Strategic guidelines & protocols for COVID - 19

Contents

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The coronavirus COVID-19 has affected 188 countries and territories around the world.

- Italy has been worse hit country with 0.1% (0.3% in Lombardy region) of population infected with the novel virus.
- Diamond princess (cruise ship) docked at Yokohama was the worst hit with 20% of passengers infected due to poor quarantine measures.

Preparedness for India

- India has an urban population of ~450M. Even assuming that Corona cases would be restricted to urban India, we are potentially looking at a peak case load of between 700K-7M. There are multiple different models that estimate a much worse possibility of the spread of this epidemic

	Base case	**Worse case**
Population (urban, Mn)	455	455
Peak infection rate (%)	0.3%	5.0%
Time of spread (months)	2	3
Peak # of infections (K)	683	7583

- Of these, nearly 20% could require hospitalization leading to a requirement of 140,000–1,500,000 beds. A significant portion of this could be concentrated in the top 40 cities

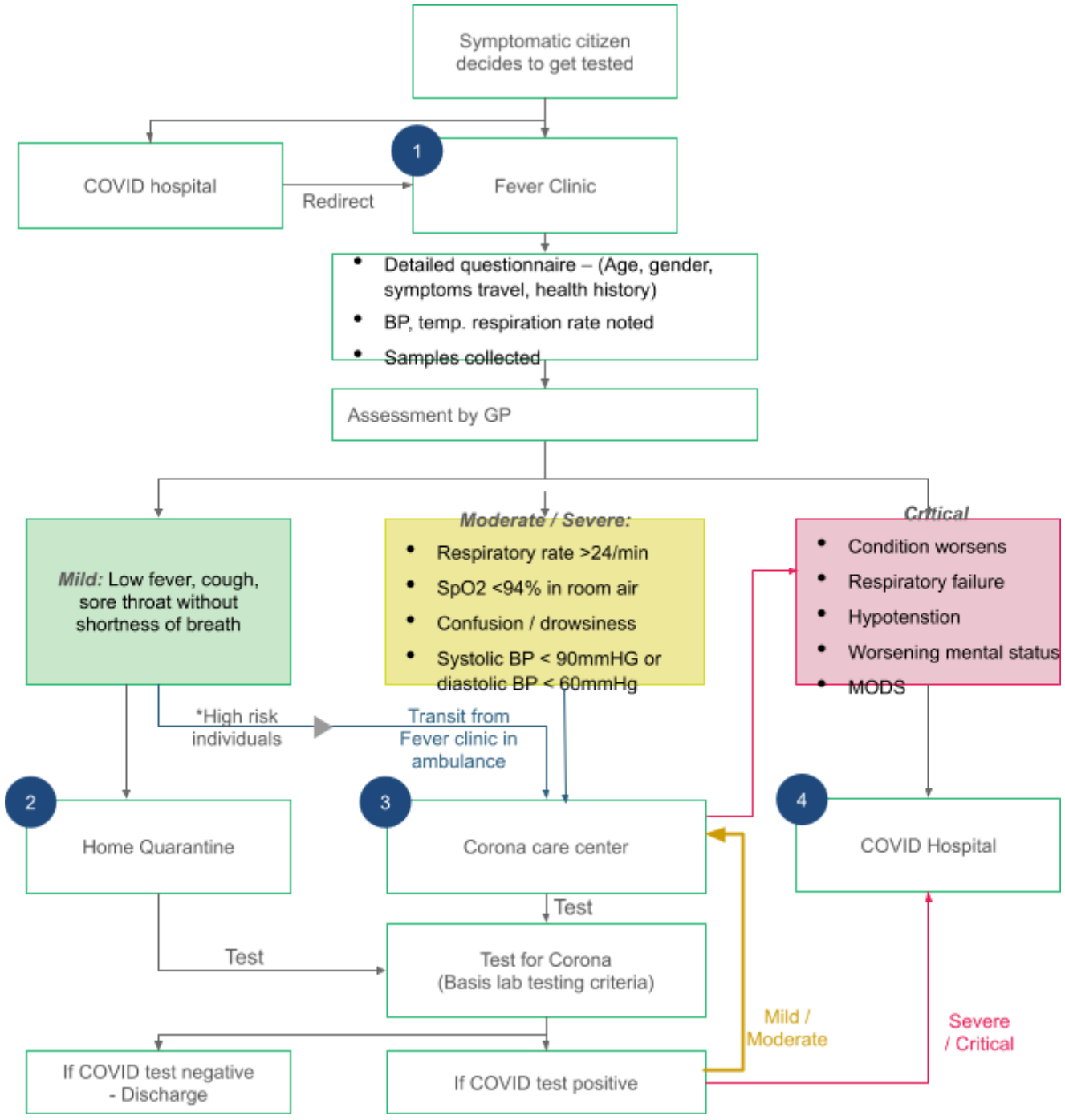
- Also, 5% of total cases could also require ICU care (with ventilator), which leads to a requirement of 50,000– 350,000 ventilators (assuming severe cases are on ventilator support for upto 6 weeks)

Strategy

This would put tremendous pressure on our existing healthcare facilities which are already stretched. India currently has 90,000 ICU beds, 50% with ventilator facility. This demand a clear segregated approach to handle the Corona spread:

- Patients would need to be distributed between home quarantine, corona care centers and COVID hospitals.
- India would need to triage and prioritize hospital care primarily for severe/ critical cases.
- Fever clinics would need to be set-up to assist in triaging of the cases. This is to avoid contamination risk at the point of testing to a larger population, if patients head directly to hospitals
- Imperative to develop a common set of guidelines for triaging, quarantine and treatment.

1 Overall triaging approach



The assumption here is that asymptomatic people would not be tested for Corona, as per current approach.

Criteria for testing for COVID (current, could evolve with the situation)

- All symptomatic (fever, cough, difficulty in breathing) individuals who have undertaken international travel in the last 14 days

- All symptomatic contacts of laboratory confirmed cases

- All symptomatic health care workers.

- All hospitalized patients with Severe Acute Respiratory Illness (fever AND cough and/or shortness of breath)

- Asymptomatic direct and high-risk contacts of a confirmed case should be tested once between day 5 and day 14 of coming in his/her contact. (Direct and high-risk contact include those who live in the same household with a confirmed case and healthcare workers who examined a confirmed case without adequate protection as per WHO recommendations.)

2 Fever Clinics

2.1 Scope

Fever clinics are critical as a first triaging point for COVID testing, to reduce the burden on overall healthcare system and to limit the risk of contamination. Fever clinics are segregated facilities to assess, test and reassure people, and where necessary, to triage them through the healthcare system.

Target patients who use these facilities will be:

- Symptomatic people
- People who may have been in contact with an infected person
- People with history of travel to COVID-19 affected countries in last 14 days
- People with other illnesses who want reassurance (to be discussed)

The idea is to divert people to a segregated facility and away from general practices and emergency departments. Not only does this reduce demand for these traditional services, it potentially limits the spread of disease among vulnerable populations, such as the sick and elderly.

Various types of models of fever clinics could be created:

1. Pop-up Fever clinics – Primarily set up in large open space
2. Dedicate few of existing clinics/ diagnostics centers to act as Fever clinics
3. Segregated section/ standalone part in existing hospitals, away from the main building

2.2 Protocols

2.2.1 Setup

Pop-up Fever Clinic/ Existing clinics and diagnostics centers	Attached to a Hospital
1.Big open areas (preferable locations – parking lots) >500sqm 2.Clear perimeter of at least 5 meter at each side of the overall area 3.Priority queue for high risk groups (>60 years, existing health conditions) 4.Create a general Waiting area with seating (400 Sqm) 5.Quarantine case waiting area : 20 sqm	1.Outside of the hospital 2.Spearate entrance / exits and movement routes 3.Dedicated registration area 4.Separate HVAC/ air conditioning

2.2.2 Clinical Triaging Protocol

- Individual come to registration desk assigned a token number and priority cases identified
- Individuals are given masks and questionnaire to fill
- Individual fills in a detailed questionnaire (possibly on tablet): Name, Age, Sex, Contact Details, Symptom details, Travel History for last 14 days, Contact with COVID positive patients in last 14 days, Health history
- Visitors will get temperature, BP & respiratory rate checked and proceed to submit samples
- Assessment criteria

Mild	Moderate/Severe	Critical	High Risk Patients
1. Low fever 2. Cough 3. Malaise 4. Rhinorrhea 5. Sore throat without shortness of breath	Any one of – 1. Respiratory rate >24/min 2. SpO2 <94% in room air 3. Confusion / drowsiness 4. Systolic BP < 90mmHG or 5. diastolic BP < 60mmHg	1. Condition worsens 2. Respiratory failure 3. Hypotention 4. Worsening mental status 6. MODS	1. People >60 years 2. History of cardiovascular disease 3. DM, other immunocompromised state 4. Chronic lung/kidney/liver disease

- Basis GP assessment
  - ***Mild:***
    - Recommend home quarantine
    - On-site counsellor to share guidelines for home quarantine
  - ***Mild (High Risk Patients) – Case by case basis***
    - Recommend transfer to Corona care center
    - Dedicated ambulance / own car to transport patient
  - ***Moderate / Severe:***
    - Recommend transfer to Corona care center
    - Dedicated ambulance / own car to transport patient
  - ***Critical:***
    - Recommend transfer to COVID hospitals
    - Dedicated ambulance / own car to transport patient

- Patients whose samples need to be sent for COVID-19 testing
  - All symptomatic (fever, cough, difficulty in breathing) individuals who have undertaken international travel in the last 14 days
  - All symptomatic contacts of laboratory confirmed cases
  - All symptomatic health care workers.
  - All hospitalized patients with Severe Acute Respiratory Illness (fever AND cough and/or shortness of breath)
  - Asymptomatic direct and high-risk contacts of a confirmed case should be tested once between day 5 and day 14 of coming in his/her contact. (Direct and high-risk contact include those who live in the same household with a confirmed case and healthcare workers who examined a confirmed case without adequate protection as per WHO recommendations.)

- All patient information to be uploaded to the central database & patient Id is assigned

2.2.3 Transportation

Patient

- Dedicated ambulance / vehicle to transit Quarantine marked patients to nearest Corona care center / COVID hospital
- Vehicle will transit once every 2 hour to corona care center and once every 2 hour to COVID hospital
- Local police to assist in providing clear pathway to ambulance on a designated route

Samples

- Refrigerated trucks to transport samples to designated labs

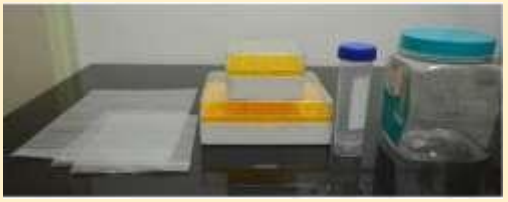
- Once every 6 hours for swifter response
- Sample Collection, packaging & treatment protocols

Requirements for Clinical Samples Collection, Packaging and Transport

1. Sample vials and Virus Transport Medium (VTM)

2. Adsorbent material (cotton, tissue paper), paraffin, seizer, cello tape

3. A leak-proof secondary container (e.g., ziplock pouch, cryobox, 50 mL centrifuge tube, plastic container)



4. Hard-frozen Gel Packs

5. A suitable outer container (e.g., thermocol box, ice-box, hard-board box) (minimum dimensions: 10 x 10 x 10 cm)

Procedure for Specimen Packaging and Transport

1. Use PPE while handling specimen

2. Seal the neck of the sample vials using parafilm

3. Cover the sample vials using absorbent material

4. Arrange primary container (vial) in secondary container

5. Placing the centrifuge tube inside a zip-lock pouch

6. Placing the zip-lock pouch inside a sturdy plastic container and seal the neck of the container

Note: *Sample vials can also be placed inside a zip-lock pouch, covered in absorbent material and secured by heat-sealing or rubber bands. Then, the zip-lock pouch should be placed inside another plastic pouch and secured*

7. Using a thermocol box as an outer container and placing the secondary container within it, surrounded by hard-frozen gel packs

7. Using a hard card-board box as an outer container and placing the secondary container and the gel packs 	8. Placing the completed Specimen Referral Form (available on www.niv.co.in) and request letter inside a leak-proof, zip-lock pouch 	9. Securing the zip-lock pouch with the Specimen Referral Form on the outer container 	10. Attaching the labels: ● Senders' address, contact number; Consignee's address /contactnumber; ● Biological substance-Category B; ● 'UN 3373'; Orientation label, Handle with care 
Documents to accompany: 1) Packaging list/proforma Invoice 2) Air way bill (for air transport) (to be prepared by sender or shipper) 3) Value equivalence document (for road/rail/sea transport) [Note: 1. A vaccine-carrier/ice-box can also be used as an outer container 2. The minimum dimensions of the outer container should be 10 x 10 x 10 cm (length x width x height)]			

2.2.4 Biomedical Waste Management

To be defined still

2.3 Personnel

2.3.1 Organization structure

- Site Coordinator – Non medical personnel managing the operations & inventory
- General Physician – Decision maker for each case
- Nurses – For diagnosis & collection of samples
- Registration desk staff – Provides masks & questionnaire
- Support staff – to assist in various support activities
- Security Guard – To ensure smooth flow of operations

2.3.2 Personnel requirement

Requirement – 12 hour shift

a. Site Coordinator – (1 for the site)
b. General Physician – 1
c. Nurses – 3
d. Registration desk staff – 1
e. Support staff – 1
f. Security Guard – 1

Shifts & Rotations

a. 12 hour shift for each member
b. Weekly rotation out of the fever clinic for fatigue management

Sources of Resources

- Nurses/ phlebotomists: could be from cadre of ANM, ASHA, Community health worker. Could also be jointly sourced with private sector from diagnostics

- Support/ Registration staff: could be community volunteers trained on Corona. Could prefer people who have recovered from Corona (with improved immunity)
- General Physician - <tbd>

2.4 Equipment and Supplies

- Sample collection & storage equipment
    - Sample collection kits – 110 / day
    - Sufficient cold storage facility to store testing kits

- PPE for medical personnel
    - N95 Respirator Masks
    - Isolation Gowns
    - Surgical Gloves
    - Eye protection
    - Disinfecting wipes

- Other equipment
    - Thermal scanners / Disposable thermometers
    - Stethoscope
    - Sample collection kits (swabs)
    - Hard frozen gel pack
    - Thermocol / Icebox
    - Mobile toilets
    - Chairs / Benches - Patients
    - Adequate drinking water
    - Food provisions for staff
    - Desks / chairs – patients & staff
    - Markings for social distancing
    - Admin – Pens/paper/computer/printer
    - Electricity / Generators

2.5 Transportation

- Type of vehicles
    - Ambulance – For carrying mild / moderate patients to Corona care center
    - Sample Collection – Vehicle for carrying samples & patient information to Labs

- Frequency
    - Ambulance - Once every 2 hour to corona care center and once every 2 hour to COVID hospital
    - Sample collection – Once every 6 hours

- Requirement per center – 1 Ambulance + 1 sample collection (Pooled across 4 centers)

2.6 Information Sharing

- Patient history
    - All patient history to be shared in real time / carried back along with samples
    - All on-site staff to have access to previous health records of patients

- Availability of supplies
    - In case of shortage of supplies, inventory manager in assistance with site coordinator to coordinate with state govt. & nearby fever clinics

3 Corona Care Center

3.1 Scope

As COVID-19 spreads through the country, the need for quarantine wards is required to ensure mild / moderate cases do occupy limited hospital beds. In order to relieve the pressure from primary healthcare facilities and utilize them only for critical patients, corona care centers can act as quarantine facilities

Corona care centers are dedicated facilities to quarantine and treat patients with mild/ moderate

Target patients who these facilities are:

- People sent by fever clinics basis GP recommendation
- Confirmed mild / moderate cases of Corona
- People without means for self-quarantine

Two types of Corona care centers may be created

1. Indoor facilities – Enclosed stadiums, schools, exhibition center, hotels, small private hospitals
2. Rubb-Hall Tents – Temporary relief structures

3.2 Protocols

3.2.1 Setup

Set-up (For 100 bed capacity)

- Enclosed structures like stadiums, schools etc,
- Clear perimeter of at least 5 meter at each side of the overall area
- Priority queue for high risk groups (>60 years, existing health conditions)
- Create a general area with beds (500 Sqm)
- Critical case quarantine area : 100 sqm
- Registration desk / Staff area / storage: 400sqm
- Beds could be put with a spatial separation of at least 1 meter (3 feet) from one another.
- There should be double door entry with changing room and nursing station. Enough PPE should be available in the changing room with waste disposal bins to collect used PPEs. Used PPEs should be disposed as per the BMWM guidelines.
- 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.
- Keep the patient's personal belongings to a minimum. Keep water pitchers and cups, tissue wipes, and all items necessary for attending to personal hygiene within the patient's reach.

3.2.2 Registration

Referred from fever clinic:

- Individuals come to registration desk and share Patient ID number
- Individual will get temperature, BP & respiratory rate checked
- Assign bed cluster basis severity of symptoms

3.2.3 Resident patients

1. All patients need to wear triple layer surgical mask at all times
2. Health check-up done every 6 hours for all patients
3. If conditions worse
   - Shift patient to critical case are and stabilize till ambulance arrives
   - Shift to COVID hospital
4. After 2 negative tests for COVID (24 hours apart), discharge with recommendation for home quarantine for 14 days
5. Update patient information on a daily basis to the central database

3.2.4 Medical Personnel

a. Personnel to work in 12 hour shift with full PPE gear <Qn: Is 12 hour feasible>
b. Weekly rotation out of corona care center for fatigue management

3.2.5 Transportation

Patient

- Dedicated ambulance / vehicle to transit critical patients to nearest COVID hospital with ICU
- Vehicle will transit once every 2 hour to COVID hospital
- Local police to assist in providing clear pathway to ambulance on a designated route

Samples

- Refrigerated trucks to transport samples to designated labs
- Once every 6 hours for swifter response

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 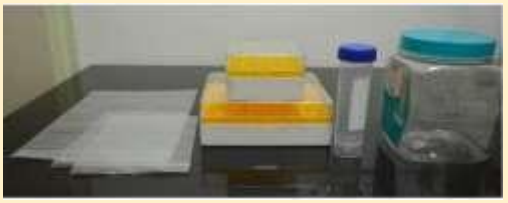 </td></tr>
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 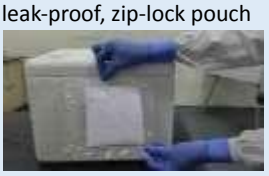 </td>
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3.3 Organization Structure

- Site Coordinator – Non medical personnel managing the operations of the clinic
- General Physician – Decision maker for each case
- Nurses – For diagnosis & collection of samples
- Registration desk staff – Provides masks & questionnaire
- Inventory manager – Ensures supply of all provisions – kits, masks,
- Information counsellor – Informs people of guidelines for home quarantine
- Support staff – to assist in various support activities
- Security Guard – To ensure smooth flow of operations
- Data engineers – Entry of patient records and real time data sharing
- Reserve – Support in case of absence

3.4 Personnel Requirement

1	Site Coordinator	1
2	General Physician	4
3	Nurses	12
4	Registration desk staff	4
5	Inventory manager	1
6	Information counsellor	6
7	Support staff	8
8	Security Guard	8
9	Data engineers	4
10	Reserve	5

- Shifts & Rotations: 12 hour shift for each member, weekly rotation out of corona care center for fatigue management
- Medical personnel facilities: Set up of temporary housing & resting area for staff within premises to ensure limited exposure to COVID to outside world, Set up of leisure facilities including hi speed broadband connection

3.5 Equipment and Supplies

1. Sample collection & storage equipment
    a. Sample collection kits – 130 / day
    b. Sufficient cold storage facility to store testing kits

2. PPE for medical personnel
    a. N95 Respirator Masks
    b. Isolation Gowns
    c. Surgical Gloves
    d. Eye protection
    e. Disinfecting wipes

3. Equipment for treatment of worsening cases
    a. Oxygen supply – for 4 people in case condition worsens.
        i. 30,000 liters / day (7200 liters/day/person)
        ii. Supplied via oxygen cylinders
    b. Ventilators – for 4 people in case condition worsens.
    c. Cardiac monitors
    d. Thermometers
    e. Syringe pumps
    f. Blood gas machine

g. Suction tube
h. Endotracheal tube
i. Critical medicines
    i. Oseltamivir (Flu)
    ii. Antibiotics
    iii. Paracetamol
    iv. Hydroxychloroquine (for moderate cases)
    v. IV

4. Equipment (100 bed capacity)

Mattresses	130		Stretcher	2
Foldable Cots	115		Sanitary Pads	10
Bed sheets	250		Diapers – kids	10
Pillows	130		Masks	1,000
Pillow Covers	130		Gloves - Exam grade	10
Towels	50		Gloves - Sterile	2
Rubber Sheets	20		Protective Gowns	50
Steel Plates	130		Thermal scanners	10
Steel Glasses	130		Batteries for thermal scanners	1
Spoons	10		BP apparatus	3
Jugs	20		Glucometer with strips	2
Stove – Big	2		Medicine	1
Large vessels	2		IV Fluid – DNS	15
Kerosene	1		IV Fluid – Dextrose	15
Buckets	10		IV Sets	30
Mugs	20		IV Cannula	15
Soap	30		IV Stand	5
Tissue paper	25		Ambulance	1
Smaller bins	20		First aid	1
Hand sanitizer	200		Rooms for Volunteers	2
Blankets	10		Food	120
Emergency Lamp	10		Food Waste	-
Chairs/Benches	100		Other Waste	-
Tables/Desks	20		Garbage bags, bins	1
Printer	1		Medical Waste	-
Computer	5		Drinking Water+ Dispenser (4)	1
Extension Boards	10		Cleaning items	1
Paper	2		Laundry (Detergents)	1
Pen	30		Fire extinguisher	1
Stapler + Pins	2		Refrigerator – smallest	1
Box file	2		E Toilet	-

Official Seal	2		Electrician / Plumber	-
Matches	2		Genset / Back up	1
Candles	12		Whistle	2
ID for patients	500		Tool set – basic	1
ID for volunteers	100		Entertainment for inmates	-
Tokens with number	200		Registration details - sticker/printer	1
Letterhead	100		White board + markers	1
Flyer - information booklet	500		Wheel Chair	2
Mosquito Repellent	10		Internet access	

3.6 Transportation

1. Type of vehicles
   a. Ambulance – For carrying critical patients to COVID hospitals
   b. Refrigerated truck – Vehicle for carrying samples & patient information to Labs

2. Frequency
   a. Ambulance – On need basis
   b. Sample collection – Once every 6 hours for swifter response

3. Requirement per center – 1 Ambulance + 1 Refrigerated truck

3.7 Information Sharing

1. Patient data
   a. All patient history to be shared in real time / carried back along with samples
   b. All on-site staff to have access to previous health records of patients (wherever possible)
   c. Real time sharing of data with control center

2. Availability of supplies
   a. In case of shortage of supplies, inventory manager in assistance with site coordinator to coordinate with state govt. & other corona care centers

3.8 Financials

1) Structure Costs	
Area required	10,000 sq. ft

Costs per sq. ft	400 INR
Total cost	40,00,000 INR
2) Supplies[1]	TBD
Incl. equipment	
Total Costs	**TBD**

[1] https://model.coronasafe.network/centralised-facilities/inventory-supplies

4 Home Quarantine

4.1 Scope[2]

- Anyone who is asymptomatic with a travel history in last 14 days and/or been in close contact with any Covid-19 positive patient
- Anyone who is mild case that is low-grade fever, cough, malaise, rhinorrhea, sore throat without shortness of breath

4.2 Guidelines[3]

4.2.1 Instructions for persons being home quarantined

The home quarantined person should:

Stay in a well-ventilated single room preferably with an attached/separate toilet. If another family member needs to stay in the same room, it's advisable to maintain a distance of at least 1 meter between the two.

- Needs to stay away from elderly people, pregnant women, children and persons with co-morbidities within the household.
- Restrict his/her movement within the house
- Under no circumstances attend any social/religious gathering e.g. wedding, condolences, etc.

Quarantined person(s) should also follow the under mentioned public health measures at all times:

- Wash hand as often thoroughly with soap and water or with alcohol-based hand sanitizer
- Avoid sharing household items e.g. dishes, drinking glasses, cups, eating utensils, towels, bedding, or other items with other people at home
- Wear a surgical mask at all the time. The mask should be changed every 6-8 hours and disposed-off. Disposable masks are never to be reused
- Masks used by patients / care givers/ close contacts during home care should be disinfected using ordinary bleach solution (5%) or sodium hypochlorite solution (1%) and then disposed of either by burning or deep burial.
- Used mask should be considered as potentially infected.
- If symptoms appear (cough/fever/difficulty in breathing), he/she should immediately inform the nearest health center.

[2] Covid-19 Management Protocol AIIMS, New Delhi https://pbs.twimg.com/media/ETnGF0UU4AALrfQ.jpg
[3] https://www.mohfw.gov.in/DraftGuidelinesforhomequarantine.pdf

4.2.2 Instructions for family members of person being home quarantined

- Only an assigned family member should be tasked with taking care of the such person
- Avoid shaking the soiled linen or direct contact with skin
- Use disposable gloves when cleaning the surfaces or handling soiled linen
- Wash hands after removing gloves
- Visitors should not be allowed
- In case the person being quarantined becomes symptomatic, all his close contacts will be home quarantined (for 14 days) and followed up for an additional 14days or till the report of such case turns out negative on lab testing

4.2.3 Environmental sanitation

- Clean and disinfect frequently touched surfaces in the quarantined person's room (e.g. bed frames, tables etc.) daily with 1%Sodium Hypochlorite Solution.
- Clean and disinfect toilet surfaces daily with regular household bleach solution/phenolic disinfectants
- Clean the clothes and other linen used by the person separately using common household detergent and dry.

4.2.4 Duration of home quarantine

- The home quarantine period is for 14 days from contact with a confirmed case or earlier if a suspect case (of whom the index person is a contact) turns out negative on laboratory testing

4.3 Additional protocol

- Twice daily self-monitored temperature
- Phone numbers of quarantined person must be shared with the authorities
- Quarantined person must let authorities use geo fencing for monitoring purpose
- A healthcare worker to call every 2 days in order to keep a record of temperature/vitals
- State governments can further add protocols (such as stamping with indelible ink, quarantine notification poster outside person's house etc.)
- Self-treatment in cases of home quarantine/isolation according to AIIMS protocol

5 Covid Hospitals

5.1 Scope[4]

- Anyone who is classified as a moderate to severe case
- Respiratory rate > 24/min, SpO2 < 94% in the room, confusion/drowsiness, Systolic BP < 90 mmHg or diastolic BP < 60 mmHg

5.2 Strategic choices

State governments have three different hospital models to treat Covid-19 patients:

5.2.1 Exclusive covid hospitals

- Only covid patients are treated
- Dedicated and trained staff, equipment and infrastructure
- Minimizing any potential contamination risks
- Continued services to other medical situations

5.2.2 Shared hospitals

- Covid patients treated along with non-covid patients
- Only non-AC hospitals can be considered (or if there is a possibility to separate the AC system between covid and non-covid wards)
- Covid treatment area of the hospital should have substantial distance from rest of the hospital area to minimize any contamination risk
- Dedicated and trained staff within existing teams, dedicated equipment and infrastructure (entry/exit) within existing structure

5.2.3 Mix of exclusive and shared

- Exclusive covid hospitals to be given preference and filled in first
- Defined trigger points to activate shared hospital network (for example 60% capacity of covid-hospital kicks in 1st shared hospital, 70% capacity kicks in 2nd and so forth)
- Prioritize and activate shared hospitals according to existing capacity load and capabilities
- The private sector centers should be treated as last resort centers for COVID

[4] Covid-19 Management Protocol AIIMS, New Delhi https://pbs.twimg.com/media/ETnGF0UU4AALrfQ.jpg

State government can decide which model to follow out of the three options. Pros and cons for each one of them listed below:

Options	Exclusive	Shared	Mix of exclusive and shared
Pros	• Low risk of virus contamination • Faster management • Dedicated equipment	• Flexibility to ramp up capacity in short notice • Accessibility and shorter transport time	• Capacity optimization over time, activating shared hospitals only when required • Lowers risks as it is spread over different level depending on activation
Cons	• Difficulty ramping up capacity in short term • Limited accessibility	• Medium-high risk of virus contamination • Network management • Protocol understanding and adherence • Financial burden, revenue loss of private hospitals from risk-averse patients	• Network management, defining trigger points • Protocol understand and adherence • Risk of contamination still exists

5.3 Capacity Modelling

Calculating numbers:

For every 1 million population, state governments should prepare for **150 beds ICU capacity, and a 600-1000 people** isolation/ treatment capacity. This capacity could be expanded basis the spread of the epidemic.

Serving population	1 million
Peak Infection rate – 0.3%	3000
Moderate and Severe cases – 20%	600
Incl. ICU admissions – 5%	150

***Note that hospital beds capacity can be split between hospitals and corona care center depending on severity of the patients**

As and when the infections rise, a simple model developed by Penn Medical could be used to refine the estimates.
HYPERLINK "https://penn-chime.phl.io/#"https://penn-chime.phl.io/#

The below list of inputs should be considered for further capacity modelling[5]

- **Hospitalized COVID-19 Patients:** The number of patients currently hospitalized with COVID-19

- **Doubling Time (days):** This parameter drives the rate of new cases during the early phases of the outbreak. This is the doubling time you expect under status quo conditions.

- **Social distancing (% reduction in person-to-person physical contact):** This parameter allows users to explore how reduction in interpersonal contact & transmission (hand-washing) might slow the rate of new infections. It is your estimate of how much social contact reduction is being achieved in your region relative to the status quo.

- **Hospitalization %:** Percentage of all infected cases which will need hospitalization.

- **ICU %:** Percentage of all infected cases which will need to be treated in an ICU.

- **Ventilated %:** Percentage of all infected cases which will need mechanical ventilation.

- **Hospital Length of Stay:** Average number of days of treatment needed for hospitalized COVID-19 patients.

- **ICU Length of Stay:** Average number of days of ICU treatment needed for ICU COVID-19 patients.

- **Vent Length of Stay:** Average number of days of ventilation needed for ventilated COVID-19 patients.

- **Hospital Market Share (%):** The proportion of patients in the region that are likely to come to your hospital (as opposed to other hospitals in the region) when they get sick. One way to estimate this is to look at all of the hospitals in your region and add up all of the beds. The number of beds at your hospital divided by the total number of beds in the region times 100 will give you a reasonable starting estimate.

- **Regional Population:** Total population size of the catchment region of your hospital(s).

[5]Penn Medicine - COVID-19 Hospital Impact Model for Epidemics https://penn-chime.phl.io/#

- **Currently Known Regional Infections**: The number of infections reported in your hospital's catchment region. This is only used to compute detection rate - it will not change projections. This input is used to estimate the detection rate of infected individuals.

5.4 Guidelines and protocols

5.4.1 Organizational structure

Each state government's MOH should ideally form two teams:

a) **Medical team:** General physicians, pulmonologists and infectious disease experts headed by senior physicians from government medical colleges with members from both government and private hospitals.

b) **ICU team:** Anaesthesiologists and intensivists' team headed by a senior anaesthesiologist from the government medical college with the members from both government and private hospitals.

5.4.2 Manpower required for COVID hospital with ICU

a) Example for 100 ICU beds:

# Staff	6-hours shift	24-hours coverage	Alternate week coverage
1. Anaesthesiologists / Intensivists	5	20	40
2. Nurses (ICU trained)	35	140	280
3. Junior Doctors (ICU care basics)	10	40	80
4. Senior Anaesthesiologists / Intensivists (remotely)	10	-	-
5. Pulmonologists			
Support Services			
6. Nephrologists			
7. Radiologists			
8. Gastroenterologists			
9. Neurologists			
10. Cardiologists			

b) Rotational 6-hours shift:
- Personal protection gear in a non-air-conditioned environment performing high-risk procedures can be very taxing. Even for the young doctors and nurses it will be extremely hard to work for more than six hours per shift

- Doctors and nurses will not be able to work for more than a week in COVID ICU. A large pool of doctors and nurses can cover the requirements in rotation

c) Ideas to increase staff short term:

- All the PG students working in any specialty clinical and non-clinical should be given special permission by the University to serve the COVID ICU as part of their training programme. This will provide large number of young skilled workforce.

- If we do not find sufficient number of qualified doctors, as a stop gap measure, Ministry of Health should ask for a special permission from State Medical Council to allow doctors trained in recognized overseas medical colleges for temporary license to work in ICU under the senior doctors.

- About 12,000 specialist doctors just finished their final year theory paper of specialty exam in anaesthesia, medicine, pulmonology, cardiology, etc. under National Board of Examination (DNB). Nearly 38,000 medical specialists finish training in vital specialties under MCI annually. As in USA, they can be given the degree as "BOARD ELIGIBLE SPECIALIST" and when they pass the final exam they can be called "BOARD CERTIFIED SPECIALIST." They can be absorbed by Ministry of Health to fill in the vacant positions in hospitals.

- Indian Nursing Council should permit final year nursing students to take care of stable ICU patients
- In addition, doctors from AYUSH, military hospitals and retired professionals should be brought to the centers to cover COVID hospitals and Corona Care Centers

5.4.3 Safety and training of health care worker

- Covid ICU simulation (training area) should be set up at large hospitals to teach staff on safe practices to protect themselves
- Identified doctors, nurses and technicians should be given a pair of PPE to wear at home to practice
- Junior doctors should be trained to work with PPE in non-Covid ICU for 2 weeks under supervision before entering the Covid ICU
- Senior doctors above > xx years to help remotely only

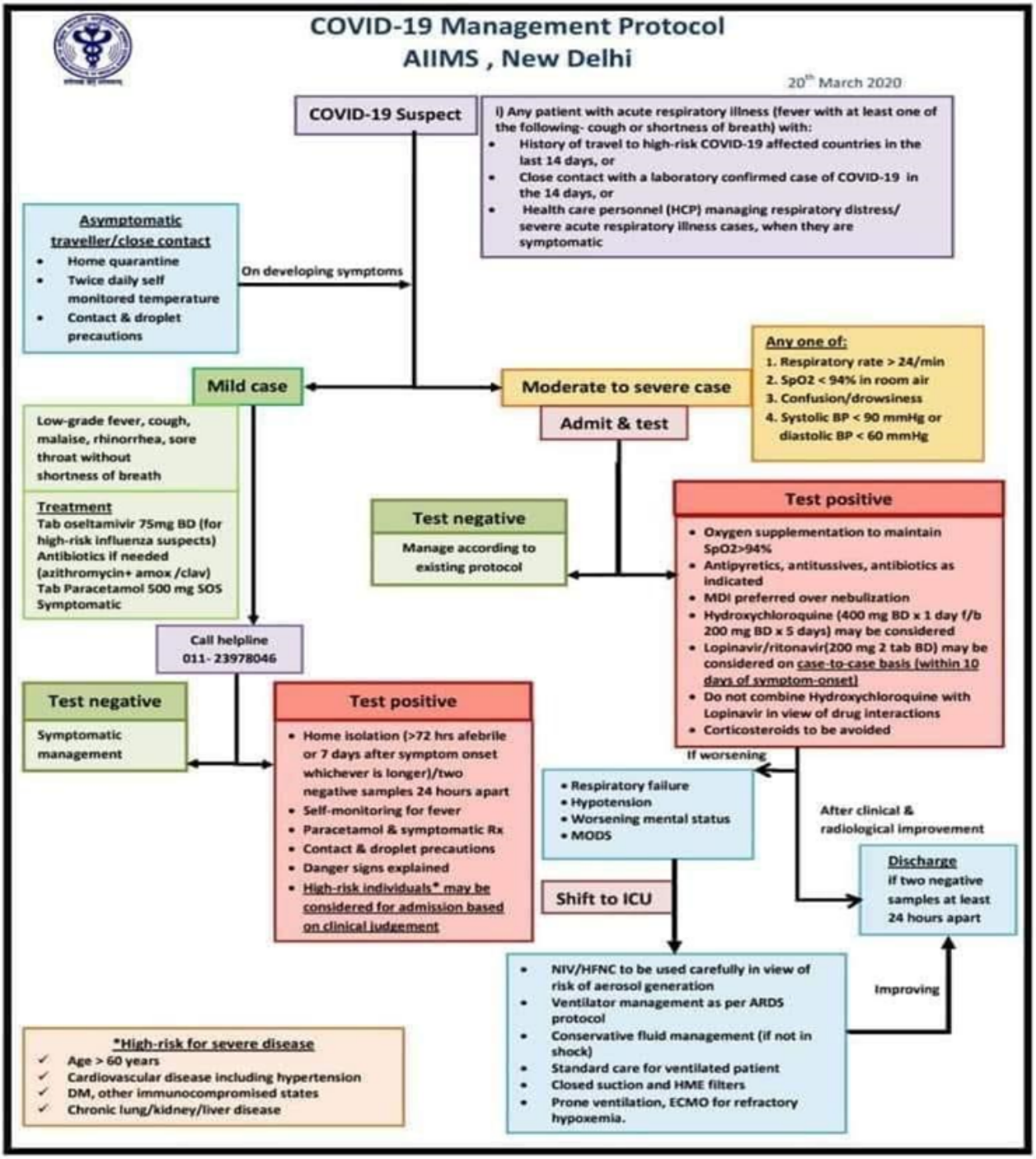
5.4.4 Equipment required for ICU

Example for 100 ICU beds:

# Items	Quantity
1. ICU beds	100
2. Ventilators	100
3. Cardiac monitors	

4. Syringe pumps	
5. Portable x-ray machines	
6. Beds with oxygen, compressed air and central suction lines	
7. Beds with central suction	
8. Blood gas machines	
9. Thermometers	
10. UV tube light for sterilization	
11. Others	
Disposables:	
12. Endotracheal tube	
13. Suction tube	
14. Others	
Personal Protective Equipment (PPE) *2 months*	
15. N95 masks	
16. Protective eyeglasses	
17. Gloves	
18. Personal protection gear	
19. Oxygen supply (!)	

5.4.5 Management Protocol



5.4.6 Bio medical waste management

6 Coordination for other support services

It is also critical to ensure supply of other critical support services which should be managed centrally at the city level. The state governments could **setup a taskforce and centrally manage** the following across the different network of fever clinics, isolation wards and hospitals:

1. Software Technology Backbone
2. Inventory Management of Medical supplies
3. Food Management
4. Waste Disposal (Medical and Food)
5. Medical Oxygen Supply
6. Super Fab Labs to create critical Personal Protection Equipment
7. Training Module for Volunteers
8. Ambulance Network
9. Creation of temporary Rubhall facilities for Corona Care Center as required