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Treatment Adherence in Elderly Hemodialysis Patients: A Literature Review

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Abstract: This literature review examines current research and articles addressing treatment adherence among elderly patients undergoing maintenance outpatient hemodialysis. Studies were identified through an English-language of studies from 2010 to the present using the following electronic databases: Proquest, PubMed, Cochrane, and GoogleScholar. A comprehensive search strategy was done using the following keywords: "end stage renal disease" or "kidney failure, chronic" and "hemodialysis" and "adults" and "adherence" or "treatment adherence" or "treatment regimen adherence" or "intention" or "intention to adhere". The review analyzes selected research papers, organizing them according to sociodemographic factors and treatment adherence. The review further identifies key factors influencing adherence in this population, including the complexity of treatment regimens, age-related changes, and the impact of comorbidities.

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I. INTRODUCTION

End-stage renal disease (ESRD) presents a significant and growing health concern worldwide. In the United States, a large proportion of ESRD cases require hemodialysis treatment.[1] The prevalence of ESRD is also rising in the Philippines, with a substantial increase in the number of patients undergoing dialysis, which increased by 42%—from 25,125 in 2022 to 35,714 in 2023.[2-3] Hemodialysis, a vital treatment for ESRD, involves regular sessions to remove waste and balance fluids and electrolytes. Patients undergoing hemodialysis often manage complex treatment regimens that include medications, dietary restrictions, and fluid restrictions. Adherence to these regimens is crucial for managing the disease, preventing complications, and maintaining quality of life. This literature review aims to explore the factors that affect treatment adherence among elderly hemodialysis patients, a population with unique challenges and needs.

- *Prevalence of End-Stage Renal Disease*

In the United States, more than 660,000 ESRD cases were reported in 2013, with 88.2% of these patients receiving hemodialysis treatment.[1] The economic burden of ESRD is substantial, with a significant portion of global medical expenditures on dialysis attributed to diabetic nephropathy.[4,5] While the incidence of ESRD remained stable around 2010, the prevalence continued to increase by approximately 21,000 cases per year.[6]

The Philippines also faces a growing ESRD problem. According to a 2022 study, the prevalence of ESRD in the Philippines is 35.94%, which is much higher than estimated global rates of 9-13%.[7,8] The Philippine Renal Registry indicated that diabetes and hypertension are the top two leading causes of CKD.[2] A large percentage (94%) of these ESRD patients undergo center-based hemodialysis.[8] The incidence of ESRD requiring hemodialysis is increasing due to age-related factors, comorbidities, and lifestyle factors such as diabetes mellitus, cardiovascular disease, and hypertension.[9]

II. TREATMENT REGIMEN

- *Hemodialysis*

One of the vital treatment regimens for patients diagnosed with end-stage kidney disease would be hemodialysis. Unlike Acute kidney disease or injury, chronic kidney disease is irreversible, and the only cure for the disease would be a kidney transplant. As this is not always accessible due to the limited number of organ donors and the long, expensive process for successful transplantation, alternative means to take over the work of the kidney must be done, and one of these is through hemodialysis treatment. This is typically done two to three times per week, depending on the orders of the patients' nephrologist. It is widely used worldwide and is the first treatment of choice as it is an essential part of the patients' treatment regimen to increase the ESRD patients' survivability and quality of life.[10] Patients will go to their hemodialysis clinic or hospital and must follow the number of times they need to be dialyzed to remove wastes and balance the patients' fluid and electrolyte status to prevent adverse events or complications of the disease.

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➢ *Medication*

Another important treatment regimen for patients undergoing maintenance hemodialysis is medication. The disease commonly progresses and is connected with other comorbid diseases such as cardiovascular disease and diabetes. With these present, patients would be prescribed more medications to handle not only their ESRD but also other underlying comorbid diseases as well. As the kidneys of ESRD patients do not function well, they are at high risk for electrolyte imbalances, low hemoglobin counts, and hypertension, which requires an average of 10-12 medications comprised of antihypertensive drugs, phosphate binders, iron, folic acid and calcium and vitamin D supplements, erythropoietin, blood thinners or platelet inhibitors, as well as antidiabetics. With the complexity of this treatment regimen due to the multiple medications the patients need to take, in conjunction with the adverse events that may happen from the medication and their disease process, this may place them at risk for noncompliance with the needed dosage or medications prescribed by their doctors.[11] On the other hand, another study revealed that patients who take more than seven medications have higher adherence because the patients may perceive their illness as severe if they must take numerous medications.[12]

➢ *Diet*

One of the significant functions of the kidneys in the body is the expulsion of wastes from the bloodstream. Because the kidneys in CKD patients are progressively declining and end-stage may mean insufficient functioning, there would be a decrease in the glomerular filtration rate, which leads to a reduction in the waste filtration and removal function of the kidneys via urination. There would also be changes in the nutritional requirements of the patients due to problems in electrolyte balance and waste removal from food breakdown; hence the need for dietary restrictions or modifications to maintain nutritional homeostasis.[13] Restriction is done to limit potassium, phosphorus, and excess fluids from fluid-rich foods such as cucumber, hence lowering the risk of morbidity and mortality. Low sodium intake is also prescribed for the patients' blood pressure management and water retention prevention, as sodium is hydrophilic. Carbohydrate intake is also restricted to the energy needs of the patient, as most of the patients undergoing hemodialysis are also diagnosed with diabetes mellitus.[14] These diet restrictions, on the other hand, may be a factor that can contribute to the patients' malnutrition, which may decrease the quality of life of the patient due to an increase in the occurrence of complications from malnutrition.[15]

➢ *Fluid*

Another treatment regimen for patients with ESRD involves fluid restrictions. One way to expel excess water in the body is through urine production, which is accomplished by the kidneys. If the kidneys are not functioning well, fluid imbalance, specifically fluid retention, would be present in the patient. Excess fluid in the body may cause discomfort or distress even during activities of daily living, wherein the person may experience shortness of breath, chest pain, and stiffness. In addition to these symptoms, excess fluid could furthermore lead to heart problems and an increase in blood pressure.[16] This requires patients to intake less than one liter of fluids daily, including liquids from foods such as soups. If the fluid restriction is not adhered to, this may lead to a lower quality of life due to the occurrence of adverse events.

➢ *Treatment Regimen Adherence*

Adherence was defined by the World Health Organization as the degree to which an individual's behavior in observing dietary plans, intake of medications, and/or carrying out lifestyle changes aligned with agreed recommendations by health care providers for their disease condition.[17] The difference between adherence and compliance is that there is an agreement in the recommendations between the patient and their health care providers, as they must be active partners in managing their health through the utilization of good communication skills.

Undergoing hemodialysis may negatively affect the patients' quality of life because of the changes that they need to undergo in their lifestyle, such as limitations in diet and fluid, additional obligations like going to their assigned hemodialysis center or hospital at an average of two to three times a week, and the burden of occurrence of physiological and psychological symptoms from the disease process and the adverse reactions of the treatment itself, which may influence the lives of the patients, especially in their activities of daily living.[18] Though negative effects have been noted, it is still necessary for patients to adhere to their prescribed treatment regimen to live as normally as possible and prevent complications from being underdialyzed, as the benefits from the treatment regimen are higher than the risks.

➢ *Intention to Adhere to Treatment Regimen*

According to the Theory of Planned Behavior (TPB) developed by Icek Ajzen,[19] behavioral intention is a factor that affects an individual's behavior, indicating how willing they are to try or make an effort in performing a behavior, including adherence, which is influenced by attitude, subjective norms, and perceived behavioral control.[20] It is an extension of the Theory of Reasoned Action by Ajzen and Fishbein,[21] where human behavior is affected by the attitude of a person or their predisposition if the enactment of the behavior is favorable or not, and the influence of other important people towards an action, which is the subjective norm, as well as the outcome that will follow. Some studies have associated the intention of the patient and their adherence behavior, and it is vital as it is beneficial to enhance the adherence of patients to their treatment regimen.

Due to many empirical claims that explain the theory, TPB introduced another variable that contributes to the prediction of an individual's choice that they are willing to perform. This is about the ease or difficulty in performing the desired behavior or perceived behavioral control, which directly influences actual behavior and indirectly affects behavior through intention. The TPB assumes that an individual's intention is a central factor, which indicates how hard they are willing to try or exert effort to perform a desired behavior. It was assumed that the stronger the intention to perform a behavior, the more likely it is to be carried out. This

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theory is helpful for understanding and predicting health-related behaviors. [20]

Intention to adhere was shown to have a positive correlation with the intake of immunosuppressive drugs of patients who have undergone organ transplant, where individuals with stronger perceived behavioral control and favorable attitude have a higher intention to adhere to their medication, while stronger subjective norms don't predict intention.[22,23] A study conducted among elderly patients during the COVID-19 pandemic showed that intention was associated with adherence to the treatment regimen.[20]

➢ *Treatment Monitoring and Evaluation*

It is important to evaluate the effectiveness or efficacy of the treatment regimen of hemodialysis patients to decrease the occurrence of complications of ESRD, as well as the treatment regimen itself. Guidelines have been created to guide health care providers in the provision of treatment and other health care management, as well as monitoring and evaluation of the health management provided to the patients.

Kidney Disease: Improving Global Outcomes (2016) guidelines emphasize that patient care and check-ups are individualized and don't follow rigid and fixed intervals for check-ups.[24] Health care providers could use current research and existing guidelines to set the time crucial for kidney disease management.

The nutritional status of the patient could change due to their high risk of developing protein-energy wasting and other malnutrition disorders, where the patients could experience unintentional weight loss of 5% in 3 months, up to 10% in 6 months. Another complication of ESRD includes anemia, which is why it is recommended to monitor patients who are not yet anemic every 3 months to prevent a drop in the levels of hemoglobin as well as the iron status of the patient. Patients can also experience secondary hyperparathyroidism, which is why it is important to assess the serum calcium and phosphate levels of the patients every 1 to 3 months, parathyroid hormones every 3 to 6 months, and alkaline phosphatase every 12 months.[25]

A clinical practice guideline also emphasized the importance of monitoring the dialysis adequacy of the patients monthly, including the fluid status of the patients, where their dry weight or body weight without extra fluid must be updated.[26]

➢ *Sociodemographic and Adherence to Hemodialysis Treatment*

- *Age and Adherence*

The older adult population is growing, and the prevalence of kidney disease and diabetes mellitus increases with age.[27,28] Physiological and psychosocial changes in older adults can affect their ability to manage their disease.[29] Studies have shown that the dialysis population of adults aged 65 years and older grew significantly from 2005 to 2008.[27] As of 2014, there was a rapid increase in the incidence of CKD among older persons.[30] This is concerning because age-related muscle mass loss might mask the decrease in age-related losses in glomerular filtration rate, even with stable serum creatinine concentration. Most older adults will be on maintenance hemodialysis, as transplantation could be unsuitable for them.[31]

Some research suggests that older patients demonstrate higher adherence to dialysis treatment, fluid restrictions, and treatment time.[32-34] This may be attributed to greater experience in handling health problems and a more structured lifestyle. However, other studies have reported no significant correlation between age and hemodialysis treatment adherence.[35,36] Additionally, some research indicates that elderly patients may have poorer medication compliance.[37,38] Elderly patients also tend to have more comorbid diseases along with changes in the body due to aging, which imposes a significant threat to their mental health, illness perception, quality of life, health literacy, and adherence to prescribed treatment modalities.[39] This may also put them at risk for polypharmacy.[40] An analysis based on data from the European Social Survey indicated that compliance varies in different countries and increases with age[42], while another study conducted in the Middle East displayed no significant difference in age between those who are compliant and not.[41]

- *Sex and Adherence*

The prevalence of chronic kidney disease (CKD) is generally higher in females than in males.[43] Some studies suggest estrogen may have a protective effect in nondiabetic CKD, while testosterone may have a harmful effect.[43] However, other research has shown faster CKD progression in men[43] and a higher incidence of ESRD in males.[44]

Regarding treatment adherence, several studies have found no significant relationship between sex and adherence to hemodialysis therapy.[33,35,45] However, a study conducted among older persons reported better treatment adherence in females.[20] A study done in Brazil also showed a significant association between sex and treatment adherence; however, males were shown to adhere more to hemodialysis treatment than females, but females are more likely to adhere to diet and medication treatment.[46]

- *Marital Status*

Marital status has been shown to play a role in the overall health and survival of people with chronic diseases, as spouses offer emotional, psychological, and material support. Studies have associated marital status with treatment adherence, showing that family members, spouses, or peer support promote better adherence in some patient groups.[20,36,47] A study in Tanzania noted that widowed, legally separated, or divorced patients were more at risk of treatment non-adherence than married and single patients.[35] However, other studies suggest that there is no significant relationship or association between marital status and treatment adherence.[33,45,48]

- *Educational Attainment*

Adults with higher educational attainment have better health, lifespan, and quality of life, and lower occurrence of symptoms, morbidity, disability, and mortality compared to

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adults with lower educational attainment.[49] Two studies conducted on older adult patients associated higher educational attainment with improved treatment adherence behavior,[20] and noted that medication adherence was higher in patients with higher education, diploma, and secondary school level, than those who only attended primary school.[37] These findings were supported by a study done in Brazil which also stated the significance of educational attainment to adherence among hemodialysis patients.[46]

On the other hand, a study undertaken in East Africa indicated that patients who only attained primary education have lower adherence than those with higher education, but their educational attainment was not significantly associated with the adherence of patients to hemodialysis treatment.[35] Conversely, studies also found that the educational level is not significantly associated with treatment adherence.[33,50]

- *Household Income and Health Insurance*

Patients on hemodialysis may face financial problems because, aside from undergoing costly hemodialysis treatment, they also need funds to buy their needed medication, as well as transportation when going to hemodialysis clinics. According to a systematic review, patients on hemodialysis have expenditure that is significantly higher than individuals who do not have the disease, and that the associations between decreased income, unemployment, and overall symptom burden were identified.[51] A multicenter study in Taiwan indicated that the hemodialysis modality has higher out-of-pocket costs and productivity losses than the peritoneal dialysis modality.[52]

In the Philippines, patients rely on the national health insurance program, PhilHealth. However, there were gaps in the provision of financial assistance to the beneficiaries, with low coverage in remote areas.[8] Even though benefits were provided for patients to have an almost free hemodialysis session, the sustainability of the benefit from PhilHealth could be uncertain due to issues the agency is facing, like bankruptcy, as well as mounting debt from individuals and hospitals.[53,54]

A study by indicated that most participants did not have any monthly income due to unemployment; however, it had no significant association with adherence to hemodialysis.[48] Other studies also found no significant association between income and adherence to hemodialysis treatment, conflicting with studies that did find a relationship between the two variables.[37]

- *Perceived Importance of Treatment Regimen*

An individual's perception plays an important role in managing their health, treatment regimen, and health research, as most care plans utilized in healthcare are patient-centered.[55] Several studies have shown that hemodialysis patients' perception of the importance of the treatment regimen has a significant association with adherence; higher perception scores mean higher adherence behavior of the patients.[48,56-57] Patients who understand their disease more are also more likely to adhere to their medication treatment regimen.[58]

- *Hemodialysis Vintage*

Hemodialysis vintage, the number of months or years a person is undergoing hemodialysis treatment, has been associated with the survival of the patients, which may be due to its association with their nutritional status.[59,60]

Patients with longer vintage felt less burden from their treatment modalities because they are already used to their routine regimen, as it has already become a habit.[61] Even though it has become a habitual practice to follow their prescribed treatments, research has shown that CKD patients have a higher burden of adverse symptoms compared to other individuals, and the longer their vintage is, the more health problems or challenges they might have.[60,61] On the contrary, a few studies showed that the patient's vintage is not particularly associated with treatment adherence behavior.[36,55]

- *Transportation*

Patients need to travel to their dialysis unit to have their hemodialysis treatment, and the frequency depends on how many times they need to attend per week, which is often lifelong until they have a kidney transplantation. Even though there are healthcare programs that lessen the burden of patients regarding their hemodialysis and medication treatment, the health-care system does not cover transportation, and the costs for this may cause stress and anxiety not only to the patients but also to their families. Longer transportation time was also associated with a lower quality of life of patients due to less socialization time with others, and they are more prone to transportation problems, which may be the cause of not being able to attend their dialysis session or having a shorter duration.[62,63]

Studies have shown conflicting results regarding the association between transportation and treatment adherence. A study conducted in Pakistan found that private transport showed better adherence, as problems with transportation are one of the main causes of missed hemodialysis sessions.[56] Similarly, a study done in the US also pointed out that suboptimal transportation or the utilization of public transport leads to poorer hemodialysis attendance than those who use private transportation.[64]

- *Convenience of Treatment Regimen*

The convenience of the treatment regimen mainly involves experiencing a smooth and less effort to adhere to the treatment regimen. Inconvenience may cause problems with patients' adherence to their treatment regimen, therefore, not being able to attain proper treatment for their kidney disease.

In-center or hospital hemodialysis is very common, but to provide more convenience to the patients, home hemodialysis, which is performed primarily overnight, has been increasing in popularity. Home hemodialysis was associated with improved quality of life, nutrition, blood pressure, socialization, and a lesser financial burden due to less travel time or maintenance of their current work or employment.[65,66] A study has also established that following the dialysis schedule is essential, and patients were found to

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be more adherent if scheduled on certain days of the week.[67] A research conducted in Japan indicated that patients find injection medication more convenient as it helps them prevent missing a dose of oral medication.[61] Another study have also found that time and dialysis schedule may cause inconvenience for the patients to be nonadherent to their prescribed diet and fluid.[68]

- *Social Support and Health Education*

Social support is defined as having a social network and resources where social connections provide emotional support, esteem, social integration, and belongingness, information dissemination, as well as guidance or aid.[69] A recent study showed that the patients' most important source of support would be their family.[70] Providing healthcare information and counseling from healthcare providers also helped the patients increase their treatment adherence.[71]

III. CONCLUSION

Adherence to hemodialysis treatment regimens is essential for managing ESRD and preventing complications. This literature review reveals that the factors influencing treatment adherence in elderly hemodialysis patients are complex and multifaceted.

Several gaps in the literature were identified in this review. Firstly, there is an inconsistency in the findings regarding the relationship between age and treatment adherence. Some studies suggest that older age is associated with better adherence, while others report no significant correlation or even poorer medication compliance in elderly patients. Secondly, the role of sex in treatment adherence remains unclear, with conflicting results across studies. Finally, the impact of other sociodemographic factors, such as marital status, race, hemodialysis vintage, and socioeconomic status, on treatment adherence also presents conflicting findings. Further research is needed to clarify the influence of these factors on treatment adherence among elderly hemodialysis patients.

Ultimately, to enhance patient outcomes in this vulnerable population, it is crucial to identify the specific factors influencing treatment adherence and to develop effective interventions through continued investigation.

REFERENCES

[1]. United States Renal Data System. (2015). USRDS Annual Data Report: Epidemiology of kidney disease in the United States. National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD.

[2]. GMA Integrated News. (2024). Dialysis patients increased by 42% in 2023 from 2022. https://www.gmanetwork.com/news/topstories/nation/908664/dialysis-patients-increased-by-42-in-2023-from-2022/story/

[3]. Philippine Society of Nephrology. (2024). Rising incidence of chronic kidney disease in the Philippines sparks call for kidney health awareness: The Philippine Society of Nephrology urges Filipinos to take proactive measures. https://psn.org.ph/2024/03/01/rising-incidence-of-chronic-kidney-disease-in-the-philippines-sparks-call-for-kidney-health-awareness-subtitle-the-philippine-society-of-nephrology-urges-filipinos-to-take-proactive-measures/

[4]. Kang, K. I. (2016). Factors affecting treatment adherence in elderly patients with end-stage renal disease. *Korean journal of adult nursing*, *28*(4), 444-454.

[5]. Lysaght M. J. (2002). Maintenance dialysis population dynamics: current trends and long-term implications. *Journal of the American Society of Nephrology : JASN*, *13 Suppl 1*, S37–S40.

[6]. Department of Health (2013). *Mortality.* Retrieved from http://www.doh.gov.ph/mortality

[7]. Suriyong, P., Ruengorn, C., Shayakul, C., Anantachoti, P., & Kanjanarat, P. (2022). Prevalence of chronic kidney disease stages 3-5 in low- and middle-income countries in Asia: A systematic review and meta-analysis. *PloS one*, *17*(2), e0264393. https://doi.org/10.1371/journal.pone.0264393

[8]. Pajimna, J. a. T., Orpilla, G. a. L., Milan, M. J. D., Virtucio, C. T. S., & Pamatian, J. V. M. (2023). Gaps and challenges in the provision of treatment for patients with end-stage renal disease: perspectives from the Philippines. *The Lancet Regional Health - Western Pacific*, *38*, 100889. https://doi.org/10.1016/j.lanwpc.2023.100889

[9]. Matsuzawa, R., Hoshi, M., Yoneki, K., & Matsunaga, M. (2016). Self-management behavior of patients receiving hemodialysis: Relationships with clinical indicators, background factors, and social support. *Nephrology Nursing Journal*, *43*(1), 15-25.

[10]. Bazrafshan, M. R., Navabpour Tehrani, S., & Ahmadizar, F. (2023). The relationship between spiritual well-being and adherence to hemodialysis treatment regimen in hemodialysis patients: A systematic review and meta-analysis. *BMC nephrology*, *24*(1), 1-13.

[11]. Ghimire, S., Peterson, G. M., Castelino, R. L., Jose, M. D., Zaidi, S. T. R., & Bereznicki, B. J. (2015). A systematic review of factors influencing medication adherence in patients with end-stage renal disease. *Nephrology*, *20*(4), 253-266.

[12]. Reach, G., Pechtner, V., & Pawin, G. (2023). Psychosocial factors influencing therapeutic inertia and adherence to treatment in patients with type 2 diabetes and chronic kidney disease. *Cardiovascular Diabetology*, *22*(1), 1-18.

[13]. Saglimbene, V. M., Wong, G., & Palmer, S. C. (2021). The impact of dietary restrictions on the quality of life of adults with chronic kidney disease. *Journal of renal nutrition*, *31*(3), 237-245.

[14]. Piccoli, G. B., Deagostini, M., & Consiglio, V. (2020). Vegetarian low-protein diets in CKD. *Nutrients*, *12*(1), 195.

[15]. Ekramzadeh, M., Ebrahimi, M., Hayati, M., Sharafkhah, M., & Esmaily, H. (2014). The relationship between malnutrition and quality of life

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25may1427

in hemodialysis patients. *Iranian journal of kidney diseases*, *8*(1), 22.

[16]. National Kidney Foundation Inc. (2025). Fluid overload in a dialysis patient. https://www.kidney.org/kidney-topics/fluid-overload-dialysis-patient

[17]. World Health Organization. (2003). *Adherence to long-term therapies: evidence for action*.

[18]. Özkan, S., & Taylan, S. (2022). Quality of life in hemodialysis patients: A single-center experience. *The European Research Journal*, *8*(1), 75-81.

[19]. Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-t

[20]. Sheikh, M. A., Ghafoor, M. M., Nawaz, A., & Asif, M. (2022). Treatment adherence behavior of elderly patients undergoing hemodialysis during COVID-19 pandemic and its relationship with identified factors. *BMC geriatrics*, *22*(1), 1-12.

[21]. Heller, L. J., Skinner, C. S., Tomiyama, A. J., Epel, E. S., Hall, P. A., Allan, J., LaCaille, L., Randall, A. K., Bodenmann, G., Li-Tsang, C. W. P., Sinclair, K., Creek, J., Baumann, L. C., Karel, A., Andersson, G., Hanewinkel, R., Morgenstern, M., Puska, P., Bucks, R. S., . . . Denollet, J. (2012). Theory of reasoned action. In *Springer eBooks* (pp. 1964–1967). https://doi.org/10.1007/978-1-4419-1005-9_1619

[22]. Chisholm, M. A., Mulloy, L. L., & Gopalakrishnan, M. (2007). A pilot study examining psychosocial predictors of immunosuppressant medication adherence in heart transplant recipients. *Journal of heart and lung transplantation*, *26*(11), 1145-1151.

[23]. Hugon, A., Metge, C. J., Durand, Z., Kamar, N., Ladrière, M., & Péré, H. (2014). Psychosocial factors associated with medication adherence in renal transplant recipients: A systematic review. *Transplantation reviews*, *28*(1), 13-23.

[24]. Kidney International. (2024). KDIGO 2024 clinical practice guideline for the evaluation and management of chronic kidney disease. *International Society of Nephrology*, 105 (Suppl 4S), S117–S314. https://kdigo.org/wp-content/uploads/2024/03/KDIGO-2024-CKD-Guideline.pdf

[25]. Wouk, K. A. (2021). Monitoring and evaluation of adult patients receiving maintenance hemodialysis. *American journal of kidney diseases*, *77*(3), 456-466.

[26]. Ashby, D., Borman, N., Burton, J., Corbett, R., Davenport, A., Farrington, K., Flowers, K., Fotheringham, J., Fox, R. N. A., Franklin, G., Gardiner, C., Gerrish, R. N. M., Greenwood, S., Hothi, D., Khares, A., Koufaki, P., Levy, J., Lindley, E., Macdonald, J., . . . Wilkie, M. (2019). Renal Association Clinical Practice Guideline on Haemodialysis. *BMC Nephrology*, *20*(1). https://doi.org/10.1186/s12882-019-1527-3

[27]. Power, A., & Brown, E. A. (2014). The growing problem of older patients on renal replacement therapy. *Clinical medicine*, *14*(6), 641.

[28]. Weinger, K., Beverly, C. J., & Smaldone, A. M. (2014). "Special issues" of diabetes in the older adult. *Current diabetes reports*, *14*, 1-11.

[29]. Washington, T. L. (2013). Self-management behaviors in older adults with end-stage renal disease. *Nephrology nursing journal*, *40*(1), 71.

[30]. National Institute of Diabetes and Digestive and Kidney Diseases. (2020). Effects of chronic kidney disease in adults study: CRIC. https://www.niddk.nih.gov/about-niddk/research-areas/kidney-disease/ effects-chronic-kidney-disease-adults-study-cric

[31]. Brown, E. A. (2010). Can quality of life be improved for the increasing numbers of older patients with end-stage kidney disease? Expert Review of Pharmacoeconomics & Outcomes Research, 10(6), 661-6. http://dx.doi.org/10.1586/erp.10.78

[32]. Ford-Anderson, R. M. (2010). *Predictors of adherence to the hemodialysis treatment regimen* (Doctoral dissertation, Capella University).

[33]. Movahedi, M. M., Shojaei, S., & Bastani, P. (2023). The relationship between general health and demographic characteristics with treatment adherence in hemodialysis patients. *BMC nephrology*, *24*(1), 1-10.

[34]. Ossareh, S., Tabrizian, S., & Rassouli, M. (2014). Factors affecting adherence to hemodialysis in hemodialysis patients. *Global journal of health science*, *6*(5), 128.

[35]. Mohamedi, A. K., & Mosha, F. W. (2022). Factors associated with adherence to hemodialysis therapy among patients attending Muhimbili National Hospital, Dar es Salaam, Tanzania: A cross-sectional study. *BMC nephrology*, *23*(1), 1-11.

[36]. Ross, B. (2017). *Demographic factors that correlate with adherence to hemodialysis treatment regimen* (Order No. 10606553). Available from ProQuest Dissertations & Theses Global. (2026768967). https://search.proquest.com/docview/2026768967?accountid=47253

[37]. Mirzaei-Alavijeh, M., Peyman, N., & Jalilian, M. (2023). The effect of education based on the health belief model on medication adherence in elderly patients with chronic kidney disease: A quasi-experimental study. *BMC geriatrics*, *23*(1), 1-11.

[38]. Waku, M., Asakura, K., Hamano, T., Wada, A., & Fukui, M. (2021). Medication adherence among elderly patients receiving hemodialysis: A single-center study. *Renal Replacement Therapy*, *7*(1), 1-8.

[39]. Kang, A. W. C. (2016). Psychological distress and physical multimorbidity: The example of coexisting diabetes mellitus and end-stage renal disease (Order No. 10754599). Available from ProQuest Central; ProQuest Dissertations & Theses Global. (1999313359). Retrieved from https://search.proquest.com/docview/1999313359?accountid=47253

[40]. Dagli, R. J., & Sharma, A. (2014). Polypharmacy in elderly: need for concern. *Journal of pharmacology and pharmacotherapeutics*, *5*(1), 12.

[41]. Larsen, J., Stovring, H., Kragstrup, J., & Hansen, D. G. (2009). Can differences in medical drug

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25may1427

compliance between European countries be explained by social factors: analyses based on data from the European Social Survey, round 2. *BMC Public Health*, *9*(1). https://doi.org/10.1186/1471-2458-9-145

[42]. Ibrahim, S., Hossam, M., & Belal, D. (2015). Study of non-compliance among chronic hemodialysis patients and its impact on patients' outcomes. *Saudi journal of kidney diseases and transplantation : an official publication of the Saudi Center for Organ Transplantation, Saudi Arabia*, *26*(2), 243–249.

[43]. Kovesdy, C. P. (2022). Sex differences in chronic kidney disease progression. *Kidney international*, *101*(5), 874-876.

[44]. Hashmi, M., Benjamin, O., & Lappin, S. L. (2023). Epidemiology of End Stage Renal Disease. In *StatPearls [Internet]*. StatPearls Publishing.

[45]. Rafiee, F., & Shafie, H. (2017). Dialysis adequacy and treatment adherence status of hemodialysis patients referred to dialysis centers of Hajar hospital, Shahrekord, Iran. *International Journal of Nursing and Midwifery*, *4*(1), 1-7.

[46]. Nakao, M., Gorayeb, R., & Cardeal da Costa, I. (2016). Hemodialysis adherence: psychobiological aspects and related factors. *Jornal Brasileiro de Nefrologia*, *38*, 218-226.

[47]. Alhomayani, F., Bukhara, M., Al-ghamdi, J., Ali, R., and Al-Amri, L. (2021). Demographic factors affecting level of adherence amongst hemodialysis patients in a single center of Taif, Saudi Arabia. *Ann. RSCB* 25, 8627–8646.

[48]. Mukakarangwa, M. C., Chironda, G., Bhengu, B., & Katende, G. (2018). Adherence to Hemodialysis and Associated Factors among End Stage Renal Disease Patients at Selected Nephrology Units in Rwanda: A Descriptive Cross-Sectional Study. *Nursing research and practice*, *2018*, 4372716. https://doi.org/10.1155/2018/4372716

[49]. Raghupathi, V., & Raghupathi, W. (2020). The influence of education on health: an empirical assessment of OECD countries for the period 1995-2015. *Archives of Public Health=Archives Belges de Santé Publique*,*78*(1), 20–20. https://doi.org/10.1186/s13690-020-00402-5

[50]. Chironda, G., Bhengu, B. & Manwere, A. (2019). Models and theories of care applicable to predicting and improving adherence behaviours among Chronic Kidney Disease (CKD) patients. *Rwanda Journal of Medicine and Health Sciences, 2(1),* 48-58. https://dx.doi.org/10.4314/rjmhs.v2i1.9.

[51]. Ng, M. S. N., Chan, D. N. S., Cheng, Q., Miaskowski, C., & So, W. K. W. (2021). Association between Financial Hardship and Symptom Burden in Patients Receiving Maintenance Dialysis: A Systematic Review. *International journal of environmental research and public health*, *18*(18), 9541. https://doi.org/10.3390/ijerph18189541

[52]. Tang, C. H., Chen, H. H., Wu, M. J., Hsu, B. G., Tsai, J. C., Kuo, C. C., Lin, S. P., Chen, T. H., & Sue, Y. M. (2019). Out-of-pocket costs and productivity losses in haemodialysis and peritoneal dialysis from a patient interview survey in Taiwan. *BMJ open*, *9*(3), e023062. https://doi.org/10.1136/bmjopen-2018-023062

[53]. Galvez, D. (2025, February 7). SC justice says PhilHealth bankrupt; not so, says Recto. *The Philippine Star*. Retrieved from https://www.philstar.com/headlines/2025/02/07/2419778/sc-justice-says-philhealth-bankrupt-not-so-says-recto

[54]. Manahan, E. (2024, October 18). PhilHealth must settle its debts. *Philippine Daily Inquirer*. Retrieved from https://opinion.inquirer.net/177647/philhealth-must-settle-its-debts

[55]. Sidani, S. & Fox, M. (2020). The Role of Treatment Perceptions in Intervention Evaluation: A Review. Science of Nursing and Health Practices / Science infirmière et pratiques en santé, 3(2), 1–15. https://doi.org/10.31770/2561-7516.1079

[56]. Hussain, F., Ashraf, S., Arshad, M., Rehman, M. M. U., Khan, F. S., Ahmad, M. A., Ali, S., Asif, M. A., Munawar, A., & Mehmood Qadri, H. (2023). Knowledge, Adherence, and Perception of Patients on Maintenance Hemodialysis to Treatment Regimens at a Tertiary Care Hospital in Pakistan. *Cureus*, *15*(12), e51341. https://doi.org/10.7759/cureus.51341

[57]. Naalweh, K. S., Barakat, M. A., Sweileh, M. W., Al-Jabi, S. W., Sweileh, W. M., & Zyoud, S.H. (2017). Treatment adherence and perception in patients on maintenance hemodialysis: a cross - sectional study from Palestine. *BMC nephrology*, *18*(1), 178. https://doi.org/10.1186/s12882-017-0598-2

[58]. Ghimire, S., Castelino, R. L., Jose, M. D., & Zaidi, S. T. R. (2017). Medication adherence perspectives in haemodialysis patients: a qualitative study. *BMC nephrology*, *18*(1), 167. https://doi.org/10.1186/s12882-017-0583-9

[59]. Chertow, G. M., Johansen, K. L., Lew, N., Lazarus, J. M., & Lowrie, E. G. (2000). Vintage, nutritional status, and survival in hemodialysis patients. *Kidney international*, *57*(3), 1176–1181. https://doi.org/10.1046/j.1523-1755.2000.00945.x

[60]. Zhu, L., Li, X. L., Shi, R., & Wang, D. G. (2023). Dialysis vintage is associated with a high prevalence and severity of unpleasant symptoms in patients on hemodialysis. *Renal failure*, *45*(1), 2201361. https://doi.org/10.1080/0886022X.2023.2201361

[61]. Ohya, M., Iwashita, Y., Kunimoto, S., Yamamoto, S., Mima, T., Negi, S., & Shigematsu, T. (2019). An Analysis of Medication Adherence and Patient Preference in Long-term Stable Maintenance Hemodialysis Patients in Japan. *Internal medicine (Tokyo, Japan)*, *58*(18), 2595–2603. https://doi.org/10.2169/internalmedicine.2676-19

[62]. Iqbal, M. S., Iqbal, Q., Iqbal, S., & Ashraf, S. (2021). Hemodialysis as long term treatment: Patients satisfaction and its impact on quality of life. Pakistan Journal of Medical Sciences, 37(2). https://doi.org/10.12669/pjms.37.2.2747

[63]. Lewis, R. A., Bohm, C., Fraser, F., Fraser, R., Woytkiw, L., Jurgutis, S., Rubin, M., Smith, G., Buenafe, J., Verdin, N., Hutton, J., & Tonelli, M. (2022). Transportation Burden Associated With Hemodialysis in Canada: A Qualitative Study of

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25may1427

Stakeholders. Kidney medicine, 5(2), 100571. https://doi.org/10.1016/j.xkme.2022.100571

[64]. Chan, K. E., Thadhani, R. I., & Maddux, F. W. (2014). Adherence barriers to chronic dialysis in the United States. *Journal of the American Society of Nephrology : JASN*, *25*(11), 2642–2648. https://doi.org/10.1681/ASN.2013111160

[65]. Walker, R. C., Howard, K., & Morton, R. L. (2017). Home hemodialysis: a comprehensive review of patient-centered and economic considerations. *ClinicoEconomics and outcomes research : CEOR*, *9*, 149–161. https://doi.org/10.2147/CEOR.S69340

[66]. Ang, Y.T.I., Gan, S.W.S., Liow, C.H. *et al* (2022). Patients' perspectives of home and self-assist haemodialysis and factors influencing dialysis choices in Singapore. *Ren Replace Ther* 8, 42. https://doi.org/10.1186/s41100-022-00430-7

[67]. A.Alzahrani, A. M., & Al-Khattabi, G. H. (2021). Factors Influencing Adherence to Hemodialysis Sessions among Patients with End-Stage Renal Disease in Makkah City. *Saudi journal of kidney diseases and transplantation : an official publication of the Saudi Center for Organ Transplantation, Saudi Arabia*, *32*(3), 763–773. https://doi.org/10.4103/1319-2442.336772

[68]. Clark-Cutaia, M. N., Sevick, M. A., Thurheimer-Cacciotti, J., Hoffman, L. A., Snetselaar, L., Burke, L. E., & Zickmund, S. L. (2019). Perceived Barriers to Adherence to Hemodialysis Dietary Recommendations. *Clinical nursing research*, *28*(8), 1009–1029. https://doi.org/10.1177/1054773818773364

[69]. Drageset J. Social Support. 2021 Mar 12. In: Haugan G, Eriksson M, editors. Health Promotion in Health Care – Vital Theories and Research [Internet]. Cham (CH): Springer; 2021. Chapter 11. Available from: https://www.ncbi.nlm.nih.gov/books/NBK585650/. https://10.1007/978-3-030-63135-2_11

[70]. Alatawi, A. A., Alaamri, M., & Almutary, H. (2024). Social Support and Adherence to Treatment Regimens among Patients Undergoing Hemodialysis. *Healthcare (Basel, Switzerland)*, *12*(19), 1958. https://doi.org/10.3390/healthcare12191958

[71]. Kim, H., & Cho, M.-K. (2021). Factors Influencing Self-Care Behavior and Treatment Adherence in Hemodialysis Patients. *International Journal of Environmental Research and Public Health*, *18*(24), 12934. https://doi.org/10.3390/ijerph182412934