

**SPECIAL SUPPLEMENT**

Pain Management  
in the ICU

# Innovation

Protecting ward patients: the case for continuous monitoring,  
*F. Michard, T.J. Gan, R. Bellomo*

Innovations in ICU ventilation: the future delivered, *F. Gordo, A. Abella,  
B. Lobo-Valbuena*

Data-driven management for intensive care units, *F. J. da Silva Ramos,  
J. I. F. Salluh*

Technology innovations in delivering accurate nutrition: preventing  
malnutrition and enforcing nutritional guidelines, *P. Singer, L. Elia*

The business of research, *J. B. Ochoa Gautier*

## PLUS

The role of disruptive and hybrid  
technologies in acute care,  
*T. Kyprianou*

Extravascular lung water as a  
target for intensive care, *M. Kirov,  
V. Kuzkov, L. Bjertnaes*

Managing delirium in the ICU  
with sleep guardians, *C. Irwin,  
S. Parkinson*

The establishment and provision  
of an acute kidney injury service  
at a tertiary renal centre, *S. Fray*

Communication myths of  
anaesthetists, *S. Watson*

The role of the Physician  
Assistant in critical care,  
*V. Bakshi*

The need to humanise the ICU,  
*S. East*

Noninvasive technologies for  
personalised haemodynamic  
monitoring: advanced  
haemodynamic monitoring  
methods, *B. Saugel*



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# Trends in epidemiology and antimicrobial resistance in intensive care units

The intensive care unit has a unique environment, mainly because it treats severe and critically ill patients who require special care. Critical care patients often require high-risk surgeries, and there is also a frequent need for invasive devices such as central or peripheral venous catheters, urinary catheters or tracheal tubes, among others. This makes these patients more susceptible to hospital-acquired infections (HAIs).

Recent data from the European Union (EU) reports that patients admitted to an ICU for more than 2 days acquired at least one HAI. These HAIs included cases of pneumonia, bloodstream infections, and urinary tract infections.

HAIs cause increased morbidity and higher treatment costs. It is estimated that HAIs result in nearly 15 million additional days of hospitalisation. More than €5.5 billion per year is spent because of HAIs. But what is even more worrisome is the fact that HAIs in an ICU environment can be life-threatening. In the EU, over 37,000 deaths each year are attributed to HAIs, and most of these deaths involve ICU patients.

Antibiotics play an important role in managing HAIs, but the problem of antibiotic resistance continues to be an issue in ICUs. Most HAIs that originate in the ICU are caused by multidrug-resistant microorganisms. The most frequent pathogens that reside in the ICU include *Escherichia coli*

and members of the ESKAPE group (*Enterococcus faecium*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, and *Enterobacter spp.*). Each of these microorganisms is resistant to most antibacterial agents that are commonly used in the ICUs.

The ESKAPE group, in particular, deserves special attention because of their virulence power and the fact that they have a higher level of antibiotic resistance. These pathogens are associated with high mortality rates in critically ill patients and are thus a major threat to public health.

## strict antibiotic control measures must be implemented in all hospital settings, especially in the ICUs

In short, antimicrobial resistance is an area of concern. There are fears that we might be returning to a pre-antibiotic era when untreatable pan-resistant microorganisms would colonise the ICU. Antibiotic options to treat the main pathogens that cause HAI have become scarce. No further development seems to be in sight since pharmaceutical companies have already

announced that they are no longer investing in the development of new antibiotic drugs. Thus, the presence of highly resistant microorganisms that cause HAI is a reality that needs to be addressed.

The problem of antibiotic resistance did not occur overnight. This resistance is related to several factors including the misuse and overprescribing of antibacterial agents as well as premature treatment stops and incorrect dosages. Statistics show that in the EU from 2011-2012, hospitalised patients who received at least one antibiotic during their stay was 35% increasing to 56.5% among patients admitted to an ICU. This in itself demonstrates that there is an enhanced pressure within the ICU to prescribe antibiotics and this practice contributes to the development of antibiotic resistance.

There is a need to take urgent action to halt or mitigate the development of antibiotic resistance. Strict antibiotic control measures must be implemented in all hospital settings, especially in the ICUs. In addition, the development of new treatment alternatives to tackle these microorganisms should remain a research priority. ■

### References

Pons, MJ and Ruiz J (2019) Current trends in epidemiology and antimicrobial resistance in intensive care units. *Journal of Emergency and Critical Care Medicine*, 3:5.

## Results of the ABATE infection trial

According to results of the ABATE infection trial, daily bathing with an antiseptic soap, plus nasal ointment for patients with prior antibiotic-resistant bacteria reduced hospital-acquired infections among patients with central venous catheters and other devices.

The ABATE infection trial included 340,000 patients from 53 hospitals. The study was led by researchers from the Harvard Pilgrim Health Care Institute, the University of California Irvine, Rush University and HCA Healthcare (HCA). The study

titled "*Chlorhexidine versus Routine Bathing to Prevent Multi Drug-Resistant Organisms and All-Cause Bloodstream Infection in General Medical and Surgical Units: The ABATE Infection Cluster Randomized Trial*," is published in *The Lancet*.

The trial evaluated whether daily bathing with an antiseptic soap for all patients and nasal mupirocin antibiotic ointment in the nose of patients with a history of Methicillin Resistant Staphylococcus Aureus (MRSA) could potentially reduce hospital infections and antibiotic-resistant bacteria.

"Several ICU trials have shown striking reductions in infections and antibiotic-resistant bacteria using daily chlorhexidine bathing and nasal decolonisation with mupirocin. We wanted to know if patients outside the ICU could benefit from a similar decolonisation strategy," said lead author Susan S. Huang, MD, MPH, Professor of Medicine, Division of Infectious Diseases, University of California, Irvine School of Medicine.

The findings show that only patients with devices such as central venous catheters, midline catheters, and lumbar drains benefit-

ted from this intervention, but no significant benefit was observed in other non-ICU patients. Patients with devices showed a 30% decrease in bloodstream infections and a 40% decrease in antibiotic-resistant organisms. A possible explanation for benefit in these particular patients may be because they are at a higher risk of infection. As it is, patients with devices account for more than half of all bloodstream infections in the hospital.

Senior author Richard Platt, MD, MSc, Professor, and Chair of the Department of Population Medicine at the Harvard Pilgrim Health Care Institute and Harvard Medical School points out that many hospitals have adopted antiseptic bathing for patients with devices outside the ICU even before the availability of any scientific evidence. However, findings from this trial provide additional

support for this strategy, and thus it might be worthwhile to adopt the decolonisation strategy as best practice in non-ICU patients with devices to reduce bloodstream infection and antibiotic-resistant bacteria. ■

### References

Huang SS, Septimus E, Kleinman K et al. (2019) Chlorhexidine versus routine bathing to prevent multidrug-resistant organisms and all-cause bloodstream infections in general medical and surgical units (ABATE Infection trial): a cluster-randomised trial. The Lancet. doi.org/10.1016/S0140-6736(18)32593-5

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