

SPECIAL COMMUNICATION

How is Your Sleep: A Neglected Topic for Health Care Screening

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Purpose: Inadequate sleep, whether it is caused by voluntary sleep curtailment or specific sleep disorders, is highly prevalent, has wide-ranging negative consequences for human health and well-being, and is greatly under-diagnosed. The objective of this study was to determine the frequency of inquiry by family medicine clinics about unhealthy sleep patterns and symptoms in their health history database questionnaires.

Methods: This study surveyed health history database forms used by family medicine clinics in the 7-county Minneapolis/St. Paul metropolitan area for questions related to sleep disorders. Fourteen distinct database batteries that are used in 121 primary care clinics and employ 935 family medicine doctors (roughly 75% of physicians practicing in this region) were analyzed.

Results: Direct questions about sleep health are often not included in health history questionnaires. Eight of 14 (57%) database batteries reviewed in this study featured *no* sleep-related questions. Other lifestyle issues were screened with much greater frequency. For example, questions about healthy eating patterns and regular physical activity were present in 13 and 12 of the 14 batteries (93% and 86%), respectively.

Conclusions: Despite the significant burden that sleep disorders place on human health, this study found that family medicine clinics do not screen for them as frequently as they do for other lifestyle/behavioral issues when they establish a health history database for new patients. (J Am Board Fam Med 2008;21:141–148.)

Preventive medicine counseling is a valued function of primary care providers. The effort to change unhealthy lifestyles through education and guidance seems worthwhile empirically. Family medicine providers frequently seize the opportunity provided by a clinical encounter, even if it is for an acute complaint, to provide preventive medicine education and counseling.¹ A national survey of physicians found that such services were a component of 42% of clinical encounters in 2004.² Formal studies have confirmed the effectiveness of counseling and education by physicians in changing patient health habits in important areas such as

smoking,³ exercise,⁴ alcohol misuse,⁵ and unhealthy eating.^{6–8}

Although primary care providers embrace their role as advocates for health promotion and disease prevention, they also struggle with the demands of providing comprehensive care. The list of issues proposed for preventive medicine counseling has expanded enormously over the years, reflecting changing attitudes and information about the key determinants of long-term health, changing expectations on the part of patients, and the availability of new tests. One generation ago, inquiry about sexual history, domestic abuse, or even mental health was rare. Now it is routine. Faced with a surfeit of possible topics for health promotion/disease prevention dialogue and a very finite time period for each patient encounter, primary care physicians must, by necessity, be selective in their approach to preventive medicine counseling.

Healthy sleep is an emerging subject worthy of consideration for routine clinical preventive services. The recent Institute of Medicine report, *Sleep Disorders: An Unmet Public Health Problem*, revealed

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that 50 million to 70 million Americans experience disorders of sleep and wakefulness⁹ and a significant majority of these people are undiagnosed.^{10–12} Simple insufficient sleep and resultant daytime sleepiness affects 30% to 40% of the population.¹³ Regarding common sleep disorders, it is estimated that in the United States chronic insomnia affects 30 million individuals, obstructive sleep apnea syndrome affects 8 million; and restless legs syndrome affects 6 million.⁹

There is abundant evidence that inadequate sleep, whether it is by choice or because of specific sleep disorders, greatly impacts multiple domains of human health and well-being, including metabolism,^{14–18} immune function,^{19,20} mood,^{21,22} cognitive performance,^{23,24} public safety,^{25,26} quality of life,^{27–30} and mortality.^{31,32}

The issue of healthy sleep practices is analogous to other healthy behaviors such as getting regular physical activity or a balanced diet. Like these other lifestyle issues, good sleep is under assault by current cultural inclinations. In our hectic society, many tend to treat sleep as a negotiable factor when scheduling activities and regard excessive daytime sleepiness as an inevitable consequence of life's duties.³³ Although sleep occupies roughly one third of our lives and is highly conserved evolutionarily among animal species (suggesting an important physiologic function), Americans presently garner almost 2 hours *less* of it on an average day than before the advent of the lightbulb.³⁴

Despite its significant bearing on overall health and its status as a lifestyle issue, healthy sleep does not seem to be a common subject of preventive medicine inquiry. Data from the National Ambulatory Medical Survey, a large annual survey of physician offices nationwide conducted by the Centers for Disease Control, reveals that the 4 leading topics of counseling and education services at family medicine physician appointments are healthy diet, exercise, weight reduction, and mental health/stress management.³⁵ Healthy sleep does not appear in the National Ambulatory Medical Survey "top 10 list" for such services (Table 1) and, to date, no study has measured the frequency of screening for it. This study was conducted to see how frequently and with which specific questions do primary care providers inquire about their patients' healthy sleep practices.

Table 1. Ten Leading Topics of Counseling by Family Physicians in 2004

Topic	Visits (n)*
Diet and nutrition	27,567
Exercise	26,267
Weight reduction	11,064
Mental health	11,058
Tobacco	5,860
Growth and development	4,301
Physiotherapy	3,872
Asthma education	3,252
Psychotherapy	2,163
Other counseling	37,626

*Total visits to family physicians offices was 207,000,000.
Source: National Ambulatory Medical Care Survey, 2004.

Methods

This study analyzed health intake assessment batteries from the 7-county Minneapolis/St. Paul, Minnesota metropolitan area. Because this region has a high proportion of hospital/clinic systems that use standardized patient care forms, only 14 such batteries were found in use at 121 primary care clinics. The Allina Medical Group, for example, uses the same questionnaires at all 17 of its primary care clinics in the region. This review includes 5 large multisite primary care practices as well as smaller networks of affiliated clinics and the 4 family medicine residency clinics in the Twin Cities.

In aggregate, this data reflects health intake assessment batteries used in 121 primary care clinics that are staffed by 793 family medicine doctors and 142 family medicine residents (total doctors, 935) along with 133 mid-level (physician's assistants and nurse practitioners) primary care providers. This analysis thus represents the practices of roughly 75% of family medicine physicians in the Twin Cities metro area; this estimate is derived from the statistics that there are 1028 metro-area family physicians who are members of the Minnesota Academy of Family Physicians and the membership rate for that academy is 79%, thus indicating that approximately 1250 family doctors work in this geographic region.

Each health history database was examined for the presence of questions about sleep symptoms drawn from 4 key areas of sleep disorders medicine: (1) insomnia, (2) hypersomnolence, (3) sleep-disordered breathing, and (4) parasomnias (Table 2). For

Table 2. Common Symptoms of Sleep Disorders*

Disorder	Symptoms
Insomnia	Difficulty falling asleep; difficulty maintaining sleep; leg discomfort interfering with sleep (<i>restless legs syndrome</i>); insufficient sleep at night; non-restorative sleep
Hypersomnolence	Difficulty staying awake in the daytime (<i>insufficient sleep syndrome</i>); excessive daytime sleepiness and sudden loss of muscle tone in moments of emotion (<i>narcolepsy/cataplexy</i>)
Sleep-disordered breathing	Loud snoring, witnessed pauses in breathing, gasping to breathe when asleep (<i>obstructive or central sleep apnea</i>)
Parasomnia	Trouble with dream content or quantity (<i>nightmares, epic dreaming</i>); eating in the middle of the night (<i>sleep-related eating disorder</i>); excessive movement in bed when asleep (<i>periodic limb movement disorder</i>); abnormal behaviors arising from sleep (<i>REM behavior disorder; nocturnal seizure disorder</i>); bruxism (grinding)

*Related sleep disorders (per the International Classification of Sleep Disorders) are included in italics.

comparison, the frequency with which questions appear about other important habits/lifestyle issues was also tabulated (Table 3). To place the findings for Minneapolis/St. Paul in a national context, this study reviewed the recommendations and opinions from 6 expert groups (representing diverse constituencies in health care) about healthy sleep as a subject for routine clinical preventive screening. These included 3 bodies representative of expert medical opinion (the United States Preventive Services Task Force [USPSTF], the American Academy of Family Practice, and the Institute for Clinical Systems Improvement); 2 large health maintenance organizations (Aetna and Kaiser-Permanente); and one public health program (the Center for Disease Control’s Behavioral Risk factor Surveillance Survey).

Results

The majority (8 of 14; 57%) of health intake assessment batteries surveyed contained no content about sleep health. The other 6 (43%) batteries presented 1 or 2 sleep-related queries but were somewhat arbitrary and not thorough in the approach of the topic. One included a set of questions about obstructive sleep apnea in its respiratory sec-

Table 3. Presence of Screening Questions for Lifestyle Issues on Health History Database Batteries in Minneapolis/St. Paul, Minnesota

Lifestyle Issue	n (%)*
Smoking	14 (100)
Alcohol use	14 (100)
Regular exercise	13 (93)
Illicit drug use	13 (93)
Caffeine use	11 (79)
Depressed mood	9 (64)
Seat belt use	9 (64)
Safe sex	9 (64)
Balanced diet	8 (57)
Domestic abuse	8 (57)
Contraception	8 (57)
Dairy/calcium intake	7 (50)
Bike helmet use	7 (50)
Stress problems	7 (50)
Gun safety	6 (43)
Sunscreen use	6 (43)
At least one inquiry about sleep health	6 (43)
Anxiety	5 (36)
Dental care	3 (21)
Home safety (e.g. fire alarm)	2 (14)

*n, number out of 14 primary care networks/clinics surveyed.

tion, but no questions about other sleep disorders; a second asked about “insomnia” and “nightmares”; and a third and fourth each asked about only one symptom, “insomnia” and “snoring,” respectively. In the other 2 batteries that contained sleep content, no specific symptom was queried; instead, a special section invited the patient to “make a check” if they have a sleep concern. Although several of the review of systems forms include “fatigue” in their constitutional symptoms section, none list the more specific *sleep-related* complaint of hypersomnolence/excessive daytime sleepiness. Caffeine use is queried in 11 of the 14 batteries (79%). This habit certainly can exacerbate insomnia in some or mitigate hypersomnolence in others, but in the overwhelming majority of users it is not associated with disturbed sleep.

In contrast to the paucity of sleep-related content, these same health history database forms investigated other lifestyle issues much more consistently. Questions about smoking and alcohol use appear on all 14 (100%) batteries in this review. Inquiries about the quintessential lifestyle issues of regular exercise and healthy diet also appear with high frequencies, on 13 (93%) and 12 (86%) of the

forms, respectively. In addition, there are a host of other health habits that appeared sporadically, but usually with frequencies of >50% (Table 3).

It is largely in teaching settings that physicians of the future develop their biases regarding what is appropriate content for a medical encounter. Therefore, the practice priorities in residency training programs may be a good predictor of future patterns in the community-based practices. Taken as a group, the 4 family medicine residency programs in this survey were more expansive in their investigation of health habits when compared with the community clinics. Questions about smoking, drug use, alcohol abuse, depression, stress, and domestic abuse all appeared with 100% frequency. Regular exercise and healthy food choice questions were included on 75% of the database batteries. However, the extent of inquiry about healthy sleep by these family medicine training programs is minimal. Two of the 4 residency sites feature no questioning about it at all, a third site has a single question about “snoring,” and the fourth site (referenced previously) asks about both “insomnia” and “nightmares” (Table 4).

Preventive Services for Healthy Sleep: Recommendations of Expert Bodies

The analysis of recommendations for routine preventive services in sleep included 6 influential expert bodies. To date, none of these thought-leaders have considered the topic of inadequate sleep (Table 5). The United States Preventative Services Task Force, perhaps the most influential expert panel regarding preventive medicine, regularly reviews and categorizes the evidence for and against routine preventive services for a long list of common primary care issues. Conservative in their recommendations, the USPSTF has thus far only endorsed routine physician screening and counseling in 4 areas: alcohol misuse, depression, healthy eating in people with atherosclerotic cardiovascular disease risk factors, and smoking. In the entire list of issues that they have reviewed and rendered an opinion on (53 to date) healthy sleep is entirely absent.³⁶

The American Academy of Family Physicians draws its recommendations for routine preventive medicine services directly from the USPSTF. However, they have created an additional designation for lifestyle issues that are “healthy behaviors but have an insufficient evidence base” to recom-

Table 4. Presence of Screening Questions for Lifestyle Issues on Health History Database Forms of Family Medicine Residency Programs in Minneapolis/St. Paul, Minnesota

Lifestyle Issue	n (%)*
Smoking	4 (100)
Alcohol use	4 (100)
Illicit drug use	4 (100)
Depressed mood	4 (100)
Domestic abuse	4 (100)
Stress problems	4 (100)
Regular exercise	3 (75)
Contraception	3 (75)
Gun safety	3 (75)
Caffeine use	2 (50)
Seat belt use	2 (50)
Safe sex	2 (50)
Balanced diet	2 (50)
Dairy/calcium intake	2 (50)
Bike helmet use	2 (50)
At least one inquiry about sleep health	2 (50)
Sunscreen use	1 (25)
Anxiety	1 (25)
Dental care	1 (25)
Home safety (eg, fire alarm)	1 (25)

*n, number out of 4 residency clinics surveyed.

mend routine services by the provider. This category includes, for example, counseling for regular physical activity. Although “healthy sleep practices” certainly would fit without controversy in the “healthy behaviors but have an insufficient evidence base” category, it is entirely absent from consideration by the American Academy of Family Physicians.³⁷

Table 5. Expert Recommendations/Positions Regarding Routine Clinical Preventive Services for Insufficient Sleep/Sleep Disorders

Panel/Institution	Recommendation
United States Preventive Services Task Force	None
American Academy of Family Physicians	None
The Institute for Clinical Systems Improvement	None
Aetna medical insurance plans	None
CDC’s Behavioral Risk Factor Surveillance System	None
Kaiser-Permanente Clinical Research Group’s “Genes, Environment, and Health” Survey	None

The Institute for Clinical Systems Improvement, an influential consortium of stakeholders in clinical practice in Minnesota, has issued guidelines for 12 preventive medicine service topics but has thus far left sleep health unexamined.³⁸

The Behavioral Risk Factor Surveillance System is a nationwide annual telephone survey of core lifestyle practices conducted by the Centers for Disease Control. Questions may vary year to year and are chosen by public health leaders at the state and national level. There is also a mechanism for input by individual citizens. Although the breadth of the survey is extensive (29 topics were queried in 2006), thus far, the Behavioral Risk Factor Surveillance Survey has not featured a single sleep health-related question in its 35 years of operation.³⁹

Aetna, with 6.2 million members, and Kaiser-Permanente, with 8.3 million members, are 2 of the largest health maintenance organizations in the United States. Aetna has crafted a standard health habits form for use by its participating physicians. It contains no sleep-related content. Kaiser-Permanente has recently launched a large scale survey of 2 million of its members.⁴⁰ Titled the “Genes, Environment, and Health Survey,” it is intended to generate voluminous epidemiologic data to advance research about the key determinants of good health. Although the links between insufficient sleep and longevity and sleep apnea and mortality are cutting edge topics of scientific investigation, the Genes, Environment, and Health Survey does not contain a question about either or about sleep practices in general (although restless legs syndrome does appear in the survey in a checklist of previous medical conditions).

Discussion

Inadequate sleep, whether it is caused by voluntary curtailment or specific sleep disorders, is a logical new candidate for routine preventive medicine services because of the significant burden it places on individual and public health and because it is often the result of modifiable behavioral choices and attitudes. Two relevant questions are, (1) Do family medicine physicians screen for inadequate sleep? and (2) What are the barriers to screening for inadequate sleep in the primary care setting?

Do Primary Care Providers Accomplish Screening for Insufficient Sleep/Symptoms of Sleep Disorders?

This review of health database batteries in a large metropolitan area revealed that screening for symptoms of sleep disorders in review of systems checklists and for sleep complaints in health questionnaires is largely ignored, especially in comparison with other lifestyle issues. Granted, providers may raise the topic of sleep in the midst of the clinical encounter without reviewing written or electronic databases. Nevertheless, the presence or absence of sleep-related questions on health intake assessment batteries is probably a valid indicator of overall frequency of screening because they are initially constructed to reflect the priorities and preferences of the physician group. Furthermore, a discrepancy in which screening questions do not appear on medical databases but are addressed during medical encounters would still not account for why sleep-related questions are posed on the screening questionnaires analyzed in this study much less frequently than questions about other lifestyle/preventive medicine issues.

What Are the Barriers to Screening for Insufficient Sleep/Sleep Disorders in the Family Medicine Setting?

Factors known to hinder provision of health promotion/disease prevention services by primary care providers are lack of time,^{1,41,42} competing demands,⁴³ lack of support,⁴⁴ and lack of reimbursement.⁴⁵ All of these bear on the question of addressing sleep health in the primary care setting.

Sometimes simple questions are the hardest ones to ask. Consider for example, How is your sleep? If a primary care provider poses this question, there is roughly a 40% probability that the answer will be “not good” and will necessitate additional time-consuming exploration.⁴⁶ The process of taking a sleep history is often vexing because of night-by-night variability in sleep and because of one quality inherent to the sleep state—unconsciousness. In this era of increased pressure for productivity, the primary care provider may not have time to flesh out the subtleties of sleep behavior.

Family physicians who look to specialists to evaluate and treat their patients with sleep complaints/symptoms often encounter a lack of support services in the community. In many regions of the United States, there is presently an undersupply of

diagnostic facilities that test for sleep-disordered breathing and narcolepsy. There is also a marked shortage of personnel qualified to provide cognitive-behavioral therapies for insomnia, the gold standard treatment for this extremely prevalent disorder.⁹

As described earlier, key expert panels and groups that write guidelines have neglected the issue of healthy sleep in preventive medicine protocols. These leaders have an influential role in defining what is and is not valid content for clinical encounters and preventive medicine services. Medical education and training institutions serve a similar purpose and there is evidence that these sources also have not given sleep medicine its proper due in medical school curricula or in primary care residency training programs.⁴⁷ Current Accreditation Council for Graduate Medical Education program requirements for family medicine training do *not* mention chronic sleep loss or sleep disorders.⁹ The cardinal rule, Don't ask the question if you are not prepared to deal with the answer, may underlie some of the physician reticence toward raising the issue of sleep because inadequate training leaves providers feeling ill-prepared to respond to sleep complaints in a cost-effective and efficient manner. In one clinical study, residents who received didactic instruction about sleep disorders were found to ask about sleep more regularly in subsequent clinical encounters.⁴⁸

Finally, reimbursement issues may loom large among reasons why primary care providers do not routinely investigate insufficient sleep and sleep disorders. A sleep specialist can count on revenue from diagnostic procedures in the sleep laboratory to subsidize the time-intensive tasks of taking histories, counseling, education, or cognitive/behavioral therapy (for insomnia). In contrast, family physicians, in their clinic-based practices, have no such revenue stream and can bill only for "time" when they provide counseling services about healthy sleep. The recent decision of the American Board of Family Practice to offer a certificate of added qualification in sleep disorders medicine may alleviate this somewhat by paving the way for more family physicians to become board-certified in sleep medicine and thereby be eligible to direct accredited sleep laboratory diagnostic testing facilities.

Conclusion

As the clinical field of sleep medicine grows and matures, there is increasing scientific evidence confirming the vital role that sleep plays in health and well-being. A large number of people with sleep disorders remain undiagnosed; perhaps an even larger number face consequences from insufficient sleep because of behavioral choices that undervalue the importance of sleeping fully. Many patients are clamoring for their providers to take notice. One in 20 patients cite a sleep complaint as the primary reason for visit to a family doctor, that is, approximately one such patient per day in a typical clinic.²

To recommend *routine* counseling and education services for a lifestyle medicine issue, one needs evidence not only documenting the disease burden of the behavior but also demonstrating the effectiveness of screening, counseling, and education to change outcomes. Until there is a greater body of clinical research on this topic, routine clinical preventive services for healthy sleep should be classified using American Academy of Family Medicine categorization as a healthy behavior with insufficient evidence.

In 2007, the clinical field of sleep disorders medicine will join other medical and surgical subspecialties and primary care fields in the American Board of Medical Specialties. Review of systems questionnaires are frequently keyed to subspecialty categories (eg, urological symptoms, cardiac symptoms, etc) whereas health habits/social histories are usually keyed to primary care concerns for healthy lifestyles. Using this model, it may very well be standard in the future to create a "sleep symptoms" subsection on review of systems forms and "healthy sleep hygiene" responses on the social history section of screening forms.

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References

1. Stange KC, Flocke SA, Goodwin MA. Opportunistic preventive services delivery. Are time limitations and patient satisfaction barriers? *J Fam Pract* 1998;46: 419–24.
2. Centers for Disease Control, National Center for Health Statistics. Ambulatory health care data (15

- January 2008). Available at www.cdc.gov/nchs/about/major/ahcd/ahcd1.htm. Accessed 16 March 2007.
3. Anderson JE, Jorenby DE, Scott WJ, Fiore MC. Treating tobacco use and dependence: an evidence-based clinical practice guideline for tobacco cessation. *Chest* 2002;121:932–41.
 4. Eakin EG, Glasgow RE, Riley KM. Review of primary care-based physical activity intervention studies: effectiveness and implications for practice and future research. *J Fam Pract* 2000;49:158–68.
 5. Whitlock EP, Polen MR, Green CA, Orleans T, Klein J, US Preventive Services Task Force. Behavioral counseling interventions in primary care to reduce risky/harmful alcohol use by adults: a summary of the evidence for the US preventive services task force. *Ann Intern Med* 2004;140:557–68.
 6. Pignone MP, Ammerman A, Fernandez L, et al. Counseling to promote a healthy diet in adults: a summary of the evidence for the US preventive services task force. *Am J Prev Med* 2003;24:75–92.
 7. Hunt JR, Kristal AR, White E, Lynch JC, Fries E. Physician recommendations for dietary change: their prevalence and impact in a population-based sample. *Am J Public Health* 1995;85:722–6.
 8. US Preventive Services Task Force. Behavioral counseling in primary care to promote a healthy diet: recommendations and rationale. *Am J Nurs* 2003;103:81–92.
 9. Colten HR, Altevogt B (editors). *Sleep disorders and sleep deprivation: an unmet public health problem*. Washington, DC: The National Academies Press; 2006.
 10. Benca RM. Diagnosis and treatment of chronic insomnia: a review. *Psychiatr Serv* 2005;56:332–43.
 11. Kapur V, Strohl KP, Redline S, Iber C, O'Connor G, Nieto J. Underdiagnosis of sleep apnea syndrome in US communities. *Sleep Breath* 2002;6:49–54.
 12. Singh M, Drake CL, Roth T. The prevalence of multiple sleep-onset REM periods in a population-based sample. *Sleep* 2006;29:890–5.
 13. Hossain JL, Shapiro CM. The prevalence, cost implications, and management of sleep disorders: an overview. *Sleep Breath* 2002;6:85–102.
 14. Coughlin SR, Mawdsley L, Mugarza JA, Calverley PM, Wilding JP. Obstructive sleep apnoea is independently associated with an increased prevalence of metabolic syndrome. *Eur Heart J* 2004;25:735–41. Comment in *Eur Heart J* 2004;25:709–11.
 15. Bass J, Turek FW. Sleepless in America: a pathway to obesity and the metabolic syndrome? [Comment]. *Arch Intern Med*. 2005;165(1):15–16.
 16. Gami AS, Somers VK. Obstructive sleep apnoea, metabolic syndrome, and cardiovascular outcomes [Comment]. *Eur Heart J*. 2004;25(9):709–711.
 17. Gottlieb DJ, Punjabi NM, Newman AB, et al. Association of sleep time with diabetes mellitus and impaired glucose tolerance. *Arch Intern Med* 2005;165:863–7.
 18. Taheri S, Lin L, Austin D, Young T, Mignot E. Short sleep duration is associated with reduced leptin, elevated ghrelin, and increased body mass index. *PLoS Med* 2004;1:e62.
 19. Teramoto S, Yamamoto H, Yamaguchi Y, Namba R, Ouchi Y. Obstructive sleep apnea causes systemic inflammation and metabolic syndrome [Comment]. *Chest*. 2005;127(3):1074–5.
 20. Vgontzas AN, Papanicolaou DA, Bixler EO, Kales A, Tyson K, Chrousos GP. Elevation of plasma cytokines in disorders of excessive daytime sleepiness: role of sleep disturbance and obesity. *J Clin Endocrinol Metab* 1997;82:1313–6.
 21. Ford DE, Kamerow DB. Epidemiologic study of sleep disturbances and psychiatric disorders. an opportunity for prevention?. *JAMA*. 1989;262(11):1479–1484.
 22. Baldwin DC Jr, Daugherty SR. Sleep deprivation and fatigue in residency training: results of a national survey of first- and second-year residents. *Sleep* 2004;27:217–23.
 23. Roth T, Roehrs T. Insomnia: epidemiology, characteristics, and consequences. *Clin Cornerstone* 2003;5:5–15.
 24. Durmer JS, Dinges DF. Neurocognitive consequences of sleep deprivation. *Semin Neurol* 2005;25:117–29.
 25. Leger D. The cost of sleep-related accidents: a report for the national commission on sleep disorders research. *Sleep* 1994;17:84–93.
 26. Connor J, Norton R, Ameratunga S, et al. Driver sleepiness and risk of serious injury to car occupants: population based case control study. *BMJ* 2002;324:1125.
 27. Strine TW, Chapman DP. Associations of frequent sleep insufficiency with health-related quality of life and health behaviors. *Sleep Med* 2005;6:23–7.
 28. Haack M, Mullington JM. Sustained sleep restriction reduces emotional and physical well-being. *Pain* 2005;119:56–64.
 29. Hasler G, Buysse DJ, Gamma A, et al. Excessive daytime sleepiness in young adults: a 20-year prospective community study. *J Clin Psychiatry* 2005;66:521–9.
 30. Baldwin CM, Griffith KA, Nieto FJ, O'Connor GT, Walsleben JA, Redline S. The association of sleep-disordered breathing and sleep symptoms with quality of life in the sleep heart health study. *Sleep* 2001;24:96–105.
 31. Patel SR, Ayas NT, Malhotra MR, et al. A prospective study of sleep duration and mortality risk in women. *Sleep* 2004;27:440–4.
 32. Kripke DF, Garfinkel L, Wingard DL, Klauber MR, Marler MR. Mortality associated with sleep duration and insomnia. *Arch Gen Psychiatry* 2002;59:131–6.

33. Dzaja A, Arber S, Hislop J, et al. Women's sleep in health and disease. *J Psychiatr Res* 2005;39:55-76.
34. Maas JB, Wherry ML. *Power sleep: the revolutionary program that prepares your mind for peak performance*. New York (NY): Quill/HarperCollins; 2001.
35. Hing E, Cherry DK, Woodwell DA. National ambulatory medical care survey: 2004 summary. *Adv Data* 2006;(374):1-33.
36. US Department of Health and Human Services, Agency for Healthcare Research and Quality. *Guide to clinical preventive services, 2007: recommendations of the US Preventive Services Task Force*. Available at www.ahrq.gov/clinic/pocketgd.htm. Accessed 19 March 2007
37. American Academy of Family Physicians. *Clinical preventive services*. Available at www.aafp.org/online/en/home/clinical/exam.html. Accessed 18 March 2007.
38. The Institute for Clinical Systems Improvement. *Guidelines, Order Sets, and Protocols*. Available at http://www.icsi.org/guidelines_and_more/guidelines_order_sets_protocols. Accessed 19 March 2007.
39. Hughes E, McCracken M, Roberts H, et al. Surveillance for certain health behaviors among states and selected local areas—behavioral risk factor surveillance system, united states, 2004. *Morb Mortal Wkly Rep Surveill Summ* 2006;55:1-124.
40. Company to study complex roots of disease. *NY Times* 2007 Feb. 15.
41. Kottke TE, Brekke ML, Solberg LI. Making "time" for preventive services. *Mayo Clin Proc* 1993;68:785-91.
42. Yarnall KS, Pollak KI, Ostbye T, Krause KM, Michener JL. Primary care: is there enough time for prevention? *Am J Public Health* 2003;93:635-41.
43. Jaen CR, Stange KC, Nutting PA. Competing demands of primary care: a model for the delivery of clinical preventive services. *J Fam Pract* 1994;38:166-71.
44. Thompson RS. What have HMOs learned about clinical prevention services? An examination of the experience at group health cooperative of Puget Sound. *Milbank Q* 1996;74:469-509.
45. Woolhandler S, Himmelstein DU. Reverse targeting of preventive care due to lack of health insurance. *JAMA* 1988;259:2872-4.
46. Hatoum HT, Kong SX, Kania CM, Wong JM, Mendelson WB. Insomnia, health-related quality of life and healthcare resource consumption. A study of managed-care organisation enrollees. *Pharmacoeconomics* 1998;14:629-37.
47. Rosen R, Mahowald M, Chesson A, et al. The taskforce 2000 survey on medical education in sleep and sleep disorders. *Sleep* 1998;21:235-8.
48. Haponik EF, Frye AW, Richards B, et al. Sleep history is neglected diagnostic information. Challenges for primary care physicians. *J Gen Intern Med* 1996;11:759-61.