COVID-19 TEMPORARY SPACE PLANNING

EMI INDIA | 10 JUNE 2020
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Severe Acute Respiratory Infections Treatment Centre

Practical manual to set up and manage a SARIF treatment centre and a SARIF screening facility in healthcare facilities.
COLLECTING INFORMATION

Umri Christian Hospital Covid-19 Planning - Initial Questions

Government-related
- To what degree does the State plan to take over the hospital?
- Will they preserve any non-Covid-19 care spaces?
  - If not, will Umri attempt to provide patient care for essential needs (basic emergency, maternity, etc.) in a different space?
- Is the nursing school at risk to be taken over?
- Will the government also look to utilize non-patient care spaces (the church/assembly area, etc.)

Staffing
- Will the government be replacing or merely supplementing Umri staff?
- Either way, we presume these government staff will require housing?
- If some Umri staff will not be utilized for Covid-19 treatment, will they need separate housing for isolation purposes?

Patient Care
- Will Umri be utilized as a “referral hospital” where Covid-19 patients from other hospitals are sent? If so, will patients be sent based on a higher acuity level, or can we expect a wide range of acuity levels in patients?
- How will Covid-19 patients be fed (I don’t recall if Umri’s canteen is for staff and patients, or just staff)?
- What is the goal for total number of Covid-19 beds?
- If the ward spaces are not adequate to reach the total goal for beds, would the addition of tent treatment areas be an option?

General Questions for Umri
- How do you currently handle linen decontamination/laundering procedures?
- Do you use canister-based O2?
- Do you have ventilators, and if so, how many?
- What is your current bed count, broken down by ward/space?
- Do you have building drawings for any of the hospital spaces, dorm, school, etc.?
- What is your current morgue capacity?
- Are nursing school students and teachers/staff still staying on-site?
A phased approach to care is presumed, with Phase 1 accepting Covid19 patients, while also maintaining normal hospital functions, and Phase 2 transitioning the hospital to being a dedicated Covid care facility.

If the hospital decides to continue regular functioning of patient care as well as treat some covid patients, a phase 1 approach can be adopted to run both simultaneously. Special care should be taken to contain spaces used for covid care, and to control circulation of staff and laundry to avoid transmission into other areas.
PATIENT POPULATIONS

- **Non-Covid Patient**: Patients not exhibiting Covid symptoms, visiting for unrelated reasons.
- **Suspected**: Patients exhibiting Covid symptoms awaiting test results.
- **Confirmed**: Patients with a positive Covid test, whose condition is stable/ambulatory.
- **Critical & Severe**: Patients with a positive Covid test, whose condition requires acute care.

WARD SPACING BY POPULATION

- **Confirmed / Critical & Severe**: Best Practice: 6' (1.8m) Minimum: 5' (1.5m).
- **Suspected**: Best Practice & Minimum: 6' (1.8m).
- **Suspected with Partition**: Impervious Partition at 8' (2.4m) high.

WARD AISLE SPACING

- 5' Min.
PATIENT SPACES
- Screening & Assessment
- Suspected Patient
- Confirmed Patient
- Severe & Acute Patient

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PATIENT CIRCULATION
- PUI (Patient Under Investigation)
- Non-Covid Patient
- Suspected Patient Admitting
- Suspected Patient Toilet
- Confirmed Patient Admitting
- Confirmed Patient Toilet
If the hospital decides to continue regular functioning of patient care as well as treat some Covid-19 patients, a phase 1 approach can be adopted to run both simultaneously. Special care should be taken to contain spaces used for Covid-19 care, and to control circulation of staff and laundry to avoid transmission into other areas.
CHINCHPADA CHRISTIAN HOSPITAL COVID-19 PROPOSAL
8 May 2020 | PHASE 2: PATIENT FLOW DIAGRAM & BED COUNT

- **Proposed new fence for containment**
- **X-ray can be used for Covid19 treatment, as necessary**

**KEY:**
- STAFF WORK/STORAGE
- Triage/Assessment
- Suspected Wards/Toilets
- Confirmed Wards/Toilets
- Severe & Critical Wards/Toilets
- Suspected Patient to Toilet
- Suspected Patient admitting
- Confirmed/Severe/Critical Patient to Toilet
- Confirmed/Severe/Critical Patient admitting
- Temporary Fence
- New Gate

- **13 Beds**
- **32 Beds**
- **7 Beds**
### Staff Spaces
- Staff Work & Storage
- PPE Donning Area
- PPE Doffing Area
- Staff Wash Area

### Staff by Clean Status
- **Clean Staff (Not in PPE)**: Enter Covid Care area at beginning of shift
- **Clean Staff (Donned in PPE)**: Put on PPE in donning area before entering a hot zone
- **Dirty Staff (In PPE)**: After working in a hot zone, enter doffing area and remove soiled PPE
- **Dirty Staff (PPE Doffed)**: After doffing soiled PPE, proceed to a wash area to disinfect

### Staff Circulation
- Green: Clean Staff Not in PPE
- Green: Clean Staff in PPE
- Red: Dirty Staff in PPE
- Red: Dirty Staff not in PPE
TENTED PPE DOFFING AREA

IMPROVISED HANDWASH STATION
Nurse/staff/storage areas within wards to be considered "Dirty".

CHINCHPADA CHRISTIAN HOSPITAL COVID-19 PROPOSAL
8 May 2020 | PHASE 1: STAFF FLOW DIAGRAM

Proposed temporary partition with door

Nurse/staff/storage areas within wards to be considered "Dirty".

Proposed new fence for containment

Staff toilets for use by clean staff only.

Approx. site wall / boundary

TENTED PPE DOFFING AREA

Key:
- CLEAN STAFF IN PPE
- CLEAN STAFF NOT IN PPE (DOFFED)
- DIRTY STAFF IN PPE
- DIRTY STAFF NOT IN PPE
- TENTED PPE DOFFING AREA
- STAFF WASHING AREA
- PPE DONNING AREA
- TEMPORARY PARTITION
- NEW DOORWAY
- TEMPORARY FENCE
- NEW GATE

EXAMPLE OF TENTED PPE DOFFING AREA

Staff toilets for use by clean staff only.
Phase 2: Med Private rooms change to only suspected patient care. Rooms should be thoroughly disinfected if previously used by confirmed patients.

Proposed new fence for containment

Staff toilets, for use by clean staff only.
Depending on patient populations needs, private rooms could be utilized either for confirmed patients or for severe patients with the addition of oxygen cylinders.

All staff enter through enclosed donning station with shelves for clean PPE storage.

Proposed new fence for containment

Nurse/staff/storage areas within wards to be considered “Dirty”.

All staff exit only through doffing and wash areas.
Staff collecting soiled linens should wear heavy gloves, mask, face shield or goggles, apron or fluid-resistant gown, and boots or closed-toe shoes.

Carry soiled laundry in enclosed bag or bucket. Do not mix with other hospital laundry until after disinfection.

Linens from the confirmed, severe, and critical wards should not pass through the suspected ward or clean staff areas.

Contaminated laundry (bed linens, masks, scrubs, etc.) to be washed in hot water (60-90°C) with appropriate commercial-grade detergents.

If no hot water, soak in 0.05% chlorine for 30 minutes, then rinsed and dry in sun or launder as usual.

After servicing laundry and removing PPE, staff should thoroughly wash hands.
If hot water (60-90°C) is not used in the laundering of soiled linens, linens should be soaked in a 0.05% chlorine sanitising solution for approx. 30 minutes before laundering.
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**Direction of Airflow**
1. Clean air from outside
2. Wind tower
3. Air in the patient's room and toilet
4. Air extractor
5. Exhausted air

**Extraction fan technical requirements**

There are many extraction fans available, such as bathroom and kitchen extractor fans, silent extractor fans, wall fans, and axial fans to remove fumes, smoke, heat and steam (Figure 9). In order to follow the IPC standards required for the SARI treatment centre, the following specifications should be met:

- Wall-mounted only: the airflow should be top-down, from the ceiling to the floor. For this reason, the extractor must be installed on the wall about 20 cm above ground level in order to avoid damage due to splashes while cleaning and disinfecting the floor.
- Backdraught shutter: to direct the exhaust airflow.
- Power rating: according to availability and the country's regulations.
- Sound: 38 dBA at 3 m (or as quiet as possible) to avoid constant noise that may disturb patients and staff.
- Airflow (measured in cubic metres per hour or litres per second): according to the room's maximum bed capacity, considering at least the minimum standard of 160 litres per second per patient or 576 cubic metres per hour per patient.

The formula to calculate the extraction fan airflow needed given a specific bed capacity is:

\[
\text{Extractor airflow} \, [l/s] = \text{maximum bed capacity} \times 160 \, l/s/patient
\]

or

\[
\text{Extractor airflow} \, [m^3/h] = \text{maximum bed capacity} \times 576 \, m^3/h/patient
\]
Proposed Fan:
Residential or commercial grade exhaust fan of at least the following specifications

<table>
<thead>
<tr>
<th>Sweep (mm)</th>
<th>Power Input (W)</th>
<th>Speed (RPM)</th>
<th>Air Delivery (CM/H)</th>
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</thead>
<tbody>
<tr>
<td>225</td>
<td>38</td>
<td>1370</td>
<td>720</td>
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**Alternately, evaporative coolers could be placed outside the open windows, with the filter media removed, and the fans pulling air from the room rather than into the room.

New openings in the wall above the doors should be made for exhaust fans to be mounted. Exhaust air from confirmed rooms should not be directed towards the toilet block which is being used by suspected patients.
Proposed Fan: Residential or commercial grade exhaust fan of at least the following specifications

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*Alternately, evaporative coolers could be placed outside the open windows, with the filter media removed, and the fans pulling air from the room rather than into the room.

Existing evaporative coolers in these windows to remain but be turned the opposite direction, water can be turned off and filter media removed.
CHINCHPADA CHRISTIAN HOSPITAL COVID-19 PROPOSAL
8 May 2020 | PHASE 2: AIR CIRCULATION DIAGRAM

KEY:

- DIRECTION OF AIR FLOW
- PROPOSED EXHAUST FAN

OPEN WINDOWS
CLOSED WINDOWS

CONFIRMED COVID WARD

Fresh Clean Air In
Contaminated Air Out
Minimum 3’ clearance from roof
Duct to direct contaminated air
Window to be kept closed
CHINCHPADA CHRISTIAN HOSPITAL – COVID WARD PROPOSAL

The hospital is preparing their facility to be used for the treatment of Covid19 patients. A phased approach to care is presumed, with Phase 1 accepting Covid19 patients, while also maintaining normal hospital functions, and Phase 2 transitioning the hospital to being a dedicated Covid care facility.

The proposed use of the space prioritizes segregation of patient types, safe circulation of staff and patients to avoid transmission, and continuous air flow circulation.

Phase 1: OPD, OT, and Surgical Ward functions remain unchanged in Phase 1 of the hospital's Covid19 response. Separation of Covid patient and other patient populations is prioritized by fencing off the Medical wards (and associated nursing and toilet areas), as well as the ACU/ICU building. The physical barrier of a fence serves to prevent the risk of non-Covid patients entering into the contaminated area, while also heightening awareness of staff moving between contaminated and clean areas of the hospital campus.

Phase 2: In Phase 2, the remaining ward spaces are assigned for Covid care. While OPD spaces have not been utilized in the Covid care plan, it is presumed that the hospital's focus and resources will be consumed with caring for Covid patients, and it is unlikely that usual functions will be happening in those spaces. The OT can still function for emergency use. The Medical ward will be entirely dedicated to suspected cases, and the ACU/ICU will continue caring for patients requiring more acute care. The entire surgical ward and surgical private rooms will become confirmed patient care spaces. In the case that the number of severe/acute patients outgrows the ACU/ICU space, private surgical rooms could be used with the addition of cylinder oxygen, though the enclosed nature of those spaces might create strain for the nursing staff.

Patient and staff circulation: At the beginning of their shift, staff don PPE at a dedicated donning space (Phase 1 - in the current casualty area; Phase 2 - with the addition of space at the entrance to the surgical wards). Any staff exiting the wards must pass through both a PPE doffing area and a wash area before leaving the building or returning to the staff work areas. If a staff member needs to re-don PPE, they may follow the same exterior paths as clean PPE-wearing staff used before. Staff needing a toilet during their shift may utilise the room/toilet on the far end of the medical ward.

Air circulation: It is very important to have continuous air flow in and out of the wards. Windows bring in natural fresh air. Exhaust fans should be installed at the upper levels of the rooms to extract any contaminated air. This extraction of air will draw in more fresh air, and keep the spaces well-ventilated. The WHO recommends 570 m3 / hour / patient for Covid-19 wards.

Laundry: Contaminated laundry will be collected from wards and moved in enclosed containers (bags or buckets) to the hospital laundry room, where they will be sanitised and washed. Laundry from the Confirmed or Severe & Critical wards should not enter the Suspected wards to avoid contamination. Upon laundering, clean items will be restocked in the staff work/supply space.
Patients entering hospital site are directed to Assessment Centre upon arrival.

Patients to exit both left and right sides of Assessment Centre.

Non-case patients directed to the appropriate hospital department.

Staff in PPE to accompany suspected patient suspected ward for admitting.
Layout of Spaces:

- The temporary building will be used for testing and assessments of patients for Covid19 and Tuberculosis.
- The space is divided into 4 main areas – the Patient Under Investigation (PUI) waiting booths, the Patient Triage Area, the Staff Triage Area, and an X-ray room.
- There are male and female toilets for the PUI to use.
- The Staff Triage Area includes donning, doffing, and washing area. Storage and staff toilet are also provided.
- The spaces will need to be well ventilated with the windows, ceiling fans, and exhaust fans.
- The building will have a lightweight pitched roof and the overhangs will cover the walking space around the building.

Note:
1. PUI – Patient Under Investigation
2. PUI Waiting Booths, Patient triage area, sinks, and toilets should be sanitised between patient use.
Flow of Staff and Patients:

- Patient arrives at hospital and is directed to Assessment Centre before entering hospital grounds. Accompanying family/friends (except in the case of a minor) are asked to wait elsewhere.
- Patient Under Investigation (PUI) arrives at Assessment Centre and is directed into one of four waiting booths.
- PUIs are permitted to use the designated male and female Assessment Centre toilets while waiting.
- Staff directs the PUI to an empty, sanitised patient triage room.
- Triage staff interacts with PUI verbally through window.
- In the case that the PUI needs physical assistance or requires Covid testing, triage staff will don PPE in the designated donning area, and enter the patient triage area.
- Once assistance/testing is complete, donned staff will escort the PUI to the Suspected Covid Ward. Stretchers/wheelchairs are provided in case the patient is not ambulatory.
- If the PUI does not meet the case definition (is not suspected to have Covid), they are directed by staff out of the Assessment Centre and to the appropriate hospital department.
- If the PUI is suspected to have TB, they are to receive a chest x-ray.
- Both suspected and non-case patients should wash their hands at the designated sinks just outside the patient triage area.
- Upon returning to the Assessment Centre, the triage staff will doff PPE in the doffing area, wash in the washing area, and return to the staff side of triage.

Note:
1. PUI – Patient Under Investigation
2. PUI Waiting Booths, Patient triage area, sinks, and toilets should be sanitised between patient use.
3. Storage room can be used for cleaning and testing supplies.
**DIRECTION OF AIR FLOW**

**PROPOSED EXHAUST FAN**

**PROPOSED CEILING FAN**

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**Proposed Fan:** Residential grade exhaust fan of at least the following specifications

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<td>200</td>
<td>30</td>
<td>1300</td>
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**Air Circulation:**

- Windows on the exterior walls of the triage and XRay rooms will bring in fresh air.
- Ceiling fans will help circulate air within the rooms.
- Exhaust fans should be installed at the upper levels of the rooms to extract any contaminated air. This extraction of air will draw in more fresh air, and keep the spaces well-ventilated.
- If space below gable roof is screened in, air flow can be increased, and will also keep the space cool.