

## Lessons Learned from Field Experiences on Hospitals' Resilience to the COVID-19 Pandemic: A Systematic Approach

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










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# Lessons Learned from Field Experiences on Hospitals' Resilience to the COVID-19 Pandemic: A Systematic Approach

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## ABSTRACT

In this concluding article of the special issue, we examine lessons learned from hospitals' resilience to the COVID-19 pandemic in Brazil, Canada, France, Japan, and Mali. A quality lesson learned (QLL) results from a systematic process of collecting, compiling, and analyzing data derived ideally from sustained effort over the life of a research project and reflecting both positive and negative experiences. To produce QLLs as part of this research project, a guide to their development was drafted. The systematic approach we adopted to formulate quality lessons, while certainly complex, took into account the challenges faced by the different stakeholders involved in the fight against the COVID-19 pandemic. Here we present a comparative analysis of the lessons learned by hospitals and their staff with regard to four common themes that were the subject of empirical analyses: 1) infrastructure reorganization; 2) human resources management; 3) prevention and control of infection risk; and 4) logistics and supply. The lessons learned from the resilience of the hospitals included in this research indicate several factors to consider in preparing for a health crisis: 1) strengthening the coordination and leadership capacities of hospital managers and health authorities; 2) improving communication strategies; 3) strengthening organizational capacity; and 4) adapting resources and strategies, including for procurement and infection risk management.

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## Introduction

In the wake of the numerous disruptions caused by the COVID-19 pandemic, there was an urgent need to respond by implementing rapid and effective health control measures while ensuring the continued functioning of health systems, and particularly hospitals, which are the focus of this special issue. The COVID-19 pandemic provided many learning opportunities that need to be described in a transparent, rigorous, and systematic way in order to draw lessons that can be used to adjust actions and apply the learning to future health emergencies. For example, in 2020, WHO stressed the need to periodically document lessons learned from national responses to

COVID-19.<sup>1</sup> To this end, a guide and toolkit were created to conduct an “intra-action review,” i.e., a structured group discussion held with key people in the national response.<sup>2</sup> Unfortunately, when discussing lessons learned, scientific authors rarely refer to a structured procedure such as the one proposed by WHO. While the term “lessons learned” often appears in the titles of scientific publications, the manner in which they were formulated is almost never described.<sup>3,4</sup>

The study presented in this article aimed to answer the question: *What did the study team, including the participants, learn about hospital responses during the pandemic that can be applied to another public health*

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*emergency at hospital level in the future?* We<sup>a</sup> wanted to be clear that the QLLs were not produced by the researchers alone but by a systematic and participatory approach. Our team explored lessons learned about the resilience of hospitals and their staff in Brazil, Canada, France, Japan, and Mali. This article is the conclusion of the special issue on the HoSPiCOVID project,<sup>5</sup> which sought to understand how, at the heart of the response, selected hospitals and their staff dealt with the pandemic. The scientific objective of the project focused on the resilience of hospitals, i.e., their capacity to adapt and transform in order to maintain access to quality care in a crisis context, as demonstrated by the articles in this special issue. However, the project also had an operational objective, which was to develop an effective strategy for developing and sharing lessons learned among the hospitals. Our aim was to produce *quality lessons learned* that could be useful in addressing a future pandemic.

A *quality lesson learned* (QLL) results from a systematic process of collecting, compiling, and analyzing data derived ideally from sustained effort over the life of a research project and reflecting both positive and negative experiences.<sup>6</sup> These lessons are rooted in particular contexts and very specific situations. There are multiple data sources for them, and the supporting evidence is rigorous.

To produce QLLs as part of this research project, a guide to their development was drafted to address the need for a systematic approach to data collection, compilation, and analysis.<sup>7</sup> To prepare this guide, a rapid review was conducted, which identified 18 documents published between 2000 and 2020.<sup>7</sup> These provided principles, procedures, or guidelines, examples of QLL application, conceptual models, or preferred techniques for producing them. Based on a content analysis of this literature, we established the principles that should guide the development of the QLLs presented in this article and the steps for producing them.

As explained in the articles contained in this issue, hospital sectors are conceptualized as adaptive systems that adjust to changing needs in the environment.<sup>8</sup> In each country, efforts were mobilized to respond to or manage the crisis from its inception and to implement numerous initiatives and various adaptations. It appears that the COVID-19 pandemic offered important opportunities for deriving QLLs, in terms of the meaning actors gave to their experiences, both positive and negative.

As stated in the introductory article of this special issue, here we present a comparative analysis of the lessons learned in these hospitals with regard to the four common themes that were the subject of empirical

analyses: 1) infrastructure reorganization; 2) human resources management; 3) prevention and control of infection risk; and 4) logistics and supply.

## Methods

### Study Design and Setting

Our study is qualitative and forms part of the HoSPiCOVID multiple case study project.<sup>5</sup> The introductory article of this special issue describes the conceptual framework, the analytical approach, and how the different themes facilitate inter-country comparisons.

The QLL development guide<sup>7</sup> proposes 10 steps followed by our teams: 1) identification and mobilization of stakeholders in the hospitals; 2) formulation of the process objectives; 3) identification of themes targeted for QLL development (four common configurations); 4) decision on when to start the process (once the analysis of the data collected was advanced); 5) selection of data collection methods for QLLs (gray literature, scientific papers, ethnographic observations, semi-directed interviews, and focus groups); 6) development of data collection tools (questions on what went well or less well in managing the pandemic); 7) choice of data sources (team researchers and key informants in hospitals); 8) verification of data (by country research teams); 9) analysis and formulation of preliminary QLLs (by country research teams and presented in fact sheets); and 10) verification and validation of QLL quality at country-based workshops.

### Data Collection

The lessons learned were generated from the results of empirical data collection and deliberative processes undertaken in each hospital between the research teams and the hospital teams. Our teams strengthened links with health professionals throughout the process to have quality data and confirmed interpretations. This allowed them to identify key informants. These key informants were healthcare personnel and members of management teams at all levels, from orderlies to hospital directors.

From April to December 2021, workshops were held online and in person (voluntary participation) to verify the quality of the QLLs. The workshops included six participants in Mali; 10 and 12 participants on days one and two, respectively, of a 2-day workshop in France; nine participants in Brazil; in Canada, 13 participants at Sainte-Justine Hospital and 65 in Laval. In Japan, due to conditions associated with the pandemic and for

**Table 1.** Participants by country.

Country	Hospital	Number of informants
Quebec/Canada	Sainte-Justine (CSJ) and Cité-de-la-Santé (Laval)	<ul style="list-style-type: none"> <li>● Sainte-Justine Hospital: 13 participants</li> <li>● Laval: 65 participants</li> </ul>
France	The Bichat-Claude Bernard (BCB) hospital	● 22 participants
Mali	The Mali Hospital (MH)	● 6 participants
Brazil	Anonymized hospital	● 9 participants
Japan	Two anonymized hospitals	<ul style="list-style-type: none"> <li>● Hospital 1: 5 interviews</li> <li>● Hospital 2: 3 interviews</li> </ul>

cultural and research operational reasons, individual follow up interviews, rather than workshops, were held with five interviews undertaken at Hospital 1 and three at Hospital 2.<sup>b</sup> Table 1 shows the composition of the groups by country. The workshops were conducted in the presence of a facilitator, with a researcher recording the QLLs directly into a PowerPoint file and two other researchers supporting the process. Also, strategies were employed to give everyone a chance to speak—call on those who had not yet spoken to express their opinion. The individual follow-up interviews in Japan presented the findings from the case study and discussed the lessons learned from the pandemic with participants.

### Data Analysis

In a first step, our analysis enabled us to prepare the first section of the results based on the QLL summary tables produced by the researchers for each of the hospitals. These summary tables were derived from fact sheets focused on the four themes common to the five countries, and presented: 1) what worked well; 2) what worked less well; and 3) what could be done otherwise in similar contexts. These tables were used as tools for knowledge transfer and validation of analyses during workshops organized in each hospital between research teams and hospital professionals. These results provide insight into the resilience of the hospitals in each setting and the QLLs formulated.

In a second step, we conducted a comparative analysis of the QLLs of the five countries by theme. Individual interviews (n = 8) were also conducted with researchers from the five countries to supplement the information in the summary tables. This analysis is presented in the second section of the results.

## Results

### Hospital Resilience and Lessons Learned by Country

Tables 2 and 3 present all the lessons learned from the changes observed during the pandemic country by country. For further details on studies carried out in hospitals in these countries, readers may consult the articles in this special issue: 1) for Quebec/Canada: David et al.,<sup>9</sup> 2) for

France: Chabrol et al.,<sup>10</sup> 3) for Mali: Coulibaly et al., (in progress); 4) for Brazil: de Araújo Oliveira et al.,<sup>11</sup> 5) and for Japan: Honda et al.<sup>12</sup> Readers may also wish to consult the article by Gautier et al.<sup>13</sup> which presents a multiple case study comparing hospital governance in four countries (Canada, Brazil, France and Japan), and the article by Honda et al., that examines enabling organizational factors for successful adoption and transformation of innovative healthcare service delivery during the pandemic (Brazil, Canada and Japan).<sup>14</sup>

### Quebec/Canada

**Infrastructure Reorganization.** The exponential increase in the number of COVID-19 cases, observed particularly in Asia and Europe, led managers of the two Quebec hospitals—Sainte-Justine (CSJ) and Cité-de-la-Santé (Laval)—to reorganize services in anticipation of a wave of cases and its impact on quality of care. At Laval, this was done by creating clinical-administrative pairs to manage the reorganization. At the CSJ, an Emergency Measures Coordinating Committee was established, the hospital's infection prevention and control (IPC) team was strengthened, and the pandemic preparedness plan was adapted.

**Human Resources Management.** Quebec's 2015 health system management reform<sup>c</sup> had a negative impact on human resources availability in these facilities. The strategy to address HR needs consisted of moving staff within services and facilities affected by COVID-19 (particularly facilities for people with reduced autonomy) via a process of redeployment. At CSJ, redeployment remained voluntary, while at Laval, it was initially voluntary, but became mandatory. This redeployment strategy was supported by bonuses and training.

**Prevention and Control of Infection Risks.** The hospitals formed literature review teams to adapt practice to the latest knowledge. IPC coaches were trained and deployed. At CSJ, video clips on personal protective equipment (PPE) were developed and disseminated, as well as a newsletter providing continuously updated clinical guidelines, and posters on PPE use were placed in various departments.

**Table 2.** Lessons learned by country.

Country	What worked well	What worked less well	Lessons learned
<b>Canada</b> CHU Sainte-Justine (CSJ) and Cité-de-la-Santé (Laval)	<ul style="list-style-type: none"> <li>• Absorption of cases</li> <li>• Hospital agility and creativity</li> <li>• Capacity for autonomy (for CSJ)</li> <li>• Recognition of IPC role (CSJ)</li> <li>• Solidarity in the network</li> <li>• Clinical/logistical alignment</li> <li>• Support for staff (hotline)</li> <li>• Sharing of human resources within the network</li> </ul>	<ul style="list-style-type: none"> <li>• Blind points of CHSLDs</li> <li>• The management of staff deployment: more adaptive and less organized phase</li> <li>• Communication complexity</li> <li>• Impact on continuity of care and teaching</li> <li>• Competition among procurement systems</li> <li>• Performance mind-set to the detriment of cross-sectional vision</li> </ul>	<ul style="list-style-type: none"> <li>• Have a less hospital-centric vision</li> <li>• Improve the management of redeployment (e.g. how to announce it)</li> <li>• Improve communication (by decision-makers: health authorities and hospital managers)</li> <li>• Rethink how continuity in non-COVID-19 care is managed</li> <li>• Review ongoing training and traineeships</li> <li>• Diversify supply channels or set up a distribution platform/center</li> </ul>
<b>France</b> Bichat-Claude Bernard Hospital (BCB)	<ul style="list-style-type: none"> <li>• Anticipation and involvement of teams in the reorganization</li> <li>• Sense of support (in the first wave)</li> <li>• Responsiveness of staff</li> <li>• Historical culture of infectious risk</li> <li>• Good support from the hygiene team</li> <li>• Collaboration between medical and paramedical personnel</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of communication → reinforces misconceptions and misunderstandings</li> <li>• Unclear, rapidly changing, poorly understood protocols</li> <li>• Staff not trained or equipped</li> <li>• Impression that some are better protected than others → sense of injustice</li> </ul>	<ul style="list-style-type: none"> <li>• Review communication by finding a common language (to inform different services and staff)</li> <li>• Harmonize protection protocols</li> <li>• Train non-frontline staff</li> <li>• Consider the impact of the pandemic on the lives of health professionals</li> <li>• Communicate transparently about necessary PPE and protocol changes based on scientific findings</li> </ul>
<b>Mali</b> Mali Hospital (MH)	<ul style="list-style-type: none"> <li>• Proactivity and responsiveness</li> <li>• Creation of three sites for suspected, emergency, and intensive care cases</li> <li>• Accessibility to PPE</li> <li>• Many donations</li> <li>• Simplification of recruitment procedures (short-term contracts)</li> <li>• Availability of hygiene staff</li> </ul>	<ul style="list-style-type: none"> <li>• Healthy patients and asymptomatic patients who tested positive sharing the same space</li> <li>• Downsizing immediately at the end of a wave</li> <li>• A single supply chain, lack of inventory management tools</li> </ul>	<ul style="list-style-type: none"> <li>• Adapt the hospital structure to the pandemic context by setting up an isolation unit or triage system at the hospital entrance</li> <li>• Improve patient routing within the hospital</li> <li>• Anticipate human resource needs while putting a fund in place that could be used by the hospital in the event of a crisis</li> <li>• Provide a minimum of PPE</li> <li>• Invest in internal or external communication</li> <li>• Review the recruitment process for health professionals</li> <li>• Implement biosecurity measures earlier, while improving coordination of disease prevention and control actions at the level of health authorities</li> <li>• Document lessons learned in a timely manner (learn quickly from previous and current crises)</li> </ul>
<b>Brazil</b> Anonymized hospital	<ul style="list-style-type: none"> <li>• Anticipation: meetings to prepare for the arrival of COVID-19 positive cases</li> <li>• Active leadership, which enabled rapid mobilization of staff</li> <li>• Infection Management Commission</li> <li>• Creation of a dedicated COVID procurement center</li> <li>• Simplified staff recruitment procedures</li> <li>• Empathy</li> <li>• Citizen initiatives</li> </ul>	<ul style="list-style-type: none"> <li>• Communication difficulties between professionals in different sectors</li> <li>• Very late decision to make use of masks mandatory (official)</li> <li>• Perceived lack of clarity regarding PPE use</li> </ul>	<ul style="list-style-type: none"> <li>• Invest in internal or external communication</li> <li>• Review the recruitment process for health professionals</li> <li>• Implement biosecurity measures earlier, while improving coordination of disease prevention and control actions at the level of health authorities</li> <li>• Document lessons learned in a timely manner (learn quickly from previous and current crises)</li> </ul>
<b>Japan</b> Two anonymized hospitals	<ul style="list-style-type: none"> <li>• Close collaboration between hospital managers and infection control teams (ICTs)</li> <li>• ICT provision of regular advice, daily supervision of all departments, and on-demand consultation for hospital staff</li> <li>• Mid-level managers communicating managerial decisions to the staff in their departments, including front-line workers</li> <li>• Changes in infection control supply management practices</li> <li>• Reduction of unnecessary supply use</li> </ul>	<ul style="list-style-type: none"> <li>• Hospital infrastructure unable to accommodate an increased number of infectious disease patients</li> <li>• Interdepartmental collaboration resulted in occasional disagreements on the approach to the delivery of care</li> <li>• Dependence on the import of raw materials to manufacture PPE</li> </ul>	<ul style="list-style-type: none"> <li>• A mechanism and training for team-based service delivery involving multiple clinical departments should be developed</li> <li>• Continuous provision of training on in-hospital infection control is necessary to strengthen the knowledge base of hospital staff</li> <li>• Health system-wide changes are necessary, including the creation of a human resource roster for infectious disease control and treatment</li> </ul>

**Logistics and Supply.** The 2015 reform had an impact on how facilities managed material resources. For example, that reform brought health facility directors together to decide collaboratively on the sharing of material resources. However, for facilities integrated into a CI(U)SSS (integrated [university] health and social services center), this reinforced their lack of decisional autonomy to plan their own stocks to anticipate resource scarcity. This was the case for

Laval, where several stock rationing mechanisms were implemented to anticipate some shortages, whereas CSJ, which was not integrated into a CI(U)SSS, was better able to anticipate shortages of material resources and even redistributed some to other facilities.

The lessons learned from the strategies implemented in these two hospitals during this crisis are presented in [Table 2](#).

**Table 3.** Quality lessons learned by theme.

Theme	Lessons learned (QLL)
Infrastructure reorganization	<ul style="list-style-type: none"> <li>● Plan an early reorganization</li> <li>● Encourage staff proactivity and creativity</li> </ul>
Human resources management	<ul style="list-style-type: none"> <li>● Improve internal and external communication</li> <li>● Review/improve recruitment process and strategies</li> <li>● Recognize the experiences of care providers</li> <li>● Remunerate hospital staff equitably</li> <li>● Improve communication with all staff: more frequent (even brief) meetings between managers, physicians, and nurses could improve staff engagement and follow-up</li> </ul>
Prevention and control of infection risk	<ul style="list-style-type: none"> <li>● Carefully monitor overtime</li> <li>● Strengthen IPC training for hospital staff</li> <li>● Promote more appropriate communication of preventive measures, procedures, and protocols</li> </ul>
Logistics and supply	<ul style="list-style-type: none"> <li>● Distribute supplies based on needs</li> <li>● Devise appropriate and less cumbersome distribution channels</li> <li>● Reassure staff regarding available supplies</li> <li>● Examine countries' dependence on PPE imports</li> <li>● Encourage/promote citizen initiatives</li> </ul>

### France

**Infrastructure Reorganization.** The Bichat-Claude Bernard (BCB) hospital in Paris was on the front line as a reference facility. In January 2020, it began preparing for the arrival of the first COVID patients by reorganizing its services to accommodate as many patients as possible while mitigating the impact of these changes on non-COVID-19 activities. Service reorganization was done over two periods. The first was the total transformation of the hospital during the first wave. The second period was the gradual transformation based on the stages of deprogramming, the reorganization of beds and services, the creation of outpatient intensive care services, and new communication channels.

**Human Resources Management.** For several years, the hospital had been suffering from a chronic shortage of health professionals. This was partially remedied by internal and external “reinforcements” during the first wave. However, it was felt more acutely during the second and third wave, leading to heavier workloads and exhaustion among health professionals, exacerbated by the lack of recognition (wages and bonuses).

**Prevention and Control of Infection Risks.** To limit contamination risk, family visits were prohibited or regulated, the hygiene services issued regular reminders regarding protective measures, and staff had easy access to screening. However, the constant changes in protection protocols were not well received by health workers, leading to mistrust and tension during the first wave. Also, a relaxation of protective measures was observed during the second wave.

**Logistics and Supply.** The influx of COVID-19 patients led to high PPE consumption. Also, national shortages

fueled this tension during the first wave. To alleviate this situation, support was provided for supplies and external donations were mobilized. At the hospital level, inventories and quotas were set up, and at the individual level, care providers regulated their daily PPE consumption.

The lessons learned from these strategies are presented in Table 2.

### Mali

**Infrastructure Reorganization.** The Mali Hospital (MH) was selected as a COVID-19 treatment site in the national response plan. This decision placed a strain on health personnel at the beginning of the pandemic, particularly due to inadequate resources, trained personnel, and infrastructure, as well as risks of contamination. To make the buildings requisitioned to create COVID-19 units operational, essential renovations had to be carried out and the buildings equipped. The requisitioning of the buildings delayed the planned relocation of certain services, creating a financial shortfall for the hospital.

**Human Resources Management.** To address the shortage of health personnel in the first wave, the hospital, with support from the Ministry of Health, recruited short-term contractors and organized rapid training for candidates. However, at the end of the first wave, managers dismissed many of these contractors due to low admission numbers. The sharp increase in the number of positive patients in the second wave obliged them to recall those workers, but most refused to return, unhappy about salary payment delays. These grievances, also observed among care providers, led to loss of motivation and more delays, or to complaints of therapeutic negligence from persons accompanying patients.

**Prevention and Control of Infection Risks.** The resurgence of the pandemic led to a large influx of patients and accompanying persons, which increased care providers' workload. Paradoxically, their application of security measures was not strict despite the good availability of PPE.

**Logistics and Supply.** In the first months of the epidemic, many partners donated PPE. Subsequently, the supply of PPE and medicines was ensured by the State through regular assessments to determine needs and daily replenishment of stocks. However, staff found the administrative procedures cumbersome.

Lessons learned from these strategies are presented in Table 2.

### **Brazil**

**Infrastructure Reorganization.** The studied hospital is a reference hospital for the management of infectious and parasitic diseases in the state of Pernambuco. Prior to the arrival of the first COVID case, the hospital set up a crisis cell and held planning meetings to receive COVID patients. Services were reorganized with government support, which included investments in the purchase of equipment and beds. Non-COVID-19 patients were transferred to other hospitals. Non-COVID-19 services were significantly reduced. The hospital's expertise in infectious disease management facilitated the mobilization of health professionals. However, communication difficulties were noted due to clinical care management complexity.

**Human Resources Management.** With the outbreak of the pandemic, the hospital had to hire new healthcare professionals and transfer professionals from non-COVID-19 to COVID-19 services. Despite staff reinforcements, professionals perceived work overload, due to constant changes associated with high numbers of sick colleagues and patients deaths. They also noted discrimination and social prejudice resulting from their work, causing tension and stress. Hospital therapists provided psychological support, while civil society and some businessmen provided snacks and meals.

**Prevention and Control of Infection Risks.** The hospital strengthened prevention and protection measures to reduce contamination, while regulating visits. IPC teams were training on protective measures and carried out inspections to ensure compliance with protection and biosecurity protocols. Their work improved working conditions and created a sense of security.

**Logistics and Supply.** The hospital received donations from private companies and civil society. To control PPE use and limit waste, the hospital made them available based on the needs of the care units.

The lessons learned from these different strategies are presented in Table 2.

### **Japan**

**Infrastructure Reorganization.** Hospital infrastructures were not designed to accommodate large numbers of infectious disease patients. The hospitals created dedicated wards and beds for COVID-19 patients by relocating existing patients to other wards and/or hospitals.

**Human Resources Management.** Care of COVID-19 patients required an increase in the number of nurses and physicians so clinical staff from various departments were relocated to enable necessary care to be delivered (task-sharing). Task-shifting was also seen with nurses undertaking tasks previously performed by external contractors and administrative staff assisting with clinical services. Task-shifting resulted in additional (overwhelming) work for hospital staff. Increased communication between mid-level managers and departmental staff helped to address fear, stress and motivational issues.

**Prevention and Control of Infection Risks.** COVID-19 hospital infection control manuals were created by hospital infection control teams (ICT). ICT provided regular advice on infection control measures, daily supervision of all departments, and on-demand consultation and advice for hospital staff. There were also changes to healthcare procedures to minimize staff movement within the hospital.

**Logistics and Supply.** At the beginning of the pandemic, hospital staff feared a shortage of PPE and consequently changed their supply management practices. Hospital staff minimized the use of unnecessary supplies. Local governments distributed supplies to hospitals.

The lessons learned from these strategies are presented in Table 2.

### **Quality Lessons Learned by Theme**

This section presents the comparative analysis of the lessons of the seven hospitals in the five countries that illustrates the QLLs with regard to the four common themes (Table 3).

### **Infrastructure Reorganization**

**Early reorganization of services** appears to have been the main lesson learned. Some hospitals anticipated the arrival of patients by reorganizing services, while also developing innovative strategies as the crisis evolved. However, this early preparedness was not unanimous. Some hospitals stressed the importance of better anticipating the crisis. Indeed, the actors were concerned about their capacity to accommodate a massive influx of patients and to carry out effective infection control due to lack of resources (material or human) or lack of preparation.

The **proactivity and creativity of hospital staff** (care providers and others) were lessons learned by many key informants. Some hospitals showed initiative, making agile decisions ahead of the health authorities. This was the case for CSJ, which introduced protective measures such as wearing PPE and isolating staff returning from abroad in early March 2020, and for Mali Hospital, where health professionals worked with the means available before receiving Ministry of Health support. Also emerging from this crisis were creative initiatives to anticipate shortages of certain products. At CSJ, products were designed in-house—hygiene products and PPE (face shields, in particular). These products were then redistributed to other services and facilities.

**Improving internal and external communication** was a lesson in most of the themes addressed. Improving communication would bolster staff and public confidence and strengthen response efforts. Internally, this would mean fostering “bottom-up” communication so that frontline health workers could communicate the status of service delivery on the ground to enable a more effective response to challenges. With health authorities, it would mean encouraging a systemic approach to information sharing, and with the public, involving the hospital in disseminating concepts of prevention to as many people as possible.

### **Human Resources Management**

**Reconsidering recruitment and retainment strategies for health workers** was one of the lessons learned in the majority of cases. While the strategies adopted by these hospitals were successful in mobilizing and covering the need for health workers, the benefit of this mobilization was relative. These human resources management strategies proved untenable in the second and third waves. In fact, they had negative or even unexpected effects. For example, simplifying recruitment procedures led to the hiring of poorly qualified staff, resulting in less effective reinforcement. Informants added that little training was offered to bring new hires up to speed.

Also, the qualified staff did not have sufficient time to supervise them, which caused tensions.

Some informants proposed strategies such as creating a human resources roster for infectious disease control and treatment, including hospital-based infection control specialists. Others recommended not downsizing the workforce too quickly at the end of a pandemic wave.

Taking an interest in **care providers’ experiences** and the pandemic’s impact on their personal lives, and valuing the work of staff were lessons mentioned by most key informants. It appeared that, with the arrival of the second wave and then an increasingly severe third wave, coupled with the staff shortage and the lack of dialogue and/or information internally, the hospitals’ capacity to respond was hampered, a situation that led to increased workload, stress, and staff demotivation. Respondents reported feeling indifferent, isolated, and abandoned. There was insufficient recognition of care providers’ experience of the crisis.

**Careful monitoring of overtime, mandatory overtime, and imposed constraints** were the lessons mentioned by some key informants in order to avoid work overload and ultimately fatigue and demotivation.

**Providing fair wages** was a lesson mentioned by key informants in all five countries, who cited issues of compensation (delayed payment of bonuses), pay equity, or the incentive system that led to adverse effects. Some believed that the hospital’s ability to maintain operations during a pandemic depended on the collective efforts of all staff, including administrative staff. Yet incentives were often given only to clinical staff involved in the provision of COVID-19 services.

### **Prevention and Control of Infection Risks**

All the hospitals in the countries included in this study reported having implemented infection prevention and control measures to ensure service quality and safety. However, these measures varied depending on the type of hospital and the country. Some informants reported that the hospitals had many staff trained in hospital infection control, which appeared to be a facilitating factor in preventing transmission of the virus.

**More appropriate communication and increased training of IPC staff** appeared to be lessons for prevention and control of infectious risks. For some, communication was inadequate, leading to a lack of understanding of IPC rules and difficult acceptance by staff of sudden changes in recommendations, protocols, and procedures from many authorities, which led to increases in risky behaviors (non-compliance with mask wearing, social distancing, etc.). To facilitate this



communication, combining a variety of communication channels (visual aids, newsletters, emails, etc.) tailored to the target audiences appeared useful. Key informants in the five countries made the following suggestions for improving communication and training: 1) inform personnel on the limitations of knowledge that sometimes warrant new protocols; 2) strengthen evidence-based medicine and take corrective action to improve federal coordination at all levels of responsibility; 3) provide more responsive IPC coaching to teams; and 4) improve coordination and digitization of information systems by health authorities in order to facilitate information sharing and rapid decision-making by hospital management.

### **Logistics and Supply**

The majority of informants reported tensions related to uncertainty about certain supplies due to a lack of diversity of supply channels, dependence on imports of masks and disinfectants, the lack of an inventory management tool, as well as the shortage in the market that led to higher prices and delivery delays.

The **needs-based distribution of stocks** emerged as the lesson most often mentioned. This strategy was adopted to improve supply chain management and reduce waste, with a view to avoiding the tensions observed primarily in the first wave.

Several informants pointed out what could have been done differently in terms of management and procurement: accepting to have much more stock, devising appropriate and less cumbersome distribution channels, reassuring staff that there was enough stock.

Other informants suggested that governments examine countries' dependence on imported materials for pharmaceutical production and develop appropriate strategies to address supply issues in the event of a health crisis.

Also, some informants praised solidarity initiatives or international donations. For example, in Brazil, respondents considered "ComVida," a citizens' initiative, to be of great value. It collected donations of PPE and raw materials for producing PPE.

### **Discussion**

Our lessons learned study was guided by the quality criteria presented in the article by Dagenais et al.<sup>7</sup>: 1) diverse sources of data collection; 2) documentation of diverse perspectives, stakeholder backgrounds, and stakeholder relationships; 3) QLLs grounded in their context for better quality of content; 4) identification of supporting evidence (four scoping reviews were conducted for this project); and 5) identification of the target audience. Also, the introductory article in this

special issue provides an overview of the various country contexts, the comparison methodology and trust in the results, and the public health implications for the studies.

Our results highlight lessons learned from hospital resilience that can be useful (with no claim to being generalizable) not only to scientists, but also to health system and hospital managers. However, for some of these lessons, hospital stakeholders will not be able to apply them because they come under the responsibility of other levels (government policy, etc.). This highlights the importance of differentiating between, on one hand, the (cognitive) lessons learned from our experience and, on the other, their application (conative lessons learned), which depends on a multitude of factors.

In comparing QLLs according to the themes in the five-country analytical framework, we identified lessons common to several countries, such as "early preparedness," "proactivity," "resources," "coordination," "communication," and "adaptation." These elements are not isolated but interact depending on the strategies adopted by these hospitals. For example, the study revealed variations in terms of early preparedness, due to effective coordination in some hospitals that was intrinsic to their historical culture as expert institutions for infectious diseases, or to some hospitals' autonomy in terms of material or financial resources.

These lessons complement those of Khalil et al.<sup>15</sup> which underscore the importance of inscribing these lessons not on a theme-by-theme basis, but rather in a holistic approach to improve hospital response and resilience to emergencies.

Hospitals in France and Brazil stressed the need for transparent, clear, bottom-up communication about infectious risks. The studies emphasized that it is essential to make decisions informed by robust and continuously updated data syntheses, encourage communication between communities and hospitals, and monitor channels for communication with the public (through social media) to avoid misinformation, as health authorities are not the only source of information during the pandemic.<sup>16,17</sup>

There is also a need for autonomy in terms of resources (material or financial). The studies highlight the importance of stimulating health care institutions' autonomy and subsidiarity by stopping certain new public management deviations, such as delegating responsibilities from the state to institutions without systematically giving them the means to assume them.<sup>18</sup> The studies also show the importance of improving intra-governmental coordination with regard to policies aimed at containing the pandemic, such as supply chains.<sup>15,18</sup>

Further, the lessons learned from this study reflect the shortcomings and limitations of health systems more broadly in the face of a crisis of this magnitude. The Lancet COVID-19 Commission's work speaks of a "global failure" in the management of the COVID-19 pandemic and one of its 11 recommendations is "strengthening national health systems and increasing investments in public and primary health," so that all countries—even those with the lowest income—have strong public health systems and health-care systems. Along with increased investments in health systems and medical supply chains.<sup>15</sup>

Finally, from the lessons learned by themes we have identified some ideas for consideration, as contributions to the recommendations made by the Lancet COVID-19 Commission to deal with the health crisis: 1) strengthen the coordination and leadership capacities of hospital managers and health authorities; 2) improve communication strategies; 3) consolidate organizational resources; and 4) adapt resources and strategies, particularly with respect to procurement and the management of infectious risks.

### Next Steps

The QLL development process on which this study was based must necessarily be examined to understand the issues and ultimately improve the procedure. To this end, we conducted interviews with the various stakeholders in this project, and an article presenting the analysis of the QLL development process is currently in preparation.<sup>19</sup> It examines the proceedings of the QLL workshops to identify facilitators and obstacles to implementing the QLLs from the perspectives of the researchers involved in organizing them and the professionals who attended. In particular, the hierarchical and cultural issues uncovered throughout the QLL development process will be addressed. Furthermore, as mentioned above, we have very little information on the application of the QLLs from this study in the hospitals concerned, and even less on their potential utility in the face of a new health crisis. Sharing and knowledge translation activities need to be planned so that those in a position to apply the QLLs produced can take ownership of them and use them to respond more effectively to any threat. These activities should then be systematically reviewed to generate new knowledge about the process of developing high quality lessons learned.

### Conclusion

Applying the QLL development guide posed a number of challenges, as it involved agreeing on lessons learned by themes, preparing fact sheets to serve as a basis for discussions with stakeholders, and holding workshops that would bring together people with considerable workload.

However, in the end, the comparative analysis of these lessons from hospitals in five countries around the world made it possible to formulate quality lessons that resulted from a process that, while certainly complex, considered the challenges faced by the different stakeholders involved in the fight against the Covid-19 pandemic. That said, the knowledge transfer mechanisms that will allow others to take ownership of these lessons to better cope with future health crises remain to be tested.

### Notes

- [a] "We" refers to the researchers and authors of the paper.
- [b] In the Japanese case study, researchers were unable to hold feedback workshops with the interview participants due to a surge in new cases of COVID-19 and subsequent disruptions to the operation of health facilities. Additionally, running the workshops in Japan was difficult due to both the organizational culture in Japan, in which people are not used to speaking freely in workshop settings in front of colleagues of varying job levels, and to observe the anonymity of the study information, as required by Japanese ethics approval.
- [c] In 2015 the Quebec health system was reorganized around Integrated health and social services centers (*Centers intégrés de santé et de services sociaux*—CISSS) and Integrated university health and social services centers (*Centers intégrés universitaires de santé et de services sociaux*—CIUSSS), which are reference territories for the population in terms of accessibility to health care and social services.

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## Ethics

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