

Date: May 10, 2012

Title: Sleep promotion in children with mental health diagnoses

Clinical Question:

- P (population)** Among children with mental health diagnoses,
- I (intervention)** do self-regulation techniques
- C (comparison)** compared to PRN sleep medications
- O (outcome)** affect sleep quality at night
- T (time)** during an inpatient hospital stay?

Self-regulation techniques include progressive relaxation, guided imagery, meditation, breathing techniques and neural effective calming techniques.

Sleep quality at night includes sleep onset latency, sleep duration and number of night time awakenings.

Target Population: Children aged 3-18 years old with mental health diagnoses, including, attention deficit disorders, autism spectrum disorders or developmental delays receiving inpatient psychiatric mental health and/or behavioral care.

Mental Health Issues: DSM IV revised diagnoses

Recommendations:

1. It is recommended that for children with sleep onset latency, improving sleep hygiene and progressive relaxation may decrease sleep onset latency (Lacks, Bertelson, Gans and Kunkel 1983 [2b]; Borkevec, Grayson, O'Brien and Weerts 1979 [2b]).
Note: Sleep hygiene would include regular bedtime and waking routines, association of bedroom with sleep, monitoring nighttime activities to promote sleep and limiting napping.
2. It is recommended that children aged 6-12 who are diagnosed with Attention Deficit Hyperactivity Disorder, and children with developmental disorders benefit from the use of melatonin to improve sleep efficacy and sleep duration and to decrease sleep onset latency (Van Der Heijden, Smits, van Someren, Ridderinkhof and Gunning 2007 [2a]; Hoebert, van der Heijden, van Geijlswijk, Smits 2009 [4a]; Dodge and Wilson 2001 [2b]; Armour and Paton, 2004 [5a]).

Discussion/Summary of Evidence Related to the Recommendations:

Although there were no studies in children that compared self-regulation techniques to sleep medications used as needed, studies on adults with sleep onset latency found that stimulus control and progressive relaxation are effective interventions to decrease sleep onset latency (Lacks, Bertelson, Gans and Kunkel 1983 [2b]; Borkevec, Grayson, O'Brien and Weerts 1979 [2b]).

Lacks et al. (1983 [2b]) defines stimulus control as education that includes: associating bed and bedroom with rapid sleep onset, curtailing sleep incompatible activities such as reading, eating and watching TV in the bedroom, regular waking times and absence of napping. Lacks et al. (1983 [2b]) in a randomized control trial of adults with sleep onset latency that compared stimulus control, progressive relaxation, paradoxical intention and placebo, found that stimulus

control produced significant differences among the groups for the sleep onset latency ($p < .05$). Another randomized controlled trial showed that progressive relaxation was significantly effective in reducing sleep onset latency and the number of minutes to sleep onset in college students (Borkovec et al., 1979 [2b]).

Pharmacologic interventions such as melatonin were found to reduce sleep latency and sleep onset insomnia in children with Attention Deficit Hyperactivity Disorder (ADHD) (Van Der Heijden, Smits, van Someren, Ridderinkhof and Gunning 2007 [2a]; Hoebert, van der Heijden, van Geijlswijk, Smits 2009 [4a]; Dodge and Wilson 2001 [2b]) and developmental disorders (Armour and Paton, 2004 [5a]). Armour and Paton (2004 [5a]) opined that melatonin improved lights out time, sleep onset and sleep duration with rare possible side effects reported such as headache, increased seizure activity, increased asthma symptoms and a potential adverse effect on puberty development.

Along with improved sleep duration and lessened time to fall asleep, Dodge and Wilson (2001 [2b]) found that the use of melatonin is effective in children with developmental delays and Autism Spectrum Disorder. Dodge's study population did not include children beyond age 12 due to concerns on possible pubertal effects of melatonin. Van der Heijden et al. (2007 [2a]) found that melatonin improved sleep onset greater than 30 minutes by 48.8% in his study of children with ADHD and chronic sleep onset insomnia. Total time asleep increased by 20 minutes and sleep latency in melatonin group vs. placebo decreased by 21.3 minutes. Sleep efficacy improved by 2.6% in melatonin group and decreased 2.1% in placebo group. Van der Heijden et al (2007 [2a]) also reports that melatonin had no effect on behavior, cognition or quality of life.

Long term use of melatonin is a safe and effective treatment for children aged 6-12 with ADHD and chronic onset sleep disorders (Hobert et al. 2009 [4a]). It is important to note that no studies were found that stated that diphenhydramine is a safe and effective pharmacologic intervention for sleep in children.

Dimensions for Judging the Strength of the Recommendation #1:

Reflecting on your answers to the dimensions below and given that more answers to the left of the scales indicates support for a stronger recommendation, complete one of the sentences above to judge the strength of this recommendation.

(Note that for negative recommendations, the left/right logic may be reversed for one or more dimensions.)

1. Grade of the Body of Evidence	<input type="checkbox"/> High	<input type="checkbox"/> Moderate	<input checked="" type="checkbox"/> Low
<i>Comments:</i>			
2. Safety/Harm (Side Effects and Risks)	<input checked="" type="checkbox"/> Minimal	<input type="checkbox"/> Moderate	<input type="checkbox"/> Serious
<i>Comments:</i>			
3. Health benefit to patient	<input type="checkbox"/> Significant	<input checked="" type="checkbox"/> Moderate	<input type="checkbox"/> Minimal
<i>Comments:</i> Sleep hygiene and relaxation techniques improve sleep onset latency (Lacks, Bertelson, Gans and Kunkel 1983 [2b], Borkevec, Grayson, O'Brien and Weerts 1979 [2b]).			
4. Burden on patient to adhere to recommendation	<input checked="" type="checkbox"/> Low	<input type="checkbox"/> Unable to determine	<input type="checkbox"/> High
<i>Comments:</i> Education and support of patients and families may be required to develop and implement initial sleep hygiene practice (Lacks, Bertelson, Gans and Kunkel 1983 [2b]; Borkevec, Grayson, O'Brien and Weerts 1979 [2b]).			
5. Cost-effectiveness to healthcare system	<input checked="" type="checkbox"/> Cost-effective	<input type="checkbox"/> Inconclusive	<input type="checkbox"/> Not cost-effective
<i>Comments:</i>			
6. Directness of the evidence for this target population	<input type="checkbox"/> Directly relates	<input checked="" type="checkbox"/> Some concern of directness	<input type="checkbox"/> Indirectly relates
<i>Comments:</i> Adult studies			
7. Impact on morbidity/mortality or quality of life	<input checked="" type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Low
<i>Comments:</i> Sleep hygiene and relaxation techniques improve sleep onset latency (Lacks, Bertelson, Gans and Kunkel 1983 [2b]; Borkevec, Grayson, O'Brien and Weerts 1979 [2b]).			

Dimensions for Judging the Strength of the Recommendation #2:

Reflecting on your answers to the dimensions below and given that more answers to the left of the scales indicates support for a stronger recommendation, complete one of the sentences above to judge the strength of this recommendation.

(Note that for negative recommendations, the left/right logic may be reversed for one or more dimensions.)

1. Grade of the Body of Evidence	<input type="checkbox"/> High	<input type="checkbox"/> Moderate	<input checked="" type="checkbox"/> Low
Comments:			
2. Safety / Harm (Side Effects and Risks)	<input checked="" type="checkbox"/> Minimal	<input type="checkbox"/> Moderate	<input type="checkbox"/> Serious
Comments: No significant adverse events were reported (Van der Heijden (2007 [2a]; Dodge (2001 [2b]; Hoebert (2009 [4a], Armour 2004 [5a]). Study population excluded children over the age of 12 years in one study due to possible impact on puberty (Dodge 2001[5a]) and expert opinion noted that melatonin has contraceptive properties that affect the onset of puberty (Armour 2004 [5a]).			
3. Health benefit to patient	<input checked="" type="checkbox"/> Significant	<input type="checkbox"/> Moderate	<input type="checkbox"/> Minimal
Comments: Improved sleep efficacy and decreased sleep onset latency were shown (Van der Heijden 2007 [2a], Hoebert 2009 [4a]).			
4. Burden on patient to adhere to recommendation	<input checked="" type="checkbox"/> Low	<input type="checkbox"/> Unable to determine	<input type="checkbox"/> High
Comments:			
5. Cost-effectiveness to healthcare system	<input type="checkbox"/> Cost-effective	<input checked="" type="checkbox"/> Inconclusive	<input type="checkbox"/> Not cost-effective
Comments: Melatonin is an over the counter medication.			
6. Directness of the evidence for this target population	<input checked="" type="checkbox"/> Directly relates	<input type="checkbox"/> Some concern of directness	<input type="checkbox"/> Indirectly relates
Comments: Children with ADHD were subjects in the studies.			
7. Impact on morbidity/mortality or quality of life	<input checked="" type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Low
Comments: Improvement in sleep may lead to long term benefits.			

Reference List: (Evidence Level in []; See Table of Evidence Levels following references)

- Armour, D., & Paton, C. (2004). Melatonin in the treatment of insomnia in children and adolescents. *Psychiatric Bulletin*, 28(6), 222-224. doi:10.1192/pb.28.6.222 [5a].
- Borkovec, T. D., Grayson, J. B., O'Brien, G. T., & Weerts, T. C. (1979). Relaxation treatment of pseudoinsomnia and idiopathic insomnia: An electroencephalographic evaluation. *Journal of Applied Behavior Analysis*, 12(1), 37-54. [2b].
- Dodge, N. N., & Wilson, G. A. (2001). Melatonin for treatment of sleep disorders in children with developmental disabilities. *Journal of Child Neurology*, 16(8), 581-584. [2b].
- Galland, B. C., Tripp, E. G., & Taylor, B. J. (2010). The sleep of children with attention deficit hyperactivity disorder on and off methylphenidate: A matched case-control study. *Journal of Sleep Research*, 19(2), 366-373. [4a].
- Hoebert, M., van der Heijden, K. B., van Geijlswijk, I. M., & Smits, M. G. (2009). Long-term follow-up of melatonin treatment in children with ADHD and chronic sleep onset insomnia. *Journal of Pineal Research*, 47(1), 1-7. [4a].
- Lacks, P., Bertelson, A. D., Gans, L., & Kunkel, J. (1983). The effectiveness of three behavioral treatments for different degrees of sleep onset insomnia. *Behavior Therapy*, 14(5), 593-605. [2b].
- Pederson, C., & Harbaugh, B. L. (1995). Nurses' use of nonpharmacologic techniques with hospitalized children. *Issues in Comprehensive Pediatric Nursing*, 18(2), 91-109. [4b].
- Russo, R., Gururaj, V., & Allen J. (1976). The effectiveness of diphenhydramine HCl in pediatric sleep disorders. *Journal of Clinical Pharmacology*. 16, 284-288. [2b].

Thompson, M., & Gauntlett-Gilbert, J. (2008). Mindfulness with children and adolescents: Effective clinical application. *Clinical Child Psychology & Psychiatry, 13*(3), 395-407. [5a].

Van der Heijden, K.,B., Smits, M. G., Van Someren, E.,J.W., Ridderinkhof, K. R., & Gunning, W. B. (2007). Effect of melatonin on sleep, behavior, and cognition in ADHD and chronic sleep-onset insomnia. *Journal of the American Academy of Child and Adolescent Psychiatry, 46*(2), 233-241. [2a].

SUPPORTING INFORMATION

Background/Purpose of BEST Development:

Based on clinical experience of direct care Registered Nurses (RN) and Child Life Specialist, a majority of the hospitalized children with mental health diagnoses appear to have difficulty sleeping, such as resistance to bedtime, sleep onset latency and difficulty staying asleep. It was not an uncommon request for a child to ask the RN for a sleeping medication early in the evening, without having pajamas on yet and without even having attempted to fall sleep. In practice, whenever possible, sleep comfort measures were offered, such as tucking younger children in for the night and offering relaxation and guided imagery at bedside for younger and older children. It was observed that when a nurse simply walked with a child to his or her bedroom at bedtime, there was, anecdotally, a positive effect on reducing resistance to sleep and to decreasing sleep onset latency and without the use of sleep medication.

Methylphenidate, commonly used in children with ADHD, has adverse effects on the amount of sleep and the extended time to fall asleep in 6-12 year old children (Galland, Tripp and Taylor 2010 [4a]). Diphenhydramine HCL has been studied in one trial of children aged 2-12 years old and was found to be more effective than placebo in decreasing sleep latency and number of awakenings, however there were no differences in restlessness, nightmares and difficulty in awakening (Russo, Gururaj and Allen, 1976 [2b]).

The project team conducted a sleep questionnaire on inpatient admission, completed by either parents or nursing staff and out of 61 survey responses 49 patients were identified as having a sleep disturbance and 12 were identified as not having a sleep disturbance on admission. These results underlie the prevalence of sleep disorders and mental health, behavioral and psychiatric diagnoses in an inpatient population.

Applicability Issues:

Creating awareness around sleep hygiene by providing a thorough education session to all mental health staff on the importance of sleep in maintaining health and wellness as well as strategies to promote sleep is essential and the first step. There are limiting factors that would prevent sleep hygiene protocol from full implementation on an inpatient psychiatric setting. Pederson and Harbaugh (1995, [4b]) found that lack of time, heavy workload, and lack of knowledge are barriers that prevent nurses from using non-pharmacological techniques. Many children in this population have a history of trauma (abuse and neglect which may have occurred in a sleep setting) which may cause sleep resistance. This resistance could prevent others from having a quiet and relaxing environment to promote positive sleep. It is also noted that some medications that improve day-time functioning in children with ADHD may exhibit decreased sleep duration and latency (Galland et al. 2010 [4a]). These factors would need to be addressed during educational sessions and along the way concerns would need to be addressed from direct care staff.

Opportunities exist to research the application of these techniques in children (Thompson and Gauntlett-Gilbert, 2008 [5a]).

Outcome or Process Measures:

A common outcome measure in these relevant sleep studies included a patient diary or sleep log (Borkovec et al, 1979 [2b]; Lacks et al. 1983 [2b]). According to Lacks et al. (1983, [2b]), the sleep diary has, "a high test-retest reliability" and correlates with findings from an EEG as well as spousal or roommate observations. In combination with the sleep diary,

having an observer (such as a staff person) record hours of sleep, number of awakenings, and the time the child laid down in bed and woke from bed are also appropriate methods of measuring sleep quality (Dodge and Wilson, 2001 [2b]). Comparing pre and post sleep hygiene protocol with a patient using the sleep diary and/or observation log would be appropriate process measures to determine improvement in sleep.

Search Strategy:

Search terms included: sleep, relaxation, progressive muscular relaxation, mediation, calming techniques, breathing techniques, self-awareness, self-regulation, cranial-sacral massage, neuroaffective, melatonin, sleep aids, Benadryl, child, and psychiatry.

The databases searched include: MEDLINE, CINAHL, PsycINFO, Cochrane Database of Systematic Reviews, PubMed. The search was limited to articles that were printed in English, all dates inclusive through December 2010.

A question was submitted to National Association of Children's Hospitals and Related Institutions, now known as Child Health Association with no responses.

Relevant CCHMC Evidence-Based Documents:

None were found

Group/Team Members:

Team Leader/Author: Aurealassa Williams, RN, BSN, LMT, VCSW, Division of Psychiatry

Team Members/Co-Authors: Devin Robinson, RN II, Division of Psychiatry, Melissa Liddle BS, CCLS, CTRS Child Life Specialist II, Division of Psychiatry

Support/Consultant: Mary Ellen Meier, RN, MSN, CPE, EBP Mentor, Debra Rhein, BSN, RN, Clinical Manager, Division of Psychiatry

Conflicts of Interest were declared for each team member:

- No financial conflicts of interest were found.
 The following financial conflicts of interest were disclosed:

Note: Full tables of evidence grading system available in separate document:

- [Table of Evidence Levels of Individual Studies by Domain, Study Design, & Quality](#) (abbreviated table below)
- [Grading a Body of Evidence to Answer a Clinical Question](#)
- [Judging the Strength of a Recommendation](#) (abbreviated table below, dimensions table above)

Table of Evidence Levels (see note above)

Quality level	Definition
1a ⁺ or 1b ⁺	Systematic review, meta-analysis, or meta-synthesis of multiple studies
2a or 2b	Best study design for domain
3a or 3b	Fair study design for domain
4a or 4b	Weak study design for domain
5a or 5b	General review, expert opinion, case report, consensus report, or guideline
5	Local Consensus

†a = good quality study; b = lesser quality study

Table of Recommendation Strength (see note above)

Strength	Definition
It is strongly recommended that... It is strongly recommended that... not...	There is consensus that benefits clearly outweigh risks and burdens (or visa-versa for negative recommendations).
It is recommended that... It is recommended that... not...	There is consensus that benefits are closely balanced with risks and burdens.
There is insufficient evidence and a lack of consensus to make a recommendation...	

Copies of this Best Evidence Statement (BEST) and related tools (if applicable, e.g., screening tools, algorithms, etc.) are available online and may be distributed by any organization for the global purpose of improving child health outcomes.

Website address: <http://www.cincinnatichildrens.org/svc/alpha/h/health-policy/best.htm>

Examples of approved uses of the BEST include the following:

- copies may be provided to anyone involved in the organization's process for developing and implementing evidence based care;
- hyperlinks to the CCHMC website may be placed on the organization's website;
- the BEST may be adopted or adapted for use within the organization, provided that CCHMC receives appropriate attribution on all written or electronic documents; and
- copies may be provided to patients and the clinicians who manage their care.

Notification of CCHMC at EBDMinfo@cchmc.org for any BEST adopted, adapted, implemented, or hyperlinked by the organization is appreciated.

Please cite as: Cincinnati Children's Hospital Medical Center: Best Evidence Statement: Sleep promotion in children with mental health diagnoses, <http://www.cincinnatichildrens.org/svc/alpha/h/health-policy/best.htm>, BEST 124, pages 1-6, 5/10/12.

This Best Evidence Statement has been reviewed against quality criteria by 2 independent reviewers from the CCHMC Evidence Collaboration.

For more information about CCHMC Best Evidence Statements and the development process, contact the Evidence Collaboration at EBDMinfo@cchmc.org.

Note

This Best Evidence Statement addresses only key points of care for the target population; it is not intended to be a comprehensive practice guideline. These recommendations result from review of literature and practices current at the time of their formulation. This Best Evidence Statement does not preclude using care modalities proven efficacious in studies published subsequent to the current revision of this document. This document is not intended to impose standards of care preventing selective variances from the recommendations to meet the specific and unique requirements of individual patients. Adherence to this Statement is voluntary. The clinician in light of the individual circumstances presented by the patient must make the ultimate judgment regarding the priority of any specific procedure.