

## Use of Aluminium Foil in Phototherapy

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### Summary

**Patel A, Owa JA and Harvey D. Use of Aluminium Foil in Phototherapy.** *Nigerian Journal of Paediatrics* 1992; 19:93. Aluminium foil was applied to one or more sides of the incubator to improve the irradiance from phototherapy units. The irradiance, measured at the level where an infant is normally placed, significantly increased when aluminium foil was applied to two or more sides of the incubator, to a maximum of about 30 percent above the initial value without the foil ( $p < 0.001$ ). This was similar to the irradiance obtained with silver swaddler. This method of using aluminium foil can improve the effectiveness of phototherapy units and reduce the need to use multiple phototherapy units.

### Introduction

PHOTOTHERAPY is the commonest treatment for neonatal hyperbilirubinaemia. The light used is in the 420 to 480 nanometer range and is part of white light. Several reports have shown that the reduction of plasma bilirubin is improved with increasing intensity of light up to a saturation point<sup>1-3</sup> and that it is important to reach a minimum irradiance of  $1\text{mW/cm}^2$ .<sup>2-4</sup> In clinical practice, it is common to find that insufficient light reaches the baby because the phototherapy lamps contain too few bulbs, or are too far away from the cot. The dose of light can be increased

by using lamps on two sides of the incubator or cot. The purpose of this study was to see whether the irradiance could be further improved by using reflecting surfaces around the incubator.

### Materials and Methods

Ordinary cooking aluminium foil was hung against the ends and one side of a Vickers 59 incubator which measured 46 x 80 x 34cm. One phototherapy lamp unit (*Air Shield*) was placed horizontally directly above the incubator and another unit was placed against one of its long sides. The irradiance was measured at the level where an infant would normally be placed, using a Macam R450 radiometer.<sup>4</sup> Measurements of irradiance were similarly made, using the *Silver Swaddler* (*Henley's Medical Supplies Limited*) as a reflecting surface. As perspex radiant heat shields and plastic bubble sheets are often used in the very low birthweight to prevent heat loss, it was desirable to see if their use would affect the irradiance of phototherapy units; hence, they were alternately placed over

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the light meter to see if their use made any difference to the irradiance. Ten readings at five minute intervals were taken with each setting. Another set of readings was taken with only one phototherapy unit placed directly above the incubator.

### Results

The irradiance obtained, using one phototherapy lamp above the incubator and aluminium foil on varying sides of the incubator is shown in Table I, while that obtained using two phototherapy lamps is shown in Table II. Foils applied on two short sides and two long sides improved the irradiance by about 29 percent, using one phototherapy unit and by 33 percent with foil on two short sides and one long side when two phototherapy units were used. The irradiance obtained using the Silver Swaddler was similar. The use of a heat shield made no difference to the irradiance, but there was a reduction of about 0.2mW/cm<sup>2</sup> when the plastic bubble sheet was used.

TABLE I

*Irradiance with one Phototherapy Unit over the Incubator*

	<i>No of short sides with foil</i>	<i>No of long sides with foil</i>	<i>Number of readings</i>	<i>Irradiance mW/cm<sup>2</sup></i>
A	0	0	20	0.99 ± 0.05
B	1	0	10	1.00 ± 0.01
C	2	0	10	1.04 ± 0.00
D	0	1	10	1.10 ± 0.02
E	0	2	10	1.20 ± 0.01
F	1	1	10	1.13 ± 0.02
G	2	1	10	1.12 ± 0.02
H	1	2	10	1.22 ± 0.02
I	2	2	10	1.32 ± 0.04

No side with foil vs all sides with 33.3 percent increase:  
t = 18.8; p < 0.001

TABLE II

*Irradiance with one Phototherapy Unit on top of the Incubator and a second unit against a long side*

	<i>No of short sides with foil</i>	<i>No of long sides with foil</i>	<i>Irradiance mW/cm<sup>2</sup></i>
A	0	0	1.50 ± 0.03
B	1	0	1.61 ± 0.02
C	2	0	1.70 ± 0.08
D	0	1	1.75 ± 0.02
E	1	1	1.82 ± 0.02
F	2	1	1.93 ± 0.03

No foil vs foil on all sides = 29 percent increase  
t = 30.4; p < 0.0001.

### Discussion

Phototherapy plays an important role in the management of neonatal hyperbilirubinaemia, although exchange transfusion remains the most rapid method of reducing a very high plasma unconjugated bilirubin concentration. It is important to achieve an adequate dose of light in order to reduce the bilirubin concentration<sup>1-3</sup> and the routine use of a light meter allows the irradiance of phototherapy to be monitored.<sup>1,4</sup> It is now our routine to use aluminium foil so as to increase the irradiance of phototherapy for severely jaundiced babies. This allows the efficient use of only one phototherapy lamp. When two phototherapy lamps are used, the extra reflecting surface is not usually necessary. Silver swaddlers can be used, but these are more expensive than aluminium foil. When a heat conserving device such as a plastic bubble sheet is used, it is important to increase the amount of light. The present results underline the importance of measuring the irradiance when using phototherapy.<sup>4</sup>

With the use of aluminium foil, the irradi-

ance was significantly increased. The addition of aluminium foil will reduce the demand on phototherapy units, especially in developing countries where this equipment is in short supply and for the number of jaundiced babies that require this type of therapy. Since the effectiveness of phototherapy depends on the intensity of irradiance energy received by the baby,<sup>4</sup> the addition of aluminium foil will improve the efficiency of the phototherapy and therefore, reduce the duration of phototherapy.

### References

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