**ENVIRONMENTAL CARE**

Developmental care and optimising the comfort and wellbeing of any neonate includes the nursery *environment* -including the acoustic environment, light, thermal environment.

**Noise**

The threshold for cochlear damage for adults is 80-85 decibels and the newborn will have a lower threshold than this as the immature cochlear is more sensitive. In the nursery noises of this magnitude include closing portholes with a snap or placing bottles on the top of the plexiglass incubator. The Ideal sound level for the nursery environment is <50 db (40-45 db)(<http://www.networks.nhs.uk/nhs-networks/staffordshire-shropshire-and-black-country-newborn/documents/Environment%20and%20noise%20%202011-13.pdf>)

Interventions to reduce noise include…….

* turning radio volume down or off
* having designated quiet times during the day (while also remembering to keep to limits at all times)
* close incubator portholes quietly
* encourage staff and visitors to talk quietly, and avoid talking over the infant in an open cot
* avoid banging bin lids
* set monitor alarm limits and tone at appropriate levels and try to silence alarms as soon as possible
* monitor noise levels periodically to identify times and causes of high levels

**Light**

Lighting should be adjustable - the adjustment level range of 100-600 lux is recommended (Graven, 2000; Lasky and Williams, 2009). Constant bright light in the nursery can interfere with natural diurnal rhythms and overstimulate the infant. Interventions to maintain appropriate individualised light environment include………..

* adjustable light levels within each cot bay plus procedure light for observation and procedures
* monitor ambient light levels
* shield infants from bright light with cot covers, eye covers and dimmed lights
* reduce light levels generally in the nursery, maintaining a safe level for accurate clinical observation as necessary (White, 2006)

**MAINTAINING A NEUTRAL THERMAL ENVIRONMENT (NTE)**

**EARLY THERMAL CARE**

For well, term / near term newborns at birth, thermal control can be maintained by BAPM guidelines for the central temperature on admission to the neonatal from Labour ward or other, is 36 degrees Celsius (BAPM, 2005). Neonates born < 28 weeks gestation are placed into a plastic bag at delivery and transferred to the neonatal unit inside this (Kent and Williams, 2008; Rohana et al, 2011). Once on the unit, they should be placed into a humidified incubator.

**Humidification-**

Generally, a neonate < 28-30 weeks, < 1kg in weight and in the 1st 7-10 days should be nursed in 50% - 90% humidity via a closed incubator such as the Ohmeda ‘Giraffe’ or similar to provide their optimum NTE (SEE BELOW).

The level of humidity and time is determined by gestational age, skin maturity and clinical signs (e.g. sodium). Extremely preterm neonates for example may require 85% - 90% for up to 14 - 21 days. Preferably such neonates should be nursed within an incubator that provides humidity OR if nursed on a babytherm, they should ideally completely covered in clear polythene sheeting which is receiving an adequate flow of humidified air.

**In summary**, to minimise transepidermal water loss (TEWL) in extremely low birth weight (<1000g) and premature neonates (≤28 weeks):

1. Place them into a plastic bag at birth until transferred to a warmed humidified incubator (Kent and Williams, 2008; Rohana et al, 2011).
2. Minimise the length of time spent under a radiant heater and move the neonate into a closed incubator as soon as possible
3. Humidify the incubator (up to 85-90% humidity may be required but the range is 50-90% depending on temperature as well as sodium /fluid)
4. In the neonate <26 weeks who has very fragile skin, additional preservation of local humidity around them may be enhanced by plastic wrapping, tucked in to provide an airtight ‘pocket’.
5. After 14 - 21 days, assess each neonate (temperature, fluid & sodium balance) and discontinue humidification (McCall et al, 2010; Lyon and Freer, 2011).

**PROVIDING A NTE**

Any newborn baby / neonate should be nursed in a neutral thermal zone according to their age and weight- i.e. the optimum environmental temperature to maintain a minimum oxygen and energy consumption.

# NTE chart according to birth weight and temperature range

(NB + or – relates to the range: I.E + or – 0.5 means plus or minus 0.5 C)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Age | 1000 – 1200 grammes (+ or – 0.5 C) | 1200 – 1500grammes(+ or – 0.5 C) | 1500 – 2500grammes(+ or – 1.0 C) | >2500 & >36 wks(+ or – 1.5 C) |
| 0-12 hrs | 35 | 34 | 33.3 | 32.8 |
| 12-24 hrs | 34.5 | 33.8 | 32.8 | 32.4 |
| 24-96 hrs | 34.5 | 33.5 | 32,3 | 32 |

|  |  |  |  |
| --- | --- | --- | --- |
| Age | <1500 grammes(+ or – 1.5 C) | 1500 – 2500 grammes(+ or – 1.5 C) | >2500 & > 36 weeks(+ or – 1.5 C) |
| 5-14 days | 33.5 | 32.1 | 32 |
| 2-3 wks | 33.1 | 31.7 | 30 |
| 3-4 wks | 32.6 | 31.4 |  |
| 4-5 wks | 32 | 30.9 |  |
| 5-6 wks | 31.4 | 30.4 |  |

Reference –Gardner et al (2010)

**Monitoring temperature**

Check the NTE is achieved by regular monitoring of the neonate’s central temperature – for methods; *See Assessment section*.

**Methods of keeping neonates warm**

**Closed Incubator** – for premature neonates / LBW neonates. These should be double walled, closed, pre-warmed (to optimum NTE) with provision of adequate humidity as appropriate – see previous.

**Overhead heaters / Babytherms** – For when ease of access is required – e.g. surgical care, for resuscitation, line insertion. However, the ideal situation is to combine both incubator and open access with the use of Giraffe © Incubators (Ohmeda). Open cots used alone provide heat by a radiant heat source from above and some provide conductive heat from below via a special mattress.

**Servo control verses manual control –** The set temperature provided by an incubator or overhear can be controlled by servo or manual means. Servo is ‘baby controlled’ when a probe placed on the neonate’s body (axilla or abdominal area) then controls the temperature setting and heat delivered in order to maintain a desired temperature. Manual control is when the carer / user changes the delivered heat according to temperature takings done at intervals.

**Heated mattress**- can be used in conjunction with an open cot / babytherm type of platform, providing heat from a water filled, heated mattress (or in later models from gel or foam base mattress) - useful for the transition from incubator to open cot in the special care environment.

**Bassinette-** for when a neonate does not require any equipment to help their thermal control. After this, they can be nursed in a cot.

**Transfer to open cot -** When a neonate can maintain temperature in environmental range of 26-28 degrees C and / or when the birth weight is optimum. This depends on individual unit guidelines as well as individual assessment of readiness for each neonate (approx. 1.6kg)(New et al, 2008).

**Recommended room temperatures**Delivery suite – 26 degrees Celsius (BAPM, 2005) / Neonatal unit -- 20 – 26 degrees C. After a neonate has been discharged home – follow guidelines for the prevention of cot death (FSID.org.uk / DoH) - 18 degrees C.

Sources: BAPM (2005), Gardner et al (2010), McCall et al (2010), Lyon and Freer (2011), Turnbull and Petty (2013 a and b).

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