Phototherapy Management of Newborn Hyperbilirubinemia

A. POLICY

All newborns undergoing phototherapy treatment for hyperbilirubinemia will receive safe and consistent care according to the following protocol. A physician’s order is required to initiate phototherapy.

NOTE: Any newborn requiring phototherapy under blue lights must be admitted to the NICU for cardiac monitoring.

B. PURPOSE

To provide consistent information to safely care for newborns undergoing treatment with white phototherapy lights, phototherapy bed and/or a bili blanket.

C. PROTOCOL

Protocol A: Phototherapy Lights (White fluorescent lights)

2. Ensure phototherapy light units have all bulbs functioning.
3. Bring warmed incubator with lights into patient’s room. Incubator and lights to be plugged into a red electrical outlet (in case of electrical failure). Phototherapy lights to be turned on. Ensure incubator temperature is set according to Neutral Thermal Environment guidelines. (see appendix)
4. Assess and document newborn’s temperature and all other components on the Newborn Assessment sheet (form #0541)
5. Remove all clothing, except diaper (unless otherwise ordered by physician). The baby should be diapered with the top rolled down (ex: bikini style) to maximize skin exposure to phototherapy.
6. If there is an order by the physician for no diaper, remove all petroleum-based products from buttocks (may cause skin irritation). Instruct parents not to use these products for the duration of phototherapy.
7. Secure eye mask in place with stocking net or Velcro strap. The newborn’s eyes should be closed before the mask is applied to prevent corneal excoriation. The mask should be fixed firmly enough to prevent dislodgement but loose enough to prevent the back of the mask from rubbing against eyes and obstruction of the nose. If eye mask becomes dislodged, phototherapy should be immediately stopped until the mask
is reapplied/replaced as necessary. If baby is being monitored with the BiliChek transcutaneous device, see Bilirubin Monitoring with BiliChek policy #4505.

8. Place newborn on back in warmed incubator, maintaining Neutral Thermal Environment (NTE) according to guidelines for incubator air temperatures (see Appendix A).

9. Assess newborn’s temperature and incubator air temperature q 1h X 3 after initiation of phototherapy until stable. Document on the Newborn Assessment sheet (form #0541)

10. When body temperature is stable (36.5 – 37.5 C), assess and document temperature and incubator air temperature q 3 to 4h, as well as other components of Newborn Assessment sheet (form #0541)

11. If body temperature is unstable, regulate the incubator temperature by following NTE guidelines according to newborn age and body weight until stable. (see Newborn Hypothermia policy #4545)

12. Infant will be removed from and placed in incubator by nurses or medical staff. The infant should only be removed for feeding.

13. Remove eye mask for feedings, to promote visual stimulation. Assess eyes for injury, irritation or purulent drainage. If drainage noted, sterile H₂O should be used for cleansing. Cover infant with blanket and or dress infant lightly.

14. When treatment is discontinued, switch off phototherapy lights and remove infant from incubator.

15. It is important to recognize the relationship between dehydration and hyperbilirubinemia. All jaundiced newborns should be adequately hydrated before and during phototherapy. Increasing the frequency of feeding will help maintain hydration and lower bilirubin levels more rapidly. Water does not help lower bilirubin levels, and should not be administered.

16. Monitor intake and output with feedings. Parent/nurse to document each feeding on the Newborn Nutrition and Elimination Record (form #8029)

17. Monitor conjugated and unconjugated bilirubins and total protein levels as per physician order and notify the physician of results. Physician will order serum bilirubin and total proteins. If physician is monitoring bilirubin using the BiliChek transcutaneous device, notify physician of results and for further orders.

18. Document initiation, maintenance, and completion of phototherapy on Progress Notes (form #562) Newborn Care Path (form #600) and Workload Measurement System (form #822)

19. The physician will determine duration of phototherapy.

20. **Note:** When discontinuing one set of phototherapy lights, the set on the back of the incubator is the set to be turned off and discontinued.

21. Optional laboratory investigations may be indicated in specific clinical circumstances and will be completed as ordered by the physician:
   - Complete blood count (CBC) including manual differential white cell count
   - Blood smear for red cell morphology
Protocol B: Phototherapy Bed “Bilibed” (Compact fluorescent blue tube light)

2. Use of the phototherapy lamps beyond the manufacturer’s recommended hours of use decreases the effectiveness of phototherapy. Check the functioning of the light according to the manufacturer’s instructions attached to each unit.
3. Bring phototherapy bed and cot into patient’s room. Plug unit into a red electrical outlet (in case of electrical power failure) and turn unit on.
4. Assess and document newborn temperature and all other components of the Newborn Assessment Sheet (form #0541) before placing infant on phototherapy bed.
5. Dress in diaper and designated outfit for phototherapy bed. The baby should be diapered with the top rolled down (ex. bikini style) to maximize skin exposure to phototherapy. Place newborn on back on unit and cover with blankets and hat as necessary.
6. Assess and document newborn’s temperature and all other components of the Newborn Assessment Sheet (form #0541) one hour after initiation of phototherapy. Add or remove bedding to regulate temperature and reassess vital signs of infant hourly until stable.
7. Monitor all components on Newborn Assessment Sheet (form #0541) q 3-4hr.
8. Parent/nurse/designated caregiver can remove newborn from phototherapy bed for feedings. Dress/cover infant lightly with blanket.
9. It is important to recognize the relationship between hydration and hyperbilirubinemia. All jaundiced newborns should be adequately hydrated before and during phototherapy. Increasing the frequency of feeding will help maintain hydration and lower bilirubin levels more rapidly. Water does not help lower bilirubin levels, and should not be administered.
10. Monitor intake and output with feedings. Parents/nurse/designated caregiver to document each feeding on the Newborn Nutrition and Elimination Record (form #8029)
11. Monitor conjugated and unconjugated bilirubins and total protein levels as per physician order and notify the physician of results. If physician is monitoring bilirubin using the BiliChek transcutaneous device, notify physician of results and for further orders.
12. Document initiation, maintenance and completion of phototherapy on Progress Notes (form #562), Newborn Care Path (form #600) and Workload Measurement System (form #822 Dec/04)
13. The physician will determine duration of phototherapy.
14. Optional laboratory investigations may be indicated in specific clinical circumstances
Phototherapy Management of Newborn Hyperbilirubinemia

and will be completed as ordered by the physician:
- Complete blood count (CBC) including manual differential white cell count
- Blood smear for red cell morphology
- Glucose-6-phosphate dehydrogenase screen (G6PD)
- Serum electrolytes and albumin or protein concentrates
- C-reactive proteins (CRP)

**Protocol C: BiliBlanket and BiliBlanket Plus Phototherapy System**

**In an incubator in conjunction with phototherapy lights**

2. Ensure phototherapy light units have all bulbs functioning.
3. Bring warmed incubator with lights into patient’s room. Incubator and lights to be plugged into red electrical outlet (in case of electrical failure). Phototherapy lights to be turned on. Ensure incubation temperature is set according to Neutral Thermal Environment (NTE) guidelines (see Appendix).
4. Ensure the BiliBlanket or BiliBlanket Plus Phototherapy system is functioning properly, by plugging it in and turning unit on.
5. The illuminator should be placed on top of the incubator, never inside the incubator.
6. Verify the air circulation vents on the top and bottom of the illuminator are unobstructed.
7. Be sure the light pad is covered with a new disposable cover/vest secured around the fiber optic cable.
8. The fiber optic cable should be inserted through an access port and the pad placed on the mattress with the light emitting side **up**.
9. Connect the power cord to the illuminator first and then to the red electrical outlet. (in case of electrical failure.)
10. Engage the fiber optic cable connector into the illuminator port.
11. Switch on the on/standby switch. If using the **BiliBlanket Plus** unit ensure switch is on “Phototherapy” not “Transilluminator.”
12. Using the brightness selector switch on the front panel, select intensity at highest level unless otherwise ordered by physician and ensure light is emitted from pad.
13. Assess and document newborn’s temperature and all other components of the Newborn Assessment Sheet (form #0541)
14. Secure eye mask in place with stocking net or Velcro strap. The newborn’s eyes should be closed before mask is applied to prevent corneal excoriation. The mask should be fitted firmly enough to prevent dislodgement but loose enough to prevent the back of the mask from rubbing against eyes and obstruction of the nose. If eye mask becomes dislodged, phototherapy should be immediately stopped until the mask is reapplied. If baby is being monitored with the BiliChek transcutaneous device, see
Bilirubin Monitoring with BiliChek policy #4505.

15. Place the diapered infant into the incubator with bare back directly on the light-emitting section of the pad with the fiber optic cable end of the pad at the infant’s feet, ensuring that as much of the infant’s skin is in contact with the disposable-covered, light-emitting section of the pad as is practical.

16. Assess newborn’s temperature and incubator air temperature q1hx3 after initiation of phototherapy until stable. Document on Newborn Assessment sheet. (form #0541)

17. When body temperature is stable (36.5-37.5 C), assess and document temperature and incubator air temperature q 3 to 4h as well as all other components of the Newborn Assessment sheet. (form #0541)

18. If body temperature is unstable, regulate the incubator temperature by following NTE guidelines according to newborn’s age and body weight until stable. (see Newborn Hypothermia policy #4545)

19. Infant will be removed from and placed in incubator by nurses or medical staff. The infant should only be removed for feeding. When coming out of the incubator for feeding, the infant along with the light-emitting pad may be covered or wrapped in a blanket. The infant will continue to receive effective phototherapy treatment as the disposable-covered, light-emitting section of the pad remains in contact with the skin.

20. Remove eye mask for feedings, to promote visual stimulation. Assess eyes for injury, irritation or purulent drainage. If drainage noted, sterile water is to be used for cleansing.

21. If disposable cover/vest becomes soiled, it should be replaced with a new cover/vest.

22. When treatment is discontinued, switch off the illuminator power switch, remove infant from the pad and incubator and discard cover/vest.

23. It is important to recognize the relationship between dehydration and hyperbilirubinemia. All jaundiced newborns should be adequately hydrated before and during phototherapy. Increasing the frequency of feeding will help maintain hydration and lower bilirubin levels more rapidly. Water does not help lower bilirubin levels and should not be administered.

24. Monitor intake and output with feedings. Parent/nurse to document each feeding on the Newborn Nutrition and Elimination Record. (form #8029)

25. Monitor conjugated and unconjugated bilirubins and total protein levels as per physician order and notify the physician of results. If physician is monitoring bilirubin using the BiliChek transcutaneous device, notify physician of results and for further orders.

26. Document initiation, maintenance and completion of phototherapy on Progress Notes (form #562), Newborn Care Path (form #600) and Workload Measurement System (form #822 Dec 04)

27. The physician will determine duration of phototherapy.

28. Optional laboratory investigations may be indicated in specific clinical circumstances and will be completed as ordered by the physician:
   - Complete blood count (CBC) including manual differential white cell count
Phototherapy Management of Newborn Hyperbilirubinemia

- Blood smear for red cell morphology
- Glucose-6-phosphate dehydrogenase screen (G6PD)
- Serum electrolytes and albumin or protein concentrates
- C-reactive proteins (CRP)

In a cot:

2. Ensure the system is functioning properly by plugging it in and turning unit on.
3. The illuminator should be placed on a table near the cot.
4. Verify the air circulation vents on top and bottom of the illuminator are unobstructed.
5. Be sure the light pad is covered with a new disposable cover/vest secured around the fiber optic cable.
6. Place the light pad on the mattress with the light-emitting side facing up.
7. Connect the power cord to the illuminator first and then to the red electrical outlet. (In case of electrical failure.
8. Engage the fiber optic cable connector into the illuminator port.
9. Switch on the on/standby switch. If using the BiliBlanket Plus unit, ensure switch is on “Phototherapy” not “Transilluminator.”
10. Using the brightness selector switch on the front panel, select intensity at highest level unless otherwise ordered by a physician and ensure light is being emitted from the pad.
11. Assess and document newborn’s temperature and all other components of the Newborn Assessment Sheet (form #0541).
12. Place diapered infant with bare back directly on the light-emitting section of the pad with the fiber optic cable end of the pad at the infant’s feat, ensuring that as much of the infant’s skin is in contact with the disposable-covered, light-emitting section of the pad as is practical.
13. Remove or reposition infant’s clothing that could interfere with the light path.
14. The infant along with the light pad may be covered or wrapped in a blanket.
15. Assess and document newborn temperature and all other components of the Newborn Assessment Sheet (form #0541) one hour after initiation of phototherapy. Add or remove bedding to regulate temperature and reassess vital signs hourly until stable.
16. Monitor all components on Newborn Assessment sheet (form #0541) 3-4hourly.
17. Parent/nurse/medical staff may remove infant from cot while ensuring the disposable-covered, light-emitting section of the pad remains in contact with the skin thereby allowing the infant to continue to receive effective phototherapy treatment.
18. If disposable cover/vest becomes soiled, it should be replaced with a new cover/vest.
19. When treatment is completed, switch off the illuminator power switch, remove the infant from the pad and discard cover/vest.
20. It is important to recognize the relationship between dehydration and hyperbilirubinemia. All jaundiced newborns should be adequately hydrated before
and during phototherapy. Increasing the frequency of feeding will help maintain hydration and lower bilirubin levels more rapidly. Water does not help lower bilirubin levels and should not be administered.

21. Monitor intake and output with feedings. Patient/nurse to document each feeding on the Newborn Nutrition and Elimination Record. (form #8029)

22. Monitor conjugated and unconjugated bilirubins and total protein levels as per physician order and notify the physician of results. If physician is monitoring bilirubin using the BiliChek transcutaneous device, notify physician of results and for further orders.

23. Document initiation, maintenance and completion of phototherapy on Progress Notes (form #562), Newborn Care Path (form #600) and Workload Measurement System (form #822 Dec 04)

24. The physician will determine duration of phototherapy.

25. Optional laboratory investigations may be indicated in specific clinical circumstances and will be completed as ordered by the physician:
   - Complete blood count (CBC) including manual differential white cell count
   - Blood smear for red cell morphology
   - Glucose-6-phosphate dehydrogenase screen (G6PD)
   - Serum electrolytes and albumin or protein concentrates
   - C-reactive proteins (CRP)

D. SUPPLEMENTAL REFERENCES


Medela® Bilibed® Series 038 (1998) Instructions for Use Mississauga, Canada

Sender, A. (1997) Phototherapy at the Mother’s bed: Pilot study in the maternity department of the St. Antoine Hospital, Paris. Medela® Bilibed® Publication

E. AUTHORS/CONSULTANTS/REVIEWERS

Dr. Anne Houstoun
Dr. Krista Jangaard
Dr. Susan Lappin
Dr. Leslie Matheson
Julie MacLean RN Quality Coordinator NICU
Annette Dawson RN, Staff Nurse
Heather Archibald RN, Staff Nurse
Wanda Cox-Maxwell RN, Staff Nurse
Jan Sabadash RN, Clinical Leader, FNU
Leeanne Lauzon, RN, MSc, PNCC, Clinical Educator
## Phototherapy Management of Newborn Hyperbilirubinemia

<table>
<thead>
<tr>
<th>Responsibility Of:</th>
<th>Women’s and Newborn Health Program</th>
<th>Effective Date:</th>
<th>January 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last Review Date:</td>
<td>New</td>
<td>Next Review Date:</td>
<td>January 2010</td>
</tr>
<tr>
<td>Cross References:</td>
<td>Bilirubin Monitoring with BiliChek # 4505 Newborn Hypothermia #4545 Newborn Assessment sheet (form #0541) Newborn Nutrition and Elimination Record (form #8029) Progress Notes (form #562) Newborn Care Path (form #600) and Workload Measurement System (form #822)</td>
<td>Policy Number:</td>
<td>4563</td>
</tr>
<tr>
<td>Target Audience:</td>
<td>Registered Nurses in FNU</td>
<td>Policy (ies) Replaced:</td>
<td>N/A</td>
</tr>
<tr>
<td>Pages:</td>
<td>10</td>
<td>Approved By:</td>
<td>Childbirth and Family Newborn Care Team</td>
</tr>
</tbody>
</table>
F. APPENDICES

Appendix A: Neutral Thermal Environment Guidelines for Incubator Air Temperature

Baby’s Weight > 2500 Grams:

<table>
<thead>
<tr>
<th>Age (Days)</th>
<th>Incubator set at:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>32.0-34.0C</td>
</tr>
<tr>
<td>2</td>
<td>31.1-33.7C</td>
</tr>
<tr>
<td>3</td>
<td>30.6-33.2C</td>
</tr>
<tr>
<td>4</td>
<td>30.2-32.8C</td>
</tr>
<tr>
<td>5</td>
<td>29.9-32.8C</td>
</tr>
<tr>
<td>6</td>
<td>29.6-32.5C</td>
</tr>
<tr>
<td>7</td>
<td>29.4-32.2C</td>
</tr>
<tr>
<td>8</td>
<td>29.2-32.0C</td>
</tr>
<tr>
<td>9</td>
<td>29.0-31.8C</td>
</tr>
<tr>
<td>10</td>
<td>28.7-31.7C</td>
</tr>
<tr>
<td>11</td>
<td>28.4-31.4C</td>
</tr>
<tr>
<td>12</td>
<td>27.9-31.1C</td>
</tr>
</tbody>
</table>

Appendix B:

Hyperbilirubinemia Management Guidelines for Healthy Full-Term Newborns (>37 Weeks and no evidence of ABO or Rh incompatibility):

*Note: All units are in μmol/Litre

<table>
<thead>
<tr>
<th>Age</th>
<th>Consider Phototherapy</th>
<th>Phototherapy</th>
<th>Exchange if Phototherapy Fails</th>
<th>Exchange Plus Phototherapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-48 hours</td>
<td>&gt;170</td>
<td>&gt;260</td>
<td>&gt;340</td>
<td>&gt;430</td>
</tr>
<tr>
<td>49-72 hours</td>
<td>&gt;260</td>
<td>&gt;310</td>
<td>&gt;430</td>
<td>&gt;510</td>
</tr>
<tr>
<td>&gt;72 hours</td>
<td>&gt;290</td>
<td>&gt;340</td>
<td>&gt;430</td>
<td>&gt;510</td>
</tr>
</tbody>
</table>

(Endorsed by IWK Health Centre, Dept. of Family Medicine, January 1996, as outlined by the American Academy of Pediatrics)