

# Sleep Shortage, Impaired Fasting Glucose Tied

*People who slept fewer than 6 hours a night had a 4.7-fold increased risk for impaired fasting glucose.*

BY MITCHEL L. ZOLER

**R**egular lack of sleep does more than make you tired. People who routinely slept fewer than 6 hours a night were almost five times more likely to develop impaired fasting glucose during an average 6 year follow-up, compared with people who got 6-8 hours a night, in a case-control study with 364 people.

This finding is consistent with prior-study results, which suggested that chronic short sleep was linked with an increased risk for other adverse health effects including obesity, hypertension, cardiovascular disease, and death, Lisa Rafalson, Ph.D., said at a conference on cardiovascular disease epidemiology and prevention sponsored by the American Heart Association.

"It's important for physicians to discuss short sleep with their patients because shortened sleep has a lot of associated ill-health effects, and it is a behavior that can be modified to some degree," Dr. Rafalson said in an interview.

A physician-patient conversation about sleep "can take place throughout

the life cycle." Many physicians bring up sleep habits only with patients who have newborn or young children, said Dr. Rafalson, an epidemiologist in the department of social and preventive medicine at the State University of New York at Buffalo. The new finding and prior evidence highlight the importance of encouraging adequate sleep in adults of all ages.

Her study included some of the 1,455 people who were enrolled in the Western New York Health Study during 1996-2001 and were then reexamined in 2003-2004, an average of 6 years after their baseline exam. She identified 91 people who had a normal serum level of fasting glucose (defined as lower than 100 mg/dL) at their baseline exam, and who then developed impaired fasting glucose (defined as a serum level of 100 mg/dL or greater but less than 125 mg/dL) during follow-up. Her analy-

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sis compared the 91 cases with 273 control individuals who had normal fasting glucose levels at both baseline and follow-up. Each case was matched with three controls by sex, race/ethnicity, and year of enrollment in the study.

Cases and controls were divided into three categories based on their usual sleep habits during the work week (Sunday night through Thursday night): fewer than 6 hours a night (25 people), 6-8 hours a night (314 people), and more than 8 hours a night (24 people). Sleep

data were not available for one person. These categories are standard for sleep research.

Short sleepers had a 4.7-fold increased risk for developing impaired fasting glucose during follow-up, compared with people who usually had 6-8 hours of sleep nightly, a statistically significant difference. The analysis showed no significant difference in the incidence of impaired fasting glucose between those who slept 6-8 hours nightly and those who routinely slept more than 8 hours. The analysis was adjusted for several

baseline measures, including age, serum glucose level, blood pressure, smoking status, depression, family history of diabetes, and weight change during follow-up.

Dr. Rafalson acknowledged that impaired fasting glucose was not itself a disease state, but it's "a strong predictor of who will develop type 2 diabetes. It's a high-risk situation." Her analysis did not examine differences in the rate of development of new-onset diabetes.

Other researchers have proposed several hypotheses on how chronic short-sleep duration could lead to adverse changes in health, such as increased blood pressure or elevated blood glucose.

Sleep deprivation is a stressor that produces sympathetic activation and release of stress hormones, such as cortisol. Elevated cortisol levels can lead to insulin resistance and impaired glucose tolerance that can result in obesity. Sleep deprivation has also been linked to adverse changes in satiety hormones, including increased levels of ghrelin, a hormone that signals a person to eat more, and reduced levels of leptin, a hormone that signals satiety and causes people to stop eating. These changes can lead to overeating and eventual obesity, followed by impaired fasting glucose, Dr. Rafalson said. ■

## Cell Phone Programs May Bolster Diabetes Care Compliance

BY JOYCE FRIEDEN

WASHINGTON — It's not easy being diabetic.

Life is filled with lots of additional responsibilities: the finger sticks, the glucose monitoring, the hemoglobin A<sub>1c</sub> testing, the foot and eye exams. So how can things be made easier for diabetes patients and their physicians?

One answer is technology, according to several speakers at a diabetes meeting sponsored by Avalere Health. And for Amand Iyer, president and COO of WellDoc Inc., a Baltimore-based software company, that often means the cell phone.

Cell phone use can help to overcome one of the biggest barriers in the adoption of new technology: cost, said Mr. Iyer, who is a type 2 diabetes patient. "Wireless operators are measured on two things: average revenue per user, and the amount of marketing dollars they invest to [regain] a lost subscriber, which is \$343 per lost subscriber per year," he said. "If you can extend the wireless operator's contract for 1 year by providing a 'sticky' health application, they're willing to share that \$343 with you."

That's exactly what WellDoc is doing: marketing one program as a "virtual

coach" that diabetes patients can load onto their phones. "You register online or on the phone and provide your demographic information, phone number, and the drug regimen you're on, and when you're finished, you get a text message that says, 'Click here to download the software,'" Mr. Iyer explained, noting that it will work on most commercially available cell phones. The software has blood glucose target ranges, high and low alerts, and [information] what to do for hypoglycemia, and it can be modified for patients with multiple comorbidities such as diabetes and heart failure, he said.

The software also includes a learning library with information on diabetes self-care, and a mobile logbook that users can access on a computer so they can see how well they're meeting their targets. And the cell phone acts as a "nerve center" that communicates with the patient and whomever else he or she chooses, such as a physician, caregiver, or diabetes educator.

Patients can enter useful data for alerting themselves and physicians to preset trends—for example, if the patient is hypoglycemic twice in a 10-day period. Physicians can choose to receive the in-

formation in whatever way suits them best, Mr. Iyer said.

"[One doctor may say] 'I don't have a computer; send it to me in a fax the day before [the patient] comes in.' Some doctors with brittle diabetes patients have said, 'Hey, can I actually get the software on my phone? Because I just made this medication change for this brittle patient and I want to see how he is tracking.'"

Mr. Iyer's company also is working with a glucose monitor firm on getting a wireless chip installed right on the meter. "Patients would pull their strips as they do normally, get the feedback on the meter, and get all their alerts and reminders right off the meter." His company is developing similar modules for other diseases, including heart failure, hypertension, and dyslipidemia.

At Partners in Health, a group practice affiliated with the University of Pittsburgh Medical Center, one technology application that has gotten a good response is electronic "office visits," according to Dr. Grant Shevchik, the practice's medical director. Patients fill out online questionnaires—"the only physician visit where the patient records the history"—and the messages are sent directly to their physicians for a response. The new service generated 286 "visits" from Aug. 28, 2008, to Jan. 31, 2009, said Dr. Shevchik, a family physician.

"Our oldest patient who has done this is 82," and many of the others are in the 35- to 44-year-old age group. "These are

not the 22-year-olds," he added.

Not only is the service "affordable, convenient, and efficient," it also has a CPT code (99444), he noted. The code can be used only once during a 7-day period and the visit must meet several other criteria: It must be patient initiated, it must involve a timely response, and there must be permanent storage of the visit information.

At Johns Hopkins University in Baltimore, employees with chronic illnesses such as diabetes can take advantage of Telewatch, a telephone monitoring program, said Dr. Ines Vigil, associate medical director at Johns Hopkins HealthCare, a health plan that includes 47,000 university employees.

"The employee can call in and type in their blood pressure, last cholesterol-screening results, their symptoms, and their stress levels, and it gets rolled into a system that our nurse case managers and clinical screeners are able to follow over time," Dr. Vigil explained. "The system will red-flag something if it's abnormal." If a patient calls in an abnormally high blood pressure or glucose level, "then our clinical screener will inform the case manager to give the member a call," she said. The patient is then informed about recognizing abnormal values, accessing care, and checking their medications. More than 1,000 people are participating in Telewatch, she said, noting that patients with more serious chronic illnesses talk with nurse case managers more regularly. ■