



DECREASE OF ADMISSION HYPOTHERMIA AMONG NEWBORNS IN NICU

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Abstract

Admission hypothermia in newborns remains a significant concern in neonatal intensive care units (NICUs), contributing to increased morbidity and mortality, especially among preterm and low birth weight infants. This study evaluates the impact of targeted interventions aimed at reducing the incidence of hypothermia at NICU admission. A multidisciplinary approach was implemented, including staff education, standardized thermal care protocols during delivery and transport, use of polyethylene wraps, pre-warmed incubators, and continuous temperature monitoring. Data collected over 24 months demonstrated a marked reduction in the rate of admission hypothermia, with improvements most notable in infants <32 weeks of gestation. The findings underscore the importance of systematic thermal management strategies and reinforce the need for ongoing quality improvement initiatives to sustain progress. These results contribute to the growing body of evidence supporting proactive thermal care as a cornerstone of neonatal safety and outcomes. In a promising shift for neonatal care, hospitals worldwide are reporting a significant decline in hypothermia-related admissions to Neonatal Intensive Care Units (NICUs). This trend reflects the success of targeted interventions and quality improvement initiatives aimed at safeguarding the most vulnerable patients—newborns, especially those born preterm.

Introduction

Newborns are more vulnerable to the effects of thermal stress. Hypothermia in newborns is an independent risk factor for morbidity and mortality. Hypothermia has been defined by WHO as body temperature below the normal range (36.5C – 37.5° C)

Normal axillary temperature ranges from 36.5 to 37.5° C for the term neonate , and 36.3 to 36.9° C for the preterm neonate. Hypothermia occurs when the infant’s attempts to maintain a normal temperature fail, which has serious metabolic consequences for the newborn infant.

Hypothermia is one of the main causes of neonatal mortality in developing countries. Neonatal hypothermia at birth increases mortality as well as significant morbidity and hospitalization period (Nayeri,& Nili,2006)

Hypothermia and Cold stress may have serious metabolic consequences for all newborns (EOENBG Guideline – Thermoregulation, 2011). Exposure of the newborn to cold stress results in metabolic acidosis and hypoxemia (Joseph, M.&, Ruth, M., 2007)

Problem originally identified when:

It was noted from the data collected between October 2022 to April 2023 that 45.4% of babies admitted to NICU have temperature below 36.5° C

Increased number of admitted babies complaining of respiratory distress with low temperature.

Objective:

The aim of this study was to decrease the percentage of hypothermia among NICU admissions from 45.4 % to 20 % by one year through implementation of thermoregulation bundle.

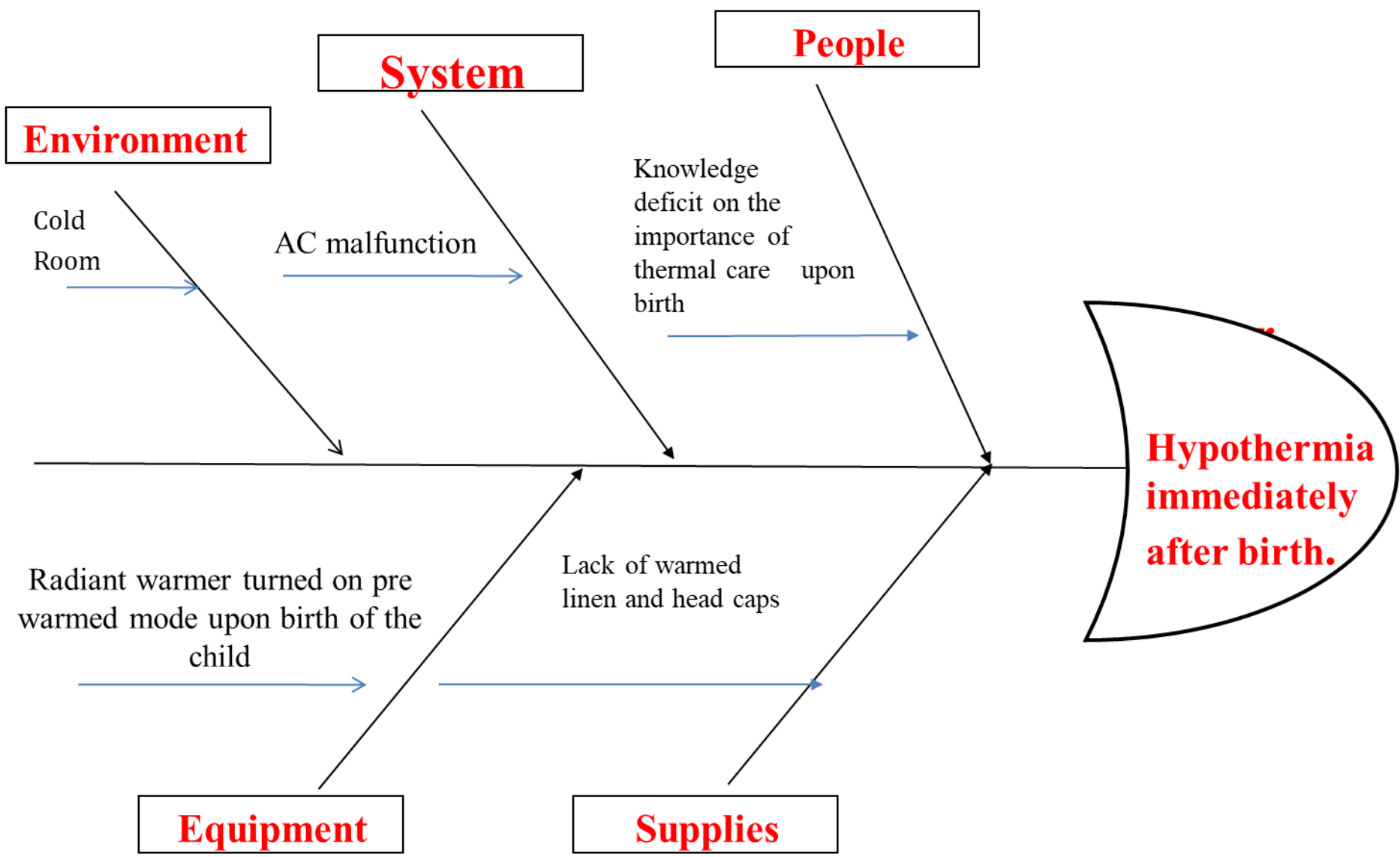
Methods

This study was performed at NICU of our hospital in UAE, from May 2023 to April 2024 and May 2024 to April 2025. All newborn infants who were admitted from the delivery room or the operation room to the neonatal unit were enrolled. Axillary temperature was measured. Body temperature less than 36.5° C within 10 minutes after admission was considered as hypothermia. We standardized the management of thermoregulation from pre-delivery through admission to the NICU with aim to minimize heat loss and maintain normal body temperature. Newborns whose mothers had intrapartum fever were excluded. We compared admission hypothermia rate before and after implementation of thermoregulation bundle. Temperature profiles for different gestational age categories were compared.

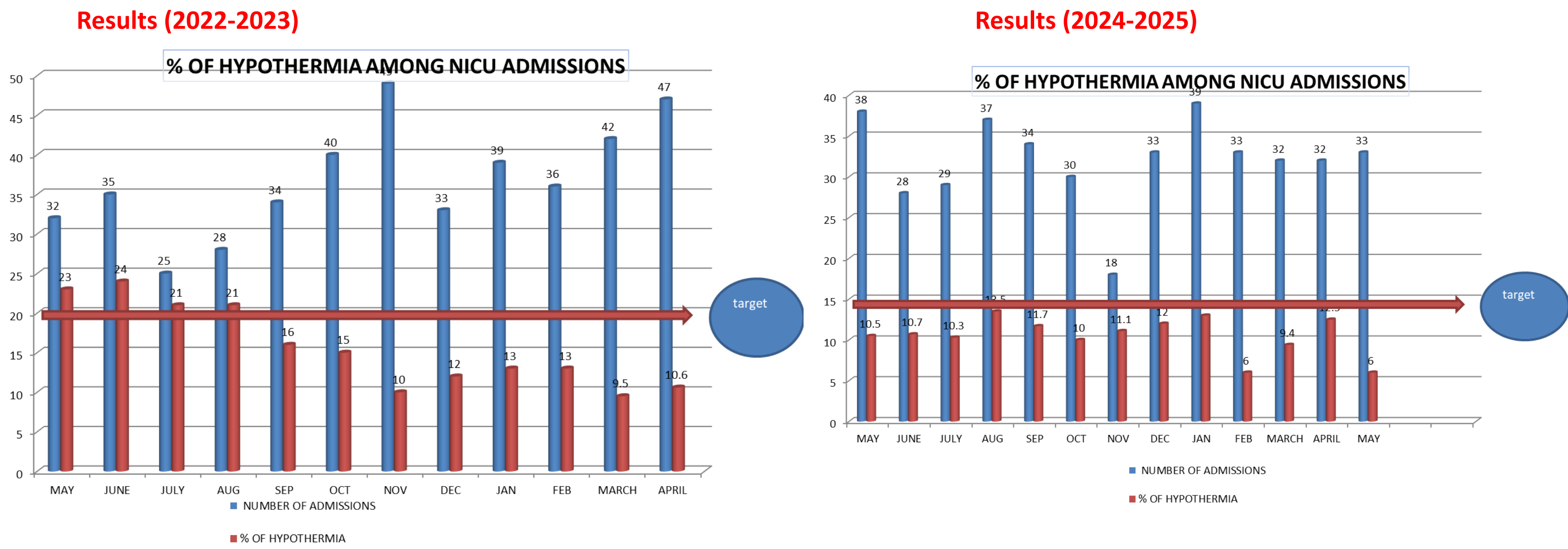
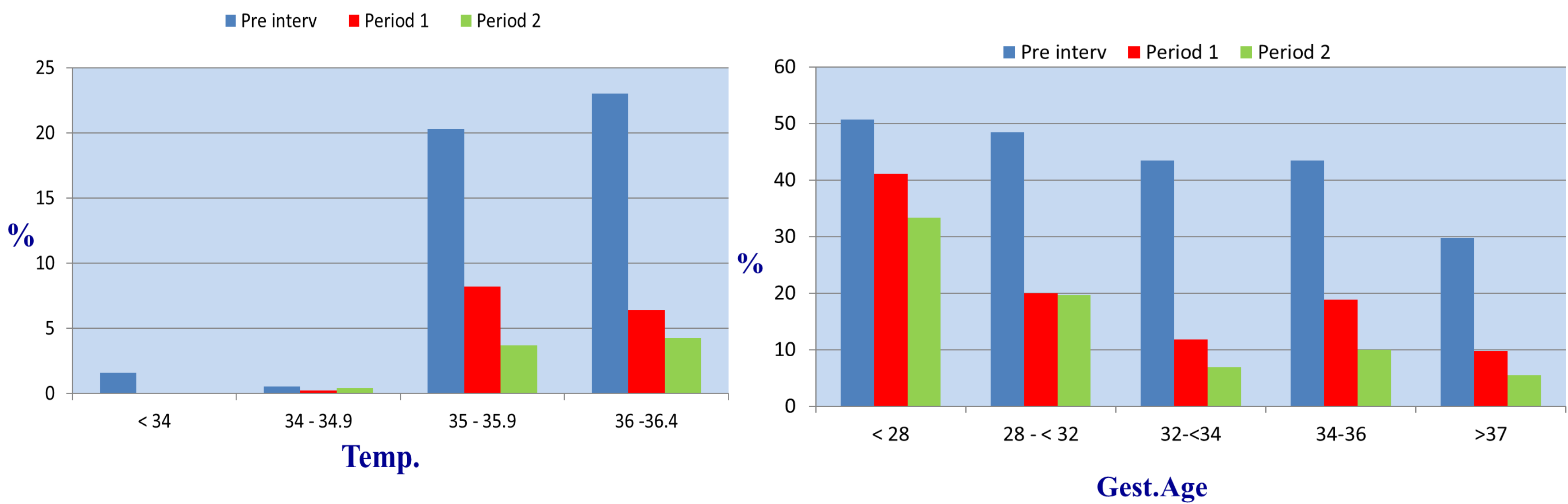
Thermoregulation Bundle

Action	Person Responsible	Start Date	End Date	Status
Use of Neowraps for babies less than 32 weeks and during transportation	NICU nurses and Respiratory therapist	May 2022	July 2023	Practicing /Auditing
Use of warm linens and head caps	NICU and Maternity staff	May 2022	July 2023	Practicing/ auditing
Keep the OT and Maternity delivery room door always closed during delivery	Nursing staffs attending births	May 2022	July 2023	Practicing/ Auditing
Create a log book to track the process of implementation	NICU nurses	July 2022	July 2023	Practicing

FISH BONE DIAGRAM



Results



Discussion

Admission neonatal hypothermia remains a worldwide problem across all climates. Results during the pre intervention period demonstrate high prevalence of admission hypothermia in all gestational age subgroups with highest rate in extremely preterm newborns. After the implementation of thermal bundle we compared data before and after interventions. In our study hypothermia rates decreased in term/late-preterm as well as in preterm newborns. Admission neonatal hypothermia remains a worldwide problem across all climates. Results during the pre intervention period demonstrate high prevalence of admission hypothermia in all gestational age subgroups with highest rate in extremely preterm newborns. After the implementation of thermal bundle we compared data before and after interventions. In our study hypothermia rates decreased in term/late-preterm as well as in preterm newborns. Incidence of admission hypothermia is comparable with reported studies. Most of the studies are focused on premature newborns. In California, prevalence of admission hypothermia in population based cohort of 8782 VLBW newborns was 56.2% . VON data 2022 reported hypothermia rate of 19.5 % . In EPICure study, 40 % of newborns less than 26 weeks gestation were hypothermic on admission. The UK National Neonatal Audit Program also reported that over 40%, < 29 weeks gestation were hypothermic. In 56 Canadian hospitals, 24% of full term infants and 62% of early preterm infant were hypothermic following resuscitation efforts.

Conclusion

We developed and implemented an evidence-based protocol, and evaluated outcomes. Close attention to the thermal management will facilitate the process of smooth postnatal adaptation. Implementation of thermoregulation bundle resulted in decreasing admission hypothermia rate. We have sustained our improvement during the second ongoing period. Optimal thermal care can reduce neonatal morbidity and mortality.

References

Watkinson M, Davis K, Oleka G, Gray D, Fitz-Simon N, on behalf of the NNAP Project Board. Annual report 2012 National Neonatal Audit Programme. London: Royal College of Paediatrics and Child Health; 2013: 5-15.

World Health Organization . Thermal protection of the newborn: A practical guide. World Health Organization; Geneva: 1997. Report No.: WHO/RHT/MSM/97.2.

Ringer S. Core Concepts: Thermoregulation in the Newborn, Part II: Prevention of Aberrant Body Temperature. NeoReviews Vol. 14 No. 5 May 1, 2013: e221-e226

Costello K, Hennessy E, Gibson AT, Marlow N, Wilkinson AR. The EPICure study: outcomes to discharge from hospital for infants born at the threshold of viability. Pediatrics 2000; 106 (4): 659-671.

Miller SS, Lee HC, Gould JB. Hypothermia in very low birth weight infants: distribution, risk factors and outcomes. J. Perinatol 2011; 31 Suppl 1: S49.

Mitchell A, Niday P, Boulton J, Chance G, Dulberg C. A prospective clinical audit of neonatal resuscitation practices in Canada. Adv Neonatal Care. 2002;2:316-326.

6VON Database of very low birth weight infants. Report of infants 501 to 1500 grams born in 2012; Vermont Oxford Network; 2013.