The National Kidney Foundation

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contents

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rethinking kidney care

In line with the tagline "rethinking kidney care", the hot air balloons depict the need to ignite our passion and rise higher to reach our shared vision of optimally treating, managing and preventing chronic kidney disease by constantly exploring different and new pathways.

Information correct as at time of printing

foreword

Thank you for your strong support as we continue to work closely together to bring renal care in Singapore to greater heights.

I am pleased to share our second issue of Renal Outlook, following our inaugural issue last year which was well-received by the renal community, with positive reviews from prominent members in the healthcare community and cabinet ministers. Renal Outlook – a collective effort of peers and colleagues covering wide-ranging clinical and educational topics within the ambit of renal care – serves as a vital platform for knowledge sharing among healthcare professionals and partners to achieve our shared goals.

As we all know, there is an urgent and compelling need to step up efforts across the entire scope of chronic kidney disease – from its prevention to treatment and management. This is exacerbated by the impending "kidney tsunami" that Singapore is currently facing, with more than 300,000 people suffering from chronic kidney disease, and possibly more due to undiagnosed cases.

While we tackle the root of the problem by striving to do more upstream to prevent or delay people from being afflicted with kidney failure, it is imperative that we also focus on research and innovation in treating kidney disease to better serve our patients. We can do this because we have the data, information and background of patients as we work together through connected networks of healthcare teams, information flow and treatment care plans. We need to continue working hand in hand in a collaborative and synergistic way to benefit our patients and the healthcare ecosystem.

In today's world of technological advancements, renal-related innovations are the buttons we need to push to enhance patient care beyond traditional treatment. Several articles in this issue explore the field of medtech which is patient-focused, to improve delivery of care and empower patients to manage their condition independently. The development of medtech is vital in meeting patients' needs. This is one key area that is part of our Future Forward 2030 vision to bring about meaningful changes in our patients' lives.

I would like to express my gratitude to members of the Editorial Advisory Committee for your time, guidance, advice and expertise towards shaping this publication into a purposeful resource. I would also like to specially thank the authors for your dedication and valuable contributions, as well as bringing fresh perspectives and approaches to the work we are doing. The multidisciplinary and multifaceted insights will certainly pave the way towards the development of new programmes and initiatives that will help bring down the incidence of kidney diseases and fuel further growth and advancement in the renal field.

Once again, my deepest thanks to all in the renal community, healthcare partners and advocates of kidney health for your unyielding support and partnership, as we tap on each other's know-how through sharing, learning, cooperation and integration. Let's continue to propel forward by immersing ourselves in research, as we seek breakthroughs and transformative change to meet the constant and evolving challenges in renal care.

Tim Oei
Chief Executive Officer

Treatment Options for Older Adults with End Stage Kidney Disease

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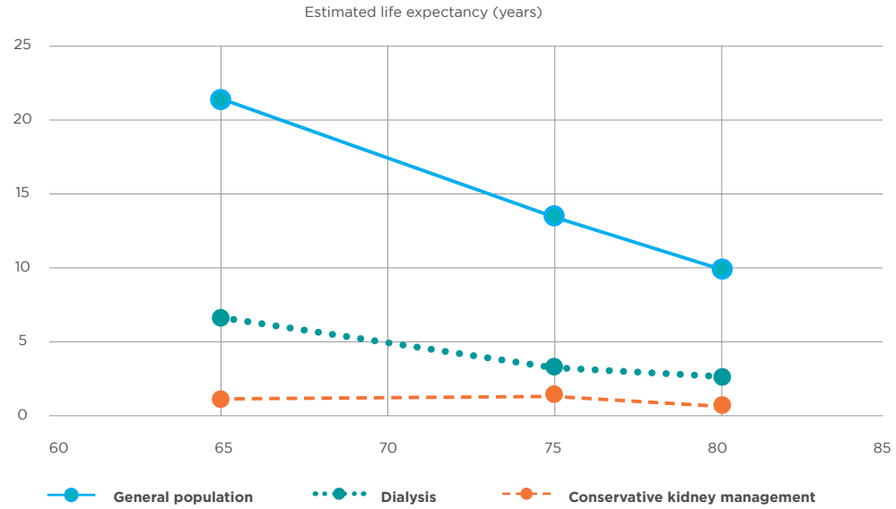
The incidence of chronic kidney disease stage 5 has been increasing with the ageing population in Singapore. It has risen from 16.4% in 2011 to 19.2% in 2020 among patients age 80 and above. Similarly, the incidence rate of starting dialysis for this group has grown from 7.1% in 2011 to 7.9% in 2020 (NDRO, 2022). Decision on kidney replacement therapy (KRT) for elderly end-stage kidney disease (ESKD) patient is complex when weighing the benefits and trade-offs of dialysis. We have to consider the patient's functional status, frailty, co-morbidities, his/her values and preferences as well as the family support. Two aspects have been brought up constantly during the KRT discussion are life-expectancy and quality of life. Below is the literature review for the elderly ESKD patients receiving dialysis or conservative management and their outcomes. Subsequently, we provide the insight on renal conservative care programme in our institution.

Life-Expectancy

Two systematic reviews showed a survival advantage for patients on dialysis compared with conservative care (Voorend, 2022) (Engelbrecht, 2021). These have been confounded by patient selection bias, lead time bias and heterogeneity from the observational studies. Generally, the median survival for patient on haemodialysis was 6.6 years and peritoneal dialysis was 4.2 years in Singapore (NDRO, 2022).

The prospective observation study from St George Public Hospital in Sydney (Chou, 2022) demonstrated that the survival benefit on dialysis diminished with increasing age (Figure 1). Therefore, the elderly ESKD patient might live slightly longer on dialysis but the treatment procedure would not reverse the decline in biological health. Several factors associated with poor survival in elderly patients based on registry data are co-morbidities especially cardiovascular disease burden and geriatric syndromes (Villain, 2019).

Figure 1: Life Expectancy



Note: Life expectancy for general population is derived from the department of statistics in Singapore, retrieved from https://www.singstat.gov.sg/ on 17 Oct 2022. Dialysis and CKD data are retrieved from study by (Chou, 2022).

Quality of Life

Overall, physical health has been reported to be better with dialysis. However, the elderly patients who have initiated dialysis might not perceive a substantial improvement in their physical health (Loon INv., 2019). Their physical and mental health reported outcomes were similar when managed conservatively or on dialysis (Verberne WR., 2018). Moreover, the patients receiving dialysis have more hospitalisations and procedures (Chou, 2022) (Engelbrecht, 2021) (Wong SPY, 2022) leading to a significant impact on their daily life (Verberne WR, 2021). Therefore, the risk and benefit of dialysis versus conservative care has to be carefully considered when providing KRT education for the elderly ESKD patients.

Renal Conservative Care Programme in SKH

The community renal conservative care programme in Sengkang General Hospital is supported by Tzu-Chi Foundation (Singapore) and Agency of Integrated Care (Project reference No. CHF002) from 1 May 2021 to 30 April 2024. The objectives are increasing the awareness of conservative kidney management, providing the continuity of care in the community, facilitating advance care planning discussion and timely transiting to hospice programme when the symptom burden increases. The nurses with palliative care experience are providing home visits at least monthly for clinical care and advance care planning discussion.

We have a total of 58 patients enrolled into this programme. Their mean age was 78 years and mean estimated glomerular filtration rate (eGFR) was 10 ml/min/1.73 m^2. A total of 15 patients (25.9%) have passed on as of 30 September 2022. They have higher Charlson-comorbidity score (CCI). In contrary, 8 patients (13.8%) changed their decision and initiated dialysis had lower CCI (Table 1). They were independent with activities of daily living and had better social support. A total of 13 patients (22.4%) were transferred to home hospice programme.

Table 1: Biodata of Patients Under Renal Conservative Care Programme

	Survive	Demise	Dialysis	Conservative
Number (%)	43 (74.1)	15 (25.9)	8 (13.8)	50 (86.2)
Follow-up duration, months	9.5	5.0	13.9	7.5
Age, years	78.7	75.8	75.0	78.5
Mean eGFR, ml/min/1.73 m^2	10	9.9	7.5	10.4
Charlson comorbidity index	7.8	10	7.6	8.4

In conclusion, a thriving conservative care programme needs community support to ascertain seamless care. Home visits by community nurses should form an integral part of the programme. The survival benefit on dialysis diminishes with increasing age. Quality of life is subjective. Moreover, increased hospitalisation and surgical procedures in the elderly dialysis patient are very likely to have an adverse impact on it. All these factors have to be taken into consideration during kidney replacement therapy discussion before establishing the treatment goals based on the patient's values and preferences.

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Insights in the Management of Kidney Transplant Recipients During the COVID-19 Pandemic

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The COVID-19 pandemic continues to evolve with newer, more immune-evasive variants, putting immunocompromised patients at risk. Kidney transplant recipients (KTR) are no exception, and they remain at higher risk for breakthrough infections and severe COVID-19 disease due to their immunocompromised state.

The National University Centre for Organ Transplantation (NUCOT) at National University Hospital (NUH) performs a major portion of Singapore's incident kidney transplants each year and cares for over 600 prevalent KTR, all of whom are regularly followed by a renal medicine physician at NUCOT with special training in kidney transplantation.

COVID-19 Infection Control Measures – A Multi-faceted Approach

Few cases of COVID-19 were seen at our centre earlier in the pandemic due to multiple factors. There were strong environmental barriers including border control and safe management measures, including social distancing, that led to few cases in the community. At NUCOT, infection control measures were put in place to decrease the risk of infections and encourage KTR to engage in infection prevention practices including:

- Advising hand hygiene, proper mask-wearing, and limiting social and work interactions by encouraging work from home and virtual meetings where possible.
- Thorough triage of KTR prior to face-to-face clinic visits to limit actual or potential cases of COVID-19 at NUCOT including screening antigen rapid testing (ART), symptom screen for potential respiratory tract infections, and thorough assessment of potential exposures including travel and occupational history.
- The adoption and routine use of telemedicine visits at NUCOT with rates as high as 80-90%.
- Staff at NUCOT regularly self-screen with ART for early diagnosis of COVID-19 and stayed home if unwell to limit exposure to vulnerable KTR.

SARS-CoV-2 Vaccinations in Kidney Transplant Recipients – A Double Edged Sword

With knowledge of improved outcomes of vaccinated individuals with COVID-19, government programmes incentivised completion of SARS-CoV-2 vaccinations. At NUCOT, transplant providers conducted thorough risk assessments and discussions with KTR and encouraged vaccination. Given the unknown potential harm to renal allografts due to SARS-CoV-2 vaccination, our programme conducted enhanced allograft monitoring after vaccination including serum creatinine, urine protein, and urinalysis approximately 3 weeks post-vaccination. Preliminary data of nearly 150 prospectively enrolled KTR who received 2 mRNA SARS-CoV-2 vaccines revealed as many as 40% experienced a transient renal event – rise in creatinine, new proteinuria, or haematuria – and 17% experienced new or recurrent antibodies against the allograft. Thankfully, nearly all of these events were transient with close monitoring and management with only rare occurrences of allograft injury.

KTR were cautioned of growing data that two mRNA vaccinations may not provide adequate immunity leading to increased risk of infection and severe disease. While prevailing advice was in place to stay home if unwell, KTR were educated during clinical visits and through mass messages sent via instant messaging of their increased risk. KTR were advised to self-administer ART or seek expedited evaluation by a trained healthcare provider if unwell. If ART positive, KTR were then instructed to notify our team for early assessment and management.

COVID-19 in Kidney Transplant Recipients – A Tale of Multiple Waves

As vaccination rates rose in the community, borders began to open and safe management measures became less restrictive. We then experienced our first wave due to the Delta variant in September 2021, which led to a major increase in COVID-19 cases in KTR. We developed protocols with ongoing support of our infectious disease colleagues to admit infected KTR to the hospital for expedited care and management. Sotrovimab, a monoclonal antibody against the SARS-CoV-2 spike protein, was approved by the Ministry of Health to be given to immunocompromised and unvaccinated patients with mild disease due to COVID-19. NUCOT collaborated with colleagues at NUHS@Home who developed a 'Virtual Ward' care model of managing acutely ill patients at home including those with COVID-19 after receiving early assessments and therapeutics. This allowed for safe monitoring, prompt interventions, and expedited readmissions to the hospital if complications arose.

The Delta wave brought many devastating outcomes in our KTR. Nearly 40 KTR at our centre were infected with COVID-19 with ⅓ requiring supplemental oxygen and 20% dying due to complications from COVID-19. Delayed treatment was associated with increased risk of severe disease. In order to reach a larger audience and educate KTR regarding these risks, Prof A. Vathsala and colleagues at NUCOT published letters to our KTR in major newspapers in Singapore to re-engage and encourage our KTR to continue to remain vigilant and seek urgent medical attention if infected.

As the Delta wave passed, vaccination rates continued to improve as we advised third vaccinations as part of the primary series for vaccination among KTR. The next wave began in January 2022 with Omicron BA.1, with increasing immune evasiveness leading to a significant increase in cases and subsequent strain on hospital bed availability. Enhanced protocols were developed between NUCOT and NUHS@Home to admit KTR with mild COVID-19 under the virtual ward programme directly to continue excellent care while avoiding need for hospitalisation.

Despite improved vaccination rates, vaccine-induced immunity – as measured by spike antibody – remained inadequate in nearly half of KTR. In the beginning of 2022, tixagevimab/cilgavimab was approved as primary prevention in immunocompromised individuals with inadequate immune responses to vaccination. KTR in our centre were strongly encouraged to take tixagevimab/cilgavimab as adjunct protection in order to decrease infection rates and lower the risk for severe disease. With the support of our pharmacy colleagues, we developed protocols to ensure expedited administration. Overall, uptake has been excellent and tixagevimab/cilgavimab has been well tolerated with very few adverse events.

Due to the emergence of Omicron BA.2 and subsequent variants with increasing resistance along with evolving protocols due to newly published data, sotrovimab was replaced with tixagevimab/cilgavimab or remdesivir. During the Omicron wave from BA.1 to BA.2 to BA.4 and BA.5, over 300 KTR were infected with COVID-19. Thankfully, due to improved vaccination rates and treatment protocols, outcomes greatly improved with less than 10% requiring supplemental oxygen and mortality dropped to 2%.

Future Directions

As the Omicron variants continue to mutate, we continue to encourage our KTR to obtain their 4th vaccinations to improve vaccine-induced immunity and reduce the risk of poor outcomes. At present, over half of our KTR have been infected with COVID-19 over the past year, and we are seeing a growing number of reinfections. Throughout the pandemic, we continue to work closely with our infectious disease colleagues to improve our management and monitoring protocols to decrease the risk of severe disease. We remain vigilant and continue to encourage our KTR and other immunocompromised individuals in the community to practice infection control measures, obtain timely vaccinations and seek early medical attention if diagnosed with COVID-19 in order to improve outcomes and stay safe.

Risk Prediction Models to Predict Incident Chronic Kidney Disease and End Stage Renal Disease

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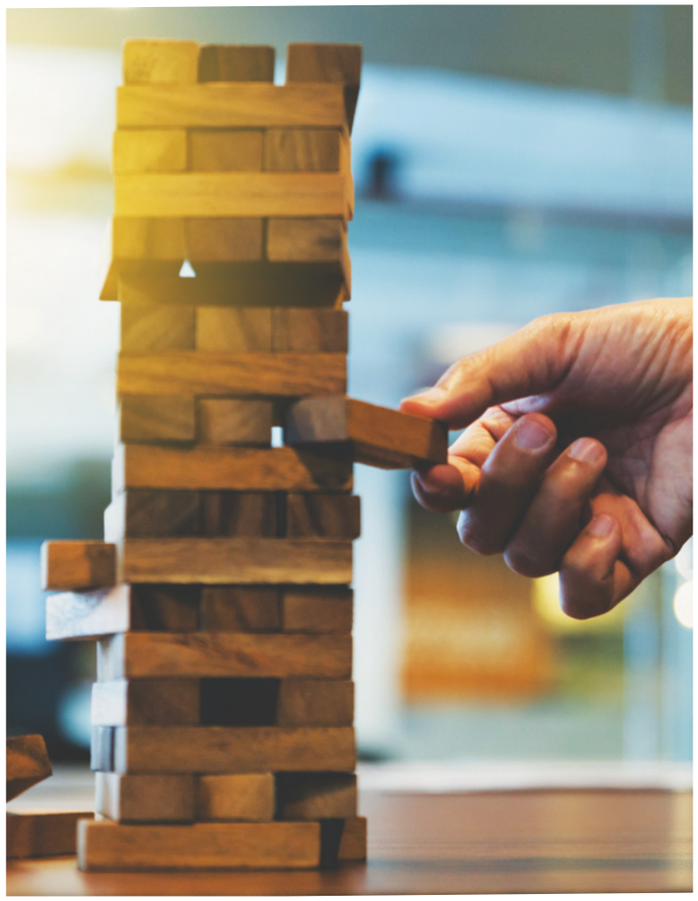

Burden of CKD

Chronic kidney disease (CKD) is a significant public health problem worldwide. It is a risk factor for cardiovascular disease (CVD), end-stage renal disease (ESRD) and mortality. In 2017, the global prevalence of CKD was 9.1% with the prevalence increasing by 29.3% since 1990.[1] The rise in prevalence is due to increasing incidence of hypertension and diabetes mellitus (DM).

In Singapore, the prevalence of CKD was reported to be 12.8% in 2010[2] and is projected to increase to 24.3% by 2035.[3] Singapore also ranks 4th in the world for the prevalence of ESRD.[4] As the prevalence of CKD and ESRD increases, the burden on our healthcare system increases. Being able to predict the risk of incident CKD or ESRD may allow for early intervention and guide treatment decisions.

CKD and ESRD Risk Prediction Models

In recent years, risk prediction models have been gaining traction in nephrology. Several models have been developed to predict the risk of incident CKD or ESRD. In 2011, Tangri et al developed kidney failure risk prediction equations (KFREs) using data from 2 Canadian cohorts to predict the risk of ESRD in patients with CKD stages 3 to 5.[5] The 4 and 8-variable KFREs were subsequently validated in 31 multinational cohorts in 2016.[6] The 4-variable KFRE comprised of age, gender, estimated glomerular filtration rate (eGFR) and albuminuria while the 8-variable KFRE consisted of the above four variables, serum calcium, phosphate, bicarbonate, and albumin. The 4-variable KFRE equation has been recalibrated in Singapore and the performance is better than existing KFREs with a high area under receiver operating characteristic curve (AUCs) at 5-year (0.94; 95% CI: 0.93-0.95) and 2-year (0.96; 95% CI: 0.95-0.97).[7]

Earlier risk prediction models to predict the risk of incident CKD included the Chien equation[8] and O'Seaghdha equation[9]. The Chien equation predicts the 4-year risk of incident CKD while the latter predicts 10-year risk. In 2019, Nelson et al. used data from 34 multinational cohorts to develop two models, one for non-diabetic individuals and one for diabetic individuals, to predict the 5-year risk of incident CKD.[10] Discrimination and calibration were better than the earlier two equations. The variables in the non-diabetic model included age, gender, black race, eGFR, history of cardiovascular disease, hypertension, BMI and urine albumin: creatinine ratio (UACR) while that of the diabetic model included the above variables, HbA1c, the interaction between HbA1c and oral diabetes medications or insulin.

Despite robust validation in multiple cohorts, the risk prediction models have yet to be widely adopted in clinical practice locally. It may be because the risk prediction scores are not routinely incorporated into our electronic medical records across all institutions. In addition, clinicians may not be familiar about the application of risk prediction models in clinical practice. Some feel that patients with CKD have significant biological variability with variable outcomes, as well as non-linear disease progression which may potentially affect the use of these risk prediction models.[11]

Integrating Risk Prediction Models into Clinical Care

There are potential clinical applications of risk prediction models including risk stratification, communication of risk to patients to encourage compliance to medications and lifestyle modification and individualised treatment decision-making.[12] They can also be used to guide nephrology referrals, timing for preparation for renal replacement therapies and identify individuals who will benefit most from interventions.[13] In several Canadian provinces, the KFRE was used to triage nephrology referrals for patients with CKD stages 3 to 5 using a risk-based cutoff of 3% over five years. This led to improved wait times and timely access to care for patients at the highest risk of progression to ESRD.[14] In the National Institute for Health and Care Excellence (NICE) 2021 guidelines, a risk threshold of >5% over 5 years is used for nephrology referrals.[15] Few studies have been conducted to assess the impact of utilising risk prediction models on clinical care. It will be interesting to await the results of a multicentre cluster randomised controlled trial looking at whether a risk-based approach can improve CKD care in Canadian primary care clinics.[16]

Building CKD and ESRD risk prediction models into electronic health records in primary care and nephrology clinics locally can help support clinical decision-making and potentially allow for efficient allocation of healthcare resources. Before utilising them, we will need to look at whether the variables included are routinely available in the intended population, validate the models in our local multiethnic population and further calibrate them to improve accuracy. Future studies can look at how using these models can influence our patients' clinical outcomes and health behaviour.

With the increasing popularity of machine learning, there are opportunities for using big data for the development of more accurate risk prediction models to predict the risk of CKD, progression of CKD and development of ESRD. Integrating them into clinical care can potentially transform the model of care for our patients by allowing early intervention in high-risk patients, hopefully translating into improved health outcomes with a reduction of incidence of ESRD and healthcare cost.

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The Effectiveness of ChloraShield™ Chlorhexidine Gluconate Antimicrobial Dressing

for the Prevention of Non-tunneled Temporary Dialysis Catheter Related Infections Among Haemodialysis Patients in a South-east Asian Cohort

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Introduction

Non-tunneled temporary dialysis catheters (NTDCs) are commonly used as temporary vascular access in patients with kidney failure who require immediate haemodialysis or temporary access[1,2,3]. While urgent dialysis may be life-saving, infectious complications related to the use of NTDCs are common and associated with increased morbidity, length of hospitalisation, and even mortality[1,2,3,4]. In 2019, the NTDC-related infection rate in Khoo Teck Puat Hospital (KTPH) was 9.7%, despite adherence to sterile barrier precautions and skin preparation during catheter insertion, thus underlining room for better infection-prevention measures. Based on recommendations from IDSA and CDC guidelines[5,6], Nephrology team in KTPH has explored the option of using Chlorhexidine Gluconate (CHG) containing antimicrobial dressing for the prevention of catheter-related infections (CRIs) for haemodialysis patients. However, these guidelines for the prevention of CRIs in short-term non-tunneled central venous catheters were developed largely based on ICU or hematology/oncology studies in Western populations[6,7]. Furthermore, it has been recommended that CHG dressings require less frequent replacement at least once every 7 days due to the anti-microbial effect of chlorhexidine, compared to standard dressings which are changed every haemodialysis session. The durability of weekly CHG dressing change has not been evaluated in our local climate and humidity. At present, there is a paucity of local data on the efficacy and durability of CHG dressings for the prevention of NTDC-related infections among haemodialysis patients.

In this study, we aim to conduct a clinical study in evaluating the efficacy and durability of ChloraShield™ Chlorhexidine Gluconate Antimicrobial Dressing for the prevention of NTDC-related infections in patients receiving Haemodialysis.

Method

A prospective, comparative, single-centre study had been carried out in KTPH Renal Dialysis Centre from November 2020 to March 2022. 55 inpatients aged > 18 years old, who had NTDCs insertion done by nephrology team in Renal Dialysis Centre, and subsequently received haemodialysis via NTDCs in Renal Dialysis Centre, were recruited in this study. Patients were randomised 1:1 into standard dressing (gauze dressing) versus ChloraShield™ Chlorhexidine Gluconate Antimicrobial (CHG) Dressing.

A dressing was applied to the haemodialysis catheter exit site once the catheter had been inserted. Standard dressing was changed at every haemodialysis session, while CHG dressing was changed once every 7 days or if the dressing integrity had been breached or soiled. Patients were monitored for signs and symptoms of NTDC-related infections, including Exit site infection and Catheter-related blood stream infection, as with definitions adapted from KDOQI, IDSA and CDC guidelines[8,9,10]. Eligible NTDCs are catheters that have been in place for more than two consecutive calendar days.

Patients with NTDCs inserted by non-Nephrology team or outside the Renal Dialysis Centre were excluded from the study. Patients aged < 18 years old, or with known contact dermatitis to standard dressing, allergy to chlorhexidine or alcohol were also excluded from the study.

Results

- 27 patients were randomised to CHG dressing, and 28 patients were randomised to standard dressing.
- A very low infection rate (2 in 55) was observed during the study period, with 1 infection occurred on patient using standard dressing and 1 on patient using CHG dressing. Thus, the efficacy of CHG containing antimicrobial dressing in reducing NTDC-related infections among haemodialysis patients in KTPH is not significant.
- 18.5% of patients in the CHG dressing group required more than 1 dressing during the NTDC lifespan of maximum 1 week, due to blood clots seen post NTDC insertion.
- The cost for the use of CHG-containing dressing for NTDC is higher, compared to the use of existing standard dressing.

Discussion

- A lower-than-expected infection rate, as compared to the average NTDC-related infection rate in KTPH, may have affected the findings of this study.
- To maximise the durability of CHG dressing, we recommend not to apply CHG dressing immediately post catheter insertion.

Acknowledgement

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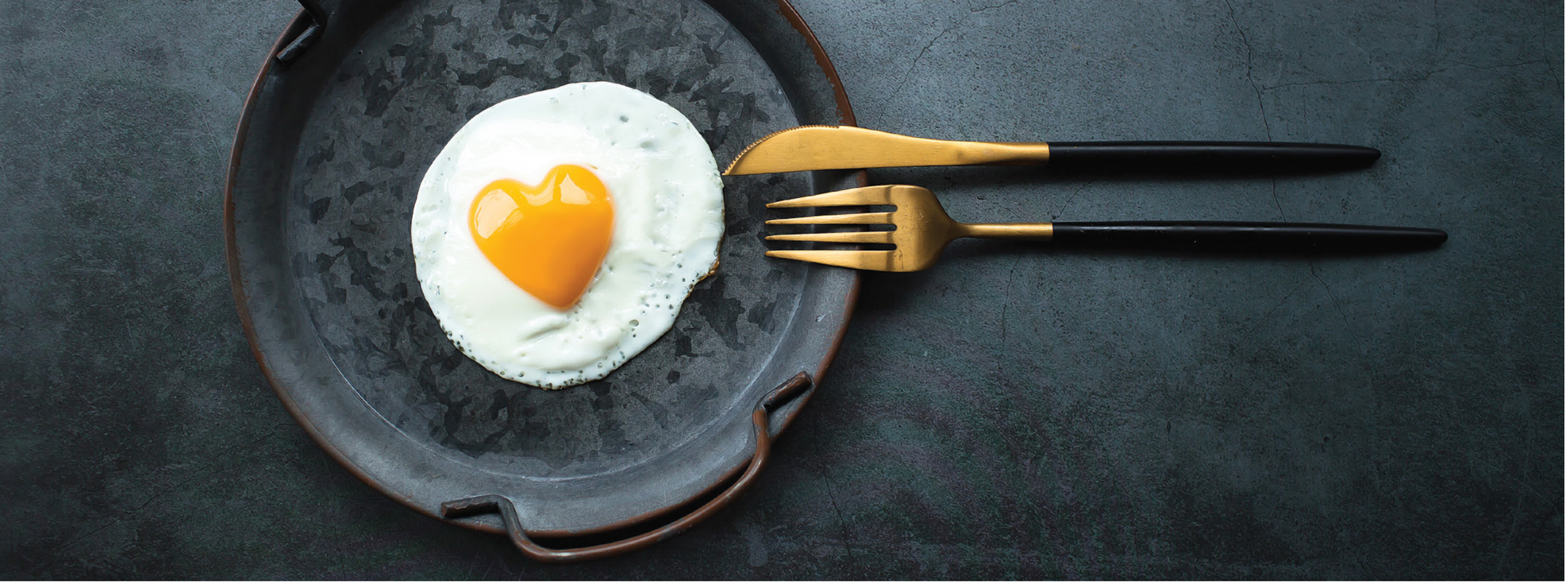

Insights from a Pilot Randomised Controlled Study:

Implementation of Supplemented Very Low Protein Diet (sVLPD) in Diabetic Kidney Disease (DKD) Patients in Singapore

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Introduction

Singapore is facing a 'kidney tsunami' with rising chronic kidney disease (CKD) and end-stage kidney disease (ESKD). Based on the United States Renal Data System (USRDS) Report in 2021, Singapore ranks first in the world for diabetic kidney disease (DKD) with ESKD[1]. From Singapore Renal Registry, six people were diagnosed with ESKD every day, up from 4 in 2011[2]. The increase is linked to Singapore's ageing population and the high prevalence of chronic diseases such as diabetes and hypertension. Apart from pharmacological treatment on renoprotection and disease control, non-pharmacological treatment such as nutritional intervention and lifestyle modifications are equally important for people with CKD to slow down its progression. A supplemented very low protein diet (sVLPD) with ketoanalogues (KAs), together with other important dietary interventions, was shown to retard CKD progression in non-DKD[3]. However, the evidence of the renoprotective effect for DKD from a very low protein diet (VLPD) was weak, partly due to different enrollment criteria and the degree of protein restriction not standardised[4-6]. Particularly for type 2 DKD, no studies have yet been designed to evaluate the effect of sVLPD in patients with severely increased albuminuria and a high risk of CKD progression.

Methodology

In Khoo Teck Puat Hospital, we conducted a randomised pilot study to compare the effects of a low protein diet (LPD) versus sVLPD and tested the feasibility. Between 2019 and 2022, a total of 10 type 2 DKD patients with advanced CKD (at least moderately increased risk of KDIGO defined category with an estimated glomerular filtration rate of 15-60ml/min AND albuminuria >300mg/g (>30mg/mmol)) were recruited. Before randomisation, they were enrolled to follow a LPD (protein 0.6g/kg body weight/day) for 3 months. Baseline demographics, anthropometry, renal function and biochemistry were collected during this run-in period. A renal dietitian and a nephrologist assessed monthly nutritional and clinical parameters. We used body composition by multifrequency bioimpedance analysis (Fresenius Medical Care). Subjective Global Assessment (SGA) was conducted at baseline and after 3 months to evaluate nutritional status. At the end of the run-in phase, 3 patients dropped out as unable to commit to the LPD, while 2 patients were not continued due to poor dietary compliance.

Five patients managed to go into randomisation. Three were assigned to continue LPD and 2 patients followed an sVLPD (protein 0.3g/kg body weight/day with KA 5 tabs/kg body weight/day) for 12 months. Monthly reviews by a renal dietitian, a pharmacist and a nephrologist were conducted for the first 6 months, followed by 3 monthly until the end of the study. All 5 patients completed the study.

Besides protein intake, patients were advised to follow a low sodium diet (<2400mg/day) to reduce proteinuria[7]. Optimal fruit and vegetable intake were included as part of the meal plan to reduce net acid production[7]. Other dietary interventions were discussed to optimise serum electrolytes and blood glucose level control. To further improve dietary

compliance throughout the study, all patients were given 2 weeks cycle of low sodium diet menu with various protein requirements based on the assigned group. We also provided resources for daily meal planning, such as locally available low protein starches options, actual protein foods portion charts (A3 size), meal planning tool kits and low protein meal recipes (Figure 1).

Patients' Feedback on LPD and sVLPD

During the study, we received feedback from patients on the barrier to dietary changes and how they felt about the assigned diet. "I managed to reduce alcohol intake and lost some weight during this study. Constant follow-up with dietitian enables me to better track my food intake and improve my health," said Mr N from the LPD group. Mr S from the sVLPD group commented, "This study provides me with the opportunity to eat healthier as I include more vegetables in my diet. However, there are limited food choices that I could enjoy. I am glad that my wife has been supporting and preparing my meals. I also feel that there are more pills that I have to take on top of my usual medication prescription by the doctor." Madam K from sVLPD said, "I find it is challenging to manage my diet as I cook for the whole family. Sometimes I feel sad that I cannot enjoy food with my family when eating out."

Learning Points and Challenges

We encountered a few challenges during the study. First, many DKD patients were not interested in or unable to commit to a 15-month study, and the dropout rate was high. Second, COVID complicated the recruitment and intervention processes as patients feared attending the hospital, especially during the circuit breaker and pre-vaccination period. We overcame the obstacle by adopting teleconsultation and accommodating a flexible schedule for blood, urine sample collection and on-site nutritional assessment. Third, limited accuracy on food portion estimation and incomplete 3 days food diary affected the accuracy of protein and energy intake (Figure 2). We advised patients to send food photos before each consultation to improve the estimation (Figure 3). Fourth, limited low-protein starches are available in the market or difficult to have lower sodium options when dining out, further limiting the choice of our patients.

Implementing LPD and sVLPD provides an opportunity for behavioural changes to healthier food intake. However, patient selection is paramount to the success of the LPD intervention. These patients should show a positive attitude to compliance and willingness to sustain the dietary intervention. We noticed that patients are more prone to follow instructions if they do home cooking and have stronger family support. Cost is another concern as KA is considered a nutritional supplement and thus not subsidised by the government of Singapore. We did not observe significant nutritional status changes, as evidenced by the SGA score and lean tissue index. In order to prevent sarcopenia, adequate calorie intake is crucial in this group of patients. Therefore, regular nutritional assessment by dietitians and a structured dietary plan should be part of the implementation plan for sVLPD to prevent malnutrition and optimise the usage of KA.

In conclusion, a selected group of DKD patients who shows willingness and sustainability to dietary compliance can be considered for sVLPD with a structured multidisciplinary (dietitian, pharmacist and nephrologist) approach and dietary plan to promote behavioural change. Larger studies are required to evaluate further the long-term benefits of sVLPD on DKD progression in advanced CKD.

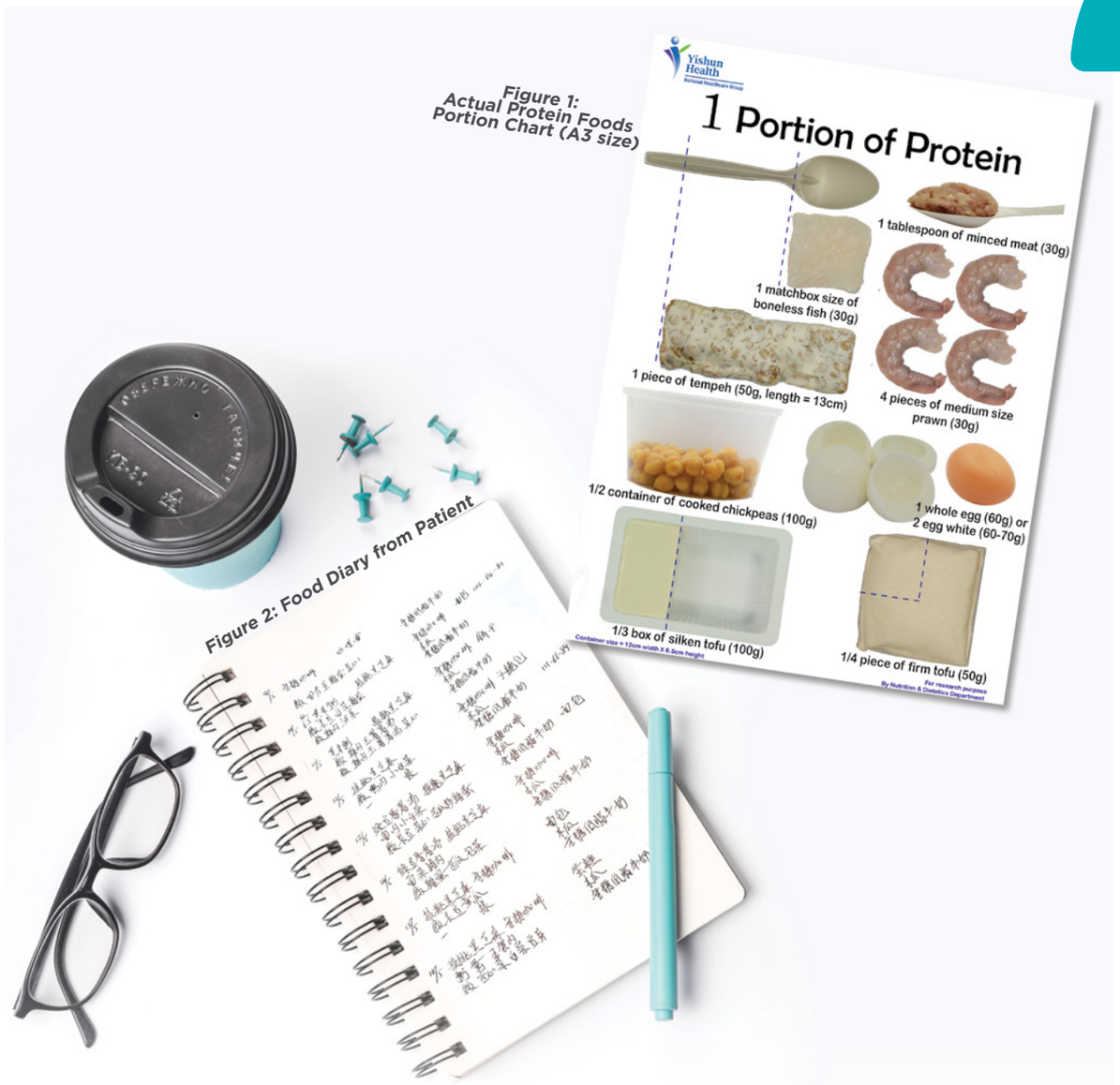
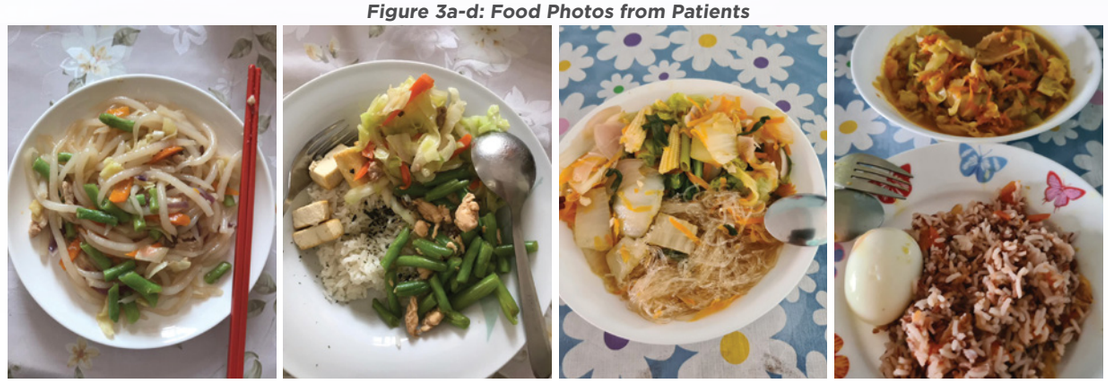


Figure 3a-d: Food Photos from Patients



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Ultrasound-guided Haemodialysis Access Cannulation

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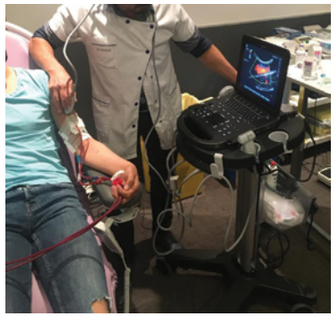
Introduction

Haemodialysis (HD) is a renal replacement therapy for kidney failure, which involves the cannulation of vascular access and the success of HD is dependent on the establishment of a well-functioning vascular access. To achieve increase in successful arteriovenous (AV) fistula cannulation, it is crucial to have effective equipment to ensure sustainability in therapy outcomes. Ultrasound (US) guidance on visualising central and peripheral venous access has been widely adopted in nephrology, reducing vascular intervention complications, including aiding in cannulation of difficult HD access.[1]

Handheld Ultrasound

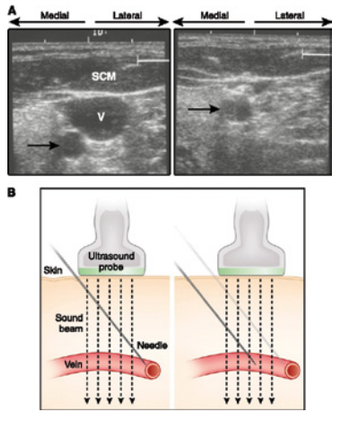
Ultrasound may be used across the spectrum of dialysis access, including central venous catheter placements, vascular mapping, maintenance or assessment of HD access, as well as assessment of the abdominal wall for peritoneal dialysis catheter placements.[2] Ultrasound and its technology have been going through much advancement. In recent years, there has been a rise in popularity in wireless and portable devices.

Picture 1: POCUS (Point of Care Ultrasound)



Point of Care Ultrasound (POCUS) to assess AVF has become increasingly common in various healthcare systems globally and its utility in dialysis centres has increased (Picture 1).

Picture 6: Ultrasound Guidance Scanner



Using an ultrasound guidance scanner in HD can better visualise the blood vessels, which in turn can help determine the best area for cannulation. This facilitates less traumatic cannulation of access, reducing incidences of aneurysms or pseudo-aneurysm, increasing the life of AV accesses, leading to better quality of life for patient and reduced cost to the healthcare system (Azura Vascular Care, 2019 Sep, Picture 6). It is estimated that almost one quarter of all Emergency Room visits by HD patients in Singapore are due to vascular access-related problems.

There are many systems available for healthcare providers to use and local professional organisations can help to compare systems which may be locally applicable to their country of practice. In Singapore, such organisations include Dialysis Access Synergy (DASy). Picture 2 shows one example of such a cannulation aid system.

Picture 2: Biim's Innovative Ultrasound System

Picture 3: Clarius Ultrasound

We have chosen to illustrate the principles of such technology through a more in-depth analysis of one type of handheld devices, which were demonstrated at the recent DASy seminar in Singapore. The handheld ultrasound scanner employs Piezoelectric (PZT) elements, which is considered one of the best technologies currently available for deeper scanning, with reduced noise. The image is reported to be consistent and reliable over time.

Picture 3 illustrates such a system, recently evaluated at DASy and undergoing user assessment trial at The National Kidney Foundation (NKF).

Ultrasound images can be viewed using the Ultrasound App (Picture 5). Such apps are specifically tailored to the overall system being utilised for image processing.

Picture 5: Clarius Ultrasound App

Assess Arteriovenous Fistula (AVF) Maturation

The National Kidney Foundation – Kidney Disease Outcomes Quality Initiative (KDOQI)[3] guidelines recommend early assessment, referral and investigation for post-operative complications to facilitate AVF maturation in a timely manner. When physical examination for detecting postoperative surveillance is inconclusive, ultrasound evaluation of the success of AVF development plays a pivotal role in preventing major complications. Ultrasound helps to evaluate causative abnormalities and assess AVF maturation progress via AVF diameter and blood flow. A randomised control study showed that an ultrasound scan can help evaluate AVF maturity when a vessel diameter is below 4-5 mm and blood flow is lower than 400-500 mL/min, giving an early opportunity for corrective action to be applied to facilitate the maturation.[4]

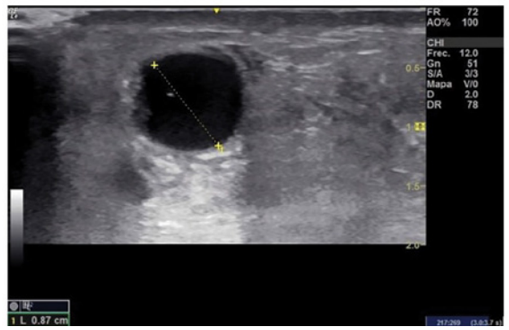
Cannulation Aid

Rope ladder cannulation technique of AV access cannulation is recommended to reduce trauma to blood vessel walls or graft walls. However, in real-world practice, the continual use of “area cannulation” is not uncommon due to limited vascular access cannulation sites. Studies demonstrated that nurses were confident with needling new or alternative AV access cannulation areas following ultrasound measurement, which helped in better appreciation of vessel diameter, depth and flow characteristics. [1,5]

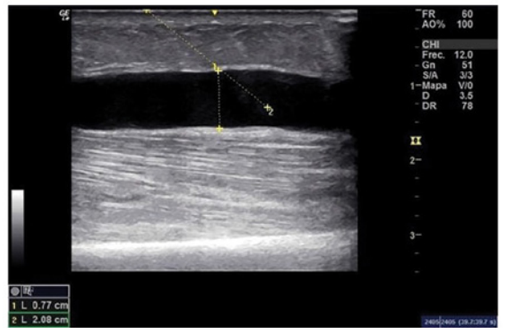
A good AVF should have sustained long-term patency and lead to good access blood flow with minimal complications. However, when a vessel is too deep, small in diameter, has an adjacent artery or nerve, or history of multiple attempts, the cannulation can be difficult despite the best needling skills. The resulting vessel wall injury will eventually result in stenosis, poor blood flow, high venous pressures, inadequate dialysis, fistula thrombosis, infiltration haematoma, and at the end to a premature loss of AV access. With better technology, availability and pricing, an increasing number of dialysis facilities have adopted ultrasound-guided needling of AV access over the traditional blind cannulation method, to mitigate these issues. [1,4,5,6,8]

One way of using the ultrasound-guided needling technique is to map the vessels and mark the best site for inserting needles.[1,6,7] Another method is to utilise real-time US guided needling. In the latter method, the needle is seen aligning in either the transverse or longitudinal visualisation plane of the ultrasound probe for successful vessel entry. Picture 8 and 9 illustrate these two different orientation planes.[6,8] Using ultrasound-guided cannulation of difficult AVF showed a higher success rate (98% vs72%, P=0.049) when adopting the transverse plane methods as compared to blind cannulation.[1] This result was congruent with other study which demonstrated a reduction in the AVF infiltration rate from 14% to 10.2%.[8]

Picture 8. Out of Plane (transverse)



Picture 9. In Plane (Longitudinal Image)



A randomised clinical trial of ultrasound-guided cannulation of difficult AVF demonstrated a significant reduction in the incidence of additional needle passes (72 vs 99, p=0.007) and the mean number of needle passes (2.74 vs 3.77, p=<0.001).[9]

Conclusion

Proper AV access cannulation for HD patients is critical in ensuring long-term survival of the AVF or AVG. It can potentially lead to reduced interventions, which are both costly and disruptive to the patient’s quality of life. A sizeable proportion of Emergency Room visits in Singapore by HD patients are due to issues with their vascular access, leading to a disproportionately heavy burden posed by this relatively minor and preventable problem. Ultrasound guided AV access cannulation can prove to be a useful tool to enhance the success rate of AV access cannulation, enhance quality of life, improve HD outcomes and lead to cost savings. HD providers and dialysis related healthcare workers would need access to such valuable technology and appropriate training for correct implementation of this useful tool in their daily care of HD patients.

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Innovations in Haemodialysis Membrane Technology

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Introduction

Innovations in Haemodialysis (HD) Membrane technology have made some progress over the past few decades. Notable examples include moving away from reuse to single-use, low flux to high flux, increasing variety in membrane surface area inside one cartridge, ability to tolerate higher transmembrane pressures and altering pore sizes which can support therapies such as haemodiafiltration (HDF), plasmapheresis and Continuous Renal Replacement Therapy (CRRT).

While all the above have now been implemented to a significant degree in various HD programmes worldwide, we are left looking at the horizon for more innovations that can not only enhance our patients' clinical and quality of life outcomes, but also lead to some cost savings in comparison to the technologies at hand.

This article is dedicated to looking at Super High Flux Sharp Cut-Off Membranes, which shows promise regarding the above-mentioned advances and gives us another viable option for comparison. The learnings from such comparative analysis can help in adoption of innovative technologies at The National Kidney Foundation (NKF).

Definitions and Impact

Various countries and manufacturers describe low vs medium vs high flux membranes with measuring different parameters with varied reference ranges.

Figure 1 below, shows the definitions used in USA, European Union and Japan.[1]

Figure 1: Difference of Dialyser between EU, US and Japan

Parameter		Low-flux	Mid-flux	High-flux
UF	mL/mmHg/h	<20	20-30	30-50
Urea	Kd(mL/min)	<180	180-200	200-220
	KoA(mL/min)	<500	500-600	600-700
	eKt/V	<1.2	1.2-1.4	1.4-1.6
ß2MG	Kd(mL/min)	**<20**	**20-40**	**40-60**
	KoA(mL/min)	<30	30-50	50-100
Albumin leakage	g/session	0	0	<2

						Super-high-flux
Classification in Japan~2013		I	II	III	IV	V
ß2MG clearance	mL/min	**<10**	**10-30**	**30-50**	**50-70**	**≧70**

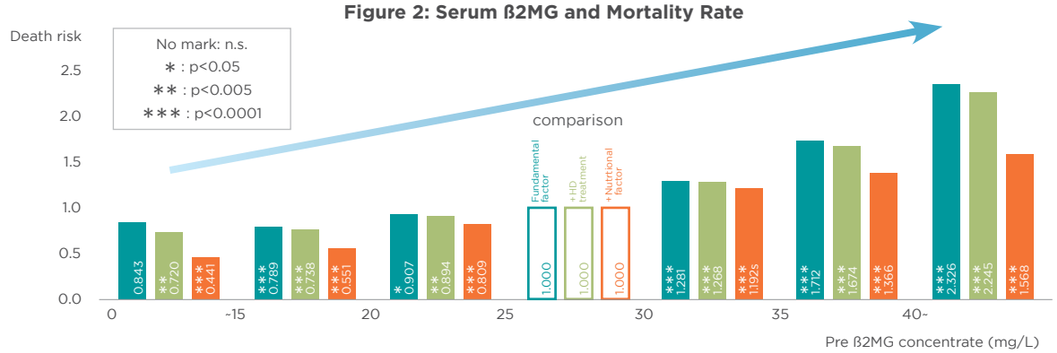
※**QB=200mL/min, membrane surface area 1.5m²**

As we can see by these definitions, Super High Flux dialyser is defined in Japan as Beta-2 microglobulin (B2MG) clearance of more than 70 mL/min (type V). This is assuming a blood flow of 200 mL/min with a membrane surface area of 1.5 meters square. About 93.8% of all dialysers used in Japan are of type IV and V, being in high-flux and super high-flux categories, respectively.

The rationale to benchmark dialyser efficiency to B2MG levels is due to the correlation of mortality rate and amyloidosis in HD patients, which has been shown to correspond to B2MG levels in the blood.[2,3,4]

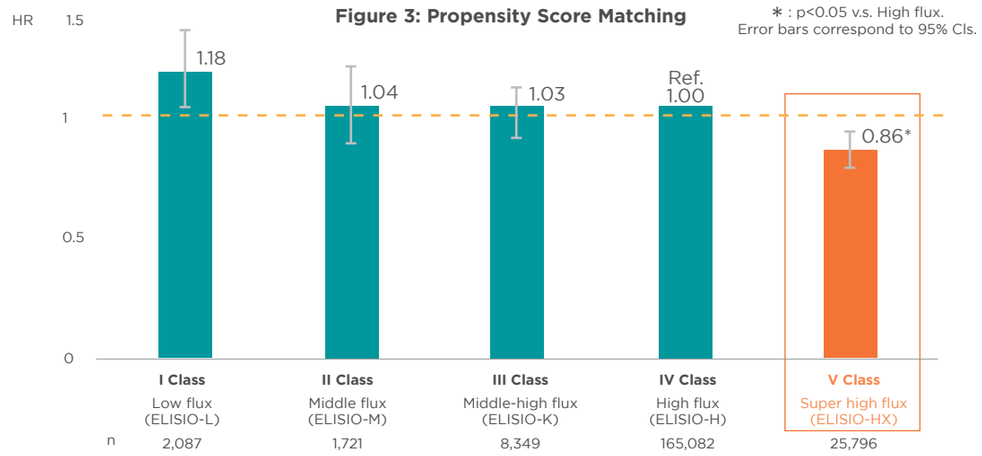
Figure 2 below, illustrates the mortality rate associated with rising pre-B2MG levels.[5]

Figure 2: Serum ß2MG and Mortality Rate



Furthermore, it has been shown that the type of dialyser and its "flux" classification has an impact on the mortality rate and prognosis of patients on HD.

Figure 3 below, demonstrates the difference in Hazard Ratios of mortality rates in HD patients, using various classes of dialysers in Japan.[6]



Super High Flux membranes were shown to improve mortality in patients on HD in a 3-year nationwide cohort study in Japan.[6]

Figure 4 below, shows a graphical abstract of these findings.[6]

Super High-flux Membrane Dialysers Reduce Mortality in Patients on Haemodialysis: a 3-year Nationwide Cohort Study

In Japan, dialysers are classified according to their ß2-microglobulin clearance: type I dialysers are classified as low-flux, type II and type III as high-flux, and type IV and V as super high-flux dialysers

Aim
To assess the association of each dialyser type with 3-year all-cause mortality

Methods
Nationwide prospective cohort study
Dialysis Therapy Renal Data Registry
2009-2011

Low-flux
(<10 mL/min clearance)

High-flux
(10-30 and 30-50 mL/min clearance)

Super high-flux
(50-70 and ≥70 mL/min clearance)

Results

242,467 patients

Low-flux
Type I 1.3%

High-flux
Type II 1.0%
Type III 4.2%

Super high-flux
Type IV 81.2%
Type V 12.3%

RIP
53,172 (21.9%)

Unadjusted HR
2.42%

Type II HR
1.74

Type III HR
1.21

Type IV
(reference)

Type V HR
0.65

Adjusted HR for (1) basic factors; (2) basic factors + dialysis-related factors; (3) basic factors + dialysis-related factors + nutrition- and inflammation-related factors; Type I maintained a higher HR and type V a lower HR

Conclusion: Haemodialysis using super high-flux dialysers might reduce mortality. Randomised controlled trials are warranted to clarify whether these type V dialysers can improve prognosis.

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Clinical Kidney Journal (2021)
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Comparison and Discussion

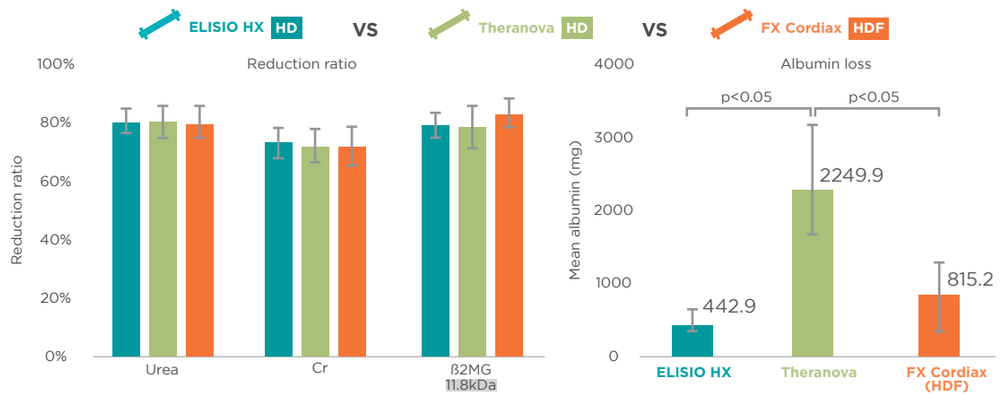
At NKF, we have used high-flux membranes for our HD patients. One of the main dialysers used have been from Nipro, Japan. Based on the above discussion, Super High Flux membranes with Sharp Cut off, may be a viable option for patients who need enhanced clearance and to reduce mortality rates in our ageing patient cohort. While HDF availability is on the rise in community-based HD centres in Singapore, it would give NKF a chance to compare not only the clinical outcomes of Super High Flux Membranes vs HDF in our Asian population cohort, but also the cost implications which will impact long-term sustainability of HD programmes with increasing End Stage Renal Disease (ESRD) numbers. Such innovative membranes designs can work on any standard HD machine and do not require special equipment, such as is required for HDF. Such innovative membrane usage with enhanced clinical outcomes has been termed in the literature as Expanded Haemodialysis (HDx).

Figure 5 below, shows a Super High Flux Sharp Cut-off Membrane ELISIO-HX being offered by Nipro and another HDx option with Theranova by Baxter.

NIPRO Dialyser
ELISIO-HX

BAXTER

One such comparative study of the above two membrane technologies with HDF (FX Cordiax) was done in Spain.[7] This was a prospective, single centre study, which was conducted on 18 patients undergoing a randomised sequence of 5 dialysis sessions over a 3-week period with these different options. The efficacy of Elisio HX19 dialyser in HDx was similar to the Theranova 400, superior to both dialysers in HD mode, and slightly lower than HDF. Elisio HX, performed with excellent behaviour and tolerance. Both membranes represented an upgrade compared to its predecessors and is very close to the removal capacity of HDF treatment.[7] One difference between Elisio HX and Theranova was that the albumin loss was much higher with Theranova (2.249 g vs 0.443 g). Furthermore, the albumin loss with Elisio HX was better than with HDF (0.443 g vs 0.815 g). Figure 6 below, illustrates the efficiency and albumin loss comparison in this study.[7]



Conclusion

ESRD numbers in Singapore are rapidly rising, bringing with them an ageing population cohort on HD. Community-based HD providers are faced with choices on providing large scale HD services at a sustainable level, while increasing the clinical outcomes and survivability of such vulnerable patients. HDF and expanded HD (HDx) are two viable options to potentially improve mortality rates. Cost implications of acquiring special machines to conduct HDF versus using specialised Super High Flux HD membranes with sharp cut-off, need to be weighed carefully for programme sustainability. This article gives viable options for NKF to consider such available options and to institute pilot programmes to generate data for further consideration.

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Light in the Darkness

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Beginning haemodialysis marks the transition to life on lifesaving yet intensive treatment. Haemodialysis (HD), however, does not just include treatment costs. Patients face a lifetime of regular dialysis sessions with many of its own side effects separate from those they already face because of their end stage kidney disease (ESKD)[1]. They are also required to follow behavioural and lifestyle recommendations pertaining to diet, fluid intake and medication. This sudden change may cause many patients to become confused or take more time to adapt to these adjustments in lifestyle, which can exacerbate existing psychosocial and health issues which they may be facing[2].

Poor psychosocial and health outcomes are especially prevalent in patients new to dialysis, at more severe degrees than those who have been on dialysis for longer periods[3]. The steep learning curve with large amounts of new information for necessary behavioural and lifestyle changes places huge cognitive demands on patients, exacerbating symptoms of distress and worsening quality of life. As many as 25% of dialysis patients report symptoms of depression, with higher symptomatology for those with an unplanned start[3]. In Singapore, more than 50% of incident HD patients had moderate to severe anxiety and depression scores that persisted over 12 months[4]. This is associated with higher rates of hospitalisation and mortality[5,6]. Transition to HD may hence be a pivotal target point for intervention, as research has demonstrated steep decline in mental health and wellbeing. These early days on HD may indeed be the "sweet spot" to target for intervention, as patients may need additional support during this transition period. Therefore, developing effective coping strategies is crucial to help patients cope with the situation.

Traditionally, ESKD research and renal services focus on the negative effects of HD experience, but there is growing use of positive emotion and benefit finding amidst stress and duress. A study by Llewellyn et al showed protective factors for preserving well-being in patients with long term conditions and their caregivers[7]. Other studies have shown that 53% to 83% of women report some type of positive change or benefit because of their cancer experience[8]. It is unclear if such potential positive gain experiences have been explored in ESKD.

Study Methods and Participants

In line with prior studies[9] and supported by an NKF research grant, we developed a positive psychological intervention ("HEDSTART") specifically tailored for new HD patients based on qualitative interviews with patients, caregivers, and expert input. HEDSTART is a four-session positive skills intervention lasting up to 2 months, that makes use of positive psychology, cognitive-behavioural therapy and motivational interviewing techniques to assist participants in setting and achieving short- and long-term goals for HD[10]. A randomised control trial is underway to evaluate the effectiveness of HEDSTART (NCT04774770). In this report, we present baseline data on N=147 incident haemodialysis patients who enrolled in the trial. The sample comprised 63.9% males, mostly older aged (Mage = 60.85, SD = 10.357), majority Chinese (53.7%). Most had some education (M = 9.24 years, SD = 4.064), were mostly married (61.2%) and retired (40.1%). These patients had been on dialysis for up to 6 months in NKF dialysis centres. Patients completed a questionnaire assessing mood using the Hospital Anxiety and Depression Scale (HADS)[11] and experience of meaning and personal growth using the Benefit Finding Scale (BFS)[12]. Scores ≥8 on the HADS denote caseness of anxiety or depression. Scores 3 and 4 in the BFS (out of a scale of 1 – not at all to 4 – very much) indicate high levels of benefit finding.

Reports of Benefit Finding

Study finding indicated that 28.5% and 29.7% of participants met anxiety and depression caseness cut offs respectively for benefit finding, 42.8% of participants reported high total benefit finding scores; 49.8% reported high acceptance, and 41.3% high personal growth.

What is especially noteworthy is that benefit finding was reported by patients meeting depression and anxiety cut off, despite hypothesising that few patients with poor mood would be able to recognise other benefits of HD, with rates ranging from 27.9% to 46.3% (Table 1).

Table 1: Rates of Benefit Finding Amongst Patients with Anxiety/Depression

Patients with Anxiety Caseness (28.5%, N = 41)	
Overall Benefit Finding	36.6%, n = 15
Benefit Finding – Personal Growth	31.7%, n = 13
Benefit Finding – Acceptance	46.3%, n = 19
Patients with Depression Caseness (29.7%, N = 43)	
Overall Benefit Finding	30.2%, n = 13
Benefit Finding – Personal Growth	27.9%, n = 12
Benefit Finding (Acceptance)	41.9%, n = 18

Discussion

Our findings show that even patients who report depression and anxiety symptoms may also experience acceptance and personal growth arising out of their HD experience. This highlights the potential value of strength-based interventions to build resilience and resources. There is evidence to demonstrate the efficacy of interventions that specifically target positive affect for people living with chronic physical and mental health conditions[13, 14] and we are optimistic that the HEDSTART intervention can be used as one of the models to yield similar benefits for new HD patients.

While important to emphasise the possible benefits of the stressful experience of HD, it is equally important not to minimise the pain and serious psychological and physical consequences of HD. There is evidence that individuals who consider both the positive and negative aspects of stressful experiences may have the best outcomes[15]. To conclude, patients' adaptation journey on renal replacement therapy (RRT) and response to HD may be complex and often include perceptions of benefits alongside distress. More work is required to map pathways linking benefit finding and health and identify ways to leverage positive affect and benefit finding for better patient outcomes in chronic kidney disease (CKD).

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Leaving Well with Kidney Disease

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Since its introduction in the 1960s, chronic dialysis programmes have given strength and hope to countless kidney failure patients. Having said so, there has been an increasing trend of patients choosing to forego dialysis. Frequently, these are very frail individuals, or individuals whose health declined such that dialysis can no longer improve their quality of life and may paradoxically add to their burden of symptoms. This trend is set to rise in our ageing population, where the prevalence, as well as impact of chronic diseases is anticipated to escalate in the coming years. Whatever the reason may be, the goals of care for these patients will then turn from pursing aggressive organ replacement therapies to relieving symptoms, maintaining quality of life and addressing psychosocial needs; even if not on dialysis, healthcare providers have a critical role of supporting these patients through their final journey. Here, we focus on 3 major aspects of care for these patients: empowering selected kidney failure patients to make an informed choice regarding conservative care, advocating advance care planning (ACP) to align treatment with patients' preferences, and finally, enabling end-of-life (EOL) care in the community.

Choosing Conservative Care

While dialysis extends and improves the quality of life for many people with kidney failure, this may not be the case for all. In a subset of patients, particularly those who have multiple other serious health conditions, not only does dialysis not lengthen life, it may significantly worsen their quality-of-life. This includes people who are elderly and frail, or have concurrent major illnesses such as dementia, cancer, or advanced heart

failure. In one large study[1], there was no improvement to survival amongst older persons choosing dialysis over those opting for conservative care. In particular, the presence of co-morbidity (particularly cardiovascular diseases) was associated with a significantly poorer survival. This result was supported by data from several other studies and provide important information that can help guide shared decision-making in older patients with kidney failure.

However, this must not lead us to conclude that older persons, or persons with multi-morbidities should not undergo dialysis. Such decisions should always be individualised to each particular patient. Nonetheless, it informs us that conservative care can be a reasonable alternative to kidney replacement therapy in selected patients who wish to have a greater focus on the quality rather than just the quantity of their lives.

In one study performed at our hospital[2], the choice of haemodialysis, peritoneal dialysis and conservative care was examined in 1,733 patients over a multi-year period. A significant proportion of patients (11.8%) opted for conservative care. Patients who opted for conservative care were more likely to be older, had greater co-morbidity burden, required more assistance with activities of daily living, and had peripheral vascular disease/amputation or higher serum creatinine. It is also noteworthy that patients who opted for conservative care tended to have more years of education, compared to those who chose dialysis. This may reflect a better understanding of the implications for conservative treatment and highlights the importance of patient education and shared decision-making during dialysis counselling.

Conservative care, also known as best supportive care, non-dialytic care or comfort care, does not equate to an abandonment of all medical care. Patients will continue to receive medications to slow the progression of kidney failure, address medical complications and to optimise symptom control. It involves tactful and person-centred communication, holistic assessment of both the needs of patients and their carer, as well as effective multi-professional collaboration that connects specialist care, primary care, community care and palliative care services. In fact, patients treated with conservative care can achieve similar quality of life and levels of symptoms control as patients on dialysis.[3]

Advance Care Planning

Advanced Care Planning (ACP) is a voluntary process of discussion on future care preferences between an individual, his or her family and healthcare providers and is suitable for everyone, regardless of age or state of health. It is especially pertinent in people with chronic diseases such as kidney failure, as they follow an undulating and less predictable disease trajectory compared to patients with cancer. It serves to elicit one's personal values and beliefs and in so doing, facilitate the establishment of a reasonable goal for care. ACP also explores healthcare preferences in difficult medical situations, which include circumstances at the end-of-life. Patients can express situations where they perceive their quality of life to be too poor, beyond which dialysis may be stopped. Naturally, such discussions will need to include a clear explanation of the anticipated clinical course after withdrawal, as well as the role and availability of palliative care services to ensure that the patient's wishes are respected, and his comfort can be optimised.

Since its inception in Tan Tock Seng Hospital (TTSH), many kidney failure patients, regardless whether they are on conservative care or receiving dialysis, have undergone ACP. Based on data collated over an 8-year period,[4] compared to kidney failure patients without an ACP, those with an ACP were less likely to be admitted to the intensive care unit, less likely to change their decision for conservative management (if not on dialysis), had fewer hospital admissions and were less likely to require a palliative care referral. These results suggest that ACP reduced the overall burden of care during the patient's care journey and allows patients and their family to align their focus towards spending more quality time together. Overall, ACP provides a platform for patients to voice and align their treatment preferences, facilitate shared decision-making and improve person-centred care.

Bringing End-of-Life Care into the Community

Historically, patients with non-cancer diseases have poorer access to palliative care services, as compared to patients with cancers. Consequently, patients undergoing dialysis frequently die in the hospital. In recent years, there has been an increased emphasis nationwide to build generalist palliative care capabilities amongst community partners, so that they may support the end-of-life care needs of patients with chronic diseases, including kidney failure.

Although there has been a rising trend of patients eventually passing away at home or at community facilities such as hospices after their withdrawal from dialysis, this proportion is half that of patients dying from other life-limiting illnesses. Recognising this, TTSH set up Programme IMPACT (Integrated Management and Palliative Care for Terminally ill Patients – non-cancer) in 2017, which aims to bring good symptom control, targeted caregiver training and holistic psychosocial support to patients at their homes. Through close collaboration between the nephrologists and palliative care physicians, many patients under the programme were able to experience seamless care transitions between healthcare settings and receive palliative care at home during the final phase of their disease trajectory. A great majority of them eventually passed away at their preferred place of death, outside the hospital. Today, TTSH continues to work closely with community partners such as Dover Park Hospice to expand the reach of Programme IMPACT.

Future Ahead

Even as we strive to transform healthcare delivery to improve life expectancy and better other clinical outcomes for patients with chronic kidney diseases, it is equally vital to ensure that they receive the very best care in the last years, months and days of their lives. This means ensuring that they not only live well, but also leave well, while coping with their progressive illnesses. Greater effort will need to be directed towards moving ACP discussions progressively upstream in the disease trajectory, and to systematically inculcate ACP discussions as part of routine care. It is also worth framing ACP as an iterative discussion, one that reflects an ongoing patient-centred conversation throughout successive healthcare encounters that helps healthcare professionals better understand the values and preferences of their patients. Additionally, continual engagement and systematic education of our patients, as well as their loved ones, to raise awareness of the option of conservative care is paramount to ensure our patients are empowered to make informed choices. Finally, care will need to be integrated across different healthcare settings, such that care partners can collaborate in providing comprehensive EOL care for patients with kidney failure.

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Patient Activation: Does it Influence the Outcome of Renal Patients?

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All chronic diseases require patient involvement in their care for better long-term outcome. Chronic kidney disease (CKD) is no exception. The patients who are better educated about their illness and better involved in their care tend to do better in terms of adherence to their diet and medications, have better control of their risk factors and generally have better outcome. On the other hand, the ones with poor understanding of their condition are likely to be less motivated, less likely to recognise early warning signs of complications and more likely to have rapid progression.

The State of Play

CKD education is provided differently in various parts of the world. The nephrologists, due to time constraints, are generally unable to spend the required amount of time counselling the patients. That is where the role of dialysis nurses, medical social workers, patient navigators and renal coordinators come into the picture. In Singapore, education is mainly provided by renal coordinators who play an invaluable role in patient care. Dialysis nurses also play an equally important role in the education of dialysis patients in the community. But instead of being just educators and counsellors, if they are able to transform their role to that of a coach, the impact will be much higher and the results much better. This involves changing the current "one-size-fits-all" approach to a highly individualised and person-centred approach based on the patient activation.

Current Understanding of the Role of Patient Activation in Renal Patients

Patient activation is the knowledge, skill and confidence to manage one's own health. In other words, patient activation refers to how involved patients are in their own care. Lower activation levels have been reported in almost half of CKD patients and were associated with a higher symptom burden and reduced health-related quality of life across the trajectory of CKD stages and treatment modalities[1]. Even among the haemodialysis population, there is evidence that the patient activation is generally quite low[2]. This, to some extent, explains the poor quality of life they have in addition to their poor clinical outcomes.

Patient activation can be measured by the 10-item Patient Activation Measure (PAM) survey known as PAM-10[3]. The survey is scored on a scale from 0 to 100, with higher scores denoting greater activation. Scores translate to 4 activation levels with level 1 being the lowest (disengaged and overwhelmed) and level 4 being the highest (proactive and engaging in many recommended health behaviours).

There are gaps in our knowledge which act as barriers to the widespread use of PAM in nephrology practice. It is unclear what should be the type, frequency and the most effective method of delivery of intervention to improve patient activation. But one would expect better quality education to improve patient activation. This can be done by moving away from passive education of a predetermined content to tailoring the education based on the individual patient activation level. Using health coaching techniques including motivational interview, by actively involving patients in their own care and by leveraging technology, one can hope to achieve better activation level.

Role of PAM in Providing Value-Driven Care (VDC)

In our pursuit of patient-centred care and VDC, enabling patients to take a more active role in their care can result in reductions in individual burden and costs to the health care system. Currently, renal patients form a substantial part of emergency department (ED) visits and hospital admissions. For instance, among 154 diabetes-related ED attendances in the month of August 2022 in Sengkang General Hospital (SKH), renal patients including those with fluid overload accounted for 41 (26.6%). By improving the activation of our patients, can we reduce some of these ED visits and hospitalisation and keep them safe in the community? The answer remains elusive based on the current literature.

At SKH, we have embarked on a pilot project and obtained license for using PAM-10 for 15 renal patients over the next one year. The patients who will be included are CKD patients with more than 2 admissions or those with GFR decline of >5 ml/min/m2 in the previous year. With the patients' consent, their PAM score will be assessed with the help of the survey and those with low scores (level 1 and 2) will receive health coaching in the form of individualised CKD material tailored to the particular patient's needs. They will be followed up by the renal coordinator up to a maximum of 4 times per year. The numbers are too small to assess the impact on the outcome of these patients. But the pilot project will certainly guide us about the practicality and usefulness of PAM and help us assess the feasibility of its wider integration into clinical practice taking into consideration the cost benefit analysis.

Future Directions

Evidence is currently lacking that improving PAM leads to better outcome in renal patients. Even though PAM is a validated tool in CKD population[4], validation in dialysis population has not been done. Research is needed in these areas to address the above questions. There is a unique opportunity for the renal coordinators and dialysis nurses to enhance their role from educators to health coaches. Adequate training needs to be provided to these two groups to take on this new role. To achieve a sustainable cultural shift, a multifaceted approach is crucial with involvement of all the stakeholders including the patient.

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