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

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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 al1 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 BSIs2 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

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 Govednik2 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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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. 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 potentially pathogenic isolate is found 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. 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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Reply to Fe Talento et al

To the Editor—We appreciate the comments by Fe Talento et al1 regarding our article evaluating the rate of effective empirical therapy for methicillin-resistant Staphylococcus aureus (MRSA) bloodstream infections.

Fe Talento et al comment on the success of an integrated clinical microbiology service at Beaumont Hospital in Dublin, Ireland. This service is led by specially trained clinical microbiologists who communicate with the attending physician of each patient who has a positive blood culture result and provide recommendations for further evaluation and treatment. The authors note that, with use of this system, 80 of 83 patients with bloodstream infection due to MRSA received antibiotics. Of these 80 patients, 91% received appropriate antibiotics within the first 24 hours after the initial blood culture isolate was identified as suspected S. aureus. Three patients received no antibiotics and were not included in this calculation. Fe Talento and colleagues report that this rate is much higher than the rate of appropriate therapy reported in our study.

Although the success of this program is laudable, the authors’ comparison is not accurate: Fe Talento et al1 judged appropriateness of treatment on the basis of antibiotics given after a blood culture result had first been noted to be positive and after S. aureus had been suspected as a pathogen (presumably after gram-positive cocci were identified as pathogens in the blood culture). In our study, appropriateness was judged on the basis of antibiotics administered on the day that the blood culture specimen was obtained—often days before the blood culture result was even known to be positive. For a more appropriate comparison, we suggest that Fe Talento and colleagues analyze the appropriateness of therapy on the day that blood samples for culture were obtained and not the day that a positive culture result was obtained.

We agree that communication between the microbiology laboratory and treating clinicians is an important tool to improve rates of effective antimicrobial therapy, and having an integrated clinical microbiology service is a wonderful asset (although it is probably not feasible in many community hospitals in the United States, the majority of which have less than 250 beds). Rapid diagnostic methods, such as polymerase chain reaction testing and culture on selective media (eg, CHROMagar; Becton Dickinson), are additional tools that can be used to assist with early identification of organisms once culture results turn positive to improve rates of effective antimicrobial therapy.

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Inside-Out: The Changing Epidemiology of Methicillin-Resistant Staphylococcus aureus

The increasing incidence of methicillin-resistant Staphylococcus aureus (MRSA) is a topic of concern in both the medical and the lay literature.1 Once thought of solely as a hospital-acquired pathogen, MRSA has been increasingly reported from the community, occurring in patients without established predisposing risk factors. Over the past decade, community-acquired MRSA (CA-MRSA) strains have been increasingly reported as the cause of serious infection and are now well recognized as a major cause of morbidity.2-4

The Veterans Affairs Medical Center (VAMC) in Washington, D.C., provided an ideal setting to study the changing epidemiology of MRSA, because the facility provides comprehensive emergency, outpatient, inpatient, and long-term care to a relatively closed population. Its electronic medical record allows infection control practitioners to monitor culture data facility-wide. We report the marked changes in the epidemiology of new clinical isolates of MRSA during the period 2001–2007.

During the 7 years of the study, approximately 40,000 patients received care at the medical center annually. We reviewed infection control data on clinical MRSA isolates recovered during the period 2001–2007. All new clinical isolates of MRSA were evaluated and categorized as either hospital-acquired MRSA (HA-MRSA) or CA-MRSA. We defined an isolate as HA-MRSA if an MRSA-positive culture result was obtained at least 48 hours after admission to the hospital for a person without obvious signs of infection at the time of admission; an isolate was also categorized as HA-MRSA if...