

## PREVALENCE AND RISKS OF NEONATAL HYPOTHERMIA

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**ABSTRACT:** Every year four million babies die within the first four weeks of life, 99% of these deaths occur in low and middle-income countries.<sup>1</sup> Hypothermia is a major contributor to the millions of incidences of neonatal morbidity and mortality around the world. It is a comorbidity factor to the main direct causes of neonatal death. MSF's current neonatal protocol uses Kangaroo Mother Care (KMC) for the treatment and prevention of neonatal hypothermia. Although KMC can be effective, studies show that even a 30-minute break in warming can result in the onset of neonatal hypothermia. Even in settings with good KMC compliance, supplemental warming is necessary to avoid newborn hypothermia.

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Neonatal hypothermia is defined as the thermal state in which a newborn's body temperature drops below 36.5°C. Hypothermic stages include cold stress (36.0-36.4°C), moderate hypothermia (32.0-35.9°C), and severe hypothermia (<32.0°C).<sup>4</sup> MSF recognizes thermoregulation as an important step in neonatal care to prevent the onset of hypothermia. Despite thermoregulation guidelines, hypothermia remains very prevalent in low-resource settings.

A survey of 22 hospital-based and 10 community-based studies for prevalence and risk factor data on neonatal hypothermia in resource-limited environments globally found that hypothermia is common in infants born at hospitals (prevalence range, 32% to 85%) and homes (prevalence range, 11% to 92%), even in tropical environments.<sup>2</sup>

Public hospitals across Ethiopia have an average prevalence of 64% among neonates admitted to NICUs. In Zambia and Zimbabwe one-half to two-thirds of newborns evaluated were hypothermic<sup>7</sup>. High rates are also reported in the West African sub-region and Nepal with occurrence rates of 62% and 92% respectively.<sup>1</sup>

Hypothermia rates are even higher amongst newborns delivered at home compared to in a hospital setting.<sup>3</sup>

The onset of hypothermia is life-threatening and a major contributor to neonatal mortality. Lunze et al. analyzed hospital-based and community-based peer-reviewed studies to determine risks associated with neonatal hypothermia. Their findings report hypothermia as a comorbidity factor to the main direct causes of neonatal death - severe infection (26%), preterm birth (28%), and asphyxia (23%).<sup>2</sup> If newborns could be kept warm and dry for the first week of life an estimated 1.3 million out of 4 million annual newborn deaths could be averted.<sup>6</sup>

Neonatal hypothermia is common because newborns have an underdeveloped ability to regulate their body temperature. Within the first 10-20 minutes post birth, infants experience significant heat loss of 2-4°C due to the evaporation of amniotic fluid. If not properly dried and warmed, infants have been recorded to drop to a temperature of only 26-27°C within 2 hours post birth.<sup>4</sup>

WHO, UNICEF and MSF have released protocols to encourage newborn warming post birth. All of these protocols emphasize KMC as the primary response. Despite the benefits of KMC, mothers cannot be expected to keep their baby on their chest for 24 hours a day for multiple days. Breaks in KMC warming are unavoidable and these short breaks are dangerous to the newborn's health.

A team from St. John's National Academy of Health Sciences in Bangalore, India performed a study where they continuously measured newborns' temperatures both during observed KMC and during warming breaks. The results show that even a 30-minute break in KMC can result in infant temperature drops of 1.5°C [Fig 1]<sup>5</sup>. This temperature drop brings a newborn into a mild hypothermic state, increasing morbidity risk by 80%.<sup>6</sup> These breaks in warming are

unavoidable with KMC as the only warming method.

It is evident that there is a need for an external warming source to either be used in conjunction with KMC or as a stand-alone device. Even in settings where KMC warming protocols are well established the 30-minute breaks allow

for a baby to enter a dangerous state of hypothermia. Furthermore, the immense amount of infants admitted to the NICU already in a hypothermic state demonstrate the need for rapid treatment options. While KMC is proven effective in maintaining infant temperature, it has significant capability shortages that demonstrate the need for an effective infant warming device.

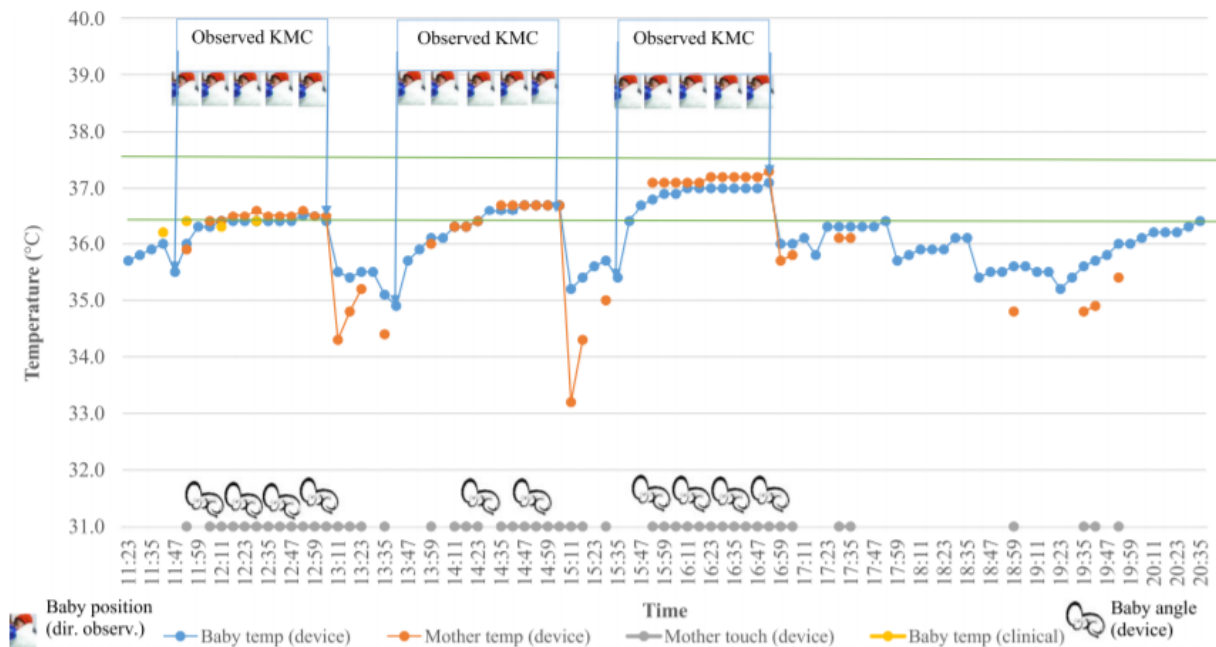


Figure 1: Continuous temperature monitoring of an infant during KMC, showing a newborn body temperature decrease of 1.5°C in a single 35-minute break, from Roa<sup>5</sup>.

## REFERENCES

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