

Reducing Hospital-Acquired Infections

(MRSA, VRE, and *C. diff*)

A Learning and Innovation Community

The Challenge

Health care-associated infections remain a major cause of morbidity, mortality, and cost despite concerted efforts of the Centers for Disease Control (CDC) and infection control professionals for nearly a half-century. Recently, treatment of these infections has become more complex due to an alarming rise in antibiotic resistance. Infections caused by methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant *Enterococci* (VRE) are particularly problematic — both are associated with increased mortality, and their incidence has risen inexorably over the past decade. The very rapid emergence of community-acquired MRSA poses a serious new challenge since these strains are beginning to spread in hospitals. According to the Centers for Disease Control, MRSA now accounts for greater than 50% of hospital-acquired *Staphylococcus aureus* infections, and there have been similar increases in VRE.¹

Costs in human and financial terms of these resistant infections are high. Studies have shown that over 125,000 patients are hospitalized annually with MRSA², of which as many as 12,000 die. MRSA is also associated with 2.7 million days in excess LOS, and \$9.5 billion in excess charges.³ Infections from VRE may contribute to an additional 20,000 hospitalizations per year⁴ with additional costs of almost \$13,000 per case.⁵

Not only is it becoming increasingly difficult to find effective antibiotics to treat these resistant health care-associated infections, but antibiotic therapy itself predisposes patients to another potentially-life threatening infection, *C. difficile* (“*C. diff*”) colitis. The incidence of *C. diff* has been increasing for years, but the recent emergence and spread of strains that produce much higher levels of a potent toxin have made control even more urgent. Overall, MRSA, VRE, and *C. difficile* infections combined infect at least 350,000 persons, cause the death of at least 12,000, and result in at least \$5 billion in excess health care costs.

The Solution

Thousands of studies have been published regarding these infections, and there is increasing evidence that specific interventions, if practiced reliably, can have an impact. In the Netherlands and some Scandinavian countries, the incidence of MRSA has remained below 5% for a number of years.⁶ Although it is much more challenging to control MRSA in countries and hospitals with high endemic rates of colonization and infection, some institutions have made substantial progress in controlling it.

A recently published guideline from the Hospital Infection Control Practices Advisory Committee provides an excellent review of the strategies that may be useful in reducing transmission of organisms resistant to multiple drugs. Subsequently, IHI has worked with clinical experts to develop a package of interventions. These evidence-based interventions include aggressive detection of carriers, rigorous isolation of colonized patients, appropriate hand hygiene, and thorough disinfection of the environment and personal equipment. Although aspects of this package may seem self-evident, the key to preventing transmission of organisms is highly reliable practice of all components — rates of compliance that greatly exceed current practice in most health care settings. In addition, infection in colonized patients can be dramatically reduced by reliable application of the Central Line and Ventilator Bundles.

There are many barriers to consistent implementation of best practices, including but not limited to: the complexity of the core processes designed into our care delivery systems; a punitive approach which inhibits reporting and open discussion of events; and the tradition of focusing corrective action on individuals rather than on the underlying systems failures. However, infections can be significantly reduced by the implementation of known measures, through standardizing and simplifying core processes, redesigning delivery systems using proven human factors principles, partnering with patients, creating safety cultures which minimize blame and maximize communication and teamwork, and using technologies appropriately.

This Learning and Innovation Community will focus primarily on the reduction of MRSA infections. VRE and *C. diff* also will be targeted since some of the basic interventions that are required to control MRSA, with appropriate additional measures, also are effective in reducing transmission of these pathogens.

Teams in this Community will build upon the work reported by successful organizations and by working collaboratively to redesign processes in their own organizations. Initial focus will be in a pilot area, such as an intensive care unit, where teams will work to achieve dramatically higher reliability in all evidence-based components of the intervention package:

- Active detection of MRSA carriers
- Contact precautions and use of dedicated equipment
- Hand hygiene
- Decontamination of the environment and equipment
- Central Line and Ventilator Bundles

This work will be enhanced by a focus on changing culture, using proven techniques from previous IHI projects on patient safety. Other areas of focus may be identified by teams and faculty during the course of the Community.

Aims

The aim of this Community will be to significantly reduce health care-associated infections due to MRSA, VRE, and *C. diff*.

The Institute for Healthcare Improvement works in partnership with the Centers for Disease Control and Prevention (CDC), the Association for Professionals in Infection Control and Epidemiology (APIC), and the Society of Healthcare Epidemiology of America (SHEA) on its hospital-acquired infections initiatives.

¹ Siegel JD, Rhinehart E, Jackson M, Chiarello L. Management of Multidrug-Resistant Organisms in Healthcare Settings, 2006. *The Healthcare Infection Control Practices Advisory Committee*. Online information also available through the Centers for Disease Control and Prevention (CDC) at www.cdc.gov.

² Kuehnert MJ, et al. Methicillin-resistant *Staphylococcus aureus* hospitalizations, United States. *Emerging Infectious Diseases*. 2005;11:868-872.

³ Noskin G, et al. The burden of *Staphylococcus aureus* infections on hospitals in the United States. *Arch Intern Med*. 2005;165:1756-1761.

⁴ Reik R, et al. An Analysis of Vancomycin-Resistant Enterococcus (VRE) Hospitalizations in the United States, 2003-2004. Master's Thesis, Emory University, 2006.

⁵ Carmelli Y, Eliopoulos G, Mozafari E, Samore M. Health and economic outcomes of vancomycin-resistant Enterococci. *Arch Intern Med*. 2002;162:2223-2228.

⁶ Verhoef J, Beaujean D, et al. A Dutch approach to methicillin-resistant *Staphylococcus aureus*. *Eur J Clin Microbiol Infect Dis*. 1999;18:416-466.

The Institute for Healthcare Improvement's

most intensive front-line improvement work happens in Learning and Innovation Communities. These are collaborative change laboratories in which teams from a wide variety of organizations work with each other and IHI faculty to rapidly test and implement meaningful, sustainable change within a specific topic area.

Led by expert faculty, and using face-to-face meetings, monthly calls, Extranet access and listservs, these Communities achieve remarkable improvements together and create lasting collegial relationships. Organizations can participate in Learning and Innovation Communities either by enrolling directly in the Community of their choice or by joining IHI's IMPACT network. (IMPACT membership includes enrollment in one Learning and Innovation Community, participation in the Leadership Community, and discounted fees on other IHI programs.)

IHI's IMPACT network is for those health care professionals who are ready to pursue system-level improvement on every front: clinical outcomes, financial performance, and patient and provider satisfaction. Through IMPACT, organizational leaders and front-line workers join together in multiple Learning and Innovation Communities to work toward and sustain dramatic whole-system change.

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