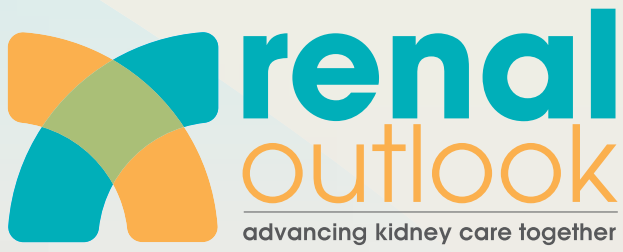


The National Kidney Foundation

NKF



contents



In line with the Renal Outlook masthead tagline of “advancing kidney care together”, the background of the chess pieces metaphorically describes our collective efforts in advancing step by step to achieve our end goal, which is to benefit kidney patients and healthcare system in an ever challenging renal landscape in Singapore.

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Foreword

Thank you for your support as we join hands to advance renal care in Singapore.

It is indeed worrying that diabetes, high blood pressure and obesity, which are the leading causes of chronic kidney disease and kidney failure, are on the rise. According to the Singapore Renal Registry (SRR) Annual Report 2020, the number of Singaporeans diagnosed with kidney failure has jumped significantly from about 4.3 new cases every day in 2011 to about 5.7 new cases in 2019; and there are currently more than 8,500 dialysis patients in Singapore. This is largely attributed to the rising incidence of diabetes and high blood pressure, and an ageing population with an expected one in four Singaporeans to be above the age of 65 by 2030. About 68% of newly diagnosed dialysis patients are due to diabetes. At NKF, we are seeing more than 100 applicants for admission every month, up from about 60 a few years ago. All these rising numbers will further add to the demand on healthcare services.

There is a pressing need to address this and we will need to do more across the whole spectrum – from prevention to treatment and management of chronic kidney disease. The care of chronic kidney patients cuts across various providers, institutions and departments including community based organisations like NKF. As members of the renal care community, we need to continuously work collectively and in a concerted way to advance renal care in Singapore through integrated care, continued education and research. It is therefore extremely vital that we keep sharing knowledge and information to achieve our common goals.

With this in mind, I am happy to share with you the inaugural issue of our publication titled Renal Outlook. It is a collaborative effort with peers and colleagues to cover a broad range of clinical and educational topics along the entire scope of renal care. It provides content that is relevant to, and reflective of, the growing diversity of the renal care community. We believe it will be a unique publication for the renal arena in Singapore and will serve as an important platform for knowledge sharing among healthcare professionals and partners.

The logo of this publication is created from the letter “r” and part of the letter “o”. The letters are criss-crossed, representing collaboration within the renal community. The orange colour symbolises hope, and teal, a cool colour represents a clinical approach to the publication.

I would like to specially thank members of the Editorial Advisory Committee for generously giving your time and expertise to evolve this publication into a meaningful resource by sharing your advice and inputs. I am also grateful to the authors for taking the lead in this important initiative to broaden and deepen our collective understanding of critical issues in kidney care through your valuable contributions. The enriching articles cover a diverse range of renal-related topics that will go a long way towards benefiting our patients and healthcare system.

We are indeed excited about the start of this endeavour and hope that the multidisciplinary insights in this publication will play a vital role towards the transformation and integration of chronic kidney disease care for the future, as well as the development of many excellent programmes and initiatives that will help reduce the incidence of chronic kidney disease in the face of emerging complex challenges in an ever challenging renal landscape in Singapore.

Once again, I thank everyone in the renal community, healthcare partners and advocates of kidney health for your strong support as we leverage on the strengths of one another and do more through sharing, close collaboration, coordination and integration to continuously raise the standard of renal care in Singapore.

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Cognitive Complaints and Difficulties in ESRD

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Haemodialysis (HD) is the most common form of renal replacement therapy, with 89% of dialysis patients receiving this treatment modality worldwide¹. The treatment burden of HD is extremely high as patients are required to permanently rearrange their schedules to accommodate treatment. The symptom burden of HD is also very high, with more than 50% patients reporting over 18 difficult symptoms and treatment side effects^{2,3}.

An additional complication associated with HD is cognitive impairment (CI), the deterioration in cognitive function that affects attention, memory, communication, learning and various other domains⁴. Recent reviews showed that HD patients have impaired cognitive function compared to the general population and patients on other renal replacement therapies⁵⁻⁷. The estimated prevalence of CI ranges from 6.6% to 51.0% in HD patients⁸. CI is associated with worse clinical outcomes such as hospitalisation and mortality^{9,10}. CI may also impact patients' treatment adherence and decision-making capacity, which are essential to long-term quality care for HD patients⁹.

Early identification of patients at risk of cognitive decline is important for targeted prevention and early intervention. Although mild cognitive impairment (MCI) has been characterised as an early stage prior to CI, neuronal loss and irreversible damage may have already taken place at this stage¹¹. Therefore, in recent years, there has been growing interest in Subjective Cognitive Complaints (SCC), the personal experience of everyday cognitive difficulties without objective signs of CI or impairments in daily functioning. Previous research has shown that SCC may be present as long as 15 years before the onset of MCI¹¹. This self-perceived decline in cognitive function has also been found to have diagnostic and clinical significance and may be an important predictor of future progression to MCI/CI^{12,13}.

The Kidney Disease Quality of Life Cognitive Function subscale (KDQOL-CF) has been widely used as a measure of SCC in the context of chronic kidney disease¹⁴. This brief measure contains three items assessing the frequency of SCC experienced in the past 4 weeks (i.e., During the past 4 weeks, did you react slowly to things that were said or done? Did you have difficulty concentrating or thinking? Did you become confused?). Respondents are asked to rate on a 6-point Likert scale for each item (1 = none of the time, 2 = a little of the time, 3 = some of the time, 4 = a good bit of the time, 5 = most of the time, 6 = all of the time). Responses are transformed to scores ranging from 0 to 100, with higher scores indicating better self-perceived cognitive function. A score of 60 has been suggested as a cut-off point for CI in patients with chronic kidney disease¹⁴. The advantages of this measure are its accessibility and ease of administration. This measure may potentially serve as a brief screening tool that allows for early identification and step-up diagnostic evaluation in HD patients. However, it is noteworthy that the KDQOL-CF is limited in its content and measurement dimensions as it only assesses the frequency (and not severity) of SCC and does not include items on memory, executive function, or other cognitive domains that have been found to be most impaired in HD patients^{5,6}. Therefore, new measures of SCC for HD patients are needed.

Early identification of CI in HD patients using brief self-report tools that can be integrated into routine care can benefit patients and renal health services. CI can compromise patients' daily functioning, self-care abilities, and quality of life, and is associated with poor clinical outcomes such as hospitalisation and mortality^{9,10}. Detecting CI at the prodromal stage would provide an opportunity for timely intervention or prevention so as to maintain health literacy and self-care skills which are crucial to the successful management of kidney disease. The recognition of cognitive burden would allow for optimisation of other services, such as patient education programmes and/or materials, so that these are better catered for those with mild or more severe CI, hence increasing patient engagement and their overall effectiveness.



From a public health standpoint, it is impractical to conduct standard cognitive testing for every HD patient since formal diagnostic evaluation for CI is labour-intensive and time-consuming. Therefore, administration of SCC self-reports may be the first step in a staged evaluation that identifies patients with CI or at risk of developing CI without trained personnel¹⁴. Incorporating brief screens in clinical practice would improve efficiency by reducing unnecessary formal testing and would enable more cost-effective allocation of healthcare resources to those who are in greater need for prevention or rehabilitation programmes.

While the KDQOL-CF measure may continue to be the main assessment tool for SCC in HD patients, novel measures that capture more cognitive domains and assess both frequency and severity of SCC are needed. Such tools may have a potential to be incorporated into routine care where HD patients report their SCC experience regularly, which would allow for accurate risk profiling and targeted prevention. Researchers should also investigate the optimal timing and frequency of SCC assessments, as well as cut-off points that accurately differentiate patients with and without MCI or CI, or patients at greater and lower risks of CI.

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Digital Health to Advance Precision Medicine Opportunities in Nephrology in the Age of Population Health

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Precision medicine holds great potential to revolutionise care delivery and improve outcomes in nephrology. Heterogeneity in the risk of development and progression of kidney diseases underscores the challenge that a one-size-fits-all approach is inadequate and a more individualised, targeted approach to prevention, diagnosis, treatment and prognosis will be better suited. Response to available treatment is also highly varied and, coupled with poor predictability of adverse effects, these suggests that a better understanding of the factors affecting one's response to drugs is needed to better tailor medical treatment to each individual. Indeed, progress in identifying mechanistic basis of disease, including pathogenic biomarkers (such as the discovery of anti-PLA2R antibody in primary membranous nephropathy) or specific genetic mutations (mutations in APOL1 and risk of kidney disease), have advanced our understanding in some kidney diseases, and in some instances, identify specific therapeutic targets (such as complement inhibition in complement-mediated kidney disease) and drive better clinical outcomes.

However, precision medicine goes beyond the individuals, disease, genes and drugs. Population health interventions, many of which targets wider environmental and social determinants, require directing efficient use of resources to populations most at risk. Novel methods and technologies to identify disease susceptibility, coupled with efficient and effective prevention and treatment strategies, can potentially improve health and reduce cost of care. For example, even though individual genetic variants generally account for small effect sizes, polygenic risk score has been shown to improve risk stratification, enhance diagnosis of disease subtypes, predict progression and recurrence, and potentially guide treatment regimes in breast cancer, cardiovascular diseases, type 2 diabetes and several other diseases. Genetic and personalised risk information may also prompt patients to make behavioural changes to reduce their disease risk.

Despite the allure and promise of precision medicine, progress has been slow in arguably the two most urgent health issues afflicting nephrology globally: prevention and slowing the progression of chronic kidney disease and improving clinical outcomes in dialysis therapy. Screening for kidney disease is still based on traditional risk factors such as diabetes and hypertension and it remains difficult to predict the individual trajectories of glomerular filtration rate loss in chronic kidney disease. Despite significant progress, mortalities and outcomes in dialysis patients remain disappointingly poor. While access to kidney replacement therapy in Singapore is universal and there is widespread delivery of quality dialysis care,

coupled with routine adoption of clinical indicators monitoring, many patients on dialysis continue to bear a high burden of disease, shortened life expectancy and report a high symptom burden and a low health-related quality of life. With the ageing population in Singapore, coupled with rising prevalence of diabetes, hypertension and obesity, the incidence and prevalence of chronic kidney disease and end stage kidney disease are set to rise, and the need for a population health approach, with better-targeted evaluation and treatment, is more urgent than ever. Fundamentally, to predict health outcomes more accurately, have faster diagnoses, provide better optimised or more novel treatments, there is a need to consider the variability and the interactions in genes, environment and lifestyle factors, over and above traditional risk factors and clinical parameters, with the aim to individualise care. To achieve this, healthcare providers and scientists must leverage on digital health solutions, and specifically, what might be considered the 3Ds of digital transformation: deep phenotype, deep learning, and deep collaborations.

Deep Phenotype

Currently, several disparate data sources hold essential information about kidney disease burden, molecular mechanisms, novel risk factors and therapeutic targets. Traditionally, patient registries, epidemiology studies, census and surveillance data hold a wealth of disease statistics, patient information and treatment outcomes. Electronic health records and administrative data contains images, pathology reports, diagnoses, laboratory results, clinical notes and billing and claims data. Clinical trials hold data on trial design, registration, participants' information and specific outcomes. Molecular data focused traditionally on genomics and proteomics, but is now widely extended to include transcriptomics, metabolomics, and microbiome data. The advent of wearables and mobile health devices has provided an explosion of data from physical activity and diet logs, treatment adherence measures, remote blood pressure and glucose monitoring and even arrhythmia logs. If these five major sources of data can be curated, stored, integrated, and analysed, there will be limitless possibilities in the development of data-driven applications for use in research and clinical practice. Big data, characterised by its variety (diversity of data), velocity (speed of data generation and accumulation), veracity (accuracy and reliability of data) and volume (scale of data), will provide a comprehensive approach to precision medicine and provide data greater than the sum of its parts.

Deep Learning

Advances in machine learning provides a powerful toolkit for extracting knowledge from a large-scale, multi-dimensional biological data sets, overcoming methodological constraints of traditional analyses using statistical modelling and inference. One family of machine learning methods that is increasingly finding applications in biology is known as deep learning, characterised by the ability of computer systems to learn how to achieve complex tasks or make recommendations from data without being specifically instructed on how to do so. In deep learning, input features are subjected to multiple layers of transformations, in which the outputs of each layer are functions of subsets of the input to that layer. Multi-modal assessment allows the integration of information from various sources into a single quantifiable measure and hence present new information to facilitate decision making, in a way "see things that the human brain can't". Deep learning can also incorporate serial data to capitalise on temporal changes as additional predictor for outcomes, beyond traditional tools such as regression analyses.

Deep Collaborations

For digital tools and solutions to be useful and deliver real-world impact, technologies must first, address the issues which are most important to patients and clinicians, and second, be easy to implement throughout the system. Implementation science in healthcare dictates that interventions must demonstrate compelling value to enhance its reach, adoption and sustainability. Deep collaborations between hospital specialists, dialysis providers, primary care physicians, population health researchers, computer scientists and technology companies are of vital importance. Beyond digital platform interoperability, digital maturity, and system readiness, coupled with training for clinicians in digital technologies to leverage the potential of exciting new technologies, collaboration between the best that industry has to offer and healthcare itself will allow translation of research to practice and drive the next significant breakthrough in patient care. Indeed, the benefits of precision medicine to healthcare systems extends beyond the better clinical outcomes of its population and cost-savings to the system, as driven by the impact of "right treatment for the right patient at the right time". Big data and machine learning of trends in kidney care can help anticipate demands and plan for costly resources before they are needed, providing valuable insights to healthcare administrators.

The nephrology community in Singapore is well placed to ride on the global waves of digital transformation to advance precision medicine and be leaders in this field that is relatively nascent to nephrology. Initiatives such as the SG100K and the National Precision Medicine Singapore will catalyse the systematic capture of population-specific data representing the local Asian diversity. Our dialysis providers, hospitals and primary care have excellent healthcare infrastructure and are advanced in digital health data. Through deep collaboration with leading expertise in data science, we will have the ability to harness insights from deep phenotypes and deep learning, transforming care in the near future. In essence, the potential for digital transformation in the care of kidney disease is enormous and exciting, and to be precise, the renal outlook is excellent.



What We Didn't Know About "Coping"

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The word "Coping" is used very often in our daily lexicon with little consideration for its implication. In psychology literature, "Coping" is defined as "constantly changing cognitive and behavioural efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person". One might critique that this suggests that "Coping" is an individual, intrapersonal endeavour, with little consideration for mutual influence (not necessarily equal influence) to and from people around them. We know that this is untrue. The way we "Cope", if you like, could be a relational response to those around them, rather than an independent cognitive and behavioural response to external demands. Hence, one could argue that we probably never "Cope" independently of others but our "Coping" exist within a network of interactions that he or she resides within.

A New Understanding

I would like to introduce a new way of understanding patients and caregivers when they face End Stage Renal Failure. This is based on my research that I have done with 18 families. There are three respondents from each family in my research; namely the Patient, the Spouse and the Adult Child. With this new understanding, Health Care Professionals will be able to appreciate the challenges of patients and caregivers and be able to appreciate the complexities of change that we might sometimes naively impose on them. A famous anthropologist, Gregory Bateson might describe our attempts to intervene without understanding the complexities of change as vulgar. He argues for a more measured and considered approach instead of rushing in where even "angels fear to tread".

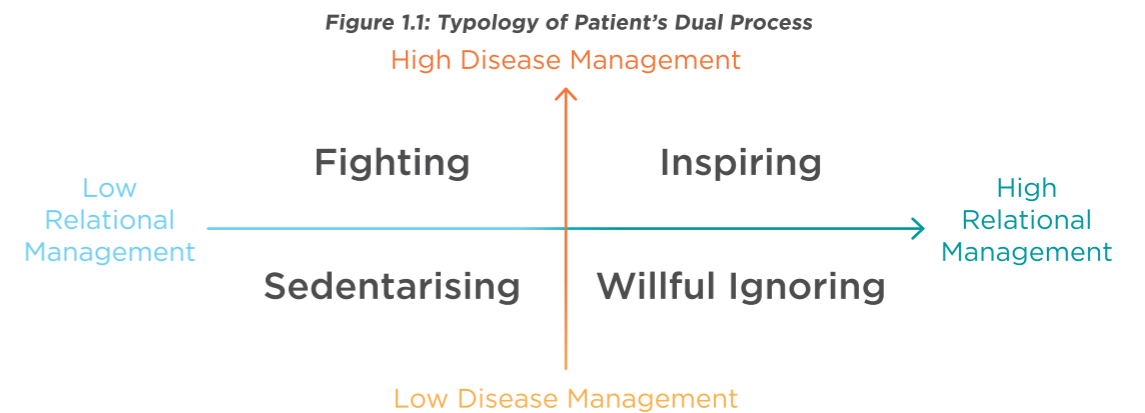
In my research with patients and caregivers, I noticed that when something challenging like an End Stage Renal Disease diagnosis occurs, there are two seemingly opposing agendas that patients and family members have to integrate. This is described as "Dual Processing". The two agendas are not two sides of the same coin, i.e. it does not mean, one needs to sacrifice one in the expense of the other. Say for example, the Dual Process that patients have to exercise in facing Illness Struggle is Negotiating Control, which, consists of Disease Management and Relational Management. There are patients who could do well in both areas or poorly in both areas. This is also the case for the Spouse, who when facing Survival Struggle. They will have to exercise Negotiating Focus, which consists of Direct Caregiving and Executive Management. Finally for Adult Children in the family, to deal with Demand Struggle, they have to exercise Negotiating Proximity, which consists of Involving and Insulating.

As it is possible for one to have high and low scores in the two agendas, Patients, Spouse and Adult Children could hence be mapped into a quadrant to demonstrate how they are functioning. These could hence guide the Health Care Professional in making an assessment and develop a deeper insight to how they are Dual Processing their experience of ESRD, which, while is a struggle for everyone, is experienced differently. (Patient: Illness Struggle, Spouse: Survival Struggle, Adult Child: Demand Struggle). The Dual Processing quadrants could be seen below.

Main Concern of Patient: Illness Struggle

Core Category: Negotiating Control

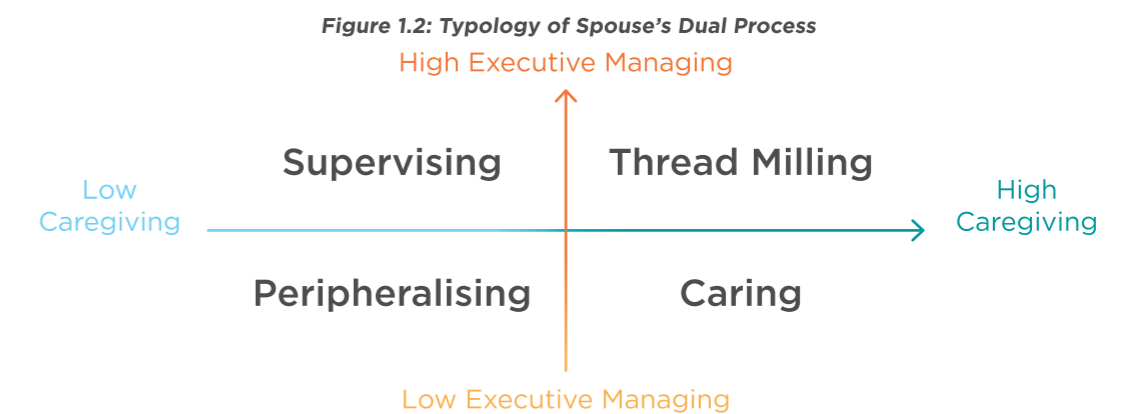
Consists of Disease Management and Relational Management



Main Concern: Survival Struggle

Core Category: Negotiating Focus

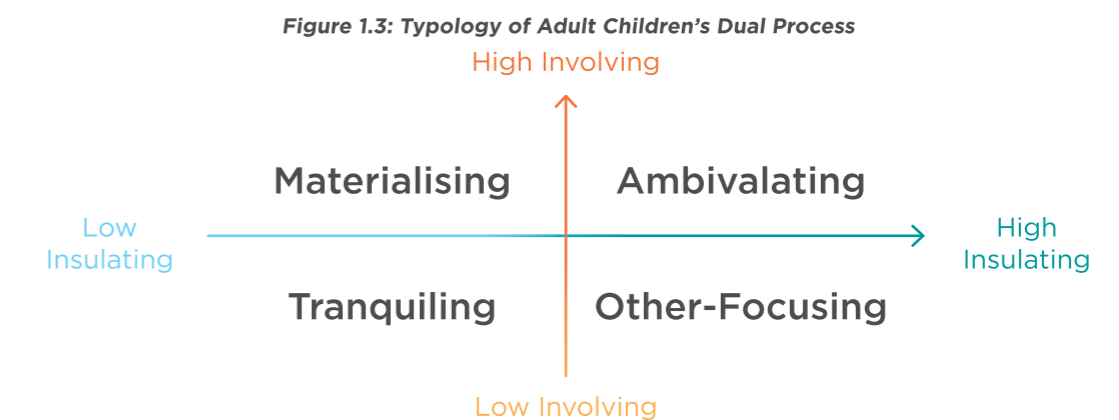
Consists of Executive Managing and Direct Caregiving



Main Concern of Adult Child: Demand Struggle

Core Category: Negotiating Proximity

Consists of Involving and Insulating



Case Example

As one considers these quadrants and where each of these Patient – Spouse – Adult Child are, one could analyse Triadic relationships and develop a deeper appreciation of what is happening between the patient and family.

Mdm T is a 60-year-old ESRD patient who has been on dialysis treatment for the last 4 years. Her husband, Mr T, 64 is a Technician who brings back home an income of \$2000. The couple's daughter, M is 26 years old and is the main caregiver of Mdm T. M has stopped school to look after her mother since she has started doing dialysis. M recently had attempted to look for jobs outside but could not last long due to adjustment issues. Mr T does his best to bring home the income back home to feed the family. However, his income is barely enough for the family's subsistence. Mr T is not able to provide much care to Mdm T as he feels inadequate to do so. He also does not get involved with the medical systems and relies on his daughter to manage that.

Mdm T and M are also very close and hence sometimes Mr T appears somewhat excluded from the mother-daughter dyad. Mdm T seems to be somewhat independent however she is anxious when daughter is not with her. Using the quadrants that has been developed in this research to analyse the behaviours of Mdm T, her spouse and daughter, we could argue that Mdm T is Fighting, while her spouse is somewhat Peripheralising and her daughter is Ambivalating. Mdm T is regarded as fighting as she has high Disease Management and low Relational Management, while Mr T is regarded as Peripheralising because he is low on Caregiving and low in Executive Managing. Finally, daughter is regarded as Ambivalating because while she demonstrates high degree of Involving, she has depression and one could argue that as a maladaptive way in which she is Insulating from her mother's illness.

Implications for Practice

Considering this triadic dynamic of Fighting-Ambivalating-Peripheralising, the Health Care Professional would be in a better position to understand what possibilities or constraints the family might have in trying to adapt and change. What options would the family have as they try to achieve whatever is "better" for them? What is the cost of changing versus cost of remaining the same? How long can they remain the same before events might force them to change? How can they be more ready for the future?

It is important that healthcare professionals take a respectful position in trying to understand the positions that each of the family members is taking without being over keen to correct or change them. Understanding the logic and why certain positions are taken by various family members is important in appreciating the complexities of change within the family. For example, Mr T might be seen as "Peripheralising" in response to the illness as his job requires long hours and he might have rationalised his role as the bread winner of the family and hence less responsible for caregiving.

Invitation to Change

In order to introduce change to such a dynamic, one could ask a series of questions that could invite the family to start to review how they are functioning. Suppose we have the view that patient needs to be more independent of her daughter, we could ask questions like:

What do you think would need to happen if your husband loses his job in the future?

How would that have an impact on your family?

What would your daughter need to do differently?

How would that have an impact on you?

Or suppose we want to get husband to be more involved in the care of the patient, we could ask questions like:

Do you think your husband is being excluded or does he keep himself out?

If he were to be more engaged in your care, instead of your daughter, what adjustments do you think you would need to make as a patient?

These questions are adapted from an article titled "Interventive interviewing: Part 11. Reflexive questioning as a means to enable healing" by a Psychiatrist Professor Karl Tomm.

Simultaneous Pancreas-Kidney Transplantation

A Life Transformed

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Over the last decade, the National University Centre for Organ Transplantation (NUCOT) at NUH and the Singapore General Hospital (SGH) Transplant Centre have been working together on a pilot Health Services Development Programme for Pancreas Transplantation. Under this programme, three Simultaneous-Pancreas Kidney (SPK) Transplants were performed at NUCOT for Type 1 Diabetics between 2012 and 2015. The HSDP programme was expanded to include Type 2 Diabetics who meet specific criteria in 2017 and a further SPK transplant was performed in a Type 2 Diabetic in 2019. On the back of these successes, the programme was approved as a mainstream service by the Ministry of Health in February 2021 and a further patient was transplanted at NUCOT in July 2021.

What are the Benefits of SPK Transplantation Over a Kidney Transplant Alone?

SPK transplantation, for suitable patients, is associated with superior patient and allograft survival than deceased donor kidney transplantation (DDKT), and survival comparable to living donor kidney transplantation. In the long-term, patients with a functioning pancreas allograft have a survival advantage even beyond that of living donor kidney transplants. This is in addition to the benefits in quality of life, and improvements in both microvascular and macrovascular complications of diabetes. This liberation from a life of insulin injections, frequent blood sugar monitoring, risks of severe hypoglycaemic attacks as well as the tribulations of dialysis is the life-transforming potential of this double organ transplant. For suitable diabetics who do not have any available living kidney donors, the shorter waiting time for an SPK transplant compared to a DDKT allows maximal benefit to be gained from transplantation.

of medication or exogenous insulin. Inclusion criteria currently also include a C-peptide cut-off for defining Type 1 diabetics vs Type 2 diabetics, however it is increasingly clear that there is significant overlap between these two types in terms of C-peptide levels in patients with ESKD, hence we also accept patients with C-peptide levels consistent with Type 2 diabetes. Outcomes of pancreas transplantation are also not related to C-peptide levels, although patients with very high C-peptide levels (>10ng/ml) are not usually included for pancreas transplantation.

In addition, as for eligibility for kidney transplantation, the potential recipient must not have a history of cancer, or untreated hepatitis or other infections.

The potential recipient will be required to undergo thorough pre-transplant workup to ensure fitness for transplantation. This would include assessment for cardiovascular disease, which needs to be repeated at intervals in view of the rapid progression of coronary artery disease in these patients. As with work-up for kidney transplantation, age-appropriate cancer screening is also required. Specialised work-up for pancreas transplant will include assessment of bladder function as a neuropathic bladder may require specific operative or peri-operative management, and assessment for gastroparesis as this will require particular management post-operatively.

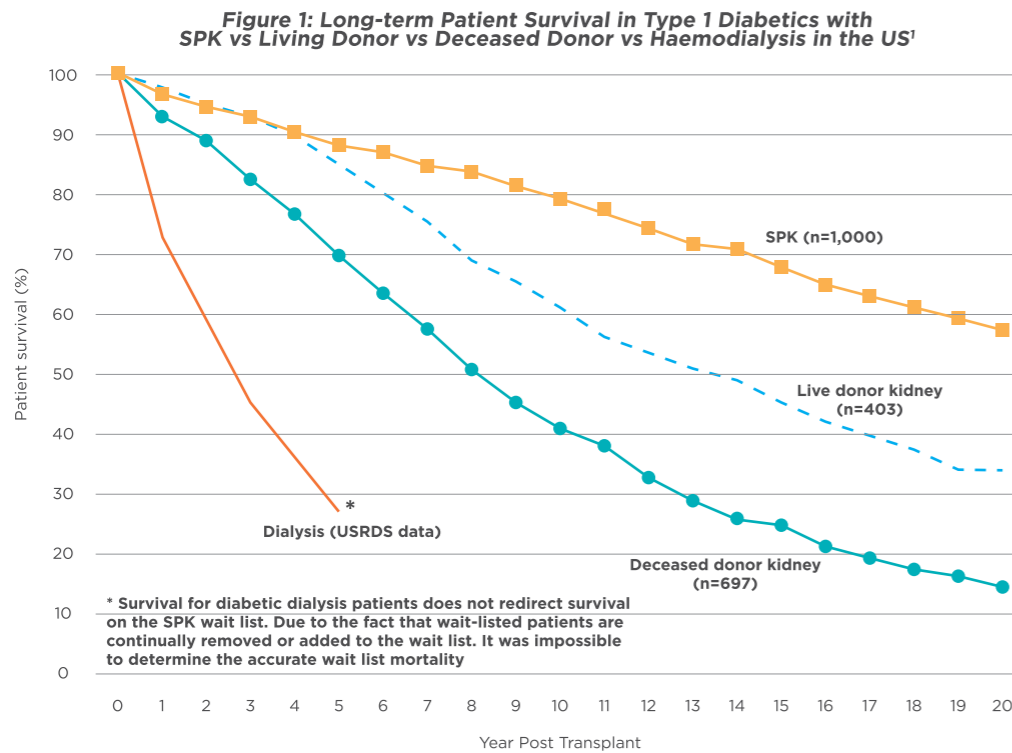
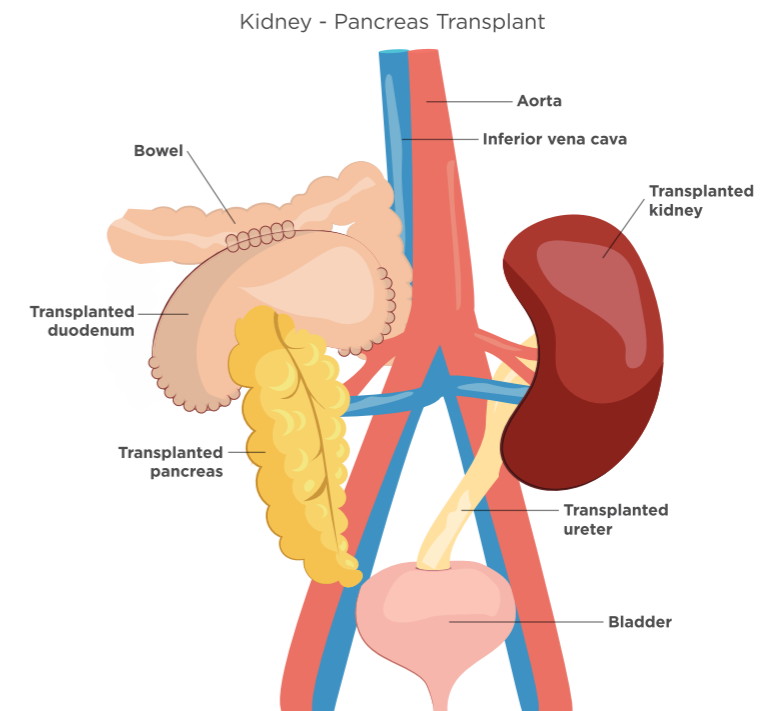


Figure 2: Anatomy of a Simultaneous Pancreas Kidney Transplant



Why is Pancreas Transplantation Important for Singapore?

Pancreas transplantation is a highly specialised service, and Singapore has the infrastructure and expertise to provide this option for our patients. Furthermore, 68% of patients with End stage kidney disease (ESKD) in Singapore have diabetes², one of the highest rates in the world, and hence there is a large pool of patients who could potentially benefit from this treatment option.

Who is Eligible for Pancreas Transplantation?

There are three types of pancreas transplantation: SPK transplantation for patients with ESKD on dialysis and insulin-dependent diabetes; Pancreas After Kidney (PAK) transplantation for ESKD patients who have a functioning kidney transplant and insulin-dependent diabetes; and Pancreas Transplant Alone (PTA) for Type 1 diabetics with severe complications of diabetes including severe hypoglycaemia without awareness, hyperlabile diabetes and severe complications thereof.

The main criteria for suitability for combined pancreas-kidney or pancreas after kidney transplantation is the absence of significant cardiovascular disease including coronary artery disease, cerebrovascular disease or advanced peripheral vascular disease. Unlike in kidney transplantation where there is no age limit for eligibility, in pancreas transplantation older patients are generally excluded due to poorer reported outcomes. Diabetics who are obese are also excluded from pancreas transplantation, as surgical outcomes are poorer in these patients. In Singapore, we accept patients up to the age of 55 years and BMI (Body mass index) up to 28kg/m². Type 2 diabetics should also have a total daily insulin dose of less than 1 unit/kg, as patients requiring high doses of insulin have greater insulin resistance and therefore may not realise the full benefit of a pancreas transplant in terms of achieving a 'cure' of their diabetes and remaining free

What are the Reported Outcomes of Pancreas Transplantation?

Worldwide over 50,000 pancreas transplants have been performed so far, with reported 1-year patient survival of 98% and pancreas allograft survival of 86%³. NUCOT reports 100% 1- and 5-year patient and allograft survival for the SPK transplants performed thus far.

It is thus an exciting era in transplantation in Singapore, with increasing treatment options for diabetic patients with complications. This possibility of transforming their quality and length of life with a pancreas transplant is an option worth considering for diabetics on dialysis.

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Putting a Stop to CKD in Singapore

New Tools After a 2-Decade Wait

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Burden of CKD in Singapore and the Important Role of Primary Care Physicians to Put a Stop to CKD

Chronic kidney disease (CKD) in Singapore could be termed as a national crisis with Singapore currently ranked 7th in the world for the incidence of ESKD¹. About 5.7 patients are diagnosed every day with end stage kidney disease (ESKD) in Singapore, making Singapore ranked consistently as one of the top 10 countries for ESKD incidence rates¹. However, the prevalence of CKD in Singapore is still predicated to double from 12.2% to 24.3% between 2007 to 2030 due to various factors such as aging population, growing incidence of comorbidities such as diabetes, hypertension and obesity².

The eventual outcome for patients with CKD is not solely dialysis treatment. As a disease multiplier, CKD patients often have CV and non-CV complications, which may lead to death even before they develop ESKD. Dalrymple LS, et al study found that the rate of all-cause mortality was 5.6 times higher than that of ESKD onset in a CKD patient (ESKD onset rate: 1.8 per 100 person-years vs all-cause mortality: 10.2 per 100 person-years)³. This suggests that more has to be done upstream to slow down CKD progression, to avoid death and risk of dialysis for patients living with CKD.

Primary Care Physicians play an important role in early CKD identification and management as they are the first healthcare providers that patients come in contact with. They often see patients with early signs of CKD, which could be identified as estimated glomerular filtration rate (eGFR) value of less than 60ml/min/1.73m² or any patient with signs of microalbuminuria (urine albumin: creatinine ratio of more than 30mg/g)⁴. These group of patients are categorised to be at risk of CKD progression by the KDIGO guidelines and early intervention is required to reduce the risk of CKD progression and mortality⁴.

Low Diagnosis of CKD in Singapore and Who, When and How to Screen a Patient for CKD

Despite CKD being a national crisis, CKD is reported to be underdiagnosed in Singapore. LY Wong et al estimated that 7 out of 10 Singaporeans do not know that they are living with CKD². It is important to recognize that hypertension, diabetes and cardiovascular diseases are established CKD risk factors and patients with these comorbidities are recommended to be screened for CKD at a one yearly interval by KDIGO, NICE and American Diabetes Association⁴⁻⁷. Primary Care Physicians can identify patients with early-stage CKD by using readily available, simple, and inexpensive tests to detect kidney function or damage. As early stage CKD patients undergo renal hyperfiltration, leading to a falsely elevated eGFR level⁸, use of urine albumin to creatinine ratio (UACR) alongside eGFR could diagnose CKD at an earlier stage⁹.

Current CKD Treatment and Evidence Development

For the past 20 years, renin angiotensin aldosterone system antagonist inhibitors (RAASi) are the sole recommended standard of care for protecting against renal decline in patients with CKD⁵. However, RAASi still possess substantial residual risk of CKD progression and mortality for patients with CKD. In two largest RAASi CKD trials, the RENAAL and IDNT trial, 30-40% of the patients reached the primary endpoint of doubling of serum creatinine, ESRD or death¹⁰⁻¹¹. In addition, despite the high risk of mortality of CKD patients, both RENAAL and IDNT trial failed to show statistical significance in all-cause mortality reduction (RENAAL: HR 1.02(0.81 - 1.27), IDNT: HR 0.94 (0.70 - 1.27))¹⁰⁻¹¹. This residual risk of CKD progression and mortality prompts us that additional treatment for CKD patients is necessary to further delay dialysis and reduce mortality.

Since 2015, sodium glucose cotransporter 2 inhibitors (SGLT2i) trials have shed light on its possible renal benefits. Results from EMPA-REG, DECLARE TIMI-58, Canvas Program, DAPA-HF and Emperor-reduced trials pointed towards efficacy of SGLT2i for renal benefits¹²⁻¹⁶. However these trials included patients with a mean eGFR of more than 60 and the renal outcomes were largely secondary outcomes, which limited the extrapolation of results to clinical practice for CKD treatment. In 2019, the Credence trial was the first dedicated SGLT2i CKD trial that provides primary evidence for treatment of diabetic kidney disease with SGT2i and included patients with mean eGFR of 56ml/min/1.73m². The Credence trial showed a statistical significant reduction in primary outcome of ESKD, doubling of the serum creatinine, or death

from renal or CV cause by 30% RRR (HR 0.70; 95% CI, 0.59-0.82, p=0.00001)¹⁷. In 2020, the DAPA-CKD trial extends the evidence of SGLT2i for CKD treatment to patients without Type 2 Diabetes and included patients with mean eGFR of 43ml/min/1.73m²¹⁸. Dapagliflozin had demonstrated a 39% RRR (HR: 0.61 (95% CI: 0.51, 0.72), p<0.001) in the primary composite endpoint of more than 50% sustained decline in eGFR, reaching ESKD, and renal or CV death, with evidence to delay dialysis by 11 years as compared to a patient not on dapagliflozin¹⁸. In addition, DAPA-CKD trial is the first CKD outcome trial to show statistical significant reduction in all-cause mortality risk of 31% RRR (HR: 0.69 (95% CI: 0.53, 0.88), p=0.004)¹⁸. All the outcomes from DAPA-CKD trial are consistent regardless of patients' diabetes status as well as CKD aetiology¹⁹. In both Credence and DAPA-CKD, respective patients are on maximally tolerated dose of RAASi and were allowed to continue on trial drug until dialysis initiation. Empagliflozin is awaiting results from its dedicated CKD trial EMPA-Kidney to be completed in the end of 2022. With Credence and DAPA-CKD trials, Singapore Health Science Authority (HSA) approved dapagliflozin and canagliflozin for the treatment for CKD with a distinction in eGFR cutoff and CKD etiology, and approved to continue use until dialysis.

	Dapagliflozin ²¹ 10mg	Empagliflozin ²² 10mg, 25mg	Canagliflozin ²³ 100mg, 300mg
eGFR Cutoff (ml/min/1.73m ²)			
Diabetes treatment	≥25* continue until dialysis* (10mg) *if eGFR falls below 45mL/min/1.73m ² additional glucose lowering treatment should be considered in patients with diabetes mellitus.	≥45 (10mg, 25mg)	≥45 (100mg, 300mg)
HFrEF treatment†		≥20 (10mg)	Not HSA Approved
CKD treatment (Patients with T2DM)		Not HSA Approved	≥30 continue until dialysis (100mg)
CKD treatment (Patients without T2DM)		Not HSA Approved	Not HSA Approved

† In patients with or without type 2 diabetes

** canagliflozin 300mg is approved for use in eGFR=60ml/min/1.73²

Putting a Stop to Diabetic Kidney Disease (DKD)

Prevalence of CKD stages 3-4 is three times higher in patients with diabetes vs those without diabetes²⁴. CKD is an early microvascular complication in patients with Type 2 Diabetes (T2DM)²⁵. Early treatment of CKD in patients with diabetes is hence of utmost urgency. KDIGO 2020 guideline recommends SGLT2i as first line diabetes therapy, together with metformin for patients with prevailing DKD. Both ADA 2021 and KDIGO 2020 recognise SGLT2i as the cornerstone of DKD treatment, where addition of SGLT2i to DKD patients' therapy should be independent of baseline HbA1c control and metformin use. Physicians are recommended to decrease dose of a current antihyperglycemic medication (other than metformin) to ensure that DKD patients are initiated on an SGLT2i for CKD treatment²⁶⁻²⁷. The focus of SGLT2i use in the treatment of DKD stems from the physiology of DKD management. Effective treatment of CKD includes both indirect (hyperglycaemia, hypertension and hypervolaemia management) and direct approaches (intraglomerular pressure reduction to reduce albuminuria and slow eGFR decline)²⁶. The mechanism of dapagliflozin for CKD treatment has been reported to act in complementary with RAASi by inducing nephron afferent arteriolar vasoconstriction, to reduce intraglomerular pressure, hence bringing about a reduction in albuminuria and slowdown of the eGFR decline. Above that, dapagliflozin provides HbA1c reduction for patients with diabetes, to further reduce risk of CKD progression²⁸⁻²⁹. With the robust evidence and guideline recommendation of SGLT2i in CKD treatment, healthcare professionals are highly encouraged to consider initiation of SGLT2i for patients with DKD to reduce CKD progression and mortality, and initiation of SGLT2i for CKD treatment should be regardless of glycaemic control.

Putting a Stop to Non-Diabetic Kidney Disease (NDKD)

Globally, 58% of CKD cases are non-diabetic in etiology³⁰. With dapagliflozin's new indication for CKD treatment, it adds on to the armamentarium for Healthcare Professionals to delay dialysis and reduce mortality for CKD patients. DAPA-CKD, the only SGLT2i CKD outcomes trial with primary evidence for non-T2DM patients showed a 50%RRR in primary outcome of ≥50% eGFR decline, ESKD, or renal or CV death (HR, 0.50 (95% CI, 0.35-0.72)) and 48% RRR in all-cause mortality (HR 0.52 (95% CI, 0.29 - 0.93)) for patient without T2DM. Dapagliflozin reduces albuminuria in patients without diabetes with a mean UACR reduction of 14.8% (95% CI 5.9, 22.9; p=0.001)³¹. While categorised as an anti-diabetic medication, dapagliflozin did not show any risk of hypoglycaemia in patients without T2DM in the DAPACKD trial (severe hypoglycaemia rates, dapagliflozin 0%, placebo: 0%)¹⁸⁻¹⁹. With the urgency to stop CKD progression, paired with the residual risk of CKD progression and lack of mortality protection from RAASi, initiation of dapagliflozin for CKD treatment should be considered for patients without T2DM, alongside RAASi up-titration to further delay dialysis and reduce mortality.

Conclusion

It has been two decades since the development of an effective CKD treatment. More than 7,700 Singaporeans are currently undergoing dialysis and this number is projected to increase if little is done to Put a Stop to CKD¹. Dapagliflozin is the latest novel oral medication that is HSA approved for treatment of CKD to delay dialysis and reduce mortality, that can be continued until dialysis in patients with or without T2DM. The time is now to ask if we are doing enough to Put A Stop to CKD. If not, act early now to reduce patients' risk of progression to dialysis and death.

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Effectiveness of Low Clearance Clinic (LCC) in Increasing Readiness of Patients for Renal Replacement Therapy (RRT) in Sengkang General Hospital

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Study Members: Zac Tan Qi Jing (Social Work Assistant), Ler Mei Fang (Social Work Assistant)

Abstract

Background: With the increasing prevalence of patients with kidney diseases, early preparation can help improve overall health outcome of patients. The objective of the study is to find out if increasing the readiness of patients through improving health literacy and psychosocial resources can drive early treatment decision and preparation.

Methods: A mixed method approach was used in this study. Participants completed two similar sets of questionnaires before and after LCC followed by a 15 minutes semi-structured interview. Results were analyzed by comparing pre and post-test results and thematic analysis of verbatim transcripts from the interviews.

Results: We have found that attending LCC increases participants' knowledge and understanding their own condition, which in turns shifted them from 'pre-contemplation' stage to 'contemplation' or 'action' stage in their readiness to initiate on treatment.

Conclusion: Our results highlighted the importance of LCC in early treatment preparation. Moving forth, healthcare professionals can further leverage on the concepts of LCC in driving better treatment outcomes.

Introduction

Chronic Kidney Disease (CKD) is a global health concern. A study conducted in 2015 showed that the ageing population and increase in prevalence rate of diabetes have brought about an increase in the total number of newly diagnosed CKD5 patients across the world (Bhatia, Browne, Naudeer, Allgar, & Bhandari, 2015). This highlights the importance of early interventions in preparing patients for treatment.

The Low Clearance Clinic (LCC) by Sengkang General Hospital (SKH) seeks to provide patients and their next-of-kin with psycho-education and psychosocial support in addition to medical information about the types of Renal Replacement Therapy (RRT). With the added psychosocial component which varied from traditional doctors' clinic, it aims to provide patients with more holistic perspectives of RRT. The team comprises of Renal Physicians, Renal Coordinators (RC), and Medical Social Workers (MSW).

The purpose of this study is to evaluate the effectiveness of LCC in increasing patient's readiness in initiating on treatment preparation. The three components of 'readiness' include health literacy, illness perception and psychosocial resources.



Methodology

a) Sample

Purposive sampling was used in this study. The inclusion criteria are as follow: i) Patients with e-GFR of 20 and below and ii) Patients attending LCC for the first time. The exclusion criteria are: Patients who are i) bedbound, ii) uncommunicative or, iii) no mental capacity.

b) Data Collection

A mixed method, comprising of questionnaires and one-to-one interview, was used for data collection. Participants were invited to complete four short questionnaires before and after attending LCC. A 15 minutes semi-structured interview, which was audio-recorded, was conducted after LCC. The data are decoded and identifiers were removed to maintain anonymity.

c) Data Analysis

Results from both pre and post questionnaires were analysed. Thematic Analysis was used to identify common themes from the verbatim transcript of the interviews.

Results

19 participant were recruited for the study. 4 participants did not complete the post-test questionnaires and short interview.

Table 1 presents the basic demographic data of the participants. The majority of the participants were above 55 years old, mostly married and living with their nuclear family. They experienced different symptoms, including fatigue, bubbles in urine and uremic itch.

Age	Study Population (n=19)
Below 54	3
50 - 54	3
55 - 59	3
60 - 64	2
65 and above	8
Gender	
Male	11
Female	8
Race	
Chinese	11
Malay	5
Indian	2
Others	1
Marital Status	
Single	0
Married	18
Divorced	1
Separated	0
Others	0
Living Arrangement	
Nuclear Family	15
Extended Family	2
Alone	1
Others	1
Symptoms	
Fatigue	4
Bubbles in Urine	2
Itch	2
Frequent Urination	1
Weakness in limbs	1
Fluid Retention	1
Nil Symptoms	9
Decision Making	
Me	10
Me and Spouse	2
Me and Spouse and Children	2
Spouse/Children	3
Others	0

Figure 1 illustrates the pre-test and post-test results of the Health Literacy Questionnaire. This is a 5-point Likert scale questionnaire (1 - strongly agree and 5 - strongly disagree). A lower score on the scale indicates stronger agreement with the statement.

Data in Figure 1 shows a decrease in the average scores, indicating an increase in participants' knowledge about their kidney conditions, need for dialysis treatment and the treatment options available. In general, participants felt that there was more support and advice, and their concerns were adequately addressed by healthcare professionals.

Figure 1: Graphical Representation of the Health Literacy Questionnaire

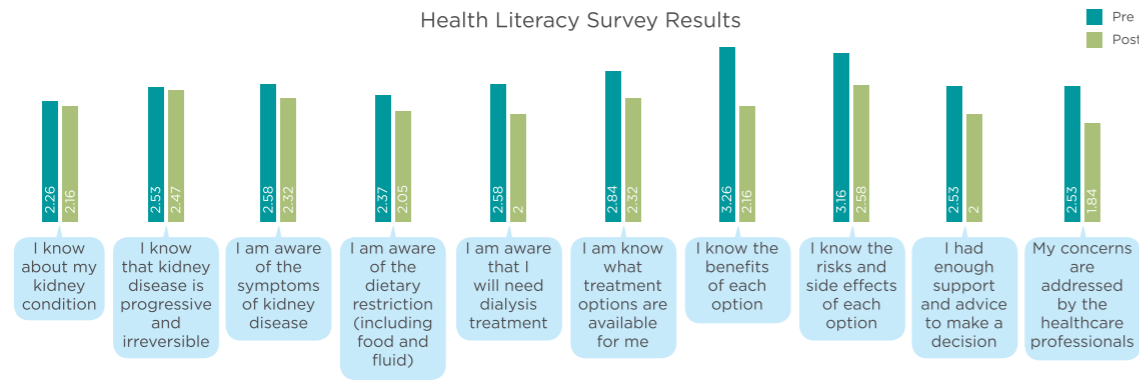


Figure 2 illustrates the pre-test and post-test results from the Brief Illness Perception Questionnaire. This is a 10-point Likert scale questionnaire (1 - minimum and 10 - maximum). A higher score indicates a stronger agreement with the statement.

Figure 2 shows an increase in patient's knowledge, understanding and awareness, as well as perceived control over their condition.

Figure 2: Graphical Illustration of Brief Illness Perception Questionnaire

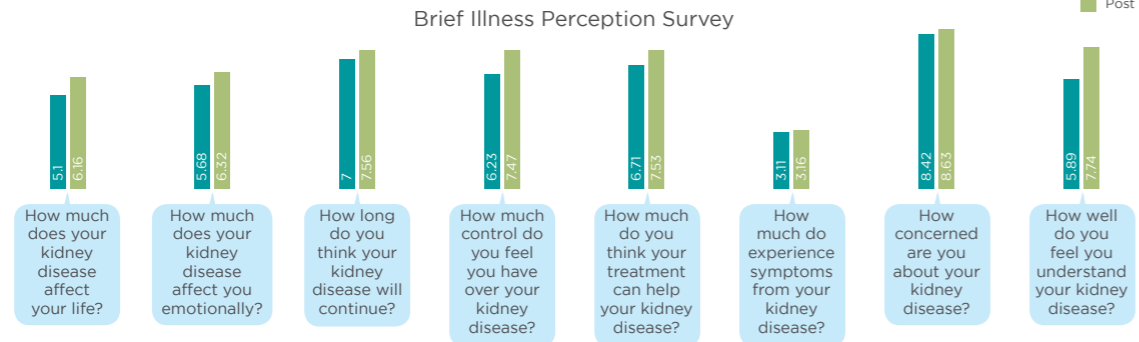


Figure 3a to 3d shows the pre-test and post-test results of the Dialysis Initiation Intention Questionnaire.

There was an increase in the number of participants who has decided on a modality for RRT after attending LCC. There was also an increase in the number of participants who will be proceeding with access creation within the next 6 months.

Figure 3a: Preference for RRT

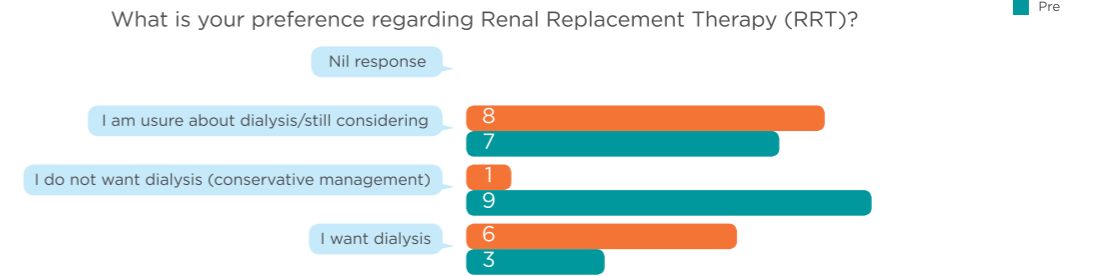


Figure 3b: Decision Making

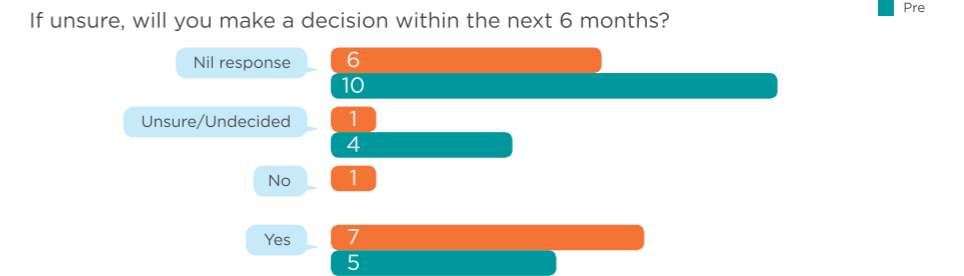


Figure 3c: Modality of RRT

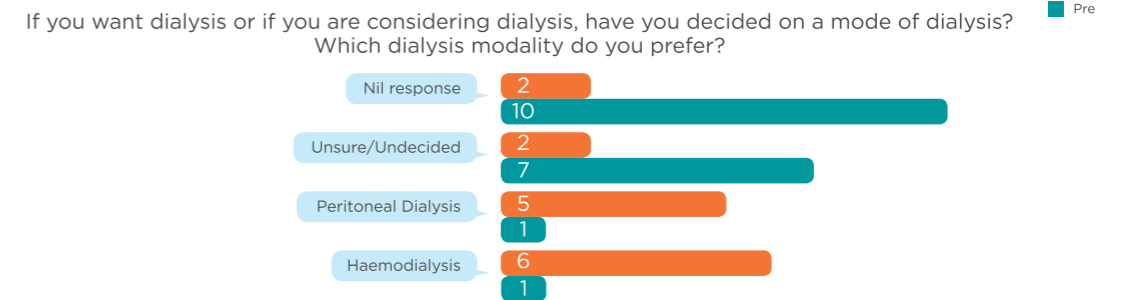
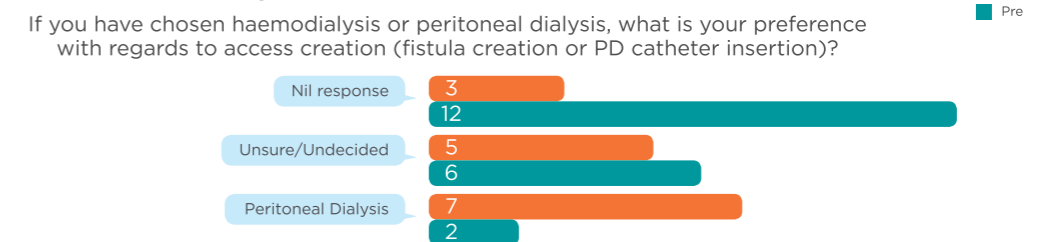
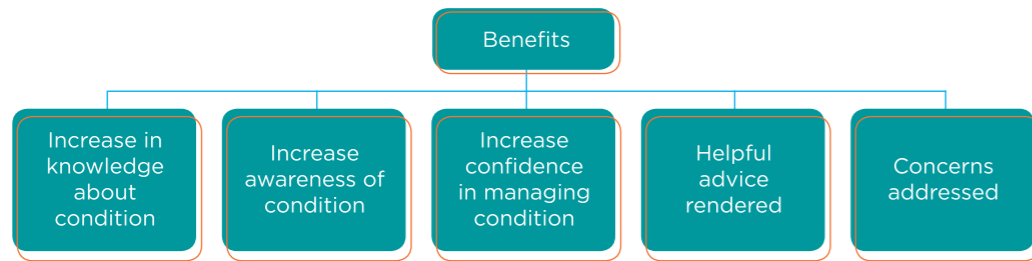


Figure 3d: Decision for Access Creation



Important ideas were extracted from the short interviews and common themes were identified.

a) Category 1: Benefits



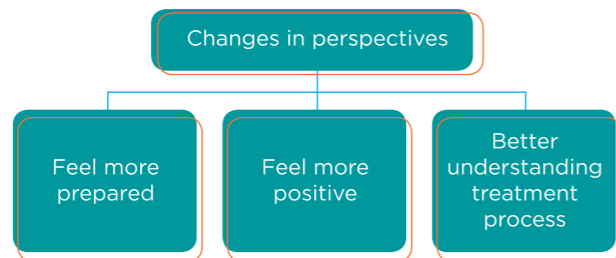
Attending LCC helped participants better understand kidney disease in general and also their own current condition. This increased their confidence in managing their condition. Helpful advices were provided and their concerns were adequately addressed by healthcare professionals.

The following were shared during the interview.

“Help me to understand more, about kidney condition and about dialysis.” (P14)

“What I want to know, I ask. And they explain very thoroughly to me... help me a lot lah.” (P12)

b) Category 2: Change in perspectives



Participants expressed changes in perspectives after LCC. They feel more prepared and positive about their condition after knowing the treatment options and processes.

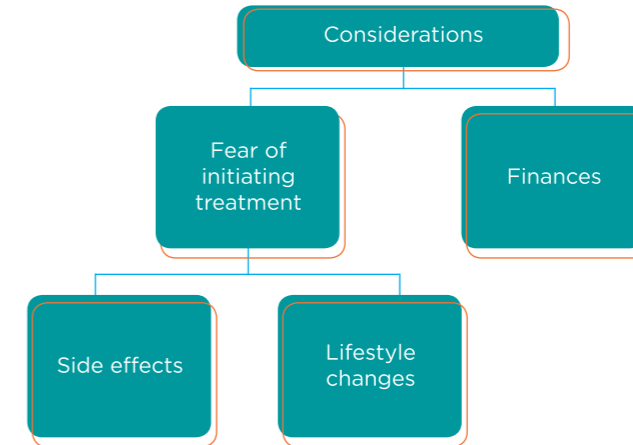
The following were sharing during the interview.

“It helps us to understand the entire process. Like find out more details and about the procedures.” (P14)

“It [LCC] helps me to be more positive...” (P13)

“I feel more ready... to make a decision now.” (P12)

c) Category 3: Considerations



Two main concerns expressed by participants were finances and fear of initiating on treatment due to potential side effects and lifestyle changes

“Scared of infection...” (P2)

“The thing I consider is my lifestyle... I wish I can carry on working, I can carry on travelling...” (P12)

Discussions

Our findings show that LCC has provided a platform for participants to bridge knowledge gaps and raise awareness of their own condition. It allows a helping relationship to be built between the care providers and the participants, increasing their psychosocial resources, which increases their readiness to initiate on treatment preparation.

Before attending LCC, the majority of participants had limited information regarding RRT and resources available. This has affected their ability to make an informed decision regarding long-term RRT modality and confidence to begin treatment preparation. After attending LCC, there was an increase in the number of participants who are more decided on their long-term RRT and keen to proceed with further intervention (e.g. access creation) within the next 6 months, indicating a shift from ‘pre-contemplation stage’ to ‘contemplation stage’ or ‘action stage’.

There are a few limitations to this study. Firstly, the post-test was conducted right after the LCC, which may have affected the results. Secondly, no follow-up study was conducted to ascertain if the participants followed through their treatment decision and access creation.

Conclusion

In conclusion, our study has highlighted the important role of LCC in increasing the health literacy and psychosocial resources (e.g. support from the different healthcare professionals) of patients, which increases their readiness for treatment preparation. Future studies can be done to compare the health and treatment outcome between patients who attended LCC and those who did not, and to find out if patients followed through their treatment decision. This can further establish the benefits of LCC and identify rooms for improvement in the future.



Malnutrition in Dialysis Population

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Singapore has been ranked 4th globally in terms of prevalence of end stage kidney disease and first in the world for diabetes induced kidney failure (United States Renal Data System, 2021). According to Singapore Renal Registry Report 2020, the number of incident dialysis patients in Singapore has increased from 903 in year 2011 to 1328 in 2020, an increase of 47% (Singapore Renal Registry & National Registry of Diseases Office, 2020). Malnutrition is the most common nutritional problem that chronic dialysis patients are faced with. The global prevalence of malnutrition in the dialysis population is 28% to 54%, while in advanced chronic kidney disease population, the prevalence of moderate malnutrition is about 26% (Carrero et al., 2018; Windahl et al., 2017).

Malnutrition is one of the leading factors that increases the risk and leads to early mortality in patients newly initiated on dialysis (Sahathevan et al., 2020; Windahl et al., 2017). It also leads to sarcopenia, a condition characterised by the loss of skeletal muscle. Patients experience decreased quality of life, mobility, increased rate of infection and frailty. It is estimated that dialysis patients lose 4kg of lean muscle mass every year (Workeneh, Kalantar-Zadeh, & Moore, 2021). The causes of malnutrition is multifactorial which includes, but is not limited to, uremic symptoms resulting from inadequate dialysis causing patients to have decreased appetite, loss of amino acids and protein during dialysis, psychosocial and financial factors causing inadequate oral intake (Sahathevan et al., 2020). All of these reinforce the importance of managing malnutrition within the dialysis population. A meta-analysis suggested that an effective programme to manage protein energy wasting (PEW) should be prioritised, and should cover PEW screening, planning and monitoring in healthcare facilities (Carrero et al., 2018). The 2020 KDOQI nutrition guidelines proposed the same for patients diagnosed with chronic kidney disease stage 3 to dialysis to manage PEW in view of the benefits of re-assessing and adjusting nutrition care plan in achieving targeted outcome (Ikizler et al., 2020).

Malnutrition is quite common among the haemodialysis patients in Singapore. In 2019, among all of the patients screened during the National Kidney Foundation's (NKF) annual nutrition assessment using the 7-point Subjective Global Assessment (SGA), a third of them were found malnourished, having obtained an SGA score of 5 or below. SGA is a validated and reliable tool widely used within the dialysis population, and also recommended for patients with CKD stages 3 to 5 in assessing nutritional status (Ikizler et al., 2020).

NKF has initiated various programmes aiming to reduce malnutrition occurrence, so as to minimise the impact on patients as well as the community. All new patients who join NKF are screened for malnutrition risk. NKF developed a 3-question nutrition screening tool (3Q-NST), where appetite, weight changes and body mass index (BMI) are asked. This is a simple and easy tool used to detect patients at risk of malnutrition. In addition, NKF patients undergo comprehensive blood testing every two months which include nutrition-related laboratory markers such as albumin, normalised protein catabolic rate (nPCR), phosphate and potassium. These results are useful for healthcare providers (including dietitians) as additional markers to prioritise patients at risk of malnutrition. Patients identified to have moderate or high risk of malnutrition will receive timely nutritional assessment conducted by a qualified dietitian.

Continuous personalised nutritional counselling (PNC) has been shown to be effective in improving nutritional status in dialysis patients (Jo et al., 2017). In NKF, patients who are moderately or severely malnourished (SGA below 5) are reviewed routinely and they receive PNC to prevent further deterioration and to improve their nutritional status.

Apart from PNC, studies showed that nutritional education programmes bring about positive impact on the nutritional status of dialysis patients, may be as effective as individual diet counselling (Hernández Morante, Sánchez-Villazala, Cutillas, & Fuentes, 2014). NKF rolled out the Nutrition Interactive Programme (NIP) in 2018, with the aim of increasing haemodialysis-related nutrition knowledge in patients with nutritional issues. The programme was conducted in groups, both physically and virtually, where every session focuses on one nutritional topic (e.g. Protein, Phosphate, Potassium, Fluid, Sodium). Through these group programmes, we found that patient-centred group nutrition education is effective in promoting dietary changes and improving knowledge (Lim, Ling, Lim, Yee, & Khan, 2021).

Even though PNC and nutritional education programmes have shown to be useful in improving patients' nutritional status, there is research showing that adherence can be poor. This is attributed to factors such as beliefs, attitude, cognitive and socio-economics (Murali & Lonergan, 2020). The study found that non- or low-adherence can be difficult to resolve. The 2020 KDOQI nutrition guidelines suggested that if dietary counselling alone is insufficient for dialysis patients to achieve their nutritional requirements, a 3-month trial of oral nutrition supplementation (ONS) might be beneficial (Ikizler et al., 2020). Another study found that a 6-month supply of renal specific ONS improves the nutritional markers and inflammatory status in malnourished CKD patients (Sezer, Bal, Tatal, Uyar, & Acar, 2014). Further studies found that dialysis patients reported improvements in quality of life and physical functioning following ONS (Ikizler et al., 2013). A complete nutritional assessment should be conducted regularly during the supplementation period to reassess their needs (Ikizler et al., 2020). In view of the evidence supporting the benefit of the ONS, NKF has started an ONS support programme targeting malnourished patients who have failed to meet their nutritional requirements despite dietary modifications. Patients are reviewed regularly during their supplementation period to assess their ONS needs as well as to reduce their reliance on ONS.

Although the causes of malnutrition are multifactorial, a well curated programme could be beneficial in managing malnutrition. NKF has embarked on one such multi-pronged programme that includes screening, assessment and intervention pertaining to patients needs followed by monitoring.

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Quality Improvement Project (QIP): Staying One Step Ahead of the Pandemic

Achieving an Effective Night Dialysis Service: Upskilling Enrolled Nurse to Provide Peritoneal Dialysis Services in National University Hospital

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Background

Since 2019, the demand for peritoneal dialysis (PD) service has grown due to increasing population need with kidney failure. PD has been demonstrated to great effect in overseas centres to deal with the surge of hospitalised COVID-19 patients. In the local setting, inpatient renal ward nurses provide night PD services, which is defined as urgent PD treatment or troubleshooting Automated Peritoneal Dialysis (APD) machine alarms, but are at risk of become overwhelmed due to competing demands in caring for other inpatients.

Aim of Project

To develop strategies to achieve efficient and effective provision of night PD services.

Root Cause Analysis

- Manpower issue: Renal Centre has insufficient trained PD nurses to work during the night shift, therefore the inpatient renal ward nurses have had to cover the night PD service.
- Delays in responding to night PD needs by inpatient nurses due to competing demands in caring for other inpatients (e.g. admissions at night, sick and falls risk patients).
- Inadequate competency to troubleshoot APD: the inpatient renal ward nurses were trained but did not have adequate exposure to APD. Treatments frequently had to be terminated prematurely.

Action Plan

- Strategic planning: We worked out a manpower plan for the night PD shift with support from nurse leaders, and proposed to trial an Upskilling and Role-Redesign for Enrolled Nurses (EN) working in the inpatient hemodialysis center. Prior to the trial, ENs worked as couriers and assisted doctors in performing renal procedures. Some of them had minimal background with hemodialysis. None had prior exposure to PD.
- Communication: Interested ENs were invited to enroll in this Upskilling and Role-Redesign plan.
- Training program: Training included technique competency in performing CAPD and APD, troubleshooting APD machine alarms, intra-peritoneal medication administration, and specimen collection for PD effluent. The total length of training ranged from 8 to 10 weeks depending on the individual's learning abilities. 2 mentors were assigned to one EN to ensure that competence was accurately assessed, and to provide formative feedback. Roles and responsibilities of ENs for night PD service were clearly delineated.
- Engagement of stakeholders: the project was presented to the various members of the Nephrology Services.

Result/Benefits: Night PD Service was Initiated Since July 2019

- Timely initiation of night PD services.
- Improved effectiveness and safety of night PD services as the ENs were competent in performing both CAPD and APD.

- ENs reported improved job satisfaction as they were now equipped with new competencies.
- One unexpected benefit was that ENs who had stayed on in hospital to provide night PD services, were able to start haemodialysis sessions in the dialysis centre as early as 6 o'clock in the morning, hence allowing the haemodialysis sessions for the day to end on time. This in turn minimised the need for the day staff to do overtime.
- A larger pool of competent nurses for PD service, and contingency planning for emergency situations.
- Eliminated patient safety concerns, which occurred previously when inpatient nurses had to step out of the ward to attend to night PD activation (the inpatient nurses were activated approximately once per night and spent between 30 to 120 minutes to attend to each activation).

Challenges

- Collaboration between different nursing stakeholders in order to facilitate EN training and staff manpower requirements.
- Working hours for ENs changed from 2 to 3 shifts, and they required time to adjust to this change.
- Senior PD nurses were made available for phone consultation to support ENs when they initially started night PD services.

Sustainability

- Continue to engage stakeholders:
Nurses regularly meet to share inputs and insights in order to improve the delivery of patient care. The team also obtains feedback from patients and the medical team as part of workflow evaluation and audit.
- ENs undergo annual competency checks and refresher training.

Conclusion

This project has had multiple benefits, which include an improved PD night service, and an increase in the pool of competent and operationally ready PD nurses. In light of the current pandemic, APD at night is a preferred option for COVID-19 patients to minimize staff exposure and mitigate infection transmission in the hospital.



Value-based Care for Kidney Disease in Singapore

A Qualitative Study of the Perspectives of Renal Care Stakeholders, Patients and Caregivers

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Background

The prevalence of chronic kidney disease (CKD) and end-stage kidney disease (ESKD) in Singapore has been increasing over the last few decades¹. This increase is anticipated to continue alongside the ageing population and rising prevalence of CKD risk factors such as diabetes and hypertension.

Accompanying these changes are two broad challenges. First, the high cost of managing CKD and ESKD to both the patient and the health system. Locally, CKD progression amongst diabetes patients was found to be associated with higher medical costs, arising from inpatient admissions². The cost of kidney replacement therapy (KRT) amongst ESKD patients, namely haemodialysis (HD) and peritoneal dialysis (PD) can impose significant financial strain on the patient given its chronic nature. Accounting for productivity losses and non-direct medical costs such as transportation, modelling estimates of cost-effectiveness analyses showed that the total societal cost of HD over a 10-year time horizon can cost up to \$300,000 locally³.

Second, meeting the increasing healthcare needs of ESKD patients. Despite efforts to promote living donor kidney transplants and peritoneal dialysis locally, patients still prefer HD delivered through community-based dialysis centres. As the prevalence of ESKD increases, the financial viability of building more dialysis centres to match the demand is challenged by cost, space and healthcare manpower constraints⁴.

To curb the rising cost of CKD and ESKD, several countries have shifted from a volume-based approach to a value-based approach in healthcare. Unlike the traditional financing approach, where service providers are paid based on the volume of care they deliver (fee-for-service), a value-based approach incentivizes and rewards providers to improve patients' health and outcomes⁵. While shifting a significant percentage of clinical and financial risk to the provider, payment reforms can also introduce incentives amongst providers to select certain treatment modalities based on patient-centred and outcome-based approaches.

One example of such model is the bundled End-Stage Renal Disease Prospective Payment System (PPS) by the United States Centers for Medicare & Medicaid Services (CMS) in 2011. The 'bundle' is composed of dialysis, injectable medication and services such as lab tests and training for home dialysis training. This reform financially incentivised dialysis service providers to adopt PD over in-centre dialysis treatment. In the short to intermediate-term, pre-post analysis has shown that the PPS increased the adoption and switch towards PD while avoiding significant PD to HD transfers⁶.

Through preliminary engagement with VVO dialysis providers and nephrologists from the public health sector, we identified several practice and policy gaps in the current CKD and ESKD care pathway. To address these prevailing and anticipated challenges, three interrelated streams of interventions with value-based healthcare as the underlying mechanism were proposed. Broadly, the goals of these interventions are: delaying the disease progression of early CKD patients, reforming the current payment model to reward providers based on outcomes and providing holistic management beyond the medical aspect of CKD and ESKD.

The design of a value-based care model involves the alignment of interests and values across different stakeholders in a health system. CKD and ESKD patients may be managed by multiple medical and social care providers across the public, private and non-profit sectors. Patients with complex social and medical needs may also rely on a mix of government subsidies, out-of-pocket costs, social service support and voluntary welfare organisation assistance to finance their treatment. To ensure that the care model is context-specific and culturally appropriate to the end-users, the perspectives and concerns of patients and the supporting family members should be surveyed and incorporated into its design. We have thus embarked on a research study to get an updated understanding of the current state of renal care in Singapore in terms of the challenges and gaps in care and service delivery. In addition, we seek to explore the feasibility and considerations of implementing value-based care in the local health system to address the prevailing and anticipated challenges in CKD and ESKD care.

We plan to conduct qualitative interviews with six groups of participants: (1) haemodialysis patients, (2) caregivers of haemodialysis patients, (3) peritoneal dialysis patients, (4) caregivers of peritoneal dialysis patients, (5) community-based dialysis service providers as well as (6) nephrologists and healthcare administrators for this study. We aim to recruit up to 15 participants in each group. To increase the diversity of views explored, we will adopt purposive sampling to recruit a heterogeneous sample of respondents across each participant group. We welcome you to contribute to this research study as a participant.

While there is a strong case surrounding the potential of a value-based care model, it is not a panacea. Individual health systems are at different levels of readiness to adopt such drastic reforms. Thus, a greater understanding of what these pre-requisites are will be critical. Additionally, considerations from each stakeholder should be examined and addressed accordingly.

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“My heartiest congratulations on the excellent inaugural issue of Renal Outlook! The publication is the result of the close partnership between NKF and renal professionals from institutions across Singapore. It reflects the strong sense of common purpose among the renal care community and its unwavering commitment to preventing renal disease and its progression, and to high quality, holistic care of our patients. Renal Outlook is therefore an important platform that highlights and shares insights and evidence on key aspects of renal care that will be relevant for a broad spectrum of health professionals and beyond.”

Prof Tan Chorh Chuan
Executive Director
MOH Office for Healthcare Transformation

“Renal Outlook will be a valuable resource for the kidney care community, providing timely and important information to the broad range of individuals involved in supporting the health and well-being of patients with kidney disease. Each issue contains concise and authoritative articles relevant to kidney care, from social and policy issues to the latest clinical advances... a very worthwhile read!”

Prof Thomas Coffman
Dean
Duke-NUS Medical School

“The combination of a more affluent and sedentary lifestyle has caused obesity to rise, particularly among the lower income segment. This trend points to the greater need for preventive health and renal care in the community. NKF has been a community pillar in Yuhua, Jurong East. Through Renal Outlook, it can serve to promote the understanding of renal care among the healthcare professionals and caregivers.”

Ms Grace Fu Hai Yien
Minister for Sustainability and the Environment

“Renal Outlook advances our collective knowledge about renal care and improves our management of population health. Through healthier lifestyles, partnerships with community-based organisations like NKF, and commitment from patients and their loved ones, we can improve the quality of life for dialysis patients and reduce chronic kidney disease among Singaporeans.”

Mr Teo Chee Hean
Senior Minister and Coordinating Minister
for National Security

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