

CORRESPONDENCE



High bright light therapy may reduce delirium incidence in critically ill patients

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Dear Editor,

Correspondence from Drs. Shen, Yan, and Cai

In a recent meta-analysis [1], Dr. Bannon reported that bright light therapy (BLT) could not reduce delirium incidence in critically ill patients (Fig. 2, four trials, RR 0.45, 99% CI 0.10–2.13). Despite the well-designed analysis, this conclusion may be biased by the significant heterogeneity ($I^2=69\%$) which we thought was caused by inclusion of the Simons trial. First, compared to the other three trials, the lighting intensity was quite low in the Simons trial (Table 1. 1500 lx vs. 5000 lx). Whether the effect of BLT was mediated by the lighting intensity remains unclear. Second, the BLT therapy only lasted for 2 h in the morning in all three trials, whereas the duration was much longer in the Simons study (from 9:00 am to 16:00 pm). According to Burgess et al.'s finding [2], the

BLT only had antidepressant effect in the morning, but not in the evening. Whether the prolonged duration played a role in the inconsistent findings still needs investigation. Third, only 24.3% of participants were postoperative in the Simons trial and the APACHE II seems much higher. As Simons indicated, most patients in their study were sedated and had their eyes closed. Whether the biological effect of BLT was weakened by the closed eyes or sedatives remains unclear. Thus, we performed a subgroup meta-analysis and found that in the subgroup excluding the Simons trial, BLT significantly reduced delirium incidence (RR 0.23, 95% CI 0.08–0.62, $I^2=0$, fixed, Mantel–Haenszel). However, this finding is also vulnerable as statistically small trials are more likely to report beneficial effects in the intervention group [3].

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Table 1 Characteristics of included studies

| Author year | ICU type (percentage of postoperative patients) | APACHE II score (mean \pm SD) | Intervention protocol | Control protocol |
|---------------------------------------------------------------------------------------------------|-------------------------------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| Taguchi (2007) ^a | Surgical ICU (100%) | Not reported | Lighting intensity at 5000 lx for 2 h in the morning | In a natural lighting condition |
| Ono et al. (2011) ^b | Surgical ICU (100%) | 7.6 \pm 2.5 vs. 8.8 \pm 2.2 | 4-day intervention with light exposure from 7:30 to 9:30 am. Lighting intensity at 2500 lx from 7:30 to 7:45, and 4000 lx from 7:45 to 8:00, then 5000 lx from 8:00 to 9:00, then the lighting intensity was reduced to 4000 lx from 9:00 to 9:15 and to 2500 lx from 9:15 to 9:30 | In a natural lighting condition, with lighting intensity variations within 1000 lx |
| Potharajaroen et al. (2018) ^c | Surgical ICU (100%) | 14.4 \pm 3.9 vs. 16.4 \pm 4.9 | Lighting intensity at 5000 lx for 2 h from 9:00 to 11:00 am for 3 days | In a natural lighting condition |
| Pooled RR in subgroup meta-analysis (RR 0.23, 95% CI 0.08–0.62, $I^2=0$, fixed, Mantel–Haenszel) | | | | |
| Simons et al. (2016) ^d | Mixed medical and surgical ICU (24.3%) | 22.7 \pm 8.6 vs. 22.4 \pm 8.1 | An integrated lighting ceiling system with intensity at 1700 lx between 9:00 am and 16:00 pm, except for 11:30 to 13:30, when the intensity was reduced to 300 lx | Lighting intensity at 300 lx |
| Pooled RR in subgroup meta-analysis (RR 1.15, 95% CI 0.95–1.40, $I^2=0$, fixed, Mantel–Haenszel) | | | | |

ICU intensive care unit, APACHE II acute physiological and chronic health evaluation II, SD standard deviation, RR risk ratio

^a Taguchi T, Yano M, Kido Y (2007) Influence of bright light therapy on postoperative patients: a pilot study. *Intensive Crit Care Nurs* 23:289–297

^b Ono H, Taguchi T, Kido Y, Fujino Y, Doki Y (2011) The usefulness of bright light therapy for patients after oesophagectomy. *Intensive Crit Care Nurs* 27: 158–166

^c Potharajaroen S, Tangwongchai S, Tayjasanant T, Thawitsri T, Anderson G, Maes M (2018) Bright light and oxygen therapies decrease delirium risk in critically ill surgical patients by targeting sleep and acid-base disturbances. *Psychiatry Res* 261:21–27

^d Simons KS, Laheij RJ, van den Boogaard M, Moviat MA, Paling AJ, Polderman FN, Rozendaal FW, Salet GA, van der Hoeven JG, Pickkers P, de Jager CP (2016) Dynamic light application therapy to reduce the incidence and duration of delirium in intensive-care patients: a randomised controlled trial. *Lancet Respir Med* 4:194–202

Compliance with ethical standards

Conflicts of interest

The authors declare that they have no conflicts of interest.

Ethical approval

An approval by an ethics committee was not applicable.

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