How a digital ICU strategy helped power the fight against a global pandemic

The evidential value in real-time critical care information systems during COVID-19

The unexpected and unprecedented scaling up of Intensive Care Units (ICU) across Europe in early 2020 due to the Coronavirus "COVID-19" (SARS-CoV-2) pandemic put all health organisations to the test. Patient capacity had to be increased and clinical teams reorganised to save as many lives as possible. Quick and accurate information to power decision making and respond rapidly to any patient deteriorations became vital as patient numbers soared at the height of the first pandemic wave.

A critical care information system that automatically collects real-time information from medical devices at the patient's bedside, and displays that data for instant review anywhere at the bedside or in a central location, provided numerous benefits to a tired and stretched ICU workforce. Digital data reduced the need for manual paper-based collection in a highly infectious care environment; saving time, reducing recording errors and enabling staff to be in many places at once.
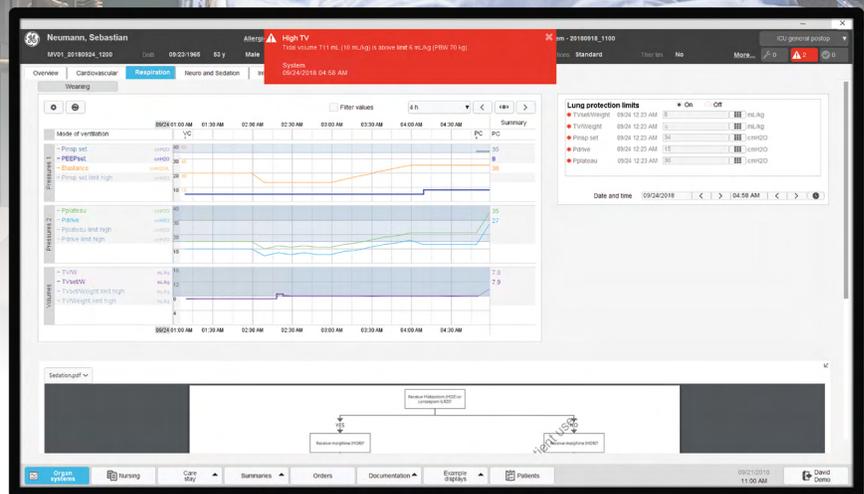
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Scaling-up to save lives

The Hospital Universitari Joan XXIII de Tarragona, part of the Catalan Health Institute in Spain, scaled up its ICU from 28 to 79 beds. It had been using GE Healthcare's clinical information system for six years prior to the crisis in order to improve the overall safety and quality of care, plus have clear information on the clinical history of patients.

Dr. María Bodí, Head of ICU Service & Coordinator in SEMICYUC states, "**We went from two to six units as part of our COVID-19 capacity measures**. The Centricity Critical Care solution gave us the opportunity to expand at speed. I cannot imagine being able to attend to patients in different units with different information systems – it would have been impossible to guarantee a high level of patient care."

"During the crisis, we also had to incorporate many professionals not used to working in ICU, especially nurses. It was a similar scenario with the medical team with physicians joining us from different areas of the hospital like Emergency, Cardiology and Anaesthesiology. This was essential in our efforts and we quickly reorganised ourselves at a team level and leaned on the system's processes to effectively train new professionals over three days – there was no time to wait months."
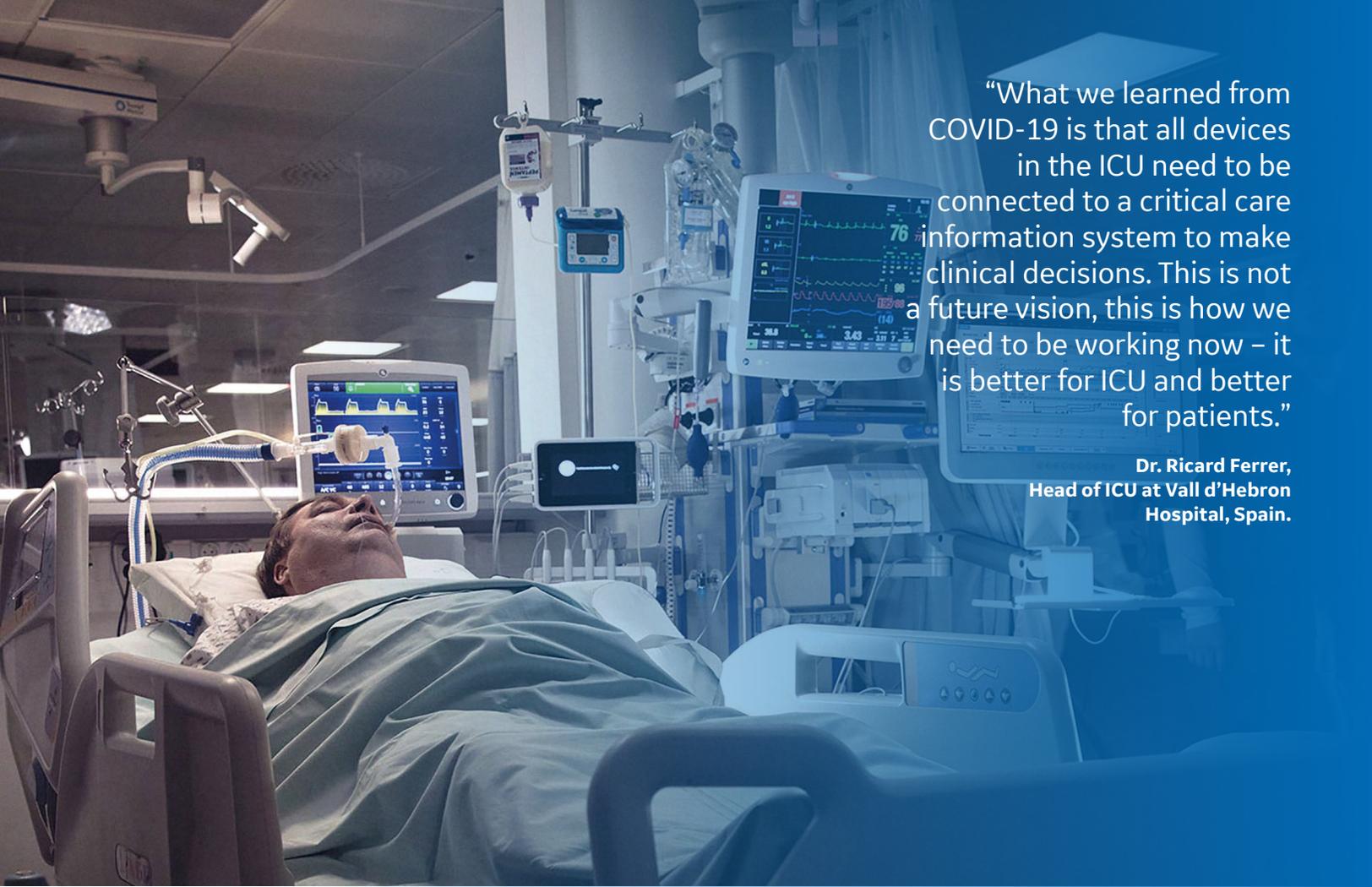
Standardising care & communication to steer through the crisis

Lack of familiarity with the ICU environment could have been very challenging for redeployed staff. However, with a digital critical care system, rule-based decision support, notifications and protocols are provided at the bedside and at the central dashboard. Worklists customised for COVID-19 as task reminders also provided consistency in the records and delivery of treatment to patients.

In Barcelona, Dr. Ricard Ferrer, Head of ICU at Vall d'Hebron Hospital and President of the Spanish Society of Intensive Care, ensured constant clinical communication during the

height of COVID-19. He explained, "We had 13 ICUs across the hospital in three separate buildings that were managed by intensivists with other professionals. Every day we had video conferences with coordinators to communicate virtually across the sites to manage the flow of patients and make some difficult decisions based on the information. We also held webinars every week for the 220 physicians taking care of the patients to give updates on protocols or sharing of new knowledge that had been published."

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Amplifying the need for digital records rather than paper

In the UK, Portsmouth Hospitals NHS Trust expanded its critical care footprint due to COVID-19 into other areas such as respiratory high care and theatre recovery. "**Expansion allowed us to potentially increase our capacity by 150%**, from 24 to 60 beds if we needed it," states Dr. Steve Mathieu, Care Group Director for Critical Care & Anesthesia & Theatres.

"The value of our digital ICU strategy was magnified during our scaling up process when in some of the other pod areas we were not able to replicate the electronic system. This was like stepping back ten years in time to use paper charts and notes before we had an electronic system. It reminded us of how important it is to have a digital ICU. Whilst paper is manageable at normal critical care capacity, it is much harder when running at 100-200% of your capacity with staffing levels as they are."

"In our critical care unit, we can get a quick snapshot overview on each patient about their physiology, their lab results and their documentation from the clinical information system. This gives us a rapid sense of the type of patient, their main problems and plans. For example, have their trends changed; what was their last blood culture result like; what antibiotics are they on; how long for and should we be changing them? A digital system also gives us consistency in terms of legibility of notes or drug prescribing. With paper, every individual writes in a different way, so if we want to look back one, two or five days, there isn't a standardized template. An electronic system gives us that."

Looking ahead to continue the management of ICU pressures

Understanding the characteristics of COVID-19 and patient response to treatments is an important part of the battle to beat the virus should there be subsequent waves or future pandemics.

"The value of all our clinical patient data from our COVID-19 experience is like gold. It shows how the oxygenation, hemodynamics, sedation and treatment evolved continuously. It is real information, what really happened in sequence. It is much more valuable than a retrospective report written by a doctor after an event. This information will be important to share with other groups and intensivists, even other countries, to be able to make prognostic or predictive models with decision support tools that could even be incorporated into the clinical information system itself," concludes Dr. María Bodí.

Imagination at work