



A Review on Corona Virus (COVID-19) Pandemic, Its Global Emergency Outbreak and Its Consequences in India

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Abstract

The outbreak of COVID-19 (Severe Acute Respiratory Syndrome Coronavirus- 2) caused threatening viral pneumonia by the end of year 2019. It affects the respiratory tract mainly by binding to the ACE-2 receptors and TMPRSS2, SARS-CoV-2 belongs to the genus Beta-coronavirus, caused the global epicentre in Wuhan, China, and then transformed into a pandemic affecting millions across the world.

In India, The World Health Organization and The Central Government of India are ensuring detection and Administrative management of cases suffering from SARS-CoV-2. Recommended guidelines are released by the Central Government of India, Department of Health Research (DHR) and The Indian Council of Medical Research (ICMR). These organisations are able to control and measure the infection of SARS-CoV-2 in accordance to the guidelines of WHO and The Centre for Disease Control and Prevention (CDC) health care professionals and research scientists are trying to identify, isolate, collect specimen and identify the different courses of transmission in humans, manage affected cases of covid-19 by using these recommended guidelines. The detailed genomic sequence (Compare of SARS-CoV-2, SARS-CoV, and MERS-CoV), have many similarities and differences in their genomic structures based on its phylogenetic relationships and is useful for developing diagnostic kits, efficient anti corona virus drugs and also in development of vaccinations. The National Institutes of Health (NIH) providing funding opportunities on COVID-19 clinical trials. In this review article we are trying to focus all these points mainly in Indian perspective and our centre's experiences that may help prevent the further spread of the pandemic.

Key words: Covid-19, lockdown, Indian Situation, recommended guidelines, SARS-CoV-2, SARS-CoV, and MERS-CoV

Background

COVID-19 is an acute, sometimes severe, respiratory illness caused by a novel coronavirus SARS-CoV-2 previously known as 2019 novel coronavirus (2019-nCoV), it began in the city of Wuhan, China in end of 2019. The WHO characterized coronavirus disease of 2019 (COVID-19) as a pandemic beginning of this year 2020. It was renamed "severe acute respiratory syndrome coronavirus- 2," or SARS-CoV-2 by the International Committee on Taxonomy of Viruses on February. It belongs to the Beta-coronavirus genus originating probably from bats. Beta coronaviruses infected mammals especially human and can cause severe respiratory disease. Other viruses in this family are SARS and MERS coronavirus¹⁻¹⁰.

Coronavirus disease of 2019 (COVID-19) in India: Current Scenario

It was an alarming situation for India in terms of public health arrangements during COVID-19 pandemic then the first positive case of COVID-19 was detected on 30th of January, 2020, in Kerala. The number of confirmed cases continually growing in India and the recovery rate is also very good as compared to other developed countries. Our health system not very relative compared to other developed countries, as we all know our population is very high, the high risk cases or severe cases require hospitalizations and intensive care units (ICU). Assuming these situations our honourable prime minister took quick actions on this pandemic conditions the government assumed the number of cases in the near future and realized the infrastructure requirements to avoid adverse situations and protection of every Indian citizen. The result we all know as compared to our population our COVID-19 positive number is less and recovery rate is good. It is possible due to close monitoring by the government, quick decision of lockdown, national and international travel restrictions, essential quarantine in any suspected condition, started manufacturing PPE kits, face masks, sanitizers, diagnostic laboratories for testing of COVID-19, etc. started new opportunities in health care system such as drugs, vaccination, diagnostic kits, ventilators, mobile app, mobile hospitals with ICU facility for public health, etc. Despite of the pandemic, the government planned very well and presented itself as 'Atmanirbhar Bharat' (self-dependent India) which is the vision of the honourable Prime Minister of India Mr. Narendra Modi of making India a self-dependent nation not only in the field of health care for this pandemic situation but also related to Indian economy. As we all

know before the month of May the personal protective equipment (PPE) production was zero in India and now the manufacture rate is more than 1,50,000 pieces per day. The Central Drugs Standard Control Organization (CDSCO) of India has taken a series of actions to fast-track development of diagnostic kit, vaccines and drugs for use in the management of the COVID-19 pandemic. As a result, first oral antiviral Indian medication for treatment of COVID-19 named FabiFlu (Favipiravir) is manufactured by Glenmark Pharmaceuticals for mild and moderate cases. Although scientists are actively involved in clinical research on COVID-19, approximately 1.2% of such trials are currently taking place in the country due to strict regulations for human clinical trials. The Serum Institute of India and Cadila Healthcare are involved in developing a COVID-19 vaccine, it is in the pre-clinical stage and human trials are under process¹¹⁻¹⁶.

The 'Atmanirbhar Bharat' does not mean that India is isolating itself from the world but it proves that India can be a bigger and more important part of the global economy. The Government of India, Ministry of Health & Family welfare broadcasts the recommendations of World Health Organization (WHO) and Center for Disease Control and prevention (CDC) healthy practices to prevent the infection of COVID-19 because only home quarantine is not enough. In the recommendations (table-2) : Avoid touching the eyes, nose mouth with unwashed hands and washing of hands for at least 20 seconds efficiently removes the virus. Hand wash with any kind of soap and at least 60% alcohol hand sanitizers are enough to prevent the virus. Face mask, social distancing is compulsory to reduce the chance of viral spread. Although national and international travel have been restricted, but still there are recommendations after travel to prevent the viral spread: Asymptomatic passengers, who are presented as mild risk suspects, travelling from COVID-19 affected cities or countries were home quarantined for 14 days and should be kept under medical observation. Persons who has comorbidities and asymptomatic presented as moderate risk were quarantined for 14 days at medical observation by the state governments. Passengers, who have fever, cough and breath problems were presented as severe or high risk and quarantined for 14 days at medical observation by the state governments. All asymptomatic healthcare workers and asymptomatic associates of laboratory test confirmation cases at medical observation by the state governments¹⁷⁻²⁰.

Contaminated Zones were designated as per guidelines (table-3) issued by the Ministry of Home Affairs to monitor and manage COVID-19 pandemic. District authorities identified within Red Zones and Orange Zones, clusters of colonies or wards or towns in urban areas and villages or panchayats or blocks in rural areas as containment zones is where life is severely restricted. Then containment areas within Red and Orange Zones will be identified separately by local authorities. These zones define as: **Red Zone:** Areas or the hotspots classified as those with the highest caseload. **Orange Zone:** Areas which have reported a limited number of cases in the past and no surge in positive cases recently. **Green Zone:** Areas with zero confirmed cases till date or no confirmed case in the last 21 days.

Guidelines for setting up isolation facility ward in COVID -19 outbreaks from National Centre for Disease Control, Directorate General of Health Services Ministry of Health and Family Welfare announced that there should be strict adherence to infection prevention control practices in all health services. All healthcare personnel are well aware and appropriate measures for necessary personal protective equipment (PPE) and hand sanitizer, soap, water etc. are in place. The designated hospitals will ensure that all healthcare staff is trained in washing of hands, respiratory etiquettes, donning/doffing & proper disposal of personal protective equipment(PPE)s and bio-medical waste management. At all times doctors, nurses and paramedics working in the clinical areas will wear three layered surgical mask and gloves. The medical personnel working in isolation and critical care facilities will wear full complement of PPE including N95 masks. The support of staff engaged in cleaning and disinfection will also wear full complement of PPE (table- 2, 3, 4). Environmental cleaning should be done twice daily and consist of damp dusting²¹⁻²⁵.

Structure of SARS-CoV-2 (COVID-19)

SARS-CoV-2 has enveloped, positive-sense, single-stranded RNA (ssRNA) coronavirus virus and spherical. Two-thirds of viral RNA, mainly located in the first open reading frame (ORF 1a and 1b), encodes 16 non-structure proteins (NSP). The rest part of the virus genome encodes four essential structural proteins: spike (S) glycoprotein, small envelope (E) protein, matrix (M) protein is the most abundant, responsible for the shape of the envelope and nucleocapsid (N) protein. It affects the respiratory tract mainly by binding to the ACE-2 receptors and TMPRSS2 which get attached to the cell membranes of cells of lungs and other organs of the body. Spike S glycoprotein of SARS-CoV-2 binds to host cell receptors, angiotensin-converting enzyme 2 (ACE2) that is a critical step for virus entry. S protein is cleaved by cellular Trans-membrane Serine Protease 2(TMPRSS2) into two separate polypeptides S1 and S2. S1 also consists of a receptor binding domain (RBD) which binds to virus receptor ACE2. S2 mediates virus cell membrane fusion by heptad repeats-1(HR1) and heptad repeats-2(HR2) N proteins remain associated with the RNA forming a nucleocapsid inside the envelope and also numerous addition proteins. N protein is largely involved in processes relating to the viral genome, it is also involved in other aspects of the SARS-CoV-2 replication cycle and the host cellular response to viral infection. (table-1) This virus-receptor interaction allows the viral genome to be delivered to the host cell cytoplasm for replication²⁶⁻³². Severe acute respiratory syndrome (SARS) is a severe, acute respiratory illness caused by the SARS coronavirus and Middle East respiratory syndrome (MERS) is a severe, acute respiratory illness caused by the MERS coronavirus (MERS-CoV). Literature suggested that SARS-CoV-2 to identity 79% approximately sequence to SARS-CoV and 50% approximately to MERS-CoV. SARS-CoV-2 have a similar receptor-binding domain structure as SARS-CoV which shows SARS-CoV-2 uses ACE2 receptor in humans for infection³³⁻³⁹ (table-1).

Researchers first identified a coronavirus in 1937, isolating one that was responsible for a type of bronchitis in birds that had the potential to devastate poultry stocks. Scientist found evidence of human coronaviruses in the 1960s, in the noses of people with the common cold. Human coronaviruses that are particularly prevalent include 229E, NL63, OC43, and HKU1⁴⁰⁻⁴². Symptoms of COVID-19 According to the CDC, people may start to experience symptoms 2-14 days after exposure to the virus. Symptoms may include: Muscle pain, headache, fever, cough, loss of taste or smell, nausea or vomiting, diarrhea, chills, sore throat, congestion, shortness of breath, runny nose, and fatigue^{22,23,25}. The Lancet and Cell Press, more than 30,000 related articles and book chapters free to access on ScienceDirect(table-2). The National Institutes of Health (NIH) 2684 studies found for: COVID-19(funded internationally). NIH explores 346,147 research studies in all 50 states and in 216 countries (table-4).

In countries where the BCG vaccine (TB vaccine) remains an essential vaccination has significantly lower mortality rate. BCG vaccine has shown protective effects against non-mycobacterial infections so it is assumed that the cytokines have a role in providing immunoprotection against COVID-19 to those who have been BCG vaccinated. Although WHO does not consider BCG vaccination for COVID-19 treatment^{43,44}.

In May first week COVID-19 testing 315-government laboratories and 111-qualified private laboratories have also been made functional in our country, and in July approx. 1000 laboratories are testing COVID-19. A total of 1,43,81,303 samples have been tested in July first week in India. 402529 active cases and 724577 cases cured or discharged from COVID hospitals where 28084 deaths have been reported at Indian government webpage (table-3).

Laboratory Testing

Indian Council of Medical Research has issued guidance on the use of TrueNat (disease specific real time micro PCR tests) ⁴⁵ Beta-coronavirus as a screening test on April 14, 2020. Asymptomatic direct and high-risk contacts of a confirmed case should be tested once between day 5 and day 14 of coming in contact. Issued guidance for hotspots in large meetings or migrants centers require all symptoms fever, cough and sore throat to be tested within 7 days of illness by RT-PCR method and after 7 days of illness there should be antibody testing even negative or confirmed by rRT-PCR). Indian Council of Medical Research Department of Health Research, Ministry of Health and Family Welfare, Government of India announced on the 19th of May 2020 that the TrueNat system is now a comprehensive assay for screening and confirmation of COVID-19 cases. First sample is collected in viral lysis buffer and therefore biosafety and biosecurity requirements for use of TrueNat machines are minimal. Second assay comprises of following two levels.

Level I: This is E gene screening assay. All samples of suspect COVID-19 should be first tested by this assay. All negatives are to be considered as true negatives. All positive samples should be subjected to confirmation by next level. Level II RdRp gene is confirmatory assay. All samples that test positive by this assay must be considered as true positive. No further RT-PCR based confirmation is required for samples that are positive after these two levels of the assay mentioned above. Finally all positive and negative results must be reported to ICMR portal in real time manner (Table-3). We are also using TrueNat testing of COVID-19 at our center.

Drawback of lockdown and Covid-19 pandemic situation:

In India there are number of people suffering from poverty, illiteracy and migration for jobs from their birth place and also local people who demand jobs, lot of them are suffering from low education mainly migrant labourers. Government of India is conducting many schemes for their education, health, even providing houses, grains, medical treatment in low cost as 'Poshan Abhiyaan' for women and child development, the Mahatma Gandhi National Rural Employment Guarantee Act 2005, Samagra Shiksha and Mid-Day Meal for school education and literacy, National Health Mission many more. These public schemes cannot facilitate every citizen because of the communication gap between citizens and government due to illiteracy, lack of documentation and identifications. Less educated labourers are not hygienic and they can spread COVID-19 as carriers via migration. In the situation of COVID-19 lockdown many citizens lost their jobs and were forced to move back to their birth place. This is a disastrous situation and many problems can rise in pre and post lockdown as crime may increase, along with unemployment, economic loss, psychological illnesses etc. In the field of health care, the patients who are suffering from chronic diseases and need urgent treatment or surgery are being treated by doctors wearing PPEs. Government is providing PPE, face masks, COVID-19 testing at subsidized rate or free in many places. These problems are not only faced by India but worldwide. As doctors and supportive paramedical staff are treating the COVID-19 patients day and night, they left their home in this time of crisis and continually saving the life, in these days they are the real hero who are saving many life, we salute our these real heroes. Our government has massive challenges and focussed approach is required. The government's efforts are very appreciative because the government is not only working for India but for other countries as well ^{14, 15, 24}.

The terminology used to understand different preventive managements to protect the infection of COVID-19 follows ²¹: **Social distancing or physical distancing:** It refers to keeping space between yourself and other people while going out or in crowded spaces. **Quarantine:** Refer to keeping someone home and separated from other people if they might have been exposed to the virus. **Isolation:** Refer to keeping sick people away from healthy people, including using a separate bedroom and bathroom whenever possible (table-2,3,6).

Pandemic and our Centre's Experience:

As our center is investigating the perception of risks and psychological states of Health Care Workers in the early phases of the COVID-19 outbreak in Northern parts of India. Data collection will be used for research purposes title "Psycho-social impact of COVID-19 on Health Care Workers" in their webpage, a questionnaire is available for employees to participate and record responses.

The COVID-19 disaster has influence on patients, employees and business of a hospital as it affect on the quality and revenues, some important precautions can help cope up with this disaster. Most of the hospitals in India are taking various precautionary measures for safety of their patients and employees to understand various strategies of their quality, business operations, and revenues during this disaster. As we mentioned above, during lockdown hospitals have been giving treatment to their patients via telecommunication by giving treatment at the comfort of their home and keep them safe from COVID-19. At our center patients who had being suffering from chronic diseases of heart, kidney, liver, even dental issues or cancer etc. are being treated. Patients requiring transplantation, or if they have to come routinely for dialysis, chemotherapy, are treated with all precautions and are regularly tested for COVID-19. The details are summarized in table-5 and table-6 which has been of great help in the prevention of spreading the disease at our center.

Conclusions

We have investigated the problem of COVID-19 spread in India. We have observed the data through internet and government web pages and surveyed the actual data trend of COVID-19 spread in India. It has been proved that social distancing, lockdown and personal hygiene plays an important role in preventing this disease. The effect of lockdown has been proved with different recovery rates. To conclude, follow the recommended guidelines and take preventive medication in daily practical life it as helps us recovering from this pandemic. A hospital has huge number of employees, patients and visitors, infection can spread very fast in this environment but due to good awareness and strictly following the recommended guidelines, the infection can be prevented by following the information in table-5 and 6. The safety

recommendations to our centre's employees have shown zero COVID-19 cases. In the coming days of July 2020 or further any patient or employee is found to be positive for COVID-19 will be isolated as per guidelines.

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Table-1: Comparison of SARS-CoV-2, SARS-CoV, and MERS-CoV

Characteristic	(MERS-CoV)	SARS-CoV	SARS-CoV-2
	Middle East respiratory syndrome coronavirus (MERS-CoV)	Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV)	Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV)
Transmission type	Animal to human then person to person Bats-Camels-Human	Animal to human then person to person Bats-Civet & Raccoon Dogs-Human	Animal to human then person to person Probably Bats-Not identified-Human
Transmission Modes	Droplet, contact, airborne	Droplet, contact, airborne	Droplet, contact, airborne
Measurements for Infection control	Standard, contact, and droplet safety measures; airborne	Standard, contact, and droplet safety measures; airborne	Standard, contact, and droplet, safety measures; airborne
Non-structural proteins	non-structural proteins, size almost same in all	non-structural proteins, size almost same in all	non-structural proteins ,size almost same in all
Structural proteins	(S) spike, envelope (E), membrane (M), and nucleocapsid(N) are represented of the four structural proteins , but differences in structural proteins arrangement from SARS and SARS-2	(S) spike, envelope (E), membrane (M), and nucleocapsid(N) are represented of the four structural proteins , but differences in structural proteins arrangement from MARS and SARS-2	(S) spike, envelope (E), membrane (M), and nucleocapsid(N) are represented of the four structural proteins , but differences in Structural proteins arrangement from MARS and SARS
Similarities between these	MERS-CoV similar to SARS-CoV-2 about 50%.	SARS-CoV similar to SARS-CoV-2 about 79%.	
Cell entry pathway	Cell membrane fusion	Endosomal fusion	Endosomal fusion
Viral phylogenecity	Lineage C βCoV	Lineage B βCoV	Lineage B βCoV
Host receptor	DPP4 (CD26)	ACE2	ACE2
Major host proteases that activate spike protein	Cathepsin L, TMPRSS2	Cathepsin L, TMPRSS2, HAT The attachment protein “spike” of the new coronavirus COVID-19 , cellular attachment factor (ACE2) and the cellular protease TMPRSS2 for their activation.	Cathepsin L, TMPRSS2, HAT The attachment protein “spike” of the new coronavirus COVID-19 , cellular attachment factor (ACE2) and the cellular protease TMPRSS2 for their activation.
Clinical syndrome	pneumonia in elderly with multiple comorbidities; upper respiratory tract infection, asymptomatic infection in children and immune-compatible persons	pneumonia in elderly with multiple comorbidities; upper respiratory tract infection, asymptomatic infection in children and immune-compatible persons	pneumonia in elderly with multiple comorbidities; upper respiratory tract infection, asymptomatic infection in children and immune-compatible persons
Common symptoms	Acute kidney injury and diarrhea	Acute kidney injury and diarrhea, fever, cough	Acute kidney injury and diarrhea, fever, cough
Common changes in blood tests	Low levels of leukocytes ,lymphocytes , platelets. reduced liver and kidney function	Low levels of leukocytes ,lymphocytes , platelets. reduced liver and kidney function increased SGPT and SGOT levels,	Low levels of leukocytes ,lymphocytes , platelets. reduced liver and kidney function , increased SGPT and SGOT, LDH, Ferritin levels
Severe complications	Acute respiratory distress syndrome(ARDS), Acute kidney injury	Acute respiratory distress syndrome(ARDS), Acute kidney injury	Acute respiratory distress syndrome(ARDS), Acute kidney injury, multi organ failure
Specimens for diagnosis with positive viral RNA (RT-PCR)	nasopharyngeal aspirate or swab, nasal and/or throat swab; extrapulmonary—urine, feces, blood, tissue biopsy bronchoalveolar lavage	nasopharyngeal aspirate or swab, nasal and/or throat swab; extrapulmonary—urine, feces, blood, tissue biopsy bronchoalveolar lavage	nasopharyngeal aspirate or swab, nasal and/or throat swab; extrapulmonary—urine, feces, blood, tissue biopsy bronchoalveolar lavage
Antibody testing	S1 Available	S 1 under development	S1 Available
Active immunization	Immunized has receptor-binding domain (RBD) of S1 (mice)	Recombinant S protein fragment mice immunized with SARS-CoV receptor-binding domain (RBD)	SARS-CoV-2 RBD exhibited significantly higher binding affinity to ACE2 ... to a host receptor through the receptor-binding domain (RBD) in

			the S1 immunization is not yet being done.
Passive immunization	anti-MERS-CoV S antibodies which accelerated virus clearance in mice	plasma therapy used in humans for recovery	plasma therapy used in humans for recovery

Table-2: Recommended Guidance with their web page links

Coronavirus Disease 2019 (COVID-19) Guidelines:	https://emedicine.medscape.com/article/2500114-guidelines
World Health Organization Clinical management of COVID-19:	https://www.who.int/publications/i/item/clinical-management-of-covid-19
US Centers for Disease Control and Prevention COVID-19 clinical care :	https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinicalguidance-management-patients.html
Clinical trials (US) :	https://clinicaltrials.gov/ct2/search
COVID-19 is an emerging, rapidly evolving situation :	https://www.nih.gov/coronavirus https://www.covid19treatmentguidelines.nih.gov/overview/
National Institutes of Health COVID-19 page :	https://www.nih.gov/health-information
Solid organ transplantation :	https://www.myast.org/covid-19-information#
The World Society for Pediatric Infectious Diseases (WSPID) is a non-profit organization and a confederation of national and international Pediatric Infectious Diseases (PID) societies.	https://wspid.org/covid-19/
Surviving Sepsis Campaign: guideline on the management of critically ill adults with COVID-19:	https://pubmed.ncbi.nlm.nih.gov/32222812/
Care of patients with cancer during COVID-19 pandemic: European society for medical oncology	https://www.esmo.org/guidelines/cancer-patient-management-during-the-covid-19-pandemic
Care of patients with cancer during COVID-19 pandemic: American Society for Radiation Oncology	https://www.asco.org/asco-coronavirus-information/care-individuals-cancer-during-covid-19
Obstetricians and gynecologists, to improving women's health. Pregnancy:	https://www.acog.org/en/Topics/COVID-19
Interim Guidance for COVID-19 and Persons with HIV :	https://aidsinfo.nih.gov/guidelines/html/8/covid-19-and-persons-with-hiv--interim-guidance-/0
Medscape drug reference :	https://www.medscape.com/resource/coronavirus
In Elsevier web page under the research tab, the latest early-stage and peer-reviewed research on COVID-19 from journals including Novel Coronavirus Information Center:	https://www.elsevier.com/connect/coronavirus-information-center
Australia's healthcare professionals with continually updated, evidence-based clinical guidelines:	https://covid19evidence.net.au/
The National Institutes of Health (NIH)	https://clinicaltrials.gov/ct2/results?cond=COVID-19 https://clinicaltrials.gov/
The World Society for Pediatric Infectious Diseases (WSPID) is a non-profit organization and a confederation of national and international Pediatric Infectious Diseases (PID) societies. WSPID's webpage has included guidelines and links resources for health care professionals and children around the world.	https://wspid.org/covid-19/

Table-3: Indian guidelines of covid-19

Government of India, Ministry of Health & Family welfare, Ministry of Home affairs broadcast the recommendations of World Health Organization (WHO) and Center for Disease Control and prevention (CDC) healthy practices to prevent the infection of covid-19.	
National Informatics Centre:	https://www.mygov.in/covid-19
Ministry of Health & Family Welfare:	https://www.mohfw.gov.in/pdf/GuidelinesonpreventivemeasuresstocontainspreadofCOVID19inworkplacesettings.pdf https://www.mohfw.gov.in/pdf/ClinicalManagementProtocolforCOVID19.pdf
National Centre for Disease Control	https://ncdc.gov.in/index1.php?lang=1&level=1&sublinkid=703&lid=550
Ministry of Home Affairs:	https://www.mha.gov.in/notifications/circulars-covid-19

Table-4: Resources from National Institutes of Health (NIH): Guidelines Coronavirus (COVID-19) Web Links

https://www.nih.gov/coronavirus	
OpenData COVID-19 portal	https://opendata.ncats.nih.gov/covid19/
Disaster Research Response (DR2)	https://dr2.nlm.nih.gov/
Information for NIH Applicants and Recipients (Grants & Funding)	https://grants.nih.gov/policy/natural-disasters/coronavirus.htm
Scientists and Organizations can submit COVID-19 asset candidates to this portal	https://grants.nih.gov/grants/rfi/rfi.cfm?ID=107
COVID-19 Social Media Resources (Office of the Director)	https://www.nih.gov/news-events/covid-19-social-media-resources
SARS-CoV-2 Images and B-roll (National Institute of Allergy and Infectious Diseases)(link is external)	https://www.flickr.com/photos/niaid/albums/72157712914621487
Clinical Trials Related to COVID-19 Listed on ClinicalTrials.gov	https://clinicaltrials.gov/ct2/results?cond=COVID-19
COVID Digital Pathology Repository	https://covid19pathology.nih.gov/
Coronavirus Disease 2019 (COVID-19) Treatment Guidelines	https://www.covid19treatmentguidelines.nih.gov/
Coronaviruses (National Institute of Allergy and Infectious Diseases)	https://www.niaid.nih.gov/diseases-conditions/coronaviruses
Coronavirus resources (National Library of Medicine)	https://www.nlm.nih.gov/index.html#Novel_Coronavirus
Coronavirus news and resources for global health researchers (Fogarty International Center)	https://www.fic.nih.gov/ResearchTopics/Pages/infectiousdiseases-coronavirus-cov.aspx
In the News: Coronavirus and “Alternative” Treatments (National Center for Complementary and Integrative Health)	https://www.nccih.nih.gov/health/in-the-news-coronavirus-and-alternative-treatments
NIH Guidance on Travel and Meetings (Office of the Director)	https://www.nih.gov/health-information/nih-guidance-travel-meetings

Table-5: summarizes lines of actions protocols, education resources, events dates and the etiquette we are following in our center.

Precautionary measures	Guidelines from WHO, CDC, ICMR Directorate General of Health Services and other organizations	Education resources in our center	Dates
Education on Corona Virus for all employees and patients	<ol style="list-style-type: none"> 1- E-mails have been circulated to spread awareness of Corona Virus 2-Corona Virus awareness programmes have been conducted by Medical team 3-Circulation of the list of Do's and Don'ts Do's to stop spread the infection, 4-Public transportation is avoided by employees and also patients. 5- Awareness for Corona Virus testing available and home sample collection has been circulated 6-Crisis Management Committee for covid-19 pandemic situation. 	Our webpage (Medanta App.), posters, web-classes power point presentations.	07/03/2020 to 9/7/2020 every day and amendments as per changes in recommended guidelines from many national and international organizations
Human Resources department has an important role	<p>Allowed work-from-home for employees</p> <ol style="list-style-type: none"> 1-Work from home made mandatory for all pregnant female employees and other employees with medical history 2- Face to Face Interviews avoided. 3-Special levels facility for infected employees or lack of transport during lockdown. 	Our webpage (or Medanta App.)	14/03/2020,17/03/2020
Sanitisation and health safety measures for all employees and patients	<ol style="list-style-type: none"> 1-Regular sanitization of door handles and taps 2-Sufficient availability of sanitizers, soaps at relevant points in center 3- Increased Frequency of housekeeping 4- Temperature checking and sanitizers at entry points of the center 5- Employees with mildest of symptoms are advised to home quarantine and employees with any symptoms of covid-19 are asked to contact nearby Government covid-19 special Hospital for check-up. 6- Masks gloves, sanitizers have been made available for all employees 7- Isolation rooms are provided at entry point if anyone is found positive. They cannot enter our center and are being sent to government covid centres. 	Our webpage (Medanta App.), posters, web-classes power point presentations.	24/03/2020 to 06/07/2020
• Instructions for travel, meetings and entry of patients and other visitors.	<ol style="list-style-type: none"> 1- All kinds of meetings, trainings & other employee crowds have been stopped during covid -19 pandemic. 2- Most meetings with comorbidity patients, vendors, and other visitors have been held telephonically or via video-conference. In special case any of these allowed to visit with all the mandatory precautions, such as temperature check, sanitized and covid-19 test report and patients' travel history is also checked. Visitors and patients are asked to filled self-declaration form. 3- Any important personal travel if required should be permitted or be reported back to Human Resources (HR). 4-Official travel is not allowed 5- Face masks have been made compulsory for all employees, patients and visitors 	Our webpage (Medanta App.), IT department, References lab of testing, web cameras	14/03/2020, 25/03/2020,28/03/2020
Measures to manage sales and revenue	Discounts are offered on procedure charges and testing as per government guidelines to increase sales in domestic market after lockdown.	official mails	24/03/2020

Measures related to operations for patients services	1-Keep high inventory of raw materials 2- Offer Work from home option to (our centre) employees, they are also trying to address the cyber security concerns associated with such schemes. 3- Prepare alternate broadcast up-linking and downlinking plans in the event of quarantine situation of telecast facilities for continuing education and conferences.Hospitals are finding alternates to business travel; meetings are being held only via teleconference/ video-conference.	web-classes power point presentations, official mails	07/03/2020 to 06/07/2020 all official mails, web-classes
• Measures to manage costs and finances: number of patients surgeries and new patients admission have being stop in lockdown period	Reduced credit 1- hospitals are restricting overall operating costs and all non-essential expenses 2- Even some essential costs are being reduced such as marketing cost, vehicle supply cost, business development cost, customer care cost, etc. 3- New testing launches are being cancelled 4- Negotiating with vendors for increased credit period	official mails	07/03/2020 to 17/06/2020

Table-6: To easily understand about covid-19 and its preventions, our center educated every employee with the help of the following safety guidelines:

<p>How to monitor covid -19 symptoms and what to do?</p> <p>Monitor your body temperature at home</p> <ol style="list-style-type: none"> Difficulty in breathing or shortness of breath Fever, cough, chills and muscle pain Loss of taste or smell and sore throat Other less common symptoms include: nausea, vomiting or diarrhea Self-medication for fever should not be taken Self-monitor symptoms and timely report them
<p>How to maintain healthy habits?</p> <ol style="list-style-type: none"> Get enough sleep Do Exercise or Yoga routinely Eat healthy foods Drink plenty of water and exercise Keep immune system strong by eating healthy foods and maintaining a healthy lifestyle
<p>What is social distancing?</p> <p>Social distancing is also called “physical distancing,” It means keeping space between yourself and other people outside of your home. To practice social or physical distancing:</p> <p>Stay at least 6 feet (about 2 arms’ length) away from other people</p> <ol style="list-style-type: none"> Do not meet in groups Stay out of crowded places and avoid mass gatherings
<p>Why practice social distancing?</p> <p>COVID-19 spreads primarily among people who are in close contact (within 6 feet) for an extended period. Spread happens when an infected person coughs, sneezes, or talks, and droplets from their mouth or nose are propelled into the air and land in the mouths or noses of people nearby or are inhaled into the lungs.</p> <ol style="list-style-type: none"> Touching a contaminated surface or object can also spread infection and social distancing aids in limiting such opportunities. Recent studies indicate that infected but asymptomatic people possibly also play a role in the spread of COVID-19.
<p>Why Hospital Entrance is important?</p> <ol style="list-style-type: none"> Everyone should wear a mask at all times inside hospital premises as well as outside Cloth masks should be washed every day at home Thermal screening should be done at all entry points Hand sanitizer should be done at all entry points
<p>What is the importance of Face Mask and why it’s mandatory?</p> <ol style="list-style-type: none"> Correct use of face mask is very important in avoiding infection Use the face mask as recommended for your area of work Do not touch the front of the mask at any time to adjust the mask. Use the strings. In case you do, wash/sanitize your hands Do not wear the mask below the nose or let it slip below the nose

<p>f) Do not remove mask when in common areas or near other people</p> <p>g) When someone tests positive, the most important factor that determines your risk of contracting the disease is the time you had spent with that person without wearing a face mask and at what distance – keep this in mind at all places</p>
<p>How to use door and lift in right way?</p> <p>Most of the doors should be kept open</p> <p>If any door is closed, use your elbow or tissue to open the door</p> <p>a) Avoid touching any door handles</p> <p>b) If touching door handles, doors or anything wash with soap or sanitize your hands</p> <p>c) Lifts should have maximum 5 people facing the walls</p>
<p>Why Stairs to be preferred over lifts?</p> <p>a) Do not touch side rails while taking staircase.</p> <p>b) In case you accidentally touch the hand rails, sanitize your hands</p> <p>c) PPE should be used by all employees according to the guidelines set for different work areas</p>
<p>Is social distancing good enough to stop the spread of infection?</p> <p>Everyone has to maintain social distancing at all times at all places, and also during travel to work because infection from aerosolized droplets can remain in the air and travel long distances.</p> <p>a) Ensure work stations are more than 6 feet apart</p> <p>b) Clean and disinfect work stations and chair regularly</p> <p>c) Avoid sharing office stationery items</p>
<p>Do meetings spread infection quickly?</p> <p>a) Large gatherings or meetings of 10 or more people should be discouraged</p> <p>b) Conduct virtual meetings wherever possible</p> <p>c) When conducting meetings physically, maintain social distancing and wear face mask</p>
<p>What is Attendance and identification?</p> <p>a) Everyone must download and use Aarogya Setu app from government of India to their mobiles</p> <p>b) Use your Employee ID Card for marking attendance</p> <p>c) Always wear your ID card as your face will be covered with the mask</p>
<p>Is Hand washing work as undying protector?</p> <p>Wash or sanitize the hands when:</p> <p>a) Before entering and when exiting the hospital</p> <p>b) Before wearing the mask and after removing the mask</p> <p>c) Before and after using any vehicle</p> <p>d) After using any shared office equipment (landline phone/computer/fax etc.)</p> <p>e) After washroom use</p> <p>f) After touching door knobs, lift buttons, stair railings etc.</p> <p>g) Before eating</p> <p>h) After blowing your nose, coughing or sneezing</p> <p>i) Whenever they look dirty</p> <p>j) WHO five moments of hand hygiene during patient care</p>
<p>What precautions should be taken at eating time?</p> <p>a) In all the cafeterias, maintain social distancing</p> <p>b) Chairs on each table have been reduced and placed at diagonal ends of the table, do not pull them to sit opposite each other</p> <p>c) Self-serving should be done away with in cafeterias</p> <p>d) During lunch, leave your visor/ goggles etc. at your work area, do not take them to the cafeteria</p> <p>e) Do not share glasses, cups and spoons</p> <p>f) Preferably carry your own water bottles and tea/coffee mugs to work</p> <p>g) Clean them yourselves rather than asking someone to clean or use disposable ones</p>
<p>How to use travel and transport?</p> <p>a) Travelling for work /by public or personal transport, follow social distancing norms.</p> <p>b) On a two wheeler, no pillion riding, and a four wheeler only two people.</p> <p>c) In public transport, guidelines must be followed</p>
<p>What should be the line of action after reaching home?</p> <p>Disinfect your shoes before entering your house or leave them out</p> <p>a) Wash your hands, take a shower and change clothes</p> <p>b) Wash clothes with detergent</p> <p>c) Sanitize your mobiles, pens etc.</p>
<p>How to avoid fomite transmission?</p> <p>a) Use digital currency; avoid taking/paying cash currency</p> <p>b) Do not give your phone to anyone nor touch anyone's phone</p>
<p>What are steps should be taken immediately if one of your colleagues or patient tests positive?</p> <p>Infection Control team should be maintained that does contact tracing for all positives patients and staff</p> <p>a) They will get in touch with you and evaluate your risk of exposure</p> <p>b) If you have a high risk exposure, you will be quarantined and tested on 7th day after exposure</p>

What special kind of counselling service for employees during covid-19?
In case of anxiety or stress, free consultation and counselling over phone should be made available.

Abbreviations:

1. ACE2 Angiotensin Converting Enzyme 2
2. ARDS Acute Respiratory Distress Syndrome
3. BCG Bacillus Calmette Guérin
4. CDC Centre for Disease Control and Prevention
5. DHR Department of Health Research
6. HR1 Heptad Repeats-1
7. HR2 Heptad Repeats-2
8. ICU intensive care unit
9. ICMR Indian Council of Medical Research
10. MERS-CoV Middle East respiratory syndrome coronavirus
11. NIH National Institutes of Health
12. NSP Non-Structure Proteins
13. PPE personal protective equipment
14. RBD Receptor Binding Domain
15. RT-PCR reverse transcription polymerase chain reaction
16. SARS-CoV severe acute respiratory syndrome coronavirus
17. SGPT Serum Glutamic Pyruvic Transaminase.
18. SGOT Serum Glutamic Oxaloacetic Transaminase
19. ssRNA Sense, Single-Stranded Ribonucleic acid
20. TB Tuberculosis
21. TMPRSS2 Trans-Membrane Serine Protease 2
22. WHO World Health Organization

