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Review Article

Coronavirus- The origin

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ABSTRACT

The world was apparently running smooth and was naïve about what was about to follow the mundane, up until December 2019 when a cluster of pneumonia cases first appeared in Wuhan, a city in Hubei province of China. The causative organism was identified as Novel Coronavirus.
The Novel Coronavirus rapidly spread throughout China, causing an epidemic and later spread to different parts of the world, involving every continent and country (except Antarctica). Identifying the pandemic, WHO (World Health Organisation) in February 2020, designated the disease as COVID-19 (Coronavirus disease 2019). The virus causing this disease is the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).

1. Statistics

The disease which first started in China in the end of 2019, currently has around 5,50,000 cases worldwide and 25,000 PLUS deaths.[1]

The epicentre shifted from it‘s origin in China to Italy, and then currently is in The United States Of America. China is in the recovery stage but for the rest of the world, the disease has just started its course.

2. Epidemiology

Initially, the route of transmission was unclear as the virus initially originated from a livestock market in China. Later after some studies, it was found to be a droplet infection, resembling influenza. This virus is also found to linger in aerosols for about 3 hours and on steel and plastic (3 days) cardboard (24 hours), thus is also transmitted by fomites.

Plastic & steel 3 days

Cardboard 24 hours

The period of infectivity of an individual with COVID-19 is uncertain. The risk of infectivity is tested by viral RNA isolated from respiratory and other specimens. The infectivity is higher earlier in the course of the disease compared with later stages or as disease advances. Asymptomatic individuals can also transmit the infection to another person.[2]

3. Clinical Course

The incubation period of the disease is approximately 14 days after exposure but most cases occur on approximately the 4^{th} or 5^{th} day with median incubation period of 5.1 days.[3]

People with symptomatic infection can have a spectrum of clinical presentation:

1. Mild- no or mild pneumonia.
2. Severe Disease- hypoxia, dyspnea (>50 percent lung involvement).
3. Critical Disease- respiratory failure, shock, multiorgan dysfunction.

3.1. Symptoms

Fever, fatigue, dry cough, anorexia, myalgia, dyspnea, sputum production.

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Fig. 1: (source: www.worldometers.info/coronavirus)

The overall case fatality was reported to be 2.3% which is dynamic and also varies from one country to another.

Co-morbidities associated with severe illness and mortality are:

1. Cardiovascular diseases
2. Diabetes mellitus
3. Hypertension
4. Chronic lung disease
5. Cancer
6. Chronic kidney disease

ARDS (acute respiratory distress syndrome) is a major complication in patients with this severe severe.

4. Evaluation and Work Up

4.1. Suspects

Patients with new onset fever/ respiratory symptoms and:

1. Travel history within 14 days to a country or place where community transmission of SARS-CoV-2 has started.
2. Close contact with a confirmed case of COVID-19.

Diagnosis- nasal and throat swabs are taken

RT-PCR is used to detect SARS-CoV-2

If initial tests are negative but suspicion is high, re-test is to be done and sample is taken from multiple respiratory tract sites.

Table 1: Corona testing positivity rates

S.No	Type of specimen	Positivity rate
1.	Bronchoalveolar lavage fluid	93%
2.	Fibrobronchoscope brush biopsy	46%
3.	Sputum	72%
4.	Nasal Swabs	63%
5.	Pharyngeal Swabs	32%
6.	FECES	29%
7.	Blood	1%
8.	Urine	0%

Thus, nasal swabs detect only $2/3^{rd}$ of the cases and pharyngeal swabs detect only $1/3^{rd}$ of the cases.

Nasal swab testing is better of the 2 for unadmitted patients.

5. Management

The governments of various countries are trying hard to contain this infection because of it's very contagious nature. People infected with COVID-19 are isolated in various locations (also home isolation). People proven to be having the disease, are isolated and also all the people who were in close contact to the infected person. Despite such efforts, this virus has managed to spread and infect more and more people. New hospitals are made and already existing hospital facilities are improvised to tackle such a pandemic.

Home care is given to people with mild infection. The person then discontinues home isolation if either:

1. There is reduced fever without medication and improvement in respiratory symptoms and negative RT-PCR Tests, or
2. After 7 days have passed from appearance of symptoms and 3 days since the resolution of symptoms and improvement of respiratory symptoms.

People with more severe disease are hospitalised and may even need ICU and Ventillatory support.

6. Prevention

All the governments have been propagating following steps to prevent its spread:

1. Frequent and methodical handwashing.
2. Social distancing (maintaining at least 2 metre distance).
3. Using protective gears to cover mouth and nose.[4]
4. For health care workers and those coming in close contact with those infected with the virus, special PPE (personal protective equipment) are recommended.

There are some drugs identified to help against this virus, the efficacy of which are based on only short term studies. Most of the drugs which are used may only be palliative and containing the spread is only solution of this pandemic.

WHO has recommended IPC stratergies associated with health care for suspected COVID-19. These include-

6.1. Ensuring triage, early recognition, and source control

Clinical triage should be done for patients being admitted for suspected COVID-19 and immediate isolation should be done from other patients (source control). Health care facilities should:

1. Encourage health care workers to have a high level of clinical suspicion.
2. There should be a separate triage room.
3. Hand hygiene and respiratory hygiene.
4. Sign boards in hospital for patients to read.

6.2. Applying standard precautions for all patients

In a time of pandemic like this, all patients should be clinically screened for symptoms of the concerned virus and also all health care workers should take standard precations while treating/ medicating any patient**.**

1. It should be ensured that all patients cover their nose and mouth with a cloth/ elbow while coughing or sneezing.
2. Patients with suspected COVID-19 should be given medical mask/surgical mask.
3. Hand hygiene should be practised after contact with any patient, especially respiratory secretions.
4. For hand hygiene, either hands can be washed for 20-60 seconds or alcohol based rubs (70%) could be used.
5. Hands should be washed with soap and water when visibly soiled.

6.3. Empiric additional precautions

6.3.1. In case of contact and droplet precautions

1. Before entering rooms of patients with suspected or confirmed COVID-19 patients, contact and droplet precautions should be taken in addition to standard precautions.
2. Patients should be placed in well ventilated and single rooms if possible and ventilation be minimum 60L/s per patient.
3. If single rooms are not available, patients with suspicion of COVID-19 should be kept together

LEVEL	SPECIFICATION	EQUIPMENT NEEDED
A	Level A represents the highest level of eye, skin, respiratory, mucous membranes protection. This is for those who are up to work in hazardous conditions with high vapor pressure and toxicity of hazmats or any unknown chemicals.	• respirator (positive pressure, SCBA with supplied air & emergency egress unit); • encapsulating chemical-resistant suit; • chemical-resistant gloves; • chemical-resistant boots with steel toe & shank.
B	This level is needed when working with chemicals that are NOT gases or vapors toxic by skin absorption. This level requires the same level of respiratory protection as in A, but a lesser one of eye & skin protection.	• respirator (positive pressure, external SCBA is allowed, supplied air line); • coverall, splash units; • chemical-resistant gloves; • chemical-resistant boots (outer allowed) with steel toe & shank.
C	This level presumes the same skin protection as in B, but respiratory protection requirements are not so strict. It is applicable to employees working with substances that are not hazardous via skin absorption.	• air purifying respirator (approved by NIOSH); • chemical-resistant clothing, splash suit; • chemical-resistant gloves (outer); • chemical-resistant boots (outer allowed) with steel toe & shank.
D	This level is for those workers who aren't supposed to contact with chemicals, thus require little skin protection and no respiratory protection at all.	• coverall; • leather or chemical-resistant shoes; • head/eye/ear protection.

Fig. 2: (OSHA, occupational safety and health administration www.osha.gov)

4. Patients with confirmed COVID-19 status should be kept together.
5. A team of health care workers should be designated to exclusively take care of such patients and not look after normal patients at the same time to minimise cross infection.
6. All patients beds should be atleast 1 metre apart.
7. Health care workers should wear medical masks, clean, non- sterile long sleeved gown, gloves, eye protection gear
8. A new set of PPE (personal protective equipment) should be used in case of attending a different patient.
9. Proper disposal of the PPEs should be done
10. Single used disposable equipments are preferred in case of COVID-19 patient‘s care.

6.3.2. Airborne precautions for aerosol generating procedures (AGP)

Health care workers involved in aerosol producing procedures should:

1. Perform procedures in a adequately ventilated room.
2. Special PPE should be used with a respirator.
3. Eye protection should be used.
4. There should be minimum number of people present in rooms where intubations occur.

6.4. Administration

The administration of any health care facility should ensure the following at current times:

1. Proper training of health care personnel
2. Ensuring an adequate patient to staff ratio.
3. Ensuring that the public and the health care personnel understand the importance of seeking medical care
4. They should check and ensure that the health care providers adhere to the above mentioned standard protocols and safety measures.

6.5. Collecting and handling laboratory specimens

People who collect, handle or transport clinical specimens should adhere to standard precations:

1. They should wear proper PPE
2. They are trained in safe handling practices
3. Specimen should be transferred in leak proof bags
4. Pneumatic- tube systems should never be used.

6.6. Out patient care

For handling outpatients, following measures should be taken-

1. Triage and early recognition of cases.
2. Practise hand hygiene, respiratory hygiene.

3. Wear medical masks.
4. Take adequate contact and droplet precautions.
5. Prioritization of care of symptomatic patients.

Fig. 3:

6.7. Personal protective equipment for Covid-19

1. Long sleeved full body covering gown
2. Face mask
3. Head gear
4. Front shield
5. Gloves
6. Shoe covers
7. Eye cover
8. All these equipment are supposed to be double layer.
9. There is standard protocol and procedure how donning and doffing is done.
10. Gears which cover the entire body and no body area is exposed are the most accurate.
11. Health care personnel should be trained to wear on and wear off these gears.[5]

7. Rapid Risk Assessment of Covid-19 by WHO

Rapid risk assessment is a systematic process for gathering, assessing and documenting information to assign a level of risk.

This practise:

1. Characterize the risk (low- moderate- high- very high)
2. Support and direct decision making
3. Support effective operational and risk communication
4. Impelement timely and appropriate control measures.
5. Improve preparedness

8. Methods and tools

The goals should be SMART (simple, measurable, achievable, relevant and time-bound).

8.1. Process

Assemble risk assessment team. Formulate risk questions. Undertake risk assessment. That is:

1. Assess hazard/ threat.
2. Assess exposure
3. Assess context (vulnerabilities and threat specific factors that increase or decrease risk)
4. Assigning level of risk.

8.2. Risk assessment components

8.2.1. Hazard

Can be known/ unknown. If unknown, prioritize potential hazards.

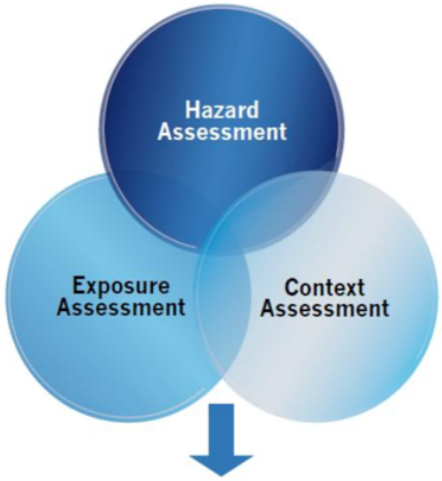

Fig. 4:

8.2.2. Exposure

Number of people likely to have been exposed and number of people exposed likely to have been affected.

8.2.3. Context

Factors associated with social, health status, behaviour Factors associated with health system.

Treatment protocol in India is as follows (as per COVID-19 Management protocol AIIMS, New Delhi, 20th March, 2020). (Based on ICMR guidelines)[7]

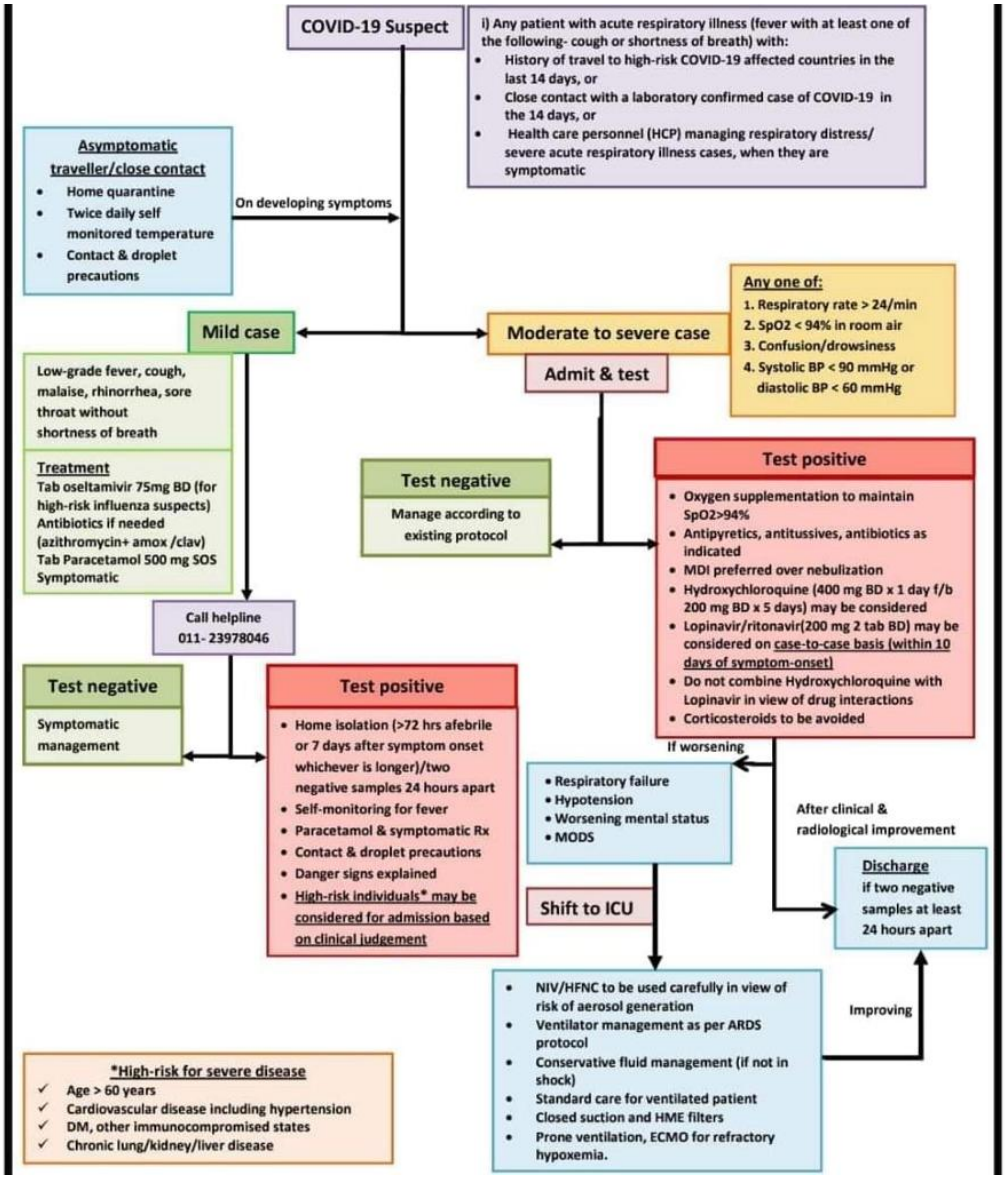

Fig. 5:

9. Coronavirus (Covid-19) Infection in Pregnancy

There is evidence that there could be a cohort of asymptomatic individuals or those with very minor symptoms carrying the virus.

Large majority of women will experience only mild or moderate cold/flu like symptoms. Cough, fever and shortness of breath are other relevant symptoms.

It has been known that whilst pregnant women are not necessarily more susceptible to viral illness, changes in the immune system of pregnant women can lead to more severe symptoms. This is truer towards the end of pregnancy.[8]

9.1. Effect on the fetus

There is currently no data suggesting an increased risk of miscarriage or early pregnancy loss in relation to COVID-19.

There is also no evidence that the virus is teratogenic. Very recent studies but demonstrate that the virus could be vertically transmitted.

9.2. Counselling of the pregnant females

They should be counselled that:

1. If they have the COVID-19 infection, they are most likely to have no symptoms or a mild illness from which they might have full recovery.

Table 2: Risk assessment- characterizing risk[6]

	Risk level	Level of management to be undertaken
Green	Low	Manage through routine procedures
Yellow	Moderate	Routine procedures may not be sufficient. Management responsibility must be specified, specific monitoring or procedures are required.
Orange	High	Local capacity surpassed, requiring next level of management and government to assist.
Red	Very high	Requiring highest level of management and government assistance. Activate emergency operations.

2. If they develop more severe symptoms or recovery is delayed, then they may require more intense care.
3. They should be advised regarding social distancing and self isolation.
4. They should be counselled that maternity care is essential and that not attending clinics could harm the baby, the mother or both. It is important to attend routine visits after discussing you midwife or obstetrician.
5. If any concern arises in between appointments, they may contact their health care providers.
6. If they have symptoms of coronavirus, they should contact maternity emergeny service. They should not attend routine clinic.

9.3. Counselling of health care workers caring for pregnant females

1. The health care workers attending pregnant females should counsel pregnant females to attend routine antenatal clinics for fetal and maternal health care.
2. HCWs should rapidly seek to adopt teleconferencing and videoconferencing capability and consider what appointments can be conducted remotely.
3. Women who have had symptoms, appointment can be deferred until 7 days after the start of symptoms, unless symptoms persevere.
4. For women with history of contact with a COVID-19 positive or suspect case, appointment should be deferred for 14 days.

9.4. Intrapartum services

1. Minimum staff should attend the female. They should be encouraged and permitted to keep birth partner present throughout labour.
2. Any further visitors should be discouraged.

9.5. Smoking cessation and carbon monoxide monitoring in pregnancy

1. Smoking is associated with worse outcomes of COVID-19, though effect cannot be commented upon.
2. Women should be counselled to stop smoking as early as possible.
3. The national centre for smoking cessation and training (NCSCT) has recommended suspension of monitoring carbon monoxide during pregnancy as a precautionary measure following concern about risk of transmission of coronavirus.

9.6. Women with current suspected/ confirmed COVID-19

Care in labour-

1. Minimise number of staff members.
2. No birth attendant should visit hospital if they themselves are a suspect/case of COVID-19.
3. Continuous electronic fetal monitoring.
4. There is no current evidence favouring one mode of birth over another.
5. There is no recorded cases of vaginal secretions to be positive for COVID-19.
6. Health care workers should wear PPEs.

9.7. Postnatal care

Breastfeeding: The benefits of breastfeeding outweigh the risk of infection contacted through the mother. So the women should continue breastfeeding.

10. Ongoing efforts of the World

There are only some events in the entire world history when the world came together as one against a common thing/ motto. One such rare moment is now. The entire world is at present combatting the novel Corona virus and using every measure possible.

Developing and levelling up health care facilities, promoting hygiene, social distancing, lockdowns.

Clinical studies and trials are done to develop or discover drugs or regimes against the virus. Vaccines are under trial.

The world has come together as one like never before in fighting against the coronavirus.

People are doing the best they can help the governments contain the spread of the virus. The layman by staying indoors and the healthcare workers by doing their duties to the best of capabilities.

11. Impact on the World

As novel corona virus hit the world, there was an unprecedented term of affairs which shook the entire world.

Almost no country is untouched by the wrath of this virus, the world is consumed in agony and despair.

There is no cure procured till date and no vaccicne against this novel corona virus. Trial is ongoing for Hydroxychloroquine, Azithromycin (with few successful trials). Trial with immunoglobulin is underway and so is the vaccine preparation.

Countries with the best of health care facilities and high-end infrastructure are in a mess with cases rising by the minute and deaths by the hour.

Developing nations (like India) only hope to contain its spread as once this disease starts spreading in the community, people would not be able to do anything but watch.

Ecomomies are hard struck, banks are down, share markets have collapsed, health care workers are dying all over the world, daily wage workers are hunger-struck, the population curves are all changing.

At this time, it can only be hoped that the situation will come under control. Our scientists and doctors who are working round the clock to help save the world will not go in vain and we, as a world will defeat this deadly and morbid SARS-COv-2.

12. Source of Funding

None.

13. Conflict of Interest

None.

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