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Review Article

A SURVEY ON NOVEL CORONAVIRUS (nCoV) 19

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Abstract*:* Government of India is taking entirely indispensable steps to confirm that we are primed well to face the contest and hazard impersonated by the developing contagion of COVID 19 – the Corona Virus. With vigorous support of the citizen of India, we have been able to comprehend the spread of the Virus in our nation. The utmost significant factor in preventing the spread of the Virus nearby is to empower the residents with the precise information and taking safeguards according to the advisories being issued by Ministry of Health and Family Welfare. In December 2019, a group of patients with pneumonia of anonymous source was linked to a seafood general market in Wuhan, China. A formerly anonymous beta coronavirus was exposed through the usage of unbiased sequencing in samples from patients with pneumonia. Human airway epithelial cells were used to segregate a novel coronavirus, named 2019-nCoV, which formed a clade inside the subgenus sarbecovirus, Orthocoronavirinae subfamily. Dissimilar from both MERS-CoV and SARS-CoV, 2019-nCoV is the seventh member of the family of coronaviruses that contaminate humans. Boosted surveillance and additional exploration are ongoing.

Keywords: *Novel Coronavirus19, Government of India, Disease 2019, World Health Organisation.*

Introduction*:* The Coronaviruses (CoV) originate their name from the element that under electron microscopic investigation, every virion is bounded by the corona. Coronaviruses (CoV) are a huge family of viruses that cause infection ranging from the communal cold to new severe infections such as Severe Acute Respiratory Syndrome (SARS -CoV) and Middle East Respiratory Syndrome (MERS - CoV). So far, seven types of coronavirus are infecting people.

Novel coronavirus (nCoV) is a new strain that has not been previously identified in humans. This "novel" coronavirus is now officially called as Coronavirus Disease 2019 (COVID-19). COVID-19 belongs to the similar big family. Development analysis displays that they are

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under dissimilar subgroup branches with dissimilar genetic sequences.

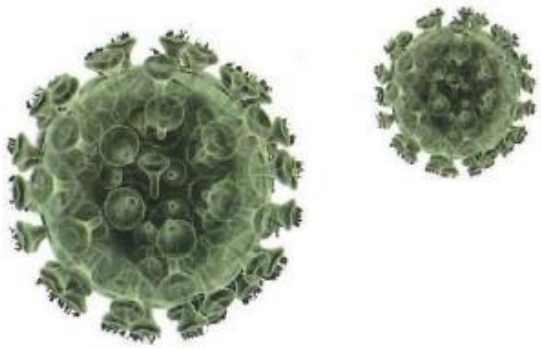

Fig.1 COVID-19

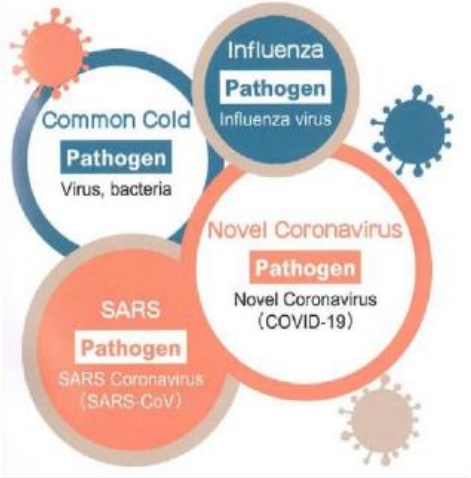

Fig.2 Development of Novel Coronavirus analysis displays that they are under dissimilar subgroup branches with dissimilar genetic sequences

Transmission: Person-to-Person, COVID-19 is the source of respiratory disease and is generally transmitted in person-to-person. It can come about in the subsequent circumstances:

It is transmitted among the people who are in close contact with each other (approximately about 6 feet) through respiratory droplets created when diseased person coughs or sneezes, these droplets can land in the mouths or noses of people who are nearby or possibly be inhaled into the lungs

Fig.3 Person-to-Person transmitted

The Directorate has issued instructions on dealing with novel coronavirus (COVID19) vide DGS Order No. 02 of 2020 dated 16.03.2020, DGS Order No. 03 of 2020 & 20.03.2020 and maritime advisories vide M.S. Notice 02 of 2020 dated 28.01.2020, M.S. Notice 03 of 2020 dated 04.02.2020 & M.S. Notice 06 of 2020 dated 03.03.2020 (F. No. 7-NT(72)/2014).

The spread of the COVID-19 pandemic across large number of nations is an unprecedented situation in recent times. To slow the spread of the disease and mitigate its impacts, travel advisories have been issued by many jurisdictions including India. However, shipping services are required to continue to be operational so that vital goods and essential commodities like fuel, medical supplies, food grains etc., are delivered and to ensure that the economic activity of the nation is not disrupted. It is, therefore, important that the flow of goods by sea should not be needlessly disrupted without compromising the safety of life and protection of the environment. In view of the same, it has been decided that for the continued operation of vessels and ports, the following shall be complied with by all stakeholders till further orders. The master of a vessel, before arrival at its first port of call in India, shall ascertain the state of health of each person on board the vessel and submit the Maritime Declaration of Health to the concerned health

authorities of the port and to the port authorities. The format of the Maritime Declaration of Health shall be as per Annex 8 of the International Health Regulations 2005, issued by World Health Organisation which has also been adopted by International Maritime Organization by the FAL Convention at section A Copy of the model Maritime Declaration of Health is enclosed.

The Maritime Declaration of Health shall be forwarded at least 72 hours prior arrival of the vessel at the port. If the voyage duration from last port of departure is less than 72hours, the Maritime Declaration of Health shall be informed to the port immediately on departure from the port. In addition, the information required by the local health authorities of the port like temperature chart, individual health declaration etc. shall also be provided by the master as per the directives of the local health authorities of the port. If the master of the vessel ascertains that a person on board the vessel is exhibiting symptoms of COVID-19, the same shall be explicitly mentioned in the Maritime Declarationof Health being forwarded to the health authorities and to the port. If the maritime declaration of health given by the master is found to be incorrect andnot reflecting the factual conditions of health of persons on board the vessel, the master is liable to be prosecuted as per applicable laws. All agents of the vessel shall ensure that this information regarding possible prosecution for incorrect declaration is clearly informed to the vessel before its arrival at Indian ports. In case of any suspected person on board the vessel, the master shall ensure that the suspected person is isolated in the ship's hospital, or other suitable location on the vessel. All other persons who may have come in contact with the suspected person shall also be isolated at appropriate locations as decided by the master. The master shall also ensure that all instructions issued by the Ministry of Health and Family Welfare, Govt. of India, as well as the guidance issued on dealing with COVID-19 matters by World Health Organization(WHO), International Maritime Organization (IMO) and other applicable trade bodies are complied with at all times. Vessels having persons suspected of COVID-19 will necessarily be required to be monitored by the health authorities and put in quarantine, if necessary. Samples from the suspected person will be taken and tested as per the instructions of the health authorities. If the samples are tested positive, the vessel will remain in quarantine and the infected person(s)will be dealt with as per the procedures laid down by MoHFW, Govt. of India. Vessels with infected person shall also be sanitized as per the extant protocols for dealing with COVID-19 pandemic. In case of medical emergency, the health authorities shall supervise transport of the patient to the designated hospital as per the procedures laid down by MoHFW, Govt. of India. In the unfortunate incident for a vessel to deal with deceased person suspected of having COVID-19, the guidelines on dead body management issued by MoHFW, Govt. of India will apply. Vessels arriving from ports of infected countries identified for mandatory quarantine and travel ban by MoHFW, Govt. of India before 14 days of departure from the infected port, or having seafarers embarked on the vessel who have been in infected regions within 14 days of arrival at any Indian port shall need to comply with additional measures. The updated list of infected countries may be obtained from the website of MoHFW, Govt. of India.

Vessels arriving from any port in China to have the necessary quarantine periods of 14days.

Stoppages of a vessel at any port of infected countries only for bunkering purposes shall not be counted for the calculation of 14 days from port of departure.

Vessels that have arrived at Indian port after 14 days of departure from an infected port need not comply with the additional requirements which are not able not comply with the additional requirements shall not allow the vessels to berth for vessels which have arrived within 14 days from the infected countries. Pilot shall normally not be assigned to any vessel unless pratique is granted to the vessel. Prior boarding the vessel,

the master of the vessel shall reconfirm to the pilot that all persons on board the vessel are healthy and there are no suspected cases of persons infected by COVID-19 on board the vessel. The master of the vessel shall also ensure that all the areas through which the pilot is likely to pass are appropriately disinfected and sanitized as per the required protocol and shall further confirm about the same to the pilot before the pilot boards the vessel.

All ships personnel who are likely to interact with the pilot should be wearing appropriate Personal Protective Equipment (PPE). In addition, the bridge team shall be wearing appropriate PPE at all times while the pilot is on the vessel. Pilot shall also be wearing appropriate Personal Protection Equipment (PPE).

Merging and reemerging pathogens are global challenges for public health.1 Coronaviruses are enveloped RNA viruses that are distributed broadly among humans, other mammals, and birds and that cause respiratory, enteric, hepatic, and neurologic diseases.2,3 Six coronavirus species are known to cause human disease.4 Four viruses — 229E, OC43, NL63, and HKU1 — are prevalent and typically cause common cold symptoms in immunocompetent individuals.4 The two other strains — severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV) — are zoonotic in origin and have been linked to sometimes fatal illness.5 SARS-CoV was the causal agent of the severe acute respiratory syndrome outbreaks in 2002 and 2003 in Guangdong Province, China.6-8 MERS-CoV was the pathogen responsible for severe respiratory disease outbreaks in 2012 in the Middle East.9 Given the high prevalence and wide distribution of coronaviruses, the large genetic diversity and frequent recombination of their genomes, and increasing human–animal interface activities, novel coronaviruses are likely to emerge periodically in humans owing to frequent cross-species infections and occasional spillover events.5,10In late December 2019, several local health facilities reported clusters of patients with pneumonia of unknown cause that were epidemiologically linked to a seafood and wet animal wholesale market in Wuhan, Hubei Province, China.11 On December 31, 2019, the Chinese Center for Disease Control and Prevention (China CDC) dispatched a rapid response team to accompany Hubei provincial and Wuhan city health authorities and to conduct an epidemiologic and etiologic investigation. We report the results of this investigation, identifying the source of the pneumonia clusters, and describe a novel coronavirus detected in patients with pneumonia whose specimens were tested by the China CDC at an early stage of the outbreak. We also describe clinical features of the pneumonia in two of these patients.

Viral diagnostic methods: Four lower respiratory tract samples, including bronchoalveolar-lavage fluid, were collected from patients with pneumonia of unknown cause who were identified in Wuhan on December 21, 2019, or later and who had been present at the Huanan Seafood Market close to the time of their clinical presentation. Seven bronchoalveolar-lavage fluid specimens were collected from patients in Beijing hospitals with pneumonia of known cause to serve as control samples. Extraction of nucleic acids from clinical samples (including uninfected cultures that served as negative controls) was performed with a High Pure Viral Nucleic Acid Kit, as described by the manufacturer (Roche). Extracted nucleic acid samples were tested for viruses and bacteria by polymerase chain reaction (PCR), using the RespiFinderSmart22kit (PathoFinder BV) and the Light Cycler 480 real-time PCR system, in accordance with manufacturer instructions.12 Samples were analyzed for 22 pathogens (18 viruses and 4 bacteria) as detailed in the Supplementary Appendix. In addition, unbiased, high-throughput sequencing, described previously,13 was used to discover microbial sequences not identifiable by the means described above. A real-time reverse transcription PCR (RT-PCR) assay was used to detect viral RNA by targeting a consensus RdRp region of pan β-CoV, as described in the Supplementary.

Isolation of virus: Bronchoalveolar-lavage fluid samples were collected in sterile cups to which virus transport medium was added. Samples were then centrifuged to remove cellular debris. The supernatant was inoculated on human airway epithelial cells,13 which had been obtained from airway specimens resected from patients undergoing surgery for lung cancer and were confirmed to be special-pathogen-free by NGS.14 Human airway epithelial cells were expanded on plastic substrate to generate passage-1 cells and were subsequently plated at a density of 2.5×105 cells per well on permeable Transwell-COL (12-mm diameter) supports. Human airway epithelial cell cultures were generated in an air–liquid interface for 4 to 6 weeks to form well-differentiated, polarized cultures resembling in vivo pseudo stratified mucociliary epithelium.13

Prior to infection, apical surfaces of the human airway epithelial cells were washed three times with phosphate-buffered saline; 150 µl of supernatant from bronchoalveolar-lavage fluid samples was inoculated onto the apical surface of the cell cultures. After a 2-hour incubation at 37°C, unbound virus was removed by washing with 500 µl of phosphate-buffered saline for 10 minutes; human airway epithelial cells were maintained in an air–liquid interface incubated at 37°C with 5% carbon dioxide. Every 48 hours, 150 µl of phosphate-buffered saline was applied to the apical surfaces of the human airway epithelial cells, and after 10 minutes of incubation at 37°C the samples were harvested. Pseudostratified mucociliary epithelium cells were maintained in this environment; apical samples were passaged in a 1:3 diluted vial stock to new cells. The cells were monitored daily with light microscopy, for cytopathic effects, and with RT-PCR, for the presence of viral nucleic acid in the supernatant. After three passages, apical samples and human airway epithelial cells were prepared for transmission electron microscopy.

Transmission electron Microscopy: Supernatant from human airway epithelial cell cultures that showed cytopathic effects was collected, inactivated with 2% paraformaldehyde for at least 2 hours, and ultracentrifuged to sediment virus particles. The enriched supernatant was negatively stained on film-coated grids for examination. Human airway epithelial cells showing cytopathic effects were collected and fixed with 2% paraformaldehyde–2.5% glutaraldehyde and were then fixed with 1% osmium tetroxide dehydrated with grade ethanol embedded with PON812 resin. Sections (80 nm) were cut from resin block and stained with uranyl acetate and lead citrate, separately. The negative stained grids and ultrathin sections were observed under transmission electron microscopy.

Viral Genome Sequencing: RNA extracted from bronchoalveolar-lavage fluid and culture supernatants was used as a template to clone and sequence the genome. We used a combination of Illumina sequencing and nanopore sequencing to characterize the virus genome. Sequence reads were assembled into contig maps (a set of overlapping DNA segments) with the use of CLC Genomics software, version 4.6.1 (CLC Bio). Specific primers were subsequently designed for PCR, and 5′- or 3′-RACE (rapid amplification of cDNA ends) was used to fill genome gaps from conventional Sanger sequencing. These PCR products were purified from gels and sequenced with a BigDye Terminator v3.1 Cycle Sequencing Kit and a 3130XL Genetic Analyzer, in accordance with the manufacturers' instructions.

Multiple-sequence alignment of the 2019-nCoV and reference sequences was performed with the use of Muscle. Phylogenetic analysis of the complete genomes was performed with RAxML (13) with 1000 bootstrap replicates and a general time-reversible model used as the nucleotide substitution model.

Patients: Three adult patients presented with severe pneumonia and were admitted to a hospital in Wuhan on December 27, 2019. Patient 1 was a 49-year-old woman, Patient 2 was a 61-year-old man, and Patient 3 was a 32-year-old man. Clinical profiles were available for Patients 1 and 2. Patient 1 reported having no underlying chronic medical conditions but

reported fever (temperature, 37°C to 38°C) and cough with chest discomfort on December 23, 2019. Four days after the onset of illness, her cough and chest discomfort worsened, but the fever was reduced; a diagnosis of pneumonia was based on computed tomographic (CT) scan. Her occupation was retailer in the seafood wholesale market. Patient 2 initially reported fever and cough on December 20, 2019; respiratory distress developed 7 days after the onset of illness and worsened over the next 2 days (see chest radiographs, Figure 4), at which time mechanical ventilation was started. He had been a frequent visitor to the seafood wholesale market. Patients 1 and 3 recovered and were discharged from the hospital on January 16, 2020. Patient 2 died on January 9, 2020. No biopsy specimens were obtained.

Detection and isolation of a novel coronavirus: Three bronchoalveolar-lavage samples were collected from Wuhan Jinyintan Hospital on December 30, 2019. No specific pathogens (including HCoV-229E, HCoV-NL63, HCoV-OC43, and HCoV-HKU1) were detected in clinical specimens from these patients by the RespiFinderSmart22kit. RNA extracted from bronchoalveolar-lavage fluid from the patients was used as a template to clone and sequence a genome using a combination of Illumina sequencing and nanopore sequencing. More than 20,000 viral reads from individual specimens were obtained, and most contigs matched to the genome from lineage B of the genus betacoronavirus — showing more than 85% identity with a bat SARS-like CoV (bat-SL-CoVZC45, MG772933.1) genome published previously. Positive results were also obtained with use of a real-time RT-PCR assay for RNA targeting to a consensus RdRp region of pan β-CoV (although the cycle threshold value was higher than 34 for detected samples). Virus isolation from the clinical specimens was performed with human airway epithelial cells and Vero E6 and Huh-7 cell lines. The isolated virus was named 2019-nCoV.

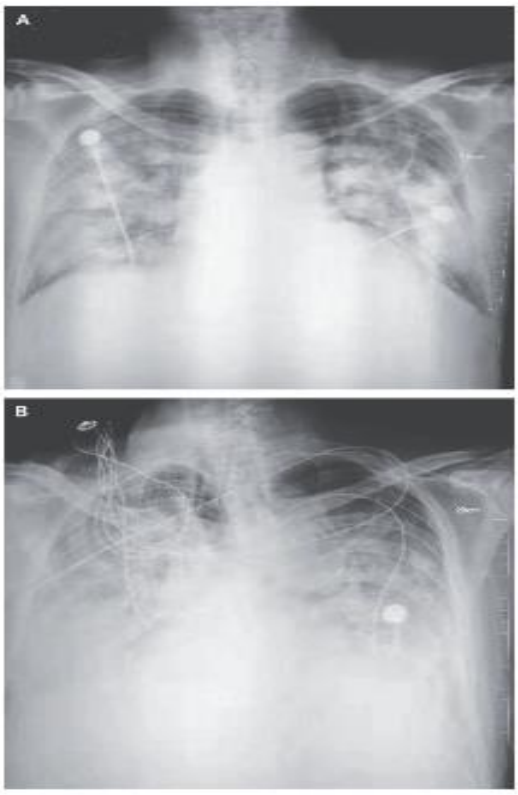

Fig.4 Chest Radiographs

Indirect transmission: A person can possibly get COVID-19 by touching a surface or an object (e.g. doorknobs and table) that has the virus on it and then touching his own mouth, nose, or eyes.

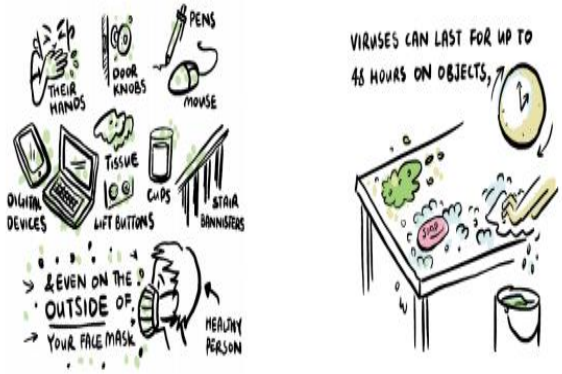

Fig.5. Contact with Infected Surfaces or Objects

Signs & symptoms: The signs and symptoms of COVID-19 are similar to the symptoms of ordinary flu. A study of where a patient has been or whom the patient has had contact with will give clues as to whether the patient may have been exposed to COVID-19.

Physical Signs & Symptoms for COVID-19: Reported illnesses have ranged from mild symptoms to severe illness and death for

confirmed coronavirus disease 2019 (COVID-19) cases. The following symptoms may appear 2-14 days after exposure:

- Fever
- Cough
- Shortness of breath

Fig.6 Physical Signs & Symptoms for COVID-19

Vulnerability

Fig.7. People of all ages can be infected

People at High Risk:

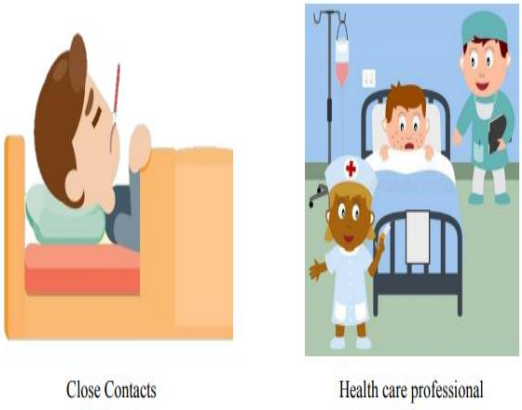

Fig.8. People at High Risk

Close contact is a person who, for example, has stayed in the same cabin, participated in common activities, dined together, a cabin steward, or someone who has a contact within 1 meter or was in the closed environment with the suspect/confirmed COVID-19

Incubation Period: Transmission may occur during the incubation period before a person shows signs of sickness. The incubation period of the virus is the time between the exposure and the display of symptoms. Current information suggests that the incubation period ranges from 1 to 12.5 days (with median estimates of 5 to 6 days), but can be as long as 14 days.

Preventive Measures:*The best way to prevent illness is to avoid being exposed to it. WHO recommends the following actions to prevent the spread of respiratory diseases:*

- *Wash hand frequently*
- *Maintain Social Distance of at least 1 meter (3 feet)distance between yourself and anyone who is coughing or sneezing*
- *Avoid touching eyes, nose, and mouth*
- *Practice respiratory hygiene*
- *Seek medical care early if you have a fever, cough, and difficulty breathing*
- *Practice food safety*

Fig.9 prevent the spread

Hand hygiene is the most important measure of reducing the spread of COVID-19.

Crew members should perform hand hygiene properly and frequently, especially before touching eyes, nose, and mouth. When hands are visibly soiled or likely contaminated with blood and body fluid or after the contact with infected persons, it is advised to clean hands with liquid soap and water.

Follow five easy steps below –

Step 1 – Wet your hands with clean, running water
Step 2 – Lather your hands by rubbing them together with the soap. Be sure to lather the backs of your hands, between your fingers, and under your nails.
Step 3 – Scrub your hands for at least 20 seconds.
Step 4 – Rinse your hands well under clean, running water
Step 5 – Dry your hands using a clean towel.

Symptoms for Coronavirus Family

Table 1: Symptoms of Coronavirus family

	COVID-19	SARS	Influenza	Common Cough
Clinical Manifestations	Excessive Fatigue; coughs; shortness of breaths; coughing up yellow or green mucus; chest X-ray shows scattered opacities in the lungs	Coughs; breathing difficulties; fatigue; headache and diarrhea; fever	Running nose; sneezing; coughs; high temperature; muscle pain; diarrhea; vomiting	Nasal congestion; coughs; sore throat discomfort; sneezing
Incubation Period	7-14 days	2-7 days	1-4 days	1 days
Ways of Transmission	Short distance droplet spread; close contact; contact with animals	Short distance droplets spread; close contact	Coughs; sneezing and droplets spread; contact with secretions of an infected person	Droplet spread; contact with infected nasal secretions
Preventive Measures	Regular and frequent hand washing; check body temperature; use alcohol-based disinfectant; wear a surgical mask; enhance airflow; avoid contacts with animals or eat game meat	Cover mouth and nose when sneezing and coughing; regular and frequent hand washing; do not touch nose and mouth; wear a surgical mask; enhance airflow	Vaccination (flu shot); keep hands clean; wear a surgical mask; improve airflow	Regular hand wash, wear a surgical mask, boost your immune system

Guidance for Sanitizing Hands: Hand sanitizer is a liquid generally used to decrease infectious agents on the hands. If hand washing facilities are not available, or when hands are not visibly soiled, perform hand hygiene with 70% to80% alcohol-based hand sanitizer (e.g., isopropyl alcohol and ethyl alcohol). It is an effective alternative to prevent cross-transmission of infectious diseases via hands.

Personal Protective Equipment: The vessel must maintain below Personal Protective Equipment (PPE) when calling infected areas.

- *Disposable surgical masks*
- *Disposable gloves*
- *Eye Protection*
- *Face Shields*
- *Medical Gown*
- *Ray Thermometer*

Disposable Surgical Masks: Face mask provides a physical barrier to fluids and large particle droplets. Surgical mask is a type of face mask commonly used. When used properly, surgical masks can prevent infections transmitted by respiratory droplets. Most surgical masks

adopt a three-layer design which includes an outer fluid- repelling layer; a middle layer serves as a barrier to germs, and an inner moisture-absorbing layer. Mask without the above functions is not recommended as it cannot provide adequate protection against infectious *diseases transmitted by respiratory droplets. Crew members should wear surgical masks when they have respiratory infection; when taking care of persons with respiratory infection in order to reduce the spread of infection. Please note the following points when wearing a mask.*

Choose the appropriate mask size

Perform hand hygiene before putting on a surgical mask

The surgical mask should fit snugly over the face

Disposable Gloves: Disposable safety gloves are worn to prevent cross contamination between the infected person(s) / object(s) and people who perform cleaning/people who enter the medical care area. Change gloves if they are torn or contaminated. When finished, place used gloves in a biohazard trash bag. Wash your hands immediately after handling the items.

Goggles: Goggles are forms of protective eyewear that usually enclose or protect the area surrounding the eye to prevent particulates, water, or chemicals from striking the eyes. Disinfect used goggles according to the manufacturer's instructions after use. This is required when handling sick persons or cleaning where infected people were residing.

Conclusion: Government of India is taking all necessary steps to ensure that we are prepared well to face the challenge and threat posed by the growing pandemic of COVID 19 – the Corona Virus. With active support of the people of India, we have been able to contain the spread of the Virus in our country. The most important factor in preventing the spread of the Virus locally is to empower the citizens with the right information and taking precautions as per the advisories being issued by Ministry of Health & Family Welfare.

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