

# Primary Prevention of COVID 19

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## Abstract

Coronavirus disease - 19 is caused by a newly discovered virus called coronavirus. Coronavirus is a spherical, enveloped particle with a single stranded RNA which causes acute mild respiratory illness. The transmission is via airborne droplets. It multiplies in the nasal mucosa causing cell damage and inflammation. COVID 19 has been increasing exponentially as it spreads very fast and in a country like India with a population of 135 crore it is difficult to curtail the spread of the virus. The steps taken to control this spread such as social distancing, nation-wide lockdown were important to restrict the geographical spread of coronavirus. The virus is transmitted by droplets which can travel in air when an infected person or carrier coughs or sneezes. Therefore, primary preventive measures like practicing hygiene with soap and water for at least 60 seconds or using alcohol-based hand rub, social distancing and lockdown were implemented. This article covers the method of hand washing, steps of hand washing and gives information about the do's and don'ts of alcohol-based hand rubs. It also covers the importance of social distancing and lockdown with the social distancing methods adopted in India.

**Key words:** Coronavirus, hand washing, prevention, alcohol based sanitizers, masks, mode of transmission, social distancing, N95, respirators, droplet, lockdown, biomedical waste management, disposal, labelled containers.

## Introduction

Coronavirus disease - 19 is caused by a newly discovered virus called coronavirus. Coronavirus is a spherical, enveloped particle with a single stranded RNA which causes acute mild respiratory illness. The transmission is via airborne droplets. It multiplies in the nasal mucosa causing cell damage and inflammation. This is manifested as sneezing, cough, cold, nasal obstruction and fever. <sup>(1)</sup>

The disease spreads by coming in contact with an infected person through droplets and since most people could be asymptomatic carriers the best way to prevent the spread is to be informed about the preventive measures for the society at large. There is no medication or vaccination available for this virus right now. All vaccinations are under trial and therefore won't be available anytime soon. Primary prevention, that is, aiming to prevent the disease even before it occurs has now become the only means of curtailing the spread of coronavirus.

## Method

Published articles, documents were reviewed and compiled together to constitute this article.

### Hand Hygiene

Hand hygiene is now considered as one of the most important steps in infection control protocols. With an increasing number of healthcare-associated infections and multi drug resistant pathogens health care practitioners have realised that it is time to go back to the fundamentals of infection prevention by using uncomplicated and cost effective widespread measures like hand hygiene. This has occurred because of scientific evidence backing the fact that simple measures like adopting proper hand washing can on their own reduce the risk of cross transmission of infections in healthcare.

The hands of healthcare workers are colonized with multi drug resistant pathogens which can survive for as long as 150 hours. Around 1000000 skin cells are shed in a day that can contaminate the immediate surrounding of the patient.

## Importance

Hand hygiene has become one of the most important and the least costly methods in reducing transmission of infection.

The objects we touch during the day such as door knobs, mobile phones, car keys etc act as fomites i.e. fomites are the inanimate objects that serve as mechanism of transfer of infection between hosts.

There are two types of flora on the hand; transient and resident flora.

Transient flora is present in the superficial cells and the resident flora is present in the deeper layers. These transient microorganisms can be removed easily by hand washing and are the main source of spread of infection in a healthcare facility.

MRSA or methicillin resistant staphylococcus aureus has become one of the most challenging problems faced in the ICU and studies have shown that increase in compliance for hand washing has shown a fall in MRSA rates.

The most important problem faced after knowing the importance of handwashing is knowing when to use a sanitizer and when to wash hands with soap and water.  
(2)

Major determining factors should be cost, availability of product, requirements from the product and the presence or absence of visible contamination of hands.

Advantages of using plain soap :

1. Good for removal of soil and proteinaceous material from hands.

Disadvantages of using plain soap:

1. Not bactericidal

2. Can cause dermatitis

Advantages of using alcohol compounds:

1. Faster onset of action

2. Effective against bacteria, enveloped and non enveloped viruses.

Disadvantages of using alcohol compounds:

1. Cannot be used when hands are visibly soiled

2. Flammable

3. Volatile

4. The type of alcohol, concentration, duration of contact and method of application all play a key role in its action.

Wash hands with soap and water when

1. Visibly soiled with blood and other body fluids

2. After using the washroom

3. Prior to and after meals.

4. After blowing one's nose, coughing or sneezing

5. After providing routine care for someone who needs assistance

Alcohol based hand rub should be used

1. When in direct contact with the patient

2. Before wearing gloves

3. Before inserting self-retaining catheters etc

4. Before and after examining patients

Method of hand washing



**Figure 1 : Steps of Handwashing (World Health Organisation, 2020)**

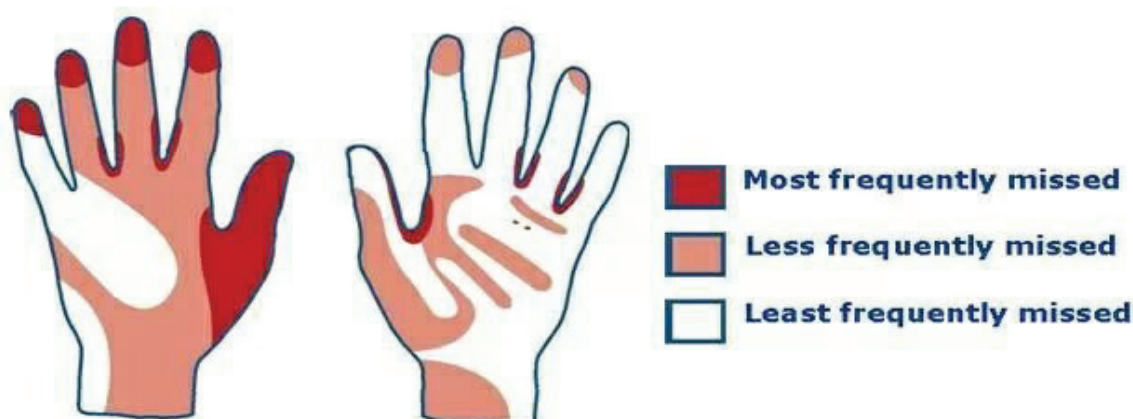
Method of hand washing:

Before washing hands remove all accessories such as bangles, wrist watches, rings etc.

Following the given steps is important because when we wash hands in a hurry some areas of the palm are

neglected such as thumbs, tips of fingers and interdigital clefts.

Wet hands under running water, lather with soap and follow the steps mentioned in the image above. Wash hands under running water . Air dry or use a single use disposable towel to dry the hands.



**Figure 2 Areas often missed on improper hand washing**

Even with the on-going <sup>(3)</sup> attempts to spread awareness about the importance of hand hygiene there are some factors that influence the compliance of health workers to hand hygiene: clinical factors such as working in an ICU, understaffed hospitals, weekdays, camps where there's no time for the health care professional to practice proper hand hygiene <sup>(4,5)</sup>.

Other factors include lack of guidelines and protocols in institutions, lack of knowledge, when wearing personal protective equipment, forgetfulness, shortage of soap and water supply <sup>(6)</sup>.

#### **Methods to improve hand hygiene:**

It takes 21 days to form a habit and that's why the practice of hand hygiene shouldn't just be taught in medical colleges, it should be practiced.

With the idea of increasing the clinical exposure of medical students in colleges such practices should be taught then.

Hospital administration should install sinks and maintain adequate supply of soap, sanitizers and disposable towels should be available in every ward, doctors must use hand sanitizer after visiting every patient in the ward, the nursing staff, cleaning staff should be taught the right method. <sup>(2)</sup>

The most important step in increasing compliance would be to adapt these activities at the peripheral health centres since they are the first and the most commonly visited place by a patient. The staff at a peripheral health centre should be taught the right method and should explain it to the patients as well. Hand hygiene demonstrations should be conducted for them.

Other steps like positive role modelling and the use of performance indicators also improve the adherence to hand hygiene <sup>(7)</sup>.

It should be emphasized that wearing gloves does not eliminate the need for hand hygiene and that contamination may occur during glove removal. Hospitals should also have an infection control team and should strictly follow protocols made by them.

The problems of non-compliance in the Indian scenario are due to factors like overcrowding, limited number of doctors due to high cost of medical education, understaffing, poor infrastructure such as lack of sufficient hand facilities such as sinks, running water and sewage system, lack of awareness and education, ignorance and the fact that most people are losing faith in doctors it's hard to adapt such practices in our society.

Handwashing or the use of alcohol based sanitizer has become a necessity now and is now practiced not only at hospital entrances but also at places of worship, airports, cabs etc. This clubbed with social distancing to reduce the spread of coronavirus.

## MASKS

Considering the route of spread of infection i.e. droplets, the use of masks to curtail the spread of infection becomes evident. The droplets can further form aerosols and travel longer distances and remain in the air for longer periods of time therefore the use of masks at all times is crucial.

There are various types of masks available for people to use but they should be used according to the following factors - profession, places visited, duration of contact with people and risk of development of complications in people who have comorbidities such as HIV/Diabetes, elderly and pregnant females.

Doctors and the entire hospital staff should wear N95 masks. The panic and the fear caused by the coronavirus outbreak has led to a high demand of these N95 masks and therefore guidelines for the use, reuse and extended use of N95 masks has been provided to the health care professionals.

### The Physics behind N95 masks:

Once an airborne particle touches the fibre in the mask it stays stuck to it and isn't airborne anymore. This mainly depends on the particle size.

Particles larger than 1 micrometer travel in a straight line due to inertia and because these masks have a lot of these sticky fibres, it's bound to stick to one of those. This is called "capture by inertial impaction".

Particles smaller than 0.1 micrometer collide with air molecules and move in a zigzag motion called the Brownian movement. This makes the particle stick to a fibre and is called "capture by diffusion". Intermediate size particles are difficult to filter because they do not move like the other size particles and therefore can move around the fibre with the air. But N95 masks capture these particles using an electric field. This is called as "capture by electrostatic attraction". And because it filters 95% of such particles, it is called an N95 mask.

Extended use of the mask means using the same mask for repeated exposure to several patients without

removing the respirator in between patients.

Reuse is the use of the same N95 respirator for multiple patients but removing it after each encounter.

Perform hand hygiene before and after touching the respirator. A face shield could be worn over the mask for additional protection.

When to discard the respirators?

1. When used after an aerosol generating procedure.
2. Visibly soiled respirators should be discarded
3. After coming in close contact with an infected patient.

Controlling the spread of respiratory infection using a mask is a well established strategy.

The use of face masks can account for the different levels of prevention i.e primary as well as secondary.

Primary prevention aims at reducing the incidence of disease by elimination of risks for the protection of personal and community health.

Secondary prevention aims at reducing the prevalence by shortening the duration of the disease. This is done by early detection and interventions to minimise disability. This is practiced everywhere now by the means of thermal temperature checks. People with fever are subjected to further evaluation.

### Biomedical Waste Management of Covid-19

The following measures are proposed for covid 19 waste management:

1. Dedicated sanitation workers deputed only to collect covid-19 waste
2. All the bags and containers from covid 19 areas should be labelled as "COVID-19 WASTE"
3. They should have foot operated lids.
4. The inner and outer surface of these containers must be disinfected daily with 1% sodium hypochlorite solution.
5. Double layers should be used to ensure no leaks.
6. Records of covid 19 waste should be maintained



separately.

Face shields, goggles, hazmat suit, nitrile waste and laboratory wastes such as transport media, plastic vials, vacuators, pipette tips should be disposed of in the RED bin.

Used masks such as N95 masks, head cover, shoe cover, disposable linen gown, leftover food, disposable plates, glasses, tissues, toiletries etc used by the patients should be disposed of in the YELLOW bin.

The risk of transmission of COVID 19 from sewage water of healthcare facilities is low but still requires adequate disinfection and waste water treatment.

### Social distancing

Social distance turned out to be the most effective means in combating COVID 19 worldwide because it broke the chain of transmission by acting as a primordial level of prevention.

Primordial prevention is aimed at establishing and maintaining conditions that minimise hazards to health. This level of prevention acts even before the onset of the disease and this is particularly helpful for this pandemic because of the high number of asymptomatic people who are potential carriers and can spread the virus among others<sup>(8)</sup>.

Primordial prevention is acting on the underlying socio-economic and environmental conditions leading to causation of disease. The most effective mode of intervention here is health education which is difficult in a country as diverse as India.

This is achieved by newspapers, local news channels, radio and the caller tune while dialing someone. These act as a constant reminder of maintaining the new normal as it is being called.

Here, the mode of transmission is droplet.

When the respiratory droplet particles are >5-10micron in diameter they are referred to as respiratory droplets and when they are less than 5 micron they are called droplet nuclei.

According to the current information on Coronavirus, it is primarily transmitted between people through respiratory droplets and contact routes. The microorganisms that are less than 5micron remain suspended in the air.<sup>(9)</sup>

Factors that influence the airborne transmission:

1. Temperature
2. Humidity
3. Rainfall
4. Amount of sunlight
5. Wind
6. Human behaviour

Other factors include the socioeconomic and living conditions. The number of people residing in an area is important.

Indoor environments such as indoor ventilation, use of air conditioning also affects the spread of pathogens. Poor or inadequate ventilation has played an important role in the spread of many pathogens<sup>(10)</sup>.

Since most of these factors are beyond our control, the only way to curtail the spread of such a pandemic that could be adapted was modifying the human behaviour that included social distancing, nation-wide lockdown, ban on large gatherings, schools and colleges, factories, malls, theatres and places of worship being shut and people were encouraged to stay indoors and practice work from home for as long as possible and to only go out for essential work.

This was important because it broke the chain of spread, decreased the number of people being exposed to the virus and also helped with contact tracing and thus reducing the burden on the health care professionals<sup>(11)</sup>.

Social distancing norms suggest keeping a distance of about 6 feet or about 2 arms' length from others. This is one of the easiest and most effective methods we have to avoid being exposed to the virus and slowing its spread locally and across the country and the world.<sup>(3)</sup>

Just like hand hygiene, social distancing is an effective method based entirely on behavioural patterns of individuals and by not abiding to the norms of social distancing it could very easily overwhelm the healthcare system since the number of beds, the availability of ventilators, PPE kits, rapid tests for COVID19 and masks is limited.

Social distancing measures practiced in India currently:

1. Contact less delivery practices by food , grocery delivery services such as Swiggy
2. The number of people in a shop at a time is monitored .
3. Digital transactions are being preferred over cash.
4. Classes and meetings are being conducted over video calls.
5. Admissions are being done online.
6. Long queues outside of shops are avoided by keeping a safe distance between people. Shop owners have marked circles outside their shops as guides to maintain social distancing.
7. The number of people in a car is also according to the social distancing norms according to the various zones.
8. Restaurants have to maintain a distance of one meter between the tables and do regular temperature checks and follow proper hand hygiene.
9. Encouraging work from home as long as possible.<sup>(12)</sup>
10. Postponing all non-essential social and cultural gatherings.<sup>(3)</sup>

### Nationwide lockdown

So the purpose of a nationwide lockdown was twofold: it slowed the transmission of the virus and second it also slowed the geographical spread of the virus which is extremely important in India. Both of these play a crucial role because slowing the transmission slows the short term spread of cases and by slowing the geographical spread and localizing the geographical spread there is flattening of curve in the long term. It is estimated that without the lockdown the cases would have been six times the current estimated infection .

### Conclusion

COVID emerging as a pandemic has shed some light on a lot of aspects of the basics of health care such as hand washing. Adopting correct hand washing methods, teaching staff and students, knowing when to use soap and water and when a hand sanitizer should be used and focussing on the areas that are commonly missed while

washing hands is important to know. Just knowing the right method won't be enough, hospitals should also have the facilities and infrastructure to provide the same. These practices are cost efficient.

Some other lessons learnt from the pandemic

Social distancing and hand washing should become a part of normal life from now on whether there's a virus or not and guidelines for people at risk people should be in place and practice.

### Mental health is important.

We should pay more attention to our health.

Children and elderly who are more at risk to infections in general should not be neglected.

Hospitals should have infectious disease control teams with proper protocols in place.

Need to promote original R&D and strengthen our drug and vaccine development programme.

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