

New innovation successfully treats neonatal hypothermia

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Neonatal hypothermia—which occurs when an infant's core body temperature falls below the normal range needed to maintain health—contributes to approximately one million deaths each year, and countless cases of stunted growth, almost exclusively in low- and middle-income countries. To address this common but preventable condition, researchers from Boston Children's Hospital, engineers at Lawrence Berkeley National Laboratory, and colleagues in Rwanda developed the Dream Warmer, a low cost, reusable non-electric infant warmer to prevent and treat hypothermia. A new study from the team shows that infants who received treatment with the warmer had only an 11 percent rate of hypothermia compared to 29 percent of those who did not. Infant death rates also dropped, from 2.8 percent among infants who did not use the warmer to 0.9 percent of those who did. Results of the study were published in eClinicalMedicine from *The Lancet*.

"Infant hypothermia is a silent killer," says study leader Anne Hansen, MD, MPH of the Division of Newborn Medicine and Medical Director of the Neonatal Intensive Care Unit at Boston Children's, "but it's a modifiable risk factor, and this study shows that reducing it can have a large impact on survival and also likely on the long-term neurodevelopment of these babies."

Warmer was effective and safe

The primary aim of the study was to see if the warmer increased body temperatures in [infants](#) who are hypothermic or at risk of hypothermia due to prematurity or [low birth weight](#) compared to the standard of care in rural Rwandan hospitals.

Over the study period from November 2019 to July 2020, 464 infants at ten of the largest neonatal wards in Rwandan district hospitals used the warmer 892 times. Data was also collected on over a thousand patients on the neonatal ward who did

not receive the warmer.

The study found that:

- The rate of achieving a normal body [temperature](#) rose from 51 percent before introduction of the warmer to 67 percent after the warmer was introduced.
- Use of the warmer did not lead to an increased rate of excessively high core temperatures.
- The warmer caused no burns, rashes or other safety concerns, and no instances of incorrect warmer use were observed.

"This is a good option for treatment in setting where incubators are not the right solution, whether it is because they are too expensive, (about \$100 compared with \$5,000 for an incubator) require electricity, or require extensive training to correctly use and maintain," says Hansen, who adds that the warmer was specifically designed to complement skin-to-skin care, known as kangaroo mother care, either when it provides insufficient heat or if the mother needs to take a break. "And, the nurses needed only a couple minutes of training to prepare, use and clean it correctly because it is quite intuitive."

Ten years in the making

Dr. Hansen has been working in Rwanda for more than a decade to address these and other preventable causes of infant disease and death. She teamed up with engineers from Lawrence Berkeley National Lab at the University of California, Berkeley, to develop this low-cost, reusable infant warming mattress. The warmer contains 12 wax "candles" that are made of a material specially designed to melt at exactly skin temperature. When heated in boiled water, the candles melt and remain at body temperature for about six hours. Once they cool, the mattress can be cleaned and reused multiple times.

"The final design is a skin temperature heating pad that the infant can either lay on or be wrapped around the infant's back in addition to skin-to-skin care with the mother," says Hansen. Two smaller studies conducted by Hansen's team in Rwanda in 2016-2018 showed the warmer was effective, safe, and usable without needing an extensive training.

"Because treating neonatal hypothermia is relatively easy given the appropriate equipment, we hope this warmer can play a significant role in optimizing the health of these vulnerable infants in low- and [middle-income countries](#)," says Hansen, who is now partnering with others with the goal of distributing the infant warmer across Sub Saharan Africa as well as Haiti and Chiapas, Mexico.

Provided by Children's Hospital Boston

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