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RESEARCH

A Pragmatic Descriptive Study of Rewarming the Newborn After the First Bath

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ABSTRACT

Objectives: To evaluate two methods of rewarming newborns after the first bath: radiant rewarming and skin-to-skin maternal newborn contact.

Design: A nonrandomized clinical trial in which mothers chose the rewarming method, with 200 participants in the skin-to-skin rewarming group (experimental condition), and 200 in the radiant rewarming group (control).

Setting: A teaching hospital in the Southeast United States.

Participants: Healthy, term infants after vaginal delivery.

Methods: Newborn temperatures were taken immediately prior to the bath (T1), and 30 minutes (T2) and 60 minutes (T3) after the bath. Descriptive statistics and *t* tests were used to determine differences between groups and between time points. Logistic regression was employed to assess risk factors for newborns with temperatures less than 36.4°C 30 minutes after the bath.

Results: Because 96 of the first 100 mothers chose skin-to-skin rewarming, we concluded the study early and analyzed the data. Of the 96 mothers who chose skin-to-skin, 91 infants were successfully rewarmed and five required rescue rewarming under the radiant warmer. Careful review of newborns requiring rescuing showed inadequate skin-to-skin contact or removal of the protective covering. In this sample, African American mothers were significantly younger, had smaller newborns, and their newborns had lower temperatures than non-African American newborns.

Conclusions: Given a choice, mothers overwhelmingly preferred skin-to-skin rewarming. Newborns can safely rewarm skin-to-skin if staff pay special attention to how they are positioning the newborn and recheck mother and newborn frequently. The unexpected finding of racial differences in maternal and newborn characteristics will require further investigation.

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The newborn's first bath presents an early challenge to the ability to maintain body temperature. In addition to heat loss as the newborn transitions to life outside the uterus, bathing exposes the newborn to increased heat loss through conduction while in the water and evaporation during the drying process (Galligan, 2006). Evidence regarding best practices for skin care in newborns has been inconclusive, and questions still remain as to whether healthy, full-term infants should be bathed or washed at all during the first week of life. Despite or perhaps because of this lack of evidence, bathing practices vary from setting to setting in terms of the frequency of bathing, use of water or cleansing agents, bathing procedures (tub or sponge), and the appropriate age for giving the first bath (Garcia et al., 2009).

One of the newborn's first life challenges is maintaining body temperature. When compared with children and adults, newborns are at increased risk of thermoregulatory problems and are far more sensitive than either group to changes in the external environment (Blackburn, 2003). Although fetuses produce heat in utero, the consistent temperature of the amniotic fluid makes thermoregulation unnecessary. Failure to maintain adequate body temperature after birth results in cold stress for neonates that can have serious, even fatal consequences (Verklan & Walden, 2004). The increased metabolic rate that occurs during cold stress can lead to increased demands for glucose and oxygen that can rapidly progress to hypoglycemia and hypoxemia (Blackburn, 2003). Prolonged cold stress can cause respiratory difficulty even in a healthy full-term infant, and this may be

Nurses were curious whether mothers' bodies were as effective as radiant warmers in rewarming newborns after their first baths.

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exacerbated by decreased production of surfactant, which increases the work of the lungs even more (Verklan & Walden, 2004). Because newborns have thin skin with blood vessels close to the surface, they lose body heat rapidly. In addition, they have little or no subcutaneous fat to insulate muscles and organs from heat loss. Finally, newborns have 3 times the surface area to weight than adults, and that provides significantly more area for heat loss. The result is that newborns lose heat at a rate 4 times that of adults (Hackman, 2001).

Newborns do have some compensatory mechanisms that are important to recognize and preserve. For example, the healthy full-term infant remains in a position of flexion, helping to reduce the amount of skin surface exposed to the surrounding temperatures and decreasing attendant heat loss. Although newborns cannot shiver and have very little voluntary muscle control, their basal metabolism does increase in response to falling skin temperatures, but as described above, there are physiologic limits to the benefit of this mechanism (Knobel & Holdtich-Davis, 2007). At the other extreme, hyperthermia in newborns is rare and almost always iatrogenic in origin. Radiant warmers can cause potentially fatal hyperthermia and burns if newborns are not closely monitored (Maramkhah, 2006).

Prior to this study, standard practices at the study hospital for women who gave birth vaginally and whose newborns were determined to be physiologically stable involved moving the mothers and newborns from labor and delivery to postpartum as soon as they both met preestablished criteria, including the newborn having an axillary temperature above 36.4°C. Once the mother/newborn dyad arrived in postpartum, and the newborn's temperature stabilized at or above 36.4°C, the first bath was given. For the healthy newborn this typically occurred in the first 24 hours after birth. The bathing technique used for the bath is as follows: after supplies were gathered, a basin was filled with water that was warm to the touch of the wrist. Using a clean wash cloth with only water, the newborn's face was washed, starting with the eyes, followed by face and ears. Mild soap was used to wash the infant's body, taking care to keep the umbilical cord clean and dry. The newborn was then rinsed with plain water from the basin using a clean wash cloth. The newborn was dried well and wrapped in a blanket. The hair was then washed with a mild shampoo, rinsed, and dried. The newborn was diapered, a cap placed on its head, and it was placed under the radiant warmer with no further covering. The temperature was checked every 30 minutes until it was equal to or greater than 36.4°C, after which the newborn was returned to the mother for routine care. The purposes of this study were to determine if (a) the mothers at the study hospital would choose to warm their newborns skin-to-skin after the first bath and (b) if mother-newborn skin-to-skin contact was as effective as radiant warming in rewarming newborns after their first bath.

Design

We initially designed the study as a pragmatic, nonrandom, comparative effectiveness trial, in which mothers chose the postbath rewarming method (skin-to-skin vs. radiant warming). Pragmatic trials are designed to be conducted in "real-life" settings so they can be used more directly to inform practice changes (Peikes, Geonnotti, & Wang, 2013) For this study skin-to-skin rewarming was considered the experimental intervention and radiant warming the comparator. The study was terminated early, however, in response to the overwhelming choice by mothers of the skin-to-skin rewarming (96 of the first 100 participants). Given this evidence of patient preference, the analysis described below was redirected to describe the safety and effectiveness of skin-to-skin contact between mother and newborn in rewarming newborns after the first bath. This study received expedited approval from the institutional review board as a minimal risk study.

Participants

All English speaking mothers, for whom pregnancy, labor, and delivery resulted in a normal vaginal delivery and a healthy newborn, defined as average weight for gestational age and not requiring any special care, were eligible for this study. Births requiring cesarean section, forceps or vacuum deliveries were excluded; newborns who were small (below 10th percentile) or large (above 90% percentile) for gestational age, were at risk for sepsis (e.g., meconium present), required resuscitation, or were admitted to neonatal intensive care were excluded.