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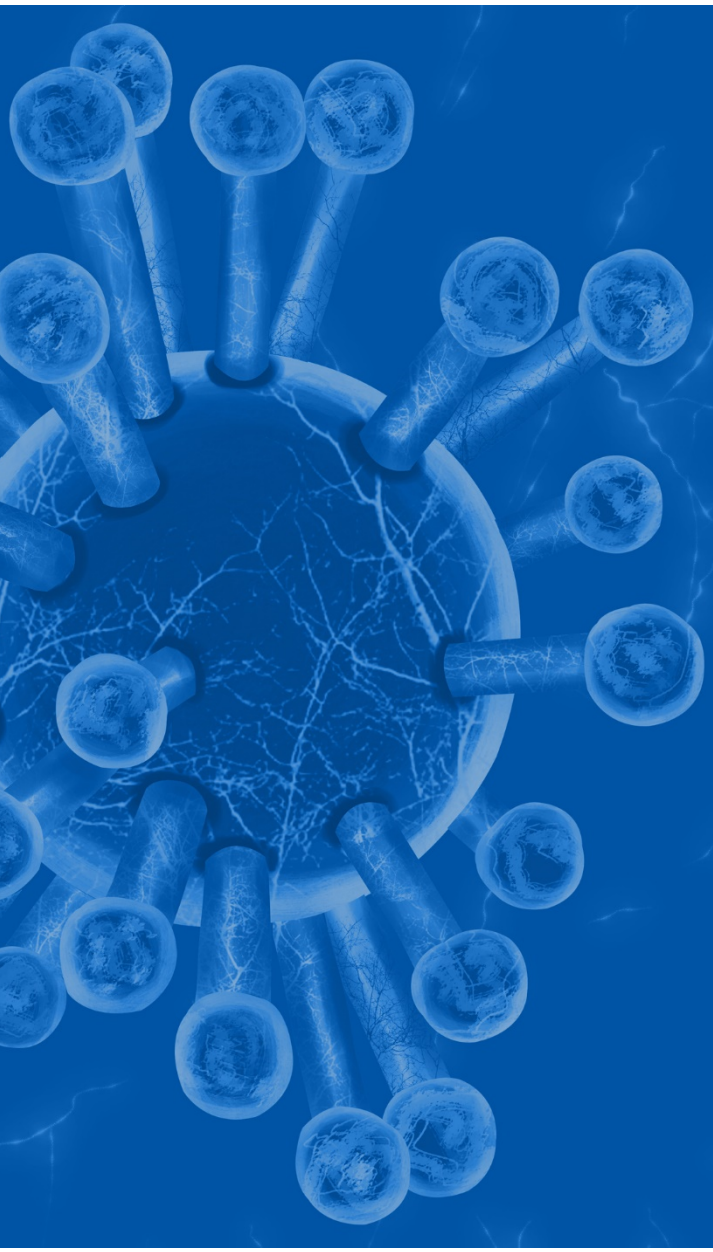
Hospital Readiness actions for the response to COVID-19



Recommendations for reorganization and expansion of hospital services in response to COVID-19

Technical Working Document v5 – April 2020

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Introduction

Expanding hospital service capacity involves the development and implementation of strategies to provide care and treatment and effectively manage growing numbers of COVID-19 patients.

To optimally organize hospital response to COVID-19 and, in particular, expand capacity, it is essential to implement certain necessary basic functions.

RESPONSE FUNCTIONS

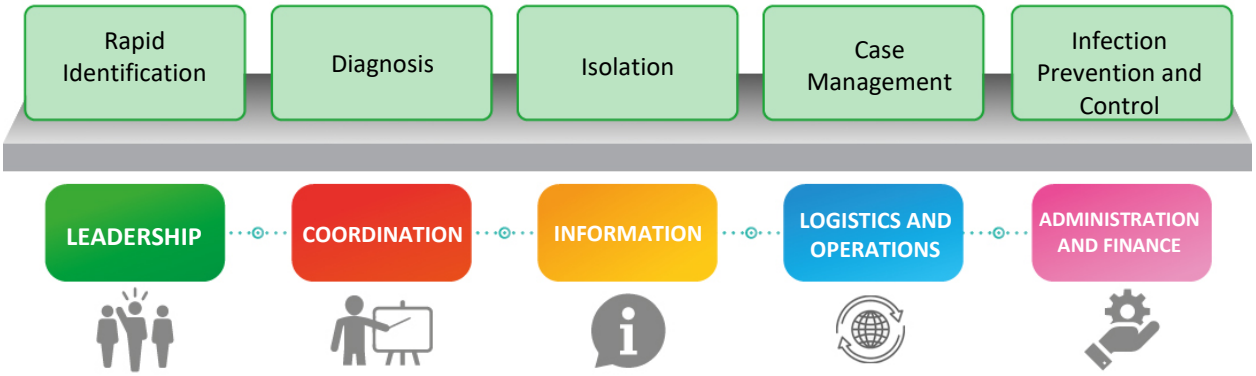

Figure 1. COVID-19 response functions in hospitals

Leadership is one of the main response functions, performing a key role in activating a hospital's emergency response mechanism, through the hospital incident management system, or another mechanism that the hospital has adopted based on its readiness, experience, and regulatory aspects.

The hospital incident management system enables the facility's authorities to make informed decisions and determine a single chain of command and authority, by setting clear objectives for the response at all levels of the organization (strategic, management, tactical/operative), improving both institutional and interinstitutional coordination.

It is important to highlight that the reorganization of health services is not only limited to increasing the number of beds or their complexity; it is a set of actions deployed at the Primary Level of Care (LNA) that enhances the ability to identify and control cases,

monitor patients at home and identify early complications, triage, referral of patients, and education of the population, as well as maintaining services for patients with other acute and/or chronic conditions that require priority care.

Likewise, it is important to identify alternative health care sites, that will allow expanding the capacity of the integrated network of health services when it is anticipated that the healthcare ceiling will be exceeded and all other resources will have been depleted.

The Pan American Health Organization published the " Reorganization and Progressive Expansion of Health Services for the Response to the COVID-19 Pandemic" that guides the reorganization of hospital services in an articulated manner with the integrated network of health services.

Key Elements

Three key elements need to be considered in managing the expansion of hospital service capacity: ***Human Resources***, ***Medical Equipment*** and ***Physical Space and Infrastructure***

Human Resources

A hospital must have trained human resources.

Strategies for increasing the capacities of a hospital's personnel include:

- **Reassigning and training personnel from other clinical units** within the hospital to care for COVID-19 patients.
- **Requesting support from volunteers with clinical experience and retired personnel** who can support different phases of the patient care process, including training other staff members and providing remote care.
- **Requesting support from nonmedical military personnel.**
- **Ensuring the availability of psychosocial support teams for staff members** (i.e., social workers, counselors, interpreters, clergy members, etc.).
- **Using cohort methodology**: assign staff teams to specific units.
- **Considering extra hours and extended shifts** for personnel working in COVID-19 units, as well as rotating them.

Sample cohorts:
Cohort 1: Working with patients who tested positive for COVID-19.
Cohort 2: Working with patients whose clinical assessment suggests COVID-19, but who have not yet received definitive results. Suspected patients.
Cohort 3: Working with patients who do not have clinical symptoms suggestive of COVID-19 and who tested negative.

Medical Equipment – drugs and clinical supplies (including personal protective equipment—PPE)

The increased demand for medical care and treatment for COVID-19 patients means that hospitals must have enough medical equipment, drugs, and clinical supplies to respond effectively. For them to be used efficiently, allocation should be organized, prioritizing units with the greatest need, based on patients' needs.

Strategies to increase the supply of necessary medical equipment in a hospital include:

- Transfer medical equipment, supplies, and drugs from nonessential/non-functional departments or units to essential/functional departments for the response to COVID-19.
- Agreements with authorities, suppliers, and organizations within its network to acquire essential supplies. Prioritize integrated network management for the procurement and lease of equipment, as well as provision of PPE, drugs, and clinical supplies.
- For mechanical ventilators, convert anesthesia machines that will not be used due to suspension of elective surgery.
- Carry out and maintain an up-to-date inventory of all equipment, supplies, and pharmaceutical products and set up a stock-out warning system.
- Coordinate with authorities and suppliers to ensure uninterrupted provision and delivery of equipment, supplies, essential drugs, and other items for which there may be a shortage. These can be obtained from institutional and central reserves, through emergency agreements with local suppliers and national and international aid agencies, in coordination with the hospital's care network.
- Establish a physical space within the hospital for storing additional supplies, considering easy access, safety, temperature, ventilation, exposure to light, and moisture levels.

Physical Space and Infrastructure

During the pandemic response phase, hospitals need to adapt, retrofit, and often expand existing physical space to accommodate the increase in patients who are admitted and need care of differing degrees of complexity.

Effective strategies for creating usable physical space in a hospital include:

Reverse triage: identify patients who are in stable condition to be discharged to home, to home hospitalization, or to other lower complexity facilities. This not only frees up beds and health workers for people affected by COVID-19, but also reduces the risk of exposure for those patients, optimizing the use of resources (see discharge criteria below).

Reschedule all elective procedures and surgeries to reduce the risk of exposure for patients, increase available physical space for treatment of COVID-19 patients, maintaining the number of operating rooms and facilities for the response to emergency surgeries.

Prepare hospital departments or units that are not essential to the response (e.g., endoscopy units, post-anesthesia units, outpatient surgery areas, post-surgery recovery spaces, and operating rooms, among others) to provide intermediate, critical, or intensive care. This will depend on the conditions of the infrastructure in the units to be retrofitted.

Use areas of the hospital that are not normally used for clinical practice. Increasing daily capacity for care can involve adapting unoccupied staff beds, non-operational services, or additional spaces such as auditoriums, libraries, classrooms, closed parking lots, etc.

Identify alternative care sites to relieve hospital demand. These sites can be used as locations for triage, outpatient care for minor illnesses, vaccination, and prescribing for chronic patients. This situation is appropriate when the site is close to a referral hospital and when the public health system or an organization can ensure staffing and the provision of minimal equipment and drugs.

Make transportation/transfer resources available (e.g., ambulances, helicopters, beds, etc.) for intra- and inter-hospital movement of patients in the event of emergency or need for transfer to lower complexity hospitals in the early-discharge process.

Convert private rooms to double rooms.

Put all available hospital beds into service and make them available for repurposing for need by COVID-19 patients.

Key Elements in Reorganization and Expansion of Hospital Services

There are four key elements in the reorganization and expansion of hospital services.

1. **Classifying patients and establishing flows within the hospital and the health services network for continuity of care.**
2. **Repurposing beds, using a progressive complexity model with activated support units.**
3. **Conversion of equipment and other hospital units.**
4. **Centralization of bed management at the national level (includes centralization of use of critical equipment, such as mechanical ventilators).**

1 Classifying patients and establishing flows within the hospital and the health services network for continuity of care

a) Classification in Hospital Emergency Units (HEUs) and hospitalization according to complexity

Elective care will be suspended, to be rescheduled or referred to lower complexity hospitals or to the first level of care, which means that the primary gateway to hospitals will be the hospital emergency unit (HEU).

Patients who come in to HEUs come from:

- the prehospital emergency system; or,
- referrals from the first level of care; or,
- spontaneous demand.

Pre-triage

The pre-triage area should be set up outside the HEU and should have separate spaces and flows specially set up for patients who are seeking care for respiratory symptoms (suspected COVID-19).

The separation of flows will be properly marked for both people and ambulances and/or mobile transfer units.

Triage and classification of patients in HEUs

Hospital areas should also be separated, which means having separate HEUs for respiratory (suspected COVID-19) and non-respiratory patients, with appropriate protection measures and PPE for the staff of both HEUs.

In the HEU area for respiratory patients, triage should be done to classify patients according to risk, using the hospital's regular triage system, or adopting one.

The classification level for each patient (from C1 to C5) determines the health team and the place where they should receive initial care (resuscitation, treatment bay, basic care) according to the following table:

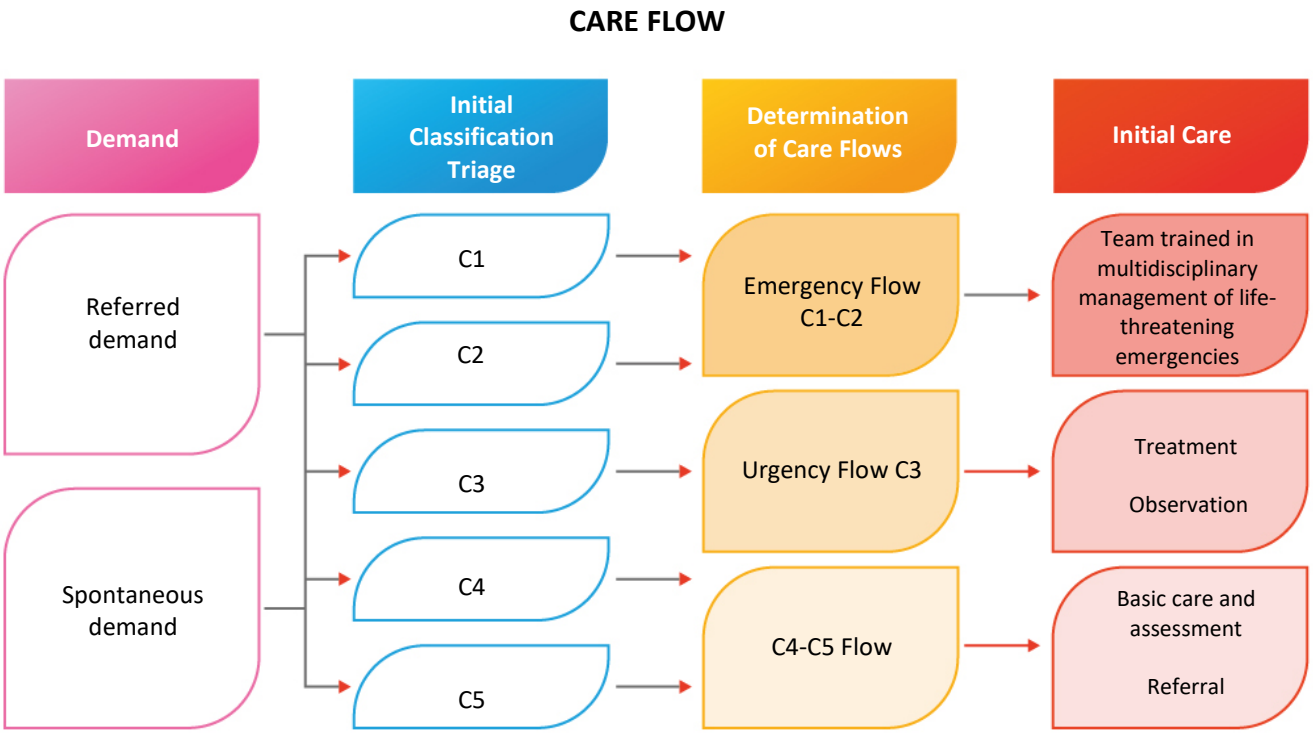

Figure 2. Care flows in hospital emergency units

Hospitalization in units of progressive complexity according to patient needs

Once the patient receives initial care and has an admission diagnosis, they should be hospitalized in the service or unit that provides care and treatment according to their level of clinical complexity and dependency on nursing care. Movement of respiratory patients (COVID-19) should always be kept separate and be properly marked.

- Patients in unstable critical condition should be hospitalized in type A beds (intensive care).

- Patients in stable critical condition should be hospitalized in type B beds (critical care).

- Patients in unstable non-critical condition that require constant monitoring and care should be hospitalized in type C beds (intermediate or special care).

- Patients in stable condition should be hospitalized in type D beds that correspond to basic beds. A hospital being used for COVID-19 should not have basic beds, and basic beds should be converted to more complex beds, so these patients should be referred to lower complexity hospitals, home hospitalization, or to other network facilities.

Types of beds by complexity in hospital units

	A	B	C	D
Patients	Unstable critical condition	Critical condition	Unstable non-critical condition that requires constant monitoring and care	Stable condition
Medical personnel	Intensive care physician Intensive care nurse	Intensive care physician Intensive care nurse	Medical specialist (internist, emergency care physician, infectious disease specialist) Nurse trained in specialized care	General practitioner Professional nurse
Ratio	One permanent medical team for every 6 beds: 1 intensive care physician 2 nurses 3-4 nursing assistants	One permanent medical team for every 12 beds: 1 intensivist on call 1 specialist (internist, emergency care physician, infectious disease specialist) 2 nurses 3-4 nursing assistants	One permanent medical team for every 18 beds: 1 specialist 2 nurses 3-4 nursing assistants	One permanent medical team for every 18 beds: 1 physician 1 nurse 3-4 nursing assistants
Technology	• Mechanical ventilation • Medical gas network with oxygen, air, and vacuum • Secondary oxygen supply system • Continuous monitoring • Availability of invasive monitoring • Crash cart with defibrillator and pacemaker • Drug administration by infusion pump • Portable x-ray machine • Availability of portable sonography	• Mechanical ventilation • Medical gas network with oxygen, air, and vacuum • Secondary oxygen supply system • Continuous monitoring • Crash cart with defibrillator and pacemaker • Drug administration by infusion pump • Portable x-ray machine	• Medical gas network with oxygen, air, and vacuum • Non-invasive monitoring • Measurement of oxygen saturation • Crash cart with defibrillator • Drug administration by infusion pump	• Access to oxygen therapy • Availability of crash cart with defibrillator and pacemaker • Measurement of oxygen saturation
Support equipment	• Respiratory therapy • Availability of anesthesia • Availability of tracheostomy surgery • Measurement of arterial gases	• Respiratory therapy • Availability of anesthesia • Availability of tracheostomy surgery • Measurement of arterial gases		

Table 1. Type of beds by complexity

b) Patient flows within the hospital and in the care network to maintain continuity of care

Hospital bed managers keep records of available beds and arrange for hospitalization of patients in the service or unit they require. They monitor length of stay and facilitate discharge processes. They coordinate with diagnostic support services. They coordinate transfer and monitoring of discharged patients with liaison teams and with the first level of care.

Transfers between hospital units should be avoided, except those produced by changes in a patient's condition.

As soon as patients can be discharged (reverse triage), they will be referred through ***liaison teams to the first level of care for home hospitalization or transferred to a lower complexity hospital, without losing continuity of care.***

It is important to keep patient flow as efficient as possible, to free up beds for more complex patients to be admitted.

To expedite early discharges, "reverse triage" (Kelen, et al. 2006) is recommended, which classifies hospitalized patients according to their risk at discharge.

a) Patients without risk (e.g., patients that only need to continue antibiotic therapy).
b) Patients with residual risk of medical complications.
c) Patients who can be discharged, but who require care at a lower-complexity hospital or nursing care.
d) Patients with substantial risk that require hospital care.
e) Unstable or critical patients.

Use of this tool involves medical visits once or twice a day, preparing the patient for discharge from the time of admission, and coordinating with bed managers.

2 Repurposing beds, using a progressive complexity model with activated support units.

- The reorganization of beds (table with bed type by complexity) is intended to maintain A, B, and C type beds in the hospital with established staffing and equipment conditions.

- The hospital will reorganize its units and suspend elective specialty care. It will maintain the minimum number of beds necessary for surgical, trauma, OB/GYN, urology, ear-nose-throat, eye, and other emergencies. This will be possible only when these emergencies cannot be addressed by another medical facility in the network. Oncology, dialysis, and other units should be maintained, with optimized ambulatory management, separated from areas for COVID-19 patient care.

- Repurposing the maximum number of basic or type D beds to type C beds is recommended, and, when respirators, equipment, and trained personnel are available, moving them up to intensive care (A and B beds).

- Not only will type C beds make it possible to hospitalize unstable patients, they will also relieve intensive care units, acting as patient step-down areas.

- This reorganization involves having diagnostic support units at their maximum capacity. Diagnostic imaging, clinical laboratory, transfusion medicine units, and pharmacy should be open around the clock to support efficient clinical management and avoid prolonging patient stays.

- This reorganization also involves putting all the hospital's available beds "to work."

3 Conversion of equipment and other hospital units

After suspension of elective care, including elective surgery, operating room use will be minimized, and outpatient surgery will be suspended. Recommendations:

- Turn operating rooms into intensive care units, since they have medical gas networks, climate control, air filters, and other enabling conditions.

- Use (converting) anesthesia machines as mechanical ventilators, with training for anesthesiologists and health teams that usually work in operating rooms.

- Convert surgery recovery rooms (including those for outpatient surgery) into intermediate or intensive care units, depending on the conditions of their infrastructure.

- All medical areas within the hospital can be used to increase the complexity level of beds, ensuring they have the staffing and equipment resources mentioned in the "bed types" table.

4 Centralization of bed management at the national level (includes centralization of use of critical equipment, such as mechanical ventilators)

- The health authority should take control of all available beds at the national level, especially critical care beds, including those in university, military, private, social security, and other hospitals.

- Have a centralized bed management unit (CBMU) to keep a record of available beds, guide the transfer of patients to facilities that have availability, warn of risk of collapse, monitor lengths of stay, etc. The CBMU can be installed wherever the health authority decides. Information is received up to twice a day from the bed management teams in each network and facility. The PAHO/WHO document *"Reorganization and Progressive Expansion of Health Services for the Response to the COVID-19 Pandemic"* refers to the CBMU.

- This unit should also keep records of the critical equipment (such as mechanical ventilators and anesthesia machines available and occupied) at each facility. This way, if it is necessary and logistically feasible, decisions can be on transfers of critical equipment to where it is needed. The intention is to optimize the timely use of all available resources.

REORGANIZATION AND EXPANSION OF SERVICES IN THE COVID-19 CARE NETWORK

For an appropriate response to COVID-19, the care network as a whole and in an integrated manner, should coordinate strategies to ensure continuity of care for COVID-19 (+) and COVID-19 (-) patients. This will involve strategies to reorganize and strengthen the different facilities.
Regarding bed management (especially critical care beds), critical equipment such as mechanical ventilators, and medical transfers, centralized management is recommended for efficient use of these resources.

First level of care

- Pre-triage and triage.
- Separate flows and use of PPE.
- Community testing – quarantine monitoring for vulnerable people.
- Medical quarantine of cases and contacts. Follow-up.
- Monitor patients with chronic conditions (telehealth).
- Ensure drugs for chronic patients.
- Strengthening of problem-solving capacity with specialty care away from the first line of care (traumatologists, ophthalmologists, urologists, gynecologists, prenatal care, etc.).
- Home hospitalization.
- Lighten hospital patient load and provide case follow-up.
- Ensure medical transfer in accordance with needs.

Hospital for exclusive care of COVID-19 patients

- Referral of patients from other specialties to the first level of care or other network hospitals (medical transfer).
- Suspension of elective admissions (including elective surgeries).
- Beds repurposed according to progressive complexity:
    - Basic beds (D) kept to a minimum;
    - Repurposed to intermediate care beds (C);
    - Increased complexity: create critical care and intensive care beds (A and B);
    - Convert operating rooms and recovery rooms into intensive and critical care units.
- Diagnostic support units at maximum capacity, 24/7.
- Classification of patients and hospitalization in appropriate beds.
- Early discharges sent to home hospitalization (first level of care) or to a lower complexity hospital. Reverse triage.
- Conversion of equipment (anesthesia machines to mechanical ventilation).
- Scale up staffing according to patients' age and comorbidity.
- Train internists, anesthesiologists, and emergency care physicians for intensive care. Different lines of response.
- The entire hospital should make rational use of PPE and infection prevention and control measures.
- Adjust shifts, as necessary.

If the care network is not able to provide separate hospitals to care for COVID-19-positive patients and must continue to receive mixed demand, the following is recommended:

- Separate flows from triage to circulation of patients and staff within the hospital.
- Separate emergency units.
- Suspension of elective admissions, including surgeries.
- Maintenance of oncology, dialysis, and other units on an outpatient basis.
- Maintenance of surgery according to need and risk.
- Management of early discharges. Reverse triage.
- Repurposing of beds and equipment in accordance with demand from patients without a COVID-19 diagnosis.
- The entire hospital uses PPE and standard precautions.
- Special precautions to prevent cross-contamination among hospital staff members in diagnostic and therapeutic support areas (if they cannot be separated), and in common use areas (cafeterias and others), if they cannot be separated.
- The red zone functions as an exclusive area for COVID-19.

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