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## Use of reflective materials during phototherapy in neonates with unconjugated hyperbilirubinaemia: worth reflecting upon

Anne-Catherine Vanhove<sup>a,b</sup>, Trudy Bekkering<sup>a</sup>, Filip Cools<sup>a</sup>

<sup>a</sup> Cochrane Belgium, Belgian Centre for Evidence-Based Medicine (Cebam)

<sup>b</sup> Centre for Evidence-Based Practice (CEBaP) of the Belgian Red Cross-Flanders

[info@cochrane.be](mailto:info@cochrane.be)

### Question

Does using reflective curtains improve the effectiveness of phototherapy of unconjugated hyperbilirubinaemia in newborn infants?

### Context

Neonatal jaundice occurs in about 60% of otherwise healthy new-borns and is usually due to an increased breakdown of haemoglobin while liver function is still immature, leading to unconjugated hyperbilirubinaemia. Although in most infants the jaundice does not lead to morbidity, the hyperbilirubinaemia can become so severe that bilirubin is deposited in the brain which could result in permanent brain damage.

Phototherapy has replaced exchange transfusion as the standard treatment since the late 1950's as the latter, although effective in removing bilirubin, was associated with many complications. In phototherapy, the energy provided by the specific wavelength light changes the structure of bilirubin allowing it to be excreted via the liver or the kidneys directly. It has already been shown that increasing the light intensity increases the rate of decline in bilirubin. A potentially inexpensive and easy way to increase the light intensity would be to hang reflective materials from the sides of the phototherapy unit which would reflect the dispersed phototherapy light back onto the baby. This systematic review addresses the question whether the use of reflective materials in combination with phototherapy is more effective in reducing unconjugated hyperbilirubinaemia as compared to phototherapy alone.

### Criteria for study selection

The Cochrane review included studies of term and preterm neonates up to 14 days (term) or 21 days (preterm) of age receiving phototherapy for unconjugated hyperbilirubinaemia. Studies had to compare the use of phototherapy in combination with curtains of reflective material of any type to the use of phototherapy alone or to other intensified phototherapy. The main outcome of interest was the decline in serum bilirubin levels per unit of time.

### Summary of the results

The review identified 12 trials with 1288 babies in total. Eleven studies compared phototherapy with reflective materials to phototherapy alone and one study compared a single phototherapy light bank with reflective materials to a double bank without reflective materials. The reflective materials used in the studies consisted of curtains on three or four sides of the cot made of white plastic (5 studies), white linen (2 studies) or aluminium (3 studies) with two studies not specifying the material.

The use of reflective curtains probably results in a larger bilirubin decline at four to eight hours compared to not using curtains (MD: 14.61  $\mu\text{mol/L}$  lower (95% CI\*: 19.8 lower to 9.42 lower) (0.85 mg/dL lower (95%CI: 1.16 mg/dL lower to 0.55 mg/dL lower)); 3 studies, 281 infants, moderate-certainty evidence). Nine studies with a total of 893 participants reported a faster decline in bilirubin over 24 hours in the intervention group with curtains but the decline varied widely between studies from -5.00  $\mu\text{mol/L}$  (-0.26 mg/dL) to -100  $\mu\text{mol/L}$  (-5.57 mg/dL) and it was not meaningful to estimate an overall size of the effect. Due to this substantial inconsistency between studies as well as lack of blinding and possible selection bias, the evidence for this outcome was very uncertain (very

low-certainty evidence). Subgroup analyses by type of reflective material used in the intervention group and by baseline serum bilirubin level did not explain the differences between the studies as heterogeneity remained very high within the subgroups. Duration of phototherapy was reduced in four studies, but once again results differed substantially between studies from -1.6 hours to -22.27 hours making a meta-analysis to calculate an overall effect size not meaningful. The evidence was also very uncertain for this outcome (very low-certainty evidence). The use of reflective curtains probably reduces the duration of hospital stay by almost 2 days (MD: -41.08 hours (95% CI: -45.92 to -36.25); 2 studies, 179 infants, moderate-certainty evidence). Exchange transfusion was reported by two studies, but both reported none in either group. None of the studies reported on costs, parental or medical staff satisfaction, breastfeeding outcomes or neurodevelopmental outcomes.

Only one study with 156 infants compared the combination of phototherapy and reflective curtains to double phototherapy. The evidence suggests that there is no difference in decline in bilirubin (MD: 0.17  $\mu\text{mol/L}$  (95% CI -8.58 to 8.92); low-certainty evidence) nor in the duration of phototherapy (MD: 4.04 hours (95% CI -1.56 to 9.64); low-certainty evidence).

Adverse events were reported in nine trials and were similar between groups. Five of those nine trials reported that no adverse events occurred in either group. Due to the rarity of the adverse events, precise information regarding risks is lacking.

### Conclusion

The use of reflective curtains during phototherapy seems to result in a greater decline in serum bilirubin levels and a shorter duration of hospital stay. However, the effect varied greatly across studies and this heterogeneity could not be explained by type of material used nor by baseline bilirubin level. Unfortunately, the inconsistency in effect size limits the applicability of the results in clinical practice. The studies do not show an increase in adverse events when using curtains, but additional studies are needed as we are still uncertain about the possible harms.

### Implications for practice

Although the effect size is unpredictable, the evidence supports the use of reflective curtains to treat unconjugated hyperbilirubinaemia. Whether it also reduces the risk for an exchange transfusion remains unclear.

#### REFERENCE:

Vuorio A, Kuoppala J, Kovanen PT, Humphries SE, Tonstad S, Wiegman A, Drogari E, Ramaswami U. Statins for children with familial hypercholesterolemia. Cochrane Database of Systematic Reviews 2019, Issue 11. Art. No.: CD006401. DOI: 10.1002/14651858.CD006401.pub5.

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<sup>^</sup> CI: confidence interval