To investigate the effects of sleep systems on sleep quality and pain in children and young people with cerebral palsy

Study date: 2009 to 2011

Funding: The Nancie Finnie Charitable Trust

Research team: Terry Pountney, Research Lead
Jessica Underhill, Research Fellow
Liz Bryant, Research Fellow

ABSTRACT

Purpose
In recent years there has been a significant increase in the prescription and use of sleep systems for children with cerebral palsy. The aim of this study was to investigate the effect that sleeping in a sleep system has on the sleep-wake patterns and pain levels for children with cerebral palsy.

Method
A cross-over design was undertaken. All participants slept for four nights in their sleep system and four nights out of their sleep system, the order of which was randomised. Eleven non-ambulant children and young people with cerebral palsy, who normally use a sleep system participated in this study (aged 5-15 years). Primary outcomes including sleep-wake patterns (using actigraphy) and pain levels (using the Paediatric Pain Profile) were obtained for all participants for both conditions. The Chailey Sleep Questionnaire, sleep diaries and interviews were used to support and supplement the objective data.

Results
Paired t-tests demonstrated no significant difference in actigraphic variables or pain levels between the two conditions (p>0.05).

Conclusions
The use of sleep systems did not appear to have a significant effect on either pain levels or on sleep-wake patterns in children with cerebral palsy. Although no significant differences were found, we did observe varying responses amongst the participants. Therefore we would recommend that both pain and sleep are discussed and assessed with the prescription of sleep systems for children with cerebral palsy.

Publications associated with this study
Underhill J, Bryant E and Pountney T (2012). The effect of sleep systems on sleep-wake patterns and pain levels in non-ambulant children and young people with cerebral palsy. APCP Journal 3 (1) 57-64.
The findings were also presented in poster format at the APCP Annual Conference 2011 (shown below).
The effect of sleep systems on sleep-wake patterns and pain in children with cerebral palsy

T Pountney PhD, J Underhill MSc, E Bryant PhD
Chailey Heritage Clinical Services

Background
The use of sleep systems form part of a child’s postural management programme and are designed to maintain a child’s position whilst sleeping to improve sleep and comfort in the short term and, in the long term, prevent development of deformity.

Research on sleep systems has largely focused on the management of deformity. There has been limited research on the children’s quality of sleep or their levels of pain.

The aim of this study was to investigate the effect that sleeping in a sleep system has on the sleep-wake patterns and pain levels for children with cerebral palsy (CP). Figure 1 shows a selection of sleep systems available.

![Image of various sleep systems]

Figure 1. Various sleep systems

Method
In a cross-over design study sleep-wake patterns and levels of pain were assessed during four nights in a sleep system and four nights out of a sleep system.

Eleven children with CP, who regularly use a sleep system, were recruited. The average age was 10 (SD 3.2). All children were unable to walk independently with GMFCS levels ranging from III to V. Various sleep systems were used by the children.

Primary outcomes including sleep-wake patterns and pain levels were obtained for all participants for both conditions (in and out of their sleep system). Data on sleep-wake patterns was collected using actigraphy. Each participant wore an Actiwatch type AW7 (CamNtech Ltd, UK). Pain levels were assessed using the Paediatric Pain Profile (PPP). The Chailey Sleep Questionnaire, sleep diaries and interviews were used to support and supplement the objective data.

The actigraphy data for each child was averaged over the four nights for each condition and average scores were analysed. Differences between the Paediatric Pain Profile scores for each condition were analysed.

Results - Sleep-wake patterns
The actigraphy variables measured included sleep latency (time before falling asleep following bedtime), sleep efficiency (percentage of time in bed actually spent asleep) and actual sleep time (estimated amount of sleep minus wake time). The mean actigraphy data was similar for both conditions (see Table 2); paired t-tests revealed no significant differences between the two conditions ($p > 0.05$).

<table>
<thead>
<tr>
<th>Sleep parameter</th>
<th>Condition</th>
<th>Mean (SD)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sleep latency (hours)</td>
<td>With</td>
<td>1.09 (0.49)</td>
<td>0.22</td>
</tr>
<tr>
<td></td>
<td>Without</td>
<td>1.20 (0.47)</td>
<td></td>
</tr>
<tr>
<td>Sleep efficiency (%)</td>
<td>With</td>
<td>76.2 (8.2)</td>
<td>0.34</td>
</tr>
<tr>
<td></td>
<td>Without</td>
<td>73.8 (11.1)</td>
<td></td>
</tr>
<tr>
<td>Actual sleep time (hours)</td>
<td>With</td>
<td>8.37 (0.54)</td>
<td>0.51</td>
</tr>
<tr>
<td></td>
<td>Without</td>
<td>8.29 (1.12)</td>
<td></td>
</tr>
</tbody>
</table>

Supplementary data from the Chailey Sleep Questionnaire, sleep diaries and interviews revealed some children experienced an increase night-time waking (n=3), vomiting (n=2), length of time to get to sleep (n=3) and the need for repositioning (n=4) during the four nights without their sleep systems.

When interviewed the majority of parents/carers (n=8) preferred their children to sleep with their sleep system; whereas 3 out of 4 children interviewed preferred to sleep without their sleep system.

Discussion
The findings indicate that the use of sleep systems did not have a significant effect on either pain or on sleep-wake patterns in children and young people with CP.

The average pain profile scores remained constant for the majority of participants whether they were in their sleep system or out of their sleep system.

The actigraphy parameters (sleep latency, sleep efficiency and actual sleep time) did not differ significantly between the two conditions (with and without the sleep system).

However, individual variations were observed amongst the participants.

Recommendations/ Implications for practice
Whilst no significant differences were found in this study, we did observe varying responses amongst the children. Therefore we would recommend that both pain and sleep are discussed and assessed with the prescription and use of sleep systems for children with CP.

Acknowledgements
We would like to thank the Nancio Finnie Charitable Trust for funding this study. We would also like to thank the children and young people for their participation.

Contact Details
For further information about this study please contact Dr Terry Pountney via email: terry.pountney@nhs.net