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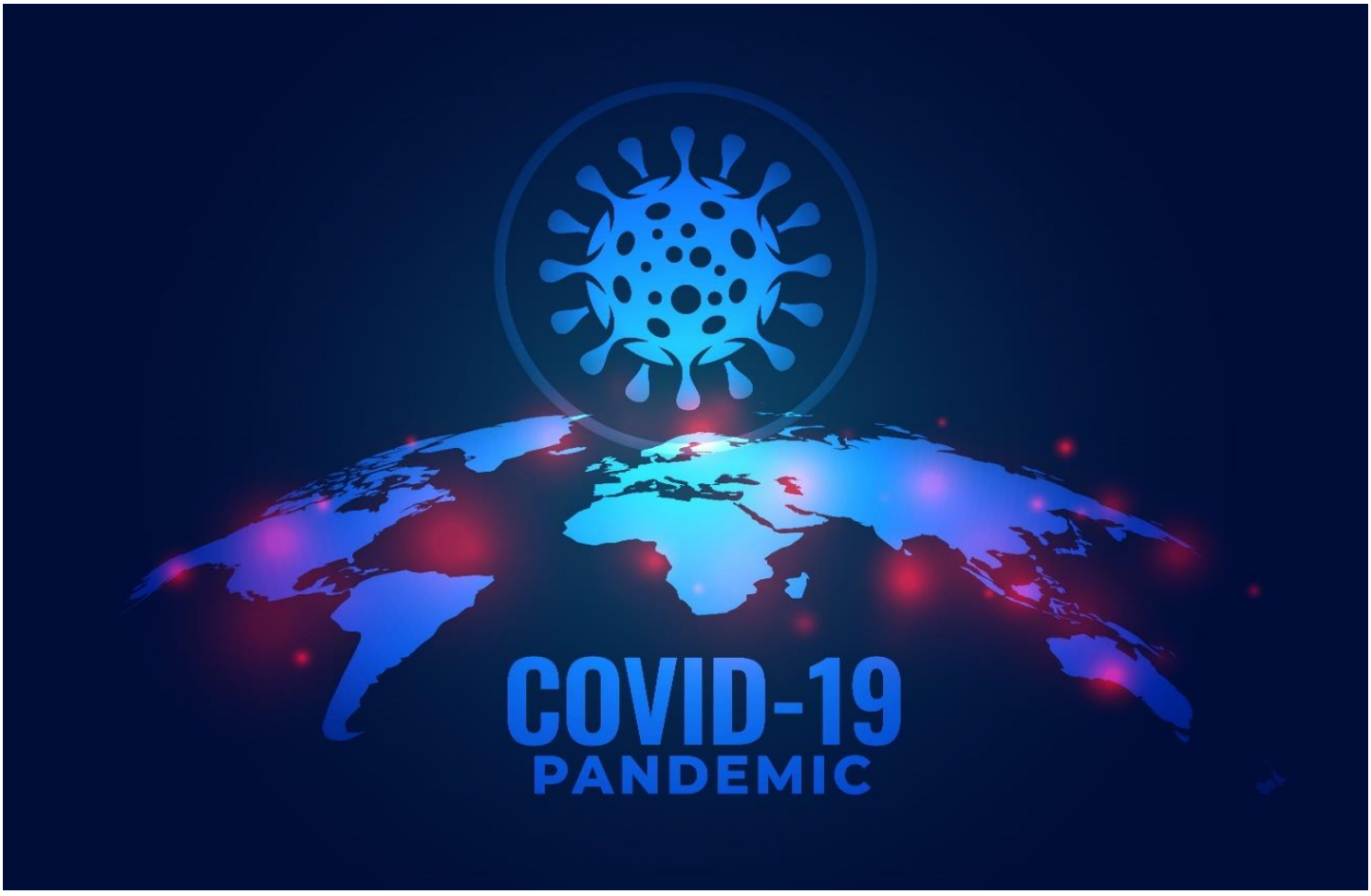
SARS-CoV2 MANUAL



From the Editor's desk

The SARS-CoV-2 has been spreading at a rapid rate across the world, due to which World Health Organization (WHO) has declared it as a pandemic disease. A lot of things about this virus are still unknown, including its treatment is under trail. We would like to request all readers to excuse all the contributors of this handbook for the minor errors; this was purely due to the shortage of time we got for framing this SARS-CoV-2 consensus. This handbook is available to everyone for free. Therefore, let us all join hand and fight against SARS-CoV-2.

TEAM SGRD

CONTENT

1 Introduction

Coronaviruses are non-segmented, enveloped, positive-sense, single-strand ribonucleic acid viruses, belonging to the Coronaviridae family. Six types of coronavirus have been identified that cause human disease: four cause mild respiratory symptoms, whereas the other two, Middle East respiratory syndrome (MERS) coronavirus and severe acute respiratory syndrome (SARS) coronavirus, have caused epidemics with high mortality rates. In December 2019, a new type of coronavirus called SARS-COV2 was extracted from lower respiratory tract samples of several patients in Wuhan, China. These patients presented with symptoms of severe pneumonia, including fever, fatigue, dry cough, and respiratory distress. Novel COVID-19 – infected pneumonia (NCIP) is believed to have originated in a wet "seafood market" in Wuhan.(1)

Pandemic originated in China and it has quickly spread over all continents affecting most countries in the world. However, there are some striking differences on how SARS-COV2 is behaving in different countries. For instance, in Italy there has been strong curtailing of social interactions and SARS-COV2 mortality is still high. In contrast, Japan had some of the earlier cases, but the mortality is low despite not having adopted some the more restrictive social isolation measurements. These puzzling differences have been adjudicated to different cultural norms as well as differences in medical care standards. The mean incubation period is estimated to be 5.2 days, which allows air travellers to spread the disease globally. Virus transmission can occur during the incubation period in asymptomatic patients. Moreover, high sputum viral loads were found in a patient with NCIP during the recovery phase. As of February 5, 2020, more than 25,000 confirmed cases have been reported worldwide, with a rapid rise in the number of deaths. The World Health Organization has announced the outbreak a global health emergency.(1)

Coronaviruses are enveloped RNA viruses that cause respiratory illnesses of varying severity from the common cold to fatal pneumonia. Numerous coronaviruses, first discovered in domestic poultry in the 1930s, cause respiratory, gastrointestinal, liver, and neurologic diseases in animals. Only 7 coronaviruses are known to cause disease in humans. Four of the 7 coronaviruses most frequently cause symptoms of the common cold. Coronaviruses 229E and OC43 cause the common cold; the serotypes NL63 and HUK1 have also been associated with the common cold. Rarely, severe lower respiratory tract infections, including pneumonia, can occur, primarily in infants, older people, and the immunocompromised. Three of the 7

coronaviruses cause much more severe, and sometimes fatal, respiratory infections in humans than other coronaviruses and have caused major outbreaks of deadly pneumonia in the 21st century.[2]

1.1 MERS-CoV

MERS-CoV was identified in 2012 as the cause of Middle East respiratory syndrome (MERS). MERS-CoV infection was first reported in September 2012 in Saudi Arabia, but an outbreak in April 2012 in Jordan was confirmed retrospectively. Through 2019, worldwide, nearly 2500 cases of MERS-CoV infection (with at least 850 related deaths) have been reported from 27 countries; all cases of MERS have been linked through travel to or residence in countries in and near the Arabian Peninsula, with > 80% involving Saudi Arabia. The largest known outbreak of MERS outside the Arabian Peninsula occurred in the Republic of Korea in 2015. The outbreak was associated with a traveller returning from the Arabian Peninsula. Cases have also been confirmed in countries throughout Europe, Asia, North Africa, the Middle East, and the United States in patients who were either transferred there for care or became ill after returning from the Middle East. Preliminary seroprevalence studies indicate that the infection is not widespread in Saudi Arabia. The World Health Organization considers the risk of contracting MERS-CoV infection to be very low for pilgrims traveling to Saudi Arabia for Umrah and Hajj. For additional information about pilgrimages to the Middle East. Median age of patients with MERS-CoV is 56 years, and the male: female ratio is about 1.6:1. Infection tends to be more severe in older patients and in patients with a pre-existing disorder such as diabetes, a chronic heart disorder, or a chronic renal disorder.[3]

Transmission of MERS-CoV

MERS-CoV may be transmitted from person to person via direct contact, respiratory droplets (particles > 5 micrometers), or aerosols (particles < 5 micrometers). Person-to-person transmission has been established by the development of infection in people whose only risk was close contact with people who had MERS. The reservoir of MERS-CoV is thought to be dromedary camels, but the mechanism of transmission from camels to humans is unknown. Most reported cases involved direct human-tohuman transmission in health care settings. If MERS is suspected in a patient, infection control measures must be initiated promptly to prevent transmission in health care settings. Symptoms and Signs The incubation period for MERS-CoV is about 5 days. Most reported cases have involved severe respiratory illness requiring hospitalization, with a case fatality rate of about 35%; however, at least 21% of patients had mild or no symptoms. Fever, chills, myalgia, and cough are common.

Gastrointestinal symptoms (e.g., diarrhoea, vomiting, abdominal pain) occur in about one third of patients. Manifestations may be severe enough to require treatment in an intensive care unit, but recently, the proportion of such cases has declined sharply. (4)

Diagnosis

Real-time reverse transcriptase-polymerase chain reaction (RT-PCR) testing of upper and lower respiratory secretions and serum MERS should be suspected in patients who have an unexplained acute febrile lower respiratory infection and who have had either of the following within 14 days of symptom onset: Travel to or residence in an area where MERS has recently been reported or where transmission could have occurred Contact with a health care facility where MERS has been transmitted Close contact with a patient who was ill with suspected MERS, MERS should also be suspected in patients who have had close contact with a patient with suspected MERS and who have a fever whether they have respiratory symptoms or not. The most recent recommendations are available from the Centers for Disease Control and Prevention. Testing should include real-time RT-PCR testing of upper and lower respiratory secretions, ideally taken from different sites and at different times. Serum should be obtained from patients and from all, even asymptomatic close contacts, including health care workers (to help identify mild or asymptomatic MERS). Serum is obtained immediately after MERS is suspected or after contacts are exposed (acute serum) and 3 to 4 weeks later (convalescent serum). Testing is done at state health departments or the Centers for Disease Control and Prevention. In all patients, chest imaging detects abnormalities, which may be subtle or extensive, unilateral or bilateral. In some patients, levels of LDH and AST are elevated and/or levels of platelets and lymphocytes are low. A few patients have acute kidney injury. Disseminated intravascular coagulation and hemolysis may develop. (4)

MERS: Epidemiology and Imaging MERS coronavirus

Infection was first reported in Jeddah, Saudi Arabia, in 2012. Since then, approximately 2,500 laboratory-confirmed human infections have been reported in 27 countries, with a mortality rate reaching more than 30%. The risk for transmission to family members and health workers seems to be low. Despite the potential for epidemics through Hajj pilgrimages in Saudi Arabia, there has not been a notable outbreak recently. It seems that in contrast to the human-to-human pathway as the main route of virus spread in SARS coronavirus, the transmission in MERS coronavirus occurs mainly through nonhuman, zoonotic sources (e.g., bats, camels). In 83% of patients with MERS coronavirus infection, initial radiography will show some degree of abnormality, with ground-glass opacities being the most common finding. Likewise, CT will

show bilateral and predominantly groundglass opacities, with a predilection to basilar and peripheral lung zones, but observation of isolated consolidation (20%) or pleural effusion (33%) is not uncommon in MERS. [4]

Treatment Supportive: Treatment of MERS is supportive. To help prevent spread from suspected cases, health care practitioners should use standard, contact, and airborne precautions.

1.2 SARS-CoV

SARS–CoV was identified in 2002 as the cause of an outbreak of severe acute respiratory syndrome (SARS). These coronaviruses that cause severe respiratory infections are zoonotic pathogens, which begin in infected animals and are transmitted from animals to people. SARS is much more severe than other coronavirus infections. SARS is an influenza-like illness that occasionally leads to progressively severe respiratory insufficiency. SARS-CoV was first detected in the Guangdong province of China in November 2002 and subsequently spread to > 30 countries. In this outbreak, > 8000 cases were reported worldwide, with 774 deaths (about a 10% case fatality rate, which varied significantly by age, ranging from < 1% in people ≤ 24 years to > 50% in those ≥ 65 years). The SARS-CoV outbreak was the first time that the Centers for Disease Control and Prevention advised against travel to a region. This outbreak subsided, and no new cases have been identified since 2004. The immediate source was presumed to be civet cats, that were being sold for food in a live-animal market and had likely been infected through contact with a bat before they were captured for sale. Bats are frequent hosts of coronaviruses.[4]

Transmission of MERS-CoV

SARS-CoV is transmitted from person to person by close personal contact. It is thought to be transmitted most readily by respiratory droplets produced when an infected person coughs or sneezes.[4]

Diagnosis of SARS

Diagnosis of SARS is made clinically, and treatment is supportive. Coordination of prompt and rigid infection control practices helped control the 2002 outbreak rapidly. Although no new cases have been reported since 2004, SARS should not be considered eliminated because the causative virus has an animal reservoir from which it conceivably could remerge.[4]

Epidemiology and Imaging SARS-CoV

SARS-CoV coronavirus was first recognized in 2003 after a global outbreak originating in southern China. The virus spread to 29 countries globally, affecting 8,422 patients, with a mortality rate of 11%. The transmission of this coronavirus occurs via large droplets and direct inoculation. The virus may remain viable for up to 24 hours on dry surfaces, but it loses its infectivity with widely available disinfectants such as Clorox and formaldehyde. Initial chest radiography in individuals with SARS will frequently show focal or multifocal, unilateral, ill-defined air-space opacities in the middle and lower peripheral lung zones, with progressive multifocal consolidation over a course of 6 to 12 days involving one or both lungs Chest CT will show areas of ground-glass opacity and consolidation in involved segments.[4]

1.3 SARS-CoV2 (COVID-19)

SARS-CoV2 is an acute, sometimes severe respiratory illness caused by a novel coronavirus SARS-CoV2. SARS-CoV2 was first reported in late 2019 in Wuhan, China and has since spread extensively in China and worldwide. As Per WHO documentation most people with SARS-COV2 develop only mild or uncomplicated illness, approximately 14% develop severe disease that requires hospitalization and oxygen support, and 5% require admission to an intensive care unit. In severe cases, SARS-CoV2 can be complicated by the acute respiratory distress syndrome (ARDS), sepsis and septic shock, multi organ failure, including acute kidney injury and cardiac injury. Older age and co-morbid disease have been reported as risk factors for death, and 2 Clinical management of severe acute respiratory infection (SARI) when SARS-CoV2 disease is suspected: Interim guidance recent multivariable analysis confirmed older age, higher Sequential Organ Failure Assessment (SOFA) score and d-dimer > 1 µg/L on admission were associated with higher mortality. A median duration of viral RNA detection of 20.0 days in survivors, but SARS-CoV2 virus was detectable until death in non-survivors. The longest observed duration of viral shedding in survivors was 37 days.[5]

2 Who are at Risk?

Older adults and people who have severe underlying medical conditions like heart or lung disease or diabetes seem to be at higher risk for developing more serious complications from SARS-CoV2 illness.

2.1 People with Moderate to Severe Asthma

People with moderate to severe asthma may be at higher risk of getting very sick from SARS-CoV2. SARS-CoV2 can affect your respiratory tract (nose, throat, lungs), cause an asthma attack, and possibly lead to pneumonia and acute respiratory disease.

People of all ages with underlying medical conditions, particularly if not well controlled, including:

- People with chronic lung disease or moderate to severe asthma
- People who have serious heart conditions
- People who are immunocompromised: Many conditions can cause a person to be immunocompromised, including cancer treatment, smoking, bone marrow or organ transplantation, immune deficiencies, poorly controlled HIV or AIDS, and prolonged use of corticosteroids and other immune weakening medications.
- People with severe obesity (body mass index [BMI] of 40 or higher).
- People with diabetes.
- People with chronic kidney disease undergoing dialysis.
- People with liver disease.

2.2 People with HIV

Older adults and people of any age who have a serious underlying medical condition might be at higher risk for severe illness, including people who are immunocompromised. The risk for people with HIV getting very sick is greatest in:

- People with a low CD4 cell count, and
- People not on HIV treatment (antiretroviral therapy or ART).

People with HIV can also be at increased risk of getting very sick with SARS-COV2 based on their age and other medical conditions.

2.3 Children

All children are susceptible to SARS-COV2 though infants are more vulnerable to the infection. Children get a less severe infection than adults.

2.4 Pregnant women, unborn children and neonates

There are a limited number of cases reported to date where pregnant women have contracted SARS-COV2, all in the late third trimester and nearly all delivered? Seven days after the onset of symptom; most will only experience mild or moderate cold/flu like symptoms. At present, expert opinion is that the fetus is unlikely to be exposed during pregnancy. Only one case of possible vertical transmission caused by intrauterine infection has been identified. Transmission of the virus is therefore most likely to occur post birth.

2.5 Health care professionals

Health workers are at the front line of the SARS-COV2 outbreak response and as such are exposed to hazards that put them at risk of infection. Hazards include pathogen exposure, long working hours, psychological distress, fatigue, occupational burnout, stigma, and physical and psychological violence.(6)

Health workers exposure risk assessment and management in the context of SARS-COV2 virus This tool is to be used by health care facilities that have either cared for or admitted SARS-COV2 patients; it is to be completed for all health workers who have been exposed to a confirmed SARS-COV2 patient in a health care facility. It will help determine the risk of SARS-COV2 virus infection of all HCWs who have been exposed to a SARS-COV2 patient and then provides recommendations for appropriate management of these HCWs, according to their infection risk.

SARS-CoV2 virus exposure risk assessment form for HCW's

1. Interviewer information	
A. Interviewer name:	
B. Interview date (DD/MM/YYYY):	__/__/_____
C. Interviewer phone number:	
D. Does the HCW have a history of staying in the same household or classroom environment with a confirmed SARS-COV2 patient?	□ Yes □ No
E. Does the HCW have history of traveling together in close proximity (within 1 meter) with a confirmed COVID- 19 patient in any kind of conveyance?	□ Yes □ No
2. Health worker information	
A. Last name:	
B. First name:	
C. Age	

D. Sex:	□ Male □ Female □ Prefer not to answer
E. City:	
F. Country:	
G. Contact details (phone number):	
H. Type of health care personnel:	□ Medical doctor □ Physician assistant □ Registered nurse (or equivalent) □ Assistant nurse, nurse technician (or equivalent) □ Radiology /X-ray technician □ Phlebotomist □ Ophthalmologist □ Physical therapist □ Respiratory therapist □ Nutritionist/dietitian □ Midwife □ Pharmacist □ Pharmacy technician or dispenser □ Laboratory personnel □ Admission/reception clerk □ Patient transporter □ Catering staff □ Cleaner □ Other (specify):
I. Type of health care facility:	Tick all that apply: □ Outpatient □ Emergency □ Medical unit □ Intensive care unit □ Cleaning services □ Laboratory □ Pharmacy □ Other, specify:
3. Health worker interactions with SARS-CoV2 patient information	
A. Date of health worker first exposure to confirmed SARS-COV2 patient:	Date (DD/MM/YYYY): _____/_____/_____ □ Not known
B. Name of health care facility where patient received care:	
C. Type of health care setting:	□ Hospital □ Outpatient clinic □ Primary health centre □ Home care for patients with mild symptoms □ Other (specify):

D. City:	
E. Country:	
F. Multiple SARS-COV2 patients in health care facility	□ Yes □ No □ Unknown If yes, number of patients (approximate if exact number not known):
4. HCW activities performed on SARS-CoV2 patient in health care facility	
A. Did you provide direct care to a confirmed SARS-CoV2 patient?	□ Yes □ No □ Unknown
B. Did you have face-to-face contact (within 1 metre) with a confirmed SARS-COV2 patient in a health care facility?	□ Yes □ No □ Unknown
C. Were you present when any aerosol-generating procedures were performed on the patient? See below for examples	□ Yes □ No □ Unknown
- If yes, what type of procedure?	□ Tracheal intubation □ Nebulizer treatment □ Open airway suctioning □ Collection of sputum □ Tracheotomy □ Bronchoscopy □ Cardiopulmonary resuscitation (CPR) □ Other (specify):
D. Did you have direct contact with the environment where the confirmed SARS-CoV2 patient was cared for? e.g. bed, linen, medical equipment, bathroom etc	□ Yes □ No □ Unknown
E. Were you involved in health care interaction(s) (paid or unpaid) in another health care facility during the period above?	□ Other health care facility (public or private) □ Ambulance □ Home care □ No other health care facility

If the health worker responds 'Yes' to any of the Questions 4A – 4D the health worker should be considered as being exposed to SARS-COV2 virus.

5. Adherence to IPC procedures during health care interactions	
For the following questions, please quantify the frequency with which you wore PPE, as recommended:	
'Always, as recommended' means more than 95% of the time; 'Most of the time' means 50% or more but not 100%; 'occasionally' means 20% to under 50% and 'Rarely' means less than 20%.	
A. During a health care interaction with a SARS-COV2 patient, did you wear personal protective equipment (PPE)?	□ Yes □ No
- If yes, for each item of PPE below, indicate how often you used it:	
- 1. Single-use gloves	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
- 2. Medical mask	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
- 3. Face shield or goggles/protective glasses	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
- 4. Disposable gown	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
B. During a health care interaction with the SARS-COV2 patient, did you remove and replace your PPE according to protocol (e.g. when medical mask became wet, disposed the wet PPE in the waste bin, performed hand hygiene, etc.)?	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
C. During a health care interaction with the SARS-COV2 patient, did you perform hand hygiene before and after touching the SARS-COV2 patient (whether or not you were wearing gloves)?	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
D. During a health care interaction with the SARS-COV2 patient, did you perform hand hygiene before and after any clean or aseptic procedure was performed (e.g. while inserting a peripheral vascular catheter, urinary catheter, intubation, etc.)?	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
E. During a health care interaction with the SARS-COV2 patient, did you perform hand hygiene after exposure to body fluid?	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
F. During a health care interaction with the SARS-COV2 patient, did you perform hand hygiene after touching the patient's surroundings (bed, door	□ Always, as recommended □ Most of the time

handle, etc.), regardless of whether you were wearing gloves?	□ Occasionally □ Rarely
G. During a health care interaction with the SARS-COV2 patient, were high-touch surfaces decontaminated frequently (at least three times daily)?	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
6. Adherence to IPC measures when performing aerosol-generating procedures (e.g. tracheal intubation, nebulizer treatment, open airway suctioning, collection of sputum, tracheotomy, bronchoscopy, cardiopulmonary resuscitation (CPR), etc.).	
For the following questions, please quantify the frequency with which you wore PPE, as recommended:	
'Always, as recommended' means more than 95% of the time; 'Most of the time' means 50% or more but not 100%; 'occasionally' means 20% to under 50% and 'Rarely' means less than 20%.	
A. During aerosol-generating procedures on a SARS-COV2 patient, did you wear personal protective equipment (PPE)?	□ Yes □ No
- If yes, for each item of PPE below, indicate how often you used it:	
- 1. Single-use gloves	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
- 2. N95 mask (or equivalent respirator)	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
- 3. Face shield or goggles/protective glasses	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
- 4. Disposable gown	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
- 5. Waterproof apron	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
B. During aerosol-generating procedures on the SARS-COV2 patient, did you remove and replace your PPE according to protocol (e.g. when medical mask became wet, disposed the wet PPE in the waste bin, performed hand hygiene, etc.)?	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
C. During aerosol-generating procedures on the SARS-COV2 patient, did you perform hand hygiene before and after touching the SARS-COV2 patient,	□ Always, as recommended □ Most of the time

regardless of whether you were wearing gloves?	□ Occasionally □ Rarely
D. During aerosol-generating procedures on the SARS-COV2 patient, did you perform hand hygiene before and after any clean or aseptic procedure was performed?	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
E. During aerosol-generating procedures on the SARS-COV2 patient, did you perform hand hygiene after touching the patient's surroundings (bed, door handle, etc), regardless of whether you were wearing gloves?	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
F. During aerosol-generating procedures on the SARS-COV2 patient, were high-touch surfaces decontaminated frequently (at least three times daily)?	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
7. Accidents with biological material	
A. During a health care interaction with a SARS-COV2 patient, did you have any type of accident with body fluid/respiratory secretions? See below for examples	□ Yes □ No
- If yes, which type of accident?	□ Splash of biological fluid/respiratory secretions in the mucous membrane of eyes □ Splash of biological fluid/respiratory secretions in the mucous membrane of mouth/nose □ Splash of biological fluid/respiratory secretions on non-intact skin □ Puncture/sharp accident with any material contaminated with biological fluid/respiratory secretions

3 Transmission of SARS-CoV2

Early SARS-CoV2 cases were linked to a live animal market in Wuhan, China, suggesting that the virus was initially transmitted from animals to humans. Person-to-person spread occurs through contact with infected secretions, mainly via contact with large respiratory droplets, but it could also occur via contact with a surface contaminated by respiratory droplets; it is unclear whether infection can be acquired by the fecal-oral route or what role aerosols (small respiratory droplets) play in the transmission. It is also unclear how readily this virus spreads from person to person or how sustainable infection will be in a population, although it appears more transmissible than SARS and spread is probably more similar to that of influenza. Super-spreaders played an extraordinary role in driving the 2003 SARS outbreak and may also play a significant role in the current SARS-COV2 outbreak. A super-spreader is an individual who transmits an infection to a significantly greater number of other people than the average infected person. Quarantine and isolation measures are being applied in an attempt to limit the local, regional, and global spread of this outbreak.[7]

3.1 Respiratory Transmission

While the basic outlines of disease transmission have not been upended by SARS-COV2, there are some nuances that could play an important role in the spread of the disease. From the beginning, the Centers for Disease Control and Prevention (CDC) have said that SARS-CoV-2 is a respiratory virus, and as such, it is mainly transmitted between people through "respiratory droplets" when symptomatic people sneeze or cough. This idea, that large droplets of virus-laden mucus are the primary mode of transmission, guides the CDC's advice to maintain at least a 6-foot distance between you and other people. The thinking is that gravity causes those large droplets (which are bigger than about .0002 inches, or 5 microns, in size) to fall to the ground within a distance of 6 feet from the infected person.

But that 6-foot guideline is more of a ballpark estimate than a hard and fast rule, said Josh Santarpia, the research director of Countering Weapons of Mass Destruction Program at the University of Nebraska's National Strategic Research Institute.

"There really isn't anything magic about standing 6 feet away from someone that you are interacting with directly. If you stand talking to someone who is infected with the virus, whether it's 3 feet or 6 feet, there is going to be some risk of infection," Santarpia told Live Science in an email.

That's because even large respiratory droplets can travel fairly far if the airflow conditions are right, Santarpia said.

And some experts believe the 6-foot rule is based on outdated information.

"6 feet is probably not safe enough. The 3-6 foot rule is based on a few studies from the 1930s and 1940s, which have since been shown to be wrong — droplets can travel farther than 6 feet," said Raina MacIntyre, a principal research fellow and professor of global biosecurity, who heads the Biosecurity Program at the Kirby Institute, in Australia. "Yet hospital infection control experts continue to believe this rule. It's like the flat Earth theory — anyone who tries to discuss the actual evidence is shouted down by a chorus of believers."

Another complicating factor is that at least 25% of the people who are transmitting the virus may be asymptomatic at the time, said Dr. Robert Redfield, director of the Centers for Disease Control and Prevention, Live Science previously reported. That suggests coughs and sneezes aren't necessary to transmit the virus, though it's not clear whether simply breathing spreads the virus, or whether talking is required. [7]

3.2 Aerosol Transmission

In order for the virus to be spread without being coughed or sneezed in large drops of mucus, it has to somehow be able to suspend in the air for long enough to infect passersby. And that's another complicating factor in figuring out transmission: People emit virus particles in a range of sizes, and some are small enough to be considered aerosols, or fine particles that can stay suspended in the air for hours and can travel with air currents across tens of feet. A study published March 17 in the New England Journal of Medicine found that virus particles that were aerosolized could remain viable for up to 3 hours.

What's not clear from this data is whether the virus is commonly transmitted via aerosols, or how long the virus remains infectious in aerosols in real-world settings. In that study, researchers used an extremely high concentration of virus particles, which may not reflect those shed by people with the disease.

"To my knowledge, there is no definitive evidence of transmission where aerosol was the only possible route," Santarpia told Live Science. (For instance, even someone who's not sneezing may emit respiratory droplets when talking, because people may spit when talking, and those droplets could be deposited on surfaces.)

One case study is suggestive however; a choir group in Skagit, Washington, met for a two-hour practice in early March. No one was symptomatic, so singers weren't coughing or sneezing out infected droplets. And everyone kept their distance. But when all was said and done, 45 people

became infected with SARS-COV2 and at least two people died from the virus, the Los Angeles Times reported. That suggested the viral particles were shed as aerosols by someone, before being inhaled or otherwise acquired by other choir members. A 2019 study in the journal Nature Scientific Reports found that people emit more aerosol particles when talking, and that louder speech volumes correlate to more aerosol particles being emitted.

That case, along with those studies, suggest that the virus can be routinely transmitted via aerosols, though other routes of transmission (such as large droplets being emitted during singing or speech) are still possible explanations. In the 2003 SARS outbreak, aerosol transmission occurred during hospital procedures that generated large volumes of aerosols, such as intubation. [7]

3.3 Contact Transmission

There's one other route that's thought to play a role in the spread of SARS-COV2: contact transmission. In that situation, viral particles emitted from the respiratory tract of an infected individual land on a surface. Then, another person touches that object, then touches their nose, mouth or eyes. The virus then sneaks into the body via the mucous membranes, infecting the second person.

So far, no one knows how common this mode of transmission is, but it does seem to be possible. One study found that SARS-CoV-2 could remain viable on surfaces such as cardboard for up to 24 hours, and on plastic and steel for 2 to 3 days.

Santarpia has studied viral surface contamination in the context of patients hospitalized with SARS-COV2 at the University of Nebraska Medical Center. In that study, which was published March 26 on the preprint database medRxiv, Santarpia and his colleagues found viral contamination in air samples, on surfaces such as toilets, and on frequently touched surfaces.

Also on March 26, the CDC published a report on the coronavirus-stricken Diamond Princess cruise ship. An investigative team found traces of RNA from SARS-CoV-2 on surfaces throughout the cruise ship, in the cabins of both symptomatic and asymptomatic infected passengers, up to 17 days later — though no evidence suggests this viral RNA was still infectious. (SARS-CoV-2 is an RNA virus, meaning its main genetic material is RNA, not DNA.)

Another case report published by the CDC — this time from Singapore — also suggests contact with contaminated surfaces can transmit the virus. In that case, a person who was infected with SARS-CoV-2, but not yet symptomatic, attended a church service. Later in the day, another person sat in the same seat, and also came down with SARS-COV2. Whether the virus was

contracted via a contaminated surface, or potentially a lingering aerosol, however, couldn't be ascertained. (7)

3.4 Is food safe?

So far, there's no evidence that the virus is transmitted via food. The virus will not live long in food proper, and while it's possible that food packaging from groceries or takeout could contain small concentrations of virus particles, it is easy to mitigate this risk by washing your hands after handling groceries or takeout. (7)

3.5 The takeaway?

The fact that so many seemingly innocuous activities can transmit the virus can be scary. And it can be even scarier not knowing the actual risks associated with each transmission route — without that information, how can we take the right steps to protect ourselves?

But ultimately, there's some reassurance in the data as well.

What is true is that persons who have a member of their household infected with the virus have a higher probability of getting infected with COVID than people who do not have a member of their household infected. This tells us a lot. This tells us that close contact is the most important factor

Briefly passing a person on the street, at a distance of 6 feet, is likely to pose a low risk of infection, Martin said. Chatting at a distance of 6 feet with that same person for a few hours will be higher risk, he said. Ultimately, social distancing is a powerful tool to cut all the hypothesized routes of transmission. (7)

3.6 How long can the coronavirus stay airborne

A study done by National Institute of Allergy and Infectious Diseases' Laboratory of Virology in the Division of Intramural Research in Hamilton, Montana helps to answer this question. The researchers used a nebulizer to blow coronaviruses into the air. They found that infectious viruses could remain in the air for up to three hours. The results of the study were published in the New England Journal of Medicine on March 17, 2020.

How long can the coronavirus that causes SARS-COV2 survive on surfaces

A recent study found that the SARS-COV2 coronavirus can survive up to four hours on copper, up to 24 hours on cardboard, and up to two to three days on plastic and stainless steel. The researchers also found that this virus can hang out as droplets in the air for up to three hours before they fall. But most often they will fall more quickly.

There's a lot we still don't know, such as how different conditions, such as exposure to sunlight, heat, or cold, can affect these survival times.

As we learn more, continue to follow the CDC's recommendations for cleaning frequently touched surfaces and objects every day. These include counters, tabletops, doorknobs, bathroom fixtures, toilets, phones, keyboards, tablets, and bedside tables.

If surfaces are dirty, first clean them using a detergent and water, then disinfect them. A list of products suitable for use against SARS-COV2 is available on https://www.americanchemistry.com/Novel-Coronavirus-Fighting-Products-List.pdf. This list has been pre-approved by the U.S. Environmental Protection Agency (EPA) for use during the SARS-COV2 outbreak.

In addition, wash your hands for 20 seconds with soap and water after bringing in packages, or after trips to the grocery store or other places where you may have come into contact with infected surfaces. [7]

3.7 Warm weather EFFECTS AND outbreak of SARS-COV2

Some viruses, like the common cold and flu, spread more when the weather is colder. But it is still possible to become sick with these viruses during warmer months. At this time, we do not know whether the spread of SARS-COV2 will decrease when the weather warms up. [7]

4 SCREENING

Consider SARS-COV2 as a possible etiology of patients with acute respiratory illness under certain conditions.

Although the majority of people with SARS-COV2 have uncomplicated or mild illness (81%), some will develop severe illness requiring oxygen therapy (14%) and approximately 5% will require intensive care unit treatment. Of those critically ill, most will require mechanical ventilation. The most common diagnosis in severe SARS-COV2 patients is severe pneumonia. Early recognition of suspected patients allows for timely initiation of appropriate measures. Early identification of those with severe illness, such as severe pneumonia, allows for optimized supportive care treatments and safe, rapid referral and admission to a designated hospital ward or intensive care unit according to institutional or national protocols.

Older patients and those with comorbidities, such as cardiovascular disease and diabetes mellitus, have increased risk of severe disease and mortality. They may present with mild symptoms but have high risk of deterioration and should be admitted to a designated unit for close monitoring.

Screening should be done at first point of contact at the emergency department or outpatient department/clinics. Suspected SARS-COV2 patients should be given a mask and directed to separate area. Keep at least 1 m distance between suspected patients. Standard precautions should always be applied in all areas of health care facilities. Standard precautions include hand hygiene and the use of personal protective equipment (PPE) when in indirect and direct contact with patients' blood, body fluids, secretions (including respiratory secretions) and non-intact skin. Standard precautions also include prevention of needle-stick or sharps injury; safe waste management; cleaning and disinfection of equipment; and cleaning of the environment. In addition to standard precautions, health care workers should do a point-of-care risk assessment at every patient contact to determine whether additional precautions (e.g. droplet, contact, or airborne) are required.[8]

4.1 Precautions while screening and Procedure

Instructions for patients

Give suspect patient a medical mask and direct patient to separate area; --aan isolation room if available. Keep at least 1 m distance between suspected patients and other patients. Instruct all patients to cover nose and mouth during coughing or sneezing with tissue or flexed elbow and perform hand hygiene after contact with respiratory secretions.

Droplet precautions

Droplet precautions prevent large droplet transmission of respiratory viruses. Use a medical mask if working within 1 m of the patient. Place patients in single rooms, or group together those with the same etiological diagnosis. If an etiological diagnosis is not possible, group patients with similar clinical diagnosis and based on epidemiological risk factors, with a spatial separation. When providing care in close contact with a patient with respiratory symptoms (e.g. coughing or sneezing), use eye protection (face mask or goggles), because sprays of secretions may occur. Limit patient movement within the institution and ensure that patients wear medical masks when outside their rooms.

Contact precautions

Contact precautions prevent direct or indirect transmission from contact with contaminated surfaces or equipment (i.e. contact with contaminated oxygen tubing/interfaces). Use PPE (medical mask, eye protection, gloves and gown) when entering room and remove PPE when leaving and practise hand hygiene after PPE removal. If possible, use either disposable or dedicated equipment (e.g. stethoscopes, blood pressure cuffs, pulse oximeters, and thermometers). If equipment needs to be shared among patients, clean and disinfect between each patient use. Ensure that health care workers refrain from touching their eyes, nose, and mouth with potentially contaminated gloved or ungloved hands. Avoid contaminating environmental surfaces that are not directly related to patient care (e.g. door handles and light switches). Avoid medically unnecessary movement of patients or transport. Perform hand hygiene.

Declaration Form for Screening of Patients

SCREENING AND SELF DECLARATION FORM FOR TRAVEL HISTORY AND SYMPTOMS OF COVID-19

(To be completed by patient/attendant at Hospital Entrance/ Flu Clinic/ Emergency)

Full Name: …… Age ……

Gender …… Contact Number ……

Address …… SGRD ID (If Applicable) ……

Sr. No. Particulars

1. Do you have symptoms of Respiratory illness?

   ☐ Fever ☐ Cough Sore Throat ☐ Breathlessness ☐ Running Nose

   Any Other …… Please Specify

2. Travel History in Last 14 days: By Road/ Rail/ Seaways/Air

   ☐ Domestic ☐ International

   Specify Countries and Cities visited by you in last 14 days:

   Date of Arrival in city (If Applicable):

   Any Contact with any international traveller in last 14 days: ☐ Yes ☐ No

   Country: Date of Contact:

3. Any history of Contact with a laboratory confirmed SARS-COV2 cases in last 14 days. (If Applicable) Details of Contact:

   Date of Contact …… Name of Contact ……

   Contact No……

4. Are you a Healthcare Provider ☐ Yes ☐ No

5. Family member accompanying Relationship Contact Number

6. Hospital Staff who attended to the Patient: Designation & ID Contact Number

During the lockdown in the wake of the current Corona pandemic, I have come to the hospital by myself for an Emergency Treatment.

If I am an asymptomatic carrier or an undiagnosed patient with COVID 19, I suspect it may endanger doctors and hospital staff; It is my responsibility to take appropriate precautions and to follow the Protocols prescribed by them.

I also know that I may get an infection from the hospital of from a doctor, and I will take every precaution to prevent this from happening, but I will not at all hold doctors and hospital staff accountable if such infection occurs to me or my accompanying persons.

Signature of

Patient/Attendant …… Relationship ……

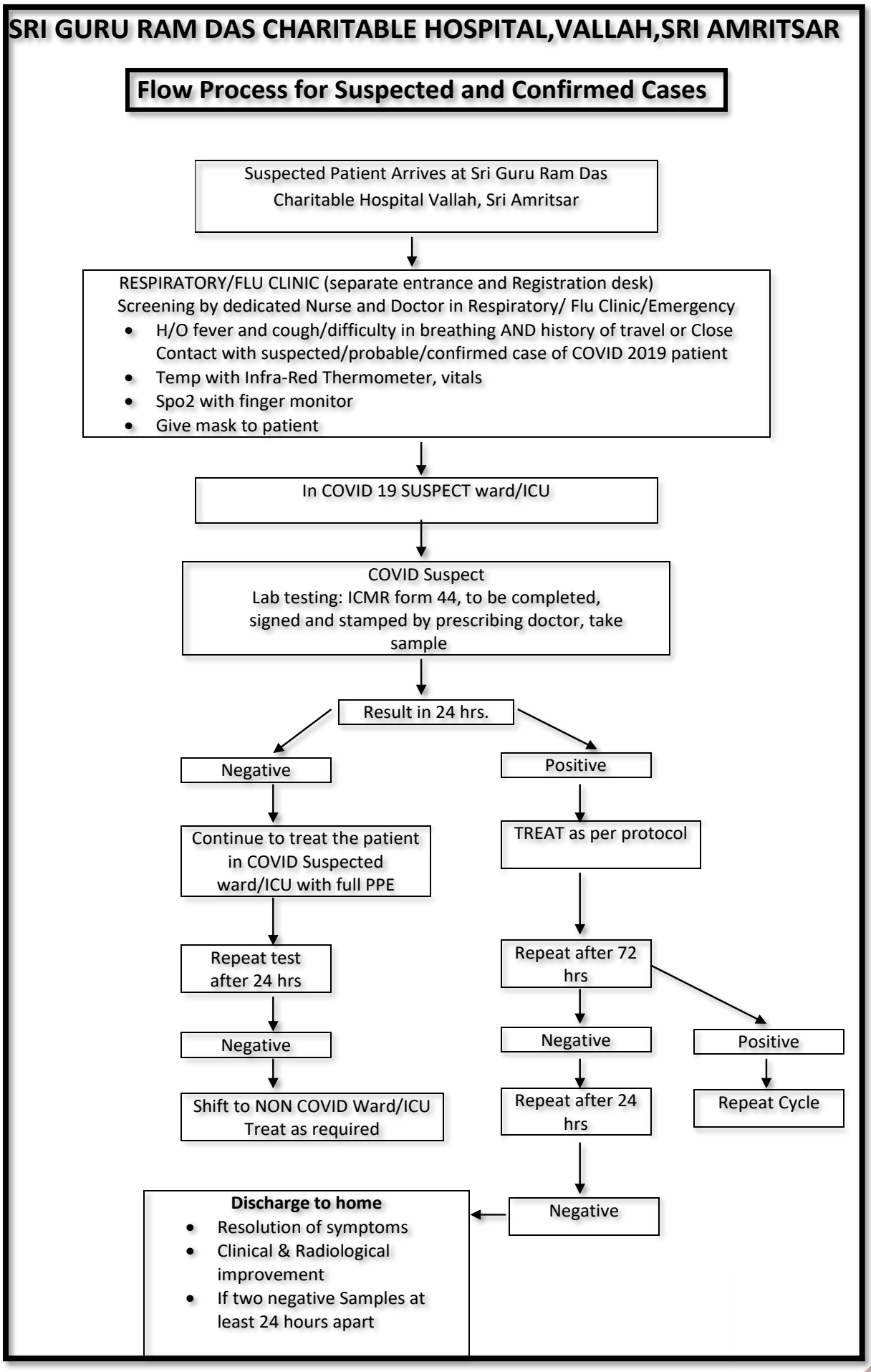
Advice by Doctor……

…… ……

Signature & Name of Staff **Date & Time**

SRI GURU RAM DAS CHARITABLE HOSPITAL,VALLAH,SRI AMRITSAR

Flow Process for Suspected and Confirmed Cases



5 Sign and Symptoms

5.1 When to Seek Medical Attention

If you develop emergency warning signs for SARS-COV2 get medical attention immediately. Emergency warning signs include*:

- Trouble breathing
- Persistent pain or pressure in the chest
- New confusion or inability to arouse
- Bluish lips or face

This list is not all inclusive. Please consult your medical provider for any other symptoms that are severe or concerning.

These symptoms may appear 2-14 days after exposure (based on the incubation period of MERS-CoV viruses).

- Fever
- Cough
- Shortness of breath

5.2 SARS-COV2 versus the flu

We are still learning about whether the 2019 coronavirus is more or less deadly than the seasonal flu.

This is difficult to determine because the number of total cases (including mild cases in people who don't seek treatment or get tested) is unknown. However, early evidence suggests that this coronavirus causes more deaths than the seasonal flu.

An estimated 0.06 to 0.1 percent Trusted Source of people who developed the flu during the 2019-2020 flu season in the United Stated died (as of March 14, 2020). This is compared to 1.2 percent of those with a confirmed case of SARS-COV2 in the United States, according to the Centers for Disease Control and Prevention (CDC)Trusted Source.

Here are some common symptoms of the flu:

- cough
- runny or stuffy nose
- sneezing
- sore throat
- fever
- headache

- fatigue
- chills
- body aches

5.3 Clinical Features

(Adapted from Repor tof the WHO-China Joint Mission on Coronavirus Disease 2019 based on 55, 924 cases and a study on 1099 cases by Guanetal published in N Eng J Med)[9]

- Fever (87.9%),
- Dry cough (67.7%),
- Fatigue (38.1%),
- Sputum production (33.4%),
- Shortness of breath (18.6%),
- Sore throat (13.9%),
- Headache (13.6%),
- Myalgia or arthralgia (14.8%),
- Chills (11.4%),
- Nausea or vomiting (5.0%),
- Nasal congestion (4.8%),
- Diarrhea (3.7%),
- Hemoptysis (0.9%),
- Conjunctival congestion (0.8%)
- ARDS (3%)
- Abnormalities on chest X-ray (59%)
- Radiological findings on chest CT scan (86%)

5.4 SARS-COV2 symptoms worsen rapidly after several days of illness

Common symptoms of SARS-COV2 include fever, dry cough, fatigue, loss of appetite, loss of smell, and body ache. In some people, SARS-COV2 causes more severe symptoms like high fever, severe cough, and shortness of breath, which often indicates pneumonia.

A person may have mild symptoms for about one week, then worsen rapidly. Let your doctor know if your symptoms quickly worsen over a short period of time. Also call the doctor right away if you or a loved one with SARS-COV2 experience any of the following emergency symptoms: trouble breathing, persistent pain or pressure in the chest, confusion or inability to arouse the person, or bluish lips or face.

5.5 Lost sense of smell a symptom of SARS-COV2

Increasing evidence suggests that a lost sense of smell, known medically as anosmia, may be a symptom of SARS-COV2. This is not surprising, because viral infections are a leading cause of loss of sense of smell, and SARS-COV2 is a caused by a virus. Still, loss of smell might help doctors identify people who do not have other symptoms, but who might be infected with the SARS-COV2 virus — and who might be unwittingly infecting others.

A statement written by a group of ear, nose and throat specialists (otolaryngologists) in the United Kingdom reported that in Germany, two out of three confirmed SARS-COV2 cases had a loss of sense of smell; in South Korea, 30% of people with mild symptoms who tested positive for SARS-COV2 reported anosmia as their main symptom.

On March 22nd, the American Academy of Otolaryngology–Head and Neck Surgery recommended that anosmia be added to the list of SARS-COV2 symptoms used to screen people for possible testing or self-isolation.

In addition to SARS-COV2, loss of smell can also result from allergies as well as other viruses, including rhinoviruses that cause the common cold. So anosmia alone does not mean you have SARS-COV2. Studies are being done to get more definitive answers about how common anosmia is in people with SARS-COV2, at what point after infection loss of smell occurs, and how to distinguish loss of smell caused by SARS-COV2 from loss of smell caused by allergies, other viruses, or other causes altogether.

Until we know more, tell your doctor right away if you find yourself newly unable to smell. He or she may prompt you to get tested and to self-isolate.

5.6 Mortality of COVID 19

So far, influenza has caused far more total deaths this flu season, both in the US and worldwide, than SARS-COV2. This is why you may have heard it said that the flu is a bigger threat.

Regarding the fatality rate, it appears that the risk of death with the pandemic coronavirus infection (commonly estimated at about 1%) is far less than it was for SARS (approximately 11%) and MERS (about 35%), but will likely be higher than the risk from seasonal flu (which averages about 0.1%). We will have a more accurate estimate of fatality rate for this coronavirus infection once testing becomes more available.

What we do know so far is the risk of death very much depends on your age and your overall health. Children appear to be at very low risk of severe disease and death. Older adults and

those who smoke or have chronic diseases such as diabetes, heart disease, or lung disease have a higher chance of developing complications like pneumonia, which could be deadly.

5.7 Covid-19 In Paediatric Population

In this outbreak, compared with adult cases, there are relatively fewer cases of children, milder symptoms and better prognosis. Also, children are less frequently exposed to the main sources of transmission. Most infected children recover one to two weeks after the onset of symptoms, and no deaths had been reported by February 2020. According to the recent report of the China-WHO Joint Mission Expert Group, the current domestic case data show that children under 18 years of age account for 2.4% of all reported cases, and no deaths have been reported.[10]

SARS-COV2 is less affected in children

The time period of the outbreak, is the winter vacation time of the university, middle school and kindergarten. It is a good time for everyone to stay in their own families, which is equivalent to active home isolation. It is a good time to avoid the collective cluster disease by chance.

Secondly, humoral and cellular immune development in children is not fully developed. This may be one of the mechanisms that lead to the absence of severe immune responses after viral infection.

As SARS-COV2 virus exploits the ACE2 receptors to gain entry inside the cells, under expression, immaturity of ACE2 receptors in children is another hypothesis in this regard.

Moreover, recurrent exposure to viruses like respiratory syncytial virus in winters can induce more immunoglobulins levels against the new virus infection compare to adults. There is no direct evidence of vertical mother-to-child transmission, but new born can be infected through close contact.

In recent studies in china, there was no significant gender difference in children and it was suggested that alleges ranged from 1 day to 18 years were prone to infected by the SARS-COV2. The symptoms of SARS-COV2 are similar in children and adults. However, children with confirmed SARS-COV2 have generally presented with mild symptoms and usually recover within 1 to 2 weeks. Reported symptoms in children may include cold-like symptoms, such as fever, dry cough, sore throat, runny nose, and sneezing. Gastrointestinal manifestations including vomiting and diarrhoea have also been reported. In the 13 paediatric patients (13/20, 65%) that had an identified history of close contact with SARS-COV2 diagnosed family members. Fever (12/20, 60%) and cough (13/20, 65%) were the most common symptoms.[11]

Children with underlying medical conditions and special healthcare needs may be at higher

risk for severe illness. There is much more to be learned about how the disease impacts children. For laboratory findings, in the early stage of the disease, the total number of peripheral white blood cells is normal or decreased, the lymphocyte count is reduced, and some children have increased liver enzymes, lactate dehydrogenase (LDH), muscle enzymes, and myoglobin; some critically ill patients have increased troponin, D-dimer and ferritin and the number of peripheral blood lymphocytes have progressively reduced. Like adults, the children with severe and critical illness may be accompanied by elevated levels of inflammatory factors such as interleukin (IL)-6, IL-4, IL-10, and tumor necrosis factor (TNF)-α.[12] There are no abnormal findings in the early stages of the disease in the children's plain X-rays with SARS-COV2 thus plain X-rays it is not recommended especially in the early stages and in whom without symptoms or any positive risk factors. Suspected cases should undergo chest CT examination as soon as possible. The most important finding in early stages is a single or multiple limited ground-glass opacity which mostly located under the pleura or near the bronchial blood vessel bundle especially in the lower lobes. Severe period is very rare, manifested by diffuse unilateral or bilateral consolidation of lungs and a mixed presence of ground glass opacities.[13] Also compared to adults, consolidation with surrounding halo signs is more common in pediatric patients and was suggested as a typical sign in pediatric patients. For now, treatment is supportive; no specific antiviral medications are available for children.

6 Diagnosis

6.1 CASE DEFINITION (As per WHO-China joint commission report)

Suspected case

Based on the epidemiologic characteristics observed so far in China, everyone is assumed to be susceptible, although there may be risk factors increasing susceptibility to infection.

A patient with acute respiratory tract infection (sudden onset of at least one of the following: cough, fever, shortness of breath) AND with no other aetiology that fully explains the clinical presentation AND with a history of travel or residence in a country/area reporting local or community transmission* during the 14 days prior to symptom onset;

OR

A patient with any acute respiratory illness AND having been in close contact with a confirmed or probable SARS-COV2 case in the last 14 days prior to onset of symptoms;

OR

A patient with severe acute respiratory infection (fever and at least one sign/symptom of respiratory disease (e.g., cough, fever, shortness breath)) AND requiring hospitalisation (SARI) AND with no other aetiology that fully explains the clinical presentation.[9]

Probable Case

A suspected case for whom testing for virus causing SARS-COV2 is inconclusive (according to the test results reported by the laboratory) or for whom testing was positive on a pan-coronavirus assay.

Confirmed Case

A person with laboratory confirmation of virus causing SARS-COV2 infection, irrespective of clinical signs and symptoms.

Close Contacts

Close contact of a probable or confirmed case is defined as

- A person living in the same household as a SARS-COV2 case;

  A person having had direct physical contact with a SARS-COV2 case (e.g. shaking hands);
- A person having unprotected direct contact with infectious secretions of a SARS-COV2 case (e.g. being coughed on, touching used paper tissues with a bare hand);
- A person having had face-to-face contact with a SARS-COV2 case within 2 metres and > 15 minutes;

- A person who was in a closed environment (e.g. classroom, meeting room, hospital waiting room, etc.) with a SARS-COV2 case for 15 minutes or more and at a distance of less than 2 metres;
- A healthcare worker (HCW) or other person providing direct care for a SARS-COV2 case, or laboratory workers handling specimens from a SARS-COV2 case without recommended personal protective equipment (PPE) or with a possible breach of PPE;
- A contact in an aircraft sitting within two seats (in any direction) of the SARS-COV2 case, travel companions or persons providing care, and crew members serving in the section of the aircraft where the index case was seated (if severity of symptoms or movement of the case indicate more extensive exposure, passengers seated in the entire section or all passengers on the aircraft may be considered close contacts).

6.2 Recommendations for Sample Collection

- Collection of specimens to test for SARS-CoV-2 from the upper respiratory tract (nasopharyngeal and oropharyngeal swab) is the preferred method for diagnosis.
- Induction of sputum collection is not recommended
- Bronchoscopy being an aerosol generating procedure has got the potential to transmit infection to others. In view of this preferably avoid performing it and limit its usage clearing secretions/mucous plugs in intubated patients
- All respiratory specimen collection procedures should be done in negative pressure rooms
- Additional specimens (e.g.: Blood, stool, urine) can also be collected to rule out alternative/supportive diagnosis.

6.3 Current Recommended Diagnostic Modality for Covid-19

- SARS-CoV-2 RNA is detected by polymerase chain reaction (RT-PCR).
- Results are generally available within a few hours to 2 days
- A single positive test should be confirmed by a second RT-PCR assay targeting a different SARS-CoV-2 gene If initial testing is negative but the suspicion for SARS-COV2 remains, the WHO recommends re-sampling and testing from multiple respiratory tract sites.
- For safety reasons, specimens from a patient with suspected or documented SARS-COV2 should not be submitted for viral culture.
- Samples should also be tested for other viral/bacterial pathogens.

6.4 Covid 19- Rapid Tests

SARS-COV2 Rapid Test qualitatively detects IgG and IgM antibodies to SARS-CoV-2 in human whole blood, serum and plasma samples. This test applies lateral flow immuno-chromatography and is a tool to assist in the diagnosis of SARS-CoV-2 infections. The IgM-IgG combined assay has better utility and sensitivity compared with a single IgM or IgG test. It can be used for the rapid screening of SARS-CoV-2 carriers, symptomatic or asymptomatic, in hospitals, clinics, and test laboratories.

Recommendation:

Despite the promise, there is no definitive definitive evidence regarding the utility of rapid kits for testing COVID 19 suspected patients respiratory/serum samples.

SARS-COV2 Rapid Test kit

6.5 Bronchoscopy

Benefits

- Helps in obtaining BAL samples in patients who are not able to expectorate sputum for checking bacterial culture/AFB smear/gene Xpert
- Bronchoscope can be used to clear out mucous plugs in ventilated patients.

Risks

- May cause some deterioration in clinical condition, especially in patients who are on high oxygen support.
- High risk of transmission of infection to providers.
- Significant utilization of valuable resources at this point (N95 respirators, physicians, respiratory therapists) – Supply of all these resources will be limited during the time of a pandemic.

Recommendations

- Bronchoscopy should not be done only for the purpose of ruling SARS-COV2. Risk of transmission of infection to others is extremely high through aerosols.
- It can be performed when sputum sample cannot be obtained to rule out alternative diagnosis like (Tuberculosis, bacterial/fungal pneumonias)
- It can be performed to suction out mucous plugs in ventilated patients.
- Consideration for use of a disposable bronchoscope if available.

- Consider bronchoscopy in patient's place of care to minimize the exposure.
- Minimize staff in room during procedure.
- Negative pressure room if available.

All Personal Protective equipment should be used: Face shield/goggles, N95 mask, Contact isolation gown, Gloves Standard disinfection protocols should be followed for cleaning your flexible bronchoscopes and video monitors.

6.6 RADIOLOGY IN SARS-COV2 INFECTION

In this section, we are about to describe the imaging features in SARS-COV2 infection. The information we have available until now, it is based on Chinese registries and publications of recently knowledge.

It is good to know that the American College of Radiology have released recommendations for the use of Chest Radiography and computed Tomography in the last two weeks (March 11st). And the official paper emphasize that knowledge of the infection is rapidly evolving. Also, there is the recommendation of the CDC, supporting the fact that chest radiography or computed tomography are not recommended to diagnose the SARS-COV2 infection. CDC link. www.cdc.gov.

The findings on chest imaging are not specific of the infection, and could overlap with other entities, such as Influenza. There are also recommendations about the performance of the chest radiography, including the fact that it is better to avoid the movement of the patient within the hospital.

Chest Radiography (CXR)

The findings on CXR are not specific, and in the initial phases of the disease the studies could be normal. The most common features include lobar/ multi-lobar / bilateral lung consolidation.

Computed Tomography (CT Chest)

Recent studies have reported the features on CT imaging. Pan et al [65] described the tomographic changes of 21 patients with mild to moderate disease who recovered from the disease, and they described **four stages:**

- Early stage (0-4 days after the onset of the symptoms), in which ground glass opacities (GGO) are frequent, with sub-pleural distribution and involving predominantly the lower lobes. Some patients in this stage could have a normal CT.

- Progressive stage (5-8 days after the onset of the symptoms), the findings usually evolved to rapidly involvement of the two lungs or multi-lobe distribution with GGO, crazy-paving and consolidation of airspaces.
- Peak stage (9-13 days after the onset of the symptoms), the consolidation becomes denser and it was present in almost all of the cases. Other finding was residual parenchymal bands.
- Absorption stage (>14 days after the onset of the symptoms), no crazy paving pattern was observed, the GGO could remain. Shi et al also described the CT findings in 81 patients in Wuhan, China. All of the patients had an abnormal CT, and the features include: GGO, smooth and irregular interlobular septal thickening, crazy paving pattern, air bronchogram and irregular pleural thickening. Usually affecting the subpleural regions and the lower lobes.

Lung ultrasound. (USG)

The USG findings are also not specific for SARS-COV2 infection. Little information is available to date on this matter. The findings include: Irregular pleural lines, sub-pleural areas of consolidation, areas of White lung and thick B lines. It is a tool that could be used at bed side avoiding the need for shifting infected patients to a Radiology suite.

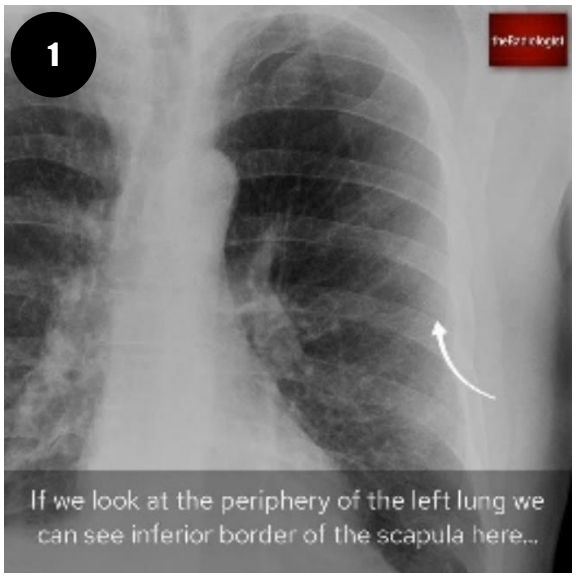
Pulmonary function tests (PFT)

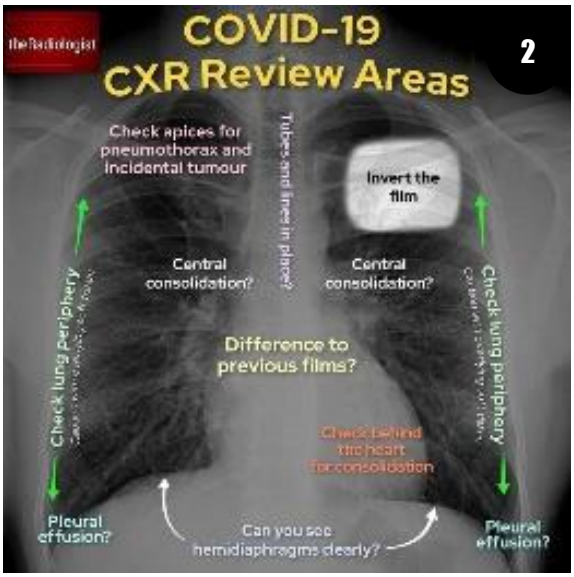
Sources of cross infection in pulmonary function lab can occur due to close contact, direct contact and through aerosolized particles. Among these Droplets/aerosolized particles is the most common mode of transmission of infection. Numerous factors play a role in the virulence of an organism: source & strain of pathogen, route of infectivity, particle size, room temperature and infective dose of pathogen.

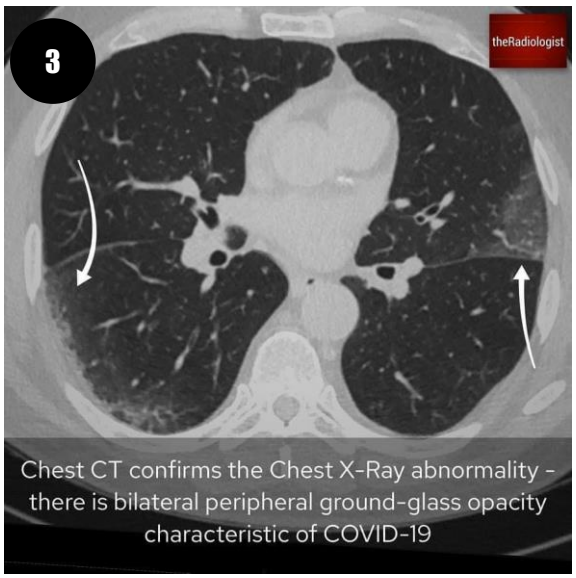
Recommendations:

- All kinds of pulmonary function tests should be avoided among patients with a strong suspicion of upper or lower Respiratory tract infection.
- In COVID 19 endemic zones it would be wise to avoid PFTs for a major proportion of patient to avoid spread of infection and usage of PFT should be limited for time being for only pre-operative fitness assessment.
- All patients who are enrolled to perform a PFT should be segregated, since this helps in preventing the spread of infection. Performing a chest x-ray prior to PFT would help to rule out Respiratory infections to certain extent.

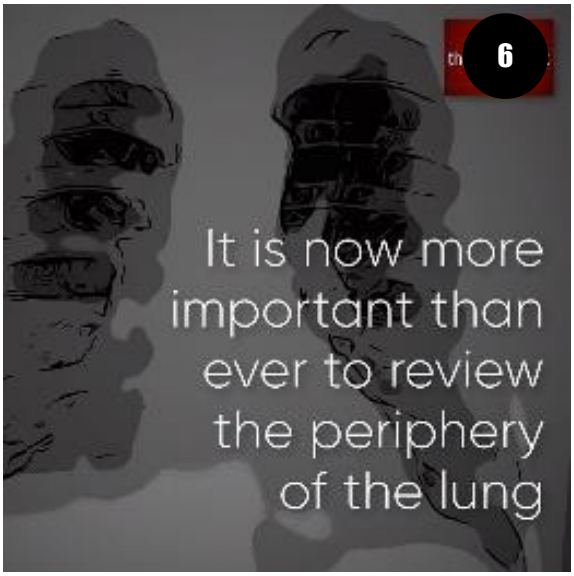
- Contact in waiting room with potentially infectious patients should be minimized. Surgical facemasks, tissues, and waste container, alcohol-based sanitizers should be made easily available for infectious patients.
- All connections between the patient and the PFT machine (tubing's & valves) should be cleaned and disinfected before re-use.
- Disposable items in PFT lab like mouth pieces can be a reservoir of microorganisms and hence should be disposed carefully.
- Usage of personal protective equipment helps in reducing the risk of cross contamination.

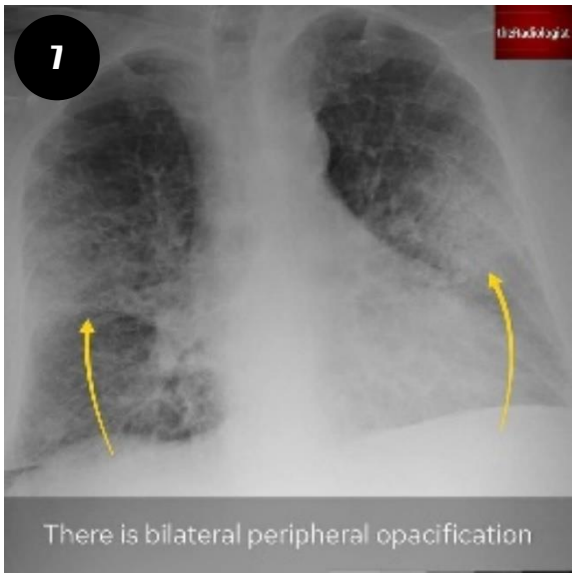


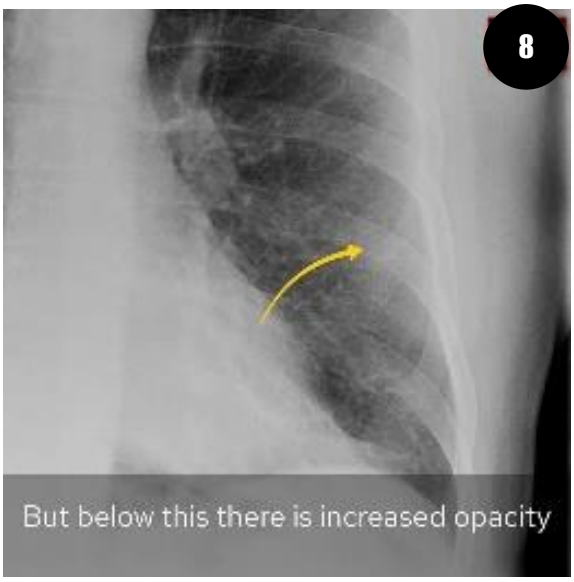


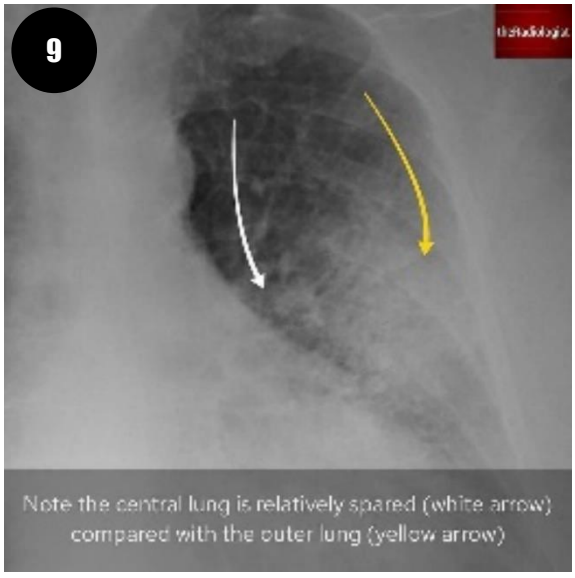


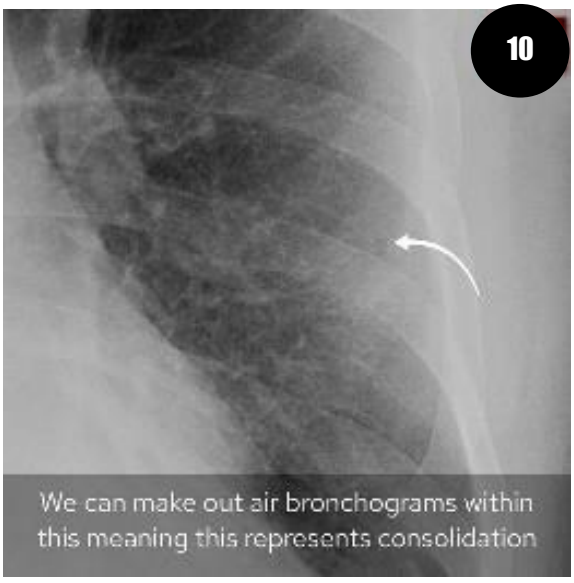

5
There is similar opacity within the peripheral right mid zone


6
It is now more important than ever to review the periphery of the lung

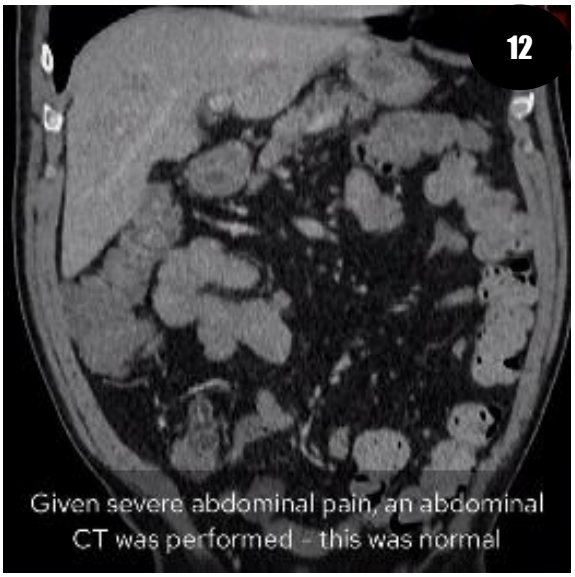

7
There is bilateral peripheral opacification

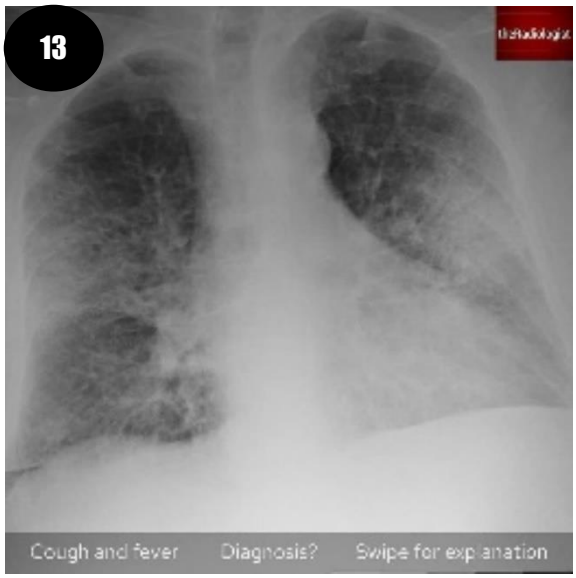

8
But below this there is increased opacity

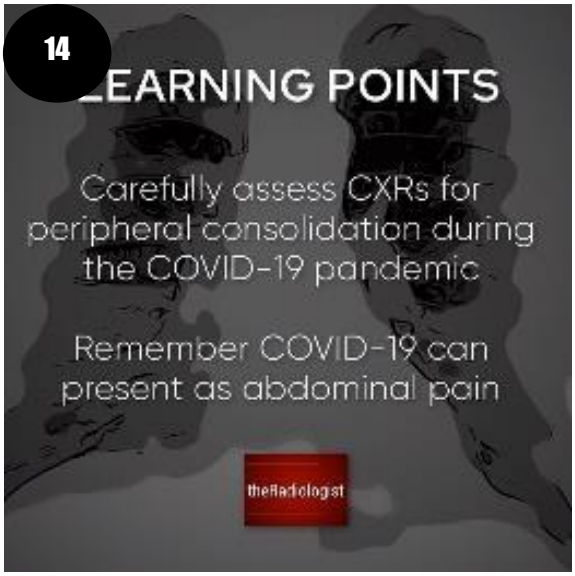

9
Note the central lung is relatively spared (white arrow) compared with the outer lung (yellow arrow)

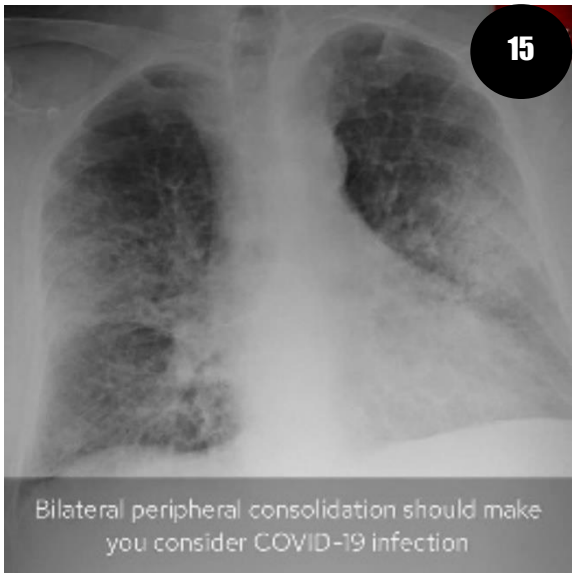

10
We can make out air bronchograms within this meaning this represents consolidation


11
theRadiologist
Bilateral peripheral consolidation should now make you consider
COVID-19


12
Given severe abdominal pain, an abdominal CT was performed - this was normal


13
Cough and fever
Diagnosis?
Swipe for explanation


14
LEARNING POINTS
Carefully assess CXRs for peripheral consolidation during the COVID-19 pandemic
Remember COVID-19 can present as abdominal pain
theRadiologist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Bilateral peripheral consolidation should make you consider COVID-19 infection

7 Laboratory Diagnosis

7.1 Sample collection: (Wear FULL PPE)

Upper respiratory tract:

- Preferred sample: Throat and nasal swab in viral transport media (VTM)and transported on ice
- Alternate: Nasopharyngeal swab, BAL or endotracheal aspirate which has to be mixed with the viral transport medium and transported on ice

Lower respiratory tract:

- Broncho alveolar lavage, tracheal aspirate, sputum
- Collect 2-3 mL into a sterile, leak-proof, screw-cap sputum collection cup or sterile dry container

7.2 Nasopharyngeal swab and oropharyngeal swab

- Oropharyngeal swab (e.g. throat swab): Tilt patient's head back 70 degrees. Rub swab over both tonsillar pillars and posterior oropharynx and avoid touching the tongue, teeth, and gums. Use only synthetic fibre swabs with plastic shafts. Do not use calcium alginate swabs or swabs with wooden shafts. Place swabs immediately into sterile tubes containing 2-3ml of viral transport media.
- Combined nasal &throat swab: Tilt patient's head back 70 degrees. While gently rotating the swab, insert swab less than one in chin to nostril (until resistance is met at turbinate). Rotate the swab several times against nasal wall and repeat in other nostril using the same swab. Place tip of the swab into sterile viral transport media tube and cut-off the applicator stick. For throat swab, take a secondary polyester swab, insert into mouth, and swab the posterior pharynx and tonsillar areas (avoid the tongue). Place tip of swab into the same tube and cut off the applicator tip.
- Nasopharyngeal swab: Tilt patient's head back 70 degrees. Insert flexible swab through the nares parallel to the palate (not upwards) until resistance is encountered or the distance is equivalent to that from the ear to the nostril of the patient. Gently, rub and roll the swab. Leave the swab in place for several seconds to absorb secretions before removing.[14]

7.3 Other Recommended Laboratory tests:

Tests for diagnosis, prognosis / risk stratification, and/or safety of agents Suggested for all hospitalized patients with confirmed or suspected SARS-COV2

1. Recommended daily labs:
   - CBC with diff (trend total lymphocyte count)
   - Complete metabolic panel1
   - CPK (creatine kinase)
2. For risk stratification (may be repeated every 2-3 days if abnormal or with clinical deterioration):
   - D-dimer
   - Ferritin / CRP / ESR
   - LDH
   - Troponin
   - Baseline ECG
3. Radiology:
   - Portable CXR at admission
   - High threshold for PA/lateral in ambulatory patients, consider only if low suspicion for SARS-COV2 and result would change management or affect suspected status
   - Non-contrast CT is of limited utility in definitively diagnosing SARS-COV2 and should only be considered if it
   - is likely to change management or PUI status
4. If clinically indicated:
   - Routine blood cultures (2 sets)
   - For acute kidney injury (i.e. serum creatinine >0.3 above baseline), send urinalysis and spot urine protein: creatinine
   - Procalcitonin
   - IL-6
5. Following up-to-date FULL PPE:
   - SARS-CoV-2 test, if not already performed5
   - If available, send influenza A/B and RSV test
6. If available, send respiratory viral panel on all patients (includes human metapneumovirus and parainfluenza 1-3)
   - As indicated, routine sputum for bacterial gram stain and culture, Legionella/Strep pneumourinary antigen

COMPENDIUM OF SARS-COV-2

Disease Progression	**1st week: Fever, non- productive cough, vomiting, nausea, diarrhea** **2nd week: Deterioration – Dyspnea, SOB, Chest, tightness** **Typical evolution:** **Day 6 post exposure - Dyspnoea** **Day 8 - Admission** **Day 10 - ICU admission / Intubation** **Deterioration or recovery most commonly occurs at day 6-7 of illness**
Characteristics	**The most associated co-morbidities with ICU Admission were diabetes and hypertension.** **Most patients are around 70 years old** **Obesity is a frequent co-morbidity** **Net prevalence in the male population** *****Interstitial pneumonia / Reps failure +/-Flu like symptoms treat as COVID +ve** **DO NOT BLINDLY trust negative swab if symptoms / pneumonia with suggestive CXR*****
Organ Failure	**Hypoxemic Respiratory Failure > 90%** **Shock 30%** **AKL 10- 30% (RRT 20%)**
Bloods	**ABG- Mild acidosis with normal lactates, severe base deficit, high AG.** **Raised CK especially in younger patients** **Lymphopenia common** **Very elevated CRP** **Often thrombocytopenic (mild)<100 rare** **WBC tends to be normal** **LFTs abnormal ~ 30%** **Difficult glycemic control- frequent Ketoacidosis**

Imaging	CXR: Interstitiopathy , Bilat Infiltrates common and Gravitational distribution.
Chest CT- Not indicated due to high difficulty in transportation, high risk of spreading the contagion - **Ground Glass Appearances, crazy paving, bilat infiltrates, atelectasis.** **Lung USS- Diffuse B-line Profile-Responds well to PEEP Consolidation / parapneumonic / atelectasis.** **ECHO- Attention to dyskinesias – Proportion of patients have troponin rise. Thought to be secondary to stress cardiomyopathies secondary to virus. Not ACS.**	

SRI GURU RAM DAS CHARITABLE HOSPITAL, VALLAH, SRI AMRITSAR
GENERAL INFORMED CONSENT FORM DURING PANDEMIC OF SARS-CoV2/ CORONAVIRUS

Name .....Ward/Unit ..... IPD No ….....

I ..... have been explained by Dr ..... that I am suffering from …… I have been informed by the hospital.

1. That outbreak of SARS-COV2/Coronavirus, which may involve the following complications and risks, including but not limited to: - Symptoms of infection can be mild to severe respiratory illness with fever, cough, and difficulty breathing. In some cases, these symptoms may be so severe that may require an admission to ICU and ventilation support.
2. I will be shifted to the isolation ward/ICU in case the COVID 19 infection is suspected or confirmed
3. I agree and understand that I may be exposed to the above-mentioned risks during and after my stay in the hospital and that I will not hold the hospital liable for any such risks, outcomes and complications. Further, I may also be an asymptomatic carrier of the infection, which manifests clinically during the hospitalization.
4. I have been informed and am opting for treatment / surgery / investigation in the midst of community.
5. I have been explained about the precautions being taken by the hospital to prevent transmission of infection in patients and staff.
6. I understand and acknowledge that although all precautions as prescribed by the Government of India have been duly implemented by the hospital, as the disease is new and its kinetics, symptoms and treatment are still being studied, no assurances or guarantees can be offered regarding disease transmission to myself or clinical outcome in case of disease transmission to me.
7. I understand and agree to strictly abide by all the instructions/ guidelines laid down by the hospital, in order to help curb the spread of Covid -19/Coronavirus.

Patient's Signature & Name **Date & Time**

..... **……..**

Guardian's Signature, Name & Relationship **Date & Time**

..... **……**

Doctor's Signature & Name **Date & Time**

…….. **……..**

SRI GURU RAM DAS CHARITABLE HOSPITAL, VALLAH, SRI AMRITSAR

INFORMED CONSENT PERFORMA FOR SARS-CoV2/ CORONAVIRUS TREATMENT

Name .....Ward/Unit.....IPDNo .....

I..... have been explained by Dr ..... that I am suffering from **SARS-CoV2/CORONAVIRUS** and informed

1. That I have been explained about my condition, treatment, procedure, risks and other associated information.
2. That the following drugs are treatment regimen may be used for severe cases i.e. is not yet proven effective /cure for the treatment of **SARS-CoV2/CORONAVIRUS** by any clinical trial. However, there are case reports of success.

Drugs:……
……
……
……
……

3. That I understand that the treatment with above mentioned drugs is on experimental basis for pandemic treatment to CORONAVIRUS (COVID 19).
4. That any other alternative treatment available……...
5. That I was able to ask questions and raise concerns with the doctor about the procedure and its risks. My queries and concerns have been discussed and answered to my full satisfaction.

The doctor has explained and it has been agreed to me that I/ my patient will be treated according to the care of plan (mentioned & requested above).

It has been explained to me, that during the course of treatment, unforeseen conditions may be revealed or encountered which may necessitate urgent surgical or other procedures in addition to or different from the care plan. In such exigency, I further request and authorize the above named Physician / Surgeon or his designee to carry out the surgical or other procedure.

I declare that no guarantee of what so ever nature has been given by anyone as to the results that may be obtained. I understand that I have the right to refuse treatment or withdraw consent at any time. I agree that any such refusal/withdrawal shall be in writing and acknowledged by the Hospital. And I shall be solely responsible for the outcome of such refusal which has been explained to my by the Dr…….

Patient's Signature & Name **Date & Time**

..... **……**

Guardian's Signature, Name & Relationship **Date & Time**

..... **……..……..**

Doctor's Signature & Name **Date & Time**

…….. **……**

8 Initial Management

8.1 Covid 19 Infected Patients

At the moment, the therapeutic strategies to deal with the infection are only supportive, and prevention aimed at reducing transmission in the community is our best weapon. Aggressive isolation measures in China have led to a progressive reduction of cases in the last few days. In Italy, in geographic regions of the north, political and health authorities are making incredible efforts to contain a shock wave that is severely testing the health system.

8.2 Who all needs isolation?

- Any person diagnosed with SARS CoV 2 infection by means of laboratory testing at a government recommended testing laboratory.
- Anyone who has symptoms of fever and respiratory illness, and has a history of close contact of a person who has either been diagnosed as SARS-COV2, or has a history of travel to a COVID affected region within the last 14 days.
- Any health care worker with symptoms of fever and respiratory illness who has been involved directly in treating COVID- 19 patients, or has close contact with persons involved in treating COVID- 19 patients during the last 14 days.

8.3 If needed where to isolate?

- Asymptomatic cases with exposure to SARS-CoV2 positive patients can be quarantined at their homes, but to be under strict surveillance by the government authorities
- Suspected patient to be isolated in well ventilated, preferably separate rooms.
- Symptomatic COVID- 19 positive patients should be hospitalized in isolation room and also should be monitored adequately by medical team
- Sputum/BAL samples (if needed) should be collected from isolation rooms or a separate space with HEPA filters/negative pressure ventilation.

8.4 Preparation of Isolation Room

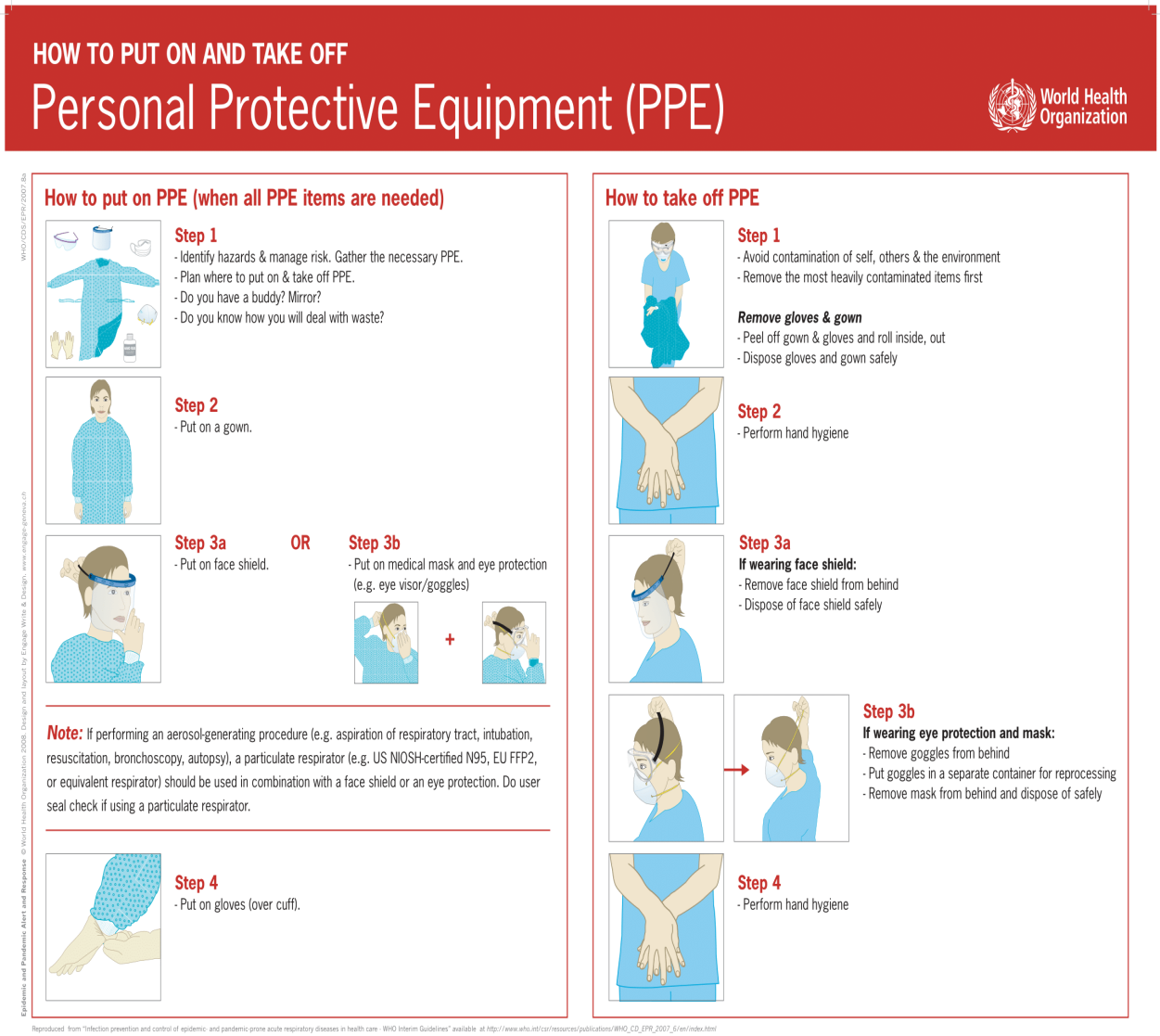
- Ensure that appropriate hand washing facilities and hand-hygiene supplies are available.
- Stock the sink area with suitable supplies for hand washing, and with alcohol-based hand-rub, near the point of care and the room door.
- Ensure adequate room ventilation.
- Post signs on the door indicating that the space is an isolation area.

- All visitors should consult the health-care worker in charge before being allowed into the isolation areas. Keep a roster of all staff working in the isolation areas, for possible outbreak investigation and contact tracing. Some centers have banned all visitors.
- Remove all non-essential furniture and ensure that the remaining furniture is easy to clean.
- Stock the PPE supply and linen outside the isolation room or area (e.g. in the change room). Setup a trolley outside the door to hold PPE. A checklist may be useful to ensure that all equipment is available.
- Place appropriate waste bags in a bin. If possible, use a touch-free bin. Ensure that used (i.e. dirty) bins remain inside the isolation rooms.
- Place containers for disposal of sharps inside the isolation room or area.
- Keep the patient's personal belongings to a minimum.
- Dedicate non-critical patient-care equipment (e.g. stethoscope, thermometer, blood pressure cuff and sphygmomanometer) to the patient, if possible. Thoroughly clean and disinfect patient-care equipment every time before using in next patient.
- Adequate equipment required for cleaning or disinfection inside the isolation room should be kept and room should be cleaned on a daily basis
- Set up a telephone or other method of communication in the isolation room or area to enable patients, family members or visitors to communicate with health-care workers. This may reduce the number of times the workers need to don PPE to enter the room or area.

8.5 Wearing and Removing Personal Protective Equipment (Ppe)

Before entering the isolation room or area:

- Collect all necessary items.
- Ensure to perform hand hygiene with an alcohol-based hand rub or soap and water;
- Use PPE in the order that ensures adequate placement of PPE items and prevents self-contamination and self-inoculation while using and taking off PPE.
- Below mentioned Figures illustrates an example of the order in which to don PPE and what all are required.



8.6 Leaving the Isolation Room Area

- Either remove PPE in the anteroom or, if there is no anteroom, make sure that the PPE will not contaminate either the environment outside the isolation room or area, or other people.
- Remove PPE in a manner that prevents self-contamination or self-inoculation with contaminated PPE or hands. General principles are:
- Remove the most contaminated PPE items first;
- Perform hand hygiene immediately after removing gloves
- Remove the mask or particulate respirator last (by grasping the ties and discarding in a rubbish bin);
- Discard disposable items in a closed rubbish bin;

- Put reusable items in a dry (e.g. without any disinfectant solution) closed container; an example of the order in which to take off PPE when all PPE items are needed is gloves (if the gown is disposable, gloves can be peeled off together with gown upon removal), hand hygiene, gown, eye protection, mask or respirator, and hand hygiene.
- Perform hand hygiene with an alcohol-based hand rub (preferably) or soap and water whenever ungloved hands touch contaminated PPE items.

8.7 Patient in Isolation Room

- Preferably wear face mask as much as time possible in a day
- Restrict movement of patient for chest x-rays/ CT scans/labs as this lead to dissemination of infection to other places
- Attached urinals/wash room facility in all isolation rooms
- Separate portable stethoscopes/ x-ray/ CT units/USG machines should be dedicated for patients suffering from SARS-COV2
- Patient needs to be kept in isolation till his both respiratory samples turns out to be negative.

9 Treatment of COVID 19

There is no specific antiviral treatment recommended for SARS-COV2, and no vaccine is currently available at time of writing this article.

9.1 Mild Disease

These patients usually present with symptoms of

- An upper respiratory tract viral infection
- Low grade fever, cough, malaise, rhinorrhoea, sore throat without any warning signs
- Shortness of breath
- Haemoptysis
- Gastro-Intestinal symptoms: Nausea, vomiting, Diarrhea
- Without change in mental status (ie: confusion, lethargy)
- Non immunocompromised

Recommendation: Consider for home isolation in asymptomatic/mild disease

9.2 Who All Needs Admission in Sars-Cov2?

Severe Disease (14%)

- Respiratory rate > 30/min
- SPo2- <93%
- PaO2/FiO2 <300
- Lung infiltrates >50% within 24- 48 hours

Critically ill (5%)

- Respiratory failure (need of mechanical ventilation)
- Septic shock
- MODS

9.3 Is there a definitive therapy?

- No drug of choice
- Oxygen support
- Oxygen saturation to be maintained above 90%
- Conservative fluid management
- Give empirical antibiotics (As per institution-based CAP guidelines)/ anti-viral (Oseltamivir)
- High dependency / ICU care when needed

9.4 Anti-Viral Therapy

No anti-viral therapy has been proven to work for SARS-COV2 in humans. Multiple RCTs are ongoing; hopefully they will bring us further information soon.

Whenever possible, patients should be enrolled in RCTs.

- Information is provided below about some of the more popular agents which are being used by some practitioners.
- Inclusion in this chapter is not a recommendation to use one or more of these medi cations. This information is simply provided as a background to help us understand these therapies.
- A focus is placed on lopinavir/ritonavir and chloroquine since these agents are currently available.
- Practitioners are encouraged to review available evidence and reach their own conclusions regarding whether to use these medications.

9.5 Indications for Anti-Viral Therapy

Retrospective data from SARS suggests that earlier treatment (e.g. within 1-2 days of admission) may be more effective than reserving therapy until severe organ failures occur (Chan 2003). This is consistent with data from influenza that suggests a finite treatment window occurring relatively early in the disease course.

- The vast majority of patients will do fine without any therapy, so in most cases there's no need for antiviral therapy.
- However, waiting until patients are severely ill before initiating therapy could cause us to miss an early treatment window, during which the disease course is more modifiable.
- Predictors of adverse outcome might be useful in predicting who will do poorly and thus who might benefit most from early anti-viral therapy, but data is limited.

9.6 Anti-Viral Molecules Under Trial (Experimental options) Remdesivir (compassionate use only)

- Investigational antiviral drug with reported in vitro activity against SARS-CoV-2
- No published phase 3 trials
- Mechanism of action: Extrapolated from MERS CoV
- Premature termination of viral RNA transcription
- Has been found to reduce pulmonary pathology in in vitro studies
- Remdesivir cannot be used in combination with other experimental antiviral agents
- Tried in Ebola virus too

- Side effects- Hepatotoxicity
- Dose: Adult: 200mg IV on day 1(loading dose) followed by 100mg IV OD x 9 days
- Pediatric: < 40 kg: 5 mg/kg IV on day 1, then 2.5 mg/kg IV q24h

Lopinavir/Ritonavir

- In vitro reduces replication by 50% in MERS corona virus
- Definite efficacy not proven
- WHO has mentioned as an agent that can be tried
- May be also tried in combination with Interferon alpha orRibavirin
- Potent CYP3A4 inhibitor – monitor for drug interactions
- Oral and liquid formulation is available
- Dose: Adult: 400/100mg PO Q12h
- Paediatric: Paediatric (based on lopinavir): Oral solution
  - < 15kg: 12mg/kg/DOSE q12h
  - 15-40kg: 10mg/kg/DOSE q12h
  - >40kg: 400mg q12h
- Oral tablet
  - ≥15-25kg: 200mg q12h
  - ≥25-35kg: 300mg q12h
  - >35kg: 400mg q12h

Ribavirin

- Inhibitor of RNA polymerization [30]
- Studies done in MERS
- Concentration required to inhibit MERS-CoV in vitro exceeds peak levels in the blood after therapeutic doses in humans.
- High risk of toxicity
- Renal dose adjustment is necessary
- Boxed warning for hemolytic anemia
- No study results yet in SARS CoV2
- Dose (Oral): 2 grams x 1 dose, then 600mg q8h

Oseltamivir

- Neuraminidase enzyme inhibitor in influenza
- Not seen in SARS CoV2

- No trials on SARS-COV2
- Many patients with similar presentation of COVID 19 might be influenza
- Hence better to give the drug to avoid patient worsening due to influenza
- Dose: 150mg BD x 5 days

9.7 Other Available Treatment Options

Ace Inhibitors (Acei) /Angiotensin Receptor Blockers (Arbs)

- Off late there is lot of interest in the potential role of ACE-inhibitors (ACEi) / angiotensin sin receptor blockers (ARBs) in the pathophysiology of this disease since the SARS-CoV-2 virus binds to the ACE2 receptor for cellular entry
- Theoretically it can be blocked by ARBs
- But ACE2 is a negative regulator of RAS (It inactivates angiotensin 2), hence the suggestion might be counterintuitive
- ACE (CD143) appears on the macrophage plasma membrane during activation
- Proposed reduction of cytokine storm
- Currently there are no data to support either starting or stopping ACEi/ARBs on any patients with SARS-COV2.

Interferons

- IFN-α2a, IFN-α2b orIFN-β1a
- SARS CoV2 attenuates the interferon (IFN) response of the innate immune system
- Impair the antiviral adaptive type 1 T-helper cell
- But in vitro effects haven't been fully shown to be working

Chloroquine/Hydroxychloroquine

- Proposed mechanism- Hampers the low pH dependant steps of viral replication
- No renal or hepatic dose adjustments necessary
- Has been even proposed for prophylaxis- however lacks evidence
- Side effects: QT prolongation
- Dose (Adult): 400mg PO Q12h x 1 day, 200mg PO Q12h x 4 days
- Paediatric: 6.5mg/kg/DOSE PO q12h x 1 day, then 3.25mg/kg/DOSE PO q12h x
- 4 days (up to adult maximum dose)

Tocilizumab (Optional)

- IL-6 inhibitor
- Proposed to reduce the cytokine storm in SARS-COV2

- Reports of tocilizumab use in SARS-COV2 infections have been mostly anecdotal from Italy or case series data from China.
- Adverse effects: elevation of liver enzymes, Increased risk of re-activation of other Respiratory infections.
- Dose: 4-8 mg/kg (max 400mg) IV x 1

Corticosteroids

- Not indicated in treating SARS CoV2 as per available evidence
- Might prolong viral shedding
- Use as per indicated in septic shock/if patient has other indications for steroid use

Ascorbic Acid

- Ascorbic acid did appear to improve mortality in the multi-center CITRIS-ALI trial.
- Extremely limited evidence suggests that ascorbic acid could be beneficial in animal models of corona virus (Atherton 1978).
- Administration of a moderate dose of IV vitamin C could be considered (e.g. 1.5 grams IV q6 ascorbic acid plus 200 mg thiamine IV q12). This dose seems to be safe. However, there is no high-quality evidence to support ascorbic acid in viral pneumonia.

Anti-Bacterial Therapy

Initial empirical antibiotics

- SARS-COV2 itself is not an indication to start antibiotics.
- However, antibiotics can be initiated to treat secondary bacterial pneumonia.
- Broad spectrum antibiotics to be initiated according to the institution based guide lines Delayed bacterial super infection
- Bacterial pneumonia can emerge during the hospital course (especially ventilator-as sociated pneumonia in patients who are intubated).
- This may be investigated and treated similarly to other ventilator-associated pneumonias, or hospital-acquired pneumonias.

Other Agents

- Baricitinib Darunavir/Cobicistat
- Umifenovir (Arbidol) - 200 mg TDS
- Favilavir - first approved drug in china
- Galidesivir
- Leronlimab

- Brilacidin
- Combination of monoclonal antibody
- Traditional medicines in different countries

WHAT WE CAN ADOPT FOR TREATMENT?

- Patient to be classified as mild/severe/critical
- Decide whether he/she requires only home isolation
- Assess oxygenation on room air
- Consider referral to a nodal center if requiring admission
- Home care advise in mild/asymptomatic cases

9.7 Covid -19 Management in A Nut Shell

There are no proven or approved treatments for SARS-COV2. The following treatment plan is suggested on the on the basis of information available till date on various investigational treatment approaches.

Severity of Illness	Plan of Treatment
Mild illness without any risk factors/ Co-morbidities	➢ Outpatient care ➢ Strict Home Quarantine monitored by government/health authorities ➢ Supportive care ➢ Assess patient's clinical condition via telephonic conversation/ using telemedicine facility
Moderate Illness: ➢ **Dyspnoea** ➢ **Hypoxemia** ➢ **Infiltrates/ consolidation on chest x-ray/ CT scan**	➢ Admit in Hospital isolation room ➢ Supportive care ➢ Start empirical antibiotics as per local community acquired pneumonia treatment guidelines ➢ Oseltamivir 75/150mg BD ➢ Consider starting Hydroxychloroquine or Lopinavir/Ritonavir (If evident risk factors for progression of disease are present)
Critical Illness: ➢ **Mechanically ventilated patient's** ➢ **Multi lobar/ bilateral lung consolidation** **Careful using these drugs in patients with multi-organ damage**	➢ Remdesivir (for compassionate use only) ➢ Tocilizumab can be considered ➢ (check IL-6 level prior to starting Tocilizumab). Especially in patients with evidence of cytokine release syndrome. ➢ Continue IV antibiotics and supportive care

	➢ Rule out ventilator associated pneumonia/ catheter related infections and other secondary bacterial/viral/fungal infections ➢ Always keep in mind the to rule out differentials of non –resolving pneumonia ➢ In ventilated patients: follow ARDS NET protocol strategy ➢ Consider ECMO if need arises ➢ Refractory or progressive cases in ICU: Interferon beta B1 can be considered. However, it should be combined with an anti-viral ➢ (Lopinavir/Ritonavir) and hydroxychloquine

9.8 Summary of currently available drugs which can be potentially used for treatment of SARS-CoV2 Disclaimer: The options listed below are NOT licensed for the treatment of SARS-CoV2

Agent	Classification	Mechanism of action	Dosage	Side effects
Hydroxychloroquine	Off label use	Hampers low PH dependant steps of viral replication	400 mg BID X2 Dose then 200 mg BID for 5 days	QT prolongation
Oseltamivir	No trials on SARS-COV2	Neuraminidase enzyme inhibitor in influenza	150mg BID for 5 days	GI intolerance headache insomnia
Remdesivir	Investigational can be used on compassionate basis	RNA dependent RNA polymerase inhibitor	200 mg IV loading dose, then 100 mg IV daily upto 10 days	GI intolerance Hepatotoxicity
Lopinavir/Ritonavir	Off label use	3CLpro (viral protease) inhibitor	400/100 BID for upto 10 days	QT prolongation Hepatotoxicity
Ribavirin	Off label use	Inhibitor of RNA polymerization	2 gm loading dose then 600mg TID	High risk of toxicity boxed warning for haemolytic anaemia
Interferon Beta B1	Off label use	Immunomodulatory; enhancement of innate and adaptive viral immunity		Flu like Syndrome depression

Tocilizumab	Off label use	Monoclonal antibody to IL6 receptor / treats cytokine release syndrome		Elevation of liver enzymes increased risk of reactivation of other respiratory infections
Antibiotics (Broad spectrum)	Initiate as per institution based CAP/VAP policy	Secondary bacterial infection (CAP)/VAP		
Corticosteroids	Not indicated in treating SARS CoV2 as per available evidence. Might prolong viral shedding. Use as per indicated in septic shock/if patient has other indications for steroid use			
IV Immunoglobulin (IVIG)	Off label use	Antibodies from convalescent plasma might suppress viraemia. Theoretically: Better to start at early stage of disease	Consider IVGI at standard dose of 1gm/kg daily x2 doses	Might interact with antivirals

9.9 Critical Care Management of ICU Patients and Those Who Need Mechanical Ventilation

Role of Non-invasive positive pressure ventilation (NIPPV):

- NIPPV have Limited role as patients are usually very much tachypneic / hypoxic and starting and maintaining NIPPV with frequent interruption by patient may cause more aerosolization of the virus with the consequent risk to medical personal.
- Avoid high flow Nasal Oxygen (HFNO) or NIPPV for the above mentioned reasons unless individualized patient's related factors exists such as (e.g. COPD, Do Not Intubate / Do Not Resuscitate status etc
- If use of NIPPV cannot be avoided (less ICU beds/ or non-availability of mechanical ventilator then use NIPPV with helmet mask interface (Preferred)
- NIV use has been found to be associated with worse outcome

Patients who require intubation and Mechanical Ventilation Caution while Intubation / resuscitation the patient

- Try to do with the minimum possible number of people (high aerosol generation risk) with full PPE precautions
- Standard intubation and resuscitation protocols to be followed with utmost importance of prevention of infection.

- Intubate early under controlled conditions if possible / Low threshold for watchful wait
- Need a separate cubicle/patient room for intubated patients
- Continuous hemodynamic and oxygenation monitoring
- Use a conservative fluid management strategy for ARDS patients who are not in shock to shorten the duration of mechanical ventilation
- early appropriate empiric Broad spectrum antibiotics

Ventilation Strategy: Manage as per ventilator management in ARDS NET protocol

- Lung Protective ventilation (Low Tidal Volume, Low Plateau pressure, High PEEP for getting adequate Spo2 targets and Permissive Hypercarbia to protect lung ventilation from ventilation induced injury and follow ARDS protocol.
- Implementing a low-volume, low-pressure ventilation strategy/protocol, which targets a tidal volume of 6 ml/kg (predicted body weight), a plateau airway pressure (Pplat) of ≤ 30 cm H2 O and SpO2 88–93% or PaO2 55–80 mm Hg (7.3–10.6 kPa) has been shown to reduce mortality in a heterogeneous population of ARDS patients.
- Sedation and Paralytics to relax patient and facilitate ventilation with daily interruption of sedation and paralytics. Administration of neuromuscular blockade for initial 48 hours has been associated with improved survival and increased time off the ventila tor without causing significant weakness [56]
- Prone positioning (Take care of accidental removal of line, tubes, and catheter) [56]
- Inhaled prostacyclins may be tried
- In selected cases ECMO can be an option too (unclear who are the ideal candidate, however can be used for refractory hypoxemia).
- Investigational therapies should be continued despite lack of significant evidence Corticosteroids may reduce inflammation. None of these investigational therapies are of proven benefit but literature is evolving rapidly and we hope that specific medicines would be available soon.

9.10 Risk of Viral Shedding

- Exact dynamics unknown
- First COVID 19 case was detected in USA on the 4 of patient's illness. It is suggestive of high viral loads and potential for transmissibility. They also detected 2019-nCoV RNA in a stool specimen collected on day 7 of the patient's illness.

- However, extra pulmonary detection of viral RNA does not necessarily mean that infectious virus is present, and the clinical significance of the detection of viral RNA outside the respiratory tract is unknown at this time
- As a precautionary measure treated/isolated patient should be discharged only after 2 samples are negative (more than 24 hours apart)

10 Prognostic Factors

10.1 General prognosis

The vast majority of infected patients (e.g. >80%) don't get significantly ill and don't require hospitalization.

- Among hospitalized patients (Guan et al 2/28)
- 10-20% of patients are admitted to ICU.
- 3-10% requires intubation.
- 2-5% dies.

Longer term outcomes: Prolonged ventilator stay? As the epidemic progresses, an issue which may arise is a large volume of patients unable to wean from mechanical ventilation.

10.2 Epidemiological risk factors

- Older Age
- Male sex
- Medical comorbidities
- Chronic pulmonary diseases
- Cardiovascular disease
- Chronic kidney disease
- Diabetes

11 When to Discharge

Discharge Criteria to Ward/ Step Down

- When patient's physiological status has stabilized and the need for ICU monitoring and care is no longer necessary
- Heart Rate < 90/ min
- SBP> 120 mm Hg off vasopressors
- RR< 20 / min
- Conscious, oriented

- Tolerating feeding
- Not needing any organ support treatment (CRRT, liver support etc)

Discharge to Home Criteria

- Suspected case: if the laboratory results for SARS-COV2 are negative, discharge is to be decided as per discretion of the treating physician based on his provisional/confirmed diagnosis
- Confirmed case: resolution of symptoms, radiological improvement with a documented virological clearance in 2 samples atleast 24 hours apart

12 For Preventing Transmission in The Community

- Diligent hand washing, particularly after touching surfaces in public. Use of hand sanitizer that contains at least 60 percent alcohol is a reasonable alternative if the hands are not visibly dirty.
- Respiratory hygiene (e.g.: covering the cough or sneeze).
- Use triple layer disposable surgical mask if you have any Respiratory symptoms.
- Avoiding crowds (particularly in poorly ventilated spaces) if possible and avoiding close contact with ill individuals. Also try to maintain a safe distance of 1 metre.
- Avoid handshakes, hugs and kisses
- Avoid non-essential travels/gatherings
- Avoid holding on railings of steps
- May use pens for switching on lights in common areas, lift buttons
- At hospitals, avoid keeping patient files on the bed
- Use gloves
- Used mask and other personal protective equipment should be considered as a potentially infected material and it should be disposed separately in an infectious waste disposable bag.

13 Covid-19 and Mental Health: Strategies to Mitigate Fear and Anxiety

With nearly 14000 people in India having fallen prey to the corona infection, the situation seems grim. To add to this burden is the growing incidence of mental health problems as highlighted below-

- Anxiety related issues like palpitations, tremors, episodes of breathlessness unrelated to cardiac and respiratory illnesses, feeling of impending doom. Such kind of panic attacks are being frequently observed in the predisposed groups. People with pre-existing mental health issues are at the highest risk.
- Depressive disorders manifesting as sad mood, low body energy, headaches, feelings of self-harm and disturbing sleep and appetite are amplified by the present situation.
- Obsessive and compulsive disorder evident clinically commonly as excessive concerns for cleanliness and thereafter repeated cleaning will see a large fold rise after the corona pandemic is over.
- Substance related issues like harmful use of opioids, alcohol and street drugs like cannabis are and will be on the rise in persons with above three psychiatric issues to cope with these issues.
- Sleep related problems most common of which is lack of sleep is being faced by many among us today is another health burden as reduced sleep proportionately increases chances of hypertension, uncontrolled diabetes which are further responsible for corona related deaths.
- The baap of all are the psychotic disorders presenting as abrupt onset of hallucinations, suspiciousness, fear fullness that the world is coming to an end and I may die soon, violence and aggression, such disorders are already evident to many of our psychiatry colleagues.
- Suicide and self-harm are being adopted as a coping mechanism to all the above mental health issues (1-6) by many people especially seen in the patients who have provisional symptoms of covid19,;cases reported in the media too. Few of these suspected patients turned out to be corona negative that was revealed after the commission of suicide.
- Children too might face the brunt of this pandemic once they grow up. Personality issues will surely be observed in these cases.

It is high time to remove the stigma related to psychiatric diseases and start practicing some mental health hygiene measures in our day to day lives and never feel shy or hesitation in seeking help from a psychiatrist.

Minimize watching, reading or listening to news about COVID-19 that causes you to feel anxious or distressed; seek information only from trusted sources and mainly so that you can take practical steps to prepare your plans and protect yourself and loved ones. Seek information updates at specific times during the day, once or twice. The sudden and near-constant stream of news reports about an outbreak can cause anyone to feel worried. Get the facts; not rumors and misinformation. Gather information at regular intervals from the WHO website and local health authority platforms in order to help you distinguish facts from rumors. Facts can help to minimize fears.

Protect yourself and be supportive to others. Assisting others in their time of need can benefit both the person receiving support and the helper. For example, check by telephone on neighbors or people in your community who may need some extra assistance. Working together as one community can help to create solidarity in addressing COVID-19 together.

Find opportunities to amplify positive and hopeful stories and positive images of local people who have experienced COVID-19. For example, stories of people who have recovered or who have supported a loved one and are willing to share their experience.

Honour carers and healthcare workers supporting people affected with COVID-19 in your community. Acknowledge the role they play in saving lives and keeping your loved ones safe.

Help children find positive ways to express feelings such as fear and sadness. Every child has his or her own way of expressing emotions. Sometimes engaging in a creative activity, such as playing or drawing can facilitate this process. Children feel relieved if they can express and communicate their feelings in a safe and supportive environment.

Keep children close to their parents and family, if considered safe, and avoid separating children and their carers as much as possible. If a child needs to be separated from his or her primary carer, ensure that appropriate alternative care is provided and that a social worker or equivalent will regularly follow up on the child. Further, ensure that during periods of separation, regular contact with parents and carers is maintained, such as twice-daily scheduled telephone or video calls or other age-appropriate communication (e.g. social media).

Maintain familiar routines in daily life as much as possible, or create new routines, especially if children must stay at home. Provide engaging age-appropriate activities for children,

including activities for their learning. Where possible, encourage children to continue to play and socialize with others, even if only within the family when advised to restrict social contact. During times of stress and crisis, it is common for children to seek more attachment and be more demanding on parents. Discuss COVID-19 with your children in an honest and age-appropriate way. If your children have concerns, addressing them together may ease their anxiety. Children will observe adults' behaviors and emotions for cues on how to manage their own emotions during difficult times.

For health care workers-Take care of yourself at this time. Try and use helpful coping strategies such as ensuring sufficient rest and respite during work or between shifts, eat sufficient and healthy food, engage in physical activity, and stay in contact with family and friends. Avoid using unhelpful coping strategies such as use of tobacco, alcohol or other drugs. In the long term, these can worsen your mental and physical well-being. The COVID-19 outbreak is a unique and unprecedented scenario for many workers, particularly if they have not been involved in similar responses. Even so, using strategies that have worked for you in the past to manage times of stress can benefit you now. You are the person most likely to know how you can de-stress and you should not be hesitant in keeping yourself psychologically well. This is not a sprint; it's a marathon. With collective efforts, India will surely win the battle & emerge stronger.

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