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## **Integrating Telemedicine in Green Nephrology: Building a Sustainable Big Data and AI Ecosystem for Intelligent Kidney Care**

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Leveraging big data and AI, Big Data Center of China Medial University Hospital has developed a transformative AI tool, Hb Co-Pilot, capable of predicting hemoglobin levels directly at the bedside of hemodialysis (HD) patients. Utilizing a simple cell phone camera to capture images of the dialysis circuit, this deep learning-powered tool instantly determines hemoglobin levels, significantly reducing environmental waste from traditional blood sampling methods such as needles, plastics, and tubes, along with associated transportation impacts. Hb Co-Pilot extends beyond real-time predictions to forecast future hemoglobin levels based on patients' clinical data. This innovation supports personalized optimization of erythropoiesis-stimulating agent (EPO) dosing and iron supplementation strategies, maintaining patient hemoglobin within safe thresholds—effectively serving as a "virtual seat belt" for HD patients. This tool exemplifies the potential of AI in kidney medicine to saving significant carbon foot print, compared to the status quo at the traditional care models, aligning with global sustainability goals. We have also launched the Strong Kidney Initiative (SKI) App, a digital service transforming HD care, currently undergoing a clinical trial to evaluate its effectiveness in minimizing the admission rate of HD patients. SKI consolidates patients' longitudinal data and fosters a digital community, enhancing engagement and support among HD patients. With the addition of a generative AI-based virtual dialysis assistant, SKI provides personalized, human-like interactions, answering queries, and proactively addressing potential dialysis complications through symptom inquiries, guided by lab results and imaging. This innovative approach paves the way for "adaptive precision" in personalized medicine, coupled with "practice-aligned calibration" for actions, reinforcing digital trust among payers, providers, and patients. SKI epitomizes a paradigm shift in intelligent kidney care, placing comprehensive HD management into the hands of patients.

It not only mitigates the time and environmental impact of travel but also harmonizes green nephrology principles with an intelligent care framework.

**Keywords:** Green Nephrology, Big Data, Artificial Intelligence, Sustainable Healthcare, Telemedicine