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**Insights into Occupational Health and Environmental Medicine during COVID-19 Pandemic**

**Abstract:**

Occupational health has an important role in protecting the health care workers (HCWs) in the health care set up to ensure better continuity of health care services. The non-healthcare workplaces, including organizations, businesses, firms, and enterprises, also hold the responsibility for protecting their respective workers' health and safety, thus paying a significant role in regulating the community's overall health status.  Environmental medicine deals with the work environment, which is a critical factor for both health and disease. The border closures with lock-downs amidst the pandemic as a mitigating measure have led to significant air pollution reductions via decreased travel and production-expenditure ratio. All of these positive environmental effects might be temporary. Still, they can serve as an example that could change the way of human life. Thus, acknowledging the occupational health and environmental perspective of COVID-19 must be better understood and well addressed for human beings' better future.

**Keywords:** COVID-19, Environmental medicine, Occupational health, Workplace

**Introduction:**

Occupational and environmental medicine (OEM) physicians have recognized the need to prevent or reduce health consequences due to workplace and hazardous environmental exposures and coordinate practices to enhance the workplace and environmental health [1]. Occupational medicine is unique in its way as it deals with workplace and health, which involve discrete patient care and a population-based health approach in all aspects of worker's health and the workplace. In the Present world, OEM covers workers' well-being, environmental issues, and disease prevention, along with occupational injury and illness care [2].

The constant development of recent infectious, chemical and environmental hazards, development of industries and technology leading to pollution, climate change, and other events leading to drastic changes in environment and increase in workplace health hazards have increased the demand for trained OEM physicians. OEM physicians play a vital role during the challenges like the COVID-19 pandemic [3]. The specialty keeps rising with the latest need; it continues to be the leader of the worker's health and the environment. OEM practice could continue to widen its scope in COVID-19 prevention during this pandemic time besides continuing its role in injured workers' care.

**OCCUPATIONAL HEALTH**

***Physical Health***

COVID-19 should be considered to be a new work-related disease, at least in the case of healthcare workers and other front-line workers. The pandemic poses a wide array of physical health concerns when it comes to front-line workers. They risk exposure to heavy viral load daily. The methods of protection opted for brings with the safety of many inconveniences. The N95 respirators impede effective communication [4].

Moreover, the multiple layers of the PPE can lead to discomfort secondary to pressure, heat, and sweating. Headache, itching, burning eyes, nausea, and dizziness can also accompany. There is a multi-fold increase in dermatological diseases such as xerosis and eczemaamong the healthcare workers due to the PPEs [5].

The long hours of shifts lead to physical exhaustion and aggravate sleep disorders [6]. The front-line workers, especially the doctors and nurses on-call, must push through the long hours without doffing their PPEs- without food, water, or restroom breaks. This highly compensates for their health, predisposing to fatigue, physical burnout, dampened cognition, and urinary tract infections. Apart from increasing the risk of exposure to those working, the sector under lock-down at home face a hugely different palette of physical health issues. With the home being the new workplace, the new 'work-from-home system' is to be analysed and improved to accommodate the worker's well-being Office workers under lock-down are shown to have a drastic increase in their daily screen time [7].

This can lead to detrimental changes in their sleep pattern and quality. Shifts in the chronotype of people working from home are also observed, with the workers tending to sleep later than when they used to, before lock-down. Sleep duration is also seen to reduce among office workers. Decreased exposure to natural light, altered 'anchor sleep and the markedly diminished external cues uproot humans' control on their sleep/wake and other circadian rhythms [8]. The incidence of metabolic disorders, hypertension, and gastrointestinal disturbancessecondary to obesity, immobility, and poor eating habits are expected to increase.

***Mental Health***

Mental health disturbances are especially pronounced in office workers, those previously in field jobs, those now being confined after leading an active life. Deprived of their regular social interactions and physical exertions tend to build anxiety and psychological stress that could eventually lead to depression. The prevailing ambiguities around the unknown pandemic, coupled with the paranoia associated with the confinement and the resulting loss of social associations and freedom, muster a shade of mass hysteria [9], develop into what can be called the 'fear pandemic.'

Accessing information is of importance and, in many situations, a distraction from the pandemic's stressors. With social media being a primary informative tool, the exposure to social media is observed to be on the rise exponentially during the pandemic, so are the negative effects that accompany, including but not limited to, psychological distress, anxiety, and depression. With widespread misinformation and information overload [10], communication via social media often tends to be risky [11] than informative and helpful. The sheer volume of information, coupled with the prevalence of mass speculation and misinformation, renders the public with no apparent trustable source of information and hence, in the perception of a loss of control in life.

The fear of unemployment and the resulting financial strain [12] has been shown to contribute substantially to the psychological stress of the workers' experience. Some of the cardinal detrimental effects of the change in the workplace environment and the confinement include Obsessive-compulsive traits, Addictive behaviours,deliberate self-harm,and suicidal thoughts [13]. All of the factors mentioned above and effects also take a toll on the worker's performance at work, posing loss at the commercial front and, eventually, the economy.

The front-line workers and other sectors of workers venturing out doubtlessly face multiple facets of the pandemic and endure various types of hardships. The constant risk of heavy exposure and the fear of infecting their loved one’s seed in them an unshakable sense of vulnerability [14]. The lack of preparedness, formal training on the control measures,and the absolute panic that the healthcare workers, especially the junior resident doctors, have to endure almost every day have devastating impacts on their mental health [15].

The job satisfaction of front-line workers also seems to dwindle [26]. During a crisis, such as a pandemic, job satisfaction depends heavily on the effectiveness of control strategies and prevention measures [16]. With the lack of a standard treatment regimen, proven vaccine, and several undetermined factors associated with the virus, the front-line workers tend to suffer an unbridled work-life, plummeting their job satisfaction. Doctors, especially in India, face an absurd lack of support from society, evident from the assaults on doctorsand eviction of resident physicians from their homes [17, 18]. The lack of sufficient resources, such as PPEs and other hygiene supplements, makes the situation much worse at the workplace [19].

The vicarious traumatization, augmented by the frequent emotional breakdowns,leads to burnout among the front-line workers [20]. Many studies have shown the workers exhibiting PTSD symptoms [21]. There is an undeniable need for immediate mental and behavioural health interventions, especially among the front-line workers. Proper psychological well-being is crucial for the front-line workers during this pandemic [22].

***Return to Work***

With COVID-19 being established as a new workplace hazard, special return-to-work measures must be taken to ensure a safe work environment. This is especially beneficial for those workers who have recovered from the pandemic. The workers go through a lot, from adjusting to the new training and regulations to facing restrictions in their social life from working. The social stigma linked with the pandemic changes their paradigm of social interactions and relationships [23].

***Decontamination of Workplace***

One of the commonest situations expected at the workplace would be the process of decontaminating the area an infected individual had been used. According to the CDC, if the exposure occurred more than 7 days earlier, there is no need for additional disinfection and deep cleaning [24]. However, common cleaning at the workplace is to be reinforced and followed meticulously. If the exposed area is secluded/restrictable, then the company could proceed operating while closing off that specific area. It is known that common disinfectants such as sodium hypochlorite, household bleach (diluted; 1:9 water), and Ethanol (70%) used for one minute is efficacious. The cleaning staff must wear PPEs during the cleaning process [25].

***Transmission Control***

Following decontamination, the workplace is made safe for the workers. Now, the working structure and policies are to be changed to accommodate the peculiar circumstance and several other factors from the employee's front to prevent workplace transmission. Occupational health and safety guidelines specific to the particular organization/field of work should be framed and implemented. Depending on the workplace's nature, the employers should prioritize the working fraction [26] employ only the essential staff to work onsite while encouraging others to work remotely, wherever possible. The organization should ensure the availability of PPEs for the workers. The job should be made flexible to take in all the workers' requirements, especially engaging the needs of disadvantaged workers, as they tend to have a higher risk of contact due to non-work-related factors [27].

The working population can be split into individual working groups that report in shifts to reduce the time of exposure and to reduce physical burnout among the employees. Immediate supervisors play a major role in inculcating awareness among the workers and frame policies to enhance workplace efficacy and safety [28]. Regular drills on the revamped work environment guidelines and new safety standards are to be held frequently to fix the workers' new normalcy.

***Monitoring and control***

Once the new normal work environment is introduced, regular monitoring is needed to keep the system in place. The employees must be screened regularly for significant body temperature changes and other characteristic symptoms of the COVID-19 infection. The screening can be done before any official gatherings, such as meetings and assembly, apart from the regular screening done at the office/factory entrance. Those with symptoms suggestive of COVID-19 or any other infective disease should be restricted from the campus and hence, from the rest of the employees. Systematic sessions on interpersonal and workplace hygiene should be conducted. Strict workplace distancing rules must be employed and frequently improvised. It is advised to prohibit team events such as recreational trips and hobby gatherings [29].

***Occupational Rehabilitation/ Therapy***

Owing to the pandemic, multiple jobs are curbed, countless employees are losing their employment. Occupational rehabilitation and occupational therapy deal with rehabilitative care for occupational injuries and, in general, deals with nursing the worker back to health. Occupational therapy, in today's situation, can help circumvent unemployment on a larger scale. It can help workers re-engage in various occupations [30]. The interventions indirectly aim to unlock the lock-down occupations, thereby helping people engage in consequential occupations. Occupational therapy plays a pivotal role in implementing public health programs for behaviour change and dampens the pandemic's spread [31].

***Environmental Impact***

Tackling a pandemic isn't limited to struggles at an interpersonal or societal level. It involves a global effort involving various elements of the environment and undoubtedly, with global consequences. Through various interventions, it has been established that while certain aspects of the pandemic have a detrimental effect on the environment, there are several positive, rather healing processes witnessed.

***The pandemic and Medical waste***

With the colossal increase in the healthcare sector's demand and functioning, the medical waste generated is skyrocketing, not to forget the PPEs used by the general public daily. These medical wastes, especially the PPEs, are composed mostly of non-biodegradable polymers. Even with proper, planned disposal, the mere quantity of the waste leads to environmental pollution. The health impact of the contaminated medical wastes is more pronounced among the ancillary service providers like the Hospital maintenance staff -cleaners, trash collectors, etc.; they become increasingly vulnerable to COVID-19 and other communicable diseases. The PPEs, especially the masks and gloves, are consumed by animals while disposed of in water, posing a grievous threat to their lives [32]. With innovations centred around biodegradable medical suppliesto deviceful methods of disposal, the above-discussed limitations can be overcome [33]. Society, including the healthcare workers, should be well educated on the efficient usage and proper disposal of the PPEs and other medical equipment types.

***Lockdown and the Environment***

Overall, a lot of positive impacts on the environment have been observed during the COVID-19 pandemic. Lockdown can be said to be the major contributor to these impacts. COVID-19 transmission is promoted by air pollution. Particulate matter, known to be a good carrier of the virus, is seen to increase the COVID-19 contagion. It is observed to widen the transmission of the virus particle beyond 2 meters. Indian cities such as Mumbai and Delhi have experienced a huge reduction in PM 2.5 levels, from 60% to 34% [34]. Another major contributor to air pollution is NO2. Many rather populated countries under lock-down (Rome, Madrid, and Milan) have been found to have NO2 decreased by nearly 45%. At the same time, Paris shows a striking reduction of 54%. Carbon emissions are majorly due to fossil fuel consumption by industrial and automobile traffic [35]. With lock-down cutting these major contributors, the amount of carbon emitted into the atmosphere plummet.

With a significant reduction in industrial effluent discharge, restricted water-based activities and the water bodies have been found to improve in quality. Observable improvements are seen in India's holy river, the Ganges, which is also one of the most polluted water bodies [36]. The decrease in water- based activities lead to rivers settling in their river basins. This, in India, is seen as the bank of 'Sangam' at the confluence of the rivers Yamuna and Ganga being seen once again [37].

A significant cutback in noise pollution is also observed during the lock-down. Reduction in the automobile- associated noise pollution, along with restricted social gatherings and Industrial noises, can be attributed to this observation. Delhi's residential areas are shown to have much-reduced noise levels (30-40 dB) compared to the usual levels (around 50 dB) [38]. The reduction in noise pollution also helps strengthen the fauna; reducing underwater noise pollution improves marine health [39], similar to reducing industrial and vehicular noise pollution, making life much better for the land animals.

**Conclusion:**

Alongside the exposure to the virus, the healthcare workers (HCW's) experience fatigue, burnout, stigma, and a need to protect them from all the concerns affecting them for better healthcare delivery. Fear of job losses or loss of income of various companies and departments must be well addressed to prevent economic fallout and further damage to those families and communities. The occupational health departments and companies can also play a significant role in mitigating the pandemic response nationally and internationally in managing the concerns among workers with their care and attention.

The current global health catastrophe calls attention towards the long-term global environmental and climate changes that may raise the [risk of emergence or re-emergence of infectious disease and pandemics](https://www.hsph.harvard.edu/c-change/news/coronavirus-climate-change-and-the-environment/) in the upcoming future. All the international governments and authorities must actively respond to the COVID-19 crisis, concurrently use these circumstances to better understand how the environmental threats can interact with global health security and how the world can recover from this COVID-19 crisis in ways that enhance global environmental health.

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