



Advancements in Peritoneal Dialysis: Overcoming Challenges in Low-Resource Settings

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INTRODUCTION

Peritoneal Dialysis (PD) is a life-saving renal replacement therapy for patients with End-Stage Kidney Disease (ESKD). Compared to hemodialysis, PD offers several advantages, including lower cost, ease of administration, and reduced dependency on healthcare infrastructure. Despite these benefits, access to PD remains limited in low-resource settings due to financial constraints, inadequate training, and supply chain challenges. Recent advancements in PD technology and innovative healthcare strategies are addressing these barriers, making PD more accessible and effective in resource-limited regions. PD is particularly suited for low-resource environments due to its flexibility and reduced requirement for extensive infrastructure. Unlike hemodialysis, PD does not require vascular access or specialized machines, making it feasible for home-based treatment. The cost-effectiveness of PD also allows healthcare systems to extend dialysis services to underserved populations, improving overall patient outcomes. Despite its potential benefits, several challenges hinder the widespread adoption of PD in low-income regions. Many healthcare professionals and patients lack proper knowledge and training regarding PD, leading to underutilization. Continuous availability of PD fluids, catheters, and sterilized equipment is a persistent issue in low-resource areas. Infections remain a major complication due to inadequate hygiene and improper technique during PD exchanges. The absence of trained nephrologists and dialysis nurses in remote areas further limits PD accessibility.

DESCRIPTION

Several innovations and strategic interventions are improving the accessibility and effectiveness of PD in low-resource settings. Local manufacturing of PD fluids has been initiated in several countries to reduce dependency on costly imports. Reusable PD systems with appropriate sterilization protocols are being explored to lower costs. Mobile Health (mHealth) applications and telemedicine platforms are now being used to provide remote

training and support for PD patients and caregivers. Community-based education programs are improving PD adoption rates by equipping local healthcare workers with essential skills. Development of low-cost antiseptic solutions and better catheter insertion techniques has reduced peritonitis rates. Pre-packaged PD exchange kits with built-in sterilization protocols help minimize contamination risks. AI-driven algorithms and mobile applications allow remote monitoring of PD patients, enabling early detection of complications. Cloud-based electronic health records help physicians track patient progress without requiring frequent hospital visits. Automated peritoneal dialysis with low-cost battery-operated cyclers is being tested to improve efficiency in areas with limited electricity. Hybrid dialysis models combining PD with intermittent in-center dialysis provide better flexibility for patients. To enhance PD accessibility in low-resource settings, governments and healthcare organizations must prioritize. Subsidizing PD supplies and ensuring uninterrupted availability. Expanding community-based PD training initiatives. Strengthening telemedicine infrastructure for remote patient support. Encouraging public-private partnerships to develop cost-effective PD technologies.

CONCLUSION

Advancements in PD technology and innovative healthcare strategies are helping overcome significant challenges in low-resource settings. By addressing supply chain limitations, enhancing infection control, and leveraging digital health solutions, PD can become a more viable option for patients with ESKD worldwide. Future efforts should focus on sustainable solutions and policy interventions to ensure equitable access to PD for all patients, regardless of their geographic and economic circumstances. Despite its potential benefits, several challenges hinder the widespread adoption of PD in low-income regions. Many healthcare professionals and patients lack proper knowledge and training regarding PD, leading to underutilization. Continuous availability

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CONFLICT OF INTEREST

The author declares there is no conflict of interest in publishing this article.

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