Intensive Care Med (2020) 46:372–374
https://doi.org/10.1007/s00134-019-05846-0

EDITORIAL

A microbiologist consultant should attend daily ICU rounds

J. Schouten[1], G. De Angelis[2] and J. J. De Waele[3*]

Antibiotics are widely used in the intensive care unit (ICU); with approximately half of the patients diagnosed with an infection, this is not surprising [1]. In parallel, we are witnessing an increase in the incidence of infections caused by multidrug resistant (MDR) infections, in which exposure to antibiotics is a contributing factor [2].

Hospital-wide antibiotic stewardship programs (ASP) have been developed to reduce antibiotic exposure and improve patient outcomes. In a multidisciplinary approach involving different specialties, different interventions are used to assist prescribers in better antibiotic decision-making. This may include the provision of guidelines, formulary restrictions, review and feedback [3].

ASP meetings are widely used in the ICU [4] but the frequency, duration and its participants vary from daily meetings with the complete team discussing each patient to once-weekly meetings with part of the team to discuss the difficult to treat patients.

Despite the presence of the microbiologist in ICU is frequently advocated [5], and studies have reported on improved antimicrobial practices after establishing a more closer interaction between clinicians and microbiologists in before–after studies in single-center studies [6], no study has formally demonstrated the superiority of a strategy with a microbiologist in daily rounds compared to different types of "liaisons" in ICU, nor in other settings. Furthermore, the systematic review by Lane et al. [7], which explored facilitators and barriers for patients care round in ICU, did not identify the "microbiologist" (but the pharmacist instead!) as leading character in multidisciplinary team rounds.

Still, extensive knowledge on susceptibility patterns, local ecology, the importance of previous infections and colonization with MDR pathogens are among the core competencies of clinical microbiologists deemed essential for appropriate management of antimicrobial therapy in the ICU (Table 1).

Since the (often mandatory) introduction of ASPs in hospital, an increasing burden has been placed upon Antimicrobial Management Team members, who have often extended their work without being provided additional workforce or funding. This is especially true for microbiologists who now need to combine more clinical outreach work with laboratory practice. As daily/weekly meetings and continuous out-of-hours service are requested by ever more departments, the workload for the microbiologist is increasing. In an era where physician burnout is more prevalent than ever before, this should not be underestimated.

Even if daily presence of a microbiologist may be considered valuable by intensivists [5], the time efficiency of such meetings is obviously questionable: not all patients have an infectious problem or have antibiotics and—once the topic of infections is discussed—intensivists may linger on indefinitely about nutrition, weaning or any other non-infection-related (but equally important) problem during which the microbiologist is clearly wasting time. Moreover, other members of the ASP team present at the meeting may also be losing valuable time.

With the introduction of rapid diagnostics [8], establishing diagnosis of the causative pathogen and susceptibility patterns in a matter of hours rather than days, a daily meeting at a fixed moment seems obsolete and would essentially slow down appropriate antimicrobial decision making. Moreover, modern communication technology and advanced electronic medical records

*Correspondence: Jan.DeWaele@UGent.be
[3] Department of Critical Care Medicine, Ghent University Hospital, C. Heymanslaan 10, 9000 Ghent, Belgium
Full author information is available at the end of the article

Springer

Table 1 Overview of areas of expertise and involvement of the clinical microbiologist in the ICU

Core domains of the clinical microbiologist in ICU	Frequency	Activities (other than daily rounds)
Assisting physicians in diagnosis and empirical treatment	Daily	On-call availability, rapid results communication and consultation, guidelines development
Aiding in interpretation of results	Daily	Report with note for contamination/colonization, selective reporting on antimicrobial susceptibilities, educational meeting
Avoiding unnecessary testing	Daily	Educational campaigns, audit and feedback, electronic ordering implementation
Assisting in correct microbiological sampling techniques and timing thereof	Daily	On-call availability, guidelines development, educational meetings on new and advanced diagnostic tests
Assisting in selecting the optimal targeted antibiotic and the correct duration	From daily to weekly	Periodical meetings, on-call availability, selective reporting of antibiotic susceptibilities, computer-decision support system, guidelines development
Providing cumulative surveillance data on resistant organisms for infection control purposes	From every 3 months or 6 months to 1 year	Hospital intranet, printed card, educational meeting
Facilitating infection prevention and control practices	Daily	On-call availability, guidelines development, educational meetings

nowadays allow for other means of interaction between the microbiologist and the ICU team [9].

So, how can we find a more efficient and less time-consuming way to integrate valuable microbiological advice into modern ICU practice?

Based on the experience of the team, the availability of the microbiologist and the needs of the unit at a specific moment in time, a unit-tailored approach can be preferable. In recently started ASP teams, daily meetings with the whole team may be very valuable, but, as experience of the team grows, antibiotic therapy is settled in clear local guidelines, laboratory is 24/7 and a microbiologist is available on call for the most rapid communication process of microbiology results to ICU team—the role of daily meetings may change. In a mature ASP team, meetings should be used to reinforce knowledge and strategies as well as to introduce new concepts or discuss ecology, etc. At that stage, much of the antimicrobial prescriptions are covered by guidelines and standard practices which are now very familiar to the bedside team.

We remain convinced that face-to-face contact is essential for implementation of good antimicrobial stewardship. While day-to-day immediate feedback using modern information technology solutions is now feasible and effective, we must keep seeing the microbiologist in our ICU in person on a regular basis (but not necessarily daily during ICU rounds) to (Table 1):

- Learn about our prescribing patterns related to (changing) resistance patterns in our ICU unit.
- Learn about new developments in (rapid) diagnostics and their effect in relevant antimicrobial stewardship principles in ICU.
- Assist in interpretation of results or in reducing unnecessary testing.

Conversely, microbiologists must be exposed regularly to the clinical complexities in ICU to improve their integrative consultation skills and regular interaction with intensivists will facilitate this.

We advocate the adoption of an alternative scheduling of appointments with clinical microbiologists and other ASP team members as below:

- Once weekly clinical round in which difficult-to-treat patients are discussed with the microbiologist.
- Once per 3–6 months feedback session with data on adherence to appropriate prescribing (using relevant quality indicators for antimicrobial prescribing in ICU such as guideline adherence, appropriate duration and PK-PD) and an oversight of hospital-wide emergence of MDR pathogens.
- More frequent (and even daily) meetings during outbreaks or epidemics requiring close collaboration and with need for intensified infection control measures.

In conclusion, the importance of a microbiologist with his/her knowledge based in the management of ICU infections is undisputed. However, in this era of modern communication tools, physical presence of a microbiologist at a daily face-to-face ward round may not be needed once an ICU antimicrobial stewardship program is fully established. We support the use of continuous digital microbiological support and established ICU adapted guidelines on one hand and a more flexible face-to-face approach when dedicated advice is really needed. 24/7

availability of an (on call) microbiologist to validate rapid diagnostic testing is essential to allow for fast change of therapy. We do believe that structural (not daily but weekly or monthly) meetings are warranted to keep both parties aligned.

Author details
[1] Department of Intensive Care, Radboudumc Nijmegen, Geert Groote Plein 10, Nijmegen, The Netherlands. [2] Istituto di Microbiologia, Università Cattolica del Sacro Cuore, Largo F. Vito 1, 00168 Rome, Italy. [3] Department of Critical Care Medicine, Ghent University Hospital, C. Heymanslaan 10, 9000 Ghent, Belgium.

Compliance with ethical standards

Conflicts of interest
Dr. Schouten has nothing to disclose. Dr. De Angelis has nothing to disclose. Dr. De Waele reports grants from Research Foundation Flanders; Dr. De Waele consulted for Bayer, Pfizer, Grifols, Accelerate (honorariumi paid to institution).

Publisher's Note

Received: 8 September 2019 Accepted: 28 October 2019
Published online: 14 November 2019

References

1. Vincent JL, Rello J, Marshall J, Silva E, Anzueto A, Martin CD, Moreno R, Lipman J, Gomersall C, Sakr Y, Reinhart K, EPIC-II Group of Investigators (2009) International study of the prevalence and outcomes of infection in intensive care units. JAMA 302:2323–2329. https://doi.org/10.1001/jama.2009.1754
2. Timsit JF, Bassetti M, Cremer O, Daikos G, de Waele J, Kallil A, Kipnis E, Kollef M, Laupland K, Paiva JA, Rodríguez-Baño J, Ruppé É, Salluh J, Taccone FS, Weiss E, Barbier F (2019) Rationalizing antimicrobial therapy in the ICU: a narrative review. Intensive Care Med 45:172–189. https://doi.org/10.1007/s00134-019-05520-5
3. Charani E, Cooke J, Holmes A (2010) Antibiotic stewardship programmes—what's missing. J Antimicrob Chemother 65:2275–2277. https://doi.org/10.1093/jac/dkq357
4. Kollef MH, Bassetti M, Francois B, Burnham J, Dimopoulos G, Garnacho-Montero J, Lipman J, Luyt CE, Nicolau DP, Postma MJ, Torres A, Welte T, Wunderink RG (2017) The intensive care medicine research agenda on multidrug-resistant bacteria, antibiotics, and stewardship. Intensive Care Med 43:1187–1197. https://doi.org/10.1007/s00134-017-4682-7
5. Wilson L, Dempsey G (2007) Medical microbiology ward rounds in critical care. Crit Care 11:P75. https://doi.org/10.1186/cc5235
6. Arena F, Scolletta S, Marchetti L, Galano A, Maglioni E, Giani T, Corsi E, Lombardi S, Biagioli B, Rossolini GM (2015) Impact of a clinical microbiology-intensive care consulting program in a cardiothoracic intensive care unit. Am J Infect Control 43:1018–1021. https://doi.org/10.1016/j.ajic.2015.04.200
7. Lane D, Ferri M, Lemaire J, McLaughlin K, Stelfox HT (2013) A systematic review of evidence-informed practices for patient care rounds in the ICU. Crit Care Med 41:2015–2029. https://doi.org/10.1097/CCM.0b013e31828a435f
8. Decousser JW, Poirel L, Nordmann P (2017) Recent advances in biochemical and molecular diagnostics for the rapid detection of antibiotic-resistant *Enterobacteriaceae:* a focus on β-lactam resistance. Expert Rev Mol Diagn 17:327–350. https://doi.org/10.1080/14737159.2017.1289087
9. Curtis CE, Al Bahar F, Marriott JF (2017) The effectiveness of computerised decision support on antibiotic use in hospitals: a systematic review. PLoS One 12:e0183062. https://doi.org/10.1371/journal.pone.0183062