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SPECIAL ARTICLES

The COVID-19 pandemic and sleep medicine: a look back and a look ahead

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The coronavirus disease 2019 (COVID-19) pandemic is a reminder that global infectious disease outbreaks are not new and they have the potential to cause catastrophic morbidity and mortality, disrupt health care delivery, demand critical decision making in the absence of scientific certainty, interrupt trainee education, inflict economic damage, and cause a spike in demand for health care services that exceeds societal capacity. In this article, we look back at how the sleep medicine community adapted to challenges imposed by the COVID-19 pandemic. To mitigate viral transmission perhaps the single most effective and efficient adaptation was the rapid adoption of telemedicine. Many additional strategies were taken up virtually overnight, including more home sleep apnea testing, reconsideration of potential risks of positive airway pressure therapy, a reduction or cessation of laboratory services, and deployment of workers to provide frontline care to infected patients. During some periods, critical shortages in essential personal protective equipment, respiratory assist devices, and even oxygen added to logistical challenges, which were exacerbated by persistent financial threats and insufficient staffing. Through ongoing innovation, resiliency, and adaptability, breakthroughs were made in assigning staff responsibilities and designing workflows, using clinical spaces, obtaining legislative support, and achieving professional society collaboration and guidance so that the missions of providing health care, teaching, and academic pursuits could continue. Here we summarize what we have learned through these critical months and highlight key adaptations that deserve to be embraced as we move forward.

Keywords: COVID-19, pandemic, sleep medicine, telemedicine

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INTRODUCTION

Optimizing sleep health is essential,[1] particularly during infectious disease outbreaks such as the coronavirus disease 2019 (COVID-19) pandemic.[2] Healthy sleep promotes a well-modulated immune response to both vaccination and infection.[3]

Large surveys indicate that poor sleep health was experienced by many during the COVID-19 pandemic,[4] including a higher rate (20%–45%) of insomnia symptoms, likely due to adverse mental health effects from living restrictions and stress imposed by the pandemic.[5,6] Among patients who had COVID-19, a retrospective study of electronic health records shows that 5%–10% reported insomnia symptoms.[7] Short sleep duration (less than 6–7 hours a night) and poor sleep quality are also associated with reduced antibody responses to hepatitis B vaccination, which may increase susceptibility to infectious disease.[8]

Patients with sleep disorders may also be at greater risk for severe consequences from infection, independently of the roles of such comorbid illnesses as obesity, diabetes, hypertension, and cardiovascular disease.[9] For example, obstructive sleep apnea may worsen respiratory complications of viral illnesses by exacerbating hypoxia and systemic inflammation,[10,11] while also increasing the likelihood of acute kidney injury in critically ill patients.[12] Insomnia and sleep loss may be factors in long-term complaints of fatigue in those infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus that causes COVID-19[13]; tiredness or fatigue are commonly reported by people with post-COVID conditions that have come to be known as "long COVID."[14] An encouraging finding is that treatment of obstructive sleep apnea may improve outcomes from infection.[15]

These findings underscore the importance of providing ongoing access to sleep medical care despite critical disruptions, in order to promote the overall health, well-being, and safety of our patients. To do this, sleep centers made rapid adaptations in practices to mitigate viral transmission, with telemedicine being at the forefront.[16] Sleep medicine in particular took advantage of the use of telemedicine to maintain access to care during critical times when many other elective services were cancelled or delayed. Sleep testing strategies were adapted to balance the risk of exposure against access to prompt care. In addition, treatment options were scrutinized, due to concern

that positive airway pressure (PAP) therapy is an aerosol-generation procedure, and preprocedure COVID-19 testing, use of personal protective equipment (PPE), and physical distancing were implemented. Challenges borne by sleep centers included limited access to testing and PPE, added costs to implement these strategies, and financial strain from decreased testing volume.

The first portion of this document summarizes the key adaptations that were made by practices, health systems, regulators, and professional societies in clinical, educational, and research arenas, with the chief among them being telemedicine. Based on the knowledge gained, the final portion of this article suggests ways to move forward in the post–COVID-19 era of sleep medicine.

LESSONS LEARNED

Staff

Staff-to-patient ratios were adjusted, schedules modified, and roles redefined to accommodate for the loss of personnel due to reassignment, illness, or resignation. Some of these changes included shifting from night work to day work, which for some staff conflicted with arrangements for childcare. Clinical leadership faced additional responsibilities to address worker shortages, make schedule changes, adapt protocols, and provide staff training to accommodate reassignment and remote services, while navigating inevitable budgetary impacts brought by closures and service reductions. By mid-2020, reports of provider and staff burnout related to the pandemic soared compared with already high, prepandemic levels.[17]

Service interruptions tended to be more common among workers who had a high level of contact with patients; as a result, mask-fitting, in-person education, or other supports that require face-to-face contact occurred less frequently. Provision of telework options as much as possible for clinical care, research, and education was highly valued. Long term, these issues have driven low staffing levels that continue to limit the ability of many sleep labs to return to full capacity.

Equipment

Supply chain delays posed huge barriers to the implementation of mitigation strategies and patient care, particularly during case surges, including shortages in adequate PPE, bacterial viral filters for PAP devices, ventilators, hospital beds, qualified personnel, and in some countries, oxygen. Since little was known initially about transmission routes (ie, contact, droplet, or airborne) and vectors, limiting transmission required a large investment of capital, time and personnel by sleep centers, which undertook a host of responses to mitigate spread in labs and practices.

Space

In the immediate response, many practices erred on the side of caution because of the absence of data to guide decision making. Some of these strategies later proved to be helpful, and others less so. Some facilities resorted to measures such as improving air circulation by using window fans and portable air purifiers that had not been tested against transmission of SARS-CoV-2. Others installed physical barriers and reduced the capacity of patient care areas to allow for physical distancing. Some placed rooms out of service to allow for air turnover; added scheduling gaps; limited visitors, guardians, and caregivers; increased surface cleaning; and modified staff lunchroom and lounge areas. Engineering controls for improving ventilation, new procedures for resting and cleaning home sleep apnea test units, and procedural controls for donning and doffing of PPE all required modification of physical spaces in sleep facilities.

Systems

Federal

Payer, licensing policies (telemedicine). The Centers for Medicare and Medicaid Services issued a new regulation to allow expanded Medicare telehealth coverage starting March 6, 2020.[18] The regulation contained four elements: 1) payment parity between phone, phone/video, or in-person visits; 2) easing of restrictions regarding documentation for the prescription of respiratory-assist devices and for in-person visits to maintain ongoing coverage for devices; 3) allowing reciprocal medical licensure across states, including sleep medicine trainees, to increase access to care; and 4) removal of restrictions on patient location, to mitigate the risk of viral spread by keeping patients at home, in long-term care facilities, or in well-ventilated areas, such as tents, vehicles, or even outdoors. Some patients were residing in distant locations while working from home, so this clause permitted continuity of care. Telehealth expansion also included the lifting of burdens associated with usual regulatory pathways, so that additional, new telehealth services could be made available for patients expeditiously.

These significant expansions resulted in the rapid uptake of telemedicine-based clinical care approaches by sleep medicine practices, as evidenced by a pulse survey conducted by the American Academy of Sleep Medicine (AASM) and a survey from the early months of the pandemic.[19,20] Telemedicine helped to increase the reach of sleep medicine into rural and previously underserved areas. Given the success of telemedicine expansion, both the Senate and the House of Representatives have introduced bipartisan bills for a "Telehealth Modernization Act" that would allow some of these measures to become permanent.[21,22]

Federal approval processes for Emergency Use Authorization. During the pandemic, usual procedures and protocols for obtaining approvals from the US Food and Drug Administration were lifted, which allowed several therapeutics to become available quickly. This included the provision of vaccines under Emergency Use Authorization, antibody infusions, and a host of ventilators and respiratory support devices.[23] An expedited, transparent process helped expand access to life-saving protocols to a large population of patients.

Health systems

Maintain access to care. Prior to the pandemic, with few exceptions, total sleep medicine-related visits included a low

percentage of telemedicine visits. During the initial COVID-19 surge in March 2020, medical triage occurred on multiple levels, including patients themselves choosing which health care problems warranted risking potential exposure to COVID-19. While some sleep centers experienced staffing shortages due to illness, resignation, or deployment elsewhere, others maintained capacity but experienced reduced visit volumes because of lack of awareness among referral sources that telemedicine visits were available, or a focus on more urgent health issues. Sleep center staffing needs and challenges fluctuated widely over time, as the numbers of cases waxed and waned during sequential surges.

Care coordination, integration. The shift to telemedicine and to the use of home sleep apnea tests required care coordination and challenged systems that lacked integration. Telemedicine platforms initially designed to deliver center-to-center telemedicine needed to be adapted to serve the center-to-home or out-of-center models.[24] Often, these legacy systems were simply abandoned in favor of those that were easier for patients to navigate. Initial visits were performed using widely available audio-video communication with less concern for protecting data privacy. As the pandemic lingered, platforms strengthened their data security and became compliant with the Health Insurance Portability and Accountability Act; however, many platforms continued to be challenging for patients lacking technological literacy, including those with cognitive, visual, hearing, or other physical impairments. Those with limited budgets due to baseline poverty or new, COVID-related job loss could not utilize these new care platforms because of a lack of access to the technology.

Integrate information from multiple sources (federal, state, local health department, intramural, and professional society recommendations). During a time when information was lacking or rapidly evolving, individuals sought well-informed guidance, as website traffic and searches indicate. Various sources of information were available with often conflicting recommendations. Sleep professionals looked to their professional organizations as well as public health organizations such as the Centers for Disease Control and Prevention for guidance. Specialty-specific guidance grew along with evidence. Guidance from professional medical societies was available online either as living documents or as information that was published and updated periodically.[25–28]

Address worker health, well-being (infection, burnout, moral injury, physical/mental health). After initially being hailed as heroes, health care workers found themselves working with increasingly more complex patients with fewer resources and rest opportunities. Some clinicians faced the added demands of screening and education related to COVID-19; battled a high prevalence of misinformation; experienced family, self, or coworkers becoming ill; observed preventable loss of life and serious morbidity; or experienced difficulties initiating and/or maintaining sleep.[29] These factors led to a high occurrence of professional burnout and moral injury, posttraumatic stress, and, in some instances, physician and other health care worker suicide.[30,31,32]

Graduate medical education

Rapid switch to virtual learning. While adapting to rapidly changing clinical protocols, sleep medicine fellowship program directors needed to develop new ways to continue sleep education while safeguarding the health of patients and learners.[33,34] Telemedicine was utilized both as a teaching tool, allowing learners to see patients and attend educational sessions remotely, but also as a curriculum subject, as sleep medicine fellows needed to become adept at the remote evaluation of patients. This included specific guidance regarding the physical exam. Many sleep medicine fellowship programs developed educational modules that could be viewed on demand and sometimes shared between institutions and professional societies. The content included classic sleep-specific education but also new, relevant topics related to the technical components of providing a telemedicine visit, navigating software, and conducting a physical exam remotely.

Other unique challenges for trainees. Some centers required that all trainee-patient encounters occur in person, due to lack of reimbursement for virtual visits by trainees. Some trainees, particularly those in adult sleep medicine tracks, were also asked to cover pandemic-related clinical needs. This burden could be substantial, including the following: demands on time; need for medical expertise in less familiar subjects, in new environments or with unfamiliar staff; witnessing a high level of morbidity and mortality related to the pandemic; concerns about infection in self or others; financial worries including disability coverage; meeting competency requirements in sleep medicine; and concerns about managing childcare when schools and other childcare services were closed or curtailed.

Sleep medicine fellows, especially those who recently completed training in pulmonary or internal medicine programs, entered fellowship programs after having navigated the first few, often highly stressful surges of COVID. The letdown in "acute stress reaction" while transitioning to sleep medicine may add to the challenges faced by this cohort.[35]

Modification of competency assessments. Given that sleep medicine fellowships typically last for only 12 months, training programs faced the challenge of providing adequate training and supervision in a setting in which resources were under heavy strain, including faculty, availability of patients and sleep studies, as well as budgets. A modification of assessment of trainees, from patient metrics to a competency-based system,[36] allowed advanced learners to complete training on time and also be available for covering other patient care areas, such as COVID-19 outpatient facilities, wards, and intensive care units.

Academic/research

Identification of topic areas (relation between sleep and infectious disease, effectiveness of telemedicine, health care disparities). Major gaps in health care outcomes and disparities became obvious with some of the most vulnerable patients (eg, elderly, impaired or disabled, pediatric, low socioeconomic status, rural). Special considerations needed to be made for specific populations. Remote care strategies such as

telemedicine, home sleep apnea tests, empiric PAP use and other adaptations were far less common in pediatric practices prior to the pandemic; all are understudied and some are specifically not recommended in current clinical guidance. These factors, plus unique elements of pediatric sleep care—such as whether and how to test for COVID-19 among adults accompanying minors in the sleep lab, whether to permit adult caregiver use of PAP during overnight studies, and other safety and urgency concerns among pediatric patients—remain to be investigated.[37]

Maintenance of pipeline of medical scientist trainees. Building a body of research as well as a pipeline of interdisciplinary investigators who hail from various specialties, including infectious disease, immunology, pulmonary/critical care, psychiatry, neurology, and others, could prove to be worth the return on investment. For this goal to be realized, novel pathways should be considered to shorten the length of time required to complete training; 2 such pathways already exist.[38]

Professional societies

Many professional societies collaborated to share experiences and expertise. This resulted in several multidisciplinary meetings and publications among different professional societies, all sharing a common goal of understanding COVID-19 and mitigation strategies. The AASM developed guidance in the form of living documents updated on a regular basis on the AASM website, accessible to members and the public.[39] The AASM created a COVID-19 Task Force to keep abreast of new information and then disseminate this information to AASM members as well as members of other professional societies and the public via webinars, email communication, and website updates. Collaboration became the norm as clinicians in differing but overlapping fields searched for guidance.

SUMMARY AND RECOMMENDATIONS

We have learned many valuable lessons since March 2020, which should inform future investment.[40–42] First and foremost, telemedicine proved to be an efficient mechanism to improve access to care while keeping patients and clinicians at home, limiting crowding and avoidable contact. Health care organizations and legislators must support ongoing reimbursement for telemedicine services. The components of Centers for Medicare and Medicaid Services regulation offered at the time of the public health emergency are crucial. These include expanded eligibility for services, payment parity, expansion of interstate licensure, promoting "hospitals without walls" by allowing care to arise from non–health care settings (such as homes), and importantly, the suspension of burdensome documentation, which contributes to work hours and adds to burnout.[43]

Second, given that the forecast for the future of the sleep medicine specialty includes a shortage of qualified professionals (particularly polysomnographic technologists), ensuring workers' health and well-being should be a priority for individuals and institutions, with particular attention to preventing infection, burnout, and moral injury[44,45]; evaluating the roles of sleep disruption, sleep deprivation, and circadian misalignment in physician well-being and burnout[46]; supporting childcare options; and addressing physical and mental well-being. Administrators should be attentive to space needs and ventilation while promoting distancing so that office space can continue to be used when needed, without conferring additional risk on workers or patients. Integration and coordination of efforts, and sharing of information across societies and organizations, can improve efficiency.

Third, more focus is required to address the disparities in care resulting from a variety of factors, which were made more evident over the course of the pandemic. Economic, geographic, contextual, occupational, and other factors may contribute to disparities that health care systems—and the field of sleep medicine—have addressed only incompletely.[47] Risk factors include reduced access due to barriers involving internet availability, socioeconomics, transportation, and trust and engagement. Disparities also occur in medically vulnerable groups such as children, older adults, and those with multiple medical problems, disabilities or high-acuity needs. Few evidence-based guidelines for alternatives to in-person and in-lab testing and care are available,[48–50] which may impede access to needed sleep medicine services, particularly for pediatric patients.

Fourth, equipment manufacturers should partner with clinicians and patients to provide the next generation of devices that are optimized for telehealth, including wireless modems and bidirectional cloud-based computing/monitoring, simplifying use, accessibility, affordability, and safety. In addition, during a supply chain crisis, the manufacturing of PAP machines, mechanical ventilators, and other life-sustaining medical devices should be prioritized by the federal government to protect the health of Americans who have chronic diseases and to provide urgent care for those who experience immediate need. Prompt action and preparedness are key, so that optimal patient-related outcomes and clinician well-being are prioritized.

Finally, guidance from professional societies helped disseminate knowledge and experience garnered by communities that were impacted early to those that were affected later. Moving forward, the strategy of using "living" documents such as the AASM's guidance, along with publications provided by other societies, will continue to be of value. The sleep medicine workforce proved itself to be resilient, innovative, and intent on strong global cooperation and information-sharing. The breakthroughs that were made in care delivery and knowledge continue to improve our patients' symptoms, performance, and safety in homes, workplaces, and on roads. Leveraging this knowledge in the future is not optional. It is imperative.

ABBREVIATIONS

AASM, American Academy of Sleep Medicine
COVID-19, coronavirus disease 2019
PAP, positive airway pressure
PPE, personal protective equipment

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