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Reply to McGuckin and Govednik

To the Editor—Hand hygiene compliance is defined as the number of times hand hygiene is performed divided by the number of hand hygiene opportunities, as defined by a rule or guideline.[1] This provides information about how often hand hygiene is performed, but only at those times *when this should have been the case.* If a healthcare worker performs hand hygiene without there being an opportunity, this measurement is not included in the equation. In this way, compliance gives a bare indication of whether people are following (complying with) the rule or violating it.

Hand hygiene product volume measurement (PVM) provides insight into the amount of product you are using but not into whether you are using it when you should. PVM is indeed a valid assessment of the frequency of hand hygiene, but this is only the numerator. For this reason, its results cannot be used as a measure for compliance. This would change should you have information on how much product you should have used. However, because this was not the case in the studies reviewed, PVM was excluded from our analysis—as, indeed, were studies that had measured only frequency of hand hygiene by some other means.

We agree with McGuckin and Govednik[2] that PVM provides many advantages in healthcare improvement packages, particularly when it comes to practicality of use and long-term implementation. Observation studies are expensive and time consuming, and much effort must be made to avoid biases in the data created by the Hawthorne effect. Use of PVM information as an indication for frequency performance feedback can be a valuable addition to a hand hygiene promotion campaign. However, if the research question is related to whether healthcare workers are adhering to the guideline, compliance must be measured to provide an answer.[1]

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An Integrated Clinical Microbiology Service Ensures Optimal Early Empirical Antimicrobial Therapy for Methicillin-Resistant *Staphylococcus aureus* Bloodstream Infection

To the Editor—We read with interest the article by Herzke et al[1] about empirical antimicrobial therapy for bloodstream infection (BSI) due to methicillin-resistant *Staphylococcus aureus* (MRSA). In that study, slightly more than one-half (51.8%) of the patients with MRSA BSI received appropriate empirical therapy. We find this surprising, given that among hospitalized patients, MRSA is the causative organism in up to 20% of BSIs[2] and bearing in mind the well-documented excess mortality for MRSA BSI, compared with methicillin-susceptible *S. aureus* BSI, and findings that improved survival is associated with early appropriate treatment in MRSA BSI.[3]

We reviewed data from patients at Beaumont Hospital (Dublin, Ireland), a 759-bed tertiary care referral hospital with a number of national specialties. Patients whose records were reviewed had *S. aureus* BSI during the period from 2007 through 2009. MRSA accounted for 39% of all *S. aureus* BSIs in 2007, for 34% in 2008, and for 19% in 2009—figures comparable to Irish and UK national data.[4] There were 103 patients with documented MRSA BSI. Eighty-three medical records were available for review, and we noted the antibiotic treatment received in the first 24 hours after suspected *S. aureus* was detected in blood cultures. Final identification and susceptibility data were usually available within the subsequent 24 hours. Only data on the initial MRSA BSI for each patient were included. In each case, the team managing the patient was contacted by the clinical microbiology service when gram-positive cocci were visualized in blood samples and again the following day, when presumptive *S. aureus* was

identified but before final susceptibility profiles were confirmed. The clinical setting, the patients' progress, and antibiotic therapy and other means of management were discussed in each case.

Of the 83 patients we studied, 80 received antibiotics. Three patients, for whom a decision was made that further active treatment was not appropriate, did not receive antibiotics. Of these 80, 73 (91%) received antibiotics appropriate for MRSA, including vancomycin (70 patients), teicoplanin (1 patient), daptomycin (1 patient), and linezolid (1 patient). Of the 7 patients who did not receive antibiotics active against MRSA, all received β-lactams and were clinically stable. In all 7 cases, advice was given by the clinical microbiology service to administer vancomycin treatment, but the decision to treat was deferred pending on-going clinical assessment, additional blood culture results, and the availability of final identification and susceptibility data. When susceptibility results became available, treatment was optimized for all of these 7 patients.

A total of 51.8% of patients with *S. aureus* BSI in the Duke Infection Control Outreach Network and 91% of such patients at Beaumont Hospital received appropriate treatment in the first 24 hours after the organism was identified in blood culture. We are curious at the disparity between the Duke and the Beaumont Hospital experiences. Among the reasons may be the sometimes segregated nature of infection services in some US hospitals, where microbiology laboratories are often managed by scientists or managers; where patient consultation and antibiotic advice may be provided by infectious diseases physicians, who may not have timely information regarding laboratory results; where surveillance of hospital-acquired infection can be undertaken by a hospital epidemiologist; where infection prevention is often the remit of infection control practitioners; and where liaisons between the microbiology laboratory and the attending physician are sometimes undertaken by clinical pharmacists. In many European countries and elsewhere, these roles are all undertaken by a physician, usually a medically qualified clinical microbiologist.[5] In Ireland, clinical microbiologists usually undergo initial postgraduate training in general internal medicine, surgery, or pediatrics and then undertake 5 years of higher specialist training in all aspects of infection, culminating in the membership examination of the UK Royal College of Pathologists.

In our hospital, as in many others, the clinical microbiologist is informed by the laboratory scientist when a potential pathogen is isolated from a sterile site. This occurs 24 hours per day. The clinical microbiologist liaises with the attending physician, offering therapeutic, additional diagnostic, and infection control advice.[6,7] All patients are reviewed clinically and fully assessed by the clinical microbiology service, which consists of a consultant microbiologist and a medically qualified microbiology trainee; entries are made in the patient notes recommending further management. In this model, antibiotic and other therapeutic recommendations and related patient care issues, additional scientific examination of the specimen, additional diagnostic evaluation, microbiology workload issues, antimicrobial stewardship, infection control, and hospital epidemiology requirements are all coordinated by a single trained individual as part of a multidisciplinary team. This broad, multifaceted approach has a high level of support and uptake from clinical colleagues and may account for the higher level of appropriate treatment of patients with MRSA BSI.

It is essential that early treatment decisions in patients with BSIs are made by properly trained and accredited clinicians with timely access to the most up-to-date laboratory data. This, in turn, ensures acceptance by physicians. Hospitals and government health departments would do well to look at this integrated model, which operates very well in many European and other countries.

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