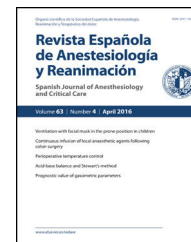




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EDITORIAL ARTICLE

Anesthesiology and the Anesthesiologists at COVID-19[☆]

Anestesiología y los anestesiólogos en la COVID-19

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Scientists around the world responded quickly once the new coronavirus (formally known as SARS-CoV-2) was formally identified in China in January. Within a few days, the entire genetic make-up, or genome, of the virus had been posted online, in stark contrast to the 2003 coronavirus outbreak, SARS, when it took 3 months for the genome to be released after the disease was initially attributed to chlamydiae.¹ This probably follows another precedent, such as the discovery of HIV in the 1980s. A turning point in daily clinical practice and also in patient care, accepting the presence of biological risk (parenteral transmission) and the use of gloves in our daily work. Widespread introduction of single-use material (economic condition), social change (sexual behaviour and practices) and research (chronicity and disease control). Viewed from this perspective, it seems that the parallels will soon converge, with stricter use of the face mask in our daily life and work, changes in our general behaviour (social distancing, trips, large meetings) and above all, increased research.² In 2 months, the scientific community has managed to populate PubMed with 5000 entries involving the term “covid” — it is hard to recall a similar situation.³

From the point of view of anaesthesiology in Spain, our contribution can also be described as brilliant and excep-

tional in both scientific terms and in the contribution of our experience in 2 important aspects of this disease, specifically, the treatment of severe hypoxaemia and the management of thromboembolic disease. We can also highlight the responsiveness, adaptive capacity and flexibility shown by different healthcare organizations in their efforts to immediately provide critically ill patients with the best care through excellent team management and clinical leadership.

Different ventilatory strategies in COVID-19

In many countries, the influx of SARS-CoV-2 patients has overwhelmed intensive care units (ICU) because so many develop viral pneumonia, characterised in its severe form by severe hypoxaemia and typical pulmonary infiltrates that require assisted ventilation. Based on existing recommendations,⁴ non-invasive strategies such as high-flow oxygen or non-invasive ventilation have been chosen as first-line therapy in 20%–30% of patients (although the percentage varies according to hospital and region). Although there are still no published data to show the potential prognostic benefits or risks of these therapies in COVID-19 patients with acute respiratory failure, first impressions are positive in terms of the low incidence of late failure, the main factor associated with mortality in patients with acute respiratory distress syndrome (ARDS).

On the other hand, a considerable number of patients admitted to the ICU have required invasive mechanical ventilation, mainly due to ARDS. Recent studies from China and Italy have described the epidemiology, clinical characteristics, and prognostic factors of patients who develop ARDS,

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the most severe form of respiratory failure,^{5,6} and there is evidence that ARDS secondary to COVID-19 exhibits atypical behaviour, insofar as patients with severe hypoxaemia present normal lung compliance.⁷ However, the relative absence of data to support this observation has generated some debate about which ventilation strategy is best to achieve the main objective, i.e., optimizing oxygenation without increasing ventilator-induced lung injury. However, the first studies published by Italian groups recommend invasive ventilation for ARDS of any aetiology, with low tidal volume, moderate-high PEEP and fraction of inspired oxygen to maintain minimum oxygenation targets. This approach is combined with other strategies often used in these patients, such as alveolar recruitment manoeuvres, prone position, and the use of neuromuscular relaxants.⁵ Several registry studies are currently under way, including one led by the Spanish Society of Anaesthesiology, (SEDAR) (CoVid19.ubikare.io),⁸ to clarify the different hypotheses on ventilatory strategies.

Impaired haemostasis, treatment strategies, and consensus in COVID-19

A very interesting aspect of clinical management in patients with COVID-19 has been the prevalence of coagulation disorders observed almost from the onset of infection. Although wide variations in coagulation tests are common in severe sepsis, in this new scenario clinicians have been surprised by the overproduction of fibrinogen, ferritin or D-dimer — findings that have been put forward as prognostic markers.⁹ This, in most cases, is not fully developed disseminated intravascular coagulation (DIC) (which may occur in the course of evolution), but rather the “preliminary phase” of DIC, which is compatible with “sepsis-induced coagulopathy” (SIC).¹⁰ In short, these findings indicate overt hypercoagulability with thrombin generation mainly at the microvascular level,¹¹ and have led to various theories to explain the underlying pathophysiology, including inflammation-induced hyperreactivity with endothellitis as a direct consequence or viral activity, and ARDS-induced hypoxia that is so frequently found in these patients.^{12–14}

This clinical situation has sparked interesting discussions on the management of these phenomena in addition to respiratory distress, due to the high risk of patients developing thrombotic cardiovascular complications derived from SARS-Cov-2 infection. The importance of anticoagulant treatment with low molecular weight heparin, particularly the different doses administered depending on risk factors or thrombotic findings, has been and continues to be a matter of controversy when agreeing on care protocols. Hopefully, the results of the studies and ongoing registries will show how to optimise this aspect of patient management.⁸

Management, leadership, and the start of the COVID-19 era

As mentioned above, new territories are being explored in management and leadership, at least at the hospital level. Each hospital and service, particularly at the start of the

outbreak, has had to adapt to new, unforeseen organisational and working practices.¹⁵ Even in settings prepared to deal with crisis situations or certain types of emergency, events unfolded at such a speed and magnitude that working practices had to be adapted on a daily basis.

The situation, obviously, has differed according area, hospital, city or region. The “top-down” responsiveness has been severely limited, and some have suggested that this is one of the factors responsible for amplifying the extent of the pandemic in Spain. Contacts, email lists and other social networks, podcasts (from companies — such as the Spanish Society of Anaesthesiology — or from individual professionals), the creation of databases^{8,16} and collaborative studies^{17,18} etc. have been and continue to be key factors.

Medical journals, among them the *Spanish Journal of Anaesthesiology and Critical Care*, have reviewed manuscript submissions at breakneck speed — a practice that is not without its risks, such as repeated case reports or series or less than thorough scrutiny — but one that was needed to facilitate the dissemination of diagnosis and treatment¹⁹ while providing free and open access to all readers. Existing voluntary *a posteriori* peer review systems have been promoted to cope with this surge in manuscripts,^{20,21} and several specific articles have been included in this number of the *Spanish Journal of Anaesthesiology and Critical Care*.

Nevertheless, even in the midst of a pandemic, lessons can be learned. Coordination between different areas or specialists (Anaesthesiology, Intensive care, Infectious diseases, Pulmonology, Internal medicine, Clinical analysis, Radiology, Emergency Medicine, SAMU, etc.), always necessary but rarely easy to achieve; the role of nursing — fundamental both in hospital wards and ICUs (even with accelerated “preparation-training” by staff); the role played by various resident specialists — with particular emphasis on anaesthesiology — and even by other specialists helping with various tasks outside their own field; not to mention the redistribution of hospital or out-of-hospital areas to care for confirmed or pre-confirmed COVID-19 patients and those who need critical care.

It may still be too early to draw conclusions, but there is no doubt that the curriculum of each specialty and each professional category should include general training in crisis situations or non-optional/mandatory refresher courses. Likewise, the contingency plans, including self-protection, put in place in each organisation, particularly each hospital, should be more than mere lengthy, theoretical, written procedures that are rarely or never put into practice, or simulations that are never carried out. The hitherto gradual implementation of “digital revolution” technologies in healthcare will now be speeded up worldwide.²² We need to think in the medium and long term, as it appears this outbreak is far from over.²³

Finally, key factors in this situation, though ones that are not directly related to our specialty (but that involve us as people, professionals and as patients), are epidemiological surveillance systems and the response of health and political authorities.

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Conflicts of interest

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