Higher CMS star ratings were also associated with lower adjusted readmission rates, with 5-star hospitals having the lowest readmissions rate of 18.7% (95% CI, 18.6%-18.8%), followed by 4-star hospitals with a rate of 21.0% (95% CI, 21.0%-21.0%), 3-star hospitals with a rate of 23.0% (95% CI, 23.0%-23.0%), 2-star hospitals with a rate of 21.8% (95% CI, 21.7%-21.8%), and 1-star hospitals with a rate of 22.9% (95% CI, 22.8%-22.9%) (P < .001 for trend) (Table 2).

Discussion | We found that a higher CMS star rating was associated with lower patient mortality and readmissions. It is reassuring that patients can use the star ratings in guiding their health care seeking decisions given that hospitals with more stars not only offer a better experience of care, but also have lower mortality and readmissions.

Our study has limitations. First, our analyses focused on the Medicare population; therefore, whether these findings would hold for younger patients is unclear. Second, although we adjusted for both patient and hospital characteristics, it is possible that some of the worse outcomes at low stars hospitals may represent residual confounding. Finally, the differences were most apparent at the extremes, with 2- to 4-star hospitals being relatively comparable. Whether this reflects the clustering methodology of the star rating program or whether quality of care is similar in these hospitals is unclear.

These findings should be encouraging for policymakers and consumers; choosing 5-star hospitals does not seem to lead to worse outcomes and in fact may be driving patients to better institutions.

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Association of Insufficient Sleep With Respiratory Infection Among Adults in the United States

Sleep is increasingly recognized as an important determinant of health and well-being. Approximately 50 million to 70 million Americans have either a sleep disorder or habitually insufficient sleep.1 How insufficient sleep ultimately affects disease risk remains unclear. Experimental evidence demonstrates that sleep loss can adversely affect components of the immune system critical to host resistance to infectious illness. Furthermore, short sleep duration and sleep disturbances prospectively predict increased susceptibility to upper respiratory infection after an experimental viral challenge.2-5 Despite this evidence and the common belief that risk of infectious illness increases during periods of insufficient sleep, to our knowledge this has not been investigated at the population level. We examined associations between self-reported measures of sleep and the probability of occurrence of colds and infections, including influenza, pneumonia, and ear infections, in a nationally representative sample of adults.

Methods | Participants were 22 726 Americans (mean [SE] age, 46.2 [0.3] years) enrolled in the 2005 to 2012 National Health and Nutrition Examination Surveys (NHANES), an ongoing, multistage survey administered by the National Center for Health Statistics. The need for institutional review board approval was waived by the University of California–San Francisco Institutional Review Board because this study was a secondary analysis of deidentified data. Participants reported their typical weekday sleep duration in hours, whether a physician had ever diagnosed a sleep disorder in them, and if they had ever told a physician that they had trouble sleeping. Participants also reported on whether they had a head or chest cold (yes or no) or an infection, including influenza, pneumonia, or an ear infection (yes or no) in the past 30 days. To account for possible confounding, analyses were adjusted for age, sex, race/ethnicity, highest educational attainment, household income, marital status, smoking status, physical activity, body mass index (BMI), and survey year. Multivariable logistic regression models were used to examine associations between sleep and odds of a cold or other infection. All analyses incorporated weights from the mobile examination center recalculated to reflect the probability of a visitor to the examination center being sampled during the study period.

Results | Among the study participants, 13.6% reported sleeping for 5 hours or less per night, 23.0% reported sleeping for long periods (95% CI, 10.7%-10.7%), and 1-star hospitals with a rate of 11.2% (95% CI, 11.2%-11.3%) (P < .001 for trend).


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A diagnosis of a sleep disorder had been made in 7.1% of the participants, and 25.0% reported having told a physician that they had trouble sleeping. Compared with participants who slept for 7 to 8 hours, short sleepers (≤5 hours) were more likely to report a head or chest cold (odds ratio [OR], 1.28; 95% CI, 1.10-1.48) and infection (OR, 1.82; 95% CI, 1.42-2.34) in the past 30 days according to results of a multivariable logistic regression analysis that adjusted for age and sex (Table). No such associations were observed among those who slept 6 and 9 or more hours. Similarly, adults who reported ever having had a diagnosed sleep disorder or disclosing trouble sleeping to a physician were also more likely to report a head or chest cold sleep disorder: OR, 1.30; 95% CI, 1.09-1.54; trouble sleeping: OR, 1.29; 95% CI, 1.15-1.45) and infection (sleep disorder: OR, 2.15; 95% CI, 1.63-2.83; trouble sleeping: OR, 1.73; 95% CI, 1.45-2.06). Similar associations were observed in multivariable logistic regression analysis that adjusted for our additional covariates (Table).

Discussion | In a nationally representative sample of adults, self-reported short sleep duration, a physician’s diagnosis of a sleep disorder, and reported trouble with sleeping was associated with a greater likelihood of a cold or infection or both in the past 30 days. This is consistent with the findings in experimental studies using viral-challenge paradigms²³ and a prospective analysis linking both short and long sleep duration with increased risk of pneumonia.⁴ The cross-sectional nature of the data in our study precludes any causal inferences, and the bidirectional relationship between sleep and the immune system is well established.⁵ However, the absence of an association between long sleep and illness increases our confidence that sleep contributes to susceptibility to infectious illness rather than vice versa. This finding adds to the growing scientific literature linking sleep with physical health. It may be time that sleep assessments become more commonplace in medical settings, as sleep may serve as yet another vital sign for health.⁶

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Author Contributions: Drs Prather and Leung had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

Study concept and design: Prather.
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Drafting of the manuscript: Prather.
Critical revision of the manuscript for important intellectual content: Both authors.
Statistical analysis: Leung.
Urgent Care Needs Among Nonurgent Visits to the Emergency Department

The goal of triage is to prioritize patients who need to be seen most urgently; it is essential for providing the highest quality of care to the sickest patients. We sought to determine whether a triage determination of nonurgent status in the emergency department (ED) effectively ruled out the possibility of serious pathologic conditions, as indicated by visits resulting in diagnostic screening, procedures, hospitalization, or death, and compared these findings with visits deemed as urgent from triage.

Methods | The National Hospital Ambulatory Medical Care Survey is a national multistage probability sample survey of patient visits to the ED. These data contain triage scores for each ED visit as assessed by a triage nurse on arrival based on a scale of 1 to 5, with 1 being immediate, 2 emergent, 3 urgent, 4 semi-urgent, and 5 nonurgent. We compared characteristics and outcomes of visits from January 1, 2009, to December 31, 2011, labeled as nonurgent (category 5) with characteristics and outcomes of visits with all other labels (categories 1-4), which we labeled as urgent visits. We focused on nonelderly adults aged 18 to 64 years and excluded visits for which triage scores were missing or where the patient left before triage or medical screening. This study was deemed exempt from human subjects review at the University of California San Francisco.

Results | We analyzed 59,293 observations from 2009 to 2011, representing 240 million visits. A total of 218.49 million visits (92.5%) were deemed urgent at triage and 17.76 million visits (7.5%) as nonurgent. A total of 33.82 million visits (15.5%) deemed urgent arrived by ambulance, compared with 1.19 million visits (6.7%) considered nonurgent. Diagnostic services, such as blood tests, electrocardiograms, and imaging, were provided in 8.45 million nonurgent visits (47.6%) (any blood tests: weighted, 18.8% [95% CI, 15.5%-22.1%]; electrocardiograms: 5.8% [95% CI, 4.3%-7.2%]; and any imaging: 28.5% [95% CI, 24.9%-32.0%]), and procedures, such as intravenous fluids, casting, and splinting, were performed in 5.76 million nonurgent visits (32.4%) (intravenous fluids: weighted, 12.6% [95% CI, 9.7%-15.6%]; casting: 0.6% [95% CI, 0.2%-1.0%]; and splinting: 6.2% [95% CI, 5.2%-7.3%]). In comparison, diagnostic services were provided in 163.49 million urgent visits (74.8%) (any blood tests: weighted, 46.2% [95% CI, 44.7%-47.6%]; electrocardiograms: 18.7% [95% CI, 17.8%-19.6%]; and any imaging: 49.0% [95% CI, 47.7%-50.3%]), and procedures were performed in 107.89 million urgent visits (49.4%) (intravenous fluids: weighted, 31.7% [95% CI, 30.2%-33.3%]; casting: 0.3% [95% CI, 0.2%-0.3%]; and splinting: 5.6% [95% CI, 5.3%-5.9%]) (P < .001 for all comparisons) (Table 1).

A total of 776,000 nonurgent visits (weighted, 4.4% [95% CI, 3.1%-5.7%]) resulted in admissions and of these, 126,000 (16.2%; weighted, 0.7% [95% CI, 0.1%-1.3%]) were admissions to critical care units. A total of 27.86 million urgent visits (weighted, 12.8% [95% CI, 11.7%-13.8%]) resulted in admissions (P < .001), of which only 2.91 million (10.5%; weighted, 1.3% [95% CI, 1.2%-1.5%]) (P = .32) were admissions to critical care units. Overall, 1.01 million nonurgent visits (weighted, 5.7% [95% CI, 4.2%-7.1%]) resulted in admission or transfer, compared with 32.49 million urgent visits (weighted, 14.9% [95% CI, 13.8%-15.9%]) (P < .001) (Table 2).

When we examined the chief symptoms reported at nonurgent visits, 6 of the top 10 reasons—back symptoms, abdominal pain, sore throat, headache, chest pain, and low back pain—were also in the top 10 symptoms reported at urgent visits. In addition, when the top 10 diagnoses from nonurgent visits were analyzed, 5 were identical to those at urgent visits (backache, lumbar, acute upper respiratory infection, cellulitis, and acute pharyngitis).

Discussion | Our study found that a nontrivial proportion of ED visits that were deemed nonurgent arrived by ambulance, received diagnostic services, had procedures performed, and were admitted to the hospital, including to critical care units. Certainly, not all of these data necessarily indicate that these services were required, and they could signal overuse or a lack of availability of primary care physicians. However, to some degree, our findings indicate that either patients or health care professionals do entertain a degree of uncertainty that requires further evaluation before diagnosis. That half of the top 10 diagnoses, among over 14,000 International Classification of Diseases, Ninth Revision codes, are found in both nonurgent and urgent visits shows that 50% of these visits are virtually indistinguishable from each other.

There are certain limitations to this study. Specifically, while the National Hospital Ambulatory Medical Care Survey uses a 5-level triage score, not all hospitals do. The National Hospital Ambulatory Medical Care Survey therefore rescales visits to hospitals that do not use a 5-level triage score, and also...