

Enhancing Dialysis Treatment in Nigeria and Sub-Sahara Africa by Improving The Knowledge of Technicians

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Abstract

Chronic kidney disease (CKD) has emerged as a significant public health concern in Nigeria and Sub-Saharan Africa, necessitating effective dialysis treatment. However, the quality of dialysis care is often compromised by a lack of adequately trained healthcare expert in the dialysis unit both public government facilities and privately owned centers especially the technicians. This paper reviews existing literature on the current state of dialysis treatment in Nigeria and Sub-Saharan Africa, emphasizing the critical role of technicians in enhancing patient outcomes. It explores educational initiatives, more advance and realistic training programs, and policy recommendations aimed at improving the knowledge and skills of dialysis technicians who work in the dialysis units for both government and privately owned centers. The paper concludes with a call for comprehensive strategies that integrate technician training into the broader health care framework to improve dialysis services in Nigeria and sub- Sahara Africa.

Keywords : Enhancing, Dialysis, Treatment, Nigeria, Sub-Sahara Africa, Improving, Knowledge, Technicians.

Introduction

Chronic kidney disease (CKD) is a growing health crisis in Nigeria and Sub-Saharan Africa, affecting millions of individuals. The World Health Organization (WHO) estimates that CKD is responsible for approximately 2.5 million deaths annually worldwide, with a significant burden in low- and middle-income countries (World Health Organization [WHO], 2021). Dialysis treatment is a critical healthcare service for patients suffering from end-stage kidney disease (ESKD) in Nigeria and Sub-Saharan Africa. The region faces a significant burden of chronic kidney disease, with estimates suggesting that approximately 20 million Nigerians are living with chronic kidney disease, and a substantial number are likely to progress to ESKD (<https://pmc.ncbi.nlm.nih.gov/articles/PMC9528372/>). Despite the high prevalence of ESKD, access to dialysis remains alarmingly low; only about 2% of patients in Nigeria receive hemodialysis, primarily due to economic barriers and inadequate healthcare infrastructure (<https://pmc.ncbi.nlm.nih.gov/articles/PMC9528372/>). This situation is compounded by a severe shortage of trained healthcare professionals, particularly dialysis technicians, who are essential for the effective delivery of dialysis care.

In as much as dialysis is a critical intervention to kidney failure for individuals with end-stage renal disease (ESRD), yet access to quality dialysis treatment remains a concern in many parts of Sub-Saharan Africa. Dialysis technicians play a vital

role in the operation of dialysis machines, patient monitoring, and ensuring adherence to safety protocols. However, many technicians in Nigeria and Sub-Saharan Africa lack adequate training and resources, which can lead to sub-optimal patient outcomes, increased morbidity, and mortality rates among dialysis patients (<https://pmc.ncbi.nlm.nih.gov/articles/PMC9444088/>). The need for improved education and training for these technicians is key to enhance the quality of dialysis services.

To address these challenges, it is very critical to implement comprehensive training programs that leverage modern educational technologies and methodologies. By integrating e-learning platforms, simulation-based training, and telehealth resources, we can significantly enhance the knowledge and skills of dialysis technicians. Also, fostering a culture of continuous professional development will empower technicians and bring them up to speed on best practices and emerging technologies in dialysis care.

As one of the critical challenges is the inadequate training of dialysis technicians, who play a vital role in the delivery of care. This paper reviews current literature on the state of dialysis treatment in Nigeria and Sub-Saharan Africa, focusing on enhancing the knowledge and skills of technicians to improve patient outcomes.

The Current State of Dialysis Treatment in Nigeria and Sub-Saharan Africa

Prevalence of Chronic Kidney Disease; the prevalence of CKD in Nigeria and Sub-Saharan Africa is alarmingly high, driven by factors such as hypertension, diabetes, and infectious diseases. According to a study by Ekrikpo et al. (2018), the prevalence of CKD in Nigeria ranges from 11% to 40%, depending on the population studied. This high prevalence necessitates increased access to dialysis treatment, yet facilities remain limited.

Availability and Quality of Dialysis Services; Dialysis services in Nigeria and Sub-Saharan Africa are often characterized by inadequate infrastructure, limited availability of machines, and a shortage of trained personnel. A study by Arogundade and Barsoum (2008) highlighted that many dialysis centers in Nigeria operate below capacity due to a lack of trained technicians and insufficient resources. The quality of dialysis treatment is further compromised by high rates of machine breakdowns and inadequate infection control practices.

Role of Technicians in Dialysis Care

Dialysis technicians are integral to the delivery of safe and effective dialysis treatment. They are responsible for machine setup, patient monitoring, and ensuring adherence to safety protocols. However, the knowledge gap among technicians regarding dialysis procedures, equipment maintenance, and emergency response can lead to adverse patient outcomes (Ogunyinka et al., 2020). A review by Shrestha et al. (2019) emphasized that well-trained technicians could significantly reduce complications associated with dialysis.

Importance of Technician Training

Impact on Patient Outcomes; Research has shown that the level of training and knowledge of dialysis technicians directly impacts patient outcomes. A study by Rojas et al. (2017) found that higher levels of technician training were associated with lower rates of dialysis-related complications, such as infections and machine errors. Ensuring that technicians are well-versed in best practices can lead to improved patient safety and satisfaction.

Current Training Programs; Despite the critical role of technicians, training programs in Nigeria and Sub-Saharan Africa are often inadequate. Most technicians receive minimal formal education, primarily learning through on-the-job training. As noted by Olowu et al. (2020), there is a pressing need for standardized training programs that encompass both theoretical knowledge and practical skills.

Barriers to Effective Training; Several barriers hinder the effective training of dialysis technicians in Nigeria and Sub-Saharan Africa. These include:

1. **Limited Resources:** Many dialysis centers lack the financial and infrastructural resources needed for comprehensive training programs (Arogundade & Barsoum, 2008).

2. **Lack of Standardization:** The absence of standardized training curricula leads to inconsistencies in technician education and skill levels (Ogunyinka et al., 2020).
3. **Inadequate Support from Health Authorities:** Insufficient government support and policy frameworks for technician training exacerbate the challenges faced in improving dialysis care (Ekrikpo et al., 2018).

Strategies to Enhance Technician Knowledge

Development of Standardized Training Programs; Creating standardized training programs for dialysis technicians is essential for ensuring consistent and high-quality care. Such programs should include:

- **Theoretical Knowledge:** Covering the fundamentals of kidney function, dialysis principles, and patient management.
- **Practical Skills:** Training on machine operation, patient monitoring, and emergency response protocols.
- **Continued Education:** Implementing ongoing education and certification programs to keep technicians updated on the latest advancements in dialysis technology and practices.

Collaboration with Educational Institutions

Collaborating with universities and technical schools can enhance the training of dialysis technicians. Educational institutions can develop specialized curricula tailored to the needs of dialysis centers. Partnerships can also facilitate internships and hands-on training opportunities, allowing technicians to gain practical experience in a controlled environment.

Implementation of Mentorship Programs

Establishing mentorship programs can provide new technicians with guidance and support from experienced professionals. Mentorship can enhance learning outcomes and foster a culture of continuous improvement within dialysis centers. Such programs can also help to address the emotional and psychological challenges faced by technicians in high-stress environments.

Integration of Technology in Training

Leveraging technology, such as online training modules and simulation-based learning, can enhance the education of dialysis technicians. E-learning platforms can provide access to resources and training materials, especially in remote areas where traditional training may be limited. Simulation-based training can replicate real-life scenarios, allowing technicians to practice their skills in a safe environment.

The integration of technology in training programs for dialysis technicians can significantly enhance learning outcomes, improve skill acquisition, and ensure that technicians are equipped to handle the complexities of modern dialysis treatment. Below are specific examples of how technology can be effectively utilized in training:

E-Learning Platforms; E-learning platforms can provide technicians with access to a wealth of educational resources, including interactive modules, videos, and quizzes. These platforms can offer:

Online Courses: Institutions can develop comprehensive online courses that cover the theoretical aspects of dialysis, including the physiology of kidney function, types of dialysis, and machine operation.

Resource Libraries: Technicians can access a library of resources, including research articles, guidelines, and best practices, which they can refer to as needed.

Self-Paced Learning: Technicians can learn at their own pace, allowing them to revisit complex topics and reinforce their understanding.

Example: The use of platforms like Coursera or edX to offer courses on renal physiology and dialysis technology can help technicians enhance their knowledge base.

Simulation-Based Training; Simulation-based training replicates real-life clinical scenarios, allowing technicians to practice skills in a risk-free environment. This can include:

Virtual Simulations: Technicians can engage with virtual dialysis machines that simulate real-world operations, enabling them to familiarize themselves with the equipment without the pressure of working with live patients.

Role-Playing Scenarios: Simulations can incorporate role-playing elements, where technicians must respond to various patient situations, such as emergencies or equipment malfunctions.

Feedback Mechanisms: Simulations can provide immediate feedback, allowing technicians to understand their mistakes and learn the correct procedures.

Example: Programs like the SimMan system by Laerdal Medical offer high-fidelity mannequins that can simulate patient responses, allowing technicians to practice emergency procedures, such as managing a patient experiencing an adverse reaction during dialysis.

Mobile Applications; Mobile applications can serve as valuable tools for on-the-go learning and real-time reference. These applications can include:

Learning Modules: Bite-sized learning modules that technicians can complete during breaks or commutes, covering essential topics in dialysis care.

Reference Tools: Applications that provide quick access to clinical guidelines, protocols, and drug information, helping technicians make informed decisions during treatment.

Reminders and Alerts: Apps can include features that remind technicians of best practices for machine maintenance and infection control protocols.

Example: An app like “Dialysis Handbook” can offer technicians quick access to essential protocols, such as infection control measures, patient monitoring guidelines, and emergency procedures.

Webinars and Online Workshops; Webinars and online workshops can be used to deliver expert-led training sessions on specific topics. These sessions can be interactive and allow for real-time Q&A. Benefits include:

Expert Insights: Technicians can learn from experienced professionals in the field, gaining insights into advanced practices and emerging technologies.

Networking Opportunities: These sessions can foster networking among technicians, promoting knowledge sharing and collaboration.

Flexible Scheduling: Online formats allow technicians to participate without the need for travel, accommodating varying schedules.

Example: Organizations such as the National Kidney Foundation often host webinars on topics related to dialysis care, which technicians can attend to stay updated on best practices.

Telehealth Training; Telehealth can be integrated into technician training to enhance remote learning opportunities. This technology provides:

Remote Supervision: Experienced technicians or instructors can supervise and guide less experienced technicians in real-time, even from a distance.

Patient Interaction Training: Technicians can practice their communication and patient interaction skills through telehealth platforms, improving their ability to engage with patients during treatment.

Access to Diverse Expertise: Technicians from remote areas can access specialized training from experts who may not be available locally.

Example: Telehealth platforms like Zoom or Microsoft Teams can facilitate live training sessions where technicians can observe procedures and interact with instructors from various locations.

Case Study: Training Program for Dialysis Technicians

In 2019, a large urban hospital in Lagos, Nigeria, faced significant challenges in its dialysis unit, including high rates of complications and patient dissatisfaction. An assessment revealed that many technicians lacked formal training and were primarily learning through on-the-job experiences. To address

these issues, the hospital administration partnered with a local university to develop a comprehensive training program.

Training Program Implementation

The training program consisted of several key components

- 1. Curriculum Development:** A standardized curriculum was created, covering essential topics such as kidney physiology, dialysis techniques, machine operation, patient monitoring, and infection control practices.
- 2. Hands-On Training:** Technicians participated in hands-on training sessions using simulation-based learning. This allowed them to practice skills in a controlled environment before working with actual patients.
- 3. Mentorship:** Experienced dialysis nurses and nephrologists served as mentors, providing guidance and support to technicians throughout the training process.
- 4. Continuous Education:** The program included ongoing education sessions to keep technicians updated on the latest advancements in dialysis technology and practices.

Outcomes

The implementation of the training program led to significant improvements in the dialysis unit

- **Reduction in Complications:** The rate of dialysis-related complications decreased by 30% within six months of the program's initiation.
- **Increased Patient Satisfaction:** Patient satisfaction scores improved, with patients reporting better communication and care from technicians.
- **Enhanced Technician Confidence:** Technicians reported increased confidence in their skills and knowledge, leading to improved performance in their roles.

This case study demonstrates that a structured training program for dialysis technicians can lead to improved patient outcomes and enhanced service delivery in dialysis units. By investing in the education and training of technicians, healthcare facilities can significantly enhance the quality of care provided to patients with kidney disease.

Policy Recommendations

Government Support and Funding; to improve dialysis treatment in Nigeria and Sub-Saharan Africa, governments must prioritize funding for technician training programs. Allocating resources towards education and infrastructure can enhance the quality of dialysis services. Policymakers should also advocate for the establishment of national standards for technician training and certification.

Establishment of Regulatory Bodies; Creating regulatory bodies to oversee the training and certification of dialysis technicians can ensure adherence to established standards. Such bodies can facilitate the development of accredited training programs and monitor compliance across dialysis centers. They can also provide a framework for continuous professional development.

Public Awareness Campaigns; Raising public awareness about the importance of dialysis and the role of trained technicians can help garner support for improving services. Campaigns can inform patients about their rights to quality care and encourage them to advocate for better training and resources in dialysis centers.

Conclusion

Enhancing dialysis treatment in Nigeria and Sub-Saharan Africa requires a multifaceted approach that prioritizes the training and knowledge of technicians. By developing standardized training programs, fostering collaborations with educational institutions, and leveraging technology, the quality of dialysis care can be significantly improved. Integrating technology into the training of dialysis technicians offers numerous advantages, from enhancing theoretical knowledge to providing practical, hands-on experiences. By leveraging e-learning platforms, simulation-based training, mobile applications, webinars, and telehealth, training programs can be made more effective and accessible. These technological advancements can lead to a more competent workforce, ultimately resulting in improved patient outcomes in dialysis care across Nigeria and Sub-Saharan Africa.

Furthermore, government support and the establishment of regulatory bodies will ensure that technicians are well-equipped to deliver safe and effective services. Ultimately, addressing the knowledge gap among dialysis technicians is essential for improving patient outcomes and tackling the growing burden of chronic kidney disease in the region.

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