EDITORIAL

Do quality indicators for antibiotic use lack quality?

B.H.J. Wittekamp

Intensive Care Center, University Medical Centre Utrecht, Utrecht, the Netherlands

Correspondence

b.h.j.wittekamp@umcutrecht.nl

In their study 'Adherence to recommended care for antibiotic use in ICU patients', published in this issue of the *Netherlands Journal of Critical Care*, Wollersheim and colleagues retrospectively evaluated the compliance to 11 quality indicators for appropriate antibiotic use, including seven indicators related to the use of selective digestive tract decontamination (SDD) or selective oropharyngeal decontamination (SOD).[1] The study provides insight into compliance to a decontamination protocol in one ICU in a non-teaching hospital. Adherence to guidelines is informative in itself, but there may be important pitfalls when measuring quality indicators related to antibiotic use.

First, as illustrated by Wollersheim et al., accurately measuring the compliance of topical antibiotic administration may be difficult. Data from electronic case records has the advantage of large amounts of information that may be readily available. However, in the current study, the data on administering SDD four times daily showed a compliance of 45-50%,[1] which may not have been accurate. The authors state that nurses did 'not see the necessity' to double check, and thereby properly register the administration of SDD in the electronic patient file. In contrast, the compliance was 100% during (non-blinded) direct observations. It is known that observations can be a stimulus for protocol compliance, which is why observations are part of the World Health Organisation hand hygiene protocol.[2] This learning effect is also known as the Hawthorne effect.[3] But even if SDD/ SOD were indeed administered in 100% of the opportunities, application of the right dose remains an issue, as the recommended dose of mouth paste is subject to interpretation, as highlighted by the authors. This was quantified in a previous small study sample in which a large variation in the amount of mouth paste was present. In fact, only 35% of the intended amount of mouth paste was applied on average.[4]

Second, indicators may seem to measure valuable and practical endpoints, such as stopping third-generation cephalosporins after four days, as dictated by the SDD protocol. However, a reason for stopping cephalosporins may be a switch to another

antibiotic class such as carbapenems, for example when escalating treatment in case of perceived treatment failure. As resistance among Gram-negative bacteria to cephalosporins is becoming more common, escalating to carbapenem antibiotics may be too, for example in the case of extended spectrum beta-lactamase producing (ESBL) bacteria. In this sense, the lack of a cephalosporin on day 5 of the SDD protocol may not necessarily be a positive sign. Similarly, important trends in types of antibiotics used are overlooked when counting days of all types of antibiotic therapy (DOT) per 100 patient-days as quality indicator. Trends of antibiotic classes are more informative (e.g. carbapenems versus penicillins). In addition, DOTs may not measure antibiotic pressure if more than one antibiotic is given on one day, which would result in a DOT of 1, but a defined daily dose (DDD) of 2 or higher. Thus, DDDs are more representative for the amount of antibiotics used. The combination of DOT and DDD per class of antibiotics is most informative as this provides information on both the duration of therapy (especially if DOTs are reported for specific infections) and the amount of antibiotics used (if DDDs are reported per infection, e.g. as DDD/100 days).

Third, there are quality indicators of which the importance could be debated. An example may be the number of annual meetings on antimicrobial resistance rates and trends. A meeting is no guarantee for success. Related to SDD, twice weekly surveillance cultures of the rectum and respiratory tract facilitate dose adjustment upon persistent colonisation and detection of antimicrobial resistance, but no studies have indicated that doubling the dose of topical antibiotics upon persistent colonisation during SDD reduces the occurrence of infections. The effect on patient outcome and ICU ecology remains to be determined.

When performing evaluations of recommended care, quality indicators may best be selected for accuracy (do they measure what they are supposed to measure, e.g. the number of signatures did not relate to the number of antibiotic administrations)

and unambiguity (the number of yearly meetings does not guarantee a functioning antibiotic stewardship program). The scientific evidence base for each quality indicator to optimise antibiotic use may be another criterion. If these criteria are met, measuring indicators will not only provide insight into the adherence to guidelines, but may also help to improve the efficiency of antibiotic therapy.

Applications for antibiotic stewardship

The scores of quality indicators could be used as a benchmark for the performance of one ICU compared with others with the aim to optimise antibiotic therapy and prevent side effects such as antimicrobial resistance or unnecessary costs, i.e. to improve antibiotic stewardship. In this context DOTs could be compared for specific infections, such as community acquired pneumonia, and a target DOT may be chosen that is associated with the best outcome in these patients and least unwanted effects such as development of resistance. As with all comparisons between institutions, differences in ICU characteristics and case-mix may preclude direct comparison and require analyses that correct for ICU characteristics and case-mix differences.[5] A comparison of the performance of the same ICU over years may be less prone to bias and can be very informative for local antibiotic stewardship initiatives. The use of database driven analyses on selected quality indicators may improve the accuracy of measurements and facilitate repeated measurements.

Indeed, the European Society of Intensive Care Medicine (ESICM) has recently underscored the importance and urgency of the problem of antimicrobial drug resistance and calls for

(mandatory) stewardship programs.[6] Although stewardship initiatives may already be present in the form of hospital-wide antimicrobial stewardship teams (A-teams),[7] it would be helpful for future ICU initiatives to have clear guidance on the selection of quality indicators that may be suitable for the evaluation of antibiotic use both within and between ICUs.

Disclosures

The author declares no conflict of interest. No funding or financial support was received.

References

1. Wollersheim BMHE, Kallen MC, Roos-Blom MJ, et al. Adherence to recommended care for antibiotic use in ICU patients. Neth J Crit Care. 2018:26:215-220.
2. WHO Guidelines on Hand Hygiene in Health Care: First Global Patient Safety Challenge Clean Care Is Safer Care. Geneva: World Health Organization, 2009. (Accessed October 19, 2018, at http://apps.who.int/iris/bitstre am/10665/44102/1/9789241597906_eng.pdf.)
3. Werzen A, Thom KA, Robinson GL, et al. Comparing brief, covert, directly observed hand hygiene compliance monitoring to standard methods: A multicenter cohort study. Am J Infect Control. 2018; Oct 9. pii: S0196-6553(18)30864-2. doi: 10.1016/j.ajic.2018.08.015.
4. Rood J, Nawzad H, Kalicharan R, van Steenbergen M, Vromans H. Drug release from an oromucosal paste for the selective decontamination of the oropharynx (in ICU patients and healthy volunteers). Eur J Pharmaceut Sci. 2015;73:88-92.
5. Nouira H, Ben Abdelaziz A, Kacem M, Ben Sik Ali H, Fekih Hassen M, Ben Abdelaziz A. Which indicators used to assess quality performance in Intensive Care Units? A systematic review of medical literature. Anaesth Crit Care Pain Med. 2018; Jul 25. pii: S2352-5568(17)30395-8. doi: 10.1016/j.accpm.2018.06.003.
6. De Waele JJ, Akova M, Antonelli M, et al. Antimicrobial resistance and antibiotic stewardship programs in the ICU: insistence and persistence in the fight against resistance. A position statement from ESICM/ESCMID/WAAAR round table on multi-drug resistance. Intensive Care Med. 2018;44:189-96.
7. Berrevoets MA, Ten Oever J, Sprong T, et al. Monitoring, documenting and reporting the quality of antibiotic use in the Netherlands: a pilot study to establish a national antimicrobial stewardship registry. BMC Infect Dis.. 2017;17:565.