Professional Certificate in Renal Nursing

Assignment Topic: End Stage Renal Failure due to Polycystic Kidney Disease

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Introduction

Polycystic kidney disease (PKD) is the most common hereditary kidney disease causing end-stage renal failure in adults. PKD is a genetic disease that is caused by mutations in genes. According to Mei et al. (2020), PKD is responsible for approximately 5% of end-stage renal failure (ESRF) cases (Chapman et al., 2015). In autosomal dominant polycystic kidney disease, there is a development of cysts that enlarge progressively with age. The expanding cysts compress and displace blood vessels, lymphatics, and normal tubules, obstructing their flow. This obstruction promotes atrophy, apoptosis, and fibrosis of functioning parenchyma. Cysts forming in the medullary collecting ducts are likely to impair the function of more upstream nephrons compared to those developing in the cortex. Despite the loss of functioning nephrons, the glomerular filtration rate remains relatively stable until late in the disease. However, in the third to fourth decades of life, there is progressive nephron obstruction, fibrosis, and interstitial

[redacted]

maintain homeostasis in patients with rapid loss of kidney function. In this process, the patient's blood is filtered to remove excess fluid, toxins, and solutes. My case study focuses on a 40-year-old patient with polycystic kidney disease, which has led to end-stage renal failure. The first objective for presenting this case study is to improve outcomes through assessment, management, and evaluation to enable best practices for the management of ESRF which aligns with Healthy People 2030 goals relating to the management of end-stage kidney disease and reducing mortality rate for dialysis patients. ESRF significantly affects the quality of life, causes disability and early mortality, and is associated with high healthcare costs and economic burdens. This case

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study will present readers with evidence-based strategies for effective assessment and management, gaining knowledge that can be applied in clinical practice to improve patient outcomes and quality of life.

Literature Review:

The prevalence of kidney failure is higher in persons aged 60 years and above. The prevalence is 38.1% for persons older than 65 and 6.0% for ages 18 – 44 (Hashmi, 2023). For patients with ESRF, timely interventions play a crucial role in preventing death. Even with timely dialysis, there is a 20% - 50% death rate within two years, with [redacted] dialysis, with 26.3% on HD and 73.6% on PD. Figure 1 below shows the prevalence of kidney replacement therapies (transplant, HD, and PD) using data obtained from the Hospital Authority. Figure 1 shows that the number of dialysis patients has significantly increased from 2009 to 2021(Li et al., 2022).

Kidney transplant is also a modality of renal replacement therapy for end ESRF that provides patients with better quality of life compared with a lifetime of dialysis (Leung et al., 2015). Currently, there are approximately 2,000 individuals on the deceased allocation waitlist in Hong Kong, and the average waiting time for a successful kidney [redacted] living donors from 2011 to 2023. As of March 2023, approximately 2433 persons were waiting for kidney donation (Department of Health, 2023).

Figure 1: Number of ESRF patients on kidney replacement therapy (source: Li et al., 2022)

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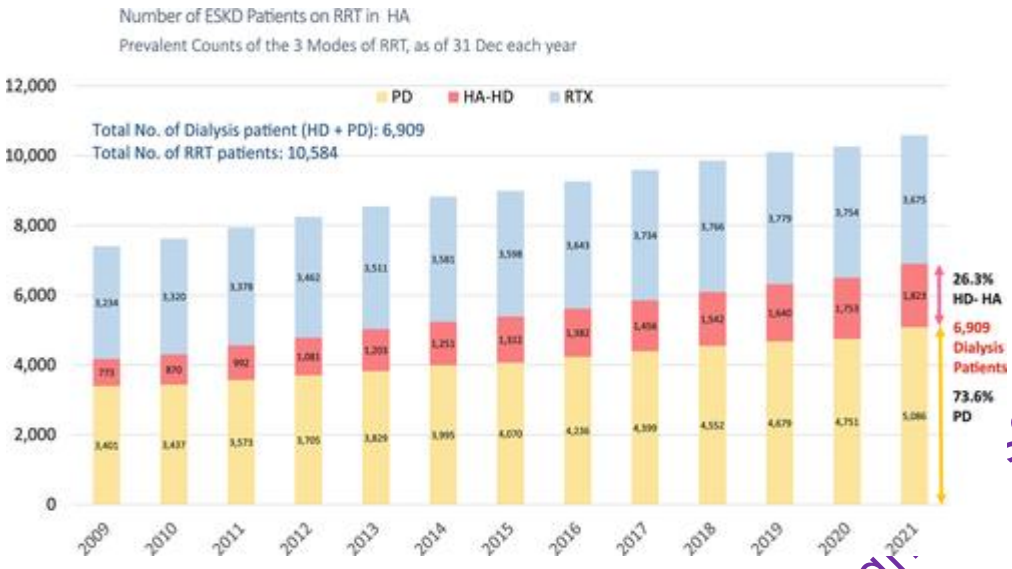

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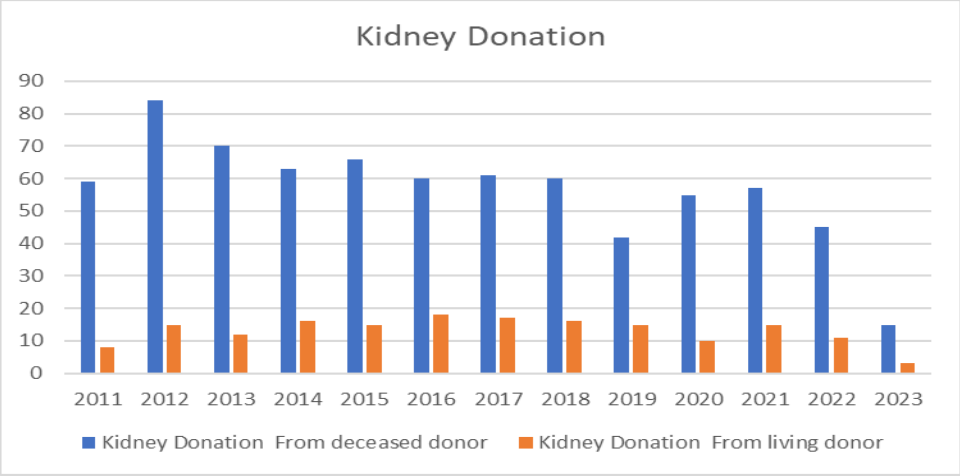
Figure 2: Kidney donations from deceased and living donors from 2011 to 2023 in Hong Kong (Department of Health, 2023)



Patient Profile:

Mr. Wong is a 40-year-old male patient who presented for a routine hemodialysis (HD) modality in the hospital renal center in ambulatory care. He is a salesperson who reported playing tennis frequently during his free time. He seems to have strong social

support from his wife and daughter, who mostly accompany him for the dialysis. Mr. Wong has end-stage renal failure due to polycystic kidney disease. In 2015, he was [redacted] hypertension; his late father had PKD and died due to end-stage renal disease.

Mr. Wong has been on hemodialysis regime twice a week, each session lasting up to 4.5 hours. His dry weight is recorded as 61kg. He is experiencing hypotension and leg cramps during the last hour of his hemodialysis sessions. Blood flow rate is 300ml/min. [redacted] mmol/L), calcium (1.5 mmol/L), glucose (5.5 mmol/L), and temperature (36.5). In assessing the past HD records, it was found he has continued weight gain within a month, pre-hemodialysis dry weight of around 65kg and post-hemodialysis dry weight around 61kg.

Nursing Assessment:

He eats high quantity of fruits, vegetables and a low-fat diet. He does not consume alcohol, likes eating and drinking meat soup, and frequently takes lemon tea. He engages in moderate physical activities like walking, jogging, and playing tennis daily, which prompts him to drink a lot of water. He reported not always following the showering technique to avoid the risk of infection on the exit site. Mr. Wong mentioned [redacted]

Upon presentation to the ambulatory care on 2/6/2023, he seemed alert and conscious with no signs of distress. His pre-HD blood pressure was 125/72 mmHg, pulse 80/min, and respiratory rate 18/min. These vital signs are all within the normal expected range. The HEENT examination revealed normal findings. Uremic fetor noticeable when he was talking. In ESRF, uremia develops when the kidneys can no longer effectively filter

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the blood, leading to a buildup of organic waste products (Glassock & Massry, 2022). The exit site of the catheter appears clean with no redness and discharge; however, the dressing is wet and loosened, likely due to the patient engaging in activities such as playing tennis. Chest walls exhibit symmetrical movement during breathing. The patient denies experiencing any chest pain. The heart rate is regular, and has normal heart sounds without murmurs, gallops, or rubs. Bilateral carotid pulses are palpable without the presence of thrills or bruit. ECG showed sinus rhythm with heart rate of 82/min. Abdomen is soft to touch, evenly rounded, symmetric, with no tenderness or palpable mass and no signs of ascites**.** Has full ROM and TMJ with no crepitus noted. The lower limbs exhibited warmth and grade 1 pitting edema, with a capillary refill time exceeding two seconds which are abnormal findings.

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Health Problems, nursing intervention and Evaluation:

I. Hyperkalemia

During Mr. Wong's assessment, he noted he has been consuming high quantities of fruits and vegetables and frequently drinks lemon tea. His lab results showed a high serum potassium level of 6mmol/L pre-HD (appendix 1). Dried fruits (like apricot and plums), bananas, avocados, lemons, and leafy greens such as spinach, milk, tomato

[redacted]

cardiac arrhythmias or sudden cardiac arrest, weakness, and paralysis, and it is also an independent risk factor for death in hospitalized patients (Simon, 2023).

Mr. Wong and his wife will be educated about adopting a low-potassium diet. They should reduce the consumption of high-potassium foods and opt for lower-potassium alternatives. For example, he can decrease his intake of red meat, fish, potatoes, deep green vegetables, try steam cooking, dry heating cooking, soaking vegetables in water

for one hour, and changing the water every 15-20 minutes before boiling, to minimize the potassium level in his meals (Batista et al., 2021). The patient will be given a health education leaflet to reinforce the information shared and future reference. They will be referred to a dietitian specializing in renal nutrition for guidance in developing a personalized dietary plan.

Evaluation of the effectiveness of the interventions involves assessing the outcomes and impact of the implemented strategies. The nurse will monitor Mr. Wong's serum potassium levels on a weekly basis to determine if it is within the desired range of 3.5 -

assessment to evaluate the impact of interventions on the management of hyperkalemia. For the future plans, the nurse will provide ongoing support and education to ensure the patient has access to resources and information for long-term management of

limitation identified should be inadequate assessment of other potential contributing factors to hyperkalemia such as medications or underlying conditions. According to National Kidney Foundation (2023), drugs such as renin-angiotensin-aldosterone system (RAAS) are a common cause of high potassium.

II. Hyperphosphatemia:

Hyperphosphatemia is a possible health problem due to the high serum phosphorus level of 3.02mmol/L (appendix 1). Hyperphosphatemia is common in ESRF due to the loss of renal elimination of phosphate and continued absorption of dietary phosphate.

Kowalski, 2016). According to Kalantar-Zadeh (2013), patients with ESRF should aim for low phosphorus intake of around 700 mg/day and maintain adequate protein intake

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to avoid protein wasting and improve survival. The patient should be educated on selecting protein sources with least serum phosphorus (Taylor et al., 2011). For example, he can take pasteurized liquid egg whites, a source of high protein, low phosphorus, and low-cholesterol content. Because meat contains phosphorus, Mr. Wong should be encouraged to limit meat soup. He will be given a booklet containing low-phosphate food choices and cooking methods to facilitate his understanding. The patient [redacted]

For evaluation, the nurse will monitor and measure serum phosphorous levels weekly to determine if the dietary modifications and Renvela 2400mg are effective in maintaining serum phosphate levels within 0.81 - 1.45 mmol/L. The patient will be given questionnaires to assess whether he has understood the component of a low phosphate [redacted] phosphorous food consumption.

III. Fluid Overload:

The discrepancy between the pre-hemodialysis dry weight (65 kg) and the post-hemodialysis dry weight (61 kg) is of concern as it indicates issues with fluid management. Additionally, the occurrence of hypotension with leg cramps during the last hour of hemodialysis is another indicator of fluid overload (Loutradis et al., 2020). During the physical assessment, the presence of pitting edema and prolonged capillary refill time suggests excess fluid accumulation (Loutradis et al., 2020). Mr. Wong also [redacted]

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Fluid restriction is advised to limit excessive fluid intake. Mr. Wong can be educated about the importance of adhering to a low-sodium diet, as sodium contributes to fluid retention. He will be referred to a dietitian for guidance relating to appropriate fluids and quantities. Hemodialysis adjustments can be made to the treatment regimen.

[redacted]

sodium control, and adherence to dietary recommendations. Mr. Wong drinks a lot of water due to playing tennis regularly, we have taught him to hold ice cubes in his mouth and to add drops of lemon juice into his water in order to help him with his secretion of saliva, and to reduce his thirst. We should also assist Mr. Wong in using a Body Composition Monitor (BCM) to facilitate the clinical judgements, making it easier for doctors to diagnose more accurate and rational outcomes of measuring fluid overload and body composition (Hou et al., 2019).

There will be regular weekly assessments to evaluate the effectiveness of the interventions. The nurse will assess the patient's response to the increased frequency

[redacted]

effectiveness of the interventions. We will also assess adherence to fluid restriction and low-sodium diet by interviewing the patient and assessing changes in fluid intake and dietary sodium sources.

IV. Wet Exit Site and Loose Dressing:

Mr. Wong is at risk of developing infection, skin irritation and catheter dislodgement related to a wet exit site and loose dressing due to his activities of playing tennis and showering afterward without using a proper technique. The use of catheters has been associated the high morbidity and mortality compared to all vascular access types, such [redacted] will also be advised to consider arteriovenous fistulas, which have been found to be safer and presents less morbidity and mortality (Kosa et al., 2016).

The nurse will monitor and track the incidence of exit site infections, catheter dislodgement, or other complications related to wet exit site and loose dressings to determine the effectiveness of the interventions. We will administer a questionnaire to [redacted] dressing. We will document any changes or abnormalities observed and compare them to previous assessments for any modifications. The assessment should address patient's beliefs and habits to align with the recommended catheter care practices.

Spiritual Distress:

Another concern noted during the assessment is Mr. Wong's statement about his reduced faith in God, and the discontinuation of religious activities indicates potential [redacted] his emotional, psychological, and even physical well-being. Spiritual distress may lead to feelings of hopelessness, anxiety, fear, and a sense of loss of meaning and purpose in life. It can also impact his ability to cope with his illness and make decisions about his

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healthcare. Mr. Wong will be referred for counselling services within the facility to receive help and coping strategies. The nurse will also provide support and develop a holistic care plan for the patient. He will be referred to support groups to connect with others who share similar experiences.

For evaluation of the effectiveness of the interventions, we will engage the patient and his family to gather any noticeable changes related to spirituality and self-care. We will assess signs of reduced distress, improved mood and resilience and whether he has a more positive outlook on life.

Conclusion

End-stage renal failure caused by polycystic kidney disease (PKD) is a significant health concern, affecting the quality of life and increasing the mortality rate of patients. Dialysis serves as a vital treatment modality to maintain homeostasis in patients with ESRF. I have learned valuable lessons from this case study on the management of end-

[redacted] with multidisciplinary team, including nephrologists, physicians, nurses, and dieticians to optimize patient care and treatment plans. Regular monitoring of patient progress through laboratory tests, physical assessments, and patient feedback helps track their response to interventions.

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Appendix

Appendix I

Laboratory result

Test	Result	Reference range
Urea	↑60.14 mmol/L	2.76 - 8.07
Creatinine	↑2739.6 mmol/L	61.9 - 106.2
eGFR by Creatinine	↓1.4 mL/min/1.73m^2	≥60
Sodium	143 mmol/L	136 - 145
Potassium	↑ 6.0mol/L	3.5 - 5.1
Albumin	40.7g/L	35.0 - 52.0
Ca, Total	2.43 mmol/L	2.15 - 2.50
Phosphorus	↑ 3.02mmol/L	0.81 - 1.45
PTH		
WBC Count	4.9 x 10^9/L	3.8 - 10.8
Hemoglobin	↓12.5 g/dL	13.5 - 18.0
Platelet count	187 x 10^9/L	158 - 355

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Appendix II

Medication Profile

Patient's Addressograph		Patient's Medication Profile	
Date	**Routine Medication**	**Date**	**PRN Medication**
21/01/2023	**Lipitor 10mcg Nocte**		
	Betaloc Zok 25mg Daily		
	Norvasc 5mg BD		
	Caltrate one tab BD		
	Cozaar 50mg Daily		
01/06/2023	**Renvela 2400mg TDS before meal**		
02/11/2022	**Post HD IVI Mircera 50mcg Q5 weeks**		
15/12/2021	**Clexane 0.3ml IVI pre HD**		
09/11/2022	**Zemplar 5mcg IVI Post HD 2 times per week**		

Revised Dae : 11-06-2023 **Drug Allergy: NKDA**

Doctor Signature:

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