

Hemodialysis versus peritoneal dialysis for chronic kidney disease patients



**ASSIGN
BUSTER**

List of Abbreviations

ACE- Angiotensin-converting enzyme

ARB- Angiotensin Receptor Blocker

AV- Arteriovenous

CDC- Center for Disease Control

CHF- Congestive Heart Failure

CKD- Chronic Kidney Disease

CVD- Cardiovascular Disease

DM- Diabetes Mellitus

ESRD- End Stage Renal Disease

GFR- Glomerular Filtration Rate

HD- Hemodialysis

HTN- Hypertension

MBD- Mineral and Bone Disorders

NIH- National Institute of Health

NSAIDs- Nonsteroidal Anti-inflammatory Drugs

PA- Physician Assistant

PCKD- Polycystic Kidney Disease

PD- Peritoneal Dialysis

QOL- Quality of Life

RRT- Renal Replacement Therapy

SLE- Systemic Lupus Erythematosus

Abstract

Chronic Kidney Disease (CKD) affects 30 million people or 15% of US adults. The incidence of Stage 5 CKD, also known as End Stage Renal Disease (ESRD), is defined as a glomerular filtration rate (GFR) of less than 15 mL/min per 1.73 m² and affects 363 per million people per year (CDC, 2017). Due to the increasing incidence of CKD in the United States, a management strategy is imperative for this mounting population. The two main renal replacement therapies (RRT) for ESRD are hemodialysis (HD) and peritoneal dialysis (PD). These are the two leading standard of care options for ESRD patients, both of which have their advantages and disadvantages. There are many factors that contribute to CKD, with diabetes mellitus (DM) and hypertension (HTN) being the two most common causes. That being said, treatment of the underlying factor is a main part of the management plan. CKD is also accompanied by comorbidities, which makes the care of the disease even trickier. It is important for healthcare providers to understand the causes of CKD, the associated comorbid conditions, and implications of PD and HD when discussing patient options. All factors, especially the pros

and cons of HD and PD, must be taken into consideration when coming up with a strategy plan to treat CKD. Quality of life (QOL) is a significant focus in these ESRD patients.

Keywords: chronic kidney disease, management of chronic kidney disease, end stage renal disease, hypertension, diabetes mellitus, comorbidities, hemodialysis, peritoneal dialysis

Thesis Overview

Chronic Kidney Disease (CKD) is a gradual decline in kidney function over time. People diagnosed with CKD complain of volume overload, hyperkalemia, metabolic acidosis, hypertension, anemia, mineral and bone disorders (MBD), hyperlipidemia, and sexual dysfunction. In addition, most live with other comorbid conditions such as diabetes mellitus (DM), cardiovascular disease (CVD), and osteoporosis. It is important for clinicians to understand the implications of peritoneal dialysis (PD) and hemodialysis (HD) as well as make each treatment plan individualized when discussing options with their patients.

Research Problem

With the increasing incidence and complicated comorbidities of CKD, it is imperative that healthcare providers have a good grasp on management options. The main two treatment modalities include PD and HD, which both have their share of advantages and disadvantages. The patients' quality of life (QOL) should be taken into consideration when coming up with a treatment plan.

Hypothesis/Research Questions

The main focus of this research paper is to determine which renal replacement therapy (RRT) has a better return in the long-term as well as providing a higher quality of life for end-stage renal disease (ESRD) patients. The questions specific to this research paper reflect the need for classification of CKD. What is CKD? What is the incidence of CKD? What are the most common causes of CKD? What are the signs and symptoms of CKD? What are the associated comorbid conditions of CKD? How do you diagnose and stage CKD? What are the treatment options for CKD? What are the advantages and disadvantages of PD versus HD? What is the QOL in patients who undergo PD versus HD?

Purpose of the Research

The purpose of this research is to explore the multiple features encompassing CKD. Research will begin with an overview of the pathophysiology behind CKD including the etiologies, signs and symptoms, diagnosis, and treatment. Secondly, it will consist of discussing the advantages and disadvantages of the two main treatment modalities, PD and HD, in regard to prolonging life. The attempt is to bring awareness to the treatment strategies of CKD. Thirdly, this research will examine the QOL among these patients and their chosen treatment modality. The ultimate goal is to provide insight to the most beneficial management strategy when viewing long-term return and QOL.

Methodology

<https://assignbuster.com/hemodialysis-versus-peritoneal-dialysis-for-chronic-kidney-disease-patients/>

Utilizing a meta-analysis approach to illustrate understanding of PD and HD in CKD patients. Several article database search engines were used through Nova Southeastern Universities HPD library access, including PubMed and EBSCO, to obtain the full-text articles. “Chronic Kidney Disease,” “Peritoneal Dialysis,” and “Hemodialysis” were typed into the search engine to acquire the most current published peer-reviewed articles. In addition, UpToDate was used to acquire insight into the most recent CKD management strategies.

Summary

CKD is a continuing decline in kidney function over time, which ultimately results in ESRD. These patients require RRT, such as PD or HD, which each have positive and negative effects on long-term outcomes and short-term QOL. It is important for these healthcare providers to grasp a full understanding of the implications of PD and HD when discussing options with their patients. This research into RRT will help guide clinicians to choose the best-individualized management plan for their patients.

Chronic Kidney Disease: The Need for Awareness

Chronic kidney disease has become a growing problem worldwide in the public health community. The Center for Disease Control (CDC) states that CKD affects 30 million people, or 15% of United States adults. According to UpToDate, CKD is defined as the “presence of kidney damage (usually detected as urinary albumin excretion of ≥ 30 mg/day or equivalent) or decreased kidney function (defined as estimated glomerular filtration rate

[eGFR] <60 mL/min/1.73 m²) for three or more months, irrespective of the cause” (Rosenberg, 2018). When the glomerular filtration rate (GFR) falls below 15 mL/min per 1.73 m², it is referred to as ESRD. At this point, patients will undergo some form of RRT, such as PD, HD, or kidney transplantation. Although CKD is becoming more recognized and there have been vast improvements in RRT selections, these patients continue to experience high morbidity and mortality.

Introduction

According to the National Institute of Health (NIH), the most common causes of CKD are diabetes mellitus (DM) and hypertension (HTN). Other causative factors include polycystic kidney disease (PCKD), systemic lupus erythematosus (SLE) nephritis, post-streptococcal glomerulonephritis, and nephrotoxic drugs such as aminoglycoside antibiotics. Additionally, reversible causes that can lead to decreased renal perfusion include hypovolemia, infection, and drugs that lower the GFR such as nonsteroidal anti-inflammatory drugs (NSAIDs) and angiotensin-converting enzyme (ACE) inhibitors (Rosenberg, 2018). Hypertension exists in about “ 80 to 85 percent of patients with CKD” (Mann, 2018). This is attributed to HTN damaging the blood vessels within the kidneys. DM is a causative factor in CKD due to the hyperglycemia leading to irreversible damage of the basement membrane within the kidneys. As kidney function declines, patients range from being asymptomatic to symptomatic even without a corresponding decrease in GFR. This symptom burden includes fluid volume overload, hyperkalemia, metabolic acidosis, mineral and bone disorders (MBD), HTN, anemia,

dyslipidemia, sexual dysfunction, and uremia. Fluid overload manifests as weight gain, peripheral edema, pulmonary edema, increased blood pressure, and congestive heart failure (CHF). Signs of uremia include anorexia, nausea, vomiting, pericarditis, peripheral neuropathy, forgetfulness, fatigue, and seizures (Rosenberg, 2018).

Diagnosis and Staging

CKD is diagnosed when the patient has “ kidney damage (usually detected as urinary albumin excretion of ≥ 30 mg/day or equivalent) or decreased kidney function (defined as estimated glomerular filtration rate [eGFR] < 60 mL/min/1.73 m²) for three or more months, irrespective of the cause” (Rosenberg, 2018). A decreasing GFR is the hallmark of renal impairment.

According to UpToDate, the staging of CKD based on GFR is characterized by: “ G1 – GFR > 90 mL/min per 1.73 m², G2 – GFR 60 to 89 mL/min per 1.73 m², G3a – GFR 45 to 59 mL/min per 1.73 m², G3b – GFR 30 to 44 mL/min per 1.73 m², G4 – GFR 15 to 29 mL/min per 1.73 m², and G5 – GFR < 15 mL/min per 1.73 m² or treatment by dialysis” (Levey and Inker, 2018). There are other diagnostic studies that are useful when determining the progression of CKD and assessing the morbidity and mortality.

Noninvasive diagnostic tools such as urinalysis are helpful because albuminuria is a frequent marker of kidney damage. When the kidneys are damaged, they become permeable and leak protein and blood into the urine.

There are three stages of albuminuria which include: “ A1 – ACR < 30 mg/g (< 3.4 mg/mmol), A2 – ACR 30 to 299 mg/g (3.4 to 34.

0 mg/mmol), and A3 – ACR ≥ 300 mg/g (> 34.0 mg/mmol)” (Levey and

<https://assignbuster.com/hemodialysis-versus-peritoneal-dialysis-for-chronic-kidney-disease-patients/>

Inker, 2018). According to Levey and Inker, “ the increase in risk is significant for urine ACR values ≥ 30 mg/g, even when GFR is > 60 mL/min per 1.73 m^2 , consistent with the current threshold value for albuminuria (≥ 30 mg/g) as a marker of kidney damage.” Other markers in the urine include cellular casts such as red and white blood cell casts, which signifies glomerulonephritis and pyelonephritis respectively. Imaging abnormalities via ultrasound are usually obtained as well. They can indicate PCKD, renal stones, hydronephrosis, and physical irregularities such as increased echogenicity and small kidneys of less than 10 cm which are due to kidney damage (O’Neill, 2018).

Treatment Overview

Slowing the progression of CKD is the first and foremost goal of managing this disease. Independent of treating the underlying disease, patients should control their blood pressure and proteinuria with renoprotective agents such as an ACE inhibitor or an angiotensin receptor blocker (ARB). Other modalities for renal protection include diet modifications, protein restriction, smoking cessation, and glycemic control. When the patient’s GFR is less than 30 mL/min per 1.73 m^2 , they should be referred to a nephrologist (Rosenberg, 2018). At this point, the nephrologist would discuss RRT options, which include HD, PD, and possibly kidney transplantation. Kidney transplantation is the optimal choice for ESRD because it improves the QOL and reduces mortality; however, there is a shortage of kidney donors and not all patients are candidates for such surgery (Mousavi, 2015);

Hemodialysis Advantages

<https://assignbuster.com/hemodialysis-versus-peritoneal-dialysis-for-chronic-kidney-disease-patients/>

Hemodialysis involves filtering the patient's blood from a surgically created arteriovenous (AV) graft or fistula through a dialysis machine that filters the blood through a semipermeable membrane and then goes back into the patient. This is usually done about three times a week for three to four hour sessions at a dialysis center. Advantages of HD include blood testing at the time of treatment in which the nurse can make any needed electrolyte adjustments at the time of treatment. In addition, for those dependent elderly patients, an advantage of HD is that a nurse will be able to set up and run the equipment for them.

Hemodialysis Disadvantages

Disadvantages to PD, includes interfering with the patients daily life due to the travel requirements and time commitment of going to the dialysis center approximately three times a week for about four hours. If a patient wants to travel out of the city, they would have to make arrangements to go to another dialysis center. Missed treatments can cause severe consequences and possibly a trip to the emergency department. Common side effects of HD include hypotension, nausea, vomiting, and fatigue. Other disadvantages are failure of the AV fistula due to vascular stenotic lesions (Beathard, 2017). According to Selby (2018), residual renal function (RRF) is an "important predictor of the overall survival, aids in maintenance of volume status, and lower rates of left ventricular hypertrophy." They found that HD patients lose RRF faster than PD patients.

Peritoneal Dialysis Advantages

Peritoneal dialysis involves inserting surgical placed catheter near the patient's umbilicus. The peritoneum is filled with dialysate fluid through the catheter. This fluid exchanges the body's waste products, and then the dialysate solution is drained out of the catheter and into a bag. This exchange process occurs about eight times a session every single day. A major pro of PD is that it can be done overnight while the patient sleeps so that it does not interfere with the patient's daily life. This type of dialysis maintenance is for those who are independent and can comprehend how to use the equipment. Another advantage is it has less dietary restrictions than HD. PD gives the most amount of freedom and the least amount of change to the patient's life. PD maintains RRF better than HD, which is important to patient survival (Selby, 2018). In one study,

Peritoneal Dialysis Disadvantages

Since the catheter is surgically fixed into the abdominal cavity, there is an increase risk of herniation. A severe complication of PD is peritonitis due to the foreign catheter inside the abdomen. PD is not suitable for all CKD patients if they gave had prior surgeries, there may be intra-abdominal adhesions, which would inhibit the dialysate solution from exchanging the wastes.

Comparison

There are many studies trying to figure out what the best renal replacement modality for CKD patients who are not eligible for kidney transplantation. A retrospective cohort study in Ontario, Canada, which included 872 HD and 203 PD patients, found that PD patients was a greater likelihood of <https://assignbuster.com/hemodialysis-versus-peritoneal-dialysis-for-chronic-kidney-disease-patients/>

hospitalization for dialysis related causes, most commonly, peritonitis and technique failure (Oliver, 2016). This could be due to the fact that patients stayed in the hospital longer from PD-related peritonitis, than from HD catheter-related bacteremia. Suri, Li, and Nesrallah (2015) had similar findings that patients were significantly less likely to be hospitalized with daily home HD (0.93/patient-year) than PD (1.35/patient-year, HR 0.75, 95% CI= 0.67-0.79) as well as HD (5.2 days/patient-year) had less hospital days than PD (9.2 days/patient-year). This study involved 1116 home HD patients and 2784 PD patients.

Yang, Khin, Lau, Chua, Vathsala, Lee, and Luo (2015) conducted a study in South-East Asia, which compared the survival outcomes of HD versus PD at initiation. They found that there was no difference in survival outcomes in the first 12 months after starting either maintenance dialysis. However, after the first year of treatment, mortality in the next 5 years was higher in PD patients at 13.7% versus HD at 7.02% (Yang, 2015). Another study conducted in found similar results that home HD was associated with less hospital days than PD

Some studies show no difference in outcomes despite the modality. A retrospective study held in Iran reported no significant advantage of PD versus HD in the first few years of initiating dialysis despite the causes. This could be due to the short duration of the study in which they could not make a full assessment of the comorbidities and nutritional status of their patients (Mousavi, 2015). In March 2018, Wong, Ravani, Oliver, Holroyd-Leduc, Venturato, Garg, and Quinn released an article on their retrospective study in Toronto, Canada. They restricted the study to patients who were eligible <https://assignbuster.com/hemodialysis-versus-peritoneal-dialysis-for-chronic-kidney-disease-patients/>

for both HD and PD. They found an equal survival outcome between the two RRT (Wong, 2018).

Discussion

Implication of the Research for the Physician Assistant Profession

Due to the increasing incidence of CKD in the United States, understanding the management strategy of ESRD is imperative for all those involved with patient care like Physician Assistants (PA). By diving deeper into the etiologies, associated comorbidities, and what each maintenance dialysis therapy entails, this provides a better long-term outcome and short term QOL for the patient. PAs are patient advocates, and as an advocate it is important to have a full grasp on all that is involved in the disease. Quantity of life does not equal quality of life. That being said, increasing clinical awareness with what is involved in the treatment options optimizes patient care.

Contributions of the Research

My research provides insight to CKD management, which is a growing problem worldwide. We know that the best way to treat CKD is to slow the progression of the disease. However, when the disease advances to the point that more invasive management is necessary, that's where my research comes into play. The two main modalities of CKD management ARE HD and PD. Currently, there are conflicting results on which is better. This paper focuses on getting closer to ending that debate and expanding the current knowledge of how HD and PD impact patient's short-term daily lives and

<https://assignbuster.com/hemodialysis-versus-peritoneal-dialysis-for-chronic-kidney-disease-patients/>

long-term survival outcomes. It is important to acknowledge those who contributed to reviewing the research, Danielle Telihiard and Cassandra Jeandell, as well as the previous professor who was in charge of the research paper, Laura McClary, PA-C.

Strengths of the Research

8 articles are up to date

accumulation of multiple studies which makes it stronger than just one source

Weaknesses of the Research

Small sample size

Insurance

Why there's higher modality failure in PD

Caregiver

Selection bias due to retrospective studies

Lack of consistency and limitations

Recommendations for Future Research

larger sample size

Comparing home HD, in center HD, home PD, self PD, assisted PD

Randomized control trials (RCTS) - difficult due to recruitment failure

<https://assignbuster.com/hemodialysis-versus-peritoneal-dialysis-for-chronic-kidney-disease-patients/>

Patient-reported outcomes

More studies on patients who are eligible for both HD and PD so it can reflect the outcome of those who are faced with a choice

Conclusion

Patients with ESRD are faced with choosing between the two main RRT modalities: HD and PD. The debate between which one is better has conflicting results. There are many factors that influence this decision such as daily lifestyle, QOL, and mortality rate. This analysis has no unanimous decision on which maintenance dialysis modality is superior. Therefore, the decision of which RRT to choose should be individualized based on financial and family support, patient preference, and daily lifestyle considerations.

References

- Beathard, G. A. (Feb 3, 2017). UpToDate. Failure of the mature hemodialysis arteriovenous fistula. Retrieved from https://www-uptodate.com.ezproxylocal.library.nova.edu/contents/failure-of-the-mature-hemodialysis-arteriovenous-fistula?topicRef=1984&source=see_link
- Beladi Mousavi, S. S., Hayati, F., Valavi, E., Rekabi, F., & Beladi Mousavi, M. (Mar, 2015). Comparison of Survival in Patients with End-Stage Renal Disease Receiving Hemodialysis versus Peritoneal Dialysis. *Saudi J Kidney Dis Transpl* 2015 . 26(2): 392-397. Retrieved from <http://doi:10.4103/1319-2442.152559>
- Levey, A. S., Inker, L. A. (Nov 16, 2018). UpToDate. Definition and staging of chronic kidney disease in adults. Retrieved from <https://assignbuster.com/hemodialysis-versus-peritoneal-dialysis-for-chronic-kidney-disease-patients/>

https://www.uptodate.com/contents/definition-and-staging-of-chronic-kidney-disease-in-adults?topicRef=7172&source=see_link#H27258226

- Mailloux, L. U., Burkart, J. M. (2017, October 02). Dialysis modality and patient outcome. *UpToDate*. Retrieved from https://www.uptodate.com/contents/dialysis-modality-and-patient-outcome?search=peritoneal%20vs%20hemodialysis&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1
- Mann, J. F. (Mar 07, 2018). Overview of hypertension in acute and chronic kidney disease. *UpToDate*. Retrieved from https://www.uptodate.com/contents/overview-of-hypertension-in-acute-and-chronic-kidney-disease?search=ckd%20hypertension&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1#H4
- Oliver, M. J., Al-Jaishi, A. A., Dixon, S. N., Perl, J., Lavoie, S. D., Nash, D. M., Paterson, J. M., Lok, C. E., & Quinn, R. R. (Jul 27, 2016). Hospitalization Rates for Patients on Assisted Peritoneal Dialysis Compared with In-Center Hemodialysis. *Clin J Am Soc Nephrol*. 11(9): 1606-1614. Retrieved from <http://doi.10.2215/CJN.10130915>
- O'Neill, C. W. (Feb 07, 2018). Radiologic assessment of renal disease. *UpToDate*. Retrieved from https://www.uptodate.com/contents/radiologic-assessment-of-renal-disease?topicRef=16406&source=see_link#H3
- Rosenberg, M. (Jun 29, 2018). Overview of the management of chronic kidney disease in adults. *UpToDate*. Retrieved from https://www.uptodate.com/contents/overview-of-the-management-of-chronic-kidney-disease-in-adults?topicRef=16406&source=see_link#H3

<https://assignbuster.com/hemodialysis-versus-peritoneal-dialysis-for-chronic-kidney-disease-patients/>

uptodate. com/contents/overview-of-the-management-of-chronic-kidney-disease-in-adults? search= chronic%20kidney%20disease&source= search_result&selectedTitle= 1~150&usage_type= default&display_rank= 1#H39

- Selby, N. M. & Kazmi, I. (Oct 23, 2018). Peritoneal dialysis has optimal intradialytic hemodynamics and preserves residual renal function: Why isn't it better than hemodialysis? *Seminars in Dialysis* . 0(0). Retrieved from <http://doi. 10. 1111/sdi. 12752>
- Suri, R. S., Li, L., & Nesrallah, G. E. (2015). The risk of hospitalization and modality failure with home dialysis. *Kidney International* , 88 (2), 360-368. Retrieved from <http://doi. org/10. 1038/ki. 2015. 68>
- Yang, F., Khin, L.-W., Lau, T., Chua, H.-R., Vathsala, A., Lee, E., & Luo, N. (2015). Hemodialysis versus Peritoneal Dialysis: A Comparison of Survival Outcomes in South-East Asian Patients with End-Stage Renal Disease. *PLoS ONE* , 10 (10), e0140195. Retrieved from <http://doi. org/10. 1371/journal. pone. 0140195>