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Standard Warmer Protocol on Selected Physiological Parameters of Low Birth Weight Babies in NICU

S.K. Mohanasundhari

Author Affiliation
*M.Sc, Pediatric Nursing, Faculty, College of Nursing AIIMS Jodhpur, Rajasthan, India.

Reprint Request
S.K. Mohanasundhari,
M.Sc, Pediatric Nursing, Faculty, College of Nursing, AIIMS Jodhpur-342005, Rajasthan, India.
E-mail:
roshinikrishitha@gmail.com

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Abstract

Most infants can be safely and adequately cared for in either incubator or radiant warmer bed. The purpose of this study is to determine whether the implementation of standard warmer protocol causes a greater influence in maintenance of normal physical parameter of the Low Birth weight babies. One group pre-post test only design was adopted for this study. Total enumerative Sampling technique includes 60 low birth weight babies weighing below 2500g admitted in Tayma general hospital during the study period. Tools consist demographic variables and physiological parameters such as temperature, heart rate, respiration, oxygen saturation, activity, appearance/ colour, fluid status, feeding capacity/24hrs were monitored The data were collected over 3 months by Bio-physiological method (in-vivo). Descriptive and inferential statistics were used to analyse the date. The result showed standard warmer protocol is effective in maintaining normal physiological parameter of LBW babies in NICU.

Keywords: Standard Warmer Protocol; Physiological Parameters; Low Birth Weight Babies and NICU.

Introduction

Survival of each newborn depends on the ability for it to regulate its body temperature. While full-term and healthy neonates (newborns) do not have serious problems with thermoregulation, preterm and sick babies often are not able to keep their body temperature and other physiological parameters at a constant level without any external assistance. Without the environment in which a preterm neonate can maintain a normal body temperature (37°C), it will risk cold stress and hypothermia, which may cause an increase in the morbidity and mortality. There are three general ways to keep term and preterm newborns warm and these include incubators, radiant warmers and heated mattresses. The first two are in common use in hospitals. The incubators were invented earlier than radiant warmers and they provide an enclosed environment with warm air circulating inside the device. Radiant warmers are open devices. They consist of a radiant heater placed above a neonate lying on a crib. In this case, a child is heated by a source of radiant heat. The power of this source is servo-controlled from the skin temperature. The main advantage of these devices over incubators is the ease in the access to the baby, thus enabling various medical interventions. However, there are also a few concerns when using radiant warmers. The main drawback is that they increase evaporative heat losses from the newborn body. This is due to the fact that premature and low birth weight babies have a very thin and permeable skin and this, combined with a strong radiation source, yields high evaporative heat losses through the skin. This

situation is likely to result in serious dehydration in the case of very premature babies.

By keeping this problem in view a study was conducted to develop a protocol to care a baby under warmer especially LBW babies which helps in keeping their body temperature in constant as well as maintains fluid balance with other physiological status.

Problem Statement

"A Study to develop and assess the effectiveness of standard warmer protocol on selected physiological parameters of Low Birth Weight Babies in NICU, Tayma General Hospital, Saudi Arabia"

Research Question and Purpose

Develop and determine whether the implementation of standard warmer protocol causes a greater influence in maintenance of normal physiological parameter of the Low Birth weight babies.

Objectives of the Study

1. To assess the selected physiological parameter of low birth weight babies at birth.
2. To develop and assess the effectiveness of standard warmer protocol on the selected physiological parameters of low birth weight babies in NICU.
3. To associate the selected demographic variables with of mean score of selected physiological parameters of low birth weight babies in NICU.

Criteria

Inclusion Criteria

- Low birth weight babies below 2.500gm
- Low birth weight babies born in Tayma general hospital

Exclusion Criteria

- Low birth weight babies with severe birth complications and illness.
- Low birth weight babies under Incubator and mechanical ventilator
- Low birth weight babies who referred out with in 24 hours after birth.

Materials and Method

- *Study Approach:* Quantitative approach
- *Study Design:* Pre experimental designàone group Pre and post test only design
- *Setting of the Study:* Clinical settingà NICU Tayma General Hospital, Saudi Arabia
- *Target Population:* Low birth weight less than 2500 gm.
- *Accessible Population:* Low birth weight babies admitted in TGH, Saudi Arabia
- *Sampling Technique:* Non probability- Total enumerative sampling technique
- *Sample Size:* 60

Development and Description of the Tool

Section 1: Demographic variables such as age in days, sex, APGAR score at birth, weight, gestational week of the baby and mode of delivery.

Section 2: An observational check list contains physiological parameters. A total score is 8.

Table 1: Observational check list

S. No	Physiological Parameters	Yes (Score- 1)	No (Score-0)
1.	Temperature	36.5-37 ^{o} C	<36.5 or >37 ^{o} C
2.	Heart rate	120-160 beats/min	<100 or >160 beats/min
3.	Respiration	30-60 breaths/min	<30 or >60 breaths/min
4.	Oxygen saturation	95-100%	< 95%
5.	Activity	Normal activity	Decreased activity
6.	Appearance / colour	Pink	Pale, blue.
7.	Fluid status	Moist/ Elastic	Dry and scaly
8.	Feeding capacity	Normal	Decreased

Score	Interpretation
7-8	Physiological parameter well Maintained
5-6	Physiological parameter moderately Maintained
<5	physiological parameter poorly Maintained

- *Ethical Clearance:* Permission obtained from the ethical committee of the TGH and consent from parents of LBW babies.
- *Method of Data Collection:* Observational and bio physiological method (in-vivo). (Thermomer, pulse-oxymeter, Cardiac Monitors were used)
- *Data Collection:* physiological parameters at birth and consecutive days at same time of birth until complete recovery were recorded.
- *Duration of Data Collection:* 5 months
- *Pretest:* Conducted to assess the feasibility of the study design and tools.
- *Data Analysis:* Parameters at birth and at 24 hours were analyzed through descriptive statistics (Tables, diagram, and measures of central tendency) and inferential statistics (X^2).

Description of the Intervention

A warmer protocol was developed and implemented over 60 Low birth weight babies from the time of birth until complete recovery. Daily Physiological parameters were compared with the previous day result.

Warmer Protocols

1. Perform hand hygiene before initiating new contact with baby and after each contact with the baby.
2. Ensure that the temperature of the room is 22^{0}C.
3. Place the warmer away from air currents.
4. Clean the mattress and platform, and cover the mattress with clean linen sheet.
5. When it is known beforehand that a baby is to arrive in the newborn unit, turn on the warmer at least 20 minutes prior to pre-warm the linen and mattress so that the baby does not lie on a cold surface initially.
6. Read temperature on display. Adjust heater output to:

   High: If baby temperature is below 36^{0}C

   Medium: If baby temperature is between 36-36.5^{0}C .

   Low: If baby temperature is between 36.5-37.5^{0}C
7. Once the baby's temperature is between 36.5-37.5^{0}C, switch on the servo mode/skin mode.
8. If baby is in supine position place the skin probe on the right hypochondrium. When in prone position, place the probe on the loin area. To prevent skin injury, place tegaderm and fix the probe on it with an adhesive.
9. Look for probe displacement when the baby is in servo mode. Check for and ensure proper probe placement every hour.
10. Change the probe site for every 12 to 24 hours.
11. Ensure that the baby's head is covered with cap and feet secured in socks and the baby is clothed or covered unless it is necessary for the baby to be naked or partially undressed for observation or for a procedure.
12. Maintain dry linens and diapers
13. Place only one baby under each radiant warmer.
14. Turn the baby frequently while under the warmer, if possible.
15. 15 Check the temperature of the warmer and of the room every hour, and adjust the temperature setting accordingly.
16. Record the heater output in each shift (every 6 hours). (Any sudden increase in heater output is an early indicator of sickness).
17. Move the baby to be with the mother as soon as the baby no longer requires frequent procedures and treatment. If in servo mode the heater output is >20% it is safe to shift the baby at mother side.
18. Postpone weaning from warmer for 24 hours if axillary temperature is less than 36.4°C at two consecutive readings
19. Use manual mode only for pre-warming, during resuscitation and initial stabilization
20. When "Skin temperature alarm High or Low" change to manual mode with maximum output if baby is having low temperature and adjust the temperature to try and normalize the baby's temperature. If baby is having fever, shift to manual mode and set appropriate heater output. Check for signs of infection.
21. For low birth weight or sick neonate adjust heater output depending on baby temperature in manual mode.

22. Never use full (100%) heater output unsupervised.
23. Record baby temperature every 2-4 hourly when it is in manual mode.
24. Give 6 to 10 feeds per day at 1st week, 6-8 per day at 2week-1 month.
25. Monitor the fluid status of the baby. liberal use of caps, and socks to reduce the IWL under the radiant warmer.
26. Apply sterile liquid paraffin or non irritating oil on the skin to reduce evaporative losses from skin.
27. Administer 80 ml/kg/day of 10% dextrose on day 1 of life for Preterm baby with birth weight 1000-1500 grams. For Term babies and babies with birth weight > 1500 grams. total fluid therapy on day 1 would be 60 ml/kg/day. It is provided as 10% dextrose. A day 2-7 it can be max of 150ml/kg/day. For >7 days it can be 150-160 ml/kg/day.
28. Use a warmed, humidified environment for increased insensible water loss.
29. Notify physician/practitioner of temperature instability of infant, extreme fluctuation of isolette temperature or out of not to exceed range if using skin control, hypo or hyperthermia, or inadequate growth pattern.

Result

The study showed that LBW babies were not able to maintain physiological parameter with in normal range at birth were as 23 % (14) of LBW babies were able to maintain moderately, the mean pre test score was 5.3 with SD of 0.26 and majority (77%) (46) of LBW babies were unable to maintain physiological parameter, the mean pre test score was 3.5 with SD of 0.49.

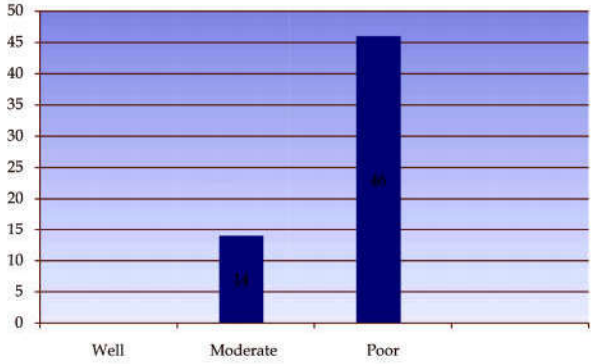

Fig. 1: Pre test status (at birth)

The study result showed that after implementation of an standard warmer protocol, around 42(70%) low birth weight babies were able to maintain normal physiological parameter, the mean post test score was 6.95 with SD of 0.75, were as 18 (30%) Low birth weight babies were able to maintain physiological parameter slightly less than normal limit, the mean pre test score was 5.6 with SD of 0.60. And study result also showed no babies were poor in maintaining physiological parameter .

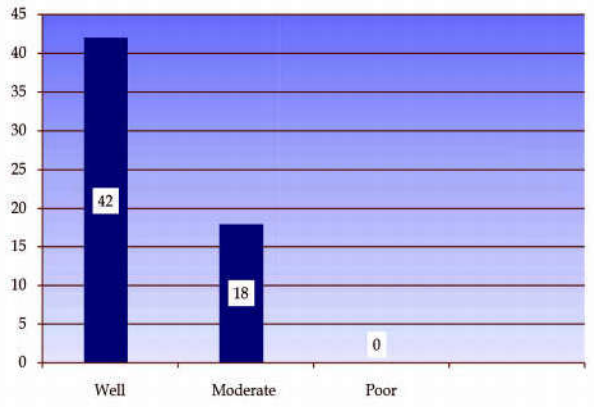

Fig. 2: Post test status for 24 hours after birth

It also found that there is a significant association exit between APGAR score at birth, weight of the baby, and gestational week of the baby. And no association exist between sex and mode of delivery with physiological parameters. Association was tested with chi square test, with 5% level of significant.

Discussion

It was found that implementation of standard warmer protocol is effective in maintaining normal physiological parameter of LBW babies in NICU. The results indicate benefits for the use of the standard warmer protocol for LBW babies. Age in days, APGAR score at birth, weight of the baby, and gestational week of the baby was major extraneous variable and in this study it showed there is association between those variables.

Conclusion

Despite improvements in neonatal care during the past 10 years, death of LBW babies are the second leading cause of neonatal mortality. Very low-birth-weight infants are vulnerable in the delivery room because of their gestational age, birth weights, and

immaturity, which puts them at risk to the effects of the environment . Neonatal health care providers must begin to implement evidence-based practices and best practices to address the needs of vulnerable infants beginning in the first minutes of life.

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