

SCIENTIFIC INVESTIGATIONS

## Short-term insomnia disorder in health care workers in an academic medical center before and during COVID-19: rates and predictive factors

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**Study Objectives:** This study investigated risk factors and estimated rates of acute insomnia disorder in health care workers at the onset of the coronavirus disease 2019 (COVID-19) pandemic.

**Methods:** A Qualtrics survey of more than 2,300 health care providers was conducted in a single academic health system on May 15, 2020, including practicing attending physicians, residents and fellows in training, advanced practice providers, and nurses. Six hundred and sixty-eight responded (29% response rate). The survey employed the Research Diagnostic Criteria for insomnia disorder to diagnose acute insomnia disorder.

**Results:** Five hundred seventy-three respondents had no missing data pertaining to sleep, with a mean age of  $43.4 \pm 12.5$  years and 72% women. The rate of insomnia disorder before COVID-19 was 44.5%, while after COVID-19 it was 64.0%. Of persons with insomnia disorder before COVID-19 10.2% stated it had resolved during COVID-19, while 43.4% of persons who did not have insomnia disorder before COVID-19 developed acute insomnia disorder during COVID-19 ( $\chi^2 = 145.2$ ;  $df = 1$ ;  $P < .0001$ ). New cases of acute insomnia disorder were related positively to female sex, advancing age, and less time spent in direct patient care.

**Conclusions:** Acute insomnia disorder was exceptionally common in this sample of tertiary care health care workers. The effects of sex and age were similar to what has been generally described as risk factors for insomnia. The surprising finding that less time spent in direct patient care was associated with more cases of acute insomnia disorder might be explained by the poorly understood stresses of working from home during COVID-19.

**Keywords:** COVID-19, health care workers, insomnia, acute insomnia disorder

**Citation:** McCall WV, Mensah-Bonsu D, Withers AE, Gibson RW. Short-term insomnia disorder in health care workers in an academic medical center before and during COVID-19: rates and predictive factors. *J Clin Sleep Med.* 2021;17(4):749–755.

### BRIEF SUMMARY

**Current Knowledge/Study Rationale:** The rate of new cases of acute insomnia disorder in health care workers during COVID-19 is unknown. Insomnia disorder may impact the mental health and performance of health care workers.

**Study Impact:** Our survey of health care workers revealed a surprising high rate of acute insomnia disorder. This implies a need for awareness on the part of health care system leaders of the pandemic's impact on their health care workers, both in the health care setting and in the home when working from home.

### INTRODUCTION

Insomnia disorder is a common sleep disorder that includes both acute and chronic forms, with respective annual prevalence of at least 8–9% and 6%.<sup>1,2</sup> Insomnia is associated with the risk of developing other psychiatric disorders,<sup>3</sup> poor quality of life,<sup>4,5</sup> and an increased risk of suicidal ideation and suicidal behavior.<sup>6,7</sup> It would be valuable to public health to understand both the modifiable and the unmodifiable risk factors for insomnia that might inform prevention strategies for insomnia and its psychiatric complications. While there is some lack of consensus as to what constitutes acute vs chronic insomnia,<sup>8,9</sup> acute insomnia disorder is typically defined as covering a timeframe of a few weeks, while chronic insomnia disorder may last months to years. Not surprisingly, acute insomnia may progress into chronic insomnia, only to eventually remit and then recur.<sup>10</sup>

Precipitating life events often precede acute insomnia disorder,<sup>11,12</sup> and the precipitating factors can either be pleasant

(like a wedding or a new job) or unpleasant (such as divorce or job loss). Most of life's pleasant and unpleasant events/stressors are private in nature, and it is unusual to witness the sudden emergence of a near universal stressor across an entire population. Pandemics such as SARS are examples of population-wide stressors that may serve as a natural laboratory for acute insomnia research, including insomnia in health care workers (HCWs).

In 2007, Su et al examined the prevalence of psychological symptoms and adaptation among nurses in a SARS unit in Taiwan. In this cohort, insomnia was more prevalent among SARS unit nurses than non-SARS unit nurses (37% vs 9.7%). Insomnia was less marked in nurses who took care of the more severely affected or intubated SARS patients.<sup>13</sup>

A recent review article on the psychological impact of pandemics in HCWs found a prevalence of insomnia symptoms in 34–36.1%.<sup>14</sup> Jing Qi et al compared sleep disturbances among frontline HCWs and non-frontline HCWs in Hubei

Province, China, during the corona virus disease 2019 (COVID-19) pandemic and evaluated sleep disturbances with the Pittsburgh Sleep Quality Index (PSQI) and Athens Insomnia Scale (AIS). Results showed that frontline HCWs had higher PSQI scores and higher prevalence of PSQI > 6 points and AIS > 6 points, and female frontline HCWs had significantly higher sleep disturbances compared to male frontline HCWs.<sup>15</sup> Zhang et al reported a 36.1% prevalence of insomnia symptoms (defined as Insomnia Severity Index > 8) in their analysis of sleep disturbance among frontline HCWs in China during the COVID-19 outbreak. Participants with the following characteristics were more likely to report insomnia symptoms: being a doctor, currently working in an isolation unit, and having uncertainty about disease control.<sup>16</sup> Contrary to expectations, some groups reported sleeping better after the onset of the outbreak.<sup>17</sup> Most studies on the topic of insomnia in HCW during COVID-19 have employed insomnia-severity scales that do not directly yield a diagnosis of insomnia disorder, including scales such as the Insomnia Severity Index,<sup>17–20</sup> PSQI,<sup>16,19,21</sup> and AIS.<sup>21</sup> Further, these reports have only provided a cross-sectional view of insomnia symptom prevalence, without reporting on rates of new cases of insomnia disorder.

In response, we conducted a survey on the topic of insomnia among HCW at a tertiary urban hospital and its clinics, using research-grade diagnostic criteria to establish the presence or absence of acute insomnia disorder, instead of using severity rating scales such as the Insomnia Severity Index, PSQI, or AIS. We hypothesized that a jump in the rates of acute insomnia disorder at the onset of COVID-19 would result in a net increase in the proportion of HCWs with insomnia disorder. Second, we hypothesized that the traditional demographic risk factors of increasing age and female sex would again prove to be relevant risk factors for incident acute insomnia disorder, and that changes in working conditions within the health system would also be relevant predictors of new cases of acute insomnia disorder. Specifically, we hypothesized that direct experience with COVID-19, increased work hours, shift work, and providing more than 30 hours of patient care per week would each be associated with onset of new cases of acute insomnia disorder.

## METHODS

### Design

This was a cross-sectional anonymous survey of practicing physicians, advance practice providers, medical residents, and nurses in a tertiary urban hospital and its clinics. The survey was reviewed and approved by institutional leaders at Augusta University Health System. The study was reviewed by the university institutional review board and was determined to be exempt. The health system has 478 adult inpatient beds, including intensive care unit capacity, 154 children's beds, and 80 outpatient primary care and specialty clinics.

The survey was conducted by email invitation. The survey was entered into Qualtrics, tested for functionality, and then distributed through an email blast on May 15, 2020. At the time of the survey the hospital and state were still experiencing an escalating rate of COVID-19 cases. On the date of the survey,

the hospital had an average daily census that included 21 COVID-19-positive patients, including 4 in the intensive care units. COVID-19 patients were admitted at a rate of 1–8 per day to the intensive care unit, with 4 patients newly placed on ventilators in the week prior.

Earlier, in mid-March, in compliance with the executive order of the state governor, all nonessential workers were instructed to work from home. Essential workers (defined broadly as those directly involved in the delivery or facilitation of patient care) were allowed to stay at their post. However, if an HCW's work effort was < 100% assigned to patient care, then that worker was encouraged to perform nonpatient care duties from home. Students at all levels of education were also sent home and instructed to complete their classes online, often requiring the supervision of parents who were also trying to work from home.

The survey asked respondents to reflect on their work assignments and sleep for the 2-week interval from mid-February to March 1 (before the ramp up of the pandemic in our health system) and to contrast those observations with their work assignments and sleep from May 8–15 at the beginning of the pandemic's impact on inpatient and outpatient operations. Study participants were given 2 weeks to respond to the survey. After 2 weeks, the survey was closed to further submissions.

### Survey instrument

The survey included 17 questions, consisting of demographic questions, work habits and exposure to COVID-19, criteria for insomnia disorder, and mood and anxiety symptoms. The survey instrument was built around the Research Diagnostic Criteria (RDC) for insomnia disorder,<sup>22</sup> the Patient Health Questionnaire-2,<sup>23</sup> and the Generalized Anxiety Disorder questionnaire-2.<sup>24</sup> The RDC diagnosis of insomnia disorder allows for insomnia symptoms to last up to 1 month before defining the problem as “primary” (ie, chronic) insomnia. The diagnosis of RDC insomnia disorder is entirely consistent with the diagnosis of acute insomnia per the *International Classification of Sleep Disorders*, third edition (ICSD-3), with the additional clarifier that the ICSD-3 allows the symptoms to persist for up to 3 months before being reclassified as chronic insomnia disorder. In contrast, the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition (DSM-5), describes a similar diagnostic scheme for insomnia disorder but does not explicitly define “acute” insomnia disorder.<sup>12</sup> In our survey, we used the RDC definition of insomnia disorder. In order to a focus on acute insomnia disorder without proceeding to meet RDC criteria for a chronic insomnia disorder, we asked respondents to remember their sleep/wake function over the 2 weeks prior to March 1 (prior to the ramp up of COVID-19 in our health system) and then to compare it against the week preceding the survey's delivery on May 15 (in the midst of the COVID-19 ramp up).

The Research Diagnostic Criteria for diagnosis of insomnia disorder requires that the respondent endorse: (1) at least 1 of 4 symptoms related to trouble sleeping (problems falling asleep, or staying asleep, or waking too early, or poor quality sleep), (2) that sleep problems occurred although adequate

**Table 1**—Baseline characteristics for 573 surveys with no missing data pertaining to sleep.

Characteristic	Mean ± SD or %
Age (years)	43.4 ± 12.5
Sex (female)	72.0%
Nurses, physicians, and APPs	55.5%, 37.5%, and 7.0%
In training (yes)	15.3%
Providing ≥ 30 hours per week of patient care throughout February 2020	82.8%
Providing ≥ 30 hours per week of patient care throughout March 1 to May 15, 2020	80.7%
Frequent shift work other than first shift	27.1%
≥ 25% Increase in work hours after March 1, 2020	21.3%
Exposed to COVID-19	75.0%

APP = advanced practice provider, COVID-19 = coronavirus disease 2019, SD = standard deviation.

opportunity and circumstances exist for sleep, and (3) that at least 1 of 9 daytime sequelae symptoms related to insomnia (fatigue, attention/memory problems, social/vocational problems, mood problems, daytime sleepiness, problems with motivation or energy, accident proneness, headaches/GI symptoms, worries about sleep). The combination of the night-time and daytime symptoms resulted in a symptom-severity checklist of 13 symptoms.

The Patient Health Questionnaire-2 is a self-administered 2-item screening test for major depressive disorder (MDD), with 1 item for frequency of depressed mood and 1 item for frequency of anhedonia, and each item is scored 0–3. At least 1 of these 2 items must be endorsed to proceed with further presumptive diagnosis for MDD. The Generalized Anxiety Disorder Questionnaire-2 is similarly structured to detect generalized anxiety disorder, with 1 item for feeling nervous, anxious, or on edge, and 1 item for not feeling able to stop or control worrying. Patient Health Questionnaire-2 and Generalized Anxiety Disorder Questionnaire-2 questions were framed to be answered with respect to the same 2-week interval as the post-COVID-19 sleep questions.

### Statistical approach

Descriptive statistics of continuous variables are presented as means and standard deviation, with percentages used for non-continuous variables. Except for age, all variables were treated as nominal variables. Nominal demographic variables included sex, health care discipline [physician, nurse, advanced practice providers (APP)/allied health], and training status (yes/no).

Nominal variables regarding exposure to COVID-19 included direct patient care at least 30 hours per week (yes/no) both before and after the COVID-19 pandemic, shift work other than an occasional on-call night (yes/no), 25% increase in hours of patient care per week after the onset of COVID-19 pandemic (yes/no), and exposure to COVID-19 (treating a known COVID-19 patient, getting tested, being quarantined, having contact with a family member or colleague with COVID-19).

The primary outcome of interest was insomnia disorder (yes/no) with the presence or absence of depressive and anxiety symptoms as secondary outcomes. Nominal variables were contrasted in bivariate analysis with chi-square, while models of nominal variables were conducted with logistic regression, with the presentation of each independent variable's beta estimate and standard error as an

indication of the effect sizes of each independent variable. Tests of differences in age were conducted with 1-way analysis of variance. Statistical significance was accepted at  $P < .05$ .

## RESULTS

### Response and completion rates

The recipients of the survey included 564 practicing physicians, 207 APPs and allied health professionals, 545 medical residents and fellows in training, and 1,000 nurses. The data was reviewed for completeness, and responders who opened the link and consented but did not complete questions were removed. There was a total of 668 responses to the email invitation (29% response rate).

We removed 32 responses for unanswered questions or because they were not HCWs. Of the 636 HCWs who started the survey, 577 answered questions regarding their sleep both before and after the onset of COVID-19 (90%). There was no difference in the completion rate among physicians, nurses, and APPs. However, HCWs who were still in training were less likely to complete the survey (83%), compared with those who had completed training (92%) ( $\chi^2 = 7.6$ ;  $df = 1$ ;  $P < .05$ ).

Of the 577 survey responders who completed questions regarding sleep both before and after COVID-19, there were 573 surveys with no missing data pertaining to sleep either before or after COVID-19. On average, the sample was middle-aged, mostly women, with strong representation from attending physicians and nurses. (Table 1) The majority of the respondents were providing ≥ 30 hours of patient care per week during both the pre-COVID-19 and post-COVID-19 assessments. Approximately one-quarter of the sample were shift workers, one-fifth experienced increased work-hour demands post-onset of the pandemic, and most had some personal experience/exposure to COVID-19 patients. The presence of shift work was unrelated to age ( $F = 0.81$ ;  $df = 1, 554$ ;  $P = .37$ ) or sex ( $\chi^2 = 0.30$ ;  $df = 1$ ;  $P = .59$ ). Respondents who spent > 30 hours per week in direct patient care during COVID-19 were younger ( $42.0 \pm 12.0$  years) than those who did not ( $49.4 \pm 12.4$  years) ( $F = 33.0$ ;  $df = 1, 554$ ;  $P < .0001$ ) but with no difference in the proportion of men and women ( $\chi^2 = 0.32$ ;  $df = 1$ ;  $P = .57$ ).

**Table 2**—Frequency of specific sleep-related and daytime insomnia symptoms for those respondents meeting criteria for insomnia disorder.

	Insomnia Disorder Present	
	Pre-COVID-19 (n = 260)	During-COVID-19 (n = 368)
Difficulty initiating sleep (%)	58.4	64.1
Difficulty maintaining sleep (%)	75.8	80.3
Waking up too early (%)	60.0	66.8
Sleep is nonrestorative or poor in quality (%)	68.8	80.9
Fatigue/malaise (%)	79.6	85.6
Attention, concentration, or memory impairment (%)	56.6	62.5
Social/vocational dysfunction or poor school performance (%)	15.9	22.0
Mood disturbance/irritability (%)	61.0	70.7
Daytime sleepiness (%)	75.9	82.0
Motivation/energy/initiative reduction (%)	70.7	79.9
Proneness to errors/accidents at work or while driving (%)	12.8	16.8
Tension headaches and/or gastrointestinal symptoms in response to sleep loss (%)	52.7	59.2
Concerns or worries about sleep (%)	58.4	62.5

COVID-19 =s coronavirus disease 2019.

**Prevalence of insomnia disorder before COVID-19 and new cases during COVID-19**

In the 573 surveys with no missing sleep data for both before and after COVID-19, the rate of insomnia disorder before COVID-19 was 44.5%, while during COVID-19 it was 64.0%. The rates of insomnia disorder during COVID-19 were identical in those respondents who worked the day shift vs those who did not. Of persons with insomnia disorder before COVID-19 10.2% stated it had resolved during COVID-19, while 43.4% of persons who did not have insomnia disorder before COVID-19 developed insomnia disorder during COVID-19 ( $\chi^2 = 145.2$ ;  $df = 1$ ;  $P < .0001$ ). The symptom count from the checklist of 13 symptoms revealed  $8.2 \pm 2.7$  symptoms (median = 8.5) in those respondents who did not have acute insomnia disorder prior to COVID-19 but then developed acute insomnia disorder during COVID-19. Similarly, the symptom checklist score was  $8.5 \pm 2.7$  (median = 9) in those respondents who had acute insomnia disorder both prior to and during COVID-19 (Table 2).

**Risk factors for insomnia disorder prevalence before COVID-19**

A logistic regression model for pre-COVID-19 insomnia disorder examined age, sex, discipline (physician, nurse, APP), training status, and workload ( $\geq 30$  hours per week of patient care) but was nonsignificant ( $\chi^2 = 9.5$ ;  $df = 6$ ;  $P = .15$ )

**Risk factors for new cases of insomnia disorder during COVID-19**

A logistic regression model was created for post-COVID-19 insomnia disorder across all respondents, with age, sex, discipline, training status, clinical workload hours, increase in workload,

presence of shift work, exposure to COVID-19, and pre-COVID-19 insomnia disorder status. This model was highly significant ( $\chi^2 = 199$ ;  $df = 11$ ;  $P < .0001$ ), with significant contributions made by age, sex, workload, and a pre-existing insomnia disorder.(Table 3) When the model was rerun with stratification according to the presence or absence of pre-COVID-19 insomnia disorder, the overall model was nonsignificant for participants with pre-COVID-19 insomnia disorder ( $\chi^2 = 13.0$ ;  $df = 9$ ;  $P = .16$ ). (Table 3) In contrast, the model was significant for those HCWs who did not have pre-COVID-19 insomnia disorder ( $\chi^2 = 53.8$ ;  $df = 10$ ;  $P < .0001$ ) (Table 3) .

Independent variables that predicted new cases of insomnia disorder in this model included increasing age ( $P < .05$ ), female sex (54.8% vs 19.2%;  $P < .0001$ ), and less clinical workload (40.3% rate for those with  $\geq 30$  clinical work hours per week vs 53.0% rate for those with  $< 30$  hours per week,  $P < .05$ ). There was no relationship with COVID-19 exposure and no significant interaction between age, sex, and workload (either before or after the onset of the pandemic).

**Mental health symptoms associated with insomnia disorder**

The clinical significance of the increase in insomnia disorder during COVID-19 is reflected in the association between the insomnia and psychological symptoms. At least 1 core symptom of depression was endorsed by 55.8% of providers during COVID, while an anxiety symptom was endorsed by 63.5%. We conducted separate logistic regression models for the presence of at least 1 depression symptom or the presence of at least 1 anxiety symptom as a respective dependent variable, with insomnia disorder as the independent variable, adjusted for age and sex. All of these models were highly significant ( $P < .0001$ ,

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**Table 3**—Logistic regression model parameter estimates for insomnia disorder during COVID-19.

Variable Name	Beta Estimate	Standard Error	$\chi^2$	Probability
All respondents				
Age	0.02	0.01	4.2	0.04
Sex [female]	−0.72	0.14	24.6	0.0001
Discipline (MD vs nurse)	0.14	0.20	0.49	0.48
Discipline (MD vs other)	−0.18	0.29	0.40	0.53
Are you in training? [no]	−0.25	0.19	1.83	0.18
Are you providing patient care at least 30 hours per week? [no]	−0.36	0.14	6.4	0.01
Are you working straight first shift? [no]	0.08	0.12	0.42	0.52
Have your hours on the job increased by 25% [no]	0.21	0.14	2.20	0.14
Exposed to COVID-19? [no]	−5.3	2989	*	0.99
Was Insomnia Disorder present pre-COVID? [no]	1.30	0.13	99.2	0.0001
Respondents who met insomnia disorder criteria prior to COVID-19				
Age	0.01	0.02	0.22	0.64
Sex [female]	−0.60	0.26	5.31	0.02
Discipline (MD vs nurse)	6.32	1856	*	0.99
Discipline (MD vs other)	−11.9	3712	*	0.99
Are you in training? [no]	−0.46	0.36	1.62	0.20
Are you providing patient care at least 30 hours per week? [no]	−0.27	0.34	0.62	0.43
Are you working straight first shift? [no]	0.14	0.22	0.41	0.52
Have your hours on the job increased by 25% [no]	0.05	0.24	0.05	0.83
Have you been exposed to COVID19? [no]	−0.06	0.28	0.05	0.82
Respondents who did not meet insomnia disorder criteria prior to COVID-19				
Age	0.03	0.01	4.88	0.03
Sex [female]	−0.77	0.18	18.10	0.0001
Discipline (MD vs nurse)	−0.07	0.23	0.11	0.74
Discipline (MD vs other)	−0.00	0.34	0.00	0.99
Are you in training? [no]	−0.16	0.22	0.52	0.47
Are you providing patient care at least 30 hours per week? [no]	−0.38	0.16	5.45	0.02
Are you working straight first shift? [no]	0.06	0.15	0.18	0.67
Have your hours on the job increased by 25% [no]	0.26	0.18	2.12	0.14
Have you been exposed to COVID19? [no]	−5.01	2989	*	0.99

\*Unstable estimate. COVID-19 = coronavirus disease 2019.

but the association between post-COVID-19 insomnia disorder and either depressive or anxiety symptoms was stronger when we examined the providers who did *not* have insomnia disorder prior to COVID-19 compared with those who had insomnia disorder prior to COVID-19 (depressive symptoms:  $\chi^2 = 53.2$  vs  $\chi^2 = 13.2$ ; anxiety symptoms  $\chi^2 = 67.3$  vs  $\chi^2 = 12.8$ ).

## DISCUSSION

Our main hypothesis was supported, in that there was a large and significant increase in cases of acute insomnia disorder

among HCWs across a 90-day interval that spanned the onset of the COVID-19 pandemic. The magnitude of the incident cases is probably related in part to our definition of “caseness,” which only required that the minimum RDC for insomnia criteria be met. However, examination of the median number of insomnia symptoms across cases of insomnia indicates that the insomnia severity was of clinical significance for many HCWs. Further, cases of acute insomnia disorder were associated with depression and anxiety symptoms, especially for new cases of the disorder. The combination of insomnia and anxiety over COVID-19 represents a potent risk for suicidal ideation.<sup>25</sup>

Advancing age and female sex were risk factors for new cases of acute insomnia disorder in our study. While advancing age and female sex are established as risks for chronic insomnia,<sup>2</sup> the limited data on age and sex risks for acute insomnia disorder have previously suggested that younger persons were at greater risk for acute insomnia disorder.<sup>1</sup> Most of our proxy indicators of COVID-19 exposure (personal experience/exposure with COVID-19, experiencing an increase in work hours, performance of shift work) were not significant contributors to the model.

However, spending < 30 hours per week in the care of patients was associated with increased rate of new cases of acute insomnia disorder. This was an unexpected finding, as we had assumed that more time with patients translated to more COVID-19 exposure, more worry, and more insomnia. Instead, we find that spending less time with patients was a risk for new cases of acute insomnia disorder. Given the Georgia governor's executive order to work from home when not taking care of patients, we hypothesize that trying to work from home at the same time that schoolchildren had been sent home to be supervised by their parents for online learning was a significant stress contributing to acute insomnia disorder. If correct, this stands in contrast to literature reporting that leaving the workplace for retirement leads to less early morning awakening and longer sleep times.<sup>26–28</sup> However, returning home for retirement at retirement age may be a completely different situation than returning home under an executive order to a home with young children. An alternative explanation for this finding is that the fatigue resulting from spending more time in direct patient care could promote better sleep and fewer cases of acute insomnia disorder among health care providers.

This study has strengths and limitations. Strengths include the use of a research-grade diagnosis for “caseness” of acute insomnia disorder and the inclusion of HCWs of varying disciplines and training status. Limitations include: (1) a modest sample size with the possibility of selective bias in the respondents who completed the survey, (2) our omission of a separate validated scale for measuring insomnia severity in order to not overburden respondents and improve our response rate, (3) measurement across a limited period of time during a pandemic which has already been shown to have dynamic fluctuations over several months, (4) we did not record episodes of insomnia disorder prior to the COVID-19 pandemic, and thus do not know whether new cases of insomnia disorder represent incidental onset of insomnia disorder vs a recurrence of insomnia disorder, (5) our omission of questions related to work within an isolation unit, and (6) a respondent's assessment of insomnia disorder symptoms was retrospective for pre-COVID-19 but was contemporaneous during COVID-19.

The clinical implications of this work include a need for awareness on the part of health care system leaders of the impact of the pandemic on their HCWs, both in the health care setting and in the home when working from home. Interventions might include standard education of HCWs in the principles of good sleep hygiene and stress management.<sup>29</sup>

## ABBREVIATIONS

AIS, Athens Insomnia Scale  
APP, advanced practice provider

COVID-19, coronavirus disease 2019  
HCW, health care workers  
PSQI, Pittsburgh Sleep Quality Index  
RDC, Research Diagnostic Criteria

## REFERENCES

1. Ellis JG, Perlis ML, Neale LF, Espie CA, Bastien CH. The natural history of insomnia: focus on prevalence and incidence of acute insomnia. *J Psychiatr Res*. 2012;46(10):1278–1285.
2. Ohayon MM. Epidemiology of insomnia: what we know and what we still need to learn. *Sleep Med Rev*. 2002;6(2):97–111.
3. Ford DE, Kamerow DB. Epidemiologic study of sleep disturbances and psychiatric disorders. An opportunity for prevention? *JAMA*. 1989;262(11):1479–1484.
4. McCall WV, Reboussin BA, Cohen W. Subjective measurement of insomnia and quality of life in depressed inpatients. *J Sleep Res*. 2000;9(1):43–48.
5. Zammit GK, Weiner J, Damato N, Sillup GP, McMillan CA. Quality of life in people with insomnia. *Sleep*. 1999;22(Suppl 2):S379–S385.
6. McCall WV, Black CG. The link between suicide and insomnia: theoretical mechanisms. *Curr Psychiatry Rep*. 2013;15(9):389.
7. McCall WV, Benca RM, Rosenquist PB, et al. Reducing suicidal ideation through insomnia treatment (REST-IT): a randomized clinical trial. *Am J Psychiatry*. 2019;176(11):957–965.
8. Ellis JG, Gehrman P, Espie CA, Riemann D, Perlis ML. Acute insomnia: current conceptualizations and future directions. *Sleep Med Rev*. 2012;16(1):5–14.
9. Morin CM. Definition of acute insomnia: diagnostic and treatment implications. *Sleep Med Rev*. 2012;16(1):3–4.
10. Perlis ML, Vargas I, Ellis JG, et al. The natural history of insomnia: the incidence of acute insomnia and subsequent progression to chronic insomnia or recovery in good sleeper subjects. *Sleep*. 2020;43(6):zsz299.
11. American Academy of Sleep Medicine. *International Classification of Sleep Disorders*. 3rd ed. Darien, IL: American Academy of Sleep Medicine; 2014.
12. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. 5th ed. Arlington, VA: American Psychiatric Association; 2013.
13. Su TP, Lien TC, Yang CY, et al. Prevalence of psychiatric morbidity and psychological adaptation of the nurses in a structured SARS caring unit during outbreak: a prospective and periodic assessment study in Taiwan. *J Psychiatr Res*. 2007;41(1-2):119–130.
14. Preti E, Di Mattei V, Perego G, et al. The psychological impact of epidemic and pandemic outbreaks on healthcare workers: rapid review of the evidence. *Curr Psychiatry Rep*. 2020;22(8):43.
15. Qi J, Xu J, Li BZ, et al. The evaluation of sleep disturbances for Chinese frontline medical workers under the outbreak of COVID-19. *Sleep Med*. 2020;72:1–4.
16. Zhang C, Yang L, Liu S, et al. Survey of insomnia and related social psychological factors among medical staff involved in the 2019 novel coronavirus disease outbreak. *Front Psychiatry*. 2020;11:306.
17. Zhou ES, Michaud AL, Owens J, Recklitis CJ. Sleep in young adult cancer survivors during the COVID-19 pandemic. *J Clin Sleep Med*. 2020;16(11):1991.
18. Zhang WR, Wang K, Yin L, et al. Mental health and psychosocial problems of medical health workers during the COVID-19 epidemic in China. *Psychother Psychosom*. 2020;89(4):242–250.
19. Huang Y, Zhao N. Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. *Psychiatry Res*. 2020;288:112954.
20. Lai J, Ma S, Wang Y, et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Netw Open*. 2020;3(3):e203976.

21. Xiao H, Zhang Y, Kong D, Li S, Yang N. The effects of social support on sleep quality of medical staff treating patients with coronavirus disease 2019 (COVID-19) in January and February 2020 in China. *Med Sci Monit.* 2020;26:e923549.
22. Edinger JD, Bonnet MH, Bootzin RR, et al; American Academy of Sleep Medicine Work Group. Derivation of research diagnostic criteria for insomnia: report of an American Academy of Sleep Medicine Work Group. *Sleep.* 2004; 27(8):1567–1596.
23. Kroenke K, Spitzer RL, Williams JB. The Patient Health Questionnaire-2: validity of a two-item depression screener. *Med Care.* 2003;41(11):1284–1292.
24. Plummer F, Manea L, Trepel D, McMillan D. Screening for anxiety disorders with the GAD-7 and GAD-2: a systematic review and diagnostic metaanalysis. *Gen Hosp Psychiatry.* 2016;39:24–31.
25. Killgore WDS, Cloonan SA, Taylor EC, Fernandez F, Grandner MA, Dailey NS. Suicidal ideation during the COVID-19 pandemic: the role of insomnia. *Psychiatry Res.* 2020;290:113134.
26. Myllyntausta S, Salo P, Kronholm E, et al. Changes in sleep difficulties during the transition to statutory retirement. *Sleep.* 2018;41(1):zsx182.
27. Hagen EW, Barnet JH, Hale L, Peppard PE. Changes in sleep duration and sleep timing associated with retirement transitions. *Sleep.* 2016;39(3):665–673.
28. Vahtera J, Westerlund H, Hall M, et al. Effect of retirement on sleep disturbances: the GAZEL prospective cohort study. *Sleep.* 2009;32(11):1459–1466.
29. Morin CM, Carrier J, Bastien C, Godbout R; Canadian Sleep and Circadian Network. Sleep and circadian rhythm in response to the COVID-19 pandemic. *Can J Public Health.* 2020;111(5):654–657.

## ACKNOWLEDGMENTS

The authors thank Jessica Burkhalter for her contribution to the preparation of and testing with the Qualtrics survey.

## SUBMISSION & CORRESPONDENCE INFORMATION

**Submitted for publication August 11, 2020**

**Submitted in final revised form November 11, 2020**

**Accepted for publication November 11, 2020**

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## DISCLOSURE STATEMENT

All authors have seen and approved the manuscript. Work for this study was performed at Medical College of Georgia and Augusta University Health. Dr. McCall receives royalties from Wolters Kluwer and research support from Vistagen, Otsuka, Merck, and MECTA. He is a scientific advisor for Jazz, Sage, and Janssen. Other authors declare no conflicts of interest.