Challenges in stemming the spread of resistant bacteria in intensive care

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A new research study of the effect of a commonly used strategy to reduce the spread of antibiotic-resistant bacteria in hospital intensive care units (ICU) shows that the strategy had no significant effect. That's the surprising finding of a multisite study led by Mayo Clinic investigators. The bacteria -- methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant enterococcus (VRE) -- are resistant to common antibiotics and harder to treat if patients become infected. The findings appear in today's *New England Journal of Medicine*.

The strategy includes screening patients admitted to ICUs for MRSA or VRE carriage -- a procedure called "active surveillance" (required by law in some states) -- and use of barrier precautions (gloves and gowns) by health care providers during the care of patients carrying these bacteria.

"We were surprised by the 'no effect' result, especially given two facts. First, many patients who were not previously known to be carriers of MRSA or VRE were identified by active surveillance. Secondly, MRSA or VRE positive patients were cared for using barrier precautions for nearly their entire ICU stay," says W. Charles Huskins, M.D., Mayo Clinic infectious diseases specialist and lead author of the article.

The study focused on whether this strategy was effective in preventing the spread of MRSA and VRE, not whether it reduced infections caused by these bacteria. In addition to hand hygiene, barrier precautions prevent contamination by MRSA or VRE of health care workers' hands, clothing, and the equipment and environmental surfaces around the

patient, which may serve as sources for spread of these bacteria to other patients. Infections are prevented by other sets of interventions.

The assumption -- and the hypothesis of the study -- was that an intervention that included active surveillance and expanded use of barrier precautions would reduce the spread of MRSA and VRE in the participating ICUs, compared to existing practice in the control ICUs.

The study was conducted in 18 ICUs at major academic medical centers around the country and used a cluster-randomized design -- a scientifically rigorous design for this type of study -- to test the effect of the intervention. Each ICU, and all the patients cared for in the ICU, represented a "cluster" and was assigned randomly to provide care using the intervention or its existing (control) procedures.

In all ICUs, active surveillance of MRSA and VRE was conducted. Swabs of body surfaces were obtained from patients soon after admission to the ICU and cultured for MRSA and VRE. Culture results were reported only to intervention ICUs.

In intervention ICUs, patients who had cultures that were positive for MRSA or VRE, or who had a history of being positive during the previous year, were cared for using contact precautions, which required health care providers to practice hand hygiene and wear clean gloves and a gown for all contacts with these patients or their surroundings. Newly admitted patients were cared for using universal gloving, which was similar to contact precautions except use of a gown was not required, until the admission culture results were negative for both MRSA and VRE.

In both groups of ICUs, observers located in the patients' rooms recorded data on health care providers' hand hygiene practices and use of gloves and gowns.

Active surveillance identified a large subgroup of patients not previously known to be colonized with MRSA or VRE. In intervention ICUs, patients who were colonized or infected with MRSA or VRE were assigned to care either using contact precautions or universal gloving for 92 percent of the days they spent in the ICU.

Despite this, there was no difference in the frequency of new colonization or infection events with MRSA or VRE, or with each separately, when comparing intervention ICUs to control ICUs. Hand hygiene and use of gloves and gowns by health care providers in intervention ICUs was less than required. Additional analyses showed that this was not likely to be the sole explanation for the results of the trial, but the authors say that "exemplary performance" in this regard may reduce the spread more effectively.

The researchers conclude that merely identifying more colonized patients through active surveillance and expanding the use of barrier precautions are not likely to be broadly effective. They suggest that better adherence to isolation precautions is important, but may need to be complemented by interventions that reduce colonization on body sites and improve environmental cleaning.

More information: WC Huskins et al. Interventions to reduce transmission of resistant bacteria in intensive care units. *New England Journal of Medicine* DOI: 10.1056/NEJMoa1000373 (2011). http://www.nejm.org/

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