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

©For personal and private use only. Reproduction must be permitted by the copyright holder. Email to copyright@mindbyte.eu.
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

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 benefitted 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