HOB Session 011

Patient Case

Dr Cissy Nampijja

Biodata

B/O ;N. I

Age: 13DOL

Sex :Male

Date of admission: 5/03/2026

Date of discharge :17/03/2026

Duration of hospital stay :13days

Pc

Received a LBWT/PT at 33wks by Ballard , bwt 1.8kgs a referral from Double cure medical cure medical center for further management.

Delivered by EMC/S secondary to eclampsia and IUGR (mother convulsed on the way to theater)

At referral site was managed for –RDS on CPAP, loaded with caffein citrate –at 20mg

- potential Neonatal sepsis on iv gentamycin and iv ampicillin

At admission, -baby was in severe Respiratory Distress (grunting), baby was transported in thin sheets and warm chain transport was not observed.

-cyanosed

-cold extremities

Initial assessment

O/E: Baby was blue, hypothermic with a temp of 34.6, jaundiced with mild pallor no edema and no dehydration. RBS 1.2mmol/l

RS: In severe distress SAS 7/10 , tachypneic RR- 72 bpm,spo2 98% on BCPAP PEEP 6cmh20, equal air entry bilaterally with occasional crepitation.

CVS : cold extremities, CRT< 3s HR – 119bpm, HS 1 and 2 heard and normal.

P/a: normal fullness soft, hepatomegaly 4cm BCM, bowel sounds present with normal pitch and frequency.

Cns : fully conscious HC- 30cm ant fontanelle narrow but normotensive good moro and grasp reflex with normal tone in all limbs.

Impression

A LBW/PT, AGA with, - RDS

- Hypothermia
- Hypoglycemia
- Potential Neonatal sepsis
- Neonatal hyperbilirubinemia r/o TORCHES

PLAN

Put baby on the radiant warmer and take the temperature every 1 hour until target of 36.5-37.5

Given a bolus of D10% AT 2ML/ KG

Put on BCPAP PEEP OF 6CMH20

Do CBC, CRP, blood group , blood culture, PT INR APTT , TSBs, Syphilis test.

Iv ampiclox 90mg bd

Iv gentamycin 9mg od

Iv caffein citrate 18mg od

TFI – 80ml/kg/ day – iv D10%- 12ml/2hrly

Take more history from the mother in regards to ANC and torches screening.

In consultation with Neonatologist, plan was to give surfactant (200mg /kg)

Monitor vitals 1 hourly

- **Results**
- Blood group; AB positive
- CBC –Hb 10.6 , Hct 30.6 , Plt , 218, Wbc 9.15, Anc 5.56
- CRP 0.1mg/l
- PT 17.80 INR 1.425, APTT 35.1 –(given iv vit k 1mg od x3/7)
- TSBs – Total bilirubin 102.4, direct 9.8,
- Tsbs -77.6BPL

2 hours after admission

Baby was warm at temp 36.6 , rbs 5.1mmol/l

SAS 3/10 – given 4.5mls of surfactant

Spo2 – 99% on BCPAP PEEP 6cm H20

Follow up

06 -8/03/ 2026

5DOL, GA- 33weeks by Ballard CGA 33.5/7 WKS.

Current status

Baby was stable, tolerating feeds well and mother was doing KMC well about 8hours.

Completed 48hrs of antibiotics.-blood culture –No growth

O/E: baby was in a pink , tinge of jaundice , temp 36.7, no cyanosis, no edema, no dehydration.

R/S: not in distress, SAS 1/10, RR- 54bpm, equal air entry bilaterally chest clear.

Cvs : warm extremities, crt < 3s, PR- 145bpm, HS 1 and 2 heard and normal

p/a : normal fullness, soft , no palpable organs

Cns: fully conscious, anterior fontanelle normotensive, normal tone in all limbs, good Moro reflex and grasp reflex.

IMPRESSION

LBWT/PT with 1. Resolved RDS

2. Neonatal hyperbilirubinemia –resolving

Plan

Iv caffein citrate 18mg od

Cont- KMC and fill in the kmc score sheets

- wean off to free flow

TFI 140ml/kg /day

EBM 90ml/kg /day – 13ml/2hrly

Iv D10%-5oml/kg /day- 7.5ml/2hrly

Transfer to baby unit

Repeat TSBs – 57BPL

From 9- 16 / 03/ 2026

- 12DOL, GA 33wks by Ballard CGA 34.6D.

Status:

Baby was stable, tolerating feeds, off oxygen, on supplements grovit, folic acid , and Enrich. Mother was doing more kmc – 10-12 hours.

- Cranial ultrasound scan was done – normal

O/E: baby was in a pink , tinge of jaundice , temp 36.8, no cyanosis, no edema, no dehydration.

R/S: not in distress, SAS 9/10, RR- 44bpm, equal air entry bilaterally chest clear.

Cvs : warm extremities, CRT < 3s, PR- 155bpm, HS 1 and 2 heard and normal

p/a : normal fullness, soft , no palpable organs

Cns: fully conscious, anterior fontanelle normotensive, normal tone in all limbs, good Moro reflex and grasp reflex.

CONT

IMPRESSION

LBWT/PT – Stable

Plan.

1.TFI 160ml/kg /day

EBM- 24ml/2hrly by cup

2. Initiate breast feeding.

3. Do ROP screening – zone 1 with anterior segment structures normal – given intravitreal Avastin given.

Gutt drops x4 2/52

Cont –grovit drops , enrich and weekly folic acid

- oral caffein citrate- held

- kmc

ROP review on 31/03 /2026

17/03/2026

Baby was discharged,

LBWT/PT at 33weeks by Ballard CGA 35 weeks

Bwt 1.8kg , discharge weight 1.77kg

In a good general condition,

Vitals –temp 36.5. sp02 995 on Room air, PR 134bpm, RR- 55bpm.

Plan

Cont – enrich, grovit drops, weekly folic acid, gutt eye drops.

Reviewed In the neonatal follow up clinic on 24/03/2026.

Mother was educated on the danger signs.

Thank you

HYPOTHERMIA IN NEWBORN
15th/5/2026

PRESENTERS:

1. Dr. Ritah A Nazziwa-Neonatologist, Nsambya Hospital

2.Babra Muga C. Midwife-Kayunga RRH

INTRODUCTION

- Hypothermia is defined as a condition in which a newborn's body temperature falls below **36.5°C (97.7°F)**.
- Temperature regulation immediately after birth and throughout the neonatal period is very critical for the survival of the neonate.
- The normal temperature range for neonates is **36.5 - 37.5ºC.**
- Neonates are at an increased risk of hypothermia
  - Thin skin
  - Little subcutaneous fat, large body surface area to volume ratio
  - Increased evaporative fluid losses from the skin,
  - Depend on mainly brown fat for heat production(little amounts).

Introduction- cont.

- Temperature instability during transport remains a challenge particularly in LBW neonates
- The greatest risk of hypothermia occur in the minutes after birth
  - A wide difference between in-utero (38°C)and environmental temperatures (<25°C
- Without precautions, the body temperature can rapidly drop by 2°C to 3°C in just a 20 – 30 minutes (1,2)
  - Important to prevent hypothermia in a newborn immediately after birth with warm chain

1.Adamsons K, et al 1965

2.Dahm et al 1972

“History of Neonatal care and thermo control”

- Pierre Budin (first neonatologist) reported the importance of thermal control in the newborn.

  He reported increased survival rate when infants’ rectal temperature was maintained

- “ He also noted that without the use of incubators for preterms less than 1500gms, the likelihood of death was close to 100%, especially if the rectal temperature dropped to less than 32°C.

- And this was further confirmed by Silverman when he studied “ *two contrasting environmental temperatures upon time survival rates of premature infants in the first 5 days of life .”*
  - *Infants who were placed in incubators with an air temperature of 31.7°C (89°F) had a higher survival rate than controls who were in incubators maintained at 28.9°C* (84°F)”
  -

Epidemiology of Hypothermia

- The incidence of hypothermia at time of admission to the NICU in VLBW newborn ranges from 31% to 78% (1,2)
- Among the 1686 infants born at <27 weeks , in England the incidence of hypothermia was 14% and an independent risk factor for death and oxygen dependency (3)
- In Ethiopia, 67% of low birth weight and high-risk infants admitted to a special care unit from outside were hypothermic
- A Study from Nsambya Hospital reported 87% of all preterms had hypothermia at the time of admission to Newborn unit (4)
- Prevalence 1st 2 hours in Lira regional hospital was 67.6% (5)

1.Watkinson M et al 2006 2.Zymakiewicz M et al 2003 3. Ostebeloe et al 2006 4. Cheptoris et al 2016 5.Akao et al 2025

Hypothermia and neonatal mortality

- Admission temperature in NICU is a strong predictor for neonatal mortality
- Each 1°C decrease in axillary temperature is associated with a 28 - 75% increase in neonatal mortality (1)
- In India, hypothermia on admission to the special care unit
- Associated with a mortality rate twice that of infants admitted with a normal temperature.
- A need for meticulous thermal care during resuscitation and transport

1.Abbot et al 2010

Classification of hypothermia

Classification	Temperature
Normal	36.5°C – 37.5°C
Mild hypothermia	36.0°C – 36.4°C
Moderate hypothermia	32.0°C – 35.9°C
Severe hypothermia	Below 32°C

Causes of hypothermia

Environmental factors

- Cold delivery room recommended room temp is above 25°C.
- Failure to dry the Baby Immediately
- Early bathing
- Inadequate wrapping
- Separation from mother
- Exposure during transport or procedures

Baby-related causes

- Prematurity and low birth weight
- Birth asphyxia
- Hypoglycemia
- Sepsis

Infants with highest risk of hypothermia

- Preterm infants
- Small for Gestational age (SGA)
- Infants who require prolonged resuscitation
- Infants that are acutely ill – with infectious, cardiac, neurologic and endocrine problems,
- Infants with surgical problems – e.g. those with gastroschisis

Differentials for Hypothermia

- Environmental/Heat loss
- Neonatal sepsis
- Hypoglycemia
- Intracranial pathology e.g. intraventricular hemorrhage, birth trauma,
- Congenital heart disease
- Metabolic- Organic acidemias, urea cycle disorders, fatty acid oxidation disorders
- Endocrine disorders- Congenital hypothyroidism, adrenal insufficiency
- Shock

Clinical Features of Hypothermia

Mild Hypothermia:

Cold hands and feet

Irritability

Poor feeding

Moderate Hypothermia

Lethargy

Weak cry

Poor suckling

Hypoglycemia

Severe Hypothermia

Apnea

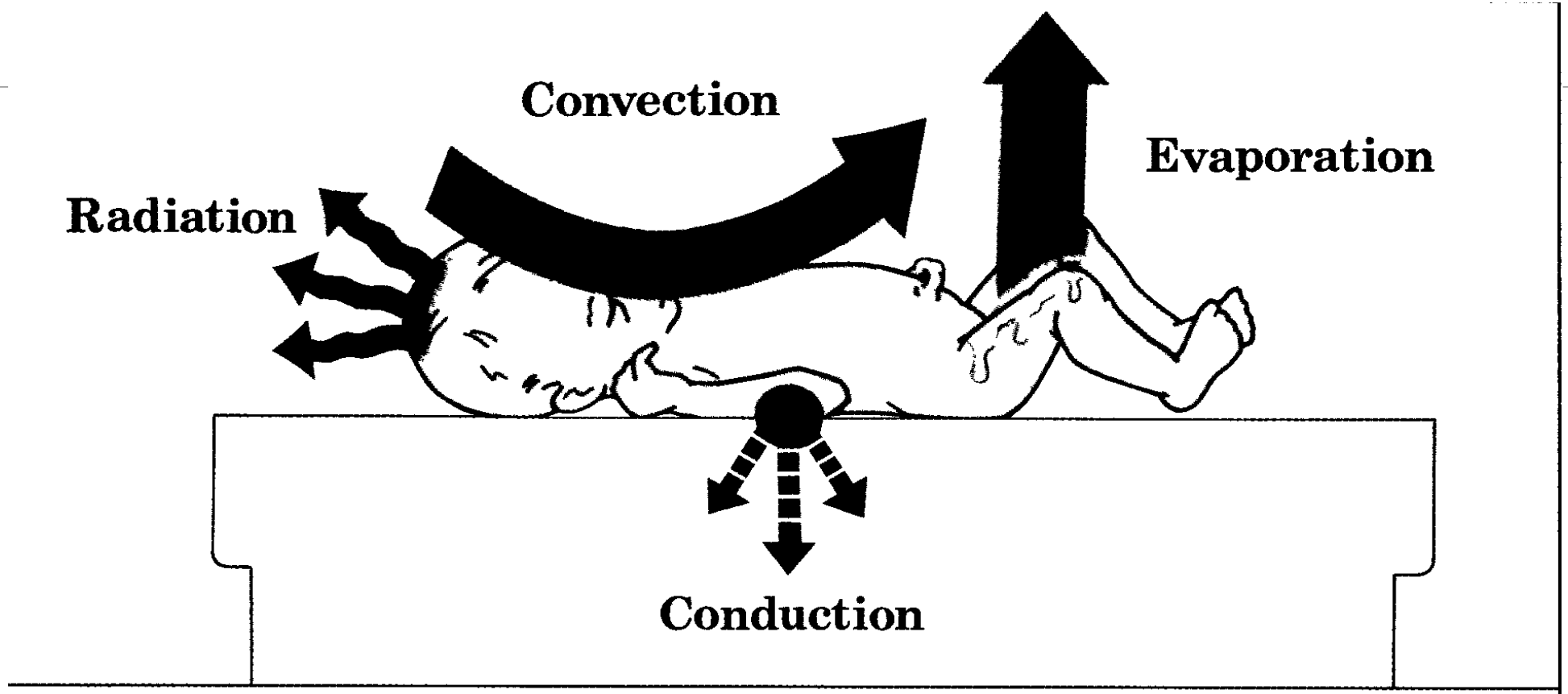
Cyanosis

Bradycardia

Coma

Shock

Mechanisms of heat loss



Four ways a newborn may lose heat to the environment

Conductive

- Heat loss occurs when the infant is in contact with a cooler surface or object.

Can occur…

- When an infant is placed on a cold surface (such as a scale or bed)
- When infant is wrapped in wet or cold blankets or cloths
- By using a cold stethoscope for exam
- By touching infant with cold hands

Radiation

- Heat loss occurs when the infant's body heat is lost to cooler objects which the infant is *not* in direct contact with.

Can occur…

- If infant is surrounded by cooler surfaces and objects, such as cool/cold windows, walls or doors
- The colder the surfaces the greater the heat loss

Convection

- *H*eat loss occurs when the infant's body heat is lost to cooler air moving around the infant.

Can occur…

- If infant is exposed to drafts from open windows or doors, from fans or air conditioners
- When the incubator is opened, even when the portholes are just opened
- When cold oxygen is blown over face or body
- Heat loss is accelerated when temperature of air is colder and air flow is higher

Evaporative

- Heat loss occurs as moisture on the infant's body surface or from the respiratory tract vaporizes.
- Can occur…
  - At delivery if infant is not immediately *and* thoroughly dried and wet cloths used to dry infant are not removed
  - If infant's skin is not intact (presence of a large wound, spina bifida, exomphalus [omphalocele] or gastroschisis)
  - If infant is premature (due to thin skin)
  - If oxygen is not warmed and humidified
  - If the windows are open and air is moving over infant

Management

- The best management is prevention of the hypothermia

Delivery room management (prevention)

The WHO recommends the “Warm Chain,” which consists of 10 interlinked procedures to prevent neonatal hypothermia

1. Warm delivery room: maintain room temperature above 25°C **,** close doors and windows and avoid fans and cold air currents

2. Warm resuscitation: use pre-warmed towels, use a radiant warmer if available and warm resuscitation surfaces

3. Immediate drying; dry immediately after birth before placenta delivery if possible, remove wet towels quickly

This prevents evaporative heat loss.

Cont’

4. Skin-to-Skin Contact: Place the baby on the mother’s chest immediately.

Maintains temperature, promotes bonding, supports breastfeeding, and stabilizes breathing and heart rate

Kangaroo Mother Care, especially for preterm babies.

5. Early Initiation of Breastfeeding: within the first hour, this helps provide calories for heat production and prevents hypoglycemia

6. Delayed Bathing and Weighing for at least 24 hours, and delay weighing until stable

7. Appropriate Clothing and Bedding, i.e., cap/hat, socks, warm clothes, and blankets

Note: The head accounts for major heat loss.

Cont’

8. Rooming-in (Mother and Baby Together); avoid unnecessary separation.

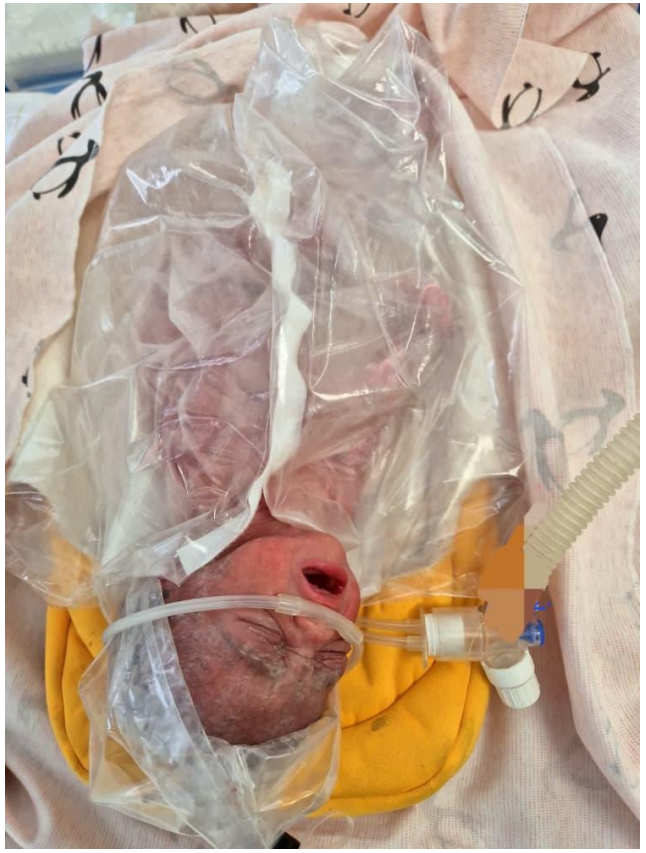
9. Warm Transportation during referral: wrap baby well, continue skin-to-skin care or use warm transport incubators if available

10. Training and Awareness; health workers and mothers should be educated about danger signs, thermal care and warm chain practices

Preterm and the delivery room

- Special consideration for less than 32WOG
- Do not dry the baby- leave the vernix on
  - The vernix reduces water loss(heat loss) through their immature skin
- Place under or inside a plastic/polythene bag
- This should remain until temperature is stable(36.5 to 37.5)
- Cover the head with a cap and extremities with socks
- Warm transport

Preterm in plastic bag/polythene



Preterm in plastic bag/polythene

Why preterm infants have a higher risk

Preterms have difficulty in balancing heat loss with heat production due to the following reasons :

- A larger surface area to body mass ratio
- Weak muscle tone/ poor flexion
- Thinner immature skin – Decreased barrier to water evaporation
- Increased evaporative water loss
- Poor ability to vasoconstrict in the first few days of life
- Decreased amounts of insulating fat
- Reduced amounts of Brown Fat

Warm Transport

- Warm transport from the delivery room to the neonatal unit /postnatal ward is very vital.

- If a baby is not kept warm during transport, there is a significant drop in temperature
  - Even if the temperature at birth is normal

- Exothermic mattresses

Options for Warm transport

- Brennan reported the successful use of exothermic mattresses to maintain body temperature between birth and admission to a neonatal unit.
- Guthrie et al placed neonates of 34 to 41 weeks born by C/S on activated gel mattresses
  - All babies in the study group to have acceptable admission temperatures btn 97.8 F ˚and 99.2 ˚F
- Simple heated water-filled mattresses have been used to prevent hypothermia in term neonates on maternity units.
- Thermal mattresses have also been used to reduce hypothermia during inter-hospital transport of vulnerable neonates
  - Exothermic chemical mattresses can prevent conductive heat losses by ensuring a warm surface for the infant.

Exothermic matresses

- 91 infants transported with exothermic mattress from lower health units to tertiary institutions compared to those without any thermal transport
  - Temperature data was collected
  - on arrival to the referring hospital
  - on departure from the referring hospital
  - on arrival to the tertiary neonatal intensive care unit
- Infants who were transported on an exothermic mattress had a greater increase or greater stability in body temperature

Johanne et al

Warmilu mattreses

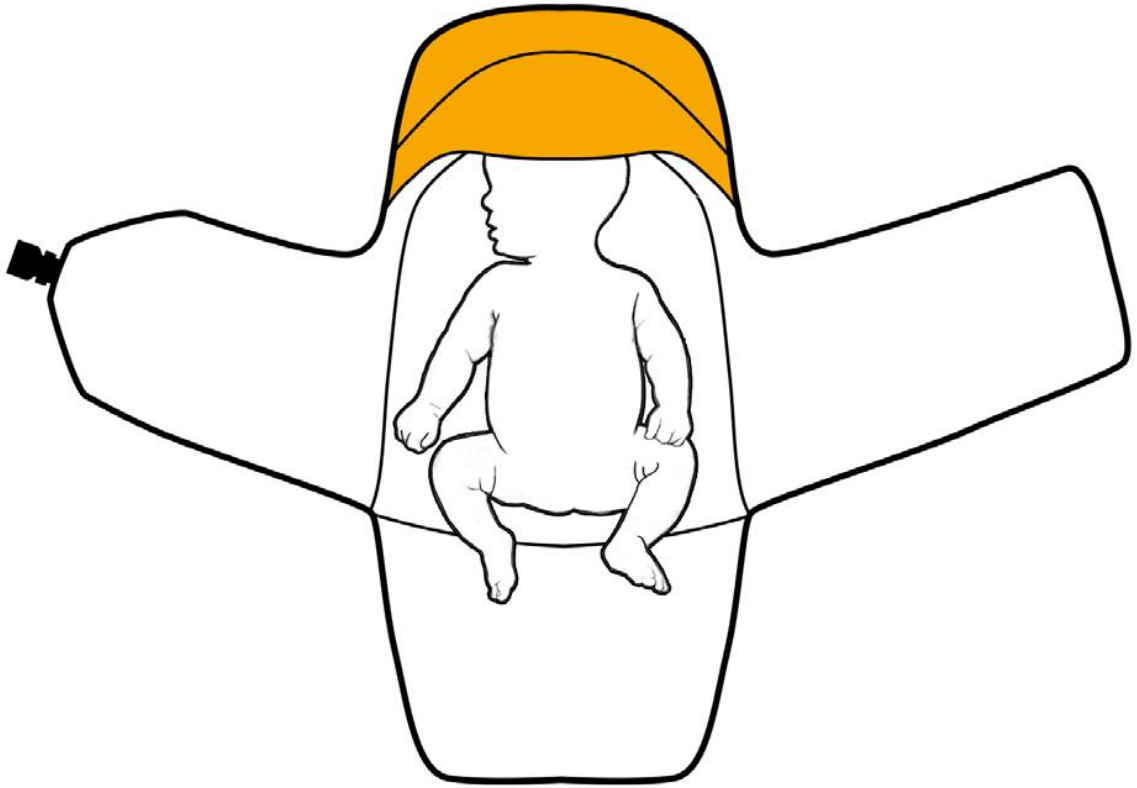
Evidence for warmilu

- Clinical trials were conducted January to March 2013 in India at Kempegowda Institute of Medical Sciences.

- 20 preterm and low birth weight stable infants with no reported morbidity was studied and there was successful thermo-regulation in the infants for at least 3 or more hours at 36.5-37.5°C.

- These results suggested that the heat source may be used for thermo-stabilization and have implications for infant warming on especially vulnerable newborns in emerging countries.

Positioning the Neonate



Management of Hypothermia

MILD HYPOTHERMIA

Rewarm the baby

- Skin-to –skin care
- Warm clothing and cap
- Warm room
- Encourage breast feeding

MODERATE HYPOTHERMIA

- Radiant Warmer or incubator
- Warmed humidified oxygen
- Continuous temperature montitoing
- Check blood glucose

Management –Cont.-Hypothermia

- NICU care
- Servo-controlled incubator/radiant warmer
- Cardiorespiratory monitoring
- Slow controlled rewarming to avoid complications
- Monitor complications and correct them especially hypoglycemia
- Evaluate and treat underlying causes

Complications

Response to hypothermia

- Vasoconstriction (Decreases heat Loss)
- An increase in the release of norepinephrine results in pulmonary and peripheral vasoconstriction.
  - This prevents blood from reaching the skin surface where heat loss occurs
- Blood stays at the core of the body and aids in heat conservation
- Prolonged vasoconstriction leads to
  - reduction in blood flow and oxygen delivery to the tissues
- This increases the risk of developing anaerobic metabolism, and lactic acidosis, resulting in organ and tissue damage

Response to hypothermia-Cont’

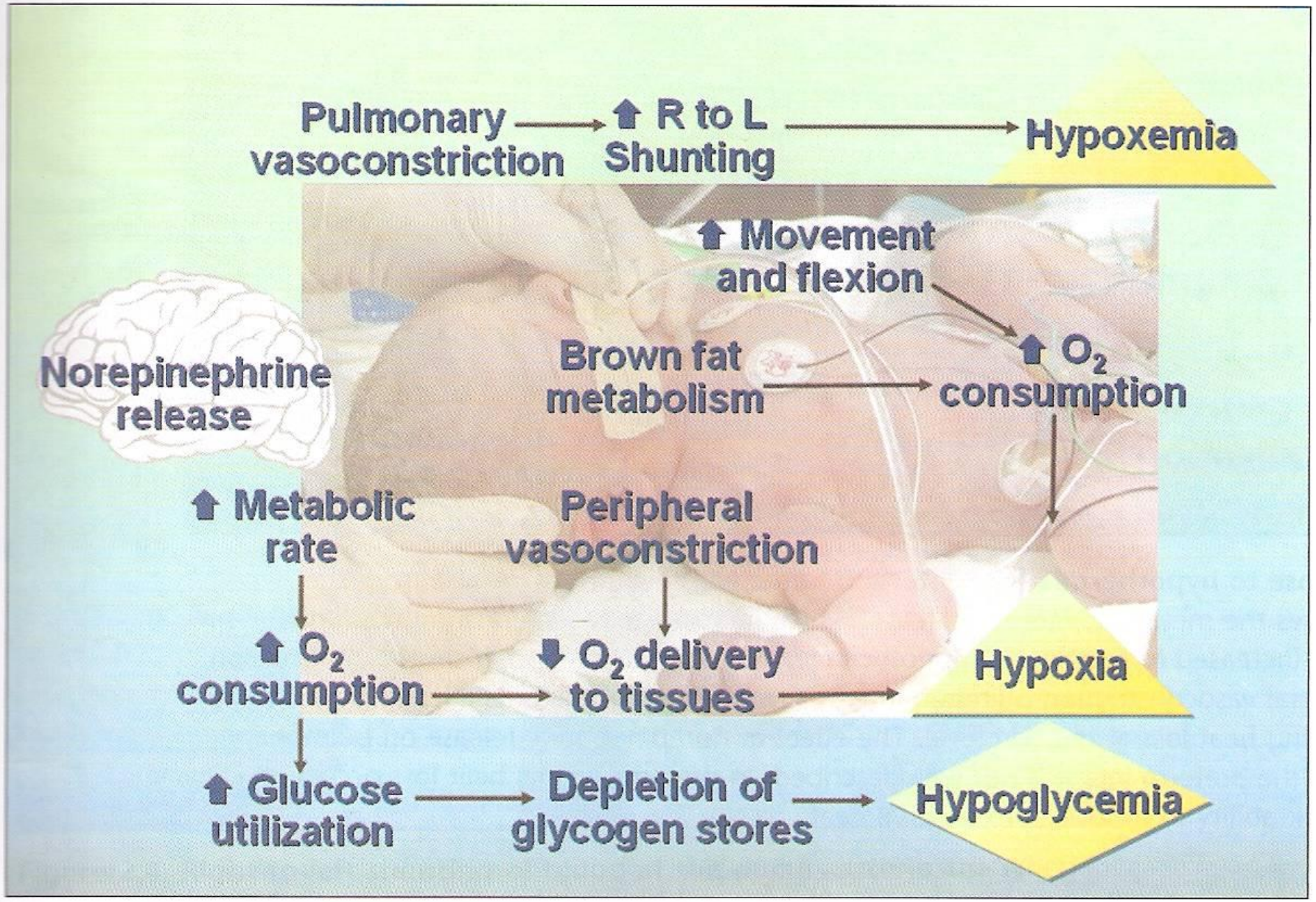
Brown Fat Metabolism – Increases Heat Production

- Brown fat increases with gestational age .
- During cold stress norepinephrine is released into the nerve endings in the brown fat, to be burned and this generates more energy than any other tissue in the body
- This produces heat in the core regions of the body and warms the blood as it circulates past it.(Non shivering thermogenesis)

Response to hypothermia-Cont’

Increased muscle activity and flexion

- This increases heat production and decreases heat loss
  - In response to cold stress, infants have poor capacity to shiver
- They increase their activity by crying and flexing their arms and legs and this reduces the surface area for heat loss

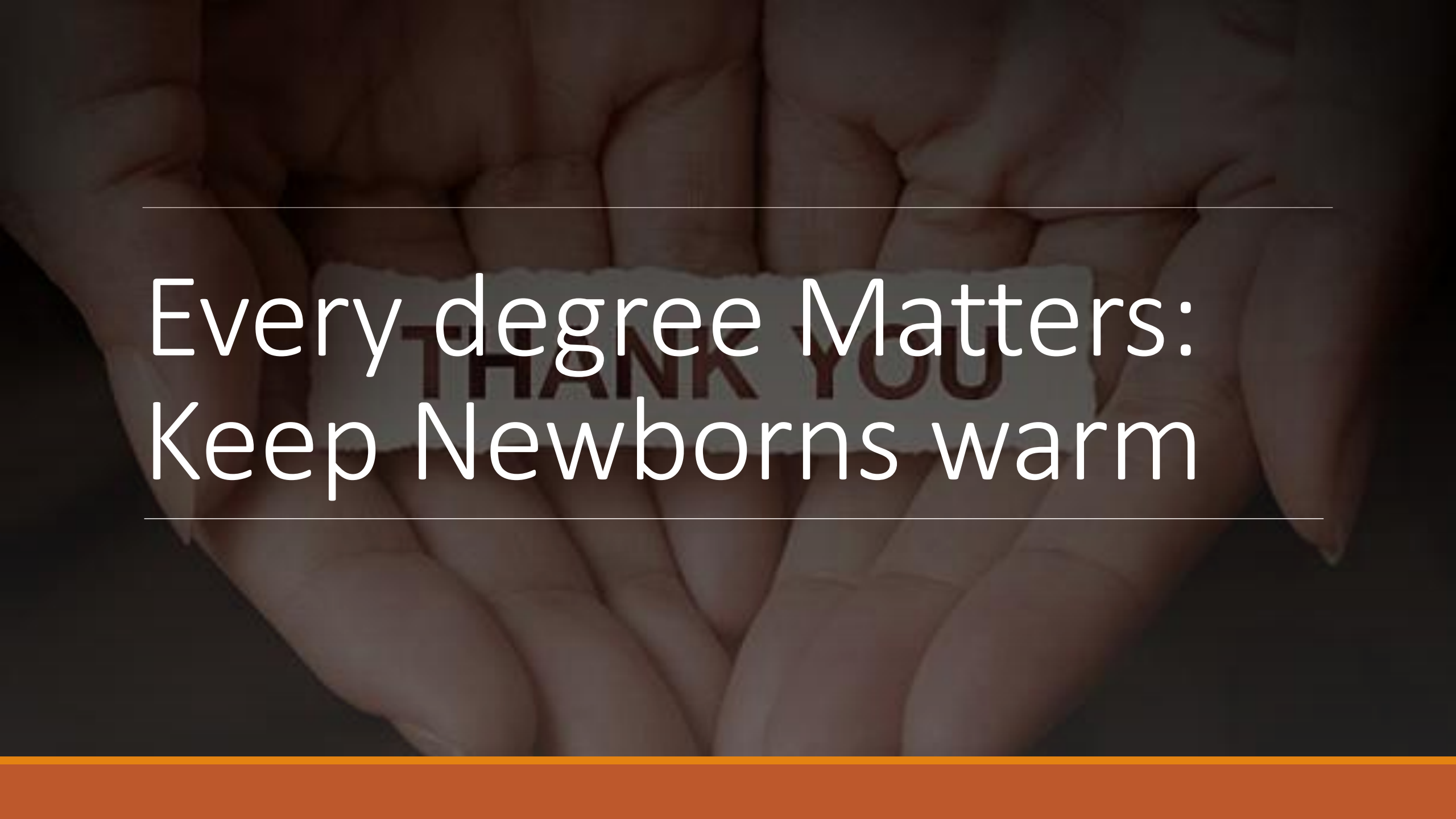

Pulmonary vasoconstriction
↑ R to L Shunting
Hypoxemia
↑ Movement and flexion
Norepinephrine release
Brown fat metabolism
↑ O_2 consumption
↑ Metabolic rate
Peripheral vasoconstriction
↑ O_2 consumption
↓ O_2 delivery to tissues
Hypoxia
↑ Glucose utilization
Depletion of glycogen stores
Hypoglycemia

Complications of hypothermia

- Hypoglycaemic- due to increased glucose utilization to produce heat
- Have abnormal clotting –reduced enzyme activity in the in the coagulation cascade
- Increased risk of respiratory distress. Hypothermia impairs surfactant production
- Pulmonary Haemorrhage – due to pulmonary vasoconstriction and abnormal clotting
- Feed intolerance, which will increase the risk of prolonged hypothermia due to lack of heat production and continued heat loss.
- Increased risk of infection
- Cold injury- fat necrosis

Complications of hypothermia- Cont.

- Anaerobic respiration - Metabolic acidosis(shallow breathing)
  - Interference with resuscitation
- Decreased level of consciousness due to hypoxia and hypoglycemia (glucose is the primary energy source for the brain)
- Increase postnatal weight loss and poor weight gain
  - Increased use of calories
- Hyperbilirubinemia
  - Brown fat metabolism releases non-esterified fatty acids (NEFAs) that compete with bilirubin for albumin binding sites
- Seizures
- Death



Every degree Matters: Keep Newborns warm