Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.
Management of the COVID-19 epidemic by public health establishments—Analysis by the Fédération Hospitalière de France

K. Barro a, A. Malone b, A. Mokede a, C. Chevance c,∗

a Pôle offres de soins - Fédération hospitalière de France, 1 bis, rue Cabanis, CS 41402, 75993 Paris cedex 14, France
b Pôle prospective, Europe, International Fédération hospitalière de France, 1 bis, rue Cabanis - CS 41402, 75993 Paris cedex 14, France
c Pôle finance Fédération hospitalière de France, 1 bis, rue Cabanis - CS 41402, 75993 Paris cedex 14, France

Available online 18 April 2020

Summary The objective of this article is to detail the measures taken in public institutions to cope with the COVID-19 epidemic. It details the initial strategy, organizational evolution towards "all-COVID", coordination between the various stakeholders and the strategy for maintaining continuity of care. The Quebec experience is also used as an example. Finally, an exit strategy must be anticipated at this phase of the epidemic.

© 2020 Elsevier Masson SAS. All rights reserved.

Face to the COVID-19 epidemic, the Fédération Hospitalière de France (French hospital federation) took prompt action as soon as the first cases were reported. The objective of this article is to detail these preparatory steps and their development in public institutions, in France and in Canada.

Preparation of the French public health institutions for arrival of the Covid-19 epidemic

Initial organization of the "ORSAN REB" strategy

Preparation for the epidemic stemmed from an initial strategy based on concentration of COVID-19 management in a limited number of establishments. The program instituted by the French government on 23 February 2020 is known as "ORSAN REB".

This organizational strategy in response to exceptional sanitary situations is designed to facilitate mobilization of the French health care system in the face of an emergent infective risk and to designate, initially at a nationwide level and subsequently region by region, several categories of establishments as first, second and third-line.

This graduated crisis management strategy was announced and outlined in the methodological guide entitled "preparation for the COVID-19 epidemic risk", which was published on 20 February 2020 by the French health ministry.

"The health system organization envisaged on French territory to ensure timely treatment of patients categorized as ‘possible cases’ or ‘confirmed cases’ of COVID-19 is premised on two-level functional hierarchization of healthcare facilities. (…) It allows (…) concentration of treatment offer in pivotal first-line establishments while at the same time ensuring that town ambulatory medicine and other health care facilities continue to function as usual. A
second line of response relies upon establishments possessing the necessary resources; once activated, the second line will increase first-line hospital capacities. Notwithstanding implementation of a containment strategy, the likelihood of having to cope with a COVID-19 epidemic (stage 3) exists”.

Initial COVID-19 management was consequently built around the 38 “first-line” establishments having been single out for COVID-19 treatment. The objective was to structure response to the emergency, while maintaining caregiving activities to the greatest possible extent, by concentrating COVID-19 treatment in first-line, followed by second-line health institutions. On 27 February, expansion from 38 to 108 of the list of duly designated establishments significantly increased the number of hospitals that were mobilized, even if they remained open for all (the 108 establishments were essentially those offering SAMU emergency medical services).

Evolution toward an “All-COVID-19” system

Given the widening spread of the outbreak, the above strategy was partially called into question. On 12 March, in a letter addressed to all director generals of the regional health agency (ARS), French health minister Olivier Véran formulated an unprecedented request: All the country’s hospitals were called upon to implement a maximal “white paper” action plan and undertake large-scale deprogramming so as to ready their facilities for the upcoming epidemic wave.

It was through implementation of this order that a massive deprogramming movement got underway in care facilities throughout France, the objective being to maintain sufficient resuscitation capacities: “I am having [the action plan] activated in advance at all sites, including those where the virus has yet to arrive […] so as to avoid our being stretched to the limit”, declared Olivier Véran.

Since 13 March, establishments have been obliged to reorganize their entire care offer, giving urgent priority to COVID-19 management while awaiting the massive arrival of “COVID-19 patients”.

Public establishments were mobilized in the overarching framework of all-encompassing deprogramming not only of procedures necessitating resuscitation facilities, but also of a sizable proportion of procedures necessitating critical care (intensive care units, continuous monitoring areas), for the purposes of transforming existing hospital offer into specialized COVID-19 hospital offer.

By impacting each and every hospital treatment sector, this movement paved the way for massively increased resuscitation capacity.

Care categorization and anticipation, the keys to transformation

One example in this respect is the Nancy university hospital center (CHU), which has adapted its admission capacities by instituting three levels of gradation: 30 beds in two medical reanimation wards (level 1); 28 supplementary beds following the transformation of critical care unit beds (level 2); transformation of the beds in the respiratory intensive care unit and the continuous monitoring and surgical care and cooperation units (level 3).

Territorial coordination and crisis management, instruments mobilized by the establishments

Public establishments also benefited from their structuring in territorial complexes or groupings (GHT, in French), which have proven conducive to territory-based and graduated COVID-19 management; the sectors that were created and consolidated in the context of pooled medical expertise initiatives have shown their relevance to the extent that hospitals are effectively working together. One example is GHT Cœur Grand Est (Verdun), which was able, via a territorial crisis cell, to envision assignment of equipment, caregivers and medicine according to the needs and capacities for COVID-19 treatment of each facility in the region.

Projection and assignment of COVID-19 and non-COVID-19 patients, major and speedily implemented innovations

Another pertinent example can be found in the University Hospital of Besançon, where a bed assignment management cell has been functioning on a territory-wide scale in conjunction with other, private as well as public health care facilities.

The set-up has streamlined bed management by optimizing treatment capacities with regard to conventional hospitalization or reanimation of COVID-19 and non-COVID-19 patients alike through daily reassessment of bed availability.

Territorial structure, illness gradation and inter-establishment coordination have thereby helped to fluidify COVID-19 cases within given geographical areas; signally responsive institutions have developed projection and management tools over a remarkably short time span.

So it is that public establishments, first-line actors in the COVID-19 emergency, have reoriented their activities toward sanitary crisis management; by doing so, however, they have run the risk of adopting what may be termed “100% COVID-19” functioning.

Maintaining continuity and quality of care during a period of major sanitary crisis

Due to an unprecedented sanitary crisis, hospital establishments have massively deprogrammed their usual activities so as to concentrate their efforts on management of COVID-19 patients; in this context, they have stood in need of state-of-the-art equipment and plethoric, highly qualified personnel. Moreover, the crisis is sure to persist, with an unusually elevated number of hospitalized patients and lengthy stays in reanimation services (around three weeks). The impact on overall organization and continuity of care for non-COVID-19 patients is and will be an issue of paramount importance. On this score, two large-scale phenomena have appeared:

- on the one hand, hospitals have deprogrammed their usual activities and thoroughly postponed scheduled consultations/operations, whatever the region and its degree of exposure to the epidemic, so as to have at their disposal the resources and equipment required for management of the COVID-19 crisis;
- on the other hand, arrivals in hospital for non-COVID-19 pathologies have markedly decreased, for several rea-
sons: a wish to avoid “disturbing” at time when the staff is presumably overwhelmed by the exigencies of COVID-19 management, fear of traveling to the hospital, postponement of appointments considered as less than urgent (screening, vaccination, etc.) during the period of confinement. However, due to their overall condition, to the need to monitor chronic illness or to emergencies such as cerebrovascular accidents or myocardial infarction for which rapid treatment is essential (survival, sequels...), a non-negligible number of persons require one form or another of hospitalized care.

It is consequently essential not to fall into a “COVID-19 trap” that would consist in a care system exclusively focused on health crisis management. This imperative raises two interrelated questions:

• what about access to care for non-COVID-19 patients?
• what about possible loss of opportunity subsequent to postponed treatment (transplantation, oncology...)?

As regards digestive oncological surgery (pancreas, liver, esophagus etc.), public establishments are on the front lines insofar as they are the only facilities having at their disposal the multidisciplinary teams and skill sets needed for treatment of these types of complex cancer.

That said, overly lengthy postponement of digestive oncological surgery can indeed lead to loss of opportunity. That is why deprogramming and postponements have got to be analyzed and prioritized so as to guarantee that urgent operations take place in a timely manner by having them rescheduled in conditions ensuring optimal suitability and safety.

Maintaining continuity of care for non-COVID-19 pathologies

Continuity of care necessitates graduated and coordinated thinking out, taking into close account the degree of epidemic severity within territorial perimeters. The issuing of nationwide recommendations on critical treatment subsectors (transplantation, abortion...) provides concrete organizational guidelines for medical facilities in given towns. With a 50% decrease in their activities, transplantation services have been dramatically affected, notwithstanding the fact that nationwide recommendations (ABM, DGOS) favor their continued pursuit, with the exception of non-vital grafts that can be safely delayed (kidney, pancreas).

Establishment adaptation

In conjunction with the ARS (Agence régionale de santé), the HCL (Hospices Civils de Lyon) has set up a territory-based bed assignment management cell to facilitate regionwide strategy, to reinforce coordination (referrals...) and to maintain graduated, sector-by-sector, step-by-step organization.

The Nancy and Reims CHUs have put into place two three-level critical care sectors aimed at receiving COVID-19 patients as well as ensuring continuity of care for patients hospitalized due to other pathologies. Treatment is thereby secured with distinct and maximally “sanctuarized” circuits.

Some departments have reasoned in terms of limits and adjusted their organization and deprogramming once they reach a threshold corresponding to a given number of COVID-19 patients undergoing treatment. So it is that the radiology department of the Poitiers CHU has geared its activities in such a way as to deprogram non-urgent interventions in a concerted manner, with a dedicated cell and while taking into account the ramp-up of COVID-19 activity.

All of the above organizational innovations, which have been brought into being in a context of extreme crisis, are aimed at maintaining care and avoiding service breakdowns/losses of opportunity to the greatest possible extent. To sum up, a fundamental preoccupation in health care establishments consists in simultaneously responding to the ongoing crisis and continuing without pause to address other, unrelated pathologies.

The Quebec experience

The organization and procedures implemented in Quebec provide food for thought. As of 7 April 2020 the province, which contains 8.5 million inhabitants, had registered 8500 COVID-19 cases and 122 deaths. As is the case elsewhere, a major challenge consists in finding a workable balance between imperative COVID-19 treatment, which demands highly specialized, heavy duty resources, and conservation of adequate reception capacity for the rest of the population, which means that patients with other pathologies will not run a risk when going to the hospital. The equilibrium to be achieved is based on two organizational echelons, first at the nationwide level, and second at the level of medical establishments, with preparation “for the worst” being graduated according to the spread of the epidemic[1].

At the nationwide level on 20 March, preparation was premised on four levels of alert [2]. Since 6 April, Quebec has been at stage 3. Each level entails the designation of a given number of COVID-19 centers (4 at stage 1, 4 +11 at stage 2, 4 +21 at stage 3 and finally, at stage 4), each and every hospital. The above gradation implies that all of the “non-designated” hospitals will continue to function as per usual, even when they are called upon (while awaiting relevant test results) to keep tabs on their suspected COVID-19 patients. If a patient tests positive, he or she will be transferred by means of a nationwide platform to a “designated” center. In addition and at each level, the hospitals designated for participation in the following stage begin to prepare for COVID-19 specialization by, among other organizational changes, deprogramming previously planned activities. For example, in the town of Quebec at stage 2, only the Institut de cardiologie et de pneumologie et and the Enfant Jésus site of the Quebec CHU were designated as COVID-19 hospitals. All the other facilities in the town continued to function, even if they were called upon to ready themselves for stage 3. During this phase, all of the hospital centers (CH) in the Quebec region, except for the adult pavilion of the Quebec CHU, were called upon to welcome COVID-19 patients incrementally, as level 1 and level 2 establishments were being “filled”, once again through implementation of a centralized nationwide bed management and patient transfer system. The guiding principle was to “fill” first the level 1, then the level 2, and finally the level 3 establishments. With this system, it becomes possible to maintain “normal” activity as long as feasible. One example: On 7 April, 24 days after Quebec had declared a state of health-related emergency, the Chicoutimi CH was designated as a COVID-19 center.

At the level of the establishments, organization has been set up with the objective of avoiding contaminations and
thereby preventing non-COVID-19 patients and hospital staff from being infected. It is based on:
• installation of a “pre-reception” area outside the hospital walls;
• division of waiting and treatment areas into three zones.

For outpatient emergencies, a hospital agent classifies arriving patients, according to whether they do not present symptoms (cold zone), do present symptoms (lukewarm zone) or are confirmed (hot zone).

For surgery: Up until the transition to stage 3 (6 April) during which 21 hospital centers (CH) were mobilized, the "non-COVID" establishments were called upon to put into place the following, surgery-related procedures:
• organization in each establishment of a surgery monitoring committee;
• drawing up, in suspected or confirmed COVID-19 cases, of a protocol for the safe delivery of surgical treatment addressed to patients and the caregiving staff;
• cessation of all activities in surgical centers except for establishments officially collaborating with one another ("ententes");
• utilization of as few teams as necessary for continuing medical procedures and optimal diminution of staff rotation during these procedures;
• postponement of all elective operations for benign pathologies;
• continuation of activities in surgical and obstetrical emergencies;
• optimal limitation of surgical services in cases deemed semi-urgent, including oncology.

Anticipating an exit strategy

Management of the COVID-19 health crisis will not come to an end when the number of contaminated, hospitalized patients (and those treated in resuscitation units) will have been reduced.

As the crisis grows less acute, public health establishments shall enter into a phase involving a new and highly specific set of issues: How will they "catch up" on deliberately unprogrammed or postponed activities? How will they deal with the aftermath of patients’ (spontaneous or induced) reduced frequentation of emergency services and areas for consultation and exploration?

The objective of these multiple postponements of programmed activities and drastic diminutions of emergency and routine visits and consultations was to optimally prepare for arrival of a projected epidemic “wave” and to maximally concentrate human and material resources on the treatment of COVID-19+ patients. Preparatory efforts took on enormous proportions, including in regions and establishments momentarily less affected and impacted by the epidemic. As a result, hospital teams and regional supervisory authorities raised questions on continuity of care for non-COVID-19 illnesses during a period of unprecedented sanitary crisis. How were they to anticipate the gradual resumption of non-COVID-19 activities? How were they to effectively catch up, following the acute phase of the crisis, with screening, monitoring and treatment not carried out during that phase?

Drastically lowered frequentation of emergency services and consultation facilities, including in cases necessitating immediate and extensive treatment (CVA, infarcts, cancers, chronic pathologies...) triggers fears of deterioration of the health of the general population, particularly in the context of a sanitary crisis that has remained acute for several weeks. It behooves physicians in various specialties to anticipate more or less delayed peaks in detection and screening of numerous pathologies. On the field, in several territories and regions, pressing concerns have been voiced subsequent to the significant drop in non-COVID-19 treatment. That much said, given the inevitable delays in elaboration of monthly activity reports and possible backlogs and difficulties in coding and invoicing encountered by teams mobilized by matters of urgent priority, as of now it is by no means easy to measure the amplitude of the diminutions and to evaluate their present and future impact on public health.

And as for the post-crisis period, it will be necessary to reschedule all of the unprogrammed and postponed treatments.

Surgery in general and digestive surgery in particular have been directly impacted by these cancellations, postponements and spontaneous reductions in frequentations, especially insofar as operating theaters are major consumers of resources in anesthesia and reanimation, resources that have been essentially dedicated over recent weeks to treatment of COVID-19+ patients.

It is consequently of prime importance to anticipate the organization of activity resumption, and more precisely the rescheduling of surgical interventions and management of peak screening periods, one example being temporarily suspended colonoscopies. All of that (and more!) will be indispensable, even though first-line crisis management teams, especially in anesthesia and reanimation, will stand sorely in need of a moment of respite and a modicum of time off with the arrival of summer, the usual time of year for holiday or vacation breaks.

Hospital teams, surgeons, anesthetists, resuscitators, nurses, care assistants, medical secretaries, administrative and logistic staff along with directors shall be called upon to work together to cope with a post-crisis period likely to be hard to navigate in disciplines called upon to cope with markedly increased workloads. In order to optimally reorganize, and so as to make sure that patients do not suffer from loss of opportunities, the conclusions and recommendations of learned societies will be of vital importance, some examples being:
• the anticipation of diagnostic peaks due to the suspension and resumption of screening;
• the prioritizing of operation rescheduling endeavors.

Last but not least, reprogramming will have to be adapted to regions, territories and establishments according to the impact of the crisis on programmed activities and non-COVID-19 emergencies.

During this sensitive period, teams in public hospitals will need to be singularly vigilant with regard to care and treatment of the most vulnerable and destitute populations, persons with disabilities, persons in prey to psychiatric disorders... Even under ordinary circumstances, these populations encounter difficulties in access to care, and they are liable to be particularly affected by the sanitary crisis. That much said, the public hospital sector is well-equipped to rise to the occasion, inasmuch as it routinely ensures the majority of the above-mentioned treatments. Public hospitals in France provide 57% of overall hospital stays and 39% of surgery-related stays (including 46% in digestive surgery); as regards “heavy duty” activities (severity 3 and 4), they represent 78% of stays, 84% of reanimation, 82% of emer-
Emergency intervention and 69% of admissions of “fragile” or “deprived” patients [personal source: PMSI ATIH-SAE-FHF]. As they manage the anticipated post-crisis phase, public hospitals will draw benefit from a supplementary advantage insofar as they provide access to a complete spectrum of treatment: regionwide outreach activities, specialized and hyper-specialized activities. Structuring and sector-by-sector treatment in the GHT (territorial hospital grouping) framework represent precious points of support for post-crisis management. In times of crisis, on a nationwide as well as a regionwide scale, the French public authorities have largely relied on the GHTs, tasking them with numerous missions: mask reception and delivery, territorial bed assignment management (Occitania, Auvergne-Rhône-Alpes...). Activity gradation and adaptation enables professionals to effectively proceed in their respective care settings; optimal quality and safety are ensured by critical care, skilled medical, clinical and medico-technical teams equipped with state-of-the-art technical platforms.

That much said, public hospitals will not be able to successfully tackle post-crisis challenges without the steadfast and unwavering solidarity of the public authorities, solidarity necessitating continuation and reinforcement of the public hospital support plan introduced during the acute phase of the crisis. Above and beyond the measures adopted during the acute phase of the crisis:
• a recovery plan highlighted by massive investment in the public hospital network;
• due recognition and significant upgrading of the career paths and remuneration of public hospital teams;
• thoroughgoing rethinking of the construction and regulation of the nationwide healthcare funding envelopes will all be indispensable.

Disclosure of interest
The authors declare that they have no competing interest.

References
[1] https://www.msss.gouv.qc.ca/professionnels/covid-19/directives-cliniques-aux-professionnels-et-au-reseau/bloc-operatoire/.
[2] https://msss.gouv.qc.ca/professionnels/documents/coronavirus-2019-ncov/2020-03-20_Plan-contingence-Soins-critiques-COVID-19_MSSS_v13.pdf.