Docket #: S18-162

Hemodialysis Fistula Health Monitor

Researchers at Stanford have developed a wearable, low-cost device that provides intermittent vessel hemodynamics measurement. This technology won a KidneyX prize and may improve the health of end stage renal disease patients. This disease affects over 700,000 patients in the U.S. and most must undergo frequent hemodialysis. This requires frequent access to the patient's circulatory system with a needle, and is often achieved by a surgeon creating an arteriovenous (AV) fistula on the patient's arm. Unfortunately, surgically created AV fistulas may fail as often as 50% of the time. One of the biggest challenges is effective monitoring to know where they are failing. Doppler ultrasound techniques are expensive, require a trained operator and are time consuming. Other methods require a patient to be connected to an extracorporeal hemodialysis system.

The new, portable device contains a processor and a set of ultrasound transducers configured to assess the position of the fistula and take measurements over time of various characteristics of the fistula vessel, such as blood flow, depth, diameter, velocity of blood within vessel, and thickness of vessel wall.

Stage of Development
This technology won a KidneyX prize. The Kidney Innovation Accelerator (KidneyX) is a partnership between the U.S. Department of Health and Human Services (HHS) and the American Society of Nephrology (ASN). These competitions aim to develop innovative solutions that can prevent, diagnose, and/or treat kidney diseases.

Applications

- Characterizing vessel hemodynamic data in hemodialysis patients
- Dialysis access surveillance

Advantages

- Frequent data acquisition
- Low cost
- Easy to use/ can be used at home
- Portable and non-invasive
- Provides more real-time patient data
- Enhanced patient compliance

Patents

- Published Application: WO20202223085
- Published Application: 20200337680
- Published Application: 20250017569

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