



# Predicting the unpredictable:

How ICU data from the COVID-19 pandemic could help medicine get a step ahead of the virus

Understanding Coronavirus “COVID-19” (SARS-CoV-2) is still work in progress. Every day, a little more is learned about how to track it, how it attacks the body and how patients respond to different supportive care treatments. To get ahead of the virus, and any future pandemics, is to be ready to predict the unpredictable.

European Intensive Care Units (ICU) have had to react fast and learn quickly to fight back against the Coronavirus pandemic. Patient care was scaled up and the advantages of a

Clinical Information System that automatically collected digital data from medical devices at the bedsides of sick people came to the fore. Simple and clear information with trends and notifications helped steer decisions rapidly and accurately without the need for paper.

Whist work continues in preparing and pre-empting subsequent regional waves of the virus, the retrospective records from a critical care system saved as gigabytes, even terabytes, of digital data in healthcare repositories holds much value.

## 1. Understanding how the virus attacks and what supportive care can help

Whilst there is currently no approved treatment for COVID-19, the priority of ICU is to support the patient’s vital organs to keep them alive.

A critical care information system records automatically and in real-time all the data from medical devices at patients’ bedsides and laboratory values. This data is directly available for review remotely without the need of specialists to be physically at the bedside location in PPE. This also gives a complete picture of their stay in ICU and shows in a structured way how a patient reacted to all steps of the care process. Reviewing this information can help with understanding how the human body responds to oxygen therapy, sedation, anti-viral medication and respiratory interventions. It is the foundation block of setting up local or national standardised treatment protocols and processes to assist future patient admissions. It simply would not be possible to do the same thing with paper charts or written records.

*“The original intention of implementing Clinical Information Systems into our ICU department was to improve the safety and quality of patient care. A secondary advantage that COVID-19 has magnified is the retention of all this information in the Clinical Information System to give a clear clinical history. There would be no other way of recording and being able to recall this information other than using a digital system.”*

Dr. María Bodí, Head of ICU Service, The Hospital Universitari Joan XXIII de Tarragona, Spain.



**A Clinical Information System provides simple and clear information with trends and notifications.**

## 2. Learning vital lessons that shape future ICU decisions

Looking back is as important as looking forward when it comes to shaping future ICU planning. COVID-19 has pushed healthcare to its limits, but it has also highlighted key issues that need addressing so healthcare is fit for the future.

*“We learnt from our COVID-19 experience that our number of ICU beds per 100,000 inhabitants is insufficient. This is something we need to correct. We also need more intensivists but this is not very easy to do as they require 5 years of training - so to meet the need, training must start today. The use of a digital ICU system during the pandemic also showed us that all the medical devices need to be connected. This makes clinical decisions better and an integrated approach produces interesting quality indicators, safety indicators and predictive tools.”*

Dr. Ricard Ferrer, Head of ICU at Vall d’Hebron Hospital, Barcelona & President of the Spanish Society of Intensive Care.



### 3. Powering research and development in prognostic and predictive modelling

By looking at critical care data of individual patients such as blood oxygen levels, blood pressure, plus wider multi-discipline information such as lab results and medicine intake, gives a rich resource to help fuel research and innovate new solutions that can drive faster and higher standards of care.

This could include predictive deep-learning algorithms to power AI based prognostic or predictive solutions that could evolve or indeed revolutionise the care and treatment of COVID-19.

*“The more you share data, the more possibility there is to advance Artificial Intelligence or machine learning tools to answer questions that are not yet resolved. In order to have prognostic and predictive modelling, you need to have a lot of data.”*

Dr. Kirsten Colpaert, Senior Intensivist ICU at Ghent University Hospital, Belgium.

### 4. Sharing data to advance medicine and science

Science and medicine coming together to share information and data has the potential to unlock future drug discoveries or treatments, not only for COVID-19, but also other clinical conditions or future pandemics. Collaboration and partnerships between academia, industry and health organisations are not new, but COVID-19 has shown how strengthening relationships through the sharing of evidence is vital to understanding and combatting challenges.

*“Sharing data is really important as we’re all learning about diseases. We know the bread and butter of medicine, we know what we need to do, but when we are faced with something different we need to be able to adapt, share and communicate to make sure we’re following evidence-based practice quickly. The other thing about sharing information is research – if we are all supporting research it will allow us to get answers to give the best treatment to patients.”*

Dr. Steve Mathieu, Care Group Director for Critical Care & Anesthesia & Theatres, Portsmouth Hospitals NHS Trust, UK.

Expanding data in ICU shines a light not only on the safe delivery of care to an individual patient at a single point in time, but also on the fundamental decisions to be made by health management. A tipping point has been reached where technology and information systems are essential in underpinning and substantiating the direction and breadth of care. The unpredictable can happen as 2020 illustrated, but we can be ready to adapt quickly and plan with data firmly in our hands.



## Imagination at work

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