

THAMES VALLEY & WESSEX NEONATAL OPERATIONAL DELIVERY NETWORK

GUIDELINE FRAMEWORK FOR CONSIDERATION OF LIGHT

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Related documents	<p>References</p> <p>Aita.M et al (2013) Intervention Minimizing preterm infants' exposure to NICU Light and Noise. <u>Clinical Nursing Research</u>, Vol 22, No 3, pp337-58.</p> <p>BBC (2006) Light risk to preterm babies. Mon 21st August 2016. www.news.bbc.co.uk/1/hi/health</p> <p>Boxwell.G (2000) <u>Neonatal Intensive Care Nursing</u>, Routledge, London.</p> <p>Cambridge (2016) <u>The Nursery Environment</u>. Cambridge University Hospitals NHS Foundation Trust www.cuh.org.uk/rosie/services/neonatal/nicu/developmentalcare/nurseryenvironment.html</p> <p>Cochrane (2013) <u>Cycled light in the intensive care unit for preterm babies and low birth weight infants</u>. Cochrane review August 2013, Morag. I and Ohlsson. A. http://dx.doi.org/10.1002/14651858.CD006982.pub3</p> <p>Draeger (2019) The influence of light on premature babies. P1-6, Found at www.draeger.com/en-uk/Hospital/Departments/Neonatal-Care/Developmental-Care/Light</p> <p>Jack.L (2000) Developmental Supportive Care: Its implementation on a Scottish Neonatal Intensive Care unit. <u>Journal of Neonatal Nursing</u>, Vol 6, No 1, pp14-17.</p>

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<p>Implications of race, equality & other diversity duties for this document</p>	<p>This guideline must be implemented fairly and without prejudice whether on the grounds of race, gender, sexual orientation or religion.</p>

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1.0 Aim of Guideline Framework

To provide a framework to ensure that all premature infants are cared for in the optimum environment

2.0 Scope of Guideline Framework

The guideline applies to all babies receiving care within Thames Valley & Wessex Neonatal Operational Delivery Network.

Thames Valley

Buckinghamshire Healthcare NHS Trust	- Stoke Mandeville Hospital, Aylesbury
Frimley Health NHS Foundation Trust	- Wexham Park Hospital, Slough
Milton Keynes University Hospital NHS Foundation Trust	- Milton Keynes General Hospital
Oxford University Hospitals NHS Foundation Trust	- John Radcliffe Hospital, Oxford
Royal Berkshire NHS Foundation Trust	- Reading

Wessex

Dorset County Hospital NHS Foundation Trust	- Dorset
Hampshire Hospitals NHS Foundation Trust	- Basingstoke
Hampshire Hospitals NHS Foundation Trust	- Winchester
Isle of Wight NHS Trust	- St Mary's Hospital
Poole Hospital NHS Foundation Trust	- Poole Hospital
Portsmouth Hospitals NHS Trust	- Queen Alexandra Hospital
Salisbury NHS Foundation Trust	- Salisbury
University Hospital Southampton NHS Foundation Trust	- Princess Anne Hospital
Western Sussex Hospitals NHS Foundation Trust	- St Richard's Hospital, Chichester

3.0 Guideline summary

- Babies are exposed to bright unnatural environmental lights in the NICU. This includes phototherapy, procedural lighting and uncontrolled sunlight. These bright lighting conditions are known to cause retinal damage, sleep pattern disturbance, disturbance of circadian rhythms and poor growth. In addition all babies appear to find bright light uncomfortable and stressful.
- Premature babies have thin eye lids that allow light through, they cannot contract their pupils (pupillary reflex) down to keep light out until after 32 weeks gestation. They often fail to close their eyes consistently and cannot turn their face away from bright light and appear to find bright light exposure uncomfortable.
- Safety is the first priority when considering light levels on a neonatal unit, and lighting levels must be high enough for staff to perform their job safely.
- All babies nursed in an incubator should have incubators covers to reduce the light levels they are exposed to.
- All babies less than 37 weeks gestation should have a cot canopy to reduce their exposure to bright, overhead hospital lighting.

- Reduce light levels at night to promote circadian rhythms for the term and near term babies.
- All babies receiving phototherapy should have their eyes protected by eye bands designed for the purpose.
- All babies in close proximity to phototherapy should be shielded from exposure to the light,
- Routine use of eye protection is not recommended, babies show high levels of stress responses in a trial of this.
- During eye examination to screen for ROP, eye drops are used to dilate the pupils. The baby's eyes must be protected from the light for 18 hours, until the effect of the drops has completely passed.
- Parents should be informed about the need to protect their baby's eyes from exposure to excessive or bright light whilst on the Neonatal Unit, and should be supported to be involved in this process.
- Turn off bright lights, so babies are more likely to open their eyes and interact with parents.

4.0 Background Information

'The visual system of a new born baby continues to develop well after birth until about the age of three years. For preterm babies they have the added addition of light in their environment as opposed to the darkness of the uterus.' (Lai et al, 2008)

The Neonatal Intensive Care (NICU) environment is complex and generally over stimulating to the sick preterm infant and creates a state of sensory overload and maladaptation. Bright lighting conditions are frequently identified as being present in the NICU and have been theorised to cause retinal damage, sleep pattern disturbance, disturbance of circadian rhythms and poor growth.

There is no evidence to show that light contributes to the occurrence of retinopathy of prematurity (ROP) or affects infant growth. However, being nursed in elevated light levels has been seen to disturb infant's length of and quality of sleep, and cause fluctuations in heart rate, respiratory rate and blood pressure.

There is currently conflicting evidence as to whether cycled lighting is beneficial to circadian rhythmicity and sleep and growth. If infant's sleep-wake state is carefully observed under dimmed lighting conditions, it is found that dimmed lighting improves the quality of sleep and promotes alert states.

5.0 Practice Guidelines

5.1 Lighting Exposure

- Safety is the first priority when considering light levels.
- Maintain low lighting levels during the day.
- Reduce light levels at night to promote circadian rhythms for the term and near term babies.
- When more light is needed, where possible gradually increase the light level using dimmer switches until the minimum light level required is achieved. This gives babies a chance to adapt gradually to the change in light levels and may reduce the level of sleep disturbance and/or negative physiological responses.
- Use spot lights for procedures/cares, instead of turning the main room light on. This will minimise the disturbance to other babies in the room.
- Staff should be aware of sources of light that could inadvertently affect a baby, and act immediately to prevent or reduce their effects. For example; sunlight, cold light sources, procedural lights, reflected light, desk lamps used by staff.
- Extra consideration of environmental light levels and sources should be given to babies suffering from Hypoxic Ischaemic Encephalopathy (HIE) or seizures, who may benefit from lower light levels.
- During quiet time ensure that light intensity in all areas is as low as possible, for safe practice.
- A pen torch can be used to provide enough light to check intravenous line sites, without needing to turn on large lights or remove light protecting covers.
- All babies nursed in an incubator should have incubators covers to reduce the light levels they are exposed to.
- Covers should be designed for the purpose and be effective at blocking light. They should still enable observation of the baby for safety and behavioural cues.
- Covers may be flapped back, or if necessary removed whilst visualisation of a baby is necessary for an activity. However, in most circumstances the cover should be replaced as soon as an activity is completed.
- When possible assess each babies sleep/wake state and self regulating behaviour before removal of the covers.
- When it is necessary to expose a baby to bright lighting conditions make every effort to reduce the negative effects for the baby, for example;
 - Angle the light away from the baby's eyes
 - Aim the light beam only onto the area required, (i.e. foot)
 - Consider using eye bands temporarily to protect the baby from light.
 - Position a hand/small cover/ teddy between the light source and baby's eyes so that they are shaded from the beam.
- When babies are nursed in cots, a cot canopy offers some shade and privacy. Ideally all babies less than 37 weeks gestation should have a cot canopy to reduce their exposure to light.
- All babies receiving phototherapy should have their eyes protected by eye bands designed for the purpose. Care should be taken to ensure the bands are securely fitted and are replaced over the baby's eyes as soon as they are noted to have come off.

- All babies in close proximity to the phototherapy should be shielded from exposure to the light, using covers, curtains, blinds or even eye bands, as appropriate.

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5.2 Following Eye Examinations

- Following eye examination where drops have been used to dilate the pupil, it is considered best practice to protect the baby's eyes from the light for 18 hours, until the effect of the drug has completely passed.
- It is known that the pupil dilating drugs can be effective for up to 18 hours. During this time a baby will not be able to effectively constrict its pupils down to reduce the light coming into the eye. For preterm babies this will be in addition to having thin eyelids that allow much light to pass through and eye lids that they cannot effectively keep closed, when asleep.
- The long term effects of high light levels on preterm baby's eyes is not yet known, so caution must be taken. Light is also likely to affect their ability to sleep, and may cause physiological instability such as apnoeas, bradycardia, desaturations, tachycardia, and tachypnoea.
- Babies do not need to routinely wear eye protection bands following eye examination, but should have a cover over their incubator or a cot canopy over their cot. Extra caution should be taken to ensure that lighting levels are kept low, and babies being cuddled are not exposed to the bright fluorescent ceiling lights. If bright lighting is needed for example to take blood, it may be safest to place eye bands on the baby for that short period.
- Staff caring for each baby must take responsibility for noting the time that dilating eye drops are instilled, and ensuring that each baby receives appropriate protection for 18 hours from then.
- Commonly used drugs for pupil dilatation in neonates include; Cyclopentolate Hydrochloride 1%, Phenylephrine Hydrochloride 2.5% and Tropicamide 0.5%.

5.3 Preparing for Discharge

- Babies past term need different lighting than preterm infants, as they need to see objects clearly enough to begin to focus and to pick out shape and form (Warren 2010). Parents used to low level lighting in hospital should be made aware of this when taking their baby home.
- Consider gradually giving the baby time without a cot canopy once a baby has reached 37 weeks gestation or is preparing for discharge. This should not be done in one stage, but should be a gradual process of 'normalising' the baby to light by gradual exposure and hence promoting a 'normal' circadian rhythm.
- It is acknowledged that babies are increasingly becoming ready for discharge from the Neonatal Unit either to home or to the post-natal levels before 37 weeks gestation. This means that a section of staff are questioning whether the use of cot canopies should be ceased as early as 34 weeks gestation, based on the argument that the babies will be exposed to 'normal' lighting levels as soon as discharge occurs. However, it should be remembered that bright overhead strip lighting does NOT simulate the normal lighting conditions in a home environment. In addition, parents will often take great care to ensure that their baby is protected from harsh environmental stimuli such as direct sunlight or sudden changes in light levels. It may be appropriate for a baby to be regularly using a cot canopy until just prior to discharge, in order to offer protection from the unnatural fluorescent lighting of the neonatal unit.

5.4 Parents

- Parents should be informed about the need to protect their baby's eyes from exposure to excessive or bright light whilst on the Neonatal Unit. They can be supported to be involved in

this process, for example not removing incubator covers totally or rapidly on their arrival, or informing staff if their baby's phototherapy eye protection had slipped off.

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- Take care to offer parents consistent information about light, as many parents identify receiving inconsistent information is one of the biggest challenges of having a baby on the Neonatal Unit. Parents can be directed to sources of information about light, such as the Network Parents Information APP, Bliss Information booklets and relevant internet websites.

5.5 Staff

- All staff should receive information and training about light exposure on the Neonatal Unit, during their orientation to the Unit. This may be in the form of self-directed learning, e-learning or formal training sessions. Ideally staff should be attaining an agreed level of competence which is documented and retained for the records.
- Nurses and nursery nurses also need to take responsibility for keeping their knowledge and practice around light up to date, although they should be facilitated by their work place to do so; For example they may be directed towards practice guidelines, developmental care leads, e-learning, internet resources, current literature, etc.

5.6 Resources

- Neonatal Units have a responsibility to provide equipment and resources that will enable staff and parents to control light level to the sick and preterm infant. Useful resources are likely to include;
 - Incubator covers
 - Cot canopies
 - Individualised lighting at each cot space - with dimmer switch control (or similar).
 - Individual bedside lamp/spot light
 - Eye bands designed for the purpose - for babies receiving phototherapy or exposed to procedural lighting.
 - Notices for identifying infants who have had pupil dilating eye drops instilled, and require special consideration for up to 18 hours.

5.7 Documentation

- When an infant is administered eye drops to dilate their pupils, in preparation for eye examination, the time of administration of the eye drops should be documented in an agreed place, so that staff are able to put in place the extra precautions recommended, whilst there effects wears off (approximately 18 hours).
- Some Units have a practical and helpful way to manage this is for any infant who has just received eye drops to have a laminated notice placed on their incubator, or by their cot space. This notice flags up to staff that the baby requires extra consideration of light. The date and time that the eye drops were administered is written on the notice using white board marker pen, so that staff and parents are able to continue the precautions until the 18 hour period has passed. At which time the notice is removed.

5.8 Audit

- Neonatal Units practice around light exposure of sick and preterm infants should be audited as per local audit policy. All staff should contribute to this process when required. This is most likely to be by completing an audit document or benchmarking questionnaire.

6.0 Parent's Information Leaflet

- See page 9-10

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Light on the Neonatal Unit: A Parent's Guide.

- Babies are exposed to bright unnatural environmental lights in the Neonatal unit. This comes from phototherapy, procedural lighting and uncontrolled sunlight. All babies appear to find bright light uncomfortable and stressful.
- Preterm babies in particular have difficulty coping with excess light, they may become agitated and their oxygen levels and heart rate may alter. This is in part because they have thin eye lids that allow light through, and they cannot close down their pupils to keep light out until after 32 weeks gestation. Also they often fail to close their eyes when sleeping.
- In addition bright lights can mean a baby's sleep is disturbed. This is a problem as babies grow and heal best when they are sleeping, so we need to work hard to help babies get to sleep and stay asleep.
- In order to try and protect babies from the light and promote rest and growth unit staff and parents/ families can try to;
 - ✓ Keep incubators covered to reduce ceiling light exposure and use a large, thick, effective cover.
 - ✓ Use cot canopies for sick babies or those less than 36 weeks gestation. Harsh ceiling lighting is not normal for anyone to lie underneath.
 - ✓ Protect babies receiving phototherapy using eye protection- babies next to someone else's phototherapy might need protecting too!
 - ✓ Avoid direct light to the baby's eyes when possible. Use nest walls, a teddy or your hand to act as a barrier.
 - ✓ Turn off bright lights, so babies are more likely to open their eyes and interact with you.
 - ✓ Try to have a cycled light pattern, where it is darker at night. This is better for babies who can often sleep more, grow better and be more settled.
 - ✓ Consider the lighting levels when you are visiting or handling your baby. If the nursery is bright only pull back part of the incubator cover.
 - ✓ When doing cares observe your baby's response to the light. If the lights are too bright ask a member of staff if the lighting can be dimmed a little, or use your hand to shade your baby's eyes.
 - ✓ Babies may struggle to cope with lots of visual stimulation at the same time as physical and sound stimulation. Think about just offering one type of stimulation at a

time, when your baby is still very sick or extremely preterm. For example- try only touching, or only talking to them or removing visual stimulation when they seem tired.

- ✓ If your baby has an eye examination, they will be given eye drops to dilate the pupils of the eye. Following this your baby may prefer a dim environment for at least 18 hours.
- ✓ Your baby can begin to be exposed to more 'normal' lighting levels as they feel better, and are preparing for home. However some protection may stay in place until discharge as a hospital does not have the gentle controllable lights that you would choose for your baby at home.



And a little bit about baby's vision....

- In order to see a baby needs healthy and mature visual system which includes eyes, optic nerves – between the eyes and the brain and special pathways in the brain. A foetus in the womb can sense light from 16 weeks and their visual system is fully formed by 26/60, when their eyelids can also open.
- We know a full term baby has vision which is out of focus, and sees in black and white. They can focus best at the distance between Mum's breast and face (8-10 inches). 1 week after birth they can see red/orange/yellow, but seeing blue and purple takes longer. By 6 months of corrected age a baby's colour vision is similar to an adult.
- We know that preterm babies see less well than term babies. They are aware of light as they close their eyes when exposed to light, and are more likely to open them when the light level is lower. Babies 30 weeks and older can fix their gaze, for a short time. The length of time they can do this for then gradually increases as they are also able to stay awake and calm for longer.
- Around 33-34 weeks babies can focus on an object and follow it with their eyes when it moves, Preterm babies seems to prefer to look at patterns, curves, bright contrasts in tone and large patterns and their sight will gradually progress to be the same as a term baby.

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