

# CoronaVirus: medical management in a developed country i.e. China versus a developing country i.e. India.

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## Abstract

The global pandemic of 2020: The COVID- 19 is responsible for the worst public health emergency worldwide, as declared by WHO in January of 2020. The disease first began in a small city named Wuhan in Hubei province of China with the clinical presentation of viral pneumonia which has led to a worldwide pandemic. As the name suggests, we are well aware that the diseases is transmitted in aerosols and thus, led the world population into isolation, quarantine and social distancing, another cause of deteriorating mental health. Anyhow, this project focuses on analyzing the accessible information, through research papers, peer- reviewed and non-peer reviewed to understand the medical management of Coronavirus based on the pandemic, morphology, qualitative and quantitative impact of COVID-19, in the world's two biggest economies- China and India. As understood, coronaviruses are typically known to cause infections in vertebrate mammals and avian populace with symptoms ranging from mild distress to septic shock with renal failure. The worldwide spread of the virus has resulted in large number of deaths, without providing us with the ultimate cure. As of now, there is no vaccination available, leaving us helpless. The best treatment for now, is to self- isolate and avoidance of human contact to forestall the contraction of this infection. The WHO, individual researchers, healthcare organizations and well established pharmaceuticals have been working around the clock to best discover an Antibody against Coronavirus, to the fix the battle against coronavirus. Fortunately, there have been a few vaccine trials have begun and succeeded until this hour. But, we have to study the infection with the goal that we can cure, and if not cure at least eliminate the disease.

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1. Abstract
2. Background:

The global pandemic of 2020: The COVID- 19 is responsible for the worst public health emergency worldwide, as declared by WHO in January of 2020. The disease first began in a small city named Wuhan in Hubei province of China with the clinical presentation of viral pneumonia which has led to a worldwide pandemic. As the name suggests, we are well aware that the diseases is transmitted in aerosols and thus, led the world population into isolation, quarantine and social distancing, another cause of deteriorating mental health. Anyhow, this project focuses on analyzing the accessible information, through research papers, peer- reviewed and non-peer reviewed to understand the medical management of Coronavirus based on the pandemic, morphology, qualitative and quantitative impact of COVID-19, in the world's two biggest economies- China and India. As understood, coronaviruses are typically known to cause infections in vertebrate mammals and avian populace with symptoms ranging from mild distress to septic shock with renal failure. The worldwide spread of the virus has resulted in large number of deaths, without providing us with the ultimate cure. As of now, there is no vaccination available, leaving us helpless. The best treatment for now, is to self- isolate and avoidance of human contact to forestall the contraction of this infection. The WHO, individual researchers, healthcare organizations and well established pharmaceuticals have been working around the clock to best discover an Antibody against Coronavirus, to the fix the battle against coronavirus. Fortunately, there have been a few vaccine trials have begun and succeeded until this hour. But, we have to study the infection with the goal that we can cure, and if not cure at least eliminate the disease.

Aim:

The aim of this study is to compare the current status of medical management in a developed country that is China versus a developing country that is India, based on current medical literature available.

Problem Description:

*COVID-19 pandemic has immersed worldwide nations in a stand- still for the last 5 months of 2020 and has changed the pace, texture and nature of our lives.* Due to limited data availability of medical management, management strategies, and approach to COVID-19 infected patients. The medical management is based on clinical experience, and clinical evaluation of individual patient's clinical and social circumstance and availability of medical resources. This document has tried to provide with very concise information available to manage mild to sever disease scenarios associated with Coronavirus infection.

Preliminary Thesis:

The systemic review has focused on to compare the available treatment options applied by China and India to manage the current pandemic situation, in their respective countries. 1.5 Material used: The following review paper has considered published peer-reviewed papers and non-peer-reviewed pre-print manuscripts on COVID19 and related aspects with an emphasis on clinical management. 1.6 Study Methodology: The retrospective review focuses on understanding the management of coronavirus, as it remains through patient solidity. However, meticulous diagnosis in based on early identification and appropriate management of high-risk cases as suggested by worldwide clinicians. For improved management of cases, there is also a need to understand test sensitivity and specificity of serology, Reverse Transcriptase- Polymerase Chain Reaction as the only available testing and radiological imaging, and the efficacy of available treatment management, for high risk cases and patients with severe disease. Even though there has been sufficient generated data on COVID-19 since early January 2020. Nevertheless, key questions remain regarding understanding the use of appropriate medications due to the effect of the virus on population at risk and various age groups, the proportion of individuals who have had asymptomatic infections and their transmission potential, the endemicity of COVID-19, and whether stringent physical distancing measures will be effective in countries of our study.

Introduction: What is Corona Virus or COVID-19?

Coronaviurs, a subfamily of *Orthocoronavirinae*, and family *Coronaviridae* [11Coronaviridae, “Family Coronaviridae.”] constitutes group of infections, that causes diseases with multiple presentation e.g. involving the respiratory or gastrointestinal system. Respiratory infection ranges from pathogenecity of the known virus involved e.g. MERS-CoV and SARS-CoV. Based on the starin of pathogenicity the novel coronavirus can be classified precisely into its subfamily, as on account of COVID-19, the infection caused by SARS-CoV-2. Coronavirus was term coined by researchers June Almeida and David Tyrell who first observed and studied human coronavirus under a microscope. The name Coronavirus was coined from Latin ‘corona’ meaning ‘crown’ or ‘wreath’. The name is based on the appearance of virions, under an electron microscope, which has center of hereditary material encompassed by an envelope with protein spikes on its surface, also known as the S- protein or the peplomers for binding to host cell membrane, also giving it a solar corna or halo appearance. [22“Coronavirus | Definition of Coronavirus by Merriam-Webster.”][33Tyrrrell and Fielder, *Cold Wars*.] Coronavirus as a zoonotic was understood to have arised from a mutation between the virus infecting bats and snakes and MERS-CoV was communicated from dromedary camels and SARS-CoV from civet felines. The mutation of the viral genome of the SARS-CoV-2 (COVID-19) is yet to be understood, as examinations are progressing to distinguish the zoonotic source of this pandemic. [44“Coronaviruses and Acute Respiratory Syndromes (COVID-19, MERS, and SARS) - Infectious Diseases - MSD Manual Professional Edition.”] The first instance of atypical pneumonia of unidentified etiology was accounted on December 30, 2019, from Wuhan, China. By January 7, 2020, a novel  $\beta$ - coronavirus was segregated from the coronavirus 2 i.e. SARS-CoV-2 the cause of ARDS while the illness was named COVID-19. COVID-19 is not just and epidemic of a single nation but a pandemic influencing about each nation, with over 22.6 million affirmed cases and more than 792, 000 identified deaths. The death rates are higher among individuals more than 60 years old and with chronic medical conditions like hypertension, diabetes and cardiovascular accidents. [55“Coronavirus Disease (COVID-19) - Events as They Happen.”][66“Estimates Vary Widely for Number of Wuhan COVID-19 Cases in January | The Scientist Magazine®.”]This paper provides a comparative update on the ongoing advances in understanding the virology, diagnostic criteria, clinical presentation, and treatment alternatives for COVID-19 dependent on research available.

Etiological Characteristics

Virus classification:

- Realm: *Riboviria*
- Kingdom: *Orthornaviriae*
- Phylum: *Pisuviricota*
- Class: *Pisoniviricetes*
- Order: *Nidovirales*

- Family: *Coronaviridae*
- Subfamily: *Orthocoronavirinae*
- Genus: *Beta coronavirus*

The virion structure is round or oval, often polymorphic, with diameter being 60 to 140 nm, enveloped, with positive single strand RNA genome, nucleocapsid that is helical. With the genome size of 26- 32 kilobases and homology association with 85% of bat SARS-like coronaviruses (bat-SL-CoVZC45), and 96.2% to bat coronavirus RaTG13. SARS-CoV-2's affinity for ACE2 also results in direct and acute injury to the lung: found in respiratory epithelial cells in 96 hours and about 6 days for virus to be isolated and cultured in Vero E6 and Huh-7 cell lines, heart, endothelial cells, and, potentially, other organs. [77Woo et al., "Coronavirus Genomics and Bioinformatics Analysis."][88Cherry et al., *Feigin and Cherry's Textbook of Pediatric Infectious Diseases E-Book*.]

1. Epidemiological Characteristics:
2. Source of infection: Associated with patients infected with novel coronavirus and asymptomatic infected people.
3. Route of transmission: Respiratory droplets or aerosols transmission in a relatively closed environment for a long-time exposure to high concentrations of aerosol and fecal and urine transmission is associated with contaminated environment that may lead to aerosol or contact transmission. [99Decaro, "Alphacoronavirus++."][1010Masters, "The Molecular Biology of Coronaviruses."][1111Cui, Li, and Shi, "Origin and Evolution of Pathogenic Coronaviruses."]
4. Pathological changes:

#### Lungs:

Consolidation presentation is variable with hyperinflated alveoli and alveoli interstitium changes and cystic lesions. Alveolar exudate is rich in fibrin and associated micro- thrombi with hyaline membrane formation. Type II pneumocytes: hyperplasia and focal desquamation with viral inclusion bodies, macrophages. Alveolar septae is bound to be congested and edematous due to monocyte and lymphocyte infiltration. And bronchus is subjected to sloughing of epithelium and deposition of mucus plugs. Severe disease is associated with hemorrhage, necrosis, and overt hemorrhagic infarction with alveolar exudates and interstitial pulmonary fibrosis. Under electron microscope, bronchial epithelium and Type II pneumocytes visualize cytoplasmic 2019-nCoV virions present and alveolar epithelial cells and macrophages reveals coronavirus, viral 3 immunoreactivity, under immunostain.

#### Spleen:

Spleen is subjected to marked atrophy, with decreased lymphocytes and focal hemorrhage and necrosis. Macrophages proliferation and phagocytosis leading to decreased myelopoiesis in bone marrow. CD4+ and CD8+ Immunohistochemistry show, decreased T cells.

#### Cardiovascular System:

Necrosis of myocardial cells, is seen and is associated with mild infiltration of monocytes, lymphocytes and/or neutrophils in the cardiac interstitium and sloughing of endothelial cells, endovasculitis and microthrombi in blood vessels is visualized.

#### Hepatobiliary System:

Hepatocytes undergo focal necrosis with infiltration of neutrophils and sinusoidal congestion. Portal system is infiltrated by lymphocytes and histiocytes with microthromb, with the general appearance of liver is dark-red and enlarged and gallbladder is prominently distended.

#### Renal System:

Degeneration and shedding of renal tubules epithelial cells, and hyaline casts, with proteinaceous exudates in the Bowman's capsule around glomeruli and microthrombi and fibrotic foci in kidney interstitium.

## Other organs:

Cerebral hyperemia and edema, with degeneration of neurons. Necrotic foci are seen in the adrenal glands. Necrosis and sloughing of epithelium mucosae of variable degree are present in the esophagus, stomach and bowel. [1212“Pathological Findings of COVID-19 Associated with Acute Respiratory Distress Syndrome - The Lancet Respiratory Medicine.”][1313“Pathology Outlines - COVID-19.”][1414“(PDF) Pathological Findings of COVID-19 Associated with Acute Respiratory Distress Syndrome.”]

1. Clinical Characteristics
2. Clinical manifestations:

- Incubation period: 1 to 14 days, mostly three to seven days. [1515Corman et al., “Chapter Eight - Hosts and Sources of Endemic Human Coronaviruses.”][1616Cecil, Goldman, and Schafer, *Goldman's Cecil Medicine, Expert Consult Premium Edition – Enhanced Online Features and Print, Single Volume*, 24.]
- Signs and Symptoms: Mild cases are associated with fever, fatigue and dry cough, nasal congestion, runny nose, sore throat, myalgia and diarrhea in some patients. And severe cases, show dyspnea or hypoxemia, which may progress to ARDS, septic shock, refractory metabolic acidosis, coagulopathy, multiple organ failure with or without a mild fever. Pediatric cases with symptoms are usually mild, but neonates and infants have atypical symptoms involving GIT i.e. vomiting and diarrhea with lethargy and shortness of breath. Special consideration should be given to elderly, pregnant and patients with chronic underlying disease. [1717“Features, Evaluation, and Treatment of Coronavirus (COVID-19) - StatPearls - NCBI Bookshelf.”][1818Fu et al., “Clinical Characteristics of Coronavirus Disease 2019 (COVID-19) in China.”]
- Laboratory tests:

## General findings:

Overall, early stage of disease is associated with peripheral WBC and lymphocytes decreased, elevated liver enzymes, LDH, myoglobin and CRP and ESR, with normal procalcitonin. Later stages show elevated troponin, D-dimer and other inflammatory marker with progressive decrease in peripheral blood lymphocytes.

## Pathogenic and serological findings:

### Pathogenic findings:

Coronavirus nucleic acid is identified via NP swabs, sputum, LRT secretions, blood, feces and urine using rt-PCR and/or NGS methods. While, sputum or air tract extraction from LRT is more accurate.

### Serological findings:

Corona specific IgM: detectable at 3-5 days after onset (variation: 12 days) and IgG, increases more during convalescence compared to acute phase (variation 14 days).

### Chest imaging:

Early stage shows multiple small patchy shadows and interstitial changes, more apparent in the peripheral zone of lungs, while, later stage of disease shows multiple ground glass opacities and infiltration bilaterally with or without pulmonary effusion. Pulmonary consolidation might be present. [1919Pericàs et al., “COVID-19.”][2020Mitchell and George, “Evaluation of the COVID19 ID NOW EUA Assay.”]

1. Surveillance Case Definition: Criteria to diagnose Corona virus infection comparison between 2 countries- China versus India In terms of Public Health, Surveillance Case Definition, are determined standards used to determine a disease for public health inspection. It enables officials to codify and to evaluate the number of cases across respective administrations. It is not utilized by practicing clinicians for making diagnosis or determining how to provide appropriate medical management to individual patients. [2121“Surveillance Case Definitions | NNDSS.”]
2. In China:

Suspect cases:

Epidemiological history (EH):

- Travel history to or accommodation in Wuhan or Hubei Province where cases have been reported within 14 days prior to the onset of the disease.
- Any contact with infected people (positive rt-PCR test) within 14 days prior to the onset of the disease.
- History of travel to or residence in Wuhan or Hubei Province, or neighboring areas where cases have been reported within 14 days prior to the onset of the disease.
- Any contact with symptomatic person with fever or with or without respiratory symptoms from Wuhan or Hubei Province where cases have been reported within 14 days prior to the onset of the disease.
- Any contact with novel coronavirus infected people (with positive results for the nucleic acid test) within 14 days prior to the onset of the disease.
- Any contact with people in a small community e.g. 2 or more cases with fever and/or respiratory symptoms in a family, office or school environment. [2222Idrovo and Manrique-Hernández, “Data Quality of Chinese Surveillance of COVID-19.”]

Clinical manifestations (CM): Fever with or without respiratory symptom, CXR with features of Coronavirus and peripheral WBC and lymphocytes normal or decreased. [2323“Coronavirus: How China’s Using Surveillance to Tackle Outbreak - BBC News.”]

\*(Any EH+ any 2 CM or any 2 CM or all 3 CM if there is no clear EH)

1. Confirmed cases are identified with fluorescent Rt-PCR positive of coronavirus nucleic acid and gene sequence homology matches human coronavirus and Coronavirus specific IgM and IgG detected in serum. [2424Lu, “China Uses Mass Surveillance Tech to Fight Spread of Coronavirus.”]
2. In India

Suspected Cases:

- All symptomatic individuals with history of international travel within last 14 days
- All symptomatic contacts of rt-PCR positive.
- All symptomatic doctors, nurses, technicians or healthcare professionals (HCP)
- All hospitalized patients with ARDS
- Asymptomatic people with contact with any HCP or anyone with tested positive for corona should be tested once with 5 days and on day 14 post- contact.
- Any person in contact with a person with fever with or without respiratory symptoms should be tested e.g. high risk contacts i.e. living in the same house with a confirmed case or Health care professional.

Confirmed Cases: A person with rt-PCR positive of COVID-19 infection, irrespective of clinical presentation. [2525Gandhi and Kathirvel, “Epidemiological Studies on Coronavirus Disease 2019 Pandemic in India.”][2626Garg, Bhatnagar, and Gangadharan, “A Case for Participatory Disease Surveillance of the COVID-19 Pandemic in India.”]

1. Clinical Classifications of Corona virus Infection: China versus India
2. In China:

Mild cases have no clinical signs of pneumonia and moderate cases with fever with or without clinical signs of pneumonia on CXR. Severe cases, in adult cases meeting the below criteria: RDS [?]30 breaths/min, SpO2 [?]93% at rest; PaO2/ FiO2 [?] 300mmHg (1 mmHg=0.133kPa). \*In high-altitude areas, PaO2/ FiO2 correction formula:  $PaO2/FiO2 \times [Atmospheric\ pressure\ (mmHg)/760]$ . CXR showing disease progression within 24-48 hours >50% should be managed as Critical cases with clinical warning indicators of critical cases: Progressive decrease in peripheral blood lymphocytes, progressive elevation in inflammatory markers i.e. IL-6, CRP, lactate and development of Lung lesion recently. Pediatric cases meeting the below criteria: Tachypnea RR [?] 40-60 breaths/min, without fever and distress, SpO2 [?] 92%, with pulse oximetry on rest or signs of labored breathing: infrasternal, supraclavicular and intercostal muscle

retractions, moaning, nasal fluttering, cyanosis and apnea and associated lethargy and convulsions, difficulty on feeding and signs of dehydration and clinical warning indicators of pediatric critical cases: Increase in RR, progressive elevation of lactate, drowsiness or poor mentation. CXR visualizing bilateral infiltrates on all lobes, with pleural effusion or development of Lung lesion recently. Pediatric cases with underlying disorders e.g Congenital Heart Disease, Bronchopulmonary Dysplasia, Respiratory tract deformation, variable Hb, or severe malnutrition, immunodeficiency secondary to long- term use of immunosuppressants. Criteria for Critical Cases: Acute Respiratory failure needing mechanical ventilation, Shock or signs of organ failure requiring ICU admission. [2727Gandhi and Kathirvel, “Epidemiological Studies on Coronavirus Disease 2019 Pandemic in India.”][2828Peng et al., “Management and Treatment of COVID-19.”]

In India: Even though every disease presentation is variable and symptom pool ranges from mild, moderate, or severe illness, this symptom classification includes severe pneumonia, ARDS, sepsis and septic shock. Infection Prevention control implementation and identification of severe manifestations, as early as possible, allows us to optimize medical management with safe and rapid referral to ICU.

1. Uncomplicated illness: Uncomplicated URTI with non-specific symptoms such as fever, cough, sore throat, nasal congestion, malaise, headache and elderly and immunocompromised have atypical symptoms.
2. Mild pneumonia: Tachypnea RR [?] 40-60 breaths/min, without fever and distress or pneumonia that is asymptomatic
3. Severe pneumonia: In Adult cases, RR [?]30 breaths/ min, RDS, SpO2 [?]90% on room air and Fever or suspected respiratory infection. In pediatric cases, Cough and difficulty + cyanosis or SpO2 < 90% and RDS secondary to symptomatic presentation of pneumonia: inability to breastfeed, lethargy, drowsiness or convulsions with signs of labored breathing- infrasternal, supraclavicular and intercostal muscle retractions, moaning, nasal fluttering, cyanosis and apnea.
4. Acute Respiratory Distress Syndrome: Onset of newly identified or worsening respiratory symptoms < 1 week of identification and Origin of Edema, respiratory failure independent of cardiac failure or fluid overload. Requires echocardiography to eliminate cardiac causes of edema in patients with no risk factors.

Oxygenation:

In Adults;

ARDS	Ratio for PaO <sub>2</sub> /FiO <sub>2</sub>	Notes
Mild	200 mmHg < PaO <sub>2</sub> /FiO <sub>2</sub> [?] 300 mmHg	With PEEP or CPAP [?]5 cm H <sub>2</sub> O or non- ventialted
Moderate	100 mmHg < PaO <sub>2</sub> /FiO <sub>2</sub> [?]200 mmHg	Same as above
Severe	[?] 100 mmHg	Same as above
Not available	SpO <sub>2</sub> /FiO <sub>2</sub> [?]315	In nonventilated patients

In children;

ARDS	OI	Notes
Mild	4 [?] OI < 8 or 5 [?] OSI < 7.5	IV
Moderate	8 [?] OI < 16 or 7.5 [?] OSI < 12.3	IV
Severe	OI [?] 16 or OSI [?] 12.3	IV

\* OI = Oxygenation Index and OSI = Oxygenation Index using SpO<sub>2</sub>, IV- Invasively Ventilated. PaO<sub>2</sub>/FiO<sub>2</sub> [?] 300 mmHg or SpO<sub>2</sub>/FiO<sub>2</sub> [?]264 via Bilevel NIV

1. Sepsis: In adults signs of AMS, difficult or labored breathing, low SpO<sub>2</sub>, decreased Urine output,

increased HR, weak pulses, low BP, cold extremities, skin mottling, lab values indicating coagulopathy, thrombocytopenia, acidosis, high lactate or hyperbilirubinemia. And in children, suspected or confirmed infection + [?]2 SIRS criteria, + Abnormal temperature or decreased WBC

2. Septic Shock: In adult, persistent Hypotension despite volume resuscitation, Vasopressors mainting MAP [?]65 mmHg and lactate level < 2 mmol/L. And, in children, hypotension, AMS, bradycardia or tachycardia (160 bpm in infants and 150 bpm in children), prolonged capillary refill (>2 sec), Vasodilation with bounding pulses, mottled skin, tachypnea, increased lactate and oliguria and hyperthermia or hypothermia. [11“The Indian Perspective of COVID-19 Outbreak.”]

1. Medical Management of novel Corona virus
2. In China:

Type of environment suitable, based on suspicion and confirmation: \*With provision of effective isolation, protection and prevention conditions. Suspected cases should be treated in Isolation. And confirmed cases are treated in the same room while critical cases are admitted in ICU.

General treatment includes monitor CBC, ABG analysis, urine output, CRP, biochemical profile i.e. LFT, KFT, PFT, troponins, CXR and cytokines if necessary. Oxygen therapy with nasal catheter and mask oxygenation or nasal high- flow therapy or application of hydrogen and oxygen (H<sub>2</sub>/O<sub>2</sub>: 66.6%/33.3%). Supportive treatment includes bed rest, proper caloric intake, water and electrolytes balance continuously monitored, with vitals and Spo<sub>2</sub>. Antiviral therapy with  $\alpha$ - interferon, dosage of 5 million units or equivalent dose with added 2ml sterilized water, atomization inhalation 2x daily and Lopinavir or Ritonavir dosage of 200 mg/50mg, 2 tablets, 2x daily. [22“Cao: A Trial of Lopinavir–Ritonavir in Adults Hospitali... - Google Scholar.”] Ribavirin, dosage of 500mg 2-3x daily IV injection for 10 days. Chloroquin Phosphate, dosage of 500mg bid for 7 days- age 18-65 and BW->50kg, 500mg bid for days 1 and 2 and 500mg qd for days 3-7 for BW<50kg and Arbidol, dosage of 200mg tid for 10 days. [33“National Health Commission of the People’s Republic... - Google Scholar.”] Patients should be placed on empirical antibiotic therapy for broad-spectrum coverage should not be given other antibiotics inappropriately.

\* Monitor drug levels, to avoid toxicity and pay close attention to contraindications e.g. chloroquine cannot be used for patients with heart diseases. Avoid using multiple antivirals at the same time. Discontinue drug if toxic side effect present. In pregnant patient, keep in mind; the number of gestational weeks, choice of drugs having the least fetotoxicity, or termination of pregnancy before treatment. [44“Wang: Clinical Characteristics of 138 Hospitalized... - Google Scholar.”]

Treatment of severe and critical cases: “Treatment principle: *Symptomatic management should be thorough enough to prevent complications, underlying disease should be treated, super- imposed infections should be prevented with appropriate organ function support.*”

Respiratory support-

Types of ventilation	Key points
Oxygen Therapy	Patient with severe symptoms are given nasal cannulas or masks for oxygen inhalation and should be assessed for RDS and or hypoxemia.
High flow nasal- catheter oxygenation or non-invasive mechanical ventilation	If standard oxygen therapy does not alleviate symptoms, shift the patient to high-flow nasal cannula oxygen therapy or non-invasive ventilation. Symptoms should improve within 1- 2 hours.



Types of ventilation	Key points
Invasive mechanical ventilation	If NIV does not alleviate symptoms within 1- 2 hours, patient should undergo tracheal intubation or consider invasive ventilation. Parameters: TV: 6-8ml/kg of ideal body weight Airway platform pressure: <30cmH <sub>2</sub> O PEEP: High, for warm and moist airway Human- Machine asynchronization secondary to excessive use of sedation and muscle relaxants. Lung Rehabilitation should be done early, and avoid use of long sedation.
Rescue therapy	Pulmonary re- tensioning for severe ARDS; Prone- position ventilation should be performed for > 12 hours a day, if not effective shift the patient to ECMO ECMO indicators: FiO <sub>2</sub> ;90%, OI < 80mmHg, for > 3- 4 hours a day In RF, for Airway platform pressure: [?] 35cmH <sub>2</sub> O use VV-ECMO mode For circulatory support, VA- ECMO mode Withdraw from ECMO when disease is well managed and cardiopulmonary function shows signs of recovery.

[11Huang et al., “Clinical Features of Patients Infected with 2019 Novel Coronavirus in Wuhan, China.”]

1. Circulatory support: with adequate fluid resuscitation, to improve microcirculation, use vasoactive drugs and closely monitor: BP, HR and urine volume and base excess in ABG. Use non-invasive hemodynamic monitor i.e. Doppler ultrasound or echocardiography or invasive blood pressure or continuous cardiac output (PiCCO) monitoring.\**If HR increases > 20% the basic value or the decrease of blood pressure > 20% of the basic value, with signs of poor skin perfusion and decreased urine output, closely observe whether the patient has septic shock, gastrointestinal hemorrhage or heart failure.*
2. Renal failure and renal replacement therapy: Management of renal failure in critically ill patient is based on treating the underlying, acid- base disorder, associated electrolyte imbalance, maintenance of body fluid, nitrogen balance and trace elements level. Continuous renal replacement therapy (CRRT) indications include Hyperkalemia, Acidosis, Pulmonary edema or water overload and fluid management in multiple organ dysfunction.
3. Blood purification treatment: To reduce inflammatory markers and eliminate cytokine storm, we can use plasma exchange, absorption, perfusion and blood/plasma filtration.
4. Immunotherapy: For patients with extensive lesion and decreased IL- 6, drug of choice is Tocilizumab, with initial dosage of 4-8mg/kg with dilution of recommended dose 400mg in 0.9% normal saline to 100ml, with infusion time of > 1 hour, Second dose should be given after 12 hours, with maximum single dose of 800mg.\**Should not be administration for patients with active tuberculosis.*
5. Other therapeutic measures: For patients with deterioration of oxygenation parameters, rapid progress in CXR, increased inflammatory markers, treatment with Glucocorticoids: methylprednisolone, dosage should not exceed 1-2 mg/kg/day, Xuebijing 100ml/time IV 2x daily, Intestinal microbial regulators, IV infusion of  $\gamma$ -globulin for severe pediatric is given. And, special consideration is given to patients who are elderly and pregnant. Recommendations: Pregnancy should be terminated preferably with C-section and psychological counseling.
6. Chinese Traditional Medicine has also been used for homeopathy management of corona cases. [22“Clinical Management of COVID-19,” 19.][33“Chen: Diagnosis and Treatment Recommendation for... - Google Scholar.”]
7. In India

1. Early supportive therapy and monitoring: Supplemental oxygen therapy parameters include initial O<sub>2</sub> at 5 L/min and titrate flow rates, for SpO<sub>2</sub> [?]90% in non-pregnant patients and SpO<sub>2</sub> [?]92-95 % in pregnant patients and for pediatric cases with signs of labored breathing should receive O<sub>2</sub> therapy during resuscitation to target SpO<sub>2</sub> [?]94%; otherwise, SpO<sub>2</sub> is [?]90%. Fluid management should be conservative, aggressive fluid resuscitation may worsen oxygenation. Empirical Antibiotic therapy is based on diagnosis e.g. community-acquired pneumonia, health care-associated pneumonia [if infection was acquired in healthcare setting], or sepsis, epidemiology and Public health data, surveillance case definition and treatment protocol. Specific antibiotics to be given after microbiology results and clinical relevance. Do not routinely give systemic corticosteroids found no effect on mortality, unless indicated otherwise. Closely monitor for severe complications. And Keeping in mind patient's co-morbid condition(s) to adjust the management of severe disease. Communicate with patient and family to provide support and prognostic information. [44“Lu: Middle East Respiratory Syndrome Coronavirus... - Google Scholar.”]
2. Management of hypoxemic RF and ARDS:

Types of Ventilation	Key points
Standard oxygen therapy	For hypoxemic respiratory failure; during labored breathing oxygen should be delivered via face-mask with reservoir bag. ( Flow rate: 10-15 L/min, FiO <sub>2</sub> 0.60-0.95) * Hypoxemic RF in ARDS is secondary to intrapulmonary V/ Q mismatch or shunt which will require mechanical ventilation
High – flow nasal catheter oxygenation or non – invasive mechanical ventilation (NIV)	HFNO- Preferred in patients with hypercapnia secondary to COPD, cardiogenic pulmonary edema, and post- operative RF. NIV- preferred for patients with hemodynamic instability, multi-organ failure, or abnormal mentation. If standard oxygen therapy does not alleviate symptoms, shift the patient to high-flow nasal cannula oxygen therapy or non-invasive ventilation. Symptoms should improve within 1- 2 hours. <i>*Patient should be managed by endotracheal intubation specialist, if his or her symptoms deteriorate after 1 hour of NIV trial.</i>
Endotracheal Intubation	Preferred for patients with severe ARDS, pediatric cases, obese or pregnant patients who might desaturate quickly during intubation. Needs 100% FiO <sub>2</sub> for 5 minutes, via a face- mask with reservoir bag, bag-valve mask, HFNO, or NIV. Rapid sequence intubation after airway assessment.
Mechanical Ventilation	Parameters: TV: 4-8 ml/kg of BW Low Inspiratory pressure, plateau pressure: 12 hours/day High PEEP: PEEP titration should be for considered for benefits i.e. to reduce atelectrauma and improvise alveolar recruitment vs risks i.e. end-inspiratory overdistension leading to lung injury and provision of pulmonary vascular resistance. Recruitment maneuver RM): episodic high CPAP (30-40 cm H <sub>2</sub> O), progressively increasing PEEP with constant or driving pressure might be also used for moderate to severe ARDS.

[11 “Dhama: COVID-19, an Emerging Coronavirus Infection:... - Google Scholar.”]

1. Management of Septic Shock: Recognize signs of septic shock when infection is suspected or confirmed and vasopressors are needed to maintain MAP [?]65 mmHg, lactate < 2mmol/L without hypovolemia, urine output >0.5 ml/kg/hr in adults and 1 ml/kg/hr in children, improvement of skin mottling, capillary refill, level of mentation. When lactate measurements are unavailable, use MAP and clinical signs of perfusion to define shock. Resuscitation need, in adults is 30 ml/kg of isotonic crystalloid for first 3hrs and in children is 20 ml/kg as a rapid bolus, then titrate upto 40-60 ml/kg in the first 1hr. \* *Additional fluid boluses of 250-1000 ml in adults or 10-20 ml/kg in children. Avoid use of hypotonic crystalloids, starches, or gelatins for resuscitation.* When mechanical ventilation is not available, and there is no response to fluid resuscitation, and signs of volume overload appear, reduce or discontinue fluid administration. Assess volume responsiveness and to give vasopressors through central venous catheters or peripheral IV, if shock persists during or after fluid resuscitation, it is associated with signs of poor perfusion and cardiac dysfunction despite achieving MAP target with fluids and vasopressors, then an inotrope such as dobutamine, should be considered.
2. Other therapeutic measures: Glucocorticoids: Methylprednisolone, dosage should not exceed 1-2 mg/kg/day for 3- 5 days and Pregnancy should be terminated preferably with C- section and psychological counseling.
3. Specific therapy: *NO SPECIFIC ANTIVIRALS* are suggested for the use of COVID-19. The following drugs may be considered for patients who are critically ill: Hydroxychloroquine, dose 400mg BD – for 1 day followed by 200mg BD for 4 days + Azithromycin 500 mg OD for 5 days. Administration of Lopinavir/ Ritonavir for PCR confirmed COVID-19 cases, with Lopinavir/ Ritonavir (200 mg/ 50 mg) – 2 tablets twice daily and Lopinavir 400mg/ Ritonavir 100 mg – 5ml suspension twice daily. \* Should not be given to children < 12yoa, pregnant and lactating women. [22 “Adedeji: Novel Inhibitors of Severe Acute Respiratory... - Google Scholar.”][33 “Falzarano: Treatment with Interferon-A2b and Ribavirin... - Google Scholar.”][44 Li et al., “[Potential antiviral therapeutics for 2019 Novel Coronavirus].”].
4. Plasma therapy: Immune plasma is FFP or hyperimmune plasma is frozen inside 24 hours after phlebotomy (PF24). The significant contrast from other plasma items is that immune plasma is acquired from benefactors who have recuperated from a particular disease. It is enriched with antibodies to the microorganism at adequate titer and biologic action to give uninvolved resistance to the beneficiary. Ideal attributes of recuperating plasma incorporate: Sufficient titer of the important counter acting antibodies, and lack of immunoreactive particles and exhibits security and viability when utilized for the particular condition. Convalescent plasma is normally acquired by apheresis in a blood bank. The plasmapheresis assortment takes around one to two hours, utilizing two small IV lines. Plasma proteins are renewed quickly in the contributor, and people can give plasma regularly. Recovered plasma can be transfused quickly to the beneficiary or solidified for later organization. It is managed as a standard plasma bonding; ordinarily, a couple of units are given. When the pandemic has subsided, immune plasma is probably going to become inaccessible except if a cycle has been set up to donate plasma to the bank, for sometime later.

## 6. Discussion:

The medical management of COVID-19 has reached a singularity, worldwide with various clinical vaccine trials and human trials for not before tested medications in progression, after WHO published management recommendations, this discussion will be focused on the steps taken by China and India, in level of their preparedness and tackling the worst pandemic of 2020. Within 7 days, of emergence of infections, China detailed its collected medical data to the World Health Organization. So as to control a significant pandemic, which started in Wuhan as an epidemic, it is critical to have dependable, explicit, exact and quick identification strategies to screen suspected, affected and non- affected personnel.

WHO is working intimately with clinicians thinking about patients with COVID-19, in China and over the globe and worldwide specialists to more readily comprehend, progressively, the clinical introduction,

normal history and treatment mediations for COVID-19. A larger part of patients with COVID-19 are adults. Among 44 672 patients in China with affirmed disease, 2.1% were underneath the age of 21. The most common symptoms included fever, dry cough, shortness of breath, and three- fourth of the patients experienced mild disease. Around 14% experienced extreme infection and 5% critically ill. Early reports recommend that disease severity is related to age (>60 years old) and co-morbidities.

Through this review, we reason that the disease profile of COVID-19 is dynamic and proceeds to quickly advance. There are as yet many open inquiries that are pending about COVID-19. As it is obvious through our writing overview, there are situations where patients affirmed with COVID-19 disease have no chest CT variations from the norm, appearing differently in relation to subclinical disease giving positive imaging discoveries on CT. It is critical that the clinical effects of screening asymptomatic patients with chest CT be resolved. A more exhaustive investigation about the presence of any expected advantage on clinical results should be tended to against the known money related expenses and introduction to ionizing radiation related with CT checking. As an ever increasing number of associated cases with COVID 19 disease emerges, emergency possibility of RT-PCR packs may likewise be expanded. This has prompted chest CT being used to help analysis in the nonattendance of RT-PCR, as shown in an ongoing case revealed from China and all over world. The movement of the lung changes of COVID-19 on CT imaging is additionally comparable to SARS, with the ground-glass and combination getting more regrettable or better more than a few days. This would be normal, as the two irresistible specialists are a piece of the coronavirus.

Clinical consideration of patients with COVID-19 spotlights on early acknowledgment, prompt disconnection and execution of suitable infection prevention and control measures; arrangement of suggestive consideration for those with mild disease; and improved steady consideration for those with critical illness. WHO has distributed patient administration direction, including break clinical consideration direction for hospitalized patients and home consideration direction for those with mild symptoms that might be treated at home in seclusion when the wellbeing framework is stressed.

Oxygen treatment is the significant treatment intercession for patients with serious COVID-19. All nations should work to improve the accessibility of ICU setting for critically ill patients. Mortality is accounted for as over half, in this manner execution of demonstrated basic consideration mediations, for example, mechanical ventilation ought to be improved. As there is at present no known successful antiviral treatment for COVID-19, the WHO R&D Blueprint has organized investigational therapeutics and built up an ace randomized clinical preliminary convention that can be utilized and adjusted by the clinician for varied patient cases.

The COVID-19 pandemic episode is a worldwide wonder that has affected all nations and residents, while stressing general wellbeing frameworks to a remarkable level as of late. A portion of the all the more testing predicaments experienced in the treatment of the malady base on the fitting reaction systems in triaging patients giving COVID-19 like indications, and the fair and impartial dispersion of scant clinical assets for those patients requiring more intense clinical intercessions in an inpatient medical clinic setting. Huge numbers of these difficulties fall inside the overall contemplations of equity as applied to medication in respects to the cycle by which clinical pioneers choose to make and execute these treatment and designation boundaries.

Yielding at the start that no static direction can envision all the bunch factors that may emerge as pivotal factors in the clinical condition to impact an official conclusions of those clinical experts on the cutting edges in thinking about these harassed patients, the plan of this segment is to give references and assets from profoundly respectable and thought-driving associations who have distributed complete direction on the moral contemplations at the bedside.

## 7. Conclusion:

COVID-19 is a pandemic, and termed as a public health emergency, has spread far and been among the hardest infections to contain. The infection knows no national fringes, and the pandemic doesn't recognize races. Just with solidarity and by collaboration can the universal network beat the pandemic and defend the basic country of humankind.

n the globalized period, we as a whole live in a network with a mutual future, " *United we stand, divided we fall* ." China, has provided world with hope and reminds countries that has the worst hit can be turned around. The medical management provided by the country has led to established guidelines in how to treat coronavirus, by WHO. The adopted medical management has become the key for managing COVID patients worldwide. From providing basic oxygen therapy for mild disease to providing plasma therapy for critically ill patients. The medical management, was based on medical classification of the type of pneumonia, and has varied from supportive to symptomatic management. The antiviral therapy usually varying from 3-14 days included seltamivir, ganciclovir, and lopinavir/ritonavir, with chloroquin and hydroxychloroquin. For severe cases, addition of immunomodulators and coalescent plasma therapy has become a permanent guideline for medical management of COVID worldwide.

Phylogenetic and Bayesian investigation of the coursing strains will give knowledge on the developmental directions of the infection including the beginning and nucleotide replacement rates. Likewise, the immunization improvement endeavors and ID of therapeutics including drug repurposing against COVID-19, ought to be examined on pressing premise. Further, detailing of expansive range antiviral drugs against human coronaviruses SARS-CoV and MERS-CoV is another perspective that can be investigated in future examinations. The development and transmission of COVID-19 to a worldwide hazard has gotten profoundly distressful. The executives of this continuous flare-up of coronavirus is a test for the worldwide network and it needs our due consideration and prompt activity.

More than 11 million people affected, causing an up- roar, yet the country has fought back COVID-19 epidemic with qualitative action: the most exhaustive, strictest and most intensive avoidance and control measures to fight the plague, while some countries are unable to find similar passion, interest and commitment in their fight against the pandemic. The implementation of prevention and control policies, understanding the need of its benefits and negative consequences is and was the best strategy adopted. Being the epicenter, and having the least time to evaluate their first response, and facing lack of COVID-19 trained professionals and systems, the country has struck back. Regulation endeavors of the pandemic will envelop convenient analysis, isolate of the corona positive people to forestall human to human transmission alongside broad network and medical clinic based observation. Besides, age of significant level of consciousness in the general public and association of Government apparatus will likewise go far in the executives of this pestilence. Expand examinations on transmission elements, clinical range of malady and its connection with hereditary and immunological viewpoint additionally should be explored.

Outlook: What India needs to learn from China: A Perspective of Public Health- China adopted the proper strategy to the infection. There is no vaccine or drug yet, so the best management was to isolate every single affirmed case and put every single presumed case under isolation. China accomplished huge work to rapidly share data and informational indexes for countermeasures, and quick and open revealing of flare-up information and the sharing of infection tests, hereditary data and examination results are empowered for every single worldwide network, non-legislative associations just as administrative establishments around the globe. Through territorial and nation workplaces of the WHO, China made national rules for the treatment of COVID-19, which is absolutely allowed to get to. China has earned trust by elevating a joint reaction to this worldwide test. Since the pandemic broke out, China has set incredible significance on global wellbeing participation. Maintaining the vision of building a network with a mutual future for mankind, China has been delivering data on COVID-19 since the beginning of the scourge in an open, straightforward and mindful way, wholeheartedly imparting to the WHO and global network its involvement with pandemic reaction and clinical treatment, and reinforcing collaboration on logical exploration. It has likewise given help to all gatherings as well as could be expected. Every one of these endeavors have, been acclaimed by the global network. Chinese specialists helped specialists in different nations by sharing genuine experience and clinical information through Zoom online gatherings, helping different nations oversee COVID-19 patients. Whereas in India, low degrees of testing, usage disappointments in containing the spread during lockdown, and genuine effects on other healthcare administrations. India's reaction is reliable with its 2019 scores on the Global Health Security Index. As far as healthcare security—pandemic readiness and limit—India is positioned 57th out of 195 nations. Its score of 46.5 was over the worldwide normal of 40.2. India scores high

on interchanges with human services laborers during a healthcare crisis, exchange and travel limitations, research center frameworks, inoculation, and economic crisis. In the more extended term, what is required are interests in healthcare foundation, guaranteeing congruity of ordinary healthcare administrations, and improving health during the pandemic. In any case, throughout the following year, India can hope to stay in a state of emergency. In view of the current status of COVID-19 and the exercises from its initial reaction, India should promptly organize the following measures:

- Increment testing limit. India can do this rapidly by bridling the limit of the private part for research facilities, test units, and supplies. Be that as it may, the legislature will likewise need to expand the thickness and limit of test locales and research facilities and improve acquirement and gracefully chains. India's household PPE pack creation has been an incredible example of overcoming adversity, which gives motivations to hopefulness.
- Keep up customary health administrations. Keep up fundamental basic wellbeing administrations and malady projects to maintain a strategic distance from a resurgence of antibody preventable ailments, irresistible infections, and interminable ailments. Both the focal and state governments should hope to extend vital ventures and associations with the private area, improvement accomplices, and network wellbeing laborers to fortify flood limit and guarantee progression of wellbeing arrangement.
- Uphold crisis measures. Implement reasonable social separating, powerful isolate systems, compulsory protective measures and hand cleanliness propensities, alongside improved discovery, control, and moderation.
- Empower sound checking. Present and guarantee national information security laws to improve India's healthcare crisis reaction and defend against information protection concerns.

India is a hugely populated nation and subsequently, the nation needs to make vigilant strides. The utilization of covers, continuous hand-washing, appropriate disinfection, social physical isolation, maintaining a strategic distance from groups and a solid way of life must be the new ordinary life. To contain the spread, chief accentuation is fundamental on the thorough testing, important equipment, ventilators, innovative work exercises. Standard directing of individuals is likewise basic to decrease the psychological pressure, which is unavoidable in such troublesome circumstances. It is indispensable to think of the continued advancemental arrangements after the COVID-19 experience to manage such extraordinary conditions with an all encompassing methodology. One needs to win this war astutely with the open help and sharpness. As it were, COVID 19 has shown individuals the most noteworthy control of life.

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