

COVID-19 Conversions: Hotels to Hospitals

Converting Hotels for Patient
Care and Sequestration

Concept Study



What if... We Used a Hotel for Patients?



The predicted hospital bed shortage

We should start by stating the obvious: the current COVID-19 crisis is unprecedented in modern times. If predictions are even partially accurate, our best preparations will still fall short of the need for hospital patient beds to handle the potential influx of people needing care.

According to The American Hospital Association, there are approximately 920,000 staffed beds in the U.S. Some studies have estimated that five to nine million infected people in the U.S. may need to be hospitalized, a third of whom might require intensive care.

While all people who get infected will not need isolation and close physiologic monitoring, there may at least be the need for medical care at some point during the illness which likely requires more hospital

rooms than are currently available nation-wide and in individual cities. The gaps between current capacity and potential demand stretch our healthcare system beyond anything imaginable.

What if we could utilize hotels for COVID-19 patient care and sequestration?

Knowing that our current USA hospital bed capacity will likely fall short of the need, we need to identify alternatives that can help offload the bed demand from our hospitals. What if, we could utilize hotels for COVID-19 patient care and sequestration?

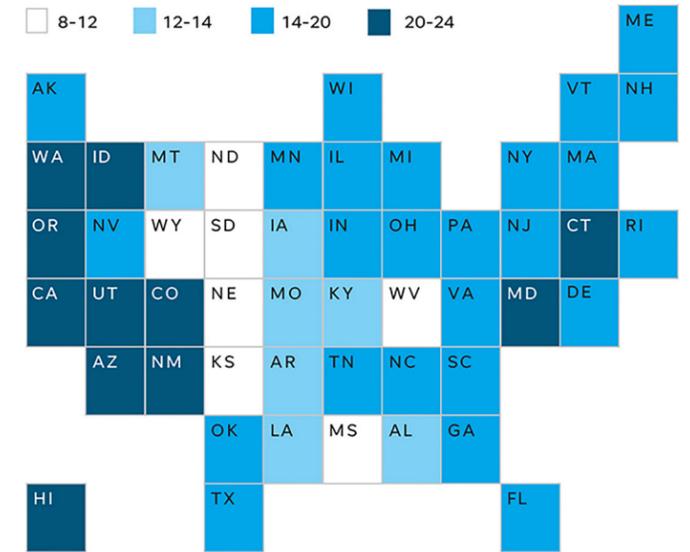
As we dive into this exploration, we should start with some assumptions that will help define the rationale and potential processes required for this secondary use of a hotel.

It would be very difficult, if not impossible without time-consuming major renovations, to convert and renovate a hotel into a fully operational hospital that meets all licensing and compliance requirements. Such conversion would not be practical or quickly done, and it would be very costly.

A hotel can be converted to patient care space that is not quite a “hospital.”

While many hotel types were considered, a full-service convention hotel provides the best opportunity to quickly create and support functional patient care spaces that will be needed if the virus spreads to predicted levels. Speed of conversion will be key.

Full-service convention hotels are predominantly located in the population centers where the needs for COVID-19 treatment and sequestration may be higher and likely near major hospitals.



Patients may outpace available hospital beds during a spike in COVID-19. Colored blocks show the estimated number of seriously ill patients per available hospital bed (for all ages).

Source: JANET LOEHRKE/USA TODAY
<https://www.usatoday.com/in-depth/news/investigations/2020/03/13/us-hospitals-overwhelmed-coronavirus-cases-result-in-too-few-beds/5002942002/>

Hotel to patient care: potential room-use conversions

Hotel Space	Hospital Space
Guest room	Patient room, nursing support/station, unit storage, unit clean supply storage, staff sleeping
Lobby/check-in	Triage/assessment/intake/registration
Conference room/large meeting areas	Central medication supply, central point of care testing, central medical supply, central materials supply, administration support (open office), nursing support (huddles/shift change)
Kitchen/room service	Kitchen/room service
Restaurant	Staff dining
Dock (logistics supply in, waste out)	Dock (logistics supply in, waste out)
Ballroom	Patient wards for better observation of those with worsening conditions and needing more real-time specialized care

What if... We Used a Hotel for Patients?

COVID-19: appropriate for care in a hotel setting

Patients with high risk factors based on age and pre-existing conditions would be best suited for the hospital. The hotel solution is intended to preserve hospital resources for the sickest patients.

Assessing patients that present symptoms will be essential to determining the best candidates for care and sequestration in facilities like a hotel converted to patient care.

If hospitals would prefer that suspected COVID-19 carriers are not present at the hospital facility, an on-site triage at the hotel can be considered.

The patients most appropriate for a COVID-19 hotel stay are:

- 1 Suspected of being a COVID-19 carrier
- 2 Confirmed COVID-19 positive, but not presenting severe symptoms
- 3 Recovering from COVID-19 but still require care or sequestration

The patients would be ambulatory — they would not need ventilation or machine assisted breathing and they would not require oxygen or only need minimal oxygen assistance.

In the case of pediatrics, this study recommends that children with severe cases be treated within hospitals due to the likely need of specialized care and patient support.

Patient types suitable for hotel as a patient care site:

- In the age range of 18 to 50
- Require ambulatory care only
- May have high risk family members at home



- Require monitoring due to risk of progression to severe condition
- Have mild symptoms and do not have adequate support or space at home pre-hospitalization
- Have mild symptoms and do not have adequate support or space at home post-hospitalization
- Have improved symptoms or are recovering yet still require sequestration and have a positive test for COVID-19, especially if beds are needed

Assessment/testing/triage

Many hospitals are looking at alternative locations for assessment and testing of potential COVID-19 patients away from their hospitals and emergency departments. For the purpose of this scenario, we are assuming that some form of assessment, testing and/or triage is happening on the site of the hotel.

With potential arrivals presenting with symptoms they will need to be assessed and tested to establish an appropriate determination of sequestration, being sent home or being sent to the hospital. The flow and circulation of those potential cases must well-planned to try and limit cross contamination.

Scenario 1: Guest Room Conversion

The guest room conversion for low acuity patients can be rather simple with a few considerations.

- Remove, if possible, non-essential furniture. This will allow for more caregiver space and other small equipment such as an IV pole, pulse oximeter and a bedside commode, if necessary.
- While the bed is not optimal for patient care, it will accommodate the needs for the scenario of this type. It is recommended that all mattresses be fully contained within a waterproof protective wrap. Linens should be replaced as often as possible.
- Utilize features already in the guest rooms such as the television, a telephone that connects to a central station, Wi-Fi connectivity, and a toilet/shower room with a sink.

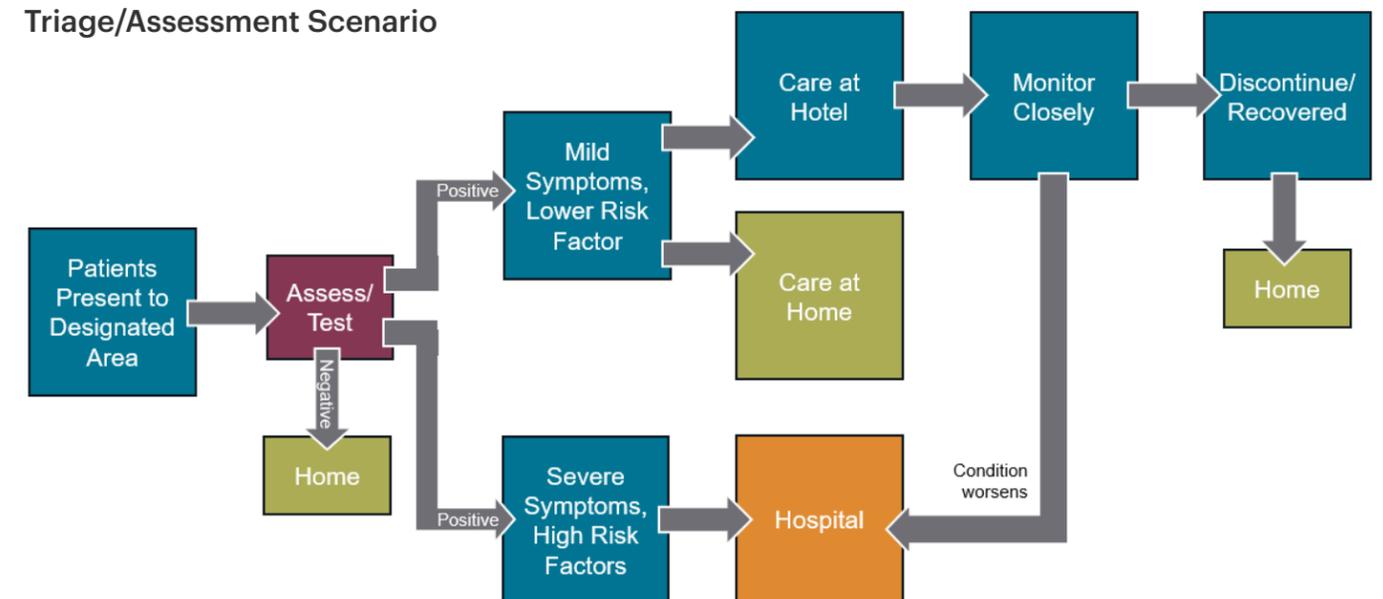


- If additional observation is necessary, consider off the shelf camera systems that are easy to install.

Infection control within the guest room must be addressed and is paramount to contain the further spread of the virus.

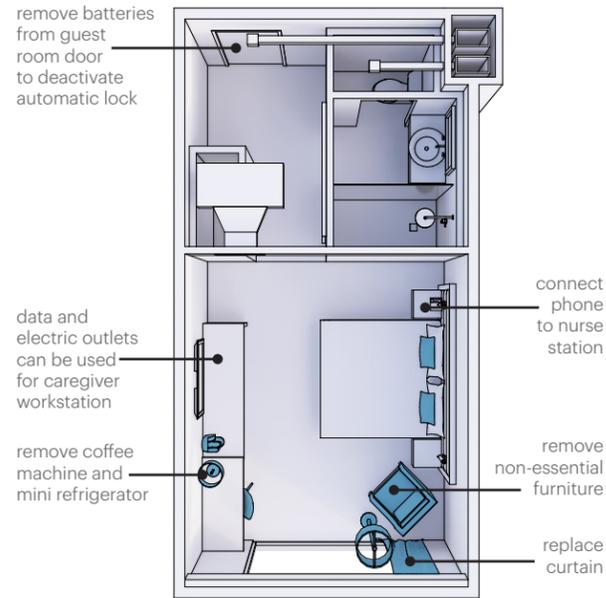
To create a barrier between the carpet and patient care, cover the carpet with “carpet protection tape” that is readily available and can be easily changed between patients. While this is not ideal for infection control it can help to reduce the incidence of contamination and spread due to fluid ejections and spills. And, it is achievable.

Triage/Assessment Scenario

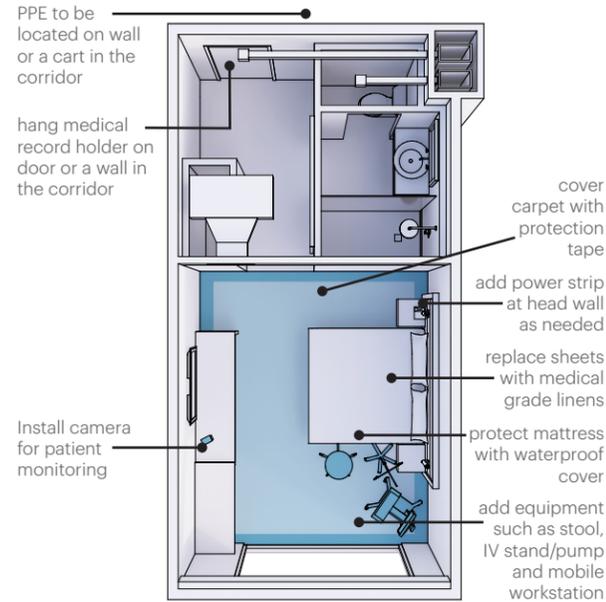


What if... We Used a Hotel for Patients?

Guest Room – Original



Patient Room – Low Acuity



Post-COVID-19 use, all carpet should be removed and replaced before the hotel returns to standard operations.

Stations for hand cleansing and access to personal protective equipment should be create near the entrance to each room if possible

Air Quality Considerations

Most hotel rooms are served by individual room units, typically fan coil units or packaged terminal air conditioners (PTAC), which recirculate air within the room. Fresh air is typically provided by a separate dedicated outside air system and dehumidified air is directly ducted into the room or the fan coil. However, some older facilities may depend on drawing outside air directly through the PTAC.

The average air exchange rate in hospital patient rooms is typically around six air changes per hour (ACH) of locally recirculated air, but probably less than two ACH of outside/exhaust air. Two ACH of outdoor air is similar to a hospital patient room. The advantage of the PTAC or recirculating room unit is that it is localized and does not return to a

central air handler to get distributed to other parts of the building. But outside air helps with dilution of infectious particles that may be in the room air, and most of these units do not draw outside air directly.

Achieving negative air pressure is often desired for hospital rooms in which infectious patients are treated. Most hotel HVAC systems are not able to create a negative pressure in the guest/patient rooms, but secondary temporary systems can be used to a supplement exhaust and create negative pressurization. However, recent guidance from the CDC suggests that negative pressure is not imperative for low acuity COVID-19 patients who are not undergoing procedures that could cause aerosolization of droplets.

If using hotel guest rooms for patient care during this surge emergency, the most efficient implementation scenario may be to leave the air conditioning systems as originally intended and operational. A cleaning regimen can be employed for the accessible components of the system but cleaning the fan coil between every room change may be impractical.

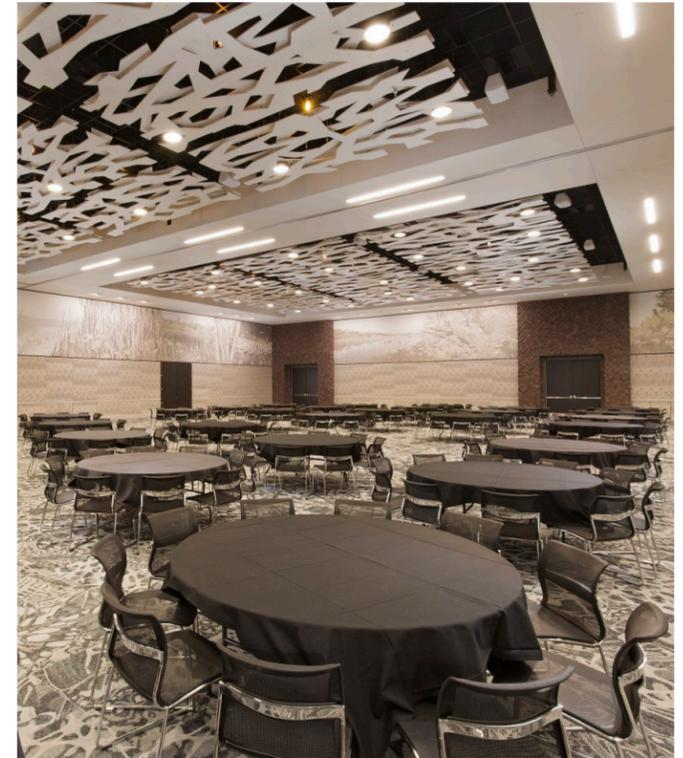
Ballroom/Ward Configuration

In the case where guest rooms will not be utilized for patient care (Scenario 1) or there is a need for a for higher patient observation area (Scenario 2), we recommend using the ballroom(s). Advantages include:

- Large flexible spaces with the ability to accommodate high weight loads on the floor and if necessary, hanging from the ceiling.
- Spaces can easily accommodate a ward configuration where beds are cohorted in small groups. For general planning purposes, it is likely you can comfortably accommodate one bed per 200 SF to accommodate appropriate spacing along with decentralized nursing care support spaces.
- This type of configuration is also conducive for more efficient staffing ratios.
- Other support spaces such as a point of care lab, central medication storage, supply storage, waste staging and a control center could be accommodated in connected/adjacent meeting rooms.
- Air exchange rates in ballrooms tend to be higher than guest rooms which will serve a ward configuration well.

Access to toilets, showers and sinks could be challenging because these spaces are typically supported by large gang toilet configurations. Depending on the location and adjacency, planners may need to consider mobile toilets within the ballroom/ward for closer proximity to and containment of patients.

Toilet use is a potential source for significant contamination. Toilets should be enclosed and must



be cleaned frequently. Bedside toilets and bedpan use will add to the workload for already-overloaded staff, also increasing potential for contamination with fecal matter and urine.

Bathing and hygiene would likely have to be accommodated at the bedside, although there could be paths for ambulatory patients to utilize guest room showers if the pathway to and from these rooms does not cross contaminate other traffic.

Another option within the ballroom is to set up prefabricated patient care tents or units that can be self-contained and sometimes provide options for showers, toilets and sinks – if these can be connected properly to domestic water and power.

Air exchanges in ballrooms tend to be at higher rates than guest rooms, with higher percentages of outside air, which will serve a ward configuration well. Temporary ducting from central systems to the patient wards/units may be necessary, depending on configuration.

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Command Center Considerations

Operations in these scenarios must be highly organized. A central location for command will be essential to maintaining operations and organizational efficiency of facility in this scenario. A large meeting room near triage and large care areas would be ideal. Or, consider a location that may have connectivity to the main phone control board in addition to office support equipment such as computers, copiers and printers.

It is likely that there will be a shortage of qualified staff to support this emergency scenario. Alternative teams will be necessary because the standard caregiver-to-patient ratios will not be achievable. An additional benefit of a hotel conversion is that some guest rooms can be reserved for staff who can remain on site after their shifts, thereby reducing the likelihood of community spread. Food service on site can be provided and can support staff needs.

Using an electronic medical record system, at least initially, may be difficult due to lack of hardware, remote connectivity to systems and staff training requirements. The planners should consider use of a paper medical record system, often stored at the door/entry to each guest room or at the foot of the bed. Conversion to electronic data can come at later time.

Closing Thoughts

This exploration is meant to ask the question, “what if?” and investigate some ideas that could be considered when facing a conversion scenario. It must be acknowledged that this study is far from comprehensive. It does not identify or resolve all the issues that may arise in a hotel conversion scenario. Nor does it consider other hotel types such as limited service hotels, non-convention models or other building types. Most importantly, there will likely be staffing deficiencies and potential medical equipment shortages.

Systems may need modification that were not addressed as part of the study. While most convention hotels share the same programmatic spaces, they often differ in configurations and will require individual assessments. This analysis sets the groundwork for deeper dives into these topics, each of which will require additional study and consideration.

This is an approach that is based on the ability to convert a non-hospital building for the use of patient care very quickly — a full-service convention hotel offers this opportunity. With the right resources and team, a conversion timeline of 10 to 14 days is reasonable. The following are exhibits that visually begin to tell the story.

Conversion Timeline (10 to 14 days)

Summary Description	Now	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Status Reports Day 7	Day 8	Day 9	Day 10	Day 11	Ready to Activate Day 12	Training/Simulation Day 13	Go Live Day 14	Daily Debrief Ongoing
Identify hotel/clinical partners and negotiate agreement																
Form Joint Hospital, Design and Implementation Team																
Mobilize, identify objectives, orient team and assign responsibilities																
Remove mobile furniture, curtains, bedspreads and any unnecessary items																
Cover carpet with 4.0 mil carpet tape																
Equip room with patient care supplies and equipment																
Prepare hotel support services with workstations, supplies, equipment, medications, staff respite spaces, prep areas, etc.																
Prepare conference or meeting rooms to function as Command Center																
Evaluate electrical services, develop plans for required modifications and implement plans																
Assess WiFi capabilities, develop plans for required modify/implement plans																
Evaluate other technology systems and develop plans for modify/implement plans																
Evaluate mechanical systems, develop plans for require modify/implement plans																
Set up ballroom(s) for step-up care																
Plan patient care flow, considering separation of clean/soiled areas, seven flows of healthcare and elevator controls																

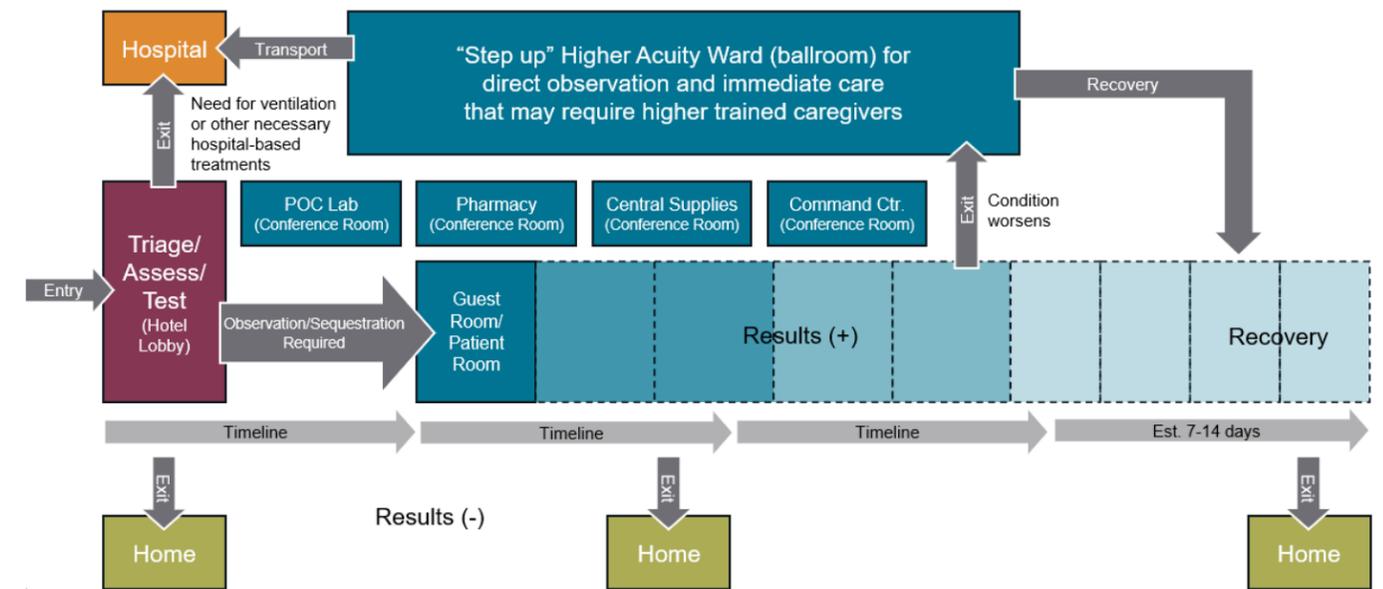
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Operational Considerations

	Now	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Status Reports Day 7	Day 8	Day 9	Day 10	Day 11	Ready to Activate Day 12	Training/ Simulation Day 13	Go Live Day 14	Daily Debrief Ongoing
Summary Description																
Diagnostics: lab and radiology																
Financial: registration, billing and collection																
Logistics: equipment storage and cleaning																
Logistics: EVS - regular and biohazard waste																
Logistics: EVS room turnaround/cleaning																
Logistics: food services																
Logistics: linen (clean and dirty)																
Logistics: supplies																
Policies and Protocols: clinical																
Policies and Protocols: operations																
Public Relations: Internal and external communication plan																
Staffing: clinical, support staff, ancillary staff																
Technology: cameras or other patient visualization equipment																
Technology: command center (computers, phones, WiFi, etc.)																
Technology: internal and external communications (staff-to-staff, patient-to-clinicians, patient-to-family, etc.)																
Technology: operations (printers, scanners, phone connectivity)																
Technology: patient care monitoring (in-room to clinician)																
Technology: medical record (start with paper charting and move to electronic)																

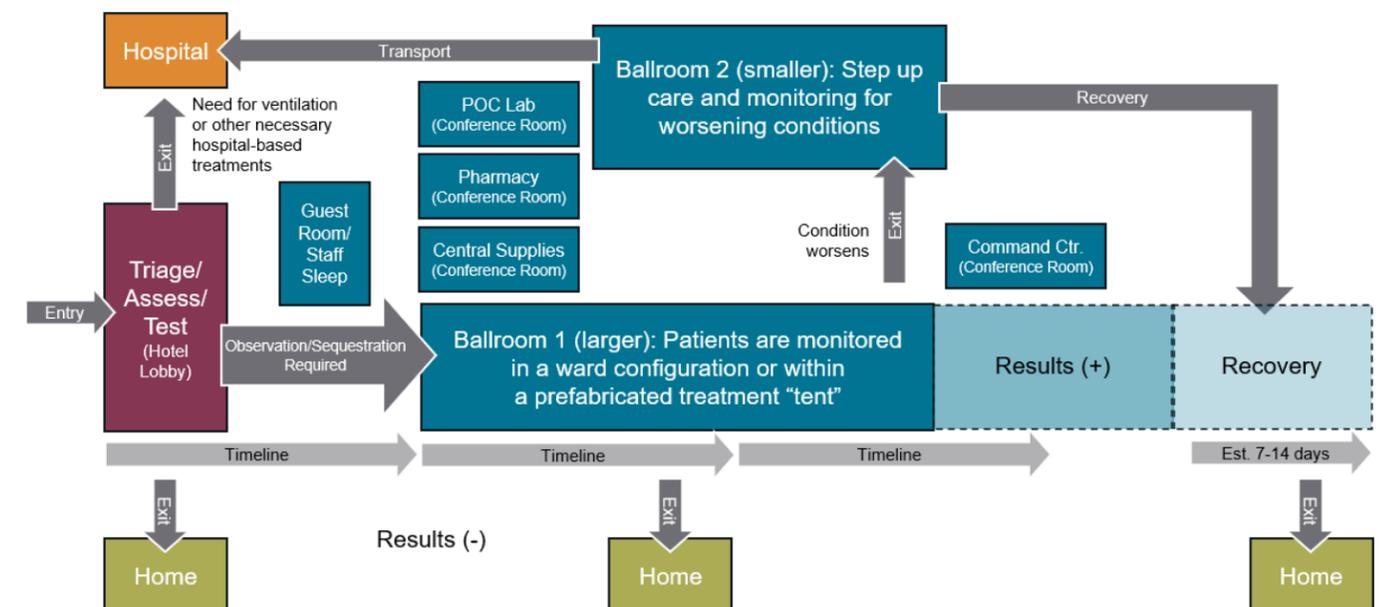
Ballroom/Ward Configuration

Scenario 1: Use of Lobby, Guest Rooms and Ballrooms

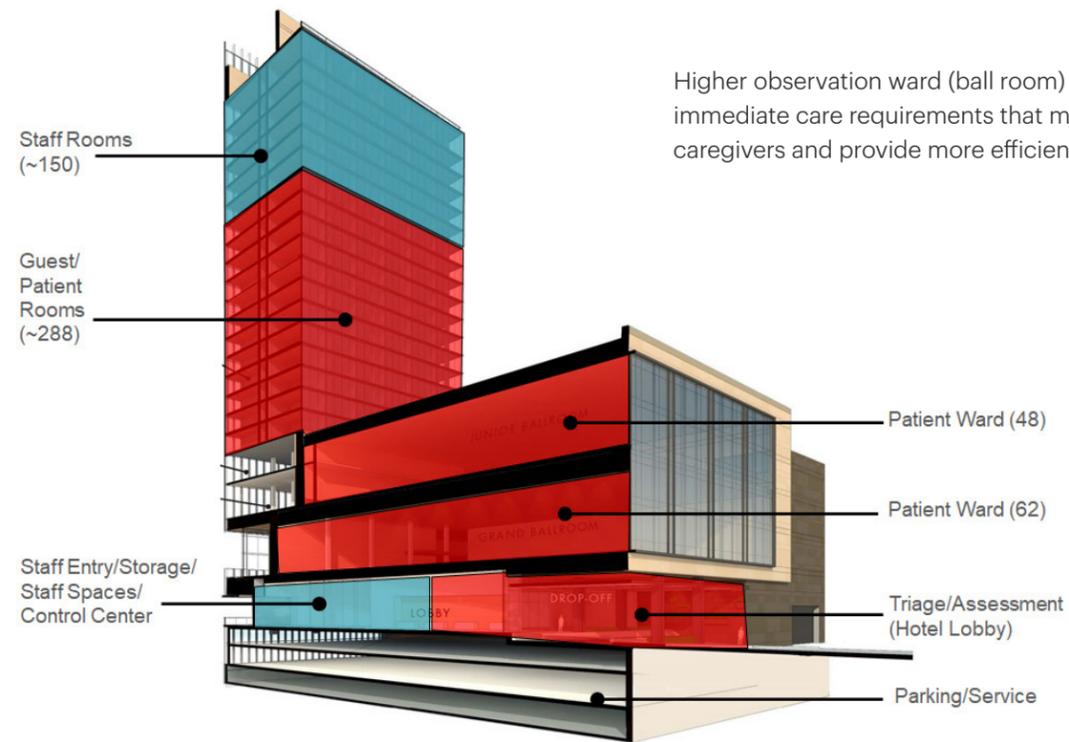


Ballroom/Ward Configuration

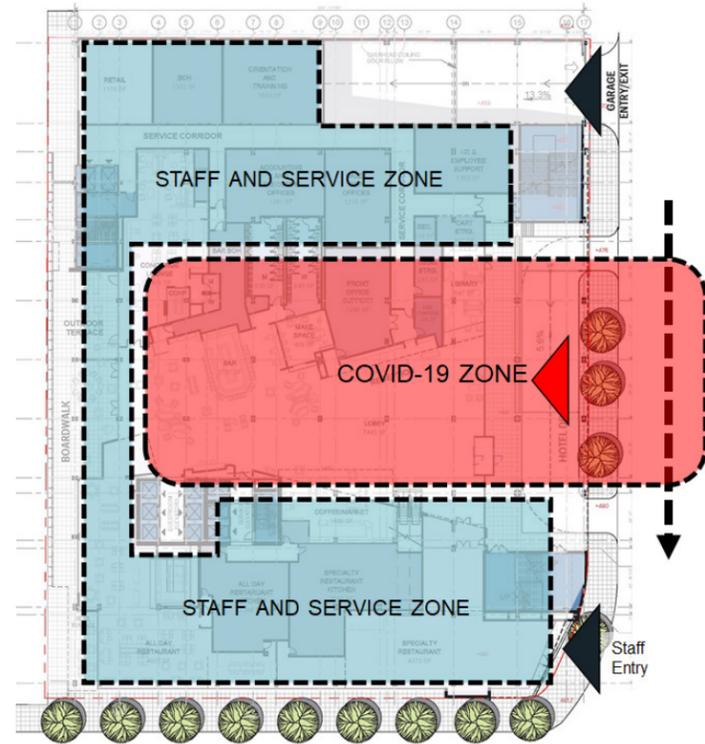
Scenario 2: Use of Lobby and Ballrooms



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Higher observation ward (ball room) for direct observation and immediate care requirements that may require higher trained caregivers and provide more efficient staffing.



Key Insights

Entry Level Zoning

- Consider zoning the entry level floor for a variety of options for COVID-19 arrivals
- Potential for drive-through testing integration
- Assessment capable spaces and flow
- Triage capable spaces and flow
- Direct admit COVID-19 arrivals
- Separation from for staff and non COVID-19 support entry and circulation



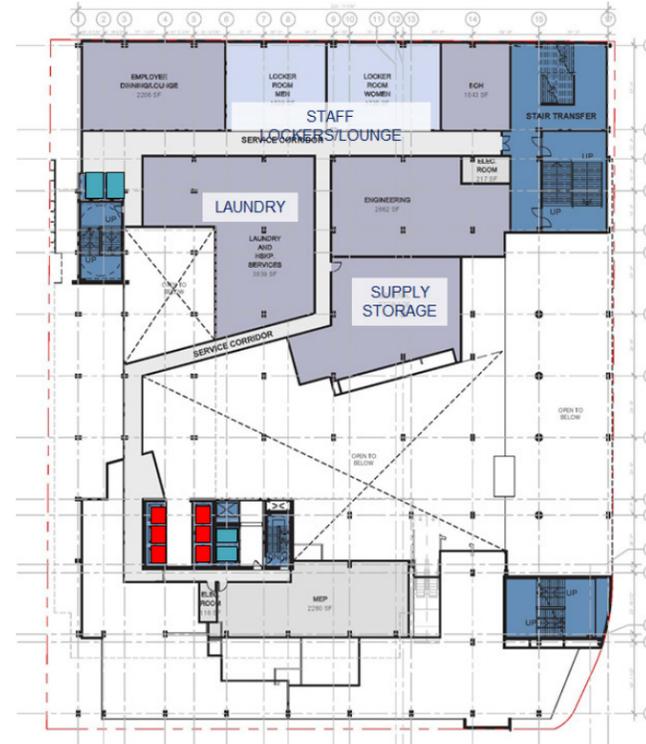
Key Insights

Pre-Admission Flow

- People will be permitted access to the hotel if they have been confirmed positive with COVID-19.
- People under investigation (PUI) will be tested at an off-site location or from their car. They will wait in their car until the results are available.
- Negative patients will return to their home environment.
- Positive patients will be triaged with a physiologic assessment and social assessment to determine ability to recover at home.

Patient Flows

- Entry into the hotel will begin with an intake process at the 'hotel reception desk.'
- Patients will then walk to triage for assessment
- If require admission they will take the designated elevators to the guest room floor or to one of the ballroom floors

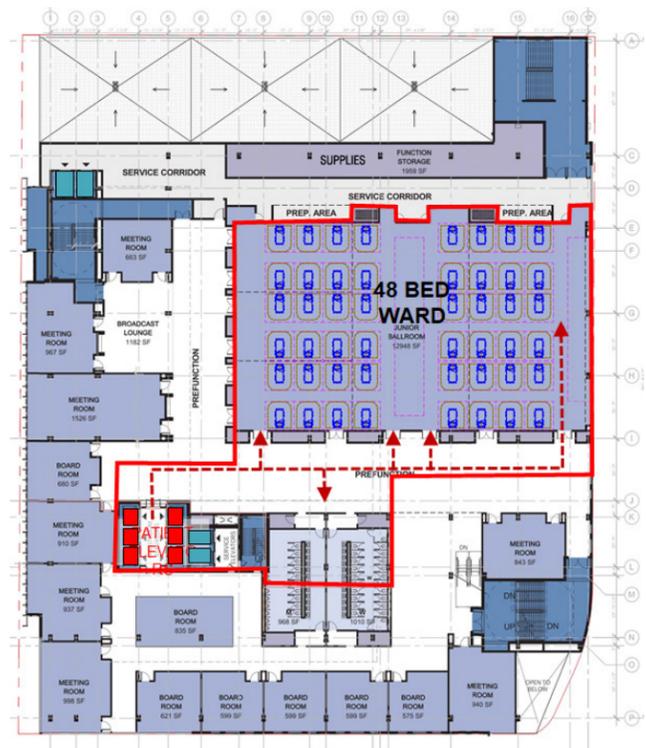
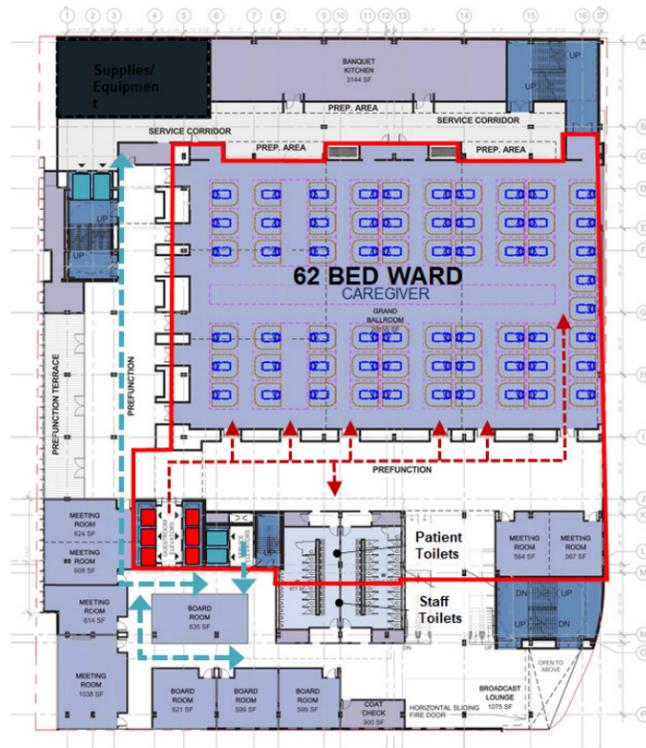


Key Insights

Staff/Support Services

- Support services floor
- Laundry from all hotel areas will be processed here
- Clean and soiled linen will be transported from this floor to the guest room and ballroom floor via the staff/service elevators
- Staff will keep their belongings in the hotel locker rooms

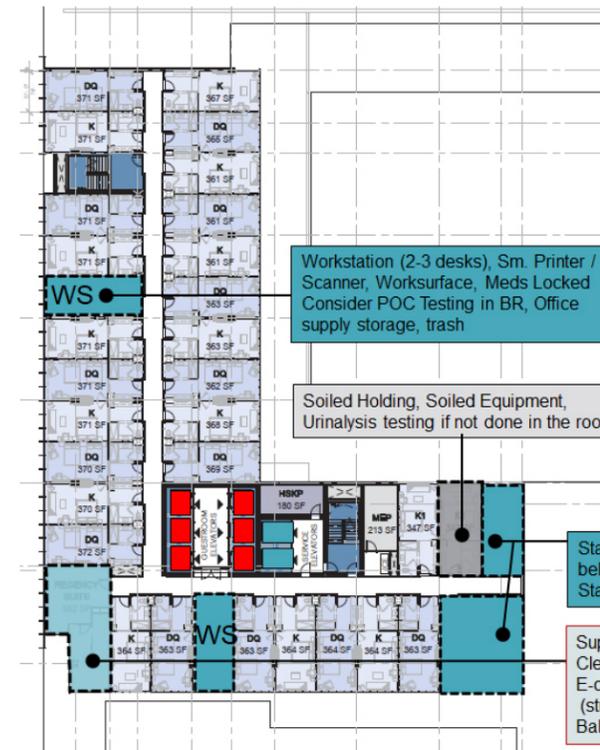
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Key Insights

Patient Care and Support Services/Ward

- Positive patients will be accompanied by a designated representative to the open care area (ballroom).
- Patients are expected to be febrile, have shortness of breath and general malaise and be ambulatory.
- Positive patients in this area may require oxygenation. Medical gas will be provided in a 12-bed area close to the elevators in case of need of immediate transport to the hospital.
- Close physiologic monitoring is required for patients with co-morbidities or moderate shortness of breath. Ideally, older patients or patients with co-morbidities will be cared for in the hospital. Patients with shortness of breath and requiring oxygenation will be moved to a different location of the hotel.
- These bays will be open, without curtains. Screens will be used when absolute privacy is required.
- This open environment will maximize visibility. Staffing models will be based on hospital policy.
- Electrical cords will be taped to the carpet and used to charge patient care equipment, provide examination light, patient mobile devices and other items.
- Centralized supplies, equipment and nourishment will be kept in a location either on or off the floor based on available space.
- Workstations, equipment, supplies and other support needs can be kept in the centralized caregiver work zone or in the periphery of the ballroom.
- Bathrooms will be shared. In this design, the bathroom will be divided for male and female use. Showers will be provided on an as-needed basis.



Key Insights

- Patients on this floor will require "droplet" isolation. This means staff use gown, gloves and N95 mask.
- Patients will not require respiratory assistance in the form of aerosol or oxygen.
- Guest rooms are slightly positive to the corridor like a med-surg floor.
- Patient triaged and walks to the guest floor using the six guest elevators. Staff will be donned with PPE.
- Portable x-ray kept downstairs. Staff use sanitizer in and out of the room. Each room has hand-sanitizer inside the room. PPE with sanitizer on cart outside the room or hanging on the door. Share carts/ container between rooms for patient dedicated PPE. Staff wash hands in workstation room.
- Guest room – bed, bedside table, guest chair, patient specific supplies, linens, work surface
- Staff shower before leaving for home.

Authors

Jason Schroer, AIA, ACHA, LEED AP
jschroer@hksinc.com
713.969.4300

Stan Shelton, MSOD
sshelton@hksinc.com
214.969.3116

Jennie Evans, RN, MBA, EDAC, LSSGB, LEED AP
jevans@hksinc.com
214.969.3159

Contributors

HKS
Luis Zapiain, Arq.
Sergio Saenz, Arq., Intl. Assoc. AIA
Kirk Teske, FAIA, LEED Fellow
Mukesh Patel, AIA, NCARB
Ana Pinto-Alexander, RID, IIDA, EDAC
Mary Alice Palmer
Norman Morgan, AIA
Alison Avedt, OT/L, MBA

Mazzetti
Walt Vernon, PE, LEED, AP, EDAC, FASHE
Jim Crabb, PE, LEED AP
Brian Hageman, LEED AP
Sarah Jane Madole, BSN, RN, EDAC