

Life-Saving Warmth For Newborns With Hypothermia

Lawrence Berkeley National Laboratory



Hypothermia contributes to the death of an estimated one million newborns every year, almost exclusively in low- and middle- income countries (LMICs). These deaths are especially tragic because they are easily preventable. Premature or low birth-weight newborns are most likely to die from hypothermia because their bodies are not yet able to retain heat. Survivors experience stunted growth, including brain growth, as they divert calories to try to stay warm. This problem is exacerbated in LMICs where incubators are scarce and families struggle to heat their homes. Although continuous skin-to-skin contact with their mothers is an excellent source of external heat, it can be insufficient or infeasible.

To give these youngest humans the best chance at life, researchers from [Lawrence Berkeley National Laboratory](#) (Berkeley Lab), using Department of Energy (DOE) funds, and the [University of California, Berkeley](#) (UC Berkeley) collaborated with [Boston Children's Hospital](#), [Partners In Health](#), and the [Rwanda Ministry of Health](#) to develop a simple, affordable, reusable, and portable [infant warmer](#) that does not require electricity.

The technology was optimized for manufacturing in 2015 by Berkeley Lab scientists [Ashok Gadgil](#) and [Vi Rapp](#), building upon an earlier design by Mike Elam, Jonathan Slack, and others at Berkeley Lab and UC Berkeley.

The warmer uses a USDA-approved biosafe phase change material that becomes liquid at exactly skin temperature. It is sealed in a mat and placed in a sleeve made with an FDA-approved polymer material. Heating the phase change material in the mat is simple, requiring a small amount of boiled water, heated with an electric tea kettle or other source of heat. The warmer retains heat for several hours warming the newborn in a safe and effective manner. Gadgil and Rapp worked with Boston Children's Hospital's [Anne Hansen](#), Berkeley Lab's partner in initial trials in Rwanda. Hansen formed a non-profit company called [Global Newborn Solutions](#), which aims to distribute the warmer first in Rwanda, and then in other countries.

The DreamWarmer is in use today because of technology transfer support. [Berkeley Lab's Intellectual Property Office](#) (IPO) recognized its potential and therefore, its intellectual property, commercialization, licensing, and legal teams worked collaboratively, filing in 2015 for, and receiving in 2016, a [design patent on the Infant Warming Pad](#) granted by the USPTO. Berkeley Lab and UC Berkeley entered into an Inter-Institutional Agreement (IIA) in 2020 to bundle complementary IP from the two institutions, including an [improved design of a temperature indicator](#) from UC Berkeley, and to enable Berkeley Lab to take the lead on licensing the collective IP to Global Newborn Solutions. Berkeley Lab IPO negotiated and executed an exclusive license agreement with Global Newborn Solutions in 2021. To maximize the impact to society, the parties agreed upon licensing terms that reflect and support Global Newborn Solutions' humanitarian goals.

Today, Global Newborn Solutions is taking the DreamWarmer to more places where it is needed. Armed with the exclusive license granted by Berkeley Lab, the company now plans to expand the [rollout of the DreamWarmer](#) in Rwanda, then into other countries in Africa and beyond. The goal is to trial the DreamWarmer in Rwanda, Malawi, Lesotho, Mexico, Peru, and India in 2022-2023, then Sierra Leone and Haiti in 2023-2024.

In addition, Global Newborn Solutions has begun identifying and on-boarding strategic commercial partners:

- Research Institute for Compassionate Economics (R.I.C.E), a joint initiative with a medical college in Uttar Pradesh;
- VNG Medical Innovation System, an India based medical device company that specializes in a range of neonatal medical devices, with offices across India, Bangladesh, Nepal, and Pakistan; and
- Africa Medical Supplier, a Rwanda base medical device distribution company.

"Mortality and morbidity from neonatal hypothermia is preventable given the appropriate equipment to complement skin to skin warmth. The collaboration between engineers, health care providers, and public health officials that has made the DreamWarmer available to communities in need is a compelling example of effective and generous teamwork," Hansen said.

This story was originally published in 2022.

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