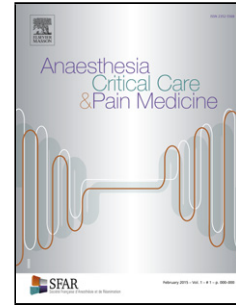


# Journal Pre-proof

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**Preliminary pragmatic lessons from the SARS-CoV-2 pandemic from France**

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**Abstract:**

The first wave of the SARS-CoV-2 pandemic required an unprecedented and historic increase in critical care capacity on a global scale in France. Authors and members from the ACUTE and REANIMATION committees of the French Society of Anaesthesiology and Critical Care (SFAR) wished to share experience and insights gained during the first weeks of this pandemic. These were summarised following the World Health Organisation Response Checklist and detailed according to the subsequent subheadings: 1. Command and Control, 2. Communication, 3. Safety and Security, 4. Triage, 5. Surge Capacity, 6. Continuity of essential services, 7. Human resources, 8. Logistics and supply management, 9. Training/Preparation, 10. Psychological comfort for patients and next of kin, 11. Learning and 12. Post disaster recovery. These experience-based recommendations, consensual across all members from both committees of our national society, establish a practical framework for medical teams, either spared by the first wave of severe COVID patients or preparing for the second one.

**Keywords:** SARS-CoV-2; critical care; surge capacity; recommendations; pandemic

**Conflicts of interest:** none

The SARS-CoV-2 pandemic requires an unprecedented and historic increase in critical care capacity on a global scale. The ongoing fight against the pandemic and potential resurgence of the virus made it compelling for the authors to share specific concepts for the management of critical care surge capacity. This short report reflects impressions the authors gained within the first weeks of the pandemic. These may evolve over the coming weeks and months.

Despite its unprecedented dimensions, we feel that all elements of the World Health Organisation (WHO) Hospital Response Checklist (1) apply to the current situation. Nevertheless, we suggest a slight adaptation by adding three categories and change the order. This provides a methodology for planning, briefings, training, and analysis of the situation: 1. Command and Control, 2. Communication, 3. Safety and Security, 4. Triage, 5. Surge Capacity, 6. Continuity of essential services, 7. Human resources, 8. Logistics and supply management, 9. Training/Preparation, 10. Psychological comfort for patients and next of kin, 11. Learning, and 12. Post disaster recovery.

### **1. Command and Control**

The importance of Command/Control and Communication at local and regional level cannot be overemphasised. It is beyond the scope of this paper to describe the detailed working of a hospital crisis committee or regional crisis coordination. However, the authors would like to share a few experiences specific to the pandemic. One particularity of any exceptional situation (mass casualty, pandemic, etc.) is the activation of a structured crisis mode during which authority lies within the crisis committee, relying on a chain of command and clearly defined principles of control. The particularity of the pandemic situation is its unknown duration casting uncertainties for how long the hospital will function in crisis mode. The imperatives of the situation imposed a complete overhaul of the entire hospital organigram and structure within days. The principle of a chain of command is not in the DNA of the medical community in general and some of its members may struggle to adapt to it. In consequence, the committee should anticipate and mitigate the possible challenges that a prolonged crisis mode may signify for the pre-crisis hospital mentality hierarchy and the change in leadership it embodies.

### **2. Communication**

Communication is vital and remains a major challenge in any exceptional situation. As debriefs of many events have demonstrated, the situation on the ground and information often evolves more rapidly than the capacity to convey information. Distortion ensues, generating contradictions, disinformation, misinterpretation and confusion.

In terms of communication, the specificity of the pandemic situation is again its unknown duration. Designating a communication officer seems vital. Disinformation is as contagious as the virus and spreads quickly often through official and social media; it affects health professionals as much as the general public and generates anxiety. Professionals should be advised to limit their use of social media. From our experience, official channels of information are essential to diffuse trusted and validated information, doctrine and procedures. For instance, hospital department-based website, regularly fed with physician-approved protocols and available through secured login and password turned out to be very efficient.

The flow of communication needs to travel down, but also up the chain of command to allow adjustments and revision of strategic plans and prevent potential non-alignment or conflict with local needs and hospital-based guidelines. A single channel and medium of communication may not be enough. Several identified official channels are required to spread information (mailing, posters, meetings/briefings, WhatsApp groups...). In several areas, existing networks (trauma, cardiology...) provided these trusted channels of communication and were tremendously useful, facilitating the federation and mobilisation of professionals.

Newly designed information technology and data science tools (applications, dashboards...) were deployed and put to use to share and structure information (patient flow, available resources, bed-management...). Some proved useful and well-adapted and those were adopted by professionals. Complex tools or those requiring a lot of user input or learning were neglected. Design and deployment of these tools require time and health professional input beforehand. Anticipated deployment and training of integrated command and control and communication tools before the next crisis is strongly recommended. Registries and data extraction facilitated data-based decision-making and prediction.

### **3. Safety and security**

In this crisis, the predominant security issue was the protection of staff against contamination with appropriate use of Personal Protective Equipment (PPE) and its procurement. Concerns of PPE procurement and new evidence required frequent adaption of Standard Operating Procedures (SOPs). Those adaptations were sometimes met with distrust and anxiety by health care professionals, as they were considered as a consequence of PPE shortage and not evidence-based. Defusing these anxieties and frustrations required a considerable effort in terms of training, information and reassurance.

### **4. Triage**

The ethical and logistical challenges of Triage and allocation of Intensive Care Unit (ICU) resources during a pandemic have been extensively discussed (2). In many places, the overall context enforced

clinicians to adapt triage to a prioritisation in alignment with available resources (resource-based triage). In the vast majority the decisions made remained individualised and patient- and context-dependant according to national guidelines (3). In all circumstances, even if increasingly limited resources impose ever more restrictive prioritisation (4), withdrawal or withholding of Critical Care must remain a shared and documented decision-making process. Maintaining this level of accountability is imperative. A detailed and thorough analysis of the withholding and withdrawal of care during the peak of this first wave should be a research priority.

## 5. Surge Capacity

Several strategies increased surge capacity: upgrading existing intermediate or recovery units into ICUs, creating new units, transforming operating theatres into ICUs, upgrading normal wards to Intermediate Care Units with the use of high-flow oxygen therapy and simple Continuous Positive Airway Pressure (CPAP) devices and very important establishing step down capacity. The increase in ICU capacity required intense follow-up and coordination at regional level; public and private, academic and non-academic institutions joined forces to shoulder the burden. Patients were offloaded either to peripheral or private hospitals with underused ICU/HDU or newly created facilities or through medical evacuation of several hundred patients by air and train from the most (Grand Est and Ile-de-France) to less affected areas. This offloading prevented a breakdown of capacity in severely affected areas.

Many sites reproduced successfully a forward flow of patients in analogy to trauma mass casualty (MC) situations: triage zone, stabilisation zone, ICU or HDU, step down unit and rehabilitation. The time scale of this flow model is not measured in hours but days, compared to classic MC events. Application of this doctrine requires keeping length of stay in each zone to a minimum and thinking about the potential discharge pathway on admission to the ICU. Anticipation to increase capacities and to adapt or innovate pathways for recovery and rehabilitation are as important as for acute care. In the ICU, treatment strategies were adapted to implement an "ICU damage control pathway". In this context, damage control is to be understood as an acceptable simplification or modification of existing treatment modalities to shorten length of stay (use of high-flow oxygen instead of intubation, keeping sedation and muscle relaxation to a minimum, prone positioning without muscle relaxation...) and avoiding iatrogenesis for the individual patient allowing to treat more patients, instead of attempting implementation of a sophisticated new strategy, less often proved to be more. The capacity of clinicians to absorb new and complex information is limited if their cognitive load is already high. In such contexts, it appears easier to readapt the existing strategy than to reinvent or adopt a completely new or less known strategy (e.g. complex forms of ventilation).

A constant challenge was to maintain the capacity to manage all other non-SARS-CoV-2 critical care patients and balance these with the capacities required for SARS-CoV-2 patients. ICU/HDU capacities management required conscious effort to preserve protected space for non-SARS-CoV-2 critical care and respond to the evolving situation. Even with confinement, the need for major trauma care never fully ebbed down.

## **6. Continuity of essential services**

Given the tremendous pressure on the integral health system, the continuity of many essential services was seriously impaired. Early in the crisis, the local situation and a ministerial instruction imposed a cessation of all non-essential surgical care, effectively shutting down any non-vital surgical or interventional activity. The transfer of many operating theatre professionals, in particular anaesthetists and nurse anaesthetists, was crucial to increase ICU capacity, and they all demonstrated their broad range of skills in anaesthesia and critical care. From the current perspective, vital essential services were maintained in the worst affected areas. This preliminary impression requires thorough analysis, based for example on registry data. In contrast, many centres suspended or transferred all oncological activity to less or non-affected centres; some institutions managed to perform interventions exclusively for cases where any delay would have resulted in reduced chances of survival.

## **7. Human resources and human factor**

As in any event, human resource management remains a persistent key matter. Mitigation and anticipation of fatigue, frustration, underuse, exposure, absenteeism and of course affection of health professionals require the full attention of crisis leaders. It was obvious from the start that all human resources management had to be performed in a sustainable and parsimonious way over weeks to months and coordinated at regional level, for some professional groups at national level. To plan and anticipate moments of uninterrupted rest even for crisis leaders is crucial. Human resource management implies caring for the physical and psychological well-being of all healthcare professionals. In many hospitals, unemployed surgeons constituted “surgical task forces” whose aims were helping ICU teams in prone positioning patients, providing medical information to relatives and filling in medical charts. Overall, the medical community demonstrated an impressive capacity to adapt to an unprecedented situation.

## **8. Resource, logistics and supply management**

The extent of the global shortage of medical supplies such as PPE and essential drugs was probably not foreseeable. These shortages imposed innovation (e.g. sedation in ICU with volatile anaesthetics, prone position teams) and parsimonious use of medication (e.g. no muscle relaxants for prone

positioning whenever lung compliance was acceptable and patient/respirator asynchrony sparse) and equipment and adaption of medical doctrine. Overzealous innovation and changes might be harmful.

### **9. Comfort for patients and next of kin**

The COVID-19 pandemic challenged our capacities to provide the necessary and usual human and psychological support patients and next of kin deserve. Patients were submitted to profound neurological and psychological stress (5) while the next of kin were not allowed to visit their loved ones for the sake of public health in most institutions. Some centres implemented a much-protocolised access to patients in the ICU or for the end of life; others used videoconference solutions to allow for some form of contact.

### **10. Training and Preparation**

Training was crucial. Any centre with an active mass casualty or disaster training program or regularly rehearsed disaster plans adapted better and faster. Training was essential to prepare healthcare professionals in the first days of the pandemic for PPE use, airway management, cleaning, cardiac arrest, etc. Ad hoc programs enabled the training of a considerable number of healthcare professionals (protection, airway management) in a short amount of time. Training proved to be an excellent way to prepare professionals psychologically, reduce anxiety and convey validated messages and information. Disaster planning, preparedness, operational and psychological trainings for all healthcare professionals within an institution should become a mandatory part of the annual calendar to develop a resilience culture.

### **11. Learning from the pandemic**

As tragic as the pandemic may be, it is a unique lesson in humility and a unique opportunity to learn and improve our healthcare systems at every level. Connections and bonds created should be continued (for example between clinicians and the administration and between private and public hospitals) to rethink working, decision and communication patterns within our hospitals and institutions. There needs to be a before and after SARS-CoV-2. Many dogmas, fully endorsed at the beginning of the pandemic (early intubation, deep sedation and neuromuscular blockade for every patient, antiviral drugs) were subsequently questioned after the first debriefings and publication of clinical trial results. It is crucial to share clinical information, including observational data and case series, preserving usual scientific standards.

### **12. Post disaster recovery**



It is definitely too early to talk about “post pandemic recovery”, because we are still in the midst of it. At least for several months we will have to live with SARS-CoV-2 and develop new modes of organisation to live and work. For an unpredictable amount of time, the SARS-CoV-2 mode may be the new normal in our hospitals. Some challenges and questions are already obvious: sustainable long-term human resource management, protection and testing of healthcare professionals, protection of patients admitted for other reasons, protect and care for the chronically ill, elderly and immunocompromised patients, rebalance the available resources for non SARS-CoV-2 care and an SARS-CoV-2 pandemic expected to ebb up and down. We are confident that the global medical community is ready to take up the challenges that lie ahead.

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