Original Article

Hypothermia in the Early Neonatal Period

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Abstract

Background: Hypothermia in neonates is a common problem and is associated with increased morbidity and mortality. Prevention of hypothermia is therefore an essential aspect of neonatal care especially in the immediate neonatal period.

Aim: To evaluate the efficacy of thermal care of the neonate in the labour ward at St Luke's Hospital, Malta.

Method: Retrospective study analysing the temperature on admission to the nursery from the labour ward. A consecutive sample of 754 neonates admitted during 2002 was studied.

Results: The proportion of babies admitted with normal body temperature (36.5-37.5°C) was 25.5%. The rest were mildly (36.0-36.5°C) (42.2%) or moderately (<36.0°C) (32.2%) hypothermic. Significantly less normothermia was evident in winter births (19.6%) than in summer births (38.1%) (Chi squared=26.5, p<0.0001).

Implications: The results indicate the need for an improvement in thermal support in the labour ward.

Keywords

Hypothermia, newborn, Malta.

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Introduction

Thermal care of the newborn infant should ensure that body temperature is maintained within normal limits, i.e. 36.5-37.5°C. Newborns are prone to become hypothermic because of their limited ability to generate and conserve heat. Immediately after birth, the wet newborn starts losing heat and unless active measures are taken, hypothermia develops rapidly[1]. Hypothermia is common and occurs in all environments, including places with warm climates[2].

Moreover, hypothermia is an important cause of morbidity. The baby becomes lethargic, hypotonic and sucks poorly. Cold stress results in profound metabolic disturbances including hypoxia, acidosis and hypoglycaemia[3].

Hypothermia in neonates is defined as a core temperature below 36.5°C; 36-36.5°C is mild hypothermia (cold stress); 32-36°C is moderate hypothermia; <32°C is severe hypothermia[4].

In this study, we evaluate thermal care of the newborn by looking at the proportion of neonates admitted with hypothermia to the nursery from the labour ward.

Methods

This retrospective study analyses the temperature of healthy term babies on admission to the nursery from the labour ward at St Luke's Hospital, Malta. The temperature of the infant on admission to the nursery reflects the efficacy of thermal care from the time of birth, the period in the labour ward, and the transfer to the nursery.

Following a WHO publication on thermal care[4], we adapted the following index as a suitable indicator of thermal care during the first few hours after birth:

$$\frac{\text{Number of infants admitted with a temperature of >36.5°C}}{\text{Total number of admissions}}$$

A secondary objective of this study was to compare any possible effect on the incidence of hypothermia between the summer and winter months. It is known that the environmental

temperature has a significant effect on the risk to the newborn of developing hypothermia. Newborns need a much warmer environment than adults do, and though the indoor temperature during the winter times may be perfectly comfortable for adults, it may be far too low for the neonate to maintain normal body temperature.

On admission to nursery, the rectal temperature of all babies is taken routinely by the nursing staff and recorded in the 'nursery notes.' A clinical mercury-in-glass thermometer is used. After discharge, the nursery notes are archived at the children outpatients department. The data for January, February, July and August 2002 was collected from the nursery notes.

Chi-square analysis was performed to compare the number of normothermic infants admitted during the winter and summer months; Student's t-test was used to compare the mean infant temperature on admission between the 2 groups.

Results

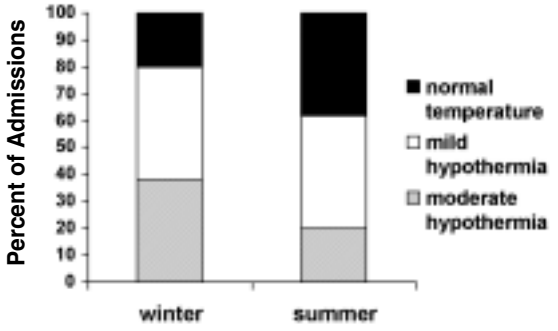
There were 754 nursery notes available, of which 53 did not have a record of the admission temperature. The numbers of infants with normal body temperature, and with mild and moderate hypothermia were tabulated (Table 1).

179 infants out of a total of 701 admissions had a temperature of 36.5°C or more. Thus, 25.5% of new admissions to nursery had a normal body temperature. 74.5% were hypothermic; 42.2% were mildly hypothermic; 32.2% were moderately hypothermic.

The mean temperature recorded in neonates in the winter period was significantly lower (0.3 degrees centigrade) than the mean temperature in summer ($p<0.0001$). The number of infants admitted with a normal body temperature during January and February was 93 out of 475 (19.6%); and during July and August, 86 out of 226 (38.1%). Significantly less normothermia was evident in winter births than in summer births (Chi squared=26.5, $p<0.0001$) (Figure 1).

Comparison between the proportion of admissions of neonates to the nursery with hypothermia and normothermia during winter (January/February) and summer (July/August), 2002.

Figure 1: *Proportion of normothermia on admission*



Discussion

The very high incidence of hypothermia (74.5%) clearly indicates an inadequacy in the thermal care of neonates in the crucial hours after birth. Typically, a period of two hours elapses between delivery and admission to the nursery. Only a quarter of all infants admitted to the nursery had a normal body temperature.

A similar study in a UK hospital involving 69 infants showed that 14% had a temperature of less than 36°C on the postnatal ward[5]. In our study, 32% had a temperature of less than 36°C on admission to the nursery.

Temperature measurements in the nursery are taken rectally. This practice is considered hazardous, but it correlates better with core temperature than the axillary site[6,7]. The American Academy of Pediatrics recommends the axillary site for temperature measurement, mainly because of the risk of rectal perforation[8,9]. The use of mercury-in-glass thermometers has been banned in most centres and the electronic thermometer, which is accurate, safe and measures the temperature quickly, should substitute it. The SI unit for temperature, the Celsius, should be adopted as in most European countries. If the temperature is <36.5°C, active measurements should be taken to re-warm the baby.

The problem of hypothermia is worse in January and February and this suggests that the indoor temperature is lower during winter. The delivery rooms are warmed by radiant

Table 1. *The number of infants classified under various temperature groups.*

	Moderate hypothermia <36°C	Mild hypothermia <36.5-36°C	Hypothermia (total) <36.5°C	Normal body temperature >36.5°C	Total number of infants
Jan/Feb	181 (38.1%)	201 (42.3%)	382 (80.4%)	93 (19.6%)	475
Jul/Aug	45 (19.9%)	95 (42.0%)	140 (61.9%)	86 (38.1%)	226
Totals	226 (32.2%)	296 (42.2%)	522 (74.5%)	179 (25.5%)	701

Table 2: *Guidelines for thermal care in the labour ward, adapted from a WHO publication[4].*

1. The temperature of the delivery room should be at least 25°C and there should be no draughts.
2. Immediately dry the newborn after birth with a warm towel, and remove wet blankets.
3. Place a cap on the baby's head.
4. Place in skin-to-skin contact with mother and cover with a warm blanket; or bundle in warm blankets, and give the baby to mother to hold; or dress in warm clothes, and place in a pre-warmed closed incubator (temperature 33°C).
5. Initiate breast-feeding within one hour of birth.
6. Bathing and weighing should be postponed. The baby should be bathed at least 6 hours after birth, and preferably on the second day of life, and only if the baby is healthy and has normal body temperature.
7. During transportation, use skin-to-skin contact with mother; or dress and wrap the baby in blankets.

heaters but there are no wall thermometers to measure the ambient temperature. No temperature records of the delivery rooms are available. The operating theater is centrally heated and the temperature is kept at 24°C during Caesarian Sections. When using spinal anaesthesia, the temperature is maintained at higher value (28°C) because the newborn remains with the mother.

The average temperature in the Maltese islands during January and February is 12°C (the mean high is 16°C and the mean low is 9°C). During July and August, the average temperature is 26°C (the mean high is 31°C and the mean low is 21°C)[10]. The difference is ambient temperature is reflected in the increased incidence of hypothermia (80.4%) in winter compared with 61.9% in summer. This implies the need for more active warming of the delivery rooms during winter. Yet, the warm summer months should not be taken with a laisser-faire attitude since hypothermia is still very common during this period.

Certain factors in the current practice in the labour ward may contribute to the occurrence of hypothermia. The delivery rooms may not be warmed sufficiently since there are no wall thermometers to measure and control the ambient temperature. Many babies are washed soon after birth and a cap is rarely used.

Given the high incidence of hypothermia in the first hours after birth, it is recommended that, following discussions with the midwifery staff, there is an immediate implementation of the WHO recommendations for thermal protection in the labour ward (Table 2).

A future audit is indicated to reassess thermal care in the labour ward after the implementation of these measures.

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