

Towards greener pulse oximetry

Product design enabling a seamless transition towards more sustainable pediatric pulse oximetry at Reinier de Graaf Gasthuis.

1. The problem

The number of medical devices intended for single use is growing (Hoveling et al., 2023). Disposable pulse oximeters also contribute to the rising tide of e-waste, one of the fastest-growing waste streams globally (Subhaprada, 2017). According to the NFU (2024), pulse oximeters rank second among disposable medical products with the highest environmental impact. At Reinier de Graaf Gasthuis, reusable devices are commonly used for adult patients. However, this is not yet the case in the pediatric departments. In 2024 alone, over 4,500 disposable pediatric pulse oximeters were purchased.

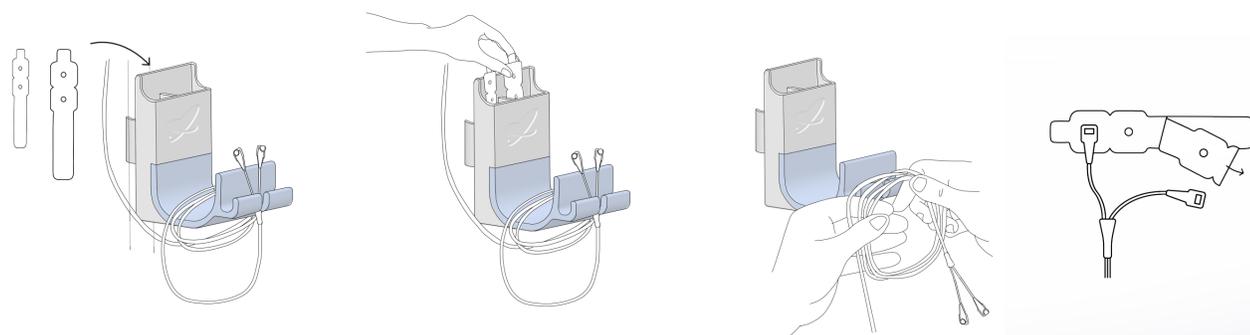


2. Methods

1. A systematic literature review and interviews to explore the barriers to switching to reusable sensors
2. Observational research to map current pulse oximeter use and identify pain points
3. A co-creation session to generate and evaluate suitable solutions

3. Key findings

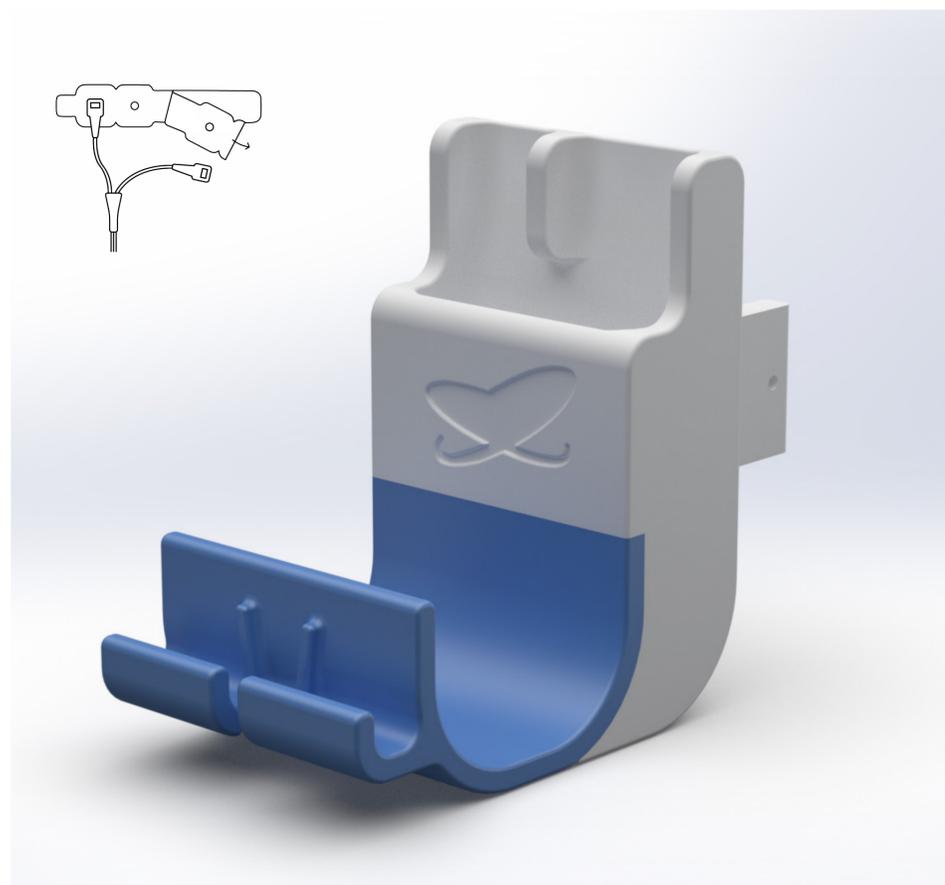
- Reuse is the most promising circular strategy for pediatric pulse oximetry.
- A partly reusable sensor has the highest potential to overcome key barriers associated with fully reusable sensors, such as a poor fit, lack of child-friendliness, and limited size availability
- The changing of the sticker expands the lifetime of the sensor, but is currently not promoted and inefficient, leading to unnecessary usage of sensors.
- The storage of the sensors is perceived as chaotic, inefficient and irregular.



4. The SatuSaver

The SatuSaver is a hygienic and user-friendly storage solution for hybrid pediatric pulse oximeter sensors, developed specifically for use at Reinier de Graaf Gasthuis. It holds two adhesive stickers readily available on top of the unit, eliminating the need to open drawers or packaging during use, reducing the risk of cross-contamination.

The reusable part of the sensor is stored in a clearly visible and consistent location, allowing for quick access while protecting the soft materials from damage. The SatuSaver is designed to be mounted on an existing pole or pendant, positioned at eye level to support an efficient and intuitive workflow.



Sticker hygiene



Material protection



Nudging towards reuse

Irene Algra
Towards greener pulse oximetry
11-07-25
Integrated Product Design

Committee Jan-Carel Diehl
Conny Bakker
Company Reinier de Graaf Gasthuis
Alie Rozendal

**TU Delft**