Safety Management System for Human Milk Banks

Health need

Breast milk is considered a pillar of child survival; it has unique immunological and nutritional properties that help infants get a healthy start in life. Infants who receive breast milk are less likely to become seriously ill or die from infections compared to infants who do not receive breast milk. This is especially true of vulnerable infants in developing countries who may face continual exposure to pathogens through unsafe water or unhygienic conditions. The World Health Organization has asked countries to promote the safe use of donor milk, when the mother's own milk is unavailable, through human milk banks (HMBs) for infants who are preterm, low birth weight, malnourished, born to HIV-positive mothers, or orphaned. Safe donor milk processing includes collection, pasteurization, and frozen storage. Currently, many low-resource health care facilities do not have access to HMB systems, as commercial-grade pasteurizers are not affordable. Alternately, flash heating is a safe and affordable method of breast milk pasteurization. This method is being piloted in a small HMB in South Africa, but challenges exist in accurately monitoring proper time and temperature requirements in order for milk to achieve safe pasteurization.

Technology solution

To address the challenge of ensuring safe pasteurization in homes and resource-limited health care facilities, PATH is advancing a safety management system based on a platform called FoneAstra. This system leverages mobile phones to precisely monitor flash-heat pasteurization of donor breast milk. FoneAstra components include a mobile phone, a USB cable and bridge, a glass jar, and a temperature sensor probe. These are paired with simple pasteurization equipment: a freezer, a pot, and a heat source. We worked closely with the University of Washington's departments of Computer Science and Engineering and Human Centered Design and Engineering to develop a novel USB bridge that connects the phone and temperature probe. FoneAstra software gives simple audio and visual instructions for safe pasteurization and transmits the data wirelessly to a server for reports and review. These quality assurances can boost acceptance of donor milk by demonstrating that pasteurization of breast milk in resource-limited settings can be done safely—a critical step toward expanding HMB adoption.

Current status and results

PATH is managing a one-year pilot study of the FoneAstra in collaboration with the Human Milk Banking Association of South Africa. We will conduct a field test to evaluate the use of FoneAstra as a low-cost HMB system compared to routine flash-heat or more expensive commercial pasteurizing systems. We will also conduct a cost analysis to guide scalability of HMB systems in South Africa. User assessments will be performed with milk bank staff to validate that they can correctly operate the system. If shown to be appropriate and effective, we anticipate that this technology will also be adapted for other health purposes, such as monitoring vaccine refrigerator temperatures.

University of Washington/Rohit Chaudhri

The FoneAstra safety management system.

"To investigate, as a risk-reduction strategy…the safe use of donor milk through human milk banks for vulnerable infants, in particular premature, low-birth-weight and immunocompromised infants, and to promote appropriate hygienic measures for storage, conservation, and use of human milk…"

WHO's call to countries concerning donor milk for vulnerable infants. World Health Assembly, May 24, 2008.

Availability

For more information regarding this project, contact Kiersten Israel-Ballard at kisrael-ballard@path.org.

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