

## Biliblanket: Home Phototherapy System

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### Abstract

Jaundice occurs when there is a build-up of a naturally occurring substance called bilirubin after the breakdown of the red blood cells. If the bilirubin levels get too high, it leads to hyperbilirubinemia and long term central nervous system damage. Phototherapy or light therapy (light treatment) is the process of using a blue/white light of varying intensity to eliminate bilirubin in the blood by assisting the liver in regulation. A biliblanket is a special light vest portable phototherapy device for the treatment of neonatal jaundice. This system uses fiber optic blankets and represents advanced technology in phototherapy treatment given in the hospital or at home

**Keywords:** Biliblanket; Phototherapy; Home Phototherapy System; Neonatal Jaundice; Hyperbilirubinemia.

Birth of a baby is one of the happiest and cherishing moments for parents. In some instances just a few days after birth, parents may notice that baby begun to yellow, a condition called jaundice [1]. Jaundice is a common, temporary and usually harmless condition in newborn. It affects both full-term, premature and under weight babies during the first week of their life.

Jaundice occurs when there is a build-up of a naturally occurring substance called bilirubin after the breakdown of the red blood cells. As bilirubin begins to build up, it deposits on the fatty tissues under the skin causing the baby's skin and whites of the baby's eyes to appear yellow [2]. If the bilirubin levels get too high, it leads to hyperbilirubinemia and long term central nervous system damage called kernicterus. In neonates, bilirubin is regulated by the liver for the excretion. It may take a few weeks for the exact regulation.

Phototherapy or light therapy (light treatment) is

the process of using a blue/white light of varying intensity to eliminate bilirubin in the blood by assisting the liver in regulation [1]. The light is placed close to the skin or touching it through a special, light-permeable fabric [3]. Baby's skin and blood absorb these light waves and change bilirubin into products, which can pass through their excretory system [2]. Prior to photo therapy, sunlight was an effective means of helping those with jaundice. However, the sun's rays can be damaging to skin and especially to the skin of an infant [4].

A biliblanket is a special light vest portable phototherapy device for the treatment of neonatal jaundice (hyperbilirubinemia). This system uses fiber optic blankets and represents advanced technology in phototherapy treatment given in the hospital or at home [2]. The name is formed as a combination of bilirubin and blanket. Synonyms used are home phototherapy system, bilirubin blanket, or phototherapy blanket. The Biliblanket has been in

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use since 1990 and is an effective and safe method of treating phototherapy. BiliBlanket is a trademark of General Electric's Datex-Ohmeda subsidiary, but this name has become the generic, colloquial and the term used by medical professions also [3].

### Apparatus

The biliblanket phototherapy system consists of the light generator-termed the light box, the fibre-optic cable through which the light is transported from a light source to the baby and the light pad [a pad of woven fibers 25cmx13cm (10"x5")] that is attached to the baby [3]. This covered fiberoptic pad is placed directly against your baby to bathe the skin in light [2]. Fibre-optic lights are imbedded in a blanket. Mattress provides comfortable cushioning underneath the infant. Disposable mattress covers ensure clean, soft surface for baby [2].

### Mechanism

The circulation of the blood will bring the bilirubin to the lighted area where it will be broken down. The skin in direct contact with the pad is the first area where bilirubin is broken down. As the treatment process continues, bilirubin is removed from the blood and the rest of the skin. Bilirubin level will be tested during treatment, usually by a small sample of blood taken from the baby's heel. These tests will determine when normal levels of bilirubin are reached and phototherapy is no longer needed. The length of time needed for phototherapy treatment varies from one baby to the next as each baby's condition is different. As the bilirubin is lowered to acceptable levels, all of you baby's skin will return to its normal color [2].

### Advantages

- Baby can be held or nursed without interrupting phototherapy, encouraging infant-parent bonding.
- Reduces the inpatient admissions in hospitals and its difficulties
- No parental separation during the therapy
- No need to lie alone in a box with his/her eyes covered.
- It offer the possibility of treating some degrees of jaundice at home itself [3].
- Parents can diaper, cloth, hold, and nurse the child during treatment without interrupting the phototherapy.

- Less chance of burns and other issues
- The biliblanket can be used 24 hours a day even during night to provide continuous treatment [2].
- Safer because the biliblanket filters out potentially harmful ultraviolet and infrared energy [2].
- Clothing can be applied over the system [2].
- Promotes a healing environment without interrupting the benefits of kangaroo care.
- Portable and lightweight design allows transport to different locations
- Blanket/pad fits easily within existing patient enclosures, such as cribs, bassinets, radiant warmers and incubators [5].
- Reduced insensible water loss compared to overheat phototherapy [6].

### Do's and Don't's

Use of the bili-blanket is simple and safe as long as the directions for use are followed.

#### Do's

- Do make sure the light source box is on a flat, non-absorbent surface. *It is safer to use while lying flat. Do not place on carpet or sit on the crib mattress.*
- Do make sure as much of the infant's skin is in direct contact with the light pad. Diapers should be worn.
- Do allow the *Fiber Optic Paddle* to warm to room temperature before placing the baby on the *Paddle*.
- Do make sure the cable and illuminator work properly.
- Do check that the disposable cover completely protects the fiber-optic pad, including the area where the cable is connected to the pad.
- Do inspect the biliblanket phototherapy system to make sure the fiber-optic pad is smooth and free from faults.
- Do remove everything except the disposable cover from between the infant's skin and the light pad. The infant can wear a diaper, clothing, or a blanket over the pad [7].
- Do have the disposable cover as the ONLY material between the light-emitting side of the

pad and infant's skin.

- Do leave the light pad on when holding or feeding the baby.
- Do turn off light when bathing the baby.
- Do change the disposable cover if it becomes soiled.
- Do use a 3-pin plug for safety.
- Do set the intensity knob on the light box to the highest setting [4].
- Do allow the *Bili Blanket Machine* to cool 15-20 minutes before moving [8].
- Do monitor temperature, intake and output and skin integrity.
- Do expose as much of the infant's skin as possible to the illuminating side of the fiber-optic pad.
- Do check serum bilirubin levels 6-12 hours post cessation of treatment and as clinically indicated [6].

#### *Don'ts*

The biliblanket *Should Not* be used when:

- Infant is <28 weeks
- Infant has broken/reduced skin integrity or is at

risk of pressure sores

- Don't directly expose the neonate's eye to the covered light pad [6].
- Don't use the light-emitting pad without a disposable cover.
- Don't keep anything on top of the light source box or the fiber optic cable [2].
- Don't block the side vents since a fan cools the light source and could then overheat
- Don't place the *Bili Blanket Machine* on carpeting or in bed with the baby.
- Don't operate or submerge the *Bili Blanket Machine* in water.
- Don't operate the *Bili Blanket Machine* with a frayed or damaged cord [8].
- Don't cut or alter the cover [8].

#### Storage and Maintenance

- Discard the *Disposable Cover*, only if it is soiled.
- If the *Paddle* gets soiled, use a damp cloth to clean. Do not saturate the *Paddle* [8].
- The lamp bulbs are checked 6 monthly by the clinical engineers as they lose their effectiveness over time.



Fig. 1:

- Decontaminate the units as per hospital policy [8].

### Key Messages

Phototherapy or light therapy (light treatment) is the process of using a blue/white light of varying intensity to eliminate bilirubin in the blood by assisting the liver in regulation. A biliblanket is a special light vest portable phototherapy device for the treatment of neonatal jaundice. This system uses fiber optic blankets and represents advanced technology in phototherapy treatment given in the hospital or at home

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