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Steps and Challenges in Creating and Managing Quarantine Capacity During a Global Emergency – Qatar’s Experience

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Background: COVID-19 pandemic has exposed the lack of adequate and appropriate quarantine capacity globally. Most countries lack the knowledge and/or capacity to set up and manage quarantine facilities at a national scale.

Methods: The State of Qatar developed a systematic plan to create and manage quarantine facilities for persons with confirmed or suspected COVID-19 infection or returning travelers and residents. A checklist was developed to streamline the process and to help other institutions requiring such guidance.

Results: Three distinct stages were identified: acquisition, commissioning and active operations. Steps required for each stage were identified and added to the checklist.

Conclusion: We share our experience and a checklist for setting up quarantine capacity at a national level. Such checklists can serve as a critical tool to quickly and efficiently ramp up capacity in this setting.

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The ongoing COVID-19 pandemic has strained global healthcare capacity to the breaking point in many countries [1–4]. Some countries appear to have been better prepared to handle the surge than others. Three distinct groups with some overlap and occasional cross-over have stretched these limits. First, non-critically ill patients requiring hospitalization have led to filling of general hospital beds rapidly. Secondly, critically ill patients requiring intensive care beds have overwhelmed local, regional and sometimes national intensive care unit capacity. Third group includes asymptomatic infected persons or those with mild symptoms and those who came into contact with definite or suspected cases. This last group, while not requiring hospitalization, requires a robust plan to quarantine or isolate them in facilities or areas safe for them and for the general population. While home isolation is an obvious and quick solution, it may not be available, practical, feasible or acceptable in all such cases.

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The State of Qatar has a population of 2.78 million persons, with expatriates accounting for approximately 85% of the total population [5]. First case of COVID-19 in Qatar was identified on February 29, 2020 in a returning traveler [6]. By November 30, 2020, a total of 1,108,078 persons have been tested for SARS-CoV-2 with 138,648 persons confirmed to have infection. Persons tested included those who met the case definition for possible infection through contact tracing, active screening of persons entering Qatar or presenting to a healthcare facility with symptoms. Hamad Medical Corporation (HMC), the healthcare delivery arm of the State of Qatar which provides approximately 85% of the inpatient hospital bed capacity in Qatar, was tasked with creating, implementing and managing quarantine sites for all persons in Qatar in need of quarantine and who could not be safely quarantined within their homes. Between February 26 and March 30, 2020, the HMC team created capacity to quarantine 8,855 persons in various locations across the country. These sites included private apartment buildings including those designated for expatriate labor workforce, hotels, modular buildings located in army facilities and hospitality resort villas. Here we describe the steps and challenges in setting up quarantine facilities in Qatar in response to the rapidly emerging COVID-19 pandemic. In Qatar, Qatari nationals and expatriates returning from countries where COVID-19 was thought to be endemic were among the first to be quarantined in addition to all contacts of confirmed cases. Asymptomatic and mildly symptomatic suspect or confirmed cases who did not have a safe home environment were also provided a quarantine room.

While there may be some overlap at the fringes, there are three distinct phases in setting up new quarantine capacity in a country. Quarantine sites have to be acquired, commissioned and operated with the population in quarantine. A systematic check-list based approach can facilitate the process and improve efficiency. We provide a checklist of steps at each stage for a governmental department or equivalent based on our recent experience in Qatar (Table 1). Some of the challenges that may be encountered at each stage are summarized below. We assume that the requesting authority is the government of the country (through the health department, healthcare delivery organization, or equivalent) and the facility to be acquired is a private entity (e.g. a hotel, an apartment building, other individual or group accommodation).

Such actions are possible only in the presence of a clear incident command and control structure with adequate representation from various sectors including emergency response, clinical and infection control expertise, facilities management, public health, medical regulatory authority, public safety department(s), utilities departments, finance, human resources and legal representatives.

### Acquisition

The first step is to determine and enact the legal right and framework to acquire facilities which are to serve as quarantine sites. Some facilities may voluntarily agree, while others may require legal authorization particularly when potentially infectious persons would reside in those facilities. Forecasting the number of persons eventually requiring such accommodations is needed to determine the number of facilities to be acquired. A contract or memorandum of understanding detailing the nature and extent of services (e.g. number of rooms) required, authority and responsibility of each party and any compensation arrangement should be signed. This includes the role of facility workers and their compensation, as well as any liability in case of injury, accidents or exposure. It is also important to determine criteria for admission to such facilities and the staffing needs for medical and support staff.

### Commissioning

Some facilities may be full service active dwellings with all furnishings and services in place. Others may require utilities connections (electric power, water, heating or air conditioning, internet access) and furniture (including linens). For facilities with shared bathroom/toilet facilities, a safe ratio and access must be ensured. For facilities with more than one resident per room, safe distance between beds and maximum number per room should be established. Infection control needs (e.g. natural ventilation, air circulation, hand and personal hygiene) and need to place medical equipment needs to be considered. Purchase, delivery and set-up of all furnishings and required equipment should be completed. Any modifications must be made at this stage for safe housing of residents. Additional equipment required includes personal protec-

### Active Operational Stage

| Acquisition Stage | Commissioning Stage | Active Operational Stage |
|-------------------|---------------------|--------------------------|
| Obtain legal authority to acquire sites | Ensure appropriate furnishings | Registration of residents including synchronization with medical records |
| Determine legal and ethical responsibilities of all parties | Ensure utilities (power, water, temperature control, internet access) connections | Provide orientation, information and education |
| Determine numbers needed (beds/rooms, facilities) | Determine and check quarters details (size of rooms, number of toilets, bathrooms) | Provide safe transport to and from facility |
| Ensure proximity and access to emergency and tertiary care facilities | Determine and provide specific medical and logistic needs, e.g. access for the disabled | Set up for routine and minor urgent medical care including medication dispensation |
| Ensure safety of the building(s) and compliance with local safety standards | Determine and implement infection control needs, e.g. hand washing/sanitizing stations, surface cleaning, safe distancing | Implement crowd control and exit control plans to prevent potentially infected residents from leaving the premises |
| Contract, memorandum of understanding or equivalent to be signed | Determine, purchase and install medical equipment and supplies needed, including personal protective equipment | Elevate housekeeping and waste management to hospital standards |
| Determine and agree upon the scope of authority and responsibility for facility staff vs. medical staff | Provide staff education and training, including clinical care pathways specific to the situation | Monitor catering (no external deliveries to be allowed) |
| Determine and agree upon the scope of liability for facility, site staff, lost revenue, staff illness/accident/injury | Determine and communicate internal flow plans including separate movement of potentially infected persons and materials, e.g. separate elevators | Ensure safe discharge planning, including instructions, medications and any other supplies |
| Determine staffing needs for medical and support staff | Establish safe exit and evacuation routes in case of emergencies | Routine communications between medical staff on site and organizational leadership for bi-directional updates |
| Establish clear admission criteria | Install additional signage or instructions for residents for safe use of facility | Synchronization of site records with hospital medical records |
tive equipment and communication devices to link with hospital medical records.

**Active Operations**

Residents need to be transported from the point of first contact to the facility in safe and reliable transport. Depending on individual circumstances, this could be an ambulance, individual transport and group transport. Since the underlying emergency in this scenario is a highly contagious infection, public transport, or any means where the resident may come in contact with unexposed persons must be avoided. Group transport may be considered only as a last measure and by escorting infected persons. Once at the facility, quick registration should take place and specific quarters assigned. Educational and informational materials should be available to provide orientation, roles and responsibilities of staff, and disease specific information. Contact information for urgent and emergent issues should be provided in addition to contact information for routine issues. Safe distance and appropriate infection controls measures (e.g. masks for residents and staff; repeated cleaning of common surfaces) must be undertaken at each stage. Crowd control and exit control strategies should be in place with clear guidelines for escalation plans should the need arise. Guest services should be elevated to hospital standards. These include housekeeping/cleaning, laundry and waste management. Catering should be monitored with no outside deliveries allowed to minimize exposure. However, special provisions can be made if such deliveries are made to a central area and then internally distributed. Finally, a discharge planning protocol should be available, including criteria, instructions and any needed medications at discharge.

**Qatar Experience**

In Qatar, all returning travelers, contacts of confirmed cases and those with suspected or confirmed infection in the community who did not have a safe home environment were quarantined. Initially, the quarantine duration was 14 days, but was reduced to 7 days and more data became available regarding the duration of possible infectiousness. All persons had an initial nasopharyngeal swab before beginning the quarantine and an intake history was documented by a physician. Each quarantined person was provided with instructions on when and how to access a healthcare provider, who was always present at each quarantine site. Any person who developed respiratory symptoms was reassessed and a repeat nasopharyngeal swab for SARS-CoV-2 PCR was performed. If positive, they were transferred to a designated facility; if negative, they were monitored via subsequent telephone consultation.

**Conclusions**

In rapidly emerging infectious diseases related global emergencies, countries may need to quickly build substantial capacity for isolation and quarantine of cases and contacts. Having a central incident command and control structure is essential to its success, with the checklist provided in this document serving as a template upon which local and specific needs can be added to make the process efficient and rapid.

**Disclosures**

Authors declare no financial conflict of interest regarding the content of this article.

**Disclaimer**

The views expressed in this article are those of the authors and do not necessarily represent official government views or policy.

**Authorship Statement**

Dr. Butt had complete access to data at all times and accepts the responsibility of the integrity of this article.

**Author contributions**

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Design: NM, AH, AA, AAB.
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