EXAFLUENCE
Data Driven Influence

Transforming Renal Care: Revolutionizing Home Dialysis with AI-Powered Solutions - Part 2

Kumaravel Chidamparam
June 2024

In part 1 of the blog series we discussed the current status of renal care, recent advancements, and how AI can help overcome the barriers to home adoption of renal care.

Part 1

This blog is part 2 of the two-part series, In this part, we discuss the following

1. Analytical framework that can help home dialysis adoption
2. How can home dialysis be implemented and monitored in a structured manner
3. The future of home dialysis across the world.
4. Key Takeaways on how AI can enable home dialysis.

Can you elaborate on the analytical framework, specifically the factors that are critical for home dialysis adoption?

1. Patient-Centric Factors

Understanding what drives a patient's decision for home versus center-based dialysis involves considering several factors:

- **Availability and Access:** Ensuring that patients have access to home dialysis equipment and supplies is crucial. This includes addressing logistical challenges and providing support for home setup.
- **Education and Training:** Comprehensive education and training programs for patients and caregivers are essential. These programs should cover the technical aspects of dialysis, as well as strategies for managing potential complications.
- **Costs and Financial Support:** Addressing the financial aspects of home dialysis, including reimbursement models and financial assistance programs, can alleviate the economic burden on patients.
- **Monitoring and Support:** Providing robust monitoring and support systems, such as

telehealth services and remote monitoring, can enhance patient confidence and safety.

- **Infrastructure and Socio-Economic Status:** Socio-economic factors, including housing stability and access to transportation, can impact the feasibility of home dialysis. Addressing these issues is essential for expanding home dialysis adoption.
- **Care Support and Preferences:** Understanding patient preferences and involving family members or care partners in the decision-making process can enhance the success of home dialysis programs.

2. Stakeholder Factors

Economic factors that influence home dialysis for various stakeholders include:

- **Training and Education Programs:** Investing in comprehensive training and education programs for healthcare providers can enhance their ability to support home dialysis patients effectively.
- **Infrastructure and Logistical Planning:** Developing robust infrastructure and logistical support systems, such as supply chain management and home delivery services, is essential for ensuring the smooth operation of home dialysis programs.
- **Monitoring Methods and Metrics:** Implementing advanced monitoring methods and metrics, such as wearable devices and remote monitoring systems, can improve patient outcomes and reduce complications.

3. External Factors

Several external factors impact home dialysis initiatives, including:

- **Health System Policies:** Advocating for supportive health system policies and reimbursement models can enhance the adoption of home dialysis. This includes engaging with policymakers and regulatory bodies to address barriers.
- **Cultural Beliefs and Lifestyle Concerns:** Addressing cultural beliefs and lifestyle concerns through targeted education and outreach programs can help to overcome patient hesitations about home dialysis.

How can the home dialysis implementation and monitoring be structured?

Effective implementation and monitoring of home dialysis require a multi-faceted approach. Key aspects include:

1. Patient Evaluation & Assessment Framework

Effective implementation and monitoring of home dialysis require a multi-faceted approach. Key aspects include:

- **Residual Kidney Function Metrics:** Evaluating residual kidney function and risk progression models to determine the appropriate dialysis modality.
- **Home Assessment and Support Evaluation:** Conducting thorough home

assessments to ensure that patients have the necessary infrastructure and support for home dialysis.

- **Education Programs for Patients and Caregivers:** Providing ongoing education and training programs to equip patients and caregivers with the knowledge and skills needed for home dialysis.

2. Metrics and Dimensions

Monitoring key metrics and dimensions is crucial for evaluating the success of home dialysis programs. These include

- **Primary Outcomes:** Tracking primary outcomes such as patient survival rates, technique survival, and time to transplant.
- **Complications:** Monitoring complications, including infection rates and vascular access issues, to ensure timely interventions and improve patient outcomes.
- **Secondary Outcomes:** Evaluating secondary outcomes such as hospitalization trends, cost of hospitalizations, and residual kidney function to assess the overall impact of home dialysis.

3. Strategizing on Home Dialysis Burdens

Addressing the burdens associated with home dialysis is essential for enhancing patient adoption and success. Strategies include:

- **Early Education of Risks and Benefits:** Providing early education about the risks and benefits of home dialysis can help patients make informed decisions and reduce fear and anxiety .
- **Involving Family Members in Discussions:** Involving family members in discussions about home dialysis can enhance support and reduce the burden on care partners.
- **Providing Psychological Support:** Offering psychological support and counseling services can help patients and caregivers manage the emotional and psychological challenges of home dialysis.

What is the future of home dialysis?

The future of home dialysis is bright, with ongoing research and development focused on enhancing patient outcomes and expanding access.

Key areas of innovation include:

- **IoT-Based Monitoring:** The integration of Internet of Things (IoT) technology into home dialysis systems offers significant potential for improving patient outcomes. IoT-based monitoring devices can provide real-time data on patient health, enabling healthcare providers to detect potential issues early and intervene promptly. This technology can also enhance patient adherence to treatment protocols and reduce the risk of complications.

- **Telehealth Support:** Telehealth services are transforming the way healthcare is delivered, offering convenient and accessible support for home dialysis patients. Telehealth platforms can provide remote consultations, education, and monitoring, reducing the need for frequent in-person visits. This technology can also enhance patient engagement and satisfaction, leading to better clinical outcomes.
- **Collaboration with Legislators and Regulators:** Collaborating with legislators and regulators is essential for creating a supportive environment for home dialysis. Healthcare companies are working to advocate for policies and reimbursement models that encourage the adoption of home-based therapies. This includes engaging with policymakers to address barriers and promote the benefits of home dialysis.
- **Continuous Research and Development:** Ongoing research and development efforts are focused on enhancing the efficacy and safety of home dialysis. This includes the development of new dialysis technologies, improved training programs, and innovative support systems. By investing in R&D, healthcare companies can ensure that home dialysis remains a viable and effective option for patients with CKD. For example, Smart Dialysis Machines with AI algorithms integrated into hemodialysis machines can monitor treatment parameters in real-time and adjust settings dynamically to optimize treatment efficacy and patient safety.

What is your final take away message for renal care and dialysis?

The landscape of renal care is undergoing a significant transformation, driven by the adoption of AI-powered solutions and innovative technologies. By addressing the barriers to home dialysis adoption and leveraging advanced analytics, healthcare companies are poised to revolutionize the delivery of renal care. The future of home dialysis is bright, with ongoing research and development efforts focused on enhancing patient outcomes and expanding access. As these innovations continue to evolve, home dialysis will play an increasingly important role in the management of chronic kidney disease, improving the quality of life for millions of patients worldwide.

References

Bikbov, B., Purcell, C. A., Levey, A. S., Smith, M., Abdoli, A., Abebe, M., ... & Adebayo, O. M. (2020). Global, regional, and national burden of chronic kidney disease, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. The Lancet, 395(10225), 709-733.

Thomas, R., Kanso, A., & Sedor, J. R. (2008). Chronic kidney disease and its complications. Primary Care: Clinics in Office Practice, 35(2), 329-344.

Mehrotra, R., Devuyst, O., Davies, S. J., & Johnson, D. W. (2016). The current state of peritoneal dialysis. Journal of the American Society of Nephrology, 27(11), 3238-3252.

Chan, C. T., Wallace, E., Golper, T. A., Glickman, J. D., Leypoldt, J. K., & Firanek, C. (2007). Exploring barriers and potential solutions in home dialysis: an NKF-KDOQI conference outcomes report. American Journal of Kidney Diseases, 49(5), 793-805.

Li, P. K., & Chow, K. M. (2021). Peritoneal dialysis—looking back, looking forward. Nature Reviews Nephrology, 17(3), 180-181.

Agar, J. W., & Schatell, D. (2020). Home hemodialysis: overview of current issues and potential developments. Journal of Clinical Medicine, 9(5), 1401.

Lee, A., Wong, G., & Chua, H. (2018). The impact of dialysis modality on infection risk in end-stage kidney disease: a narrative review. International Journal of Nephrology, 2018.

Walker, R. C., Marshall, M. R., Howard, K., & Morton, R. L. (2014). The economic considerations of patients and caregivers in choice of dialysis modality. Hemodialysis International, 18(2), 287-297.

Zhang, L., & Zhao, M. H. (2021). Time for home dialysis: A position statement from the International Society of Nephrology. Kidney International, 99(2), 274-276.

Allon, M., & Depner, T. A. (2020). Advances in home dialysis. Kidney International Supplements, 10(1), e11-e12.