

HOW TO REDUCE CORONA SPREAD

Original Research

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The novel coronavirus SARS-CoV-2 can survive in the air for several hours in fine particles known as aerosols, according to preliminary research. The coronavirus, which causes the respiratory infection COVID-19, can be detected up to 3 hours after aerosolization and can infect cells throughout that time period.

We hypothesize that a large proportion of the virion particles which pose the risk of spreading the infection (both within an individual and to others), are present in the air within a patient's lungs, and could potentially be removed via exhalation or vacuum suction and passing this exhale air through hypochlorite solution will reduce the viral load from environment. Decreasing the viral load even by a small fraction might bring the level of immune response back into the regime where the body's immune system is able to effectively stop the infection. In addition to this a negative pressure in examination chamber and ICU, HDU and in emergency ward, private rooms will further reduce the viral load.

A negative pressure environment would do a lot to prevent particles from settling onto horizontal surfaces in the first place (though a horizontal projectile landing on a vertical surface may still have the ability to cling). And in other environments that do not justify the cost of a negative pressure system, it is still conceivable that measures could be taken to explicitly lift such particles into the air by applying additional force to stimulate air circulation.

The initial dose of virus and the amount of virus an individual has at any one time might worsen the severity of COVID 19 disease. Viral load is a measure of the number of viral particles present in an individual. Higher SARS-CoV-2 viral loads. might worsen outcomes, and data from China suggests the viral load is higher in patients with more severe disease. The amount of virus exposure at the start of infection - the infectious dose - may increase the severity of the illness and is also. linked to a higher viral load.

Viral load, on the other hand, relates to the number of viral particles being carried by an infected individual and shed into their environment. "The viral load is a measure of how bright the fire is burning in an individual, whereas the infectious dose is the spark that gets that fire going," says Edward Parker at the London School of Hygiene and Tropical Medicine.

The estimated half-lives give us a sense of how long things would last if we started with different initial concentrations." In other words, knowing the half-life of a virus allows scientists to determine how long a particular virus can survive in different environments, regardless of how much virus happens to be present at the time of sampling.

The team also examined how long the virus remains viable on copper, stainless steel, plastic and cardboard. Viable virus could not be detected on Copper after 4 hours, or after 24 hours on cardboard.

The germ survived best on plastic and stainless steel, remaining viable for up to 72 hours, although its overall concentration fell significantly by that time. The half-life of the virus varied on each surface, as well; the virus showed a half-life of about 0.8 hours on copper, 3.46 hours on cardboard, 5.6 hours on steel and 6.8 hours on plastic.

The virus that causes the COVID-19 disease is primarily transmitted through "respiratory droplets and close contacts", and does not seem to stay long in the air, a recent WHO publication said. Droplet transmission occurs when you have close contact (within one metre) with a person who has respiratory symptoms such as coughing or sneezing, which may spread these potentially infectious droplets, typically 5-10 microns in size, to your body.

The WHO recommends "to ensure that environmental cleaning and disinfection procedures are followed consistently and correctly. Thoroughly cleaning environmental surfaces with water and detergent and applying commonly used hospital-level disinfectants (such as sodium hypochlorite) are effective and sufficient procedures."

How to reduce corona spread?

Virus spread is depends on two factors:

- (1) To reduce the virus load and slow down the spread i.e. protection from infected corona patients site ,to slow the spread of droplets. i.e. precaution at production site (means at source site).
- (2) Protection at receiving site i.e. use of PPE kit. I will discuss mainly preventive measures at source site (i.e. to slow the spread of virus):
 - (a) Preventive measures while shifting the suspicious patients from ambulance
 - (b) Preventive measures while triaging the patients.
 - (C) Preventive measures at O.P.D.
 - (d) Preventive measures at Emergency.
 - (e) Preventive measures in ICU.

Hypothesis: If we collect the exhaled air from suspicious patients by using various methods at various sites and through copper pipelines into cylinders or containers filled with hypochlorite solution before releasing into the environment it will kill the virus before the exhaled air enters the environment. By making different arrangements at different sites, the spread of virus may be reduced to some extent. With use of vacuum line and small chambers, use of head hood, spread of infected droplets in environment can be reduced. As part of an effort to identify innovations that may help fight the Coronavirus out- break, we propose considering the possibility.

Requirements: -Head hood and modified venti- mask

-Transparent chamber around Patients head with low pressure

-Vacuum line: central copper line, suction apparatus /suction machine.

- large container filled with hypochlorite solution.

Modified venti mask for covid patients: In normal ventilation mask add one / two large tube with Y connection. then this tube to be connected with suction inlet tube and size of ventilation-mask (vestibule part of mask) should be increased slightly as shown in photograph to collect the exhale air in expiratory phase. Then this air will be passed to suction jar filled with hypochlorite solution. This modified mask can be used in ambulance, in triage, in emergency, I C U and isolation ward.



Picture: how to use modified venti mask in ambulance.

(I)ICU PLAN: changes

- (1) In **icu** area a positive pressure chamber for staff and doctors and central nursing station,
- (2) Neg pressure in rest of icu area either using exhaust fan or vacuum motors system, then collected air passed through drum filled with 1% hypochlorite solution.
- (3) ventilator circuit -exit air collect through tube and this will be passed through jar filled hypochlorite solution.



VIDEO-2020-04-26-0
0-48-35.mp4

VIDEO NO.1 Use of modified mask in ambulance



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8db9-5af21df013ab (

Video No. 2 Examination cabin with negative pressure



VIDEO-2020-04-25-2
0-24-34 (1).mp4

ViDEO NO.3 Exit air treatmaent with sodium hypochlorite solution



PIC.2 Showing use of hood in emergency and ICU.

(II)Protection at receiving site

- (1) Personnel protection equipment-mask, caps, glass shield, goggles, gloves, gowns etc.
- (2)use of sanitizers, hand rub etc.
- (3)Social distancing
- (4)use of disinfectant: 1%sodium hypochlorite, Calcium hypochlorite(Bleaching power) etc.

Conclusion:

We must think to reduce the virus load in hospital and clinics and isolation area to slowing down the spread of Corona virus through droplets in air by doing some arrangement in nursing home and hospital I.C.U., emergency, isolation wards.

Bibilography:

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