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Short Commentary

Digital Technology in the Covid-19 Pandemic

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The digital world has been steadily creating changes to our way of life a transformation that affects all areas of how we live. In the field of health, all areas have been affected by digitalisation and computer sciences-and these contribute decisively to scientific and clinical advances.

During the current Covid-19 pandemic, which like any other unexpected catastrophe, exceeds available health resources, information technology with its many possibilities can contribute to mitigating part of its effects. Specifically, during the current pandemic, emergency services and intensive care units (ICUs) have struggled to cope. For healthcare systems, this has created a dilemma about how to maintain enough capacity to adequately treat patients infected with Covid-19, protect health staff involved in fighting the pandemic, whilst caring for other patients with acute pathology, trauma, stroke, heart attack, etc., as well as chronic illnesses [1].

The primary complication from Covid-19 infection is acute respiratory failure. Unlike other severe septic conditions that involve multi-organ failure, Covid-19 usually causes mono-organ failure in the form of acute respiratory distress syndrome (ARDS) [2]. It is still a cause for controversy whether this respiratory failure which is related to the over-activation of macrophages is a consequence of increased patient viral load or an exaggerated inflammatory response of the host [3]. Regardless, up to 20% of patients are likely to need to be admitted to ICU for ventilation support [4]. This has led to the need to improvise new ICU areas, purchase ventilators, ECMO equipment and so on. However in many countries, the main problem and one that is difficult to improvise has been finding specialist doctors with sufficient knowledge and skill to handle critical patients and sophisticated respiratory support techniques.

Precision medicine and new ways of managing and evaluating medical care based on value have made it necessary to change care concepts and devices. Whilst strong, accessible public primary care is required for looking after these patients as well as for their ongoing care, critical situations such as this require very high levels of specialisation and experience in managing them if the best results are to be achieved [5]. Digitalisation can lead to greater effectiveness and equity by providing a larger number of people with specialist care, as well as greater efficiency by centralising these activities in leading care centres and units. It also means that hospital resources can be reserved for those who really need them and ensure continuity of care.

What Can We Expect from Digital Technology During this Pandemic?

This transformation brings with it a cultural change in how we think about and understand medicine, and places the patient at the centre of the organisation of any health system. It implies that, in addition to a more flexible and person-centred organisation, we need to take advantage of all the data that patients generate. In regard specifically to ICUs, monitoring physiological variables and medical and nursing actions on a continuous basis produces an enormous amount of data, minute by minute some 1,400 units of information for each patient admitted [6]. These data must subsequently be used to produce knowledge for clinical decision-making. It is striking that, during this pandemic, despite the widespread use of electronic health records (EHR) which allows data to be gathered and stored for further analytical processing we still lack reliable information on many epidemiological, pathogenic, pathophysiological and therapeutic aspects of the current pandemic. It is possible that what is happening is that EHRs are being misused due to lack of efficient access to stored data. However, the quality of care and strategic decision-making in these situations depends on the knowledge generated by processing and analysing the information found in the active data repository.

The enormous amount of complex data from different sources has led to the need for the use of Artificial Intelligence and Big Data tools. This technology enables high-speed identification of patient profiles, repetitive and similar patterns of the disease's evolutionary behaviour, use of and response to treatments, hidden information, trends, and so on. Its use will be critical in managing the Covid-19 pandemic, together with the use of predictive algorithms that should help in understanding the virus's speed of transmission and the at-risk population, the natural history of the disease, its mortality rate and the best therapeutic options and prevention and control measures [7].

Telemedicine and mobile health (mHealth) are the new, logical consequences of the digital transformation. In this pandemic, tele-triage can help achieve a more efficient use of health services. A large number of people who are mildly or moderately affected can remain at home and be managed clinically at a distance, receiving quality

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personalised care without exposure to more seriously ill patients. Today´s telemedicine enables, in certain situations, the same quality of care as in person care.

In critical situations such as the current pandemic, the demand for care in intensive care units is beyond anything previously forecast. The availability of digital platforms that integrate bio-signals and devices and send the data online to a central point, where they can be analysed by critical care specialists, enables structural barriers to be broken through: ICU without walls [8] and availability of specialists directing the care and treatment of severe and critical patients.

Likewise, patients admitted to less-complex hospitals that have less experience in treating patients with severe ARDS are able to receive the same care by being remotely supervised from a super-specialist centre with expert teams and "evidence-based protocols" [9]. Telemedicine thus becomes a fundamental aspect of equity offering all citizens access to the health care they need on equal terms. Today's technology allows all of a patient's physiological variables to be monitored and the devices he or she needs from infusion pumps to ventilator data. Similarly, diagnostic tests such as radiology, biopsies, genetic studies, etc can all be viewed and interpreted from a computer or mobile devices by expert specialists thousands of kilometres away, making it possible for the experts' knowledge to do the travelling rather than the patient and for all patients to have access to that knowledge when they need it.

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