

# Occupational Health and Safety Practices at Workplace during COVID-19 Pandemic

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## Abstract:

Coronavirus Disease 2019 (COVID-19) a highly contagious viral respiratory disease has been declared as pandemic due to its global spread across most countries. Social isolation (i.e. physical distancing) and strict embracement of personal hygiene are few demonstrated preventive methods of COVID-19 transmission. All countries, based on the recommendations of World Health Organization (WHO), have adopted lockdown strategy (promoting physical distancing) to prevent COVID-19 transmission in the community including workplaces. In the interest of economic sustenance, many countries have partially relaxed the lockdown policies, to resume selective functioning of factories / organizations / institutes / workplaces. However, in the absence of appropriate occupational health and safety policies, workplaces are a potential threat for COVID-19 transmission & outbreak. The following document reviews the conventional hierarchy of occupational safety and health control measures (i.e. engineering controls, administrative controls and PPE), necessary to prevent COVID-19 outbreaks at workplace, based on the current scientific evidences on COVID-19.

**Key words:** COVID-19, Occupational safety and health, Hierarchy of occupational controls

## COVID - 19:

Coronavirus Disease 2019 (COVID-19) is primarily a respiratory disease caused by SARS-CoV-2 (Severe Acute Respiratory Syndrome - Corona Virus strain 2). Ever since the declaration of COVID-19 as global pandemic on March 12, 2020,<sup>[1]</sup> countries globally have resorted to multiple preventive measures to mitigate the transmission of this highly contagious SARS-CoV-2. Lockdown is one such major measure adopted to minimize the inter-human social / physical contact in addition to buy time for better management of the illness (develop vaccines, identify effective molecules to treat COVID-19).<sup>[2]</sup> This has minimized travel, trade, production, tourism, food supplies, and financial markets<sup>[2]</sup>. The lockdown in addition to reducing COVID-19 mortality and healthcare demand is perhaps an interim resort to slow transmission of COVID-19, and conceive definite plans to control the contagion.<sup>[3]</sup> Reopening the lockdown could be a potential threat for resurgence of the epidemic, particularly at the workplace.<sup>[2]</sup> Hence, it is essential to strictly consider the occupational safety measures to prevent COVID-19 outbreak / transmission at workplaces.

The occupational safety and health practices should be customized to prevent / reduce the transmission / outbreaks (of COVID-19) at the workplaces. The employer should seriously consider the specific exposure risks, sources of exposure, routes of transmission, and other unique characteristics of SARS-CoV-2, while adopting the preventive measures. Precarious resumption of work without appropriate planning and measures can result in a cascade of failures / catastrophe.<sup>[2],[4]</sup> Hence the employer should attempt to address the challenges of COVID-19 with sufficient resources and trained workers to optimally perform during this pandemic situation. The current article discusses the COVID-19 planning for occupational health and safety of workers, based on current understanding of COVID-19 transmission and conventional infection preventive industrial hygiene practices.

## Epidemiology of COVID-19

All individuals irrespective of age, sex and socio-economic status are vulnerable to COVID-19 infection. However, only a proportion of them exhibit flu-like symptoms, ranging from fever, upper respiratory tract infection and lower respiratory tract infection, gastro-intestinal symptoms with varying

severity etc. Individuals with comorbidities such as immunocompromised state, uncontrolled diabetes, persons with malignancy, subnormal renal function etc. are highly susceptible and exhibit high fatality rate.<sup>[5]</sup> Further, susceptible individuals on acquiring infection are likely to develop symptoms within the longest incubation period (i.e. 2 weeks from the day of contracting the infection, 95% confidence interval 9.2 – 18 days)<sup>[6]</sup>. Hence, the COVID-19 suspected individuals are quarantined or (observed) during the incubation period to confirm the status of illness (negative / positive) of the individual. While a substantial proportion of infected individuals remain asymptomatic / recover uneventfully<sup>[7]</sup>.

Environmental factors such as temperature, humidity, contact surface and many others could potentially influence the survival and transmission of SARS-CoV-2.<sup>[8]</sup> A unit degree Celsius rise in temperature and unit percentage increase in relative humidity would reduce the reproduction number (R0) of SARS-CoV-2 by 0.0225 & 0.0158 respectively.<sup>[9]</sup> No virus could be detected after 5 minutes at 95°C temperatures. The SARS-CoV-2, under controlled conditions (22°C & 65% humidity) has been demonstrated on plastic and steel surfaces even after 72 hours, although the number of viral particles substantially reduced after 4 hours, while particles are undetected on cardboard and copper surfaces after 4 & 24 hours respectively.<sup>[10,11]</sup> Further the virus were undetected respectively after 3 hours, 4 days, 7 days on printing / tissues papers, glass / currency notes and stainless steel / plastic surfaces under controlled conditions (22°C & 65% humidity).<sup>[12]</sup> Hence the ambient conditions should be considered in the occupational safety and health of the workers.

Disinfectants such as 1% & 2% household bleach (hypochlorite solution), 70% ethanol / isopropanol were effective virucidal agents, as no virus were detected after 5 minutes of virus inoculation under controlled conditions (22°C & 65% humidity). Other disinfectants with similar potency are 7.5% Povidone iodine, 0.05% chloroxylenol, 0.05% chlorhexidine, 0.5% hydrogen peroxide & 0.1% Benzalkonium Chloride.<sup>[12,13]</sup>

### Transmission of COVID-19

The basic reproduction number (R0) for COVID-19 ranges from 2 - 4, i.e. an infected individual is directly responsible to generate (on an average) 2 -4 new cases.<sup>[8]</sup> COVID-19 is commonly transmitted by closely contacting (2 meters or less) an infected individual. Further, the risk increases with the duration of time spent in close contact with the infected individual.

Aerosols produced by the cough / sneeze of an infected individual, by far is the common source of transmission<sup>[2]</sup>. Though SARS-Cov-2 virus is reported in other biological fluids such as blood, stool and lacrimal secretions, the transmission via these fluids is rarely reported.<sup>[14]</sup>

### There are two main known routes COVID-19 transmission:

- Direct: Close contacts (within 2 meters) directly inhale the SARS-Cov-2 contaminated aerosols / droplets.
- Indirect: By contacting the fomites (e.g. door knob, table, chair contaminated with respiratory secretions of the infected individual) or hand of the infected individual and then precariously touching one's own mouth, nose, or eyes.

### Implementation of workplace controls

The "Hierarchy of controls" adopted by the occupational safety and health professionals to control workplace hazards may as well be customized and adopted to control COVID-19 transmission at workplaces.<sup>[15]</sup> The efficient way to control an occupational hazard is to systematically remove (eliminate) it from the workplace. However, an occupational hazard (such as COVID-19), where elimination is impossible, the most effective protection measures are (listed in the hierarchy of effectiveness): engineering controls, administrative controls (including safe work practices), and personal protective equipment (PPE).<sup>[15]</sup> Each of these control measures has its merits and limitations when considering the ease of implementation, effectiveness and cost.<sup>[15]</sup> As in controlling other occupational hazards, a combination of control measures is necessary to protect workers from SARS-CoV-2.

#### Engineering Controls :

Engineering controls involve isolating employees from work related hazards; specific engineering controls for SARS-CoV-2 include:

- Improving ventilation at the workplace by installing high-efficiency air filters, negative pressure ventilation, in special settings involved in aerosol generating procedures.<sup>[16-19]</sup>
- Reducing the contact between workers by installing physical barriers, such as clear plastic sneeze guards and installing a drive-through window for customer service.<sup>[20-22]</sup>

#### Administrative Controls :

Administrative controls require action by the worker or employer. The administrative controls for SARS-CoV-2 are listed below (but not restricted to). The listed administrative control measures may be customized as per the requirement of workplace:

- The employer should ensure the physical fitness of every employee while reopening / permitting the employee at the workplace.
- The employer should brief the workers, contractors and customers that anyone with sickness, even a mild cough or low-grade fever (37.3°C or more), should refrain themselves from attending work / visiting workplace. The administration should record temperature of every employee / individual visiting workplace using a validated thermal temperature scanner.

- The employer should encourage remote (teleworking) working and flexible work hours to encourage social distancing at the workplace. Thereby minimizing the contact among workers, clients, and customers.
- Working in shifts / alternate days: The employer should establish alternating working days' protocol or extra shifts, thereby a particular employee would work on alternate days. Hence the total number of employees in a facility at a given time would be reduced, allowing them to maintain distance from one another while maintaining a full onsite work week. Further, the division of workforce into such groups (based on shifts / working days) would reduce the chances of transmitting SARS-CoV-2 among the various groups. Even during an untoward situation, where a particular group had to be isolated, the other group would be entirely available for continuation of the work.
- The working hours may be staggered, such as to maintain social distancing (avoid crowding) during entry and exit hours.
- The Employer should discourage the employees / workers from unnecessarily travelling to locations with known COVID-19 outbreaks.
- The employer should regularly train and sensitize the workers on COVID-19 risk factors and protective measures.
- The employer should provide mandatory training to workers on adherence to the respiratory etiquettes, including covering face while coughing and sneezing (not directly using palms), washing hands with soap and water immediately after sneeze or cough, and strict adherence to 'no spitting' at common places.
- The employer should train the workers requiring usage of protective clothing and equipments and its safe discard. The training materials should be comprehensible irrespective of language, culture and literacy of the workers.
- The employer should maintain regular housekeeping practices, for mandatory cleaning and disinfecting of the surfaces, equipments, and other elements of the work environment between shifts. Currently 70% alcohol / 1% hypochlorite / phenolic disinfectants are recommended as effective sterilization of SARS-Cov-2 virus. However, while choosing alternate cleaning chemicals, employers should consult information on Environmental Protection Agency (EPA)-approved disinfectant labels with claims against SARS-CoV-2 virus (emerging viral pathogens). Further, the employers would have to follow the manufacturer's instructions for use of all cleaning and disinfection products (e.g., concentration, application method and contact time, PPE).<sup>[23]</sup>
- The employer should discourage the workers from sharing phones, desks, offices, or other work tools and equipment, when possible. Encourage a single person to

handle (contact / touch) a tool / machine / surface where possible and sterilize the surface with 70% alcohol / 1% hypochlorite / phenolic based sanitizers before another individual contacts the same surface.<sup>[24]</sup>

- The employer should provide resources to promote personal hygiene at the work places, such as soap and water and alcohol-based hand rubs at multiple locations of the workplace.
- Currently there is no evidence on the efficiency of disinfection tunnel or prophylactic medications (to prevent COVID-19), hence current document doesn't recommend the practice.
- The employer should ensure the COVID negative status of the worker (while resuming to work after recovery from COVID-19) by either industrial / factory medical officer or local health authority
- The employer should provide adequate safe and hygienic drinking water at the workplace

#### Safe Work Practices

Safe work practices are types of administrative controls that include to reduce the duration, frequency, or intensity of exposure to a hazard. Examples of safe work practices for SARS-CoV-2 include:

- Instruct workers (including customers, worksite visitors) to frequently and thoroughly wash their hands, using soap and water for at least 20 seconds or with an alcohol-based hand sanitizer that contains at least 70% alcohol.<sup>[24]</sup>
- All employees should be instructed not to touch any part of their faces during work, and thoroughly wash their hands with soap before touching face.<sup>[24]</sup>

#### Routine environmental cleaning:

- All frequently touched surfaces of the workplace, such as workstations, countertops, and door handles should be regularly sanitized. Reagents such as 70% alcohol / 1% hypochlorite / phenolic disinfectants/ other specific reagents as recommended by the label (manufacturer of the instrument / equipment), should be used to sanitize the surfaces.
- Every employee should sanitize the surface of equipment / tool / workplace & hands before and after the work.

#### Policies for suspected / confirmed COVID-19 positive worker

The employer should draft policies and procedures for prompt identification and isolation of sick people at the workplace,

- The policy should consider prompt identification and isolation of potentially infectious individuals to protect the workers, customers, visitors, and others at the worksite.
- Employers should train (sensitize) the employees to self-monitor for signs and symptoms of COVID-19 if they suspect possible exposure.

- The policy should include procedures / facilities to immediately isolate the people with signs and/or symptoms of COVID-19 (flu-like symptoms). Essentially move the potentially infectious worker to a location away from other workers, customers, and visitors.
- There should be strict restriction of other workers entering the isolation areas or coming in close contact with the sick worker.
- The incident should be immediately communicated to the local public health service for further necessary actions.
- Individuals recovered from confirmed COVID-19 should be ensured free from illness as per the local health guidelines.

#### Special considerations

- Industries involving chemicals and heavy metals: The workers should strictly avoid alcohol / hypochlorite based sanitizers as these compounds could potentially facilitate the dermal absorption of the hazard chemicals / heavy metals or form compounds leading to hazardous effects.<sup>[25, 26]</sup> Hence these workers should use only soap and water for personal hygiene.
- Canteen: The workers should be instructed to use canteen / lunch lounge facility in small groups in strict designated scheduled time in staggered manner. The number of people using the facility at any given time may be decided on the capacity of the canteen / lounge, such that social distancing is maintained (approximately 22 meters / person). There should be interval between the 2 different groups using the canteen and the canteen tables and chairs should be sanitized during this interval. All employees should be encouraged to bring their own food to avoid fomite (indirect) transmission.
- Common toilets have the potential to transfer COVID-19 among the workers[27], hence the workers should avoid unnecessary touching of the surfaces in toilets. All employees should adhere to personal hygiene before and after usage of toilets, respiratory etiquettes and absolutely refraining from smoking, chewing tobacco and etc. within toilets. The toilets should be regularly cleaned, disinfected and well ventilated. Workers should be instructed to avoid crowding around the urinals / toilets.

#### Personal Protective Equipment (PPE)

While engineering and administrative controls are considered more effective in minimizing exposure to SARS-CoV-2, PPE may also be needed to prevent certain exposures. Examples of PPE include: gloves, goggles, face shields, face masks, and respiratory protection, when appropriate. The best way to reduce any risk of infection is good hygiene and avoiding close contact (closer than 2 meters) with any potentially infected person.

#### Guidance on facemasks

Face masks may be considered when working in closed spaces with other persons / co-workers. Face masks should

only be considered as a complementary measure and not a replacement for established preventive practices, such as physical distancing, cough and respiratory etiquette and personal hygiene. Following guidelines should be noted while wearing face masks

- The mask should entirely cover the face from bridge of nose to chin.
- Face masks to be worn with clean and washed hands
- Avoid touching it repeatedly and if needed one should touch the cord or elastic at the back of the face mask even while removing it.
- Disposable face masks should be disposed of in a hygienic manner.
- Reusable masks are encouraged to avoid environmental contamination, reusable masks should be washed with detergent at 60°C, immediately after removing (using it).

#### Classifying of the occupational (SARS-CoV-2) risk<sup>[28]</sup>

Occupational Safety and Health Administration (OSHA) has classified the occupational risk of contracting SARS-CoV-2 virus at the workplace during an outbreak, as “very high”, “high”, “medium”, or “lower” (caution). The classification of risk is based on the need to contact the COVID-19 confirmed / suspected person within a distance of 2 meters and for extended duration (or multiple contacts). Majority of the workplaces commonly encountered by general public would qualify between lower (caution) to medium exposure risk.

Very high risk jobs: The workers have very high potential for close exposure (< 2m) to known or suspected sources / cases of COVID-19. Workers in this category include:

- Healthcare workers (e.g., doctors, nurses, etc.) performing aerosol-generating procedures (e.g., intubation, cough induction procedures, bronchoscopies, some dental procedures and exams, or invasive specimen collection) on known or suspected COVID-19 patients.
- Healthcare or laboratory personnel collecting or handling specimens from known or suspected COVID-19 patients (e.g., manipulating cultures from known or suspected COVID-19 patients).
- Workers performing autopsies, which generally involve aerosol-generating procedures, on the bodies of people who are known to have, or suspected of having, COVID-19 at the time of their death.

High risk jobs: The workers have high potential for exposure to known or suspected sources of COVID-19. Workers in this category include:

- Healthcare delivery and support staff (e.g., doctors, nurses, and other hospital staff who must enter patients' rooms) exposed to known or suspected COVID-19 patients. (Note: when such workers perform aerosol-generating procedures, their exposure risk level becomes very high.)

- Medical transport workers (e.g., ambulance vehicle operators) moving known or suspected COVID-19 patients in enclosed vehicles.
- Mortuary workers involved in preparing (e.g., for burial or cremation) the bodies of people who are known to have, or suspected of having, COVID-19 at the time of their death.

**Medium exposure risk:** Workers frequently and/ or in close contact with (i.e., within 6 feet of) people who may be infected with SARS-CoV-2, but who are not known or suspected COVID-19 patients. In areas without ongoing community transmission, workers in this risk group may have frequent contact with travelers returning from locations with widespread COVID-19 transmission. In areas where there is ongoing community transmission, workers in this category may have contact with the general public (e.g., schools, high-population-density work environments, some high-volume retail settings).

**Lower exposure risk (caution):** Workers involved with machinery tools / computers and do not come in contact with people known to be, or suspected of being, infected with SARS-CoV-2 nor frequent close contact with (i.e., within 6 feet of) the general public. Workers in this category have minimal occupational contact with the public and other co-workers.

#### Conclusion:

In the absence of a suitable vaccine or effective molecules (drugs) against COVID 19, adherence to the preventive strategies is the best option to avoid/reduce the transmission. Further, until effective vaccines and treatment molecules are available, workers being in constant contact with co-workers and non-workers are at risk transmitting / acquiring COVID-19 at workplace. Therefore, occupational safety and preventive health strategies should be strictly adhered at workplaces to prevent COVID-19 outbreaks.

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