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Methodology for restarting hospital activities after a pandemic: COVID-19 experience

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ABSTRACT

In addition to the health responsibility of hospitals in managing this COVID-19 crisis, hospital managers must also ensure the financial viability of healthcare structures. This is why, at the dawn of a lockdown exit, managers must anticipate the identification of recovery scenarios. This point refers in particular to the selection and scale of progression of hospital activities, and also to the impacts this will have on staff and patients in the short and medium term. Unfortunately, there is a serious lack of literature on the subject.

The aim of this document is therefore to propose a methodology for resuming the medical, economic and social activities of a healthcare network or hospital.

In our approach, we identify 6 stages following the COVID-19 peak: assessment of the situation, Act 2, development of scenarios-criteria-conditions, restarting, continuous improvement, and transversal activities.

The entirety of our developed methodology is supported by a pragmatic approach with, in particular, the creation of specific tools for each stage of the process. This strategy and these tools have been created with the operational players and adapted to meet the specific features of each hospital while respecting the coherence of the healthcare network's decisions.

We are convinced that this approach can be exported on a larger scale to inspire other healthcare networks and other hospitals that have also found themselves without the weapons to prepare for the resumption of hospital activities.

1. Introduction and problems

On 30 January 2020, the World Health Organization (WHO) declared a state of international public health emergency for the coronavirus epidemic [1]. On 11 March 2020, the WHO described COVID-19 as a pandemic with the potential to cause enormous health, economic and societal impacts [1]. On 14 March 2020, Belgian hospitals launched a Hospital Emergency Plan (Plan Urgent Hospitalier-PUH) to provide care to infected patients [2]. This PUH is a legal obligation where each hospital "defines procedures for an efficient management of the sudden influx of patients without compromising the health of patients already hospitalised" [3].

In these circumstances, Belgian hospitals must both respond to the large flow of patients suspected of having a COVID-19 infection, and

ensure the best management of urgent non-COVID-19 admissions. This management is, among other things, made possible by the interruption of scheduled activities (consultations, day hospital, conventional hospitalisation), deemed not essential to the health of patients, imposed by the PUH.

Belgian hospitals have acted quickly to meet these requirements. Despite this, the COVID-19 infection has put a strain on the health system. All staff members have organised themselves at a frantic pace within the different hospitals to receive and care for patients. This has had a major impact on the "normal" functioning of the hospitals and has had significant psychological and social consequences for staff (absenteeism, professional displacement, temporary unemployment, home-working), as well as for non-COVID-19 patients, whose delayed treatment has serious consequences on their health [4].

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In addition to the health responsibility of hospitals in managing this crisis, hospital managers must also ensure the financial viability of health structures [5]. This is why, at the dawn of a lockdown exit, managers must anticipate scenarios for the resumption of activities. This refers in particular to the selection and scale of progression of hospital activities, and also to the impact this will have on staff, and also on patients in the short and medium term.

The literature [6–7] shows that a hospital cannot suddenly restart activity with a structure shattered by the crisis, without developing a plan that is clear to its employees and patients. In fact, the manager must both manage the saturation of his or her hospital beds dedicated to COVID-19 patients and re-open hospital activities while respecting government provisions, such as social distancing, set out by the country's authorities [8]. A manager must therefore demonstrate unprecedented agility to keep his or her hospital structure in balance.

In this context, the development of a strategy makes it possible to guarantee consistency in the lockdown exit stages and to ensure the effective and efficient reestablishment of the hospital.

Unfortunately, the lack of literature on methods for drawing up a hospital lockdown exit plan is glaring for the hospital, which is an operational player in this crisis and recovery. However, the healthcare sector needs a methodology, tools and direction to lead its troops and gradually resume its activities without compromising the health of its patients and staff. Faced with this disarray, each manager is therefore left to draw up his or her own scenario. But in a competitive sector, this heterogeneity can become a source of conflict to the benefit of business stakeholders.

How can the hospital sector get all its employees back on the same page? How quickly and how efficiently can hospitals restart their activities? What are the steps that the hospital must go through to understand which components are involved in this recovery?

The aim of this document is therefore to propose a methodology for resuming the medical, economic and social activities of a healthcare network or hospital.

2. Methodology

Chinese experiences and WHO reports suggest a gradual resumption of entrepreneurial activities due to the need to synchronise the whole enterprise [9–10]. McKinsey's studies [6] point in this direction but identify a certain variability in the slope of the recovery depending on policy responses. This gradual recovery also appears necessary to avoid a new wave that would impact the population in the longer term. Given these observations, the hypothesis of a gradual recovery therefore underlies our recovery methodology.

Just as the WHO [11–12–13] realises in the management of pandemics and especially influenza, we propose a theoretical approach, adapted to the healthcare sector, whether a hospital or a healthcare network, integrating all the components necessary for the resumption of activities after a pandemic. Each institution is then able to use this model to adapt it to its environment. This plan is a common thread that needs to be practically refined with the health stakeholders in each environment. We quote a few proposals in our document, but it is by no means an exhaustive list of all the possibilities covered by the ingenuity of the teams.

To illustrate our methodology, we decided to schematise it on a graph to simultaneously cross-reference the evolution of the COVID-19 pandemic and the phases of hospital lockdown exit following this pandemic.

Finally, the realisation of this approach is based on the experience we had the opportunity to have in a care network composed of three hospitals, including one university hospital, and four nursing homes.

3. Results

In our approach, we identify 6 steps following the COVID-19 peak.

The graph schematising the process of resumption of hospital activities allows each actor to take ownership of the progression path.

The magenta-coloured curve symbolises hospital activity, while the blue curve shows the bed saturation of hospital structures during the COVID-19 pandemic.

As Tseng [14] indicates in his article, our graph [Fig. 1] also illustrates

- The hypothetical arrival of a second wave of COVID-19 (A),
- The likelihood of accepting more patients with care starting late (B),
- The triggering of the psychological impact that would be experienced by healthcare workers during this pandemic (C).

Since we cannot determine the duration or timing of these waves, it should be assumed that these curves may be actually earlier or later than shown on this graph.

3.1. State/assessment

This first step consists in carrying out an assessment of the impact of the pandemic on different aspects of the structure in all its components. This phase estimates the number of human and material resources available/unavailable, such as drugs and personal protective equipment, at a time T. At the same time, this assessment aims to identify the elements that need to be strengthened to prepare the hospital for a second wave (internal or external). Indeed, according to a Sciensano report [15], at least 10% of COVID-19 infections in hospitals are explained by nosocomial infections.

To conduct this step, short and quick questionnaires are used to ensure the reproducibility, feasibility and agility of this evaluation. This assessment may be biased, but the underlying idea remains to show a trend in this environment in a relatively short period of time. For this step, we recommend addressing the issues related to the sector: human resources (availability and well-being), logistics, medical activities, hospital hygiene, and financial aspects. The use of a scale from 0 to 10 for each of the questions makes it possible to aggregate the results of this survey more quickly. Given the speed of carrying it out, and in order to follow the evolution of this trend, this evaluation can be reproduced at different times (T+1, T+2).

In view of the psychosocial impacts [16–17] present in large numbers in the literature, we feel it is already essential to propose at this stage, if it has not already been done, individual and collective psychosocial care for teams confronted with COVID-19, whether or not they are from the same institution.

3.2. Act 2

This step aims to anticipate and/or mitigate the likelihood of a second wave of infection occurring in the healthcare network or in the hospital. In this respect, predictive tools can potentially support estimates of an external incidence in order to verify the adequacy between the estimates and the available resources needed: human, material, drug, etc. This step also consists in reinforcing new behaviours such as staff screening, staff training in hygiene practices aimed at reducing cross-infections, etc. This phase is maintained and accentuated throughout the lockdown exit process according to the recommendations of the health authorities. As an example, and as a complement to a practical workshop, the creation of "serious gaming" tools allows for innovative ways of ensuring and verifying the acquisition of new practices by personnel, whether they are healthcare or administrative staff.

3.3. The development of "scenarios-criteria-conditions"

The objective of this step is to identify scenarios for the recovery of hospital structures. Concretely, it involves identifying the criteria on which the scenarios will be based to select the target population. Indeed,

Methodology to restart hospital activity

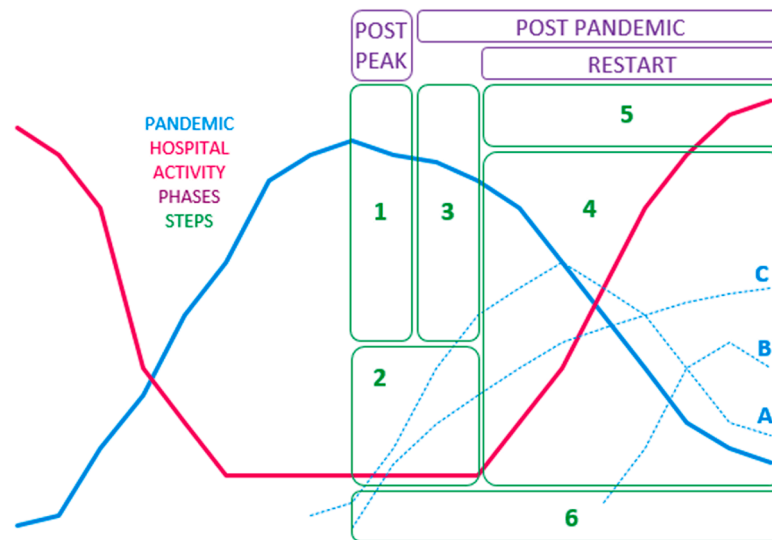


Fig. 1. Graph schematising the methodology for resuming hospital activities after a COVID-19 pandemic, April 2020.

subject to a high occupancy rate in the surgical and medical departments before COVID-19, and the mobilisation of these same beds for COVID-19 patients, hospitals must identify priority non-COVID-19 patients if they wish to treat these two populations simultaneously.

We have defined "criteria" as the parameters that determine the

selection of recovery scenario(s). In terms of medical criteria, different modules [18–19] have been created to target urgent / non-urgent pathology. In addition to these medical criteria, other variables can be added to the data set: profitability, market shares, co-morbidities, average length of stay, etc. The data set can also be extended to

The development of "scenarios-criteria-conditions"

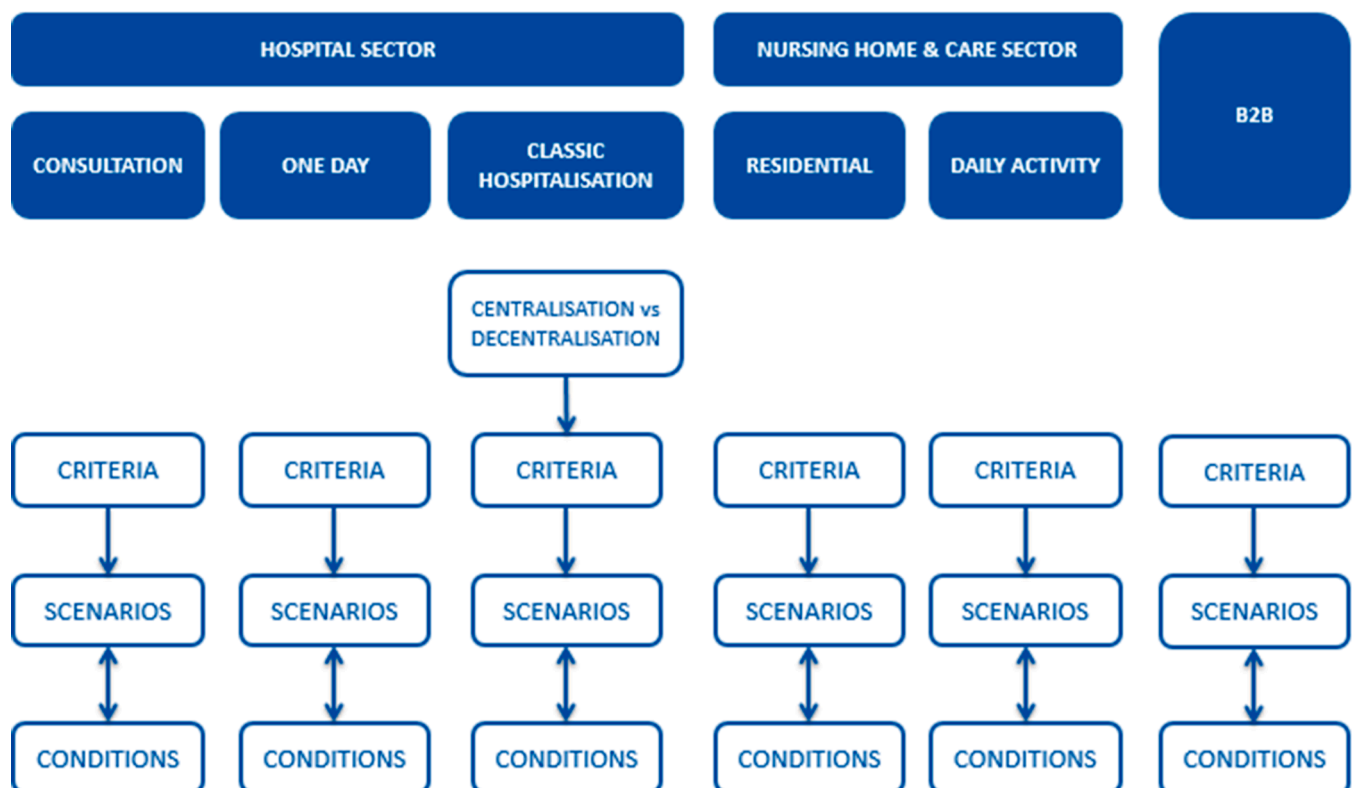


Fig. 2. Scenario-Criteria-Conditions relationship per pathway and per care sector, May 2020.

include other variables, such as the number of patients, the number of beds in the hospital, the length of stay, the comorbidity, the market share, etc.

The selection and weighting of the criteria by a group of experts from the institution then makes it possible to qualitatively and quantitatively define scenarios from among all the care sectors.

By way of "scenarios", and depending on the configuration of the care network and the hospital, it also seems important to first address the question of centralisation/decentralisation of patients with COVID-19. The hospital sector care pathways and nursing home pathways are dissociated in our figure [Fig. 2] because we believe that the criteria are different and cannot be applied as such. Finally, in developing the scenarios, we must not neglect the population of employees who have been excluded (temporary unemployment due to force majeure and homeworkers) from the health emergency and whom we have called "back to business" (B2B).

The criteria and scenarios must be scalable so as to grow gradually in capacity according to the recovery conditions.

Closely linked to the criteria and scenarios, it is also a question of identifying the "conditions" without which an activity cannot be restarted (right of veto): human and material resources, the operability of the working environment, care pathways, etc. This step is crucial, since it conditions the resumption of an activity (go/no go) as defined in the scenarios.

Each scenario/stream selected is subject to an overall assessment (number of patients, percentage in intensive care, financial aspects, etc.) to guide decisions during validation. The two-way arrow in our figure [Fig. 2] illustrates the principle that a scenario must be adjusted

according to the required conditions and vice versa.

During this phase, it is also important to monitor the evolution of new cases of COVID-19 and to measure the impact of measures aimed at reducing the internal incidence of this pandemic in the institution.

3.4. The restarting

The objective of the "recovery" phase is to select one scenario from among others on the basis of an overall assessment in order to operationalise it gradually. This assessment also illustrates the intensity of the flow in accordance with the recommendations of the country's health authorities. Overall, the aim is to translate the recovery scenarios into operational mode [Fig. 3].

This stage is an opportunity to integrate the different actors in the company in the resumption of hospital activities by creating workshops. These workshops with the operational stakeholders aim to define the operating processes and the thresholds activating the go/no go of a condition. Here, we are talking about aspects such as the equipment needed, if all patients take a new mask at the entrance of the hospital, the number of people needed if the test is performed and what impact this has on the delays and queues at the entrance of the hospital.

Once the scenarios have been validated and translated operationally, activities can then resume gradually. This resumption should then be assiduously monitored to identify and adjust any defective elements of the process. The transparency of these decisions towards staff and patients is crucial!

The quantitative and qualitative progression of the phase is conditioned by the control of flows and the arrival of a second or third wave,

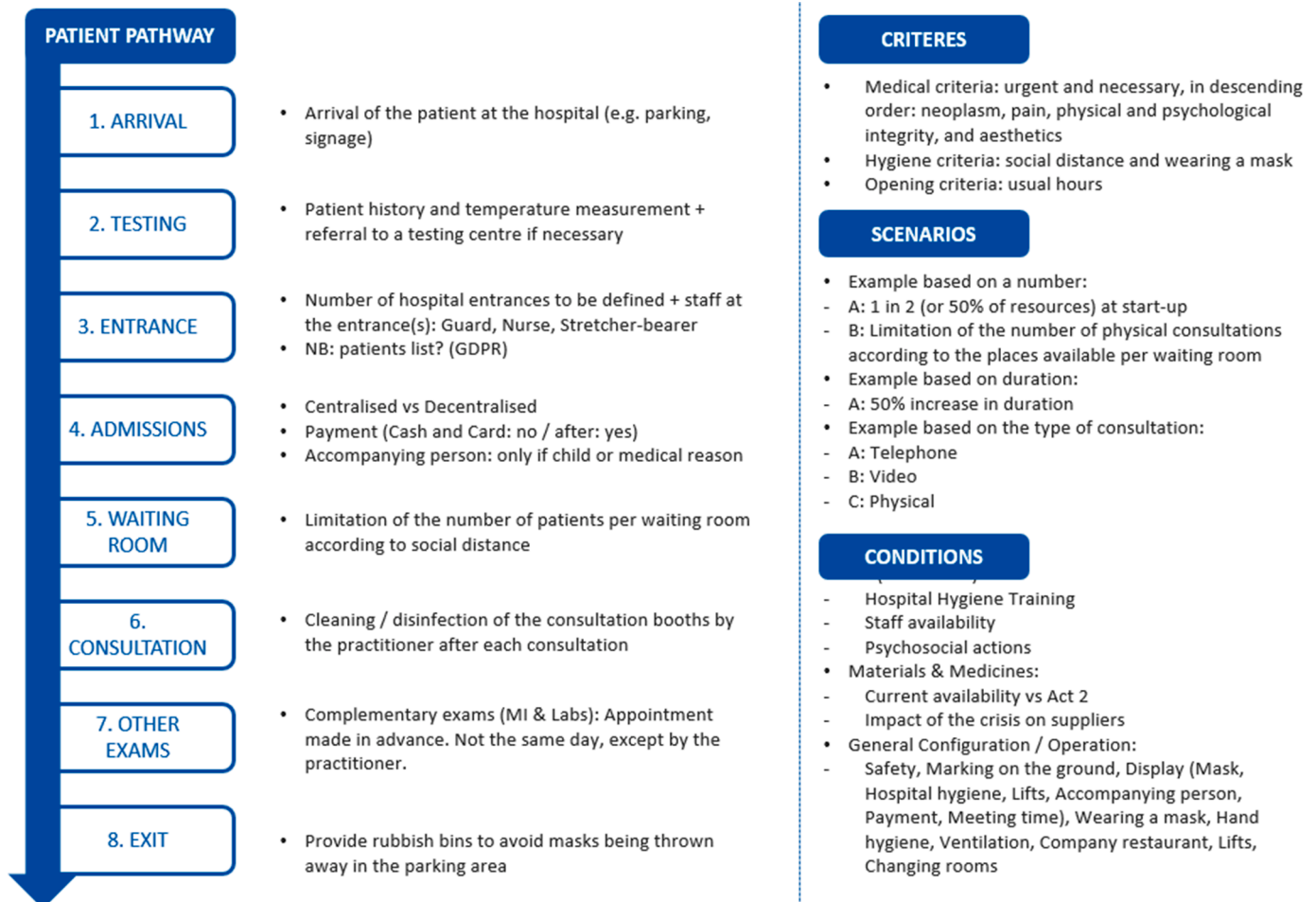


Fig. 3. Example of the operationalisation of the "consultation" care channel according to criteria and conditions, May 2020.

since they will reduce the conditions of availability in terms of beds, human resources, etc. This stage is carried out until a situation of opening similar to the pre-pandemic situation is found and may last a few months. This is why a regular evaluation must be carried out in order to adjust the scenarios-criteria-conditions accordingly. This progression phase also includes all the marketing necessary to restore the population's confidence in the delivery of hospital care.

During this stage, a certain amount of agility is required, particularly in adapting the scheduling of hospitalisations in relation to the number of beds available (beds reserved for COVID-19 patients). For example, the creation of a database, including the scheduling of hospitalisations and their length of stay, allows for solving the problems of allocating means in advance. This weekly regulation, respecting previously validated distribution keys on the basis of the number of available beds, will solve a number of problems: operating theatre, etc.

3.5. Continuous improvement

Like many tragic events, it is essential to capitalise on the lessons of this crisis. This step consists in identifying new good practices implemented in the management of the pandemic and in dealing with the dysfunctions revealed by this same crisis. We are talking in particular about the implementation of a specific hospital emergency plan for pandemics, the massive introduction of teleworking, training in hospital hygiene in rest homes, etc. Each innovation deserves an evaluation of the practice in order to report back to the public authorities and thus check the possibility of introducing it into new daily practices. It is also during this stage that a report on the epidemic should be written up for the structure as a whole. This includes crisis coordination, indicator management, communication, organisation, planning, etc.

Finally, a reconnection between the history of the pandemic and the history of the business project also seems relevant to establish in order to restore meaning to the company's employees.

3.6. The transversal activities

This step, like all the others, is also indispensable and bilaterally supports the 5 steps above (state/assessment-Scenarios-Act2-Restarting-Continuous improvement). Each of these transversal activities is continuous and progressive, and adapts to the evolution of the project. Such activities include:

- **Communication** through the evolution of hygiene measures, messages to patients, dissemination of new care pathways to the public, etc. This communication provides a framework for the possible actions of patients and staff.
- **Monitoring of the authorities' measures** since the publication of new recommendations from the health authorities modifies practices, communication and, potentially, phase 3 scenario-criteria.
- **Training and recruitment of staff** to either prepare for a new wave or ensure the availability of human resources throughout the process.
- **Governance** to ensure coherence and coordination of the actions to be undertaken. Indeed, some care networks integrating hospital structures, rest homes and care homes need to be coherent in order to establish a network-wide policy. This governance takes the form, in particular, of writing reports, working with thematic working groups, collecting monitoring indicators, taking joint positions with managers, justifying decisions when decision-makers have the most up-to-date information, etc.

4. Discussion

The objective of this article was to share a lockdown exit strategy of a hospital combined with a resumption of hospital activities.

Given the limited literature on this topic, we are convinced that our methodology is the first approach developed to demystify the term

"restarting" after a pandemic in the hospital sector. This gradual rise in importance demonstrates how medical, economic and social activities in a hospital are interlinked, making it difficult to interrupt processes. The process needs to rebuild itself gradually, taking into account all the components and the political provisions imposed.

The stakes of this rebuilding are decisive for a hospital, since it must simultaneously provide treatment to COVID-19 patients, be available in case of a new outbreak of this pandemic, and again offer care to patients who risk increasing their co-morbidities or even decreasing their chances of survival by delaying their care. All this in a context where the healthcare staff are tired.

Moreover, managers are deprived of tools and support from the health authorities, apart from what the latter are obliged to provide. This is why, in this fragile balance, where everything can tip over, managers rely on innovative approaches to ensure the hospital's resilience. Initially, the review of the literature made it possible to draw lessons from previous pandemics to flesh out this strategy. These include the following:

- The communication pitfalls, where a lack of communication was reported during SARS 2003 and 2008 [20], in contrast to what we are currently experiencing with excess information [21].
- The psychological impacts that healthcare personnel encounter in the intensity of care provided to patients [16–17].
- The hypothetical arrival of a second or third wave caused by the delay in the care of patients requiring a high level of care [12–13–14].
- The inequitable resumption of medical activities in certain specialties [22].

Secondly, the visual progression curve of the COVID-19 pandemic that appears regularly in the press was used to link it to the resumption of hospital activity in our methodology. We believe that this approach allows us to tell a story to managers, and thus integrate all teams, whether they were closely or remotely associated with the pandemic.

The entire methodology developed in the article is supported by a more pragmatic approach and tools that we have not had the opportunity to develop in this article. However, we had the opportunity to apply them in a care network composed of three hospitals and four nursing homes.

This strategy and these tools were adapted to meet the specific needs of each hospital while respecting the coherence of the network's decisions. The creation of this methodology and its operational implementation took place in a relatively short period of time. This is perhaps the major difficulty we faced because, in addition to the resources needed to monitor the entire project, we also had to ensure that the operational teams stayed on board. Nevertheless, after evaluation, we are convinced that this approach can be exported on a larger scale to inspire other healthcare networks and other hospitals that have also found themselves unarmed when it comes to preparing for the resumption of hospital activities. Finally, this work is a draft that deserves to be further developed by all parties so that managers are no longer left under pressure to create a recovery plan.

5. Conclusion

In 2020, Belgian hospitals have moved from a PUH (Hospital Emergency Plan-Plan Urgent Hospitalier) that was previously carried out to respond to a short-term health emergency to a health emergency where nobody really knows the final outcome. In view of the lack of information on hospital restart methodologies and the absence of tools to enable hospital managers to rebuild their structures in a broad sense, it seems essential to share an exit strategy to deal with this type of crisis, the likelihood of which seems real [23].

Through this publication, we are therefore calling on political leaders and hospital representatives to take stock of the entire crisis, from beginning to end, and in particular:

- To provide feedback to managers and hospital experts who have dealt with this lockdown exit in hospitals.
- To draw up a national document that will then be shared at the European or even global level, to further the discussions on hospital lockdown exits in the context of a pandemic such as COVID-19.

If this is not the case, what will remain after this crisis?

6. Declaration

- Ethics approval and consent to participate: Not applicable.
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 - o Background: FD, KL, BL
 - o Methods: FD, KL, BL
 - o Discussion: FD, KL, BL
 - o Conclusion: FD, KL, BL

All authors have read and approved the manuscript.

Declaration of Competing Interest

The authors declare that they have no conflict of interest.

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