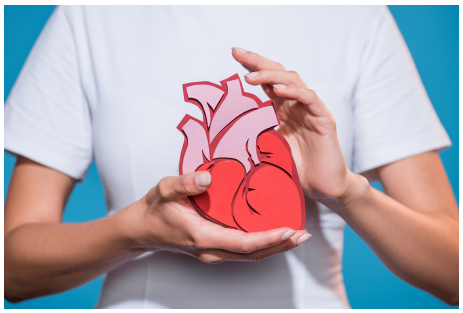

At-home monitoring and alert system for infant blood oxygen levels and heart rate

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External Link(s)

• From inventors with the Duke Design Health Program

Unmet Need

Every year there are over 1,000 babies born in the US with a congenital heart disease known as hypoplastic left heart syndrome (HLHS). HLHS affects the structure of the left side of the heart, causing poor blood flow throughout the heart and the rest of the body, difficulty breathing, and a weak pulse. HLHS is usually treated with three separate surgeries, requiring parents and caregivers to carefully, manually monitor their infant's vital signs every two to three hours at home between and after the procedures. Caregivers must painstakingly measure and write down their infant's blood oxygen levels, heart rate, and other information like weight and feeding patterns. This method of monitoring the infant's health places a large amount of stress on these caregivers, who are left to detect and determine on their own if their infant is experiencing a medical emergency. Therefore, there is a critical need for a technology that can (1) monitor infant health by automatically measuring, recording, and analyzing their vital signs, as well as (2) notify caregivers or healthcare personnel of abnormal vital signs that indicate the need for emergency medical care.

Technology

Duke inventors have developed an easy-to-use, wearable, infant-monitoring device that automatically records and analyzes vital signs, like blood oxygen levels and heart rate, and alerts caregivers and healthcare personnel in the event of abnormal readings. This is intended to be used as a home health device for infant patients with HLHS or other conditions that require careful monitoring of their vital signs. Specifically, this device is a pulse oximeter and heart rate monitor that gently and securely wraps around the infant patient's knee. The accompanying software will automatically record the timepoints of these vital signs and store them in a HIPAA-compliant cloud storage database that is easily accessible through an app on the caregiver's phone or computer. In addition to monitoring vital signs, caregivers frequently need to track their infant's weight and feeding schedule, as HLHS can cause difficulty in feeding and gaining weight. This technology further assists caregivers by tracking nutritional health. The device can be paired with a smart scale that measures and records the infant's weight over time, and caregivers can record feeding schedules in the accompanying app. This has been demonstrated in benchtop testing for sensor attachment, amount of pressure needed for accurate readings, and pulse oximeter readings on various positions around the knee area and on users with various skin tones.

Other Applications

This technology could also be used in infant patients with other health conditions that require monitoring heart rate and blood oxygen levels, such as infant chronic lung disease or other congenital heart diseases.

Advantages

- Alerts enable remote patient monitoring and faster time to care for infant patients experiencing medical emergencies
- Continuous monitoring, rather than every 2-3 hours, provides higher temporal resolution of recordings and quicker response to abnormal readings