

# Blood Pressure Cuff Selection: A Simple Step Toward Reducing the Spread of MRSA

## Summary

*The transmission of hospital-acquired methicillin-resistant Staphylococcus aureus (MRSA) infections and other infections that cannot be treated with common antibiotics is a well-known yet growing problem. The cost associated with treating these infections is staggering.*

*Current measures commonly used in most healthcare facilities to prevent the spread of MRSA and other infections are largely inadequate. Studies have shown that contamination of blood pressure cuffs and other patient care equipment is widespread. Additional measures such as using single-patient use cuffs or reusable cuffs with lifelong antimicrobial coatings can be part of an effective MRSA control strategy.*

## Background

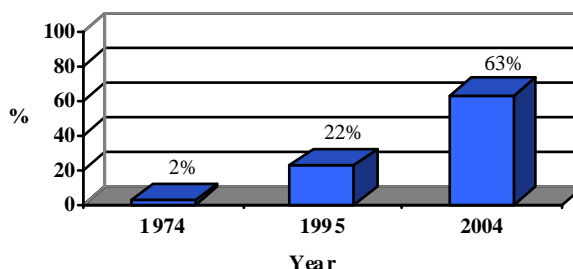
### *Hospital Acquired Infections*

Nearly two million patients in the U.S. alone get a hospital acquired infection (HAI) each and every year, and about 90,000 of those patients die as a result of their infection.<sup>1</sup> In fact, HAIs kill more than five times as many Americans as AIDS.<sup>2</sup> Further, the annual cost to treat hospital infections in the U.S. is \$30.5 billion, at an average cost of \$15,272 per patient.<sup>3</sup>

### *MRSA and Multidrug-Resistant Organisms*

The battle against MRSA is not new. For decades, MRSA has been the most common multidrug-resistant organism (MDRO) in much of the world, and its prevalence is on the rise. MDROs are estimated to cause more than 70% of HAIs<sup>4</sup>, and the increase in MRSA as a percentage of all staph infections since the 1970s is alarming:

**MRSA as Percentage of Total Staph Infections**



Source: Centers for Disease Control and Prevention (CDC)<sup>5</sup>

It is estimated that there are over 94,000 MRSA infections resulting in over 18,000 deaths in the U.S. each year.<sup>6</sup> While reports of MRSA cases found in community settings make the headlines, healthcare settings account for the largest number of MRSA infections (85%), and thus the greatest threat.<sup>7</sup> Patients infected with MRSA and other MDROs have increased lengths of stay, require additional tests and procedures, and experience higher mortality rates.

## ***Economic Considerations***

A study of published hospital-associated infections reports and interventions conducted by infection control professionals from 1990-2000 found the mean cost attributable to a MRSA infection to be \$35,367. In 2006, the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) estimated the annual cost to treat MRSA in hospitalized patients in the U.S. to be between \$3.2 billion and \$4.2 billion. These costs were associated with prolonged hospital stays - as much as 10 days longer than for patients with methicillin-sensitive *Staphylococcus aureus* infections - and the cost of critical care stays associated with these complications.<sup>8</sup>

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Further, there is the risk of legal action by the patient or the patient's family. For example, since 2004, there have been 13 lawsuits filed against Martin Memorial Hospital in Florida by or on behalf of patients who claim they acquired MRSA while in the hospital for surgery.<sup>9</sup>

Hospital reimbursements may also be at risk. Medicare is adopting policies to encourage hospitals to reduce the likelihood of hospital-acquired conditions (HACs), including certain infections, and will no longer pay for the increased costs of care resulting from one of the included conditions. Although the Centers for Medicare & Medicaid Services (CMS) has not explicitly included MRSA in their list of HACs for which reimbursements would be limited, it can be a trigger for some of the conditions that are included in the ruling. For example, if MRSA were the cause of a vascular catheter-associated infection, the HAC payment limitation would apply.<sup>10</sup> It is conceivable that

in the future rulings related to MRSA may emerge.<sup>11</sup>

Additionally, many states and private payors are considering or implementing their own policies regarding reimbursement of care associated with hospital acquired infections.

## **MRSA Transmission**

### ***Healthcare Settings***

MRSA occurs most frequently in patients undergoing invasive medical procedures or who have weakened immune systems and are being treated in a hospital or other healthcare facility. The most serious MRSA infections take place in healthcare settings.<sup>12</sup>

An individual can be a MRSA carrier without realizing it. The bacteria only cause an infection when they get inside the body, usually via a catheter, ventilator, or an incision or open wound. When a carrier is admitted to the hospital or visits a doctor's office, the organisms are transmitted to bedrails, wheelchairs, stethoscopes, and many other surfaces such as blood pressure cuffs, where MRSA can live for weeks.<sup>13 14</sup> In fact, MRSA can survive more than 38 weeks on environmental surfaces such as door knobs, faucets, keyboards, telephones, and sterile goods packaging.<sup>15</sup>

A 1997 study showed that 73% of the hospital rooms containing patients infected with MRSA and 69% of the rooms containing patients colonized with MRSA had some environmental contamination: 96 (27%) of 350 surfaces in the rooms of 38 patients colonized or infected with MRSA tested positive for MRSA.<sup>16</sup> These contaminated surfaces and equipment can then, in turn, be the source of hand contamination thus resulting in further transmission.

### ***Blood Pressure Cuff Contamination***

A study published in 1996 revealed that 57 (81%) of the 70 blood pressure cuffs included in

the study and presumed to be “clean” were tested positive for bacterial colonization. More specifically, 100% of the cuffs from the OR, PACU, Burn Special Intensive Care Unit (BSICU), and ER had bacterial colonization. In the SICU, 90% were colonized, and 80% of the cuffs in the MICU were colonized.<sup>17</sup>

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A 2003 study examining 203 blood pressure cuffs used in various hospital departments showed that 27 (77%) of 35 cuffs on nurses trolleys, 26 (63%) of 41 individually-located cuffs, 30 (52%) of 57 cuffs located on walls, and 9 (17%) of 52 stored cuffs were contaminated. The ICU had the highest overall rate of contamination, 20 (83%) of 24.<sup>18</sup> Forty-five percent of the contaminated cuffs carried MRSA.<sup>19</sup>

Blood pressure cuffs are often falsely perceived as innocuous and not requiring vigorous sanitization between patients. Additionally, locating documentation on official cuff cleaning protocols within the hospital can be problematic, and commonly-held perceptions of proper procedures are, by and large, grossly underestimated.<sup>20</sup>

## **Guidelines and Recommendations**

### ***The Situation Today***

Good hand hygiene has long been considered a major element in preventing the spread of MRSA and other infections. However, despite the CDC’s long-standing recommendation for hand washing following patient contact, most studies assessing healthcare workers’ hand hygiene have shown low compliance rates,

averaging approximately 40% and ranging as low as 10%.<sup>21</sup>

Moreover, the CDC has been criticized as underestimating the prevalence of MRSA as well as establishing guidelines that are not stringent enough.<sup>22</sup> In 2007 the Consumers Union urged hospitals to be more aggressive in their efforts to stop the spread of MRSA.<sup>23</sup> According to Lisa McGiffert, Director of Consumers Union's Stop Hospital Infections Campaign, "MRSA is lurking in every U.S. hospital and poses a serious and sometimes deadly health risk to patients who are unwittingly exposed to these superbugs. Unfortunately, most hospitals are not doing enough to keep these antibiotic-resistant germs in check. It's time for hospitals to aggressively step up their efforts to protect patients from these preventable infections."

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*“MRSA is lurking in every U.S. hospital”*

*- Lisa McGiffert, Director of Consumers Union's Stop Hospital Infections Campaign*

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McGiffert goes on to say, "We know how to control MRSA, but most U.S. hospitals are not consistently following these successful infection control practices. Hospitals need to make a commitment and invest the resources necessary to protect patients from MRSA. In the long run, that will save money and lives."

### ***What Should Healthcare Professionals Do?***

In January 2009, the U.S. Department of Health and Human Services unveiled their plan for a national strategy to reduce healthcare-associated infections. Their *Action Plan to Prevent Healthcare-Associated Infections* establishes national goals to prevent and possibly eliminate healthcare-associated infections. The proposed 5-year target relevant to MRSA is a 50% reduction in incidence rate of all healthcare-associated invasive MRSA infections.<sup>24</sup>

The CDC's Standard Precaution relative to handling of patient care equipment and instruments/devices is as follows:<sup>25</sup>

“Handle used patient-care equipment soiled with blood, body fluids, secretions, and excretions in a manner that prevents skin and mucous membrane exposures, contamination of clothing, and transfer of microorganisms to other patients and environments. Ensure that reusable equipment is not used for the care of another patient until it has been appropriately cleaned and reprocessed and that single-use items are properly discarded. Clean and disinfect surfaces that are likely to be contaminated with pathogens, including those that are in close proximity to the patient (e.g., bed rails, over bed tables) and frequently-touched surfaces in the patient care environment (e.g., door knobs, surfaces in and surrounding toilets in patients' rooms) on a more frequent schedule compared to that for other surfaces (e.g., horizontal surfaces in waiting rooms).”

The CDC's list of Contact Precautions includes the following recommendation relative to patient care equipment and instruments/devices:<sup>26</sup>

“In acute care hospitals and long-term care and other residential settings, use disposable noncritical patient-care equipment (e.g., blood pressure cuffs) or implement patient-dedicated use of such equipment. If common use of equipment for multiple patients is unavoidable, clean and disinfect such equipment before use on another patient. In home care settings limit the amount of non-disposable patient-care equipment brought into the home of patients on Contact Precautions. Whenever possible, leave patient-care equipment in the home until discharge from home care services. If noncritical patient-care equipment (e.g., stethoscope) cannot remain in the home, clean and disinfect items before taking them from the home using a low-to intermediate-level disinfectant. Alternatively, place contaminated reusable items in a plastic bag for transport.”

Specific to equipment, the Society for Healthcare Epidemiology of America (SHEA) makes the following recommendation:<sup>27</sup>

“Dedicate the use of noncritical patient-care equipment to a single patient (or cohort of patients infected or colonized with the pathogen requiring precautions) to avoid sharing between patients. If use of common equipment or items is unavoidable, then adequately clean and disinfect them before use for another patient.”

Further, the Joint Commission addresses prevention of healthcare associated infections due to MRSA and other MDROs in their 2009 National Patient Safety Goal NPSG.07.03.01<sup>28</sup> as well as Standard IC.02.02.01<sup>29</sup> which requires implementation of infection prevention and control activities when handling medical equipment, devices, and supplies.

### ***Blood Pressure Cuff Options***

As discussed, proper handling of equipment is an essential part of a MRSA control program. Blood pressure cuffs, being a ubiquitous item throughout most every location in which healthcare services are provided, are a key element in such programs. Appropriate selection and use of blood pressure cuffs is crucial.

Single-Patient Use Cuffs: Manufacturers such as CAS Medical Systems<sup>30</sup> and others offer a variety of single-patient use cuffs. By



dedicating a cuff to a single patient, the risk of infection and cross-contamination is reduced. Single-patient use, or disposable, cuffs are durable enough for multiple inflations. CAS offers a variety of Adult and Neonatal cuffs in their SoftCheck® line of disposable cuffs.

**Reusable Cuffs:** Reusable cuffs can be an economical alternative to single-patient use cuffs. When selecting a reusable cuff, a consideration to aid in the control of MRSA is to use cuffs treated with an antimicrobial agent. A few manufacturers, including CAS Medical Systems, offer antimicrobial cuffs.



CAS UltraCheck® blood pressure cuffs utilize the antimicrobial agent Micropel 5. Micropel 5 provides long term preservation from fungal and bacteria attack and helps prevent surface growth, permanent staining, and premature product failure. Materials incorporating Micropel 5 resist fungal and bacterial deterioration after long-term exposure to heat and severe weathering conditions.<sup>31</sup>

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*The antimicrobial properties of the CAS UltraCheck reusable blood pressure cuff are maintained for the full lifetime of the cuff.*

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The Micropel agent is added to the polyurethane resin of the CAS UltraCheck cuff prior to the formation of the film used for the laminated coating on the outside of the nylon fabric. This process of adding the antimicrobial agent directly to the polyurethane resin within the cuff itself allows it to maintain its antimicrobial properties through multiple cleanings.

This design has been in use for over seven years with no reported incidents of microbial growth or biocompatibility.<sup>32</sup> Micropel 5 guards against MRSA as well as dozens of other microorganisms.<sup>33</sup>

## Hospitals Have Been Successful Using MRSA-Reduction Strategies

MRSA has been successfully controlled for decades at many hospitals throughout the world that have instituted rigorous infection control practices incorporating a combination of strategies. In Denmark, for example, the prevalence of methicillin resistance among *S. aureus* blood isolates reached a peak of 33% in the 1960s then declined steadily after introduction of a MRSA control transmission policy. The rate there has been maintained at less than 1% for 25 years.<sup>34</sup>

Some U.S. hospitals are following suit. A pilot program started in 2001 at the VA Pittsburgh Healthcare System (VAPHS) in Pennsylvania resulted in a 70% reduction in infections in the hospital's surgical unit<sup>35</sup> and an 82% reduction in the rate of MRSA infections after two years following expansion of the program to include the SICU. This program incorporated a combination of active surveillance, hand hygiene, and contact precautions into the standard nursing processes. The VAPHS largely attributes its success to empowering the staff and creating a staff-owned and operated MRSA prevention program.<sup>36</sup>

The University of Pittsburgh Medical Center reduced MRSA in its intensive care units by 90%; this program consisting of screening tests, gowns and other measures cost just \$35,000 per year but saved over \$800,000 a year in infection costs.<sup>37</sup> Other hospitals using similar approaches with notable results include the University of Virginia Health System, Evanston Northwestern Healthcare in Illinois, and the Brigham and Women's Hospital in Boston.<sup>38 39</sup>

## Conclusion

As a step toward controlling the transmission of MRSA and other HAIs, single patient use (disposable) blood pressure cuffs and proper handling of reusable cuffs is imperative. To augment standard cleaning and disinfection practices, reusable cuffs with antimicrobial properties provide an added level of protection. CAS Medical Systems' reusable cuffs are manufactured with an antimicrobial agent that provides protection against MRSA for the full lifetime of the cuff.

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