

# The Future ICU

The Future of Haemodynamic Monitoring: From Planet Mars to Resource-Limited Countries, *F. Michard, M. Fortunato, A. Pratas, S. Rodrigues de Oliveira*

Clinical Decision Support Systems: Future or Present in ICU? *A. Naharro-Abellán, B. Lobo-Valbuena, F. Gordo*

The Future of Critical Care Ultrasound, *A. Butnar, A. Wong, S. Ho, M. Malbrain*

Future ICU Design: Return to High Visibility, *D. Hamilton, S. Swoboda, C. Cadenhead*

A Framework for Addressing Seasonal Influenza: A Critical Care Perspective, *L. Busse, C. Coopersmith*

Will Artificial Intelligence Change ICU Practice? *V. Herasevich, M. Keegan, M. Johnston, B. Pickering*

Future Strategies in Sedation and Analgesia, *B. Pastene, M. Leone*

Critical Care Telemedicine: A Management Fad or the Future of ICU Practice? *K. Iliopoulou, A. Xyrichis*

The Intersection of Big Data, Artificial Intelligence, Precision and Predictive Medicine to Create the Future of Critical Care, *G. Martin*

The Intelligent Intensive Care Unit: Integrating Care, Research and Education, *E. Cox, I. van der Horst*

## PLUS

Introducing the Intubation Credit Card, *A. Higgs, S. Goodhand, A. Joyce*

Improving Recognition of Neonatal Sepsis, *M. Harris, A. Masino, R. Grundmeier*

Lifesaving Applications of Transoesophageal Echocardiography in Critical and Emergency Care, *R. Arntfield*

Shaping the Human Side of Medical Devices in Critical Care: The Implication of Human Factor Studies in Clinical Settings, *M. Micocci, A. Tase, M. Ni, P. Buckle, F. Rubulotta*

Diagnosis, Treatment and Management of the Critically Ill Patient, *R. Moreno*



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# THE FUTURE ICU

Critical Care Medicine has existed for many years, but was only recognised as a specialty in the last 40 years or so. However, during this time, there has been a tremendous amount of change. Over the years, our understanding of different critical illnesses has improved, and our treatment strategies have become more effective. Technology has also played a key role in improving patient care, and adopting a human approach in the ICU. This pace of change is likely to continue in the years to come, and we will eventually see critical care medicine becoming less invasive, and more personalised.

Our cover story, **The Future ICU**, envisions what the future ICU will look like and how smart technology, Big Data, and Artificial Intelligence will shape the future of our ICUs. It presents the many possibilities that could further improve the treatment and management of the critically ill patient and highlights some of the challenges that need to be addressed to make the future better for both clinicians and patients.

Frederic Michard, Magna Fortunato, Ana Pratas and Sergius Arias Rodrigues de Oliveira talk about the future of haemodynamic monitoring and the need to consider the accessibility to scientific and technological progress, particularly in resource-limited countries while Antonio Naharro-Abellán, Beatriz Lobo-Valbuena, and Federico Gordo discuss the Clinical Decision Support Systems and how they will further develop in the near future, and become an essential part of ICU monitoring.

Anda Butnar, Adrian Wong, Serene Ho, and Manu Malbrain explore the future of Critical Care Ultrasound and how it will continue to push boundaries in the years to come. D. Kirk Hamilton, Sandra Swoboda, and Charles Cadenhead highlight the importance of staff-patient and staff-staff visibility and how this factor will be considered in future designs for critical care units.

Vitaly Herasavich, Mark Keegan, Matthew Johnston, and Brian Pickering talk about an AI-enabled ICU while Greg Martin explores the intersection of Big Data, AI, Precision and Predictive Medicine and how critical care will evolve from a system that reacts to patient deterioration into a system that predicts and prevents these events.

Seasonal Influenza remains a significant health burden. Laurence Busse and Craig Coopersmith present a framework for the comprehensive management of influenza while Bruno Pastene and Marc Leone talk about future strategies in sedation and analgesia.

Katerina Iliopoulou and Andreas Xyrichis talk about Critical Care Telemedicine, and how it is likely to be a key feature of the future ICU, and Eline Cox and Iwan van der Horst discuss the integration of care, research and education in the intelligent ICU.

In our Matrix section, Andy Higgs, Sam Goodhand, and Aidan Joyce introduce the intubation credit card, a go-anywhere checklist format to improve tracheal intubation. Mary Catherine Harris, Aaron Masino and Robert Grundmeier discuss early recognition of sepsis in the neonatal intensive care unit using machine learning models while Robert Arntfield talks about lifesaving applications of Transoesophageal Echocardiography in critical and emergency care.

In our Management section, Massimo Micocci, Arkeliana Tase, Melody Ni, Peter Buckle, and Francesca Rubulotta present an overview of Human Factors Engineering and how it can help reduce errors and preventable harm.

Our interview section features Rui Moreno, Neurocritical and Trauma Intensive Care Unit, São José Hospital, Centro Hospitalar Universitário de Lisboa Central E.P.E, Lisbon, Portugal.

There is no perfect way to predict the future, as there are many complex factors at play. However, our contributors have presented the many possibilities that exist, and the areas which could further improve the way we treat the critically ill patient. There are many exciting things to look forward to, and many challenges to handle. The goal, as always, is to improve patient care and patient outcomes. The future that we present in this issue is full of potential and hope, and many of these possibilities will make the Future ICU better for our patients.

As always, if you would like to get in touch, please email [JLVincent@icu-management.org](mailto:JLVincent@icu-management.org).

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