Sleep Problems and Sleep Disorders in Pediatric Primary Care: Treatment Recommendations, Persistence, and Health Care Utilization

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Study Objective: This study examined documented treatment recommendations provided for sleep disorders and sleep problems in pediatric primary care, the persistence of sleep problems and sleep disorders in children and adolescents, and the relationship between sleep issues and health care utilization.

Methods: In-depth chart review of pediatric primary care patient visits (n = 750 patients) from 2007 through 2010.

Results: Only 26 children (5.2% of those with a sleep disorder/problem) received a treatment recommendation, with half of these recommendations behavioral in nature. Sleep disorders and sleep problems were highly persistent across time for up to a third of children. Children with sleep disorders had significantly more sick visits/calls (mean = 8.84, 95% CI 7.77-9.90) than children without a sleep disorder (mean = 6.34, 95% CI 5.56-7.12).

Conclusions: Very few children or adolescents were found to have documented treatment recommendations or referrals for diagnosed sleep disorders or sleep problems. In addition, given that sleep disorders and sleep problems are highly persistent, as well as result in more sick visits/calls, it is important that pediatric primary care providers screen for and identify these issues across development. Furthermore, it is essential to provide health care providers with more education and support on sleep disorders and sleep problems in pediatric primary care.

Keywords: Child, adolescent, pediatrician, sleep issue

Citation: Meltzer LJ; Plaufcan MR; Thomas JH; Mindell JA. Sleep problems and sleep disorders in pediatric primary care: treatment recommendations, persistence, and health care utilization. *J Clin Sleep Med* 2014;10(4):421-426.

Disrupted or deficient sleep impacts every aspect of a child's functioning.¹⁻⁹ There are a number of potential causes for poor sleep in youth, including sleep disorders and sleep problems. "Sleep disorders" typically include sleep issues that meet diagnostic criteria for a disorder, including obstructive sleep apnea, parasomnias, narcolepsy, and insomnia. "Sleep problems," on the other hand, encompass a number of sleep issues, including bedtime problems, night wakings, sleep related anxiety, deficient sleep, and poor sleep hygiene. It has been reported that up to 40% of children experience a sleep problem sometime between infancy and adolescence,¹⁰ yet sleep disorder diagnoses are less common. As disrupted or deficient sleep can be a result of both types of sleep issues (disorders and problems), it is important to have a better understanding of how sleep issues present in pediatric primary care.

Sleep disorders may be easier for pediatric health care providers to identify (e.g., if a child has prominent snoring or excessive daytime sleepiness), yet many sleep problems may go unrecognized in pediatric practice. One reason is that sleep concerns are not frequently raised by parents during children's well-visits.^{11,12} In addition, pediatric health care providers, who have limited training in pediatric sleep¹³ and limited patient contact time, may not ask about or discuss children's sleep issues. One study of two general pediatric clinics found that a discussion of sleep issues is rare, diagnosis uncommon, and treatment recommendations lacking.¹⁴ Together these studies

BRIEF SUMMARY

Current Knowledge/Study Rationale: Sleep issues are common in children and adolescents, yet often are overlooked in pediatric primary care. Pediatric primary care providers receive little, if any, training on the diagnosis and treatment of sleep issues.

Study Impact: Sleep disorders and sleep problems persist across time for many children, and children with untreated sleep issues have more physician contacts and visits. Additional education and resources (e.g., toolkit) are needed to assist primary pediatric health care providers in recognizing and treating common pediatric sleep issues.

highlight the shortcomings in the evaluation and treatment of sleep issues in clinical practice.

Based on the electronic medical records (EMR) of almost 155,000 pediatric patient visits, we previously reported that only 3.7% of children received an International Classification of Diseases, 9th Revision (ICD-9) diagnosis for a sleep disorder.¹⁵ However, because of the methodology used (capturing "smart fields" that clinicians select from), these data did not capture the "sleep problems" that children experience. Further, the use of smart fields did not allow for an examination of sleep-specific recommendations. Finally, while the study included a large, representative sample of youth, it was a report of only one well-child visit, preventing us from examining the persistence of sleep problems or the impact of sleep issues on child health. Thus, using a randomly selected sample from the original study,

an in-depth chart review was undertaken with the following aims: (1) to examine treatment recommendations provided for sleep disorders and sleep problems; (2) to examine the persistence of sleep problems and sleep disorders; and (3) to examine the relationship between sleep issues and health care utilization (i.e., sick visits).

METHODS

Our previous study examined EMR data from all well-child visits in 2007 for 154,957 children and adolescents from 32 different urban and suburban pediatric practices (including 175 physicians and 22 nurse practitioners) affiliated with a large, tertiary care children's hospital. From this sample, 750 patients (stratified by age) were selected. For each of 5 age groups (infants, 0-2.0 months; toddlers, 12.1-47 months; preschoolers, 4-5 years; older children, 6-12 years; and adolescents, 13-18 years), 150 patients were randomly selected, stratified by the following 3 groups: (1) an ICD-9 sleep disorder diagnosis; (2) an identified "sleep problem" as indicated in free text fields (including such issues as cosleeping, bedtime resistance, sleep onset associations, deficient sleep, and sleep related anxiety); and (3) no diagnosed sleep disorder and no identified sleep problem ("no sleep issue"). All 32 practices were represented in the final sample, with no bias toward a single provider or clinical setting.

Information extracted from the medical charts included demographic data, medical and psychiatric diagnoses, treatment recommendations, medications prescribed, and identified sleep problems not captured in the smart fields of the original EMR search.

Treatment recommendations fell into 4 general categories: discussion of behavioral interventions or strategies (e.g., "put gate in the doorway and ignore tantrums" or "wake child 30-45 minutes before sleep terror"), referral for further evaluation of the sleep problem (e.g., urology, pulmonary, ENT), continue to monitor the problem (e.g., "monitor bedwetting issues" or "asked mom to observe patient while sleeping to ensure there is no apnea"), and general discussion of the issue ("discussed bedwetting" or "discussed good bedtime routine").

Medical record reviews were conducted for the initial 2007 appointment (baseline), as well as for well-child follow-up visits that occurred in 2008 (Year 1), 2009 (Year 2), and 2010 (Year 3). In addition, the number of and reason for sick visits and sick child related phone contacts between well-child visits were recorded. Sick visits were categorized into common presenting complaints (e.g., fever, earache/infection, cough/wheezing, rash). No sleep-related complaint was included as part of the sick visits/calls. This study was approved by the institutional review board at the Children's Hospital of Philadelphia.

RESULTS

The sample included 750 children, with a mean age of 6.21 years (SD: 5.40 years; range: 0.28-18 years). Of the 750 children and adolescents seen for baseline well-child visits in 2007, data were available for 520 youth (69%) in Year 1, 490 in Year 2 (65%), and 451 (60%) in Year 3. Two hundred ninety-seven youth (40%) attended the baseline and all 3 follow-up well-child visits. Preliminary analyses, including t-tests and χ^2 tests,

were conducted to determine if selective attrition occurred. The 297 youth with available sleep data at all time points were compared to those children who had missing well-child follow-up visits. Compared to children with available sleep data at all time points, those with missing data at a subsequent visit had a significantly lower household income ($t_{737} = 4.48$, $p < 0.001$), were older ($t_{748} = -7.71$, $p < 0.001$), and had fewer sick visits over an approximately 18-month period following the baseline visit ($t_{593.85} = -5.05$, $p < 0.001$). Children not seen in later years also differed from those with data at all 4 time points in terms of ethnicity ($\chi^2(40) = 26.05$; $p < 0.001$; $\phi = 0.19$), with black children less likely to have additional visits after the baseline visit (standardized residual: 2.6). The 2 groups did not differ in gender ($\chi^2(1) = 0.56$; $p = 0.45$; $\phi = 0.03$) or likelihood of having an identified sleep problem during the initial visit ($\chi^2(1) = 0.49$; $p = 0.48$; $\phi = 0.03$). Baseline diagnosed sleep disorders and identified sleep problems are presented in **Table 1**.

Recommendations for Sleep Issues

Next, we examined the frequency and type of recommendations made for sleep issues (including both sleep disorders and sleep problems). A χ^2 test was conducted to determine if the likelihood of being given a sleep recommendation differed between children with a diagnosed sleep disorder, children with an identified sleep problem, and children without a documented sleep issue. The significant χ^2 test revealed that the likelihood of having a documented sleep recommendation differed among the 3 groups ($\chi^2(2) = 28.99$; $p < 0.001$; $\phi = 0.20$). Examination of standardized residuals revealed that children with a documented sleep disorder were the most likely to receive a sleep related recommendation ($n = 21$, 8.4%; standardized residual 4.2) and children without a sleep issue were the least likely to receive a recommendation related to sleep ($n = 0$; 0.0%; standardized residual: -3.0). Only 2.0% ($n = 5$) of the children in the sleep problem group received a sleep related recommendation.

A total of only 41 recommendations were documented for 26 (3.5%) children across the 3 groups (5.2% of children with a documented sleep problem/disorder). The recommendations fell into 4 general categories: discussion of behavioral interventions or strategies ($n = 21$, 51.2% of all recommendations; 4.2% of children with a documented sleep problem/disorder), referral for further evaluation of the sleep problem ($n = 14$, 34.1% of recommendations; 2.8% problem/disorder groups), continue to monitor the problem ($n = 3$, 7.3% of recommendations; 0.6% problem/disorder groups), and general discussion of the issue ($n = 3$, 7.3% of recommendations; 0.6% problem/disorder group).

To determine if age was related to the likelihood of receiving a sleep related recommendation, a χ^2 test was conducted. The results of the χ^2 test were not significant, $\chi^2(4) = 7.67$; $p = 0.11$; $\phi = 0.10$, indicating that age was unrelated to the likelihood of receiving a sleep related recommendation.

In terms of medications as a potential treatment for sleep issues, a nonsignificant χ^2 test revealed that the likelihood of being prescribed a sleep related medication did not vary by sleep group ($\chi^2(2) = 4.39$; $p = 0.11$; $\phi = 0.08$). Across groups, antihistamines were the most frequently prescribed sleep related medication (9.7%), followed by α -agonists, antipsychotic agents, and SSRIs (0.4% for all), as well as benzodiazepines (0.1%).

Table 1—Frequency and percent of patients with diagnosed sleep disorders and identified sleep problems by group

Sleep Disorders ^a	Diagnosed Sleep Disorder (N = 249)	Identified Sleep Problem (N = 249)	No Sleep Issue (N = 252)
Insomnia	3 (1.2%)		
Restless Legs Syndrome/Periodic Limb Mvmt. Disorder	1 (0.4%)		
Infant Apnea	14 (5.7%)		
Nocturnal Enuresis	57 (23.1%)		
Narcolepsy	2 (0.8%)		
Hypersomnia	0		
Sleep Disordered Breathing	74 (29.7%)		
Parasomnia	7 (2.8%)		
Bruxism	0		
Circadian Rhythm Disorder	0		
Sleep Disorder NOS	114 (45.8%)		
Sleep Problems	Diagnosed Sleep Disorder (N = 249)	Identified Sleep Problem (N = 249)	No Sleep Issue ^b (N = 252)
Change in sleep location	4 (1.6%)	18 (7.2%)	3 (1.2%)
Daytime sleepiness	1 (0.4%)	1 (0.4%)	0
Delayed sleep schedule	0	5 (2.0%)	1 (0.4%)
Difficulty falling asleep	10 (4.0%)	11 (4.4%)	2 (0.8%)
Difficulty waking	2 (0.8%)	2 (0.8%)	0
Early morning waking	1 (0.4%)	4 (1.6%)	0
Insufficient sleep	0	1 (0.4%)	0
Nocturnal enuresis	18 (7.2%)	8 (3.2%)	1 (0.4%)
Parasomnia	4 (1.6%)	9 (3.6%)	0
Poor sleep/doesn't sleep well	0	2 (0.8%)	0
Restless sleep	1 (0.4%)	1 (0.4%)	0
RLS symptoms	0	1 (0.4%)	0
Snoring	15 (6.0%)	9 (3.6%)	4 (1.6%)
Use of medication to aid sleep	3 (1.2%)	2 (0.8%)	1 (0.4%)
Waking during the night	22 (8.8%)	53 (21.3%)	8 (3.2%)

^aThere were no diagnosed sleep disorders in the Sleep Problem or No Sleep Issue groups. ^bThe initial identification of group was determined using smart fields in the EMR, but the detailed chart review identified additional sleep problems recorded in other areas of the medical record.

Persistence of Sleep Disorders and Sleep Problems

A series of analyses were conducted to determine the persistence of sleep disorders and sleep problems. Phi coefficients were calculated to determine the stability of documented sleep disorders or sleep problems over time for each age group. In order to be included in the analyses, children must have had data through the well-child visit years being examined. As shown in **Table 2**, documented sleep disorders were highly persistent across age groups and across years. Sleep problems on the other hand were most consistently documented for school-age children, followed by infants. In general, preschoolers and adolescents had much weaker relationships between initial sleep problems and later sleep problems.

Next, we compared children with a sleep disorder, a sleep problem, or no sleep issue at the baseline visit to determine the likelihood of having a documented sleep disorder (**Figure 1A**) or sleep problem (**Figure 1B**) during the follow-up visits. Odds ratios (ORs) were used to determine if the 3 groups differed in the likelihood of documented sleep disorders or sleep problems at follow-up visits (**Table 3**). Children with an identified sleep disorder at baseline were significantly more

likely to have a sleep disorder at Year 1 (OR = 121.1), Year 2 (OR = 25.81), and Year 3 (OR = 21.07). Interestingly the presence of a sleep disorder at baseline was not predictive of a future sleep problem across years. Furthermore, children with an identified sleep problem at baseline were significantly more likely to have a sleep problem at Year 1 (OR = 4.68), Year 2 (OR = 2.29), and Year 3 (OR = 2.65). In addition, children with an identified sleep problem at baseline were significantly more likely to have a sleep disorder at Year 1 (OR = 2.49), but not at Years 2 or 3.

Sleep Issues and Sick Visits

A one-way ANOVA was used to compare the frequency of illness-related physician contacts for children with a diagnosed sleep disorder, children with an identified sleep problem, and children without a sleep issue. The number of illness related contacts was determined by counting the number of physician visits and telephone contacts for the 6 months prior to and 12 months following each child's 2007 well-child visit. The number of illness related physician contacts differed significantly among the 3 groups ($F_{2,747} = 6.75$, $p < 0.01$). Tukey post hoc

Table 2—Phi correlation coefficient between documentation of a sleep problem in 2007, 2008, and 2009 with documentation of a sleep problem in later visits by age group

Sleep Disorders						
Age Group	2007 data with follow-up years			2008 data with follow-up years		2009 data with 2010
	2008	2009	2010	2009	2010	2010
Infants	0.32**	0.24**	0.25*	0.81**	0.76**	0.76*
Toddlers	0.42**	0.53**	0.47**	1.0**	0.75**	0.75**
Preschool	0.39**	0.40**	0.18	0.70**	0.49**	0.70**
School-Age	0.40**	0.44**	0.49**	0.94**	0.77**	0.77**
Adolescents	0.59**	0.79*	0.62**	0.95**	0.49**	0.73**

Sleep Problems						
Age Group	2007 data with follow-up years			2008 data with follow-up years		2009 data with 2010
	2008	2009	2010	2009	2010	2010
Infants	0.35**	0.04	0.05	0.30**	0.34**	0.20*
Toddlers	0.01	0.16	0.20	0.34**	0.17	0.39**
Preschool	0.10	0.00	-0.02	0.21	0.01	0.24
School-Age	0.13	0.36**	0.50**	0.24*	0.35**	0.43**
Adolescents	0.20	0.41*	0.11	-0.09	0.01	0.18

**significant at 0.01, *significant at 0.05 (two-tailed).

Figure 1

(A) Percent of children with a sleep disorder documented at follow-up visits for children with sleep disorder, sleep problem, and no sleep issue at baseline visit.
 (B) Percent of children with a sleep problem documented at follow-up visits for children with sleep disorder, sleep problem, and no sleep issue at baseline visit.

comparisons of the 3 groups indicated that the children without sleep issues (mean = 6.34, 95% CI 5.56-7.12) had significantly fewer illness contacts than children with a diagnosed sleep disorder (mean = 8.84, 95% CI 7.77-9.90), $p < 0.001$. Children with an identified sleep problem (mean = 7.73, 95% CI 6.75-8.71) did not differ significantly from children with a diagnosed sleep disorder ($p = 0.24$), or with children without a sleep issue ($p = 0.10$) in illness contact frequency.

DISCUSSION

The results of this study highlight several important considerations in the treatment, persistence, and potential health care

utilization associated with both sleep problems and sleep disorders in pediatric patients.

First, only 5% of patients with either a diagnosed sleep disorder or an identified sleep problem received a sleep related treatment recommendation. It was discouraging to find that only 8% of children with a diagnosed sleep disorder and only 2% with an identified sleep problem received any type of treatment recommendation. While it is possible that those children with a diagnosed sleep disorder were under the care of another provider, nearly half of these patients were diagnosed with Sleep Disorder NOS, which is a diagnosis less likely to be utilized in a sleep center than in primary care. Note that the sleep issues assessed in this study encompassed both medically

based and behaviorally based sleep problems, and thus it would be expected that for at least the diagnosed sleep disorders, especially the medically based ones, that practitioners would be treating these concerns. Rather, further evaluation and treatment appeared to be rarely recommended. These results are consistent with other studies indicating that sleep issues often go untreated. For example, a recent study found that only 24% of children were screened for obstructive sleep apnea at well-child visits,¹⁶ counter to the American Academy of Pediatrics recommendation that screening occur every time. In addition, of those children who were identified as snoring—a hallmark of obstructive sleep apnea—62% received no further evaluation, and only 0.5% of all patients had a diagnosis of obstructive sleep apnea. Additionally, in our study, approximately half of the documented recommendations were behavioral in nature despite the fact that behaviorally based interventions have been found to be highly successful.¹⁷ Those behavioral recommendations made appeared to be appropriate, with no recommendations noted that were beyond usual practices. Note that it is highly possible that sleep-related recommendations were made by the practitioners but were simply not captured in the medical record. However, it is unlikely that recommendations were not charted for almost 95% of all patients with a sleep-related problem or disorder. Clearly, this is an area of great unmet treatment opportunity.

Because of the persistence of these sleep issues in pediatric patients, the need for treatment recommendations becomes even more critical. Between 28% and 36% of children had persistent sleep disorders, while 17% to 26% of children had a persistent sleep problem. Similar to a study of young children,¹⁸ our study demonstrates that sleep problems persist for a significant number of youth. Our results build upon previous research by including all ages, from infants through adolescents. Notably, sleep problems increased in school-aged and adolescent patients. While it is common to inquire about sleep for infants and young toddlers, it is less common for pediatric primary care providers to inquire about sleep in older youth and adolescents. However, it is essential to identify sleep issues that these patients may also be experiencing (e.g., difficulties falling asleep, multiple night awakenings). As children get older, parents become less involved with children's sleep routines, and are often not aware of sleep difficulties that older children and adolescents experience.^{12,19,20}

In addition to addressing the persistence of sleep problems, addressing sleep disorders and sleep problems in primary care may reduce health care utilization for some youth. In this study, youth with sleep disorders and sleep problems had more sick visits and physician contacts than youth without sleep issues. This was especially notable for infants and adolescents, two groups known for significant sleep disturbances. Yet the two most common issues for these patients (night awakenings for infants and difficulty falling asleep for adolescents) can be addressed with behavioral interventions.

There are several limitations to this study. First, demographic differences were found between those with and without complete data across years. These differences (race, income, number of visits to the pediatrician) may have resulted in sampling error. Second, these data are drawn from one geographic area, although a highly diverse sample, and may

Table 3—Results of binary logistic regression predicting sleep disorders and sleep problems in years 1 through 3 based on group at baseline

Sleep Disorders			
Year 1: Group at Baseline	OR	95% CI for OR	p
No Sleep Issue	Reference		
Sleep Disorder	121.0	16.58-884.83	< 0.001
Sleep Problem	3.60	0.37-34.92	0.27
Year 2: Group at Baseline	OR	95% CI for OR	p
No Sleep Issue	Reference		
Sleep Disorder	25.81	7.76-85.82	< 0.001
Sleep Problem	1.63	0.36-7.41	0.53
Year 3: Group at Baseline	OR	95% CI for OR	p
No Sleep Issue	Reference		
Sleep Disorder	21.07	4.88-90.99	< 0.001
Sleep Problem	1.36	0.19-9.88	0.76
Sleep Problems			
Year 1: Group at Baseline	OR	95% CI for OR	p
No Sleep Issue	Reference		
Sleep Disorder	2.49	1.24-5.00	0.01
Sleep Problem	4.68	2.40-9.11	0.00
Year 2: Group at Baseline	OR	95% CI for OR	p
No Sleep Issue	Reference		
Sleep Disorder	1.34	0.66-2.72	0.41
Sleep Problem	2.29	1.18-4.49	0.01
Year 3: Group at Baseline	OR	95% CI for OR	p
No Sleep Issue	Reference		
Sleep Disorder	1.68	0.66-4.29	0.28
Sleep Problem	2.65	1.10-6.66	0.04

OR, odds ratio; CI, confidence interval.

not be representative across populations. Third, all 32 primary care practices were affiliated with one institution, which may resulted in similarities across providers in terms of training, practice, and documentation. However, many of these practices had been independent prior to being purchased by the institution within the past decade, reducing the likelihood of this bias. That said, our findings should be replicated in another hospital system or across multiple institutions.

Fourth, as mentioned above, it is possible that sleep recommendations were discussed during visits, and that these recommendations were not documented in the EMR. It is possible that if common sleep recommendations are added to EMRs as smart fields, an increase in documented recommendations may occur. Finally, the high persistence of sleep disorders may have been the result of practitioners simply not removing the diagnosis from the EMR at a subsequent well-child visit; however, since there was not 100% maintenance of sleep disorders across time, many practitioners clearly did update the current diagnoses.

Additional research is needed examining the persistence of sleep problems and sleep disorders across development. Further, additional education and resources are needed for primary care pediatric health care providers, to assist with recognizing and treating common sleep issues in their practice. Such resources have been successfully developed for other behavioral disorders.

For example, toolkits for the screening and management of attention deficit hyperactivity disorder (ADHD) and other mental health concerns in primary care have been developed and are available through the American Academy of Pediatrics. A Pediatric Sleep Toolkit may help providers to better identify sleep issues, assist pediatric primary care clinicians with basic sleep treatment recommendations, and provide information about when and where to refer patients for further evaluation. In addition, primary care friendly interventions need to be further developed and validated to assist with the treatment of sleep issues. For example, an internet-based intervention for infant and toddler sleep problems was shown to be effective in helping both children and mothers sleep.²¹ Further, treatment gains were maintained for one year.²² Similar interventions are needed for older children and adolescents.

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ACKNOWLEDGMENTS

This study was funded in part by NIH K23 MH077662. We thank the network of primary care physicians for their contribution to clinical research through the Pediatric Research Consortium at the Children's Hospital of Philadelphia. We also thank Jonathan Crosette and Mark Ramos for their assistance with this project.

SUBMISSION & CORRESPONDENCE INFORMATION

Submitted for publication August, 2013

Submitted in final revised form December, 2013

Accepted for publication December, 2013

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DISCLOSURE STATEMENT

This was not an industry supported study. Data were collected at the Children's Hospital of Philadelphia. Data analyses and writing were primarily completed at National Jewish Health, Denver, CO. The authors have indicated no financial conflicts of interest.