

Review Article

Dialysis in Guam: An Overview for the Underserved Island

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Abstract

Dialysis is a critical life-saving treatment for individuals with end-stage renal disease (ESRD), a condition where the kidneys can no longer function effectively. In Guam, a U.S. territory in the Pacific Ocean with a population of approximately 170,000, the provision of dialysis services faces significant challenges due to the island's unique healthcare landscape. This review provides a comprehensive analysis of dialysis in Guam, focusing on the epidemiology of chronic kidney disease (CKD) and ESRD, the current state of dialysis services, and the challenges faced by patients and healthcare providers. The prevalence of CKD and ESRD in Guam is higher than the U.S. national average, particularly among the native Chamorro population and other Pacific Islanders. Risk factors such as diabetes, hypertension, obesity, and limited access to healthcare contribute to the high burden of kidney disease. Dialysis services on the island are provided through a limited number of facilities, including private dialysis centers and multiple acute care hospitals, but capacity constraints, long wait times, and workforce shortages hinder access to care. Patients often face logistical, financial, and emotional challenges, exacerbated by Guam's geographic isolation and the high cost of treatment. To address these issues, this review proposes strategies such as expanding dialysis capacity, enhancing workforce development, and improving financial access to care. Investments in home dialysis programs, training for healthcare professionals, and policy reforms to increase insurance coverage are essential to meet the growing demand for dialysis services. By addressing these challenges, Guam can improve the quality of life for individuals with ESRD and reduce the burden on its healthcare system. This review underscores the urgent need for targeted interventions and long-term investments to ensure equitable access to dialysis care for the people of Guam.

Keywords

End-stage Renal Disease, ESRD, Chronic Kidney Disease, CKD, Dialysis, Hemodialysis, Guam, Underserved

1. Introduction

Dialysis is a life-saving treatment for individuals with end-stage renal disease (ESRD), a condition where the kidneys can no longer perform their vital functions of filtering waste and maintaining fluid balance in the body [1]. For the residents of Guam, a small U.S. territory located in the Pacific Ocean, the availability and access to dialysis services is a critical concern due to the island's unique healthcare challenges. With a population of approximately 170,000, Guam

faces specific issues in providing sufficient healthcare services, and dialysis is one of the many areas where access is limited. This review article aims to provide a comprehensive understanding of dialysis in Guam, including the epidemiology of renal disease, the challenges faced in delivering dialysis services, the available treatment options, and the future of renal care in the territory. It will also discuss the various factors that impact the effectiveness of dialysis treatment in

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Guam and the strategies being employed to improve care for individuals with chronic kidney disease (CKD) and ESRD.

2. Epidemiology of CKD and ESRD in Guam

CKD and its progression to ESRD is a growing concern for healthcare professionals worldwide, including in Guam. More than 1 in 7 American adults, about 35.5 million people, or 14%, are estimated to have CKD [2], and more than 808,000 Americans have ESRD. The Department of Public Health in Guam does not provide the updated data on the size of the population in Guam that have ESRD since 2017, but the current prevalence of CKD and ESRD in Guam is expected to be higher than the national average in the United States as the ESRD prevalence was already at 14.3% then [3], while the incidence of ESRD is expected to increase over time like in other places [4], and it is disproportionately prevalent in certain ethnic groups, particularly among the island's native Chamorro population and other Pacific Islanders [5]. The lack of renal transplantation service on the island prevents most patients from receiving kidney transplantation, which is the curative treatment for ESRD. As a result, most patients with ESRD would require dialysis to stay alive.

2.1. Prevalence and Risk Factors

CKD is often associated with conditions like diabetes and hypertension [6], both of which are highly prevalent in Guam. The Chamorro population, which makes up 37.3% of the island's residents, has a high genetic predisposition to diabetes, which, when poorly managed, can lead to kidney damage. Hypertension is also a major risk factor for CKD and ESRD and is common among the adult population of Guam. The higher incidence of CKD and ESRD in Guam is compounded by a variety of socioeconomic factors. Limited access to healthcare services, lack of awareness about the disease, and cultural factors contribute to the higher rates of kidney disease [7]. Additionally, obesity, a prevalent issue in the Pacific Islands, is another major contributing factor to the rise of diabetes and hypertension, further increasing the risk of renal disease [8]. As there are no preventive measures or programs implemented in Guam due to lack of financial resources from the local government to prevent the occurrence of CKD and ESRD, it is now mainly dependent on the healthcare providers to aggressively control hypertension and diabetes, which is by no means as effective as primary prevention. There is no pre-dialysis clinic in Guam where the general practitioners simply refer the patients of CKD stage 4 and above to the nephrologist for preparation of dialysis, and we do not foresee this as a possibility given the lack of financial resources from the Department of Public Health.

2.2. Impact on the Population

The high prevalence of kidney disease has placed a significant burden on the healthcare system in Guam. According to a report from the Guam Department of Public Health and Social Services, kidney disease and diabetes together account for a substantial number of hospitalizations and deaths on the island [7]. This burden is expected to increase as the population ages, and the incidence of diabetes and hypertension continues to rise. The need for dialysis treatment, therefore, is critical, as dialysis is the primary treatment option for individuals who progress to ESRD. However, providing adequate dialysis services has proven to be a complex challenge for the healthcare infrastructure of Guam.

3. Dialysis Services in Guam

Guam has several facilities that provide dialysis treatment, both for in-center hemodialysis and peritoneal dialysis. More than 95% of the islanders receive hemodialysis rather than peritoneal dialysis for it is preferably recommended by the head physician of the local nephrology group for unclear reasons. As there is no availability of vascular surgeons on island, almost all arteriovenous fistulas for hemodialysis are created by general surgeons. When there is a delay in fistula creation, the patients would need to rely on dialysis catheters for hemodialysis for months. However, the number of dialysis centers available and the capacity of these centers are limited, resulting in challenges related to access, treatment scheduling, and the quality of care for patients with ESRD [9].

3.1. Dialysis Facilities and Centers

There are 19 hemodialysis units on the island, operated by two private corporations, Guam Dialysis Center and Fresenius Dialysis Center. Each dialysis unit is equipped with only 2-4 dialysis machines. Guam Dialysis Center, the larger provider in the region, covering more than 90% of the patients with ESRD [10], while Fresenius dialysis center is the smaller one with fewer units. These centers provide both in-center hemodialysis, which requires patients to visit the clinic multiple times a week, and peritoneal dialysis, a home-based treatment option. Meanwhile, Guam Memorial Hospital (GMH), the island's public hospital, as well as the Guam Regional Medical City (GRMC), the island's only private hospital, also offer dialysis services to the local population who need emergency dialysis in the hospital [11], but the availability of dialysis services on the island is still overall strained, and patients often face long wait times to begin treatment. There is a significant gap between the demand for dialysis and the available capacity, which has led to a backlog of patients needing regular dialysis treatment.

3.2. Types of Dialysis Treatments

There are two main types of dialysis treatments available in Guam: hemodialysis and peritoneal dialysis. Hemodialysis is the most common form of dialysis used in Guam, where patients visit a dialysis center multiple times a week for treatment. During hemodialysis, blood is drawn out of the body, filtered through a dialysis machine, and then returned to the body. This process helps to remove waste, excess fluid, and electrolytes that build up in the blood when the kidneys are no longer functioning properly [12]. Peritoneal dialysis is an alternative method in which the lining of the abdominal cavity and the peritoneum are used as the natural filters [13]. This treatment can be performed at home, offering more flexibility for patients. However, peritoneal dialysis requires significant training and commitment from patients and their families, and it is not suitable for everyone.

3.3. Capacity Issues and Access to Dialysis

One of the most significant challenges faced by dialysis patients in Guam is the limited availability of dialysis centers and the high demand for treatment [14]. Most patients go to the dialysis center by their own vehicles or walking as there is no viable public transportation unless they are qualified for disability. Many patients must travel long distances to access dialysis centers, and wait times for treatment slots can be long, especially in the public sector. Additionally, the limited number of trained healthcare professionals who specialize in renal care, such as nephrologists and dialysis nurses, further exacerbates the strain on the system. There is only one nephrology specialist group composed of five nephrologists for the whole population in Guam. Most of the dialysis nurses are travelers from the Philippines as the relatively low salary prevents most local nurses from entering this job. Due to the high demand and limited resources, patients often experience delays in accessing dialysis services, which can have serious health consequences. For individuals with ESRD, missing even one dialysis session can lead to life-threatening complications, including fluid overload, electrolyte imbalances, and increased risk of cardiovascular events [15].

4. Challenges Faced by Dialysis Patients

The dialysis patients in Guam face a multitude of challenges, ranging from logistical and financial issues to medical and emotional difficulties. The combination of these factors makes the overall experience of receiving dialysis treatment in Guam more difficult than it might be in larger, more well-resourced healthcare systems.

4.1. Geographical Isolation

Guam's geographic isolation is a major challenge in providing healthcare services, including dialysis. Located

3,700 miles from Hawaii, residents often need to travel long distances for specialist care or advanced medical treatments not available on the island. For dialysis patients, the situation is particularly dire as they require frequent and ongoing treatment, often multiple times a week. The lack of immediate access to transplant centers or advanced medical resources means that patients in Guam must often seek medical treatment off-island, which adds a financial and logistical burden to their already challenging healthcare situation [16].

4.2. Financial Constraints

For many residents of Guam, the cost of dialysis treatment can be prohibitive. While Medicaid and Medicare programs provide coverage for individuals with ESRD, the reimbursement rates for dialysis services in Guam are lower than those on the U.S. mainland, according to the local nephrology group. As a result, patients often face higher out-of-pocket expenses for their care. Furthermore, the limited number of private insurance options in Guam and the high rates of underinsurance exacerbate financial access to healthcare. The high costs of dialysis, combined with limited financial resources, mean that many patients must make difficult decisions about whether to continue with treatment or prioritize other basic needs. This financial strain may lead to non-compliance with treatment schedules, which can further worsen patient outcomes.

4.3. Healthcare Workforce Shortages

Another challenge for dialysis patients in Guam is the shortage of healthcare professionals specializing in renal care [17]. The island struggles to attract and retain nephrologists, dialysis nurses, and other medical staff with expertise in the management of ESRD. This shortage means that existing healthcare workers are often overburdened and unable to provide the level of care that is necessary for optimal dialysis treatment. The shortage of trained professionals also leads to delays in treatment and a reduced ability to provide individualized care for dialysis patients. This is particularly problematic for individuals with complex medical histories who require specialized attention and monitoring.

5. Strategies for Improving Dialysis Care in Guam

Addressing the challenges faced by dialysis patients in Guam will require a multi-faceted approach, incorporating both short-term solutions and long-term investments in healthcare infrastructure.

5.1. Expanding Dialysis Capacity

One of the most urgent needs in Guam is the expansion of

dialysis capacity. This could involve building additional dialysis centers, increasing the number of dialysis machines available, and improving the facilities at existing centers. The government, along with private sector partners, could invest in expanding dialysis infrastructure to meet the growing demand for treatment. Additionally, the establishment of more home dialysis programs [16], such as peritoneal dialysis, could help reduce the burden on in-center facilities. This would require training patients and their families, as well as providing the necessary support services to ensure that home dialysis can be safely administered.

5.2. Enhancing Workforce Development

Investing in workforce development is essential to improving dialysis care in Guam. This includes recruiting and training more nephrologists, dialysis nurses, and technicians to ensure that patients receive timely and high-quality care. Offering incentives such as loan repayment programs, competitive salaries, and professional development opportunities could help attract skilled professionals to work in Guam.

5.3. Improving Financial Access to Care

To improve financial access to dialysis treatment, policymakers should explore ways to enhance insurance coverage for dialysis patients in Guam. This could involve expanding Medicaid eligibility, increasing reimbursement rates for dialysis providers, and working with insurance companies to provide more affordable coverage for kidney disease patients.

6. Conclusions

Dialysis care in Guam remains a critical challenge in the healthcare system due to the increasing prevalence of CKD and ESRD, compounded by the island's unique geographical, financial, and workforce limitations. The island's healthcare infrastructure faces significant strain as the demand for dialysis services continues to grow, largely driven by the high rates of diabetes, hypertension, and obesity prevalent in Guam's population. While there are dialysis facilities on the island, the limited capacity of these centers, the scarcity of trained healthcare professionals, and the financial barriers to care present substantial obstacles for patients needing ongoing treatment.

The geographical isolation of Guam further exacerbates these issues, as patients often face long travel distances for specialized care and must seek medical treatments off-island, adding financial and logistical burdens. Furthermore, despite Medicaid and Medicare coverage, many patients in Guam experience difficulties accessing affordable care due to underinsurance and high out-of-pocket costs. The shortage of

nephrologists, dialysis nurses, and other renal specialists contributes to longer wait times, reduced quality of care, and unmet medical needs for dialysis patients. Addressing these challenges requires a multi-pronged approach. Immediate steps should focus on expanding dialysis capacity, enhancing workforce development, and improving financial access to care. This could involve building additional dialysis centers, investing in home dialysis options, and offering incentives to attract and retain healthcare professionals specializing in renal care. Moreover, policymakers should explore options for improving insurance coverage and reimbursement rates to ensure that more residents of Guam can access affordable dialysis treatment without sacrificing their financial stability.

Ultimately, improving dialysis care in Guam will not only reduce the burden on individuals with ESRD but also enhance the overall health outcomes of the population. By addressing the healthcare infrastructure gaps, expanding workforce resources, and ensuring financial accessibility, Guam can better meet the needs of its residents and improve the quality of life for those affected by chronic kidney disease. The path forward involves collaborative efforts between the government, healthcare providers, and the community to build a more sustainable and equitable healthcare system for dialysis patients on the island.

Abbreviations

CKD	Chronic Kidney Disease
ESRD	End Stage Renal Disease
GMH	Guam Memorial Hospital
GRMC	Guam Regional Medical City

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Conflicts of Interest

The author declares no conflicts of interest.

References

- [1] Shin SJ, Lee JH. (2018). Hemodialysis as a life-sustaining treatment at the end of life. *Kidney Res Clin Pract.* 37(2): 112-118. <https://doi.org/10.23876/j.krcp.2018.37.2.112>
- [2] Centers for Disease Control and Prevention. (2023). Chronic Kidney Disease in the United States, 2023. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention; 2023.
- [3] GBD Chronic Kidney Disease Collaboration (2020). Global, regional, and national burden of chronic kidney disease, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet* (London, England), 395(10225), 709-733. [https://doi.org/10.1016/S0140-6736\(20\)30045-3](https://doi.org/10.1016/S0140-6736(20)30045-3)
- [4] Thurlow, J. S., Joshi, M., Yan, G., et al. (2021). Global Epidemiology of End-Stage Kidney Disease and Disparities in Kidney Replacement Therapy. *American journal of nephrology*, 52(2), 98-107. <https://doi.org/10.1159/000514550>
- [5] United States Renal Data System (USRDS). (2023). Annual Data Report: Epidemiology of Kidney Disease in the United States. National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases.
- [6] Erfanpoor S, Etemad K, Kazempour S, et al. (2020). Diabetes, Hypertension, and Incidence of Chronic Kidney Disease: Is There any Multiplicative or Additive Interaction? *Int J Endocrinol Metab*, 2; 19(1): e101061. <https://doi.org/10.5812/ijem.101061>
- [7] Guam Department of Public Health and Social Services. (2023). Chronic Disease Burden in Guam: A Report on Diabetes, Hypertension, and Kidney Disease.
- [8] World Health Organization (WHO). (2023). Global Health Observatory Data Repository: Diabetes and Kidney Disease in the Western Pacific Region.
- [9] Niu J, Saeed MK, Winkelmayer WC, Erickson KF. (2021). Patient Health Outcomes following Dialysis Facility Closures in the United States. *J Am Soc Nephrol*, 32(10): 2613-2621. <https://doi.org/10.1681/ASN.2021020244>
- [10] Fresenius Kidney Care. (2023). Dialysis Services in Guam: Challenges and Opportunities.
- [11] Guam Regional Medical City (GRMC). (2023). Annual Report on Dialysis Care and Patient Outcomes.
- [12] Murdeshwar HN, Anjum F. Hemodialysis. (2023). In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan.
- [13] Andreoli MCC, Totoli C. Peritoneal Dialysis. (2020). *Rev Assoc Med Bras* (1992). 66Suppl 1(Suppl 1): s37-s44. <https://doi.org/10.1590/1806-9282.66.S1.37>
- [14] Cohen DE, Gray KS, Colson C, et al. (2019). Impact of Rescheduling a Missed Hemodialysis Treatment on Clinical Outcomes. *Kidney Med.* 2019 Dec 11; 2(1): 12-19. <https://doi.org/10.1016/j.xkme.2019.10.007>
- [15] Centers for Disease Control and Prevention (CDC). (2023). Chronic Kidney Disease Surveillance System: Data on ESRD in U.S. Territories.
- [16] Pacific Islands Health Officers Association (PIHOA). (2023). Health Workforce Shortages in the Pacific: Strategies for Recruitment and Retention.
- [17] American Society of Nephrology (ASN). (2023). Innovations in Dialysis Technology: Wearable Artificial Kidneys and Remote Monitoring Systems.