

Impact on Methicillin-resistant *Staphylococcus Aureus* infections rate after the implementation of a specific Antibiotic Care Bundle based on results of Rapid Molecular Screening in the Intensive Care Unit

Paola Stano, Manuela Avolio, Rita De Rosa, Maria Luisa Modolo, Alessandro Camporese

SOC Microbiologia e Virologia, Dipartimento di Medicina di Laboratorio
Azienda Ospedaliera "S. Maria degli Angeli", Pordenone.

Background

Colonization with methicillin-resistant *Staphylococcus aureus* (MRSA) is a risk factor for subsequent MRSA invasive infections, including ventilator-associated pneumonia, bacteremia and endocarditis, particularly in patients admitted to critical areas such as intensive care units (ICU). Recently published articles highlights the usefulness of active surveillance cultures (ASC) as a predictor of methicillin-resistant *Staphylococcus aureus* infections and they demonstrate that MRSA screening should be considered a useful tool for predicting in advance the MRSA etiology of the infection and for starting a correct empiric antimicrobial treatment. Moreover, several studies demonstrated that MRSA colonization results must be rapidly delivered to critical care physicians to translate into an actual clinical impact, thus the recent introduction of various molecular tests for rapid identification of MRSA carriers can improve infection control procedures by providing results within hours rather than days, as previously required by culture-based methods. ACB is a group of key elements based on clinical features and laboratory results for the management of antibiotic prescription. MRSA surveillance, in conjunction with an antibiotic care bundle (ACB) approach, has been recently proposed as a guide for correct treatment of patients admitted to ICU. We conducted a surveillance among patients admitted to our ICU and we assess here the effects of a specific methicillin-resistant *Staphylococcus aureus* (MRSA) antibiotic care bundle (ACB), based on rapid molecular screening for MRSA nasal carriage, contact precautions for patients MRSA colonized or infected and promptly beginning of an empirical anti-MRSA coverage, on MRSA infections prevalence in our intensive care unit.

Methods

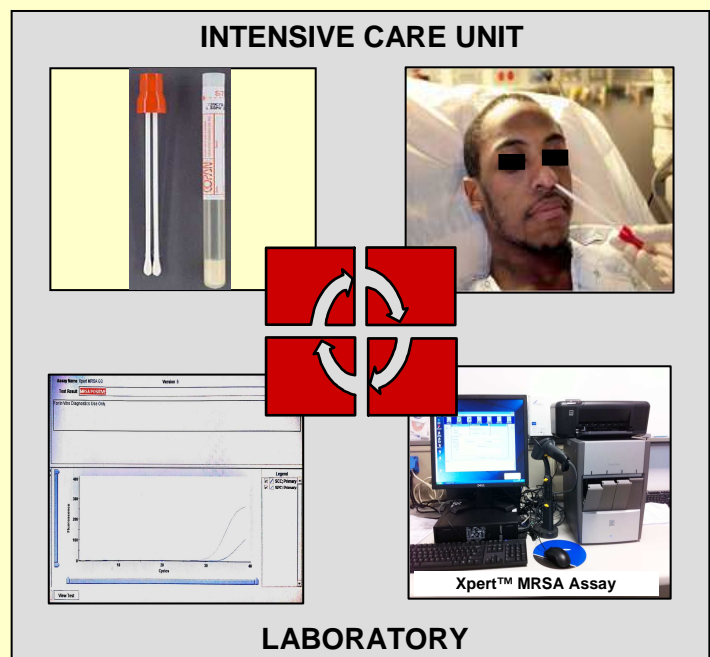
An MRSA ACB was implemented in 2011 in our ICU (1). A total of 431 and of 577 nasal swabs were obtained from ICU patients at the admission respectively from April 2009 through December 2010 (pre-intervention period) and, after the ACB implementation, from January 2011 through December 2012 (post-intervention period) and analyzed by the rapid molecular test Xpert™ MRSA Assay (Cepheid, Sunnyvale, CA, USA). All patients were followed during their whole ICU stay to determine whether they developed MRSA infection which was confirmed by a positive culture from sterile sites. The results were available to critical care physicians within 2 hours from specimen receipt.

Results

During the pre-intervention period, 9 patients (2%) developed a generalized MRSA infection, but the MRSA rate reduced to 0,3% (2 patients) in the post-intervention period, with a total MRSA infection decrease of 100% in two consecutive semesters, between July 2011 and July 2012 (Table 1). The rate of MRSA infections among positive nasal carriers dropped from 30% in the pre-intervention period to 4% in the post-intervention period although the colonization rate at the admission increased respectively from 7,1% to 8,4%. The statistical analysis shows the relative risk reduction, absolute risk reduction and relative risk after interventions are respectively 0.85 (95% confidence interval: 0.36-0.97), 0.26 (95% confidence interval: 0.06-0.33) and 0.14 (95% confidence interval: 0.02-0.63). Moreover, the relative risk reduction of bacteremia infections alone in the ACB period was 100%.

Conclusion

The analysis demonstrated a significant decline in MRSA infections following the introduction of rapid molecular active surveillance and the specific ACB in our ICU. Moreover we showed a significant reduction of the risk of MRSA infections among colonized patients managed following the ACB protocol and especially of the risk associated with MRSA bacteremia (relative risk reduction 100%). Admission rapid molecular nasal screening followed by the specific ACB appears to be an effective tool to decrease the spread of MRSA and to reduce the MRSA infection rate in the intensive care unit. We underscore the importance of using the rapid molecular nasal screening instead of traditional methods: it is sensitive and capable of providing to clinicians results in few hours, allowing MRSA-positive ICU patients who will more likely develop MRSA infections to be rapidly detected and managed appropriately (2).



	April 2009-December 2010 Pre-intervention period	January 2011-December 2012 Post-intervention period
Total patients screened, n	431	577
MRSA negative nasal screen, n	401	528
MRSA positive nasal screen, n	31 (7,1%)	49 (8,4%)
MRSA infections (%)	9 (2%)	2 (0.3%)

Table 1.

REFERENCES:

- (1) Stano, P. et al. *In Vivo*, 2012; 26(3): 469-72.
- (2) Stano, P. and A. Camporese. *Crit Care Med* 2012; 40(11): 3113-4.