

Hypothermia in the early neonatal period: follow-up study

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Abstract

Background: Thermal care is an essential aspect of the routine care of the newborn because hypothermia is an important and preventable contributor to morbidity.

Aim: To evaluate whether the new practice of postponing bathing of the newborn at St Luke's Hospital has resulted in an improvement in neonatal thermal care.

Methods: Analysis of the temperature on admission to the nursery from labour ward during 2005 of a consecutive sample of 877 infants, compared to the results obtained from a similar study in 2002.

Results: The proportion of babies admitted with normal body temperature (36.5–37.5°C) was 43.4% in 2005, compared to 25.5% in 2002. The proportion of babies admitted with moderate hypothermia was reduced from 32.3% in 2002 to 14.4% in 2005.

Implications: Delayed bathing has resulted in a significant improvement in thermal care of the newborn.

Introduction

Naked, wet, newborn infants cannot maintain normal body temperature even if the environmental temperature is comfortably warm for adults. Unless active measures are taken to dry and warm the infant, hypothermia will set in within minutes. Exposure of the newborn to cold stress results in metabolic acidosis¹ and hypoxaemia.² Hypothermia in neonates is defined as a core temperature below 36.5°C; mild hypothermia (or cold stress) is 36–36.5°C; moderate hypothermia is 32–36°C.³

Objective

Following a study entitled "Hypothermia in the Early Neonatal Period,"⁴ a new measure was adopted at the labour ward, St Luke's Hospital, Malta, to improve the standard of thermal care. Infants are now bathed at the nursery on the second day of life rather than immediately after birth at the labour ward. In this follow-up study we evaluate the effectiveness of this measure by comparing the proportion of babies admitted to nursery with normal body temperature in corresponding periods between 2002 and 2005.

Methods

In this retrospective study, we analyzed the temperature on admission to the nursery of healthy, term newborn babies born during the months of January, February, July and August 2005.

The temperature on admission to nursery reflects the efficacy of thermal care of the infant from the time of birth, the stay in labour ward, and the transfer to nursery. The following index, adapted from a WHO publication⁵ is taken as a suitable indicator of thermal care of the newborn in our hospital:

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

On admission to nursery, the axillary temperature is measured using a mercury-in-glass thermometer. The data was obtained from the nursery notes archived at the children's outpatients department.

Key words

Hypothermia, newborn, Malta

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Table 1: The number of infants classified under various temperature groups in 2002 and 2005

| | Moderate hypothermia | Mild hypothermia | Total hypothermia | Normal temperature | Total number of infants |
|---------------------|-----------------------------|-------------------------|--------------------------|---------------------------|--------------------------------|
| Jan-Feb 2005 | 83 (18.9%) | 187 (42.5%) | 270 (61.3%) | 170 (38.6%) | 440 |
| Jan-Feb 2002 | 181 (38.1%) | 201 (42.3%) | 382 (80.4%) | 93 (19.6%) | 475 |
| Jul-Aug 2005 | 43 (9.8%) | 183 (41.9%) | 226 (51.7%) | 211 (48.3%) | 437 |
| Jul-Aug 2002 | 45 (19.9%) | 95 (42.0%) | 140 (61.9%) | 86 (38.1%) | 226 |
| Total 2005 | 126 (14.4%) | 370 (42.2%) | 496 (56.6%) | 381 (43.4%) | 877 |
| Total 2002 | 226 (32.2%) | 296 (42.2%) | 522 (74.5%) | 179 (25.5%) | 701 |

Results

There were 901 nursery notes available of the 1040 babies born during the study period; the temperature was not documented in 24 cases. Thus the total number of infants included in this audit study was 877. The numbers of infants with normal body temperature, and with mild and moderate hypothermia were tabulated (Table 1).

381 infants out of a total of 877 admissions (43.4%) had a temperature of 36.5°C or more; there were no recorded cases of hyperthermia (>37.5°C). Thus, 43.4% of infants had a normal body temperature in 2005, compared to 25.5% in 2002 ($\chi^2=53.8$ – Yates corrected, $p<0.001$). This represents a significant decrease in the overall proportion of hypothermic babies between 2002 and 2005.

The proportion of babies (14.4%) with moderate hypothermia in 2005 was less than half that in 2002 (32.2%). (Figure 1)

In 2005 significantly more infants were admitted with hypothermia in the winter period (Jan-Feb) (61.3%) than in summer (Jul-Aug) (51.7%) ($\chi^2=7.92$, $p<0.01$ – Yates corrected).

This represents an overall reduction when compared with the previous study (80.4% in winter; 61.9% in summer 2002).

Discussion

This study has demonstrated a marked improvement in thermal care of the newborn at St Luke's Hospital between 2002 and 2005 as evidenced by the increase in the percentage of infants admitted with normothermia in both summer and winter months, and a remarkable decrease in the number of infants admitted with moderate hypothermia.

There is now more awareness on the importance of thermal care in the newborn since the publication of the previous study in the Malta Medical Journal. A number of lectures on this subject were delivered to the midwifery, nursing and medical staff. A change in official policy about bathing has been enforced. The newborn baby is now bathed on the second day of life at the nursery rather than immediately after birth at the labour ward. A randomized, controlled trial involving 249 infants in a Ugandan referral hospital, designed to study the impact of newborn bathing on the prevalence of neonatal hypothermia concluded that bathing newborn babies shortly after birth increased the risk of hypothermia.⁶

As expected the proportion of hypothermic infants is greater in winter; yet even during summer as much as half of the babies become hypothermic. Vigilance must be continuous throughout the year.

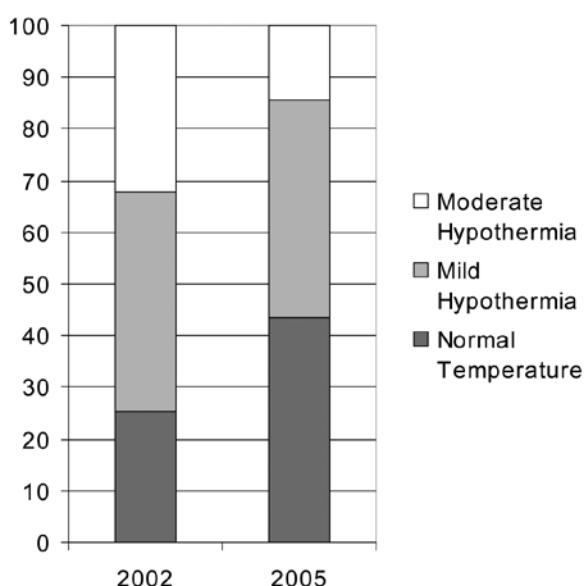
This study is limited by the inter-personal variations in the procedure of measuring the temperature. The time interval before reading the thermometer is not defined. This may result in inaccurate readings.

The temperature is now regularly measured in the axilla rather than the rectum as was the practice in 2002. Since the axillary temperature is slightly less than the rectal or core temperature, the observed difference between the years studied is probably more pronounced.

The mercury-in-glass thermometer is still being used at St Luke's Hospital. Though this type of thermometer may still be utilized, the European Commission is proposing to restrict the marketing and use of all mercury devices.⁷ The mercury-in-glass thermometer should be replaced by the electronic thermometer, which is safe and accurate.

The improved thermal care of the newborn is principally

Figure 1: Proportion of normothermia, mild and moderate hypothermia in 2002 and 2005



due to the dedicated work of the midwives; they also shoulder the main responsibility to maintain and improve this present level of care.

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References

1. Gandy GM, Adamsons Jr K, Cunningham N, Silverman WA, James LS. Thermal environment and acid–base homeostasis in human infants during the first few hours of life. *J Clin Invest* 1964; 43:751-8.
2. Stephenson J, Du J, Tk O. The effect of cooling on blood gas tensions in newborn infants. *J Pediatr* 1970;76:848-52.
3. Thermal protection of the newborn, a practical guide, WHO/ RHT/MSM/97.2 [online] 1997 [cited 2006 June 15]. Available from: URL: www.who.int/reproductive-health/publications/MSM_97_2_Thermal_protection_of_the_newborn/MSM_97_2_table_of_contents_en.html.
4. Mizzi J, Sultana P. Hypothermia in the Early Neonatal Period. *Malta Medical Journal* 2003; 15(2): 22-4.
5. Thermal protection of the newborn, a practical guide, WHO/ RHT/MSM/97.2 [online] 1997 [cited 2006 June 15]. Available from: URL: www.who.int/reproductive-health/publications/MSM_97_2_Thermal_protection_of_the_newborn/MSM_97_2_table_of_contents_en.html.
6. Bergstrom A, Byaruhanga R, Okong P. The impact of newborn bathing on the prevalence of neonatal hypothermia in Uganda: a randomized, controlled trial. *Acta Paediatr*. 2005 Oct;94(10):1462-7.
7. Minutes of the Committee on the Safety of Devices Meeting, 23 March 2006 [cited 2006 June 24]. Available from: URL: www.mhra.gov.uk/home/idcplg?IdcService=GET_FILE&dID=21086&noSaveAs=1&Rendition=WEB