

Practice Parameters for Behavioral Treatment of Bedtime Problems and Night Wakings in Infants and Young Children

An American Academy of Sleep Medicine Report

Timothy I. Morgenthaler, MD¹; Judith Owens, MD²; Cathy Alessi, MD³; Brian Boehlecke, MD, MSPH⁴; Terry M. Brown, DO⁵; Jack Coleman, Jr., MD⁶; Leah Friedman, MA, PhD⁷; Vishesh K. Kapur, MD, MPH⁸; Teofilo Lee-Chiong, MD⁹; Jeffrey Pancer, DDS¹⁰; Todd J. Swick, MD¹¹

¹Mayo Clinic, Rochester, MN; ²Rhode Island Hospital, Providence, RI; ³VA Greater Los Angeles Healthcare System and University of California, Los Angeles, Sepulveda, CA; ⁴University of North Carolina, Chapel Hill, NC; ⁵St. Joseph Memorial Hospital, Murphysboro, IL; ⁶Murfreesboro, TN; ⁷Stanford University, Stanford, CA; ⁸University of Washington, Seattle, WA; ⁹National Jewish Medical and Research Center, Denver, CO; ¹⁰Toronto, Ontario, Canada; ¹¹Houston Sleep Center, Houston, TX

Summary: Bedtime problems and frequent night wakings are highly prevalent in infants, toddlers, and preschoolers. Evidence suggests that sleep disruption and/or insufficient sleep have potential deleterious effects on children's cognitive development, regulation of affect, attention, health outcomes, and overall quality of life, as well as secondary effects on parental and family functioning. Furthermore, longitudinal studies have demonstrated that sleep problems first presenting in infancy may become chronic, persisting into the preschool and school-aged years. A solid body of literature now exists supporting the use of empirically-based behavioral management strategies to treat bedtime problems and night wakings in infants, toddlers, and preschoolers. The following practice parameters present recommendations for the use of behavioral (i.e., non-pharmacological) treatments of bedtime problems and night wakings in young children (aged 0 – 4. years 11 months). A companion review paper¹ on which the recommendations are based was prepared by a taskforce appointed by the Standards of Practice Committee (SPC) of the American Academy of Sleep Medicine (AASM), and summarizes the peer-reviewed scientific literature on this topic. The authors of the review paper evaluated the evidence presented by the reviewed studies according to modified Sackett criteria.² Using this information and a grading system described by Eddy³ (i.e., standard, guideline or option), the Standards of Practice Committee and Board of Directors of the American Academy of Sleep Medicine determined levels of treatment recommendation presented in the practice parameters below. These practice parameters provide 3 types of recommendations. First, recommendations are provided indicating that behavioral interventions are effective in the treatment of bedtime problems and

night wakings in young children, producing reliable and significant clinical improvement in sleep parameters. Second, recommendations are made regarding specific behavioral therapies, including: (1) unmodified extinction, extinction with parental presence, and preventive parent education are all rated as individually effective therapies in the treatment of bedtime problems and night wakings (Standards), and (2) graduated extinction, bedtime fading/positive routines and scheduled awakenings are rated as individually effective therapies in the treatment of bedtime problems and night wakings but with less certainty (Guidelines). There was insufficient evidence to recommend standardized bedtime routines and positive reinforcement as single therapies. In addition, although behavioral therapies for bedtime problems and night wakings are often combined, there was insufficient evidence available to recommend one individual therapy over another or to recommend an individual therapy over a combination of therapies. Finally, recommendations are provided regarding the beneficial effects of behavioral treatments on secondary outcomes, including daytime functioning (child) and parental well-being.

Keywords: Practice guidelines; practice parameters; bedtime problems, night wakings in young children; treatment, behavioral, non-pharmacological; unmodified extinction, graduated extinction, extinction with parental presence, parent education, positive routines, scheduled awakenings, standardized bedtime routines, positive reinforcement.

Citation: Morgenthaler TI, Owens J, Alessi C et al. Practice parameters for behavioral treatment of bedtime problems and night wakings in infants and young children. *SLEEP* 2006;29(10):1277-1281.

Disclosure Statement

This was not an industry supported study. Dr. Morgenthaler has received research support from Itamar Medical Ltd. and ResMed Research Foundation; and has received research equipment from Olympus. Dr. Owens is a consultant for Eli Lilly, Sanofi-Aventis, Cephalon, and Shire; has received research support from Eli Lilly, Cephalon, and Sepracor; and is a speaker for Eli Lilly, Cephalon, Sanofi-Aventis, and Johnson & Johnson. Dr. Alessi is a consultant for Prescription Solutions, Inc. Dr. Kapur has received research support from the Washington Technology Center and Pro-tech Services, Inc.; and has received research equipment from Respiroics. Dr. Swick has received research support from Sanofi-Aventis, Takeda Pharmaceuticals, Merck, Jazz Pharmaceuticals, Pfizer, Somaxon, Astellas-Pharmaceuticals, and Cephalon; and is on the speakers' bureau of GlaxoSmithKline, Jazz Pharmaceuticals, Sepracor, Cephalon, and Boehringer Ingelheim. Dr. Coleman has is a consultant for Acclarent and Influent. Drs. Boehlecke, Brown, Friedman, Lee-Chiong, and Pancer have indicated no financial conflicts of interest.

Address correspondence to: Timothy I Morgenthaler, MD, Mayo Sleep Disorders Center, Mayo Clinic, 200 First Street SW, Rochester, MN 55905; Tel: (507) 284-3764; Fax: (507) 266-4372; E-mail: morgenthaler.timothy@mayo.edu

1.0 INTRODUCTION

BEDTIME PROBLEMS AND FREQUENT NIGHT WAKINGS ARE HIGHLY PREVALENT IN YOUNG CHILDREN, OCCURRING IN APPROXIMATELY 20% TO 30% of infants, toddlers, and preschoolers. Bedtime problems include bedtime struggles and bedtime refusal (e.g., verbal protests, crying, getting out of bed, attention-seeking behaviors). These sleep behaviors usually fall within the clinical diagnostic category of behavioral insomnia of childhood, limit-setting type, in which parents demonstrate difficulties in adequately enforcing bedtime limits. Night wakings are nocturnal awakenings that are viewed as problematic by caregivers, generally because they are frequent and/or prolonged and/or require parental intervention. In general, night wakings fall within the diagnostic category of behavioral insomnia of childhood, sleep onset association type, in which children become dependent upon specific sleep onset associations (e.g., rocking, feeding, parental presence) to fall asleep at bedtime and to return

to sleep during the night.

The etiology of bedtime resistance and night wakings in childhood represents a complex combination of biological, circadian, and neurodevelopmental factors that interact with environmental and behavioral variables. Thus, bedtime resistance and night wakings in childhood, similar to psychophysiological insomnia in adults, involve predisposing, precipitating, and perpetuating factors. Bedtime problems and night wakings may be viewed as representing some delay in the emergence of, or a regression in behaviors associated with, the neurodevelopmental processes of sleep consolidation and sleep regulation that evolve over the first few years of life. Like most developmental processes, these are shaped by both intrinsic (e.g., temperament) and extrinsic (e.g., sleeping environment, parenting practices) factors which, in turn, may be modified by behavioral strategies.

It should be noted that bedtime problems and night wakings in children, in contrast to the definition of insomnia in adults, are defined as such primarily by caregivers, and do not necessitate a subjective sleep complaint by the child himself. Thus, the definition of these sleep problems in young children is also highly influenced by the developmental, environmental, and cultural context in which they occur. Furthermore, although research definitions of bedtime problems and night wakings generally include parameters related to some combination of frequency (e.g., number of episodes per night or per week), severity (e.g., duration of episodes), and chronicity (e.g., weeks to months), there are currently no standardized research criteria for defining these sleep problems in the pediatric population. Finally, because of the nature of sleep complaints in young children, outcomes may include parameters related not only to daytime functioning in the child, but to parental variables (e.g., mental health, marital satisfaction) as well.

2.0 METHODS

The SPC of the AASM developed these practice parameters based on the accompanying review paper.¹ A task force of content experts was appointed by the AASM in July, 2003 to review and grade evidence in the peer-reviewed scientific literature regarding the behavioral treatment of bedtime problems and night wakings. Recommendations are based on evidence from studies evaluated in this literature review.

The Board of Directors of the AASM approved these recommendations. All members of the AASM SPC and Board of Directors completed detailed conflict-of-interest statements and were found to have no conflicts of interest with regard to this subject.

These practice parameters define principles of practice that should meet the needs of most patients in most situations. These guidelines should not, however, be considered inclusive of all proper methods of care or exclusive of other methods of care reasonably expected to obtain the same results. The ultimate judgment regarding appropriateness of any specific therapy must be made by the healthcare practitioner and patient, in light of the individual circumstances presented by the patient, available diagnostic tools, accessible treatment options, resources available and other relevant factors.

The AASM expects these guidelines to have an impact on professional behavior, patient outcomes, and, possibly, health care costs. These practice parameters reflect the state of knowledge at the time of publication and will be reviewed, updated, and revised

Table 1—AASM Classification Of Evidence

Evidence Levels	Study Design
I	Randomized well-designed trials with low alpha and beta error*
II	Randomized trials with high alpha and beta error*
III	Nonrandomized concurrently controlled studies
IV	Nonrandomized historically controlled studies
V	Case series

Adapted from Sackett²

*Alpha (type I error) refers to the probability that the null hypothesis is rejected when in fact it is true (generally acceptable at 5% or less, or $p < 0.05$). Beta (Type II error) refers to the probability that the null hypothesis is mistakenly accepted when in fact it is false (generally, trials accept a beta error of 0.20). The estimation of Type II error is generally the result of a power analysis. The power analysis takes into account the variability and the effect size to determine if sample size is adequate to find a difference in means when it is present (Power generally acceptable at 80-90%).

Table 2—AASM Levels Of Recommendations

Term	Definition
Standard	This is a generally accepted patient-care strategy, which reflects a high degree of clinical certainty. The term standard generally implies the use of Level I Evidence, which directly addresses the clinical issue, or overwhelming Level II Evidence.
Guideline	This is a patient-care strategy, which reflects a moderate degree of clinical certainty. The term guideline implies the use of Level II Evidence or a consensus of Level III Evidence.
Option	This is a patient-care strategy, which reflects uncertain clinical use. The term option implies either inconclusive or conflicting evidence or conflicting expert opinion.

Adapted from Eddy³

as new information becomes available. This practice parameter paper is referenced, where appropriate, using square-bracketed numbers to the relevant sections and tables in the accompanying review paper,¹ or with additional references at the end of this paper. The AASM classification of evidence for evidentiary articles is listed in Table 1. Definitions of levels of recommendations used by the AASM appear in Table 2.

3. RECOMMENDATIONS

The recommendations in this paper are supported by Level I to Level V evidence. Each of the 52 articles included in the accompanying review paper¹ was evaluated using the evidence-based approach outlined by the SPC in Table 1 of this paper. The evidence was then evaluated by the SPC according to methodology presented in Table 2 of this paper to establish a recommendation level (Standard, Guideline, or Option). The following are recommendations of the SPC and the Board of Directors of the AASM. It should be noted that the age range of children included in these recommendations is 0 - 4 years 11 months, and the target population does not include children with known developmental disabilities, or co-morbid medical or psychiatric conditions.

Table 3—Table of Treatment Terminology

Term	Definition
Unmodified extinction	Involves parents putting the child to bed at a designated bedtime and then ignoring the child until morning, although parents continue to monitor for issues such as safety and illness. The objective is to reduce undesired behaviors (e.g., crying, screaming) by eliminating parental attention as a reinforcer.
Graduated extinction	Involves parents ignoring bedtime crying and tantrums for pre-determined periods before briefly checking on the child. A progressive (graduated) checking schedule (e.g., 5 min., then 10 min.) or fixed checking schedule (e.g., every 5 minutes) may be used. Like Unmodified extinction, the goal is to enable a child to develop “self-soothing” skills and be able to fall asleep independently without undesirable sleep associations.
Positive routines/faded bedtime with response cost	Positive routines involve parents developing a set bedtime routine characterized by enjoyable and quiet activities to establish a behavioral chain leading up to sleep onset. Faded bedtime involves temporarily delaying the bedtime to more closely coincide with the child’s natural sleep onset time, then fading it earlier as the child gains success falling asleep quickly. Response cost involves taking the child out of bed for prescribed brief periods if the child does not fall asleep. These strategies rely on stimulus control as the primary agent of behavior change and target reduced affective and physiological arousal at bedtime.
Scheduled awakenings	Involves parents preemptively awakening their child prior to a typical spontaneous awakening, and providing the “usual” responses (e.g., feeding, rocking, soothing) as if child had awakened spontaneously.
Parent education/prevention	Involves parent education to prevent the occurrence of the development of sleep problems. Behavioral interventions are incorporated into these parent education programs.

GENERAL RECOMMENDATION

3.1. Behavioral interventions are effective and recommended in the treatment of bedtime problems and night wakings in young children. [4.1] (Standard)

Of the 52 selected studies examining the effectiveness of behavioral interventions for the treatment of bedtime problems and night wakings, 94% (49 of 52) reported that behavioral interventions as a whole produced clinically significant improvements in bedtime resistance and night waking, while the remaining three studies reported equivocal findings. Nine of the 52 (17%) represented randomized treatment control trials that were classified as Level I. Four studies (8%) were classified as Level II. The primary outcome measures in these thirteen studies were child sleep parameters.

RECOMMENDATIONS FOR SPECIFIC THERAPIES

3.2 Unmodified extinction and extinction of undesired behavior with parental presence are effective and recommended therapies in the treatment of bedtime problems and night wakings. [4.2] (Standard)

Of the 23 separate studies involving the use of unmodified extinction, 21 found this behavioral strategy to be effective; four were Level I randomized controlled trials and two were Level II.

The objective of unmodified extinction procedures for sleep problems is to reduce the undesired behavior (e.g., prolonged bedtime protests) by eliminating any reinforcement (e.g., parental attention) of the behavior. This therapy usually involves having the parents put the child to bed at a designated bedtime and then not responding to the child’s undesired behavior;. It should be noted that, although generally found to be effective, unmodified extinction has limited parental acceptance. Some parents find extinction with parental presence, which involves a similar structure except that the parents remain in the child’s room at bedtime during the extinction procedure, more acceptable.

3.3. Parent education/prevention is an effective and recommended therapy in the treatment of bedtime problems and night wakings. [4.2] (Standard)

This recommendation is based on three randomized controlled trials classified as Level I and one study classified as Level II. Parent education programs may be targeted primarily towards prevention of sleep problems, largely in the pre-natal period or first 6 months of life, or towards intervention with a pre-existing sleep problem. Both of these strategies focus on development of positive sleep habits, and typically involve giving caretakers an education package that includes some combination of information on bedtime routines, sleep schedules, and the acquisition of “self soothing” skills on the part of the infant or child. Parental education also appears to be a highly cost-effective treatment modality. Treatment format varies across studies and includes individual therapist-parent sessions, group sessions, and education booklets. Although there appears to be limited support for the inclusion of clinical sessions in prevention/intervention education programs, more research is needed to determine which of these delivery models is most effective.

3.4. Graduated extinction of undesired behavior is an effective and recommended therapy in the treatment of bedtime problems and night wakings. [4.2] (Guideline)

This recommendation is based upon two randomized controlled trials classified as Level I and one Level II study. The goal of graduated extinction is to enable a child to develop the ability to fall asleep independently, without requiring the intervention of a parent. Parents are generally instructed to ignore bedtime crying and tantrums for specified periods according to a fixed schedule or progressively longer intervals, and to avoid reinforcing protest behavior. This intervention is often referred to as “sleep training”. Parental acceptance of graduated extinction techniques tends to be greater than that of unmodified extinction.

3.5. Delayed bedtime with removal from bed/positive bedtime routines is an effective and recommended therapy in the treatment of bedtime problems and night wakings. [4.2] (Guideline)

This recommendation is based on 1 Level I study. Delayed bedtime involves temporarily delaying the child’s bedtime in order to more closely approximate the actual sleep onset time; removal from bed (also referred to as response cost) adds the requirement for the parent to remove the child from bed for a specific time period if sleep onset is not achieved within a prescribed time. Positive bedtime routines involve the institution of a set sequence of pleasurable and calming activities preceding bedtime in order to establish a behavioral chain leading up to sleep onset. Both of

these treatments are based upon stimulus control techniques, and are targeted towards reducing affective and physiologic arousal at bedtime.

3.6. The use of scheduled awakenings is an effective and recommended therapy in the treatment of bedtime problems and night wakings. [4.2] (Guideline)

The recommendation is based on 1 study classified as Level I. Scheduled awakenings requires documentation of the pattern of night wakings, followed by the institution of preemptive waking of the child by the parent prior to the expected time of those awakenings, and subsequent fading out of the awakenings over time. Studies suggest that this technique may be less acceptable to parents, and may have less utility in very young children.

3.7. Insufficient evidence was available to recommend any single therapy over another for the treatment of bedtime problems and night wakings. Insufficient evidence was also available to recommend combination, or multi-faceted, interventions for bedtime problems and night wakings over single therapies. [4.2, 4.3, 4.4] (Option)

Although several behavioral techniques were included as part of a multi-component treatment package in a large number (14) of studies, whether they are independently effective could not be determined from the available data. [4.2] For example, insufficient evidence was available for standardized bedtime routines as a stand-alone treatment to be evaluated and thus recommended as a single therapy in the treatment of bedtime problems and night wakings. Similarly, although positive reinforcement in the form of token systems, verbal praise, etc was included as part of the treatment package in 15 studies, there is currently insufficient data to recommend it as a single intervention. [4.2]

There have been very few studies (5) that have conducted head-to-head comparisons between different behavioral treatments. Although these few studies suggest that there may be comparative differences in degree and rapidity of treatment response, there is currently not enough evidence to recommend the use of 1 treatment over another. Similarly, although a total of 30 studies (5 of which were classified as Level I or II, 16 as Level III, and 9 as Level IV or V) included 2 or more types of behavioral interventions (e.g., parent education, positive reinforcement, graduated extinction, individually tailored treatment) in combination, there was a great deal of variability in the treatment components included in these studies. Therefore, no specific recommendations can be made regarding the relative superiority of any combination vs. single therapies. Only 1 study in children has compared the relative efficacy of combined behavioral-pharmacologic treatment vs. behavioral treatment alone. [4.3, 4.4]

RECOMMENDATIONS FOR SECONDARY OUTCOMES

3.8. Behavioral interventions are recommended and effective in improving secondary outcomes (child's daytime functioning, parental well-being) in children with bedtime problems and night wakings. [4.6] (Guideline)

A total of 13 studies have assessed a number of secondary treatment outcomes related to daytime functioning in the child (including behavior, mood, self-esteem, parent-child interactions). The majority of these studies reported positive effects on daytime

functioning; no adverse secondary effects were identified in any of these studies. Parental (largely maternal) well-being (including mood, overall mental health status, parenting stress, marital satisfaction) has been included as an outcome measure in 12 studies; results have been consistent in demonstrating improvements in perceived parenting efficacy, marital satisfaction, parenting stress, and maternal mood.

4.0 AREAS FOR FUTURE RESEARCH

- a) Standard research definitions of bedtime problems and night wakings in young children need to be established. These definitions should include parameters such as frequency, severity, and duration of the sleep problem, and impact on daytime functioning in both the child and the caregivers.
- b) Criteria for primary subjective and objective outcome measures of child sleep parameters, and secondary outcome measures related to child daytime functioning (including mood, neurobehavioral and neurocognitive function), and caregiver well-being (including mood, functioning, sleep parameters) need to be established.
- c) Individual treatment components (e.g., extinction, positive reinforcement, parent education) and delivery issues (including format, duration, delivery mechanisms, etc) need to be studied and compared in regards to efficacy, acceptance and adherence, and cost-effectiveness.
- d) The impact of potential confounding variables (e.g., child temperament, parent education, cultural differences in sleep practices) on treatment outcomes needs to be systematically examined.
- e) The role of alternative treatments, either alone or in combination with behavioral therapies, such as the use of complementary and alternative medicine strategies (e.g., herbal preparations, infant massage) should be studied.
- f) The long-term impact of behavioral interventions for bedtime problems and night wakings in children on persistence of sleep problems into adulthood, later affective, cognitive, and behavioral function, and the emergence of psychopathology in adolescence and adulthood need to be evaluated.⁴
- g) The use of behavioral treatment for bedtime problems and night wakings in older (> 5 years) children and adolescents needs to be explored. Additional studies are also needed to examine the use of these strategies in children with special needs (e.g., children with autism spectrum disorders, mental retardation, neurodevelopmental disabilities) and in children with chronic medical and psychiatric conditions.

ACKNOWLEDGEMENTS

The AASM and the SPC would like to thank Sara Seaquist and Maria DeSena for coordinating the work on this practice parameter and Richard Rosenberg, PhD, Andrew L. Chesson, MD, Max Hirshkowitz, PhD, and Susan Benloucif, PhD for their contributions to the preparation of the manuscript.

REFERENCES

1. Mindell JA, Kuhn B, Lewin DS, Meltzer LJ, Sadeh A. Behavioral treatment of bedtime problems and night wakings in infants and young children. *An American Academy of Sleep Medicine Review*
2. Sackett DL. Rules of evidence and clinical recommendations for the management of patients. *Canadian Journal of Cardiology*. 1993;

9:487-9.

3. Eddy DM, (Ed.) A manual for assessing health practices and designing practice policies: the explicit approach. Philadelphia, PA: American College of Physicians; 1992
4. Ramchandani P, Wiggs L, Webb V, Stores G. A systematic review of treatments for settling problems and night waking in young children. *BMJ*. 2000 Jan 22;320(7229):209-13.