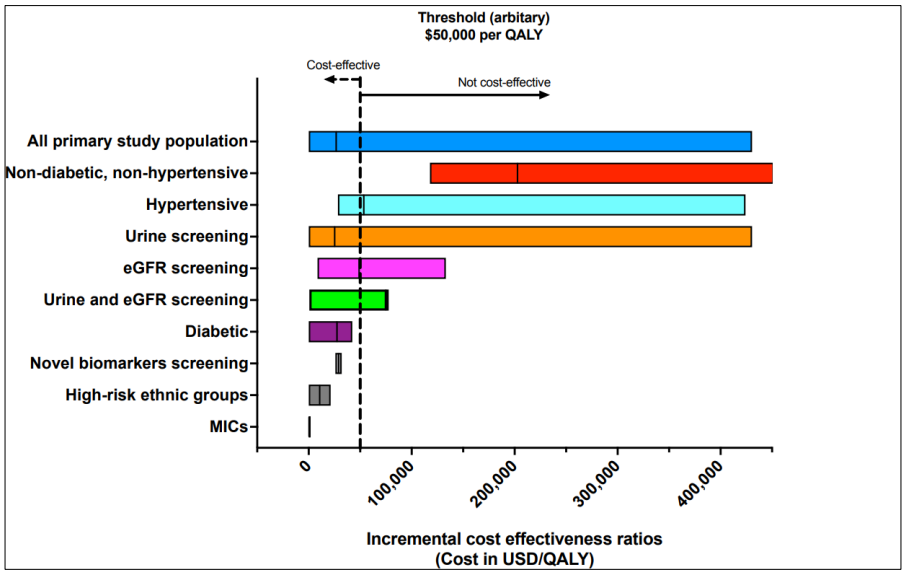


Figure 1: Plot comparing reported incremental cost-effectiveness ratios in selected sub-populations and for various screening strategies. Each bar represents the range of ICERs reported with the line showing the median value. $50,000 ICER threshold was pre-defined to demonstrate cost-effectiveness (left of vertical dotted line) or not cost-effective (right of vertical dotted line). MICs: Middle-income countries.

Factors Affecting Unplanned Dialysis Initiation - A Cross Sectional Survey on Patient-Identified Barriers

Samantha Hui Ling Cheong1, Jia Hong Koh2, Christopher Cheang Han Leo3 Emmett Tsz Yeung Wong1, Wei-Zhen Hong1, Priyanka Khatri1

1Division of Nephrology, Department of Medicine, National University Hospital, Singapore, Singapore

2Department of Medicine, National University Hospital, Singapore, Singapore

3Nephrology and Dialysis Services, Raffles Internal Medicine Centre, Raffles Hospital, Singapore, Singapore

Background and Hypothesis: Unplanned dialysis initiation is associated with higher mortality and morbidity than elective dialysis starts. Among patients who underwent emergent unplanned haemodialysis (HD) initiation, we aimed to determine patient-reported factors influencing initial decision against elective initiation. To identify gaps in current peri-dialysis education, we studied changes in patient perspectives pre- and post-dialysis.

Methods: We conducted interviews using survey questionnaires in 32 haemodialysis patients at outpatient nephrology clinics at National University Hospital, Singapore.

The study population included End-Stage Kidney Disease (ESKD) patients more than 21 years old who initiated dialysis without an existing dialysis access from June 2019 to May 2020. We excluded patients who had a delay in access creation because of system factors, required interim dialysis while awaiting kidney transplantation, and patients lacking mental capacity. Surveys were conducted from August 2020 to July 2021.

Results: Majority of our study population were males (n=23, 72%) and of Malay ethnicity (n=14, 44%). The most common patient reported factor for initial dialysis refusal was financial concerns (n=30, 94%), followed by concerns over lower quality of life (n=26, 81%), fear of dialysis making overseas travel challenging (n=23, 72%), fear of undergoing surgery for access creation (n=23, 72%), and fear of dialysis dependence (n=22, 69%). Factors convincing patients to initiate urgent start dialysis included doctor's recommendations (88%), worsening symptoms from progression of kidney disease (n=22, 69%), family and social support (n=13, 40%). Study participants felt that listening to experiences from dialysis patients (n=19, 59%) and in-person viewing of the dialysis centre (n=17, 53%) would have helped convince them for elective dialysis start instead.

Conclusions: Proposed strategies to improve uptake of elective dialysis initiation include dialysis centre visits, counselling on potential lifestyle changes post-dialysis initiation, earlier nephrology referrals for timely discussions about dialysis, involving family in decision-making, and catering pre-dialysis education to individual needs.

Honouring End-of-life Care for the End Stage Kidney Disease on Conservative Non-dialysis Therapy

Ivan Wei Zhen LEE1, Swee Ping TEH2, Mee Horng LAI3, Edwin Boon Howe LIM3, Shashidhar BUIKUNJE2, Lee Ying YEOH2.

1SingHealth Residency, MOHH Holdings, Singapore.

2Department of Renal Medicine, Sengkang General Hospital, Singapore.

3Tzu Chi Foundation, Singapore.

Background and Hypothesis: Ren al Conservative Care (RCC) program focuses on supportive care to promote good quality of life, advance care plan (ACP) and timely transition to hospice services for patients with End Stage Kidney Disease (ESKD) who have opted for Conservate Kidney Management (CKM) through a multidisciplinary approach. Objective of this study was to assess whether their preferred place of death was honoured.

Methods: This is a single center, prospective observational study on ESKD patients opted for CKM from May 2021 to June 2023. Patients with dialysis withdrawal were excluded. The place of demise was obtained and compared with the preferred place of death recorded in their ACP.

Results: A total of 86 patients were enrolled into the RCC program and 3 were transferred to another institution. Analyses were done for 83 patients with mean age of 79 years, mean eGFR of 10.1ml/min and mean Charlson Co-morbidity Index (CCI) of 9 at enrolment. By June 2023, 40(48.2%) patients remain on active follow-up, 32(38.6%) died, and 11(13.3%) were started on dialysis. Median duration under RCC program was 7.7 month (IQR 0.2- 23.1). ACP was initiated in 68 (81.9%) patients, of which 46 completed. Amongst the deceased, their mean age was 78 years, CCI was 9 and median final eGFR was 6.5ml/min (IQR 4-10). There were 17 patients with accessible ACP prior to demise. Preferred place of death was home (8), no preference (6) and hospice or hospital (3). The actual place of death was home (6), hospital/ hospice (11). Therefore, 14(82.4%) had concordance with their preferred place of death, whilst 3(17.6%) preferred home but demised at the hospital/ hospice.

Conclusions: RCC provides holistic integrated care which respects patient's goal of care and honouring their wishes. A dedicated multi-disciplinary teamwork is crucial to ascertain the consistency of care plan.

Validation of Urine Clusterin and Monocyte Chemoattractant Protein-1 in Predicting Drug-Induced Acute Kidney Injury with A 2-Day Lead Time

Nor Islya Emma OTHMAN1, K AKALYA1, Yi DA1, Wei Zhen HONG1,2, Liang Piu KOH3,5, Hui-Kim YAP4,5, Horng-Ruey CHUA1,5

1Division of Nephrology, Department of Medicine, National University Hospital.

2Fast and Chronic Programmes, Department of Medicine, Alexandra Hospital.

3Department of Haematology and Oncology, National University Hospital.

4Division of Paediatric Nephrology, Dialysis and Renal Transplantation, Department of Paediatrics, National University Hospital.

5Yong Loo Lin School of Medicine, National University of Singapore.

We have published that elevated urine clusterin, MCP1, β2MG, KIM1 and cystatin-C predict drug-induced AKI in patients receiving nephrotoxic drugs (vancomycin, aminoglycosides and calcineurin inhibitors) with a 1–3 days lead-time. We aim to validate the best-performing biomarkers for drug-induced AKI prediction in susceptible patients.

We first determined the reproducibility of the five proposed biomarkers to predict AKI using a multiplex assay in 13 drug-induced AKI patients and 13 non-AKI controls. We subsequently conducted a prospective single-centre study of 137 patients receiving nephrotoxic drugs. Urine samples were collected 2–5 days before AKI onset by KDIGO criteria or before the end of nephrotoxic therapy in non-AKI patients. The primary analysis was the ability of the selected biomarkers to predict AKI with a 2-day lead time using respective ELISA assays.

Urine clusterin, MCP1, β2MG yielded consistent AKI prediction with respective AUCs of 86%, 75%, 74%, and were superior to that of KIM1 and cystatin-C in the initial 26 patients. Of the validation cohort of 137 patients, 28% developed AKI. AKI and non-AKI patients had a similar mean age of 55 years, with AKI patients having a higher baseline eGFR than non-AKI patients (104 vs 98 mL/min/1.73m2 respectively, p=0.01). Median biomarker levels were higher in AKI cases vs non-AKI patients (p<0.0001 for clusterin and MCP1, p=0.03 for β2MG). Their AUCs for AKI prediction were 73(64-82)% with clusterin, 77(68-86)% with MCP1, and 62(51-72)% with β2MG. A single urine Clusterin >150 ng/mL or MCP1 >200 pg/mL predicted AKI with an 87% sensitivity but only 37% precision. A repeat Clusterin >500 ng/mL and MCP1 >600 pg/mL predicted AKI with an improved precision of 61%.

Urinary clusterin >150 ng/mL or MCP1 >200 pg/mL predicts drug-induced AKI by 2 days prior with high sensitivity, with an improved precision achieved by further elevations of both biomarkers

POSTER PRESENTATIONS

Early Return to Peritoneal Dialysis after Hernia Repair: A Single-Center Experience in Singapore

Faith Huiwen SEE1, Wei-Zhen HONG1, Martin Beng-Huat LEE1

1Division of Nephrology, National University Hospital

Background and Hypothesis: Peritoneal dialysis (PD) patients undergoing abdominal wall hernia repair may be converted to hemodialysis (HD) for fear that early resumption of low volume PD may cause surgical complications or provide inadequate dialysis. We present our center's experience from 2020 to 2022.

Methods: A single centre observational study of our prevalent PD patients with hernias was conducted.

Results: 20 of 271 prevalent PD patients (7%) had abdominal wall hernias identified clinically or radiologically. Total prevalence of hernias is expected to be higher. 16 of 20 patients (80%) underwent hernia repair, with 4 patients (20%) awaiting surgery.

Of the 16 patients repaired, 3 patients (19%) with low residual kidney function (RKF) of 250ml urine/day or less and median vintage of 36 months (range 20-49 months) were electively converted to long term HD. The 13 patients (81%) remaining on PD had better RKF (median urine volume 624ml/day, range 100-1500ml) and a shorter PD vintage of 27 months (0-71 months).

Post-operatively, 9 of 13 patients (69%) successfully resumed low volume peritoneal dialysis within the first week. Of these, 6 patients (46%) restarted PD on the first post-operative day, 1 patient (8%) on the 3rd day, and 2 patients (15%) on the 7th day. 5 of 13 patients (38%) required supplemental post-operative HD, of which only 3 (23%) needed HD beyond the first week. Patients that needed supplemental HD, compared to those that did not, had median BMI (28.7 vs 27), PD vintage (26 vs 31 months) and RKF (764 vs 505 ml) respectively. 11 of 13 patients (85%) received hernia repair with a mesh. No patient restarted on PD developed leakage, wound hematoma, or infection in the immediate 30-days post-operatively or at 1 year follow-up.

Conclusion: Early return to PD after hernia repair is compatible with good outcomes and no/minimal need for prolonged HD.

Valvular Heart Disease in End-Stage Kidney Disease Patients on the Transplant Waitlist

Yan Nerng LYE1, Quan Yao HO2,3, Choong Hou KOH4, Yann Shah KEH4, Haoyang CHEN1, Shan-Yeu Carolyn TIEN2,3, Ian Tatt LIEW2,3, Sobhana THANGARAJU2,3, Zi Hui Sharel ONG2,3, Chin Yee LEE2,3, Terrance Siang Jin CHUA4, Khung Keong YEO4, Terence KEE2,3

1Yong Loo Lin School of Medicine, National University Singapore

2Department of Renal Medicine, Singapore General Hospital, Singapore

3SingHealth Duke-NUS Transplant Centre, Singapore

4Department of Cardiology, National Heart Centre Singapore, Singapore

Background and Hypothesis: Valvular heart disease (VHD) is a risk factor for adverse outcomes in end-stage kidney disease (ESKD) patients but its impact on patients on the local kidney transplant waitlist is unclear. We hypothesize that VHD is an independent risk factor for mortality in our ESKD patients on the transplant waitlist.

Methods: This is a single-center retrospective cohort study including ESKD patients who were referred for transplant waitlist placement from May 2008 to February 2021 and had undergone transthoracic echocardiogram (TTE). Significant VHD was defined as valvular lesions that were moderate or severe on TTE.

Results: Of the 512 patients included, 89 (17.4%) had significant VHD. The most common significant valvular lesions were tricuspid regurgitation (9.0%), mitral regurgitation (MR, 8.6%), and aortic regurgitation (2.1%). VHD was associated with longer median dialysis duration (38.0 vs 18.0 months, p=0.04).

All-cause mortality was associated with presence of any significant VHD (hazard ratio (HR) 1.55, 95% confidence interval (CI) 1.01-2.36, p=0.04), left-sided VHD (LVHD) (HR 1.76, 95% CI 1.10-2.81, p=0.02) and aortic stenosis (AS) (HR 5.80, 95% CI 2.36-14.3, p<0.0001, Figure 1A) and remained significant after adjustment for age, diabetes mellitus and history of cardiovascular disease (VHD: adjusted HR (aHR) 1.57, 95% CI 1.02-2.42, p=0.04; LVHD: aHR 1.92, 95% CI 1.19-3.10, p=0.01; AS: aHR 2.93, 95% CI 1.15-7.46, p=0.02).

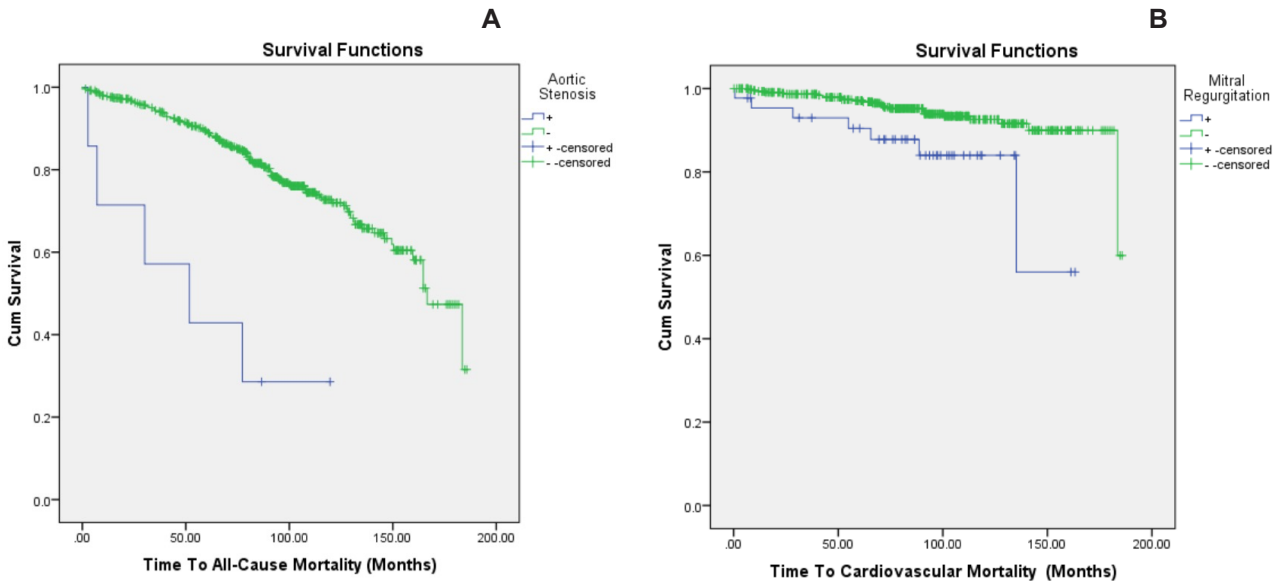
With non-cardiovascular mortality as a competing event, LVHD (sub-distribution HR (SHR) 2.54, 95% CI 1.13-5.70, p=0.03, Figure 1B) and MR (SHR 2.94, 95% CI 1.27-6.84, p=0.02) were significantly associated with cardiovascular mortality and remained significant after adjustment for age, diabetes mellitus and history of cardiovascular disease (LVHD: aSHR 2.68, 95% CI 1.15-6.24, p=0.02; MR: aSHR 3.33, 95% CI 1.38-8.03, p=0.007).

Conclusions: VHD, particularly AS and MR, may be an independent risk factor for mortality in ESKD patients on the kidney transplant waitlist. Prolonged dialysis may be associated with VHD

Table 1. Prevalence of Valvular Heart Disease (VHD) in End-stage Kidney Disease Patients Referred for Transplant Waitlist Placement

Type of VHD	Any, n (%)	Mild, n (%)	Moderate, n (%)	Severe, n (%)
Mitral Regurgitation	135 (26.4%)	91 (17.8%)	41 (8.0%)	3 (0.6%)
Mitral Stenosis	11 (2.2%)	9 (1.8%)	2 (0.4%)	0 (0.0%)
Aortic Regurgitation	50 (9.8%)	39 (7.6%)	10 (2.0%)	1 (0.2%)
Aortic Stenosis	12 (2.3%)	5 (1.0%)	5 (1.0%)	2 (0.4%)
Tricuspid Regurgitation	113 (22.1%)	67 (13.1%)	37 (7.2%)	9 (1.8%)
Tricuspid Stenosis	1 (0.2%)	1 (100%)	0 (0.0%)	0 (0.0%)
Pulmonary Regurgitation	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Pulmonary Stenosis	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

Figure 1. Kaplan-Meier Survival Curves for (A) All-Cause Mortality by Patients With and Without Significant Aortic Stenosis (B) Cardiovascular Mortality by Patients With and Without Significant Mitral Regurgitation



Transitioning Dialysis Modality from Haemodialysis to Peritoneal Dialysis: A Single Centre Retrospective Study

Shanti TAN1, Penelope WONG1

1National Health Group, Tan Tock Seng Hospital

Background and Hypothesis: Transition between dialysis modalities should be included in a patient's life plan when discussing renal replacement therapy. Patients who are on haemodialysis (HD) may encounter issues with vascular access, including catheter related complications, difficult or failed fistula creation or have lifestyle preferences that lead them to transition to peritoneal dialysis (PD). The outcome of patients who switch from HD to PD (PD-switch) is poorly studied and few studies have looked at survival after PD-switch.

Methods: This is a retrospective single-centre study of patients who transitioned from HD to PD between 2006 to 2018. Reasons for PD-switch and outcomes after PD-switch were analysed. Study outcomes were censored at 1/1/2022.

Results: 45 patients (age 61±14 years, 66% female, 79% diabetes) transitioned from HD to PD. HD vintage prior to PD switch was 1192 (±838) days. 91% (41/45) patients transitioned to PD for poor vascular access with 73% (30/41) having had ≥2 prior vascular accesses created.

At the end of the study period, survival of all patients after PD-switch was 1151 (±1192) days with a duration of 800 (± 908) days on PD-switch.

PD-switch resulted in a significant reduction of hospitalizations (5.1 vs 1.9) when comparing admissions 1-year pre and post PD-switch ($p<0.05$).

31% (14/45) of patients required conversion back to HD, with 64% (9/14) converting back to HD due to PD peritonitis. The average duration on PD-switch before conversion back to HD was 576 (± 416) days.

Conclusions: PD-switch resulted in reduced hospitalisations in the year following PD-switch. Majority of PD-switch patients remain on PD. PD peritonitis was the main reason for conversion back to HD. In a subsequent study, we will aim to compare the outcomes of PD-switch patients to PD-first patients or HD-only catheter-based patients who have not converted to PD.

A Case Report and Review of Early Post-Transplant Phosphate Nephropathy

Yuan Kai TEH1, Shihleone LOONG2, Ian Tatt LIEW3,4
1Department of Renal Medicine, Tan Tock Seng Hospital, Singapore
2Department of Anatomical Pathology, Singapore General Hospital, Singapore, 169608, Singapore
3Department of Renal Medicine, Singapore General Hospital, Singapore, Singapore.
4Singhealth Duke-NUS Transplant Centre, Singapore, Singapore.

Background: Acute phosphate nephropathy (APN) is characterised by calcium-phosphate precipitates within the tubules and interstitium, classically described following the use of sodium-phosphate containing bowel purgative.1,2 Early (within 2 months of transplantation) APN amongst kidney transplant recipients (KTRs) are limited to scattered case reports [Table 1].3,4,5,6,7 We describe a case of early APN in a KTR with review of the literature.

Case: A 21-year-old Chinese man with end-stage kidney disease secondary to chronic glomerulonephritis on peritoneal dialysis received a living donor kidney transplantation from his father. His mineral and bone disorder (MBD) was treated with Lanthanum Carbonate and Cinacalcet 25mg/day. At time of transplantation, his corrected serum calcium (cCa) was 2.43mmol/L, serum phosphate (PO4) was 1.60mmol/L, and intact parathyroid hormone (iPTH) was 99.3pmol/L.

He had immediate graft function with a nadir serum creatinine of 77umol/L. He became hypophosphatemic requiring oral PO4 replacement averaging 32mmol elemental PO4 replacement/day. 3 weeks post-transplantation, his allograft function deteriorated unexpectedly with serum creatinine rising to 158umol/L. Urine microscopic examination was unremarkable, urine protein:creatinine ratio of 0.15g/g. PO4 was 1.0mmol/L, cCa was 2.52mmol/L and iPTH 24pmol/L.

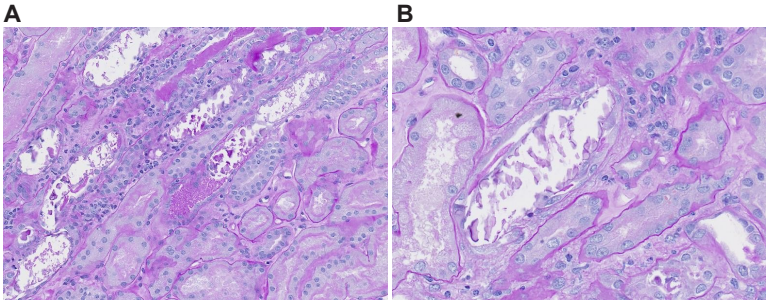
Allograft biopsy showed APN [Figures 1].

24-hour urinary citrate was low at 0.42mmol/day. PO4 supplementation was ceased. He was commenced on potassium citrate with Cinacalcet.

Discussion: APN is an uncommon but important complication of uncontrolled MBD. APN should be considered in KTRs with pre-existing hyperparathyroidism presenting with early onset graft dysfunction. Whilst older age has been reported as a risk factor for APN amongst native kidney biopsies, this is less established amongst KTRs.2 Uniquely, our case occurred in a young patient with short dialysis vintage on peritoneal dialysis. Whilst post-transplant hypophosphatemia is common, judicious PO4 supplementation is prudent. Aggressive control of MBD has been the mainstay of treatment of APN. Reinitiating Cinacalcet reduces iPTH levels and post-transplant phosphaturia.8 This strategy may mitigate urinary super- saturation and crystal precipitation.

Table 1. Reported cases of biopsy proven acute phosphate nephropathy in incident kidney transplant recipients

Cases (reference)	**Case 1 (Wong PN et al.3)**	**Case 2 (Mok MM et al.4)**	**Case 3 (Riella LV et al.5)**	**Case 4 (Manfro et al.6)**	**Case 5 (Cheunsuchon et al.7)**	**Case 5 (Cheunsuchon et al.7)**
Age, years	44	31	70	36	58	21
Gender	Female	Female	Female	Male	Female	Male
Etiology of ESKD	IgA Nephropathy	Lupus Nephritis	Diabetic kidney	Unknown cause	Lupus Nephritis	Chronic Glomerulonephritis
Dialysis modality	Peritoneal dialysis then hemodialysis	N.R.	Hemodialysis	Hemodialysis	Hemodialysis	Peritoneal Dialysis
Dialysis vintage (years)	8	N.R.	7	9	2	2.5
Pre transplant Serum, corrected calcium, mmol/L	8	N.R.	7	1.98	2.65	2.5
Pre transplant Serum phosphate, mmol/L	3.90	N.R.	1.25	3.30	1.39	1.60
Pre transplant Serum parathyroid hormone, pmol/L	318.0	N.R.	29.6	10.3	113.8	99.3
Use of phosphate binder	N.R.	N.R.	Yes (Sevelamer)	Yes	Yes (Lanthanum then converted to Aluminum hydroxide)	99.3
Use of Vitamin D analog	N.R.	N.R.	Yes (Paricalcitol)	N.R.	No	No
Use of Calcimimetic	N.R.	N.R.	No	N.R.	Yes	Yes
History of parathyroidectomy	No	N.R.	No	Yes	No	No
Type of kidney donor	Deceased donor	Deceased donor	Deceased donor	Deceased donor	Living donor	Living donor
Cold ischemia time, hour	17	N.R.	N.R.	N.R.	N.R.	1
Induction immunosuppressant	N.R.	Basixilimab	Thymoglobulin	Basiliximab	No	Basiliximab
Immunosuppression regime	Prednisolone, Mycophenolate Sodium, Cyclosporine	Corticosteroid, Mycophenolate Mofetil, Tacrolimus	Prednisone, Azathioprine, Tacrolimus	Corticosteroid, Mycophenolate Sodium, Cyclosporine	Corticosteroid Mycophenolate Mofetil, Tacrolimus	Prednisolone, Mycophenolate Mofetil, Tacrolimus
Post transplant hypophosphatemia requiring replacement	N.R.	Yes	Yes	No	No	Yes
Delayed graft function	Yes	No	Yes	Yes	No	No
Acute rejection (type of rejection)	Yes (T cell mediated rejection)	N.R.	No	Yes (not further defined)	No	No
Time from transplant to biopsy proven acute phosphate nephropathy	16 days	10 days	14 days	15 days	2 days	34 days
Yes. 5 months post-	Yes. 5 months post- transplant	No	No	No	No	No
N.R Not reported						



Figures 1.

(A) Calcium phosphate crystal deposition within tubular lumens. (PAS, original magnification x200.)

(B) Calcium phosphate crystal deposition within tubular lumens. (PAS, original magnification x400.)

25-OH Vitamin D Threshold for Optimal Bone Mineral Density in Elderly Patients with Chronic Kidney Disease

KOG Zheng Xi, NG Chee Yong, Roy DEBAJYOTI
Changi General Hospital
Singhealth Renal Medicine Senior Residency

Background and Hypothesis: Vitamin D deficiency is common in patients with chronic kidney disease (CKD) and is associated with low bone mineral density (BMD), decreased muscle strength, and increased hip fracture risk. Current guidelines have heterogenous recommendations targeting 25-OH vitamin D (25(OH)D) levels between 20 and 30 ng/ml in the general population, but there are no specific recommendations for CKD patients. This problem is imperative as anti-resorptive treatment is not recommended for eGFR < 30-35ml/min/1.73m2 and there is a well-known association between low vitamin D levels and osteoporosis.

Methods: In this single-center, retrospective cohort study, we investigated the association between 25(OH)D deficiency and low BMD in elderly patients with and without CKD. Our study included 1097 patients with hip fractures, 44% of whom had CKD.

Results: Using the conventional threshold 25(OH)D < 30 ng/dl, there was no association with low BMD in patients with or without CKD. However, we identified a new discriminatory threshold of 25(OH)D < 27 ng/ml using the Youden index, which was associated with low BMD in patients with and without CKD. Patients with CKD and 25(OH)D < 27 ng/ml also had a higher risk of mortality.

Conclusion: These findings suggest that targeting vitamin D repletion to at least 27 ng/ml may be useful in preventing hip fractures and improving outcomes in elderly patients with and without CKD. Further prospective studies are needed to validate these findings.

All That is Gold Does Not Glitter – The Value of Immunoelectron Microscopy in Cryofibrinogen Disease

LEE Yu Jin1, NG Yan Fei2, Alwin Hwai Liang LOH2, LIEW Ian Tatt1
1Department of Renal Medicine, Singapore General Hospital, Singapore, Singapore.
Singapore General Hospital, Department of Anatomical Pathology, Singapore

Background and Hypothesis: Cryofibrinogen-associated renal disease (CARD) is reported in up to 22% of patients with cryofibrinogenemia and commonly manifests as a membranoproliferative glomerulonephritis. We discuss the diagnosis of a case of CARD based on electron microscopic investigation with immunogold labelling despite undetectable plasma cryofibrinogen and cryoglobulin.

Case: A 72-year-old Chinese lady with newly diagnosed (cold-sensitive) leucoclastic small vessel vasculitis was referred from her dermatologist for asymptomatic microscopic haematuria and elevated serum creatinine. She had a low complement 3 level of 0.68g/L but complement 4 was replete. Anti-double stranded DNA, anti-neutrophil cytoplasmic antibodies, hepatitis serologies and myeloma screen were negative. Plasma cryoglobulin and cryofibrinogen also returned negative. Skin biopsy was suggestive of an evolving small vessel vasculitis with perivascular inflammation – notably immunofluorescence was positive for fibrin staining at the superficial blood vessel wall. A renal biopsy was performed.

Results: Renal biopsy showed membranoproliferative pattern with hyaline pseudo thrombi [Figure 1]. Electron microscopy revealed subendothelial and intraluminal deposits of organised double/triple-layered targetoid microtubules [Figure 2]. Immunofluorescence for anti-fibrinogen stained positive within the glomerulus [Figure 3]. Immunogold performed was positive for fibrinogen [Figure 4].

The patient was treated for CARD with Prednisolone and Mycophenolate Mofetil. Her cutaneous lesions resolved rapidly and she has achieved partial renal remission since.

Discussion: Immunogold allows for identification of macromolecules within subcellular structures. Specific antibodies to the macromolecule of interest are conjugated with colloidal gold which can then be identified under electron microscopy. Previous reports have relied on mass spectrometry to formalise the diagnosis of CARD. , In our report, the constellation of clinical manifestations, renal light microscopy, electronic microscopy with immunogold and immunofluorescence were sufficient to establish the diagnosis.

Conclusions: Accurate diagnosis of CARD can be obtained with combination of immunogold to supplement ultrastructural analysis. This technique is accessible to centres with electron microscopy and alleviates the need for mass spectrometry.

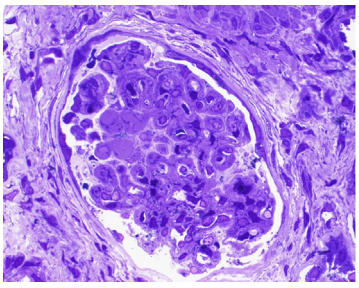


Figure 1. Toluidine blue section showing hyaline pseudo thrombin

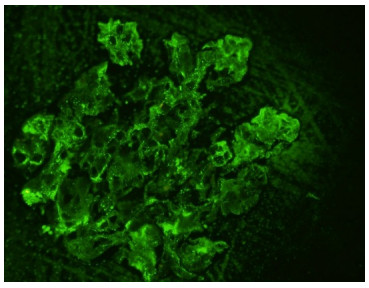


Figure 2. Positive anti-fibrinogen immunofluorescence staining in capillary walls

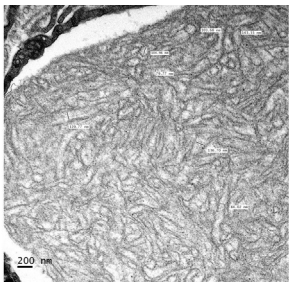


Figure 2. Positive anti-fibrinogen immunofluorescence staining in capillary walls

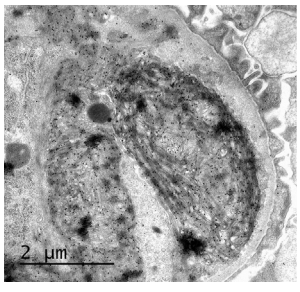


Figure 4. Electron microscopy showing positive immunogold labelling with anti-fibrinogen

Urinary and Plasma Tenascin-C (Tnc) Levels in a Multi-Ethnic Chronic Kidney Disease Cohort

Zhen Yu LIM1, Hazirah Binte MOHAMAD2, Hung Chew WONG3, Gek Cher CHAN1, Boon Wee TEO1
1Institution: National University Hospital, Department of Medicine, Division of Nephrology
2Institution: National University of Singapore, Department of Medicine
3Institution: National University of Singapore, Research Support Unit

Background and Hypothesis: Tenascin-C (TNC) is an extra-cellular matrix protein that plays a role in kidney fibrosis by activating fibroblasts. Increased TNC levels is seen in kidney biopsies of chronic kidney disease (CKD) patients. Current literature lacks studies evaluating its association with clinical outcomes. We hypothesize that elevated urinary and plasma TNC levels in CKD patients is associated with decline in glomerular filtration rate (GFR), shorter time to end of stage kidney disease (ESKD) and death.

Methods: We analysed CKD patients enrolled as part of the Asian Kidney Disease Study with follow-up to 3-4 years (n = 57). TNC levels in 24-hour urine and plasma samples were assayed using IBL Tenascin-C Large (FNIII-B) assay kit. Baseline variables examined include age, gender, smoking history, presence of diabetes, hypertension, and coronary artery disease (CAD). TNC concentration was assessed for associations with time to ESKD, death and GFR decline (GFR measured 36 months from the enrolment date). Statistical significance was taken at $p < 0.05$.

Results: Baseline demographics: mean age 59.4, 52.6% male, 63.2% Chinese, 86% non-smokers, 50.9% with diabetes, 84.2% with hypertension and 21.1% with CAD. 22.8% reached ESKD (n=13), 10.5% demised (n=6). Higher urinary TNC concentration had significantly shorter time to ESKD (HR=1.60, 95% CI 1.13-2.27) and significantly shorter time to death (HR=1.46, 95% CI 1.002-2.14), adjusted for baseline demographics and medical history. Plasma concentration was not associated with time to ESKD (HR=0.64, 95% CI 0.33-1.23) or time to death (HR=2.03, 95% CI 0.90-4.55). On average, for every 1ng/mL increase in urinary concentration, there is a 2.94 mL/min/1.73m2 (95% CI 0.42–5.45) decrease in GFR adjusted for baseline demographics and medical history (p=0.024).

Conclusion: Urinary TNC levels in CKD patients is associated with decrease in GFR, shorter time to ESKD and death, offering novel utility in risk stratification of CKD patients.

Hospital Readmission Rate for Fluid Overload in Patients with Diabetes

NG Li Choo Michelle, Cynthia LIM

Background and Hypothesis: Diabetes is a chronic condition which can lead to various complications, including fluid overload (FO). FO can lead to serious health problems, such as CCF and kidney failure. Patients with diabetes are at higher risk of developing FO due to several factors, such as impaired kidney function. When patients with diabetes develop FO, they may require hospitalization for treatment, including the administration of diuretics. This paper described the hospital readmissions for fluid overload among patients with diabetes and kidney disease in one of the largest tertiary hospitals in Singapore.

Methods: Single-center electronic medical records study of 1531 consecutive adults with diabetes and kidney disease who were hospitalized for FO between January 2015 and December 2017. The outcome of this analysis was frequency of hospital readmission during the first 6 months after discharge. We compared patients with two or more readmissions, one readmission and no readmission, with statistical significance at $p<0.016$.

Results: 2350 patients with diabetes and kidney disease were hospitalized for FO. 1531 patients were included in the analysis. 1168 (76%) had no readmission, 256 (17%) had 1 episode of readmission for fluid overload and 107 (0.1%) had 2 or more readmissions with fluid overload within 6 months after discharge for the index hospitalization. For the latter two groups, the median (interquartile) time to the first readmission for fluid overload was 49 (17, 107) and 39 (13, 68) days, respectively. Result shown that those with more frequent readmissions were significantly more likely to be male, younger, current smoker, have CVD, AF, higher Hba1c, prior hospitalization for FO, two or more visits to the ED within 6 months before index hospitalization, and required high-dose intravenous furosemide during hospitalization.

Conclusions: Patients at risk of readmissions for fluid overload, especially those with recurrent episodes, can be identified for interventions to reduce readmissions.

Effectiveness of a Multidisciplinary Care Model for Renal Patients with Malfunction Dialysis Access

NG Li Choo Michelle, TAN Chien Suai

Background and Hypothesis: ESRD patients with mmalfunction dialysis access had long waiting time for endovascular intervention. Based on the traditional model of care, an ALOS was more than 3 days for malfunction dialysis access and more than 50% of the patient had temporary dialysis catheter insertion due to long waitlist to intervene. This paper describes a new model of care in caring for this group of patients.

Methods: Retrospectively collected data on haemodialysis access interventions from electronic medical records 1 year before and after 1 April 2015 (Set up of new model of care). Subsequent data was collected for year 2016 to 2018 for the purpose of this analysis to evaluate the new model of care.

Results: Since April 2015, Renal department in SGH adopted new multidisciplinary approach to manage this problem. A dedicated suite for endovascular procedures for haemodialysis patients was set up with an team including trained interventional nephrologists, surgeon, interventional radiologist, renal APN and radiology nurses were formed. The renal APN played a vital role to perform the initial competent assessment for these patients at the Emergency Department, in collaboration with the radiology nursing team in ensuring the success of this initiative. Over years, LOS was significantly reduced from 5 days to 3 day (p=<0.001), 50.2 % of the patients had their intervention within 24 hours compared to previous 17.2% (p=<0.001), 'Days to intervention' was reduced to 1 day day from 3 days (p=<0.001). There was less intervention for temporary catheter (32.9% versue 52.8%). Number of HD session was also reduced from 3 to 2 session. Procedure success rate was 92.8% versue 87.2% as the dialysis access was intervene timely hence less complications were expected.

Conclusions: This multi-disciplinary collaboration has the potential to represent a promising, sustainable care model in improving the delivery of healthcare services for patients with dysfunction haemodialysis access.

Effectiveness of a Multidisciplinary Care Model for Advanced Chronic Kidney Disease Patients - Low Clearance Program

NG Li Choo Michelle, KWEK Jia Liang

Background and Hypothesis: The incidence of chronic kidney disease (CKD) stage 5 in Singapore increased by 31% from 383.9 per million population (pmp) in 2010 to 503 pmp in 2018. KDIGO (2012) recommended that progressive CKD should be managed in a multidisciplinary care setting to allow provision of holistic care to these patients, which include patient education, treatment modalities options and psychosocial care. The main goal of the program was to better prepare CKD patients for End Stage Renal Disease (ESRD) and their long-term treatment plan. The team includes physicians, renal APN, nurses, renal coordinator, MSW, pharmacist and dietician.

Methods: This paper retrospectively collected data from the Low Clearance Program started since Aug 2015 till Dec 2022. It aims to audit and evaluate the care for patients who have exited the LCC program with a long team renal plan established.

Results: Since August 2015, the program recruited a total of 733 patients with CKD 5. More than 60% were elderly with age 71 or above, 78% were Chinese and mainly male gender. Diabetic nephropathy was the main cause of etiology for their CKD, which is consistent with the MOH statistics. Among the recruited group, only 507 exit the program due to lost to follow up and death. 44.6% opted for HD and 32% of these HD patients started using a permanent vascular access (AVF or AVG), 11 of them require no admission as outpatient dialysis was arranged by the team. 23 % of the patients started PD with a permanent access too, 1% had preemptive transplantation and 31% selected conservative care. Among those on conservative, Advance Care planning was performed in 55 patients to discuss their treatment choice.

Conclusions: After 8 years of establishment, the LCC is currently collaborating with various stakeholders including dialysis providers and community nursing/services to better tailor patient experiences and ensure continuity of care.

Use of Weekly Chlorhexidine-Impregnated Dressing for Catheter Exit-Site Care Among Hospitalized Peritoneal Dialysis Patients

WANG Wei, HTAY Htay

Background and Hypothesis: Catheter exit-site care is of paramount importance in nursing care to prevent peritoneal dialysis (PD) related infection. In our center, PD nurses perform daily dressing for all inpatients, which is time-consuming and challenging, particularly during COVID-19 pandemic. Therefore, an alternate type of dressing without compromising care of patients is needed. A pilot study was performed by the PD team in 2020 with weekly chlorhexidine dressing in 50 incident PD patients. Result shown that weekly chlorhexidine dressing was associated with acceptable PD-related infection outcomes and was well-accepted by staff and patients.

Methods: This was a Quality Improvement Project conducted in Singapore General Hospital from September to November 2021. The weekly chlorhexidine-impregnated dressing was applied at exit-site for all hospitalized PD patients instead of daily dressing with topical gentamicin cream (conventional dressings). Outcomes monitored included catheter-related infections (exit site infection or peritonitis) or adverse effects (allergic reactions), time and cost-saving with chlorhexidine dressing, and PD nursing acceptance of chlorhexidine dressing using anonymized online survey.

Results: A total of 80 PD patients were hospitalized: mean age 65 ± 13 years, 59% male, 81% Chinese, 68% diabetes mellitus, 56% kidney failure from diabetes nephropathy. Total length of stay (LOS) in hospital for the cohort was 1047 days and median LOS for individuals was 7 days (interquartile range 4-12). None of the patients developed catheter related infections or allergic reactions to chlorhexidine dressing. A total of 194 chlorhexidine dressings were used instead of 1047 conventional dressings during that period. The average cost of chlorhexidine and conventional dressings, inclusive of nursing service, were SGD $ 29.50 and $20.50 respectively. The cost for these 80 patients were SGD$ 5723 with chlorhexidine versus S$ 21,463 with conventional dressings and time taken for PD nurses with dressing was 48.5 hours with chlorhexidine versus 262 hours with conventional dressings, (assuming 15 minutes per dressing change for both dressings).

An anonymized survey amongst PD nurses demonstrated positive experience with chlorhexidine dressing.

Conclusions: This audit demonstrated that the weekly application of chlorhexidine-impregnated sponge dressings at the catheter exit-site in PD patients was an acceptable treatment, with additional benefits such as savings in terms of dressing cost for patients and nursing manpower. There were no adverse events observed in this cohort. Lastly, the survey results from PD nurses were encouraging too. Nonetheless, future studies should also look at patient's experience and feedback.

Automation of Requests to Portering Department for Transportation Services of Patients for Haemodialysis at The Renal Dialysis Centre

ZHANG Yan, KAN Foong Ming

Background and Hypothesis: RDC in SGH performs approximately 20,000 in-centre dialysis sessions annually. Portering requests are done before and after each dialysis session manually. The task is labour intensive, inefficient. and prone to error with manual repetitive transferring of data into the e-Porter system. The main aim was improving the current work process through automation in RDC for non-value-adding administrative tasks.

Methods: Robotic Process Automation (RPA) UiPath software – based technology programming was adopted for this project. RDC team collaborated with General services in SGH to trial this software to automate request via SGH potering request system - e-porter system to arrange transportation for patents to and from Renal Dialysis Centre (RDC) for haemodialysis.

The dialysis time slot of patient was scheduled in an excel sheet and the PRA read the scheduled dialysis time slot would automate with Macro Visual Basic Application (VBA) to auto populate the cases that required porter requests. PRA was programmed to read this information to raise a porter request on the e-porter system automatically.

Results: The baseline of time consuming to raise e-porter request on the e-porter system was 45 seconds manually for each patient versus the estimated time consumed by PRA was 12 seconds. The estimated time saving was equivalent to 1.34 hours daily, which is equivalent to 0.168 FTE saved /day to diverted to patient care actives.

Conclusions: The automation for raising porter requested on the e-porter system had shown to save time to allow nurses to perform other patient care activities. This pilot project has provided an insight that Robotic Process Automation (RPA) UiPath software is useful to improve work processes in healthcare setting.

ORGANISER

Singapore Society of Nephrology

Singapore Society of Nephrology
c/o Wizlink Consulting Pte Ltd
2 Venture Drive #06-25
Vision Exchange
Singapore 608526
Website: https://www.ssn.org.sg/

IN COLLABORATION WITH

KDIGO

SUPPORTED BY

ISN INTERNATIONAL SOCIETY OF NEPHROLOGY

ISN's endorsement is for the promotion of education in general, therefore the specific content of the event/course is the responsibility of the organizer.

SECRETARIAT

Wizlink Consulting

Wizlink Consulting Pte Ltd
2 Venture Drive #06-25
Vision Exchange
Singapore 608526
Tel: (+65) 6774-5201
Fax: (+65) 6774-5203
Email: secretariat@ssn.org.sg

ACKNOWLEDGMENT

The 13th SSN ASM 2023 Organising Committee would like to thank the following for their kind and generous contributions:

Diamond Sponsors

Boehringer Ingelheim

FRESENIUS MEDICAL CARE

Platinum Sponsors

CSL Vifor

Otsuka

Gold Sponsor

BAYER

Silver Sponsors

AstraZeneca

DKSH

FRESENIUS KABI
caring for life

KYOWA KIRIN

ZP THERAPEUTICS
making healthcare more accessible

JARDIANCE offers multiple metabolic benefits[2-4]

HbA1c	Body Weight*	Systolic BP*
Baseline HbA1c ≥8.5%[3]	Baseline BMI ≥35[3]	Baseline SBP (mean) 130 mmHg[2]
-1.5% at Week 24 vs. placebo	-3.4 kg at Week 24 vs. placebo -4.8 kg at Week 76 vs. placebo	-5.2 mmHg at Week 24 vs. placebo

THE POWER TO ACCOMPLISH MORE

In Adults with Type 2 Diabetes and High CV Risk

JARDIANCE significantly reduced CV risk and improved overall survival on top of standard of care[1]

38% CV death vs. placebo

In Adults with Type 2 Diabetes and High CV Risk

JARDIANCE significantly reduced the rates of clinically relevant renal events on top of standard of care[1]

39% RRR in incident or worsening Nephropathy[4] vs. placebo

Please scan QR code for Jardiance® Latest Prescribing Information

*Jardiance is not indicated for weight loss or blood pressure reduction.

References

1. Zinman B, et al. N Engl J Med. 2015;373(22):2117-2128 **2.** JARDIANCE Singapore Prescribing Information
3. Inzucchi SE, et al. Diabetes Obes Metab. Doi:10.111/dom.14234 **4.** Häring HU, et al. Diabetes Care. 2014;37(6):1650-1659

For healthcare professionals only.

Boehringer Ingelheim

Boehringer Ingelheim Singapore Pte. Ltd.
128 Beach Road, #11-01 Guoco Midtown
Singapore 189773
Phone +65 6419 8600 | Fax +65 6297 5771

Jardiance® (empagliflozin)

PC-SG-102135 AUG 2023

Haemodialysis

HighVolumeHDF

Do it for your patients.

Just push the button

FRESENIUS MEDICAL CARE

Fresenius Medical Care Singapore Pte Ltd.
250 North Bridge Road, #05-01 Raffles City Tower, Singapore 179101
Phone: +65 6837 3113 Fax: +65 6837 2112
www.freseniusmedicalcare.sg

Scan for details:

www.HighVolumeHDF.asia

WHEN TREATING HYPERKALAEMIA

GO WITH LOKELMA

CHOOSE THE PATH TO RAPID K^+ REDUCTION AND SUSTAINED K^+ CONTROL[1,3]

87% OF PATIENTS CONTINUED RAAS INHIBITOR USE WITH LOKELMA*[1,4]

Rapid K^+ Reduction

- **1 dose** of Lokelma significantly reduced serum K^+ levels in **1 hour**[1,2]

Sustained K^+ Control

- **88%** of patients maintained normokalemia up to **1 year**[1,2]

Generally Well-Tolerated

- Few adverse reactions and limited drug-drug interactions in clinical trials involving more than **1,700 patients**[1,2]

LOKELMA™
powder for oral suspension
Sodium zirconium cyclosilicate

References: *Based on a retrospective analysis of the changes in RAAS inhibitor therapy at baseline maintained the same dose.[4] **1.** LOKELMA Singapore Prescribing Information Reference: 05/BC/SG/Doc ID-004025194 V8.0 (May 2023) AstraZeneca Pte Ltd **2.** Kosiborod M. Rasmussen HS, Lanvin P, et al. Effect of sodium zirconium cyclosilicate on potassium lowering for 28 days among outpatients with hyperkalemia: the HARMONIZE randomized clinical trial. JAMA. 2014;312(21):2223-2233 **3.** Packham DK, Rasmussen HS, Lavin PT, et al. Sodium zirconium cyclosilicate in hyperkalemia. N Engl J Med. 2015;372:222-231 **4.** Spinowitz BS, Fishbane S, Pergola PE, et al; ZS-005 Study Investigators. Sodium zirconium cyclosilicate among individuals with hyperkalemia: a 12-month phase 3 study. Clin J Am Soc Nephrol. 2019;14:798-809.

Please consult local the Full Prescribing Information of LOKELMA before prescribing.

LOKELMA® (sodium zirconium cyclosilicate) 5g & 10 g POWDER FOR ORAL SUSPENSION
INDICATIONS: LOKELMA is indicated for the treatment of hyperkalaemia in adult patients.
DOSAGE & ADMINISTRATION: For patients with a serum potassium level >5.0 mmol/L, the recommended starting dose of LOKELMA is 10g three times a day orally as a suspension in water, up to 2 days/48 hours. Continued maintenance treatment would require a minimum effective dose to be established, recommended at 5g once daily and titrated up or down by 5g as needed to maintain a normal potassium level. No more than 10 g once daily should be used for maintenance therapy. Serum potassium levels should be monitored regularly during treatment. Monitoring frequency will depend upon a variety of factors including other medications, progression of chronic kidney disease and dietary potassium intake. No changes from the normal doses are required for patients with renal impairment who are not on chronic haemodialysis.
For patients on dialysis LOKELMA should only be dosed on non-dialysis days. The recommended starting dose is 5 g once daily. To establish normokalaemia (4.0-5.0 mmol/L), the dose may be titrated up or down weekly based on the pre-dialysis serum potassium value after the long inter-dialytic interval (LIDI). The dose could be adjusted at intervals of one week in increments of 5 g up to 15 g once daily on non-dialysis days. It is recommended to monitor serum potassium weekly while the dose is adjusted; once normokalaemia is established, potassium should be monitored regularly (e.g. monthly, or more frequently based on clinical judgement including changes in dietary potassium or medication affecting serum potassium).
MECHANISM OF ACTION & PHARMACODYNAMIC EFFECTS: LOKELMA captures potassium throughout the entire GI tract and reduces the concentration of free potassium in the GI lumen, thereby lowering serum potassium levels and increasing faecal potassium excretion, along with its elimination. It reduces serum potassium levels as soon as 1 hour after ingestion and serum potassium concentrations continue to decline over the 48-hour treatment period.
SPECIAL PRECAUTIONS: Overdose with LOKELMA could lead to hypokalaemia. Serum potassium should be checked and potassium supplemented as needed. In patients with serum potassium levels <3.0 mmol/L, LOKELMA should be discontinued and the patient re-evaluated. In clinical trials of LOKELMA, oedema was generally mild to moderate in severity and was more commonly seen in patients treated with 15 g once daily. Monitor for signs of oedema, particularly in patients who should restrict their sodium intake or are prone to fluid overload.
DRUG INTERACTIONS: LOKELMA can transiently increase gastric pH, therefore should be administered at least 2 hours before or 2 hours after oral medications with clinically meaningful gastric pH dependent bio availability.

LOKELMA Local Prescribing Information Reference: 05/BC/SG/Doc ID-004025194 V8.0 (May 2023)

FOR HEALTHCARE PROFESSIONALS ONLY

SCAN **for Full Prescribing Information**

AstraZeneca
AstraZeneca Singapore Pte Ltd
10 Kallang Avenue, #12-10 Aperia Tower 2, Singapore 339510.
Tel: +65 6812 4700 Fax: +65 6385 3050

SG-6957 LOK 20230912