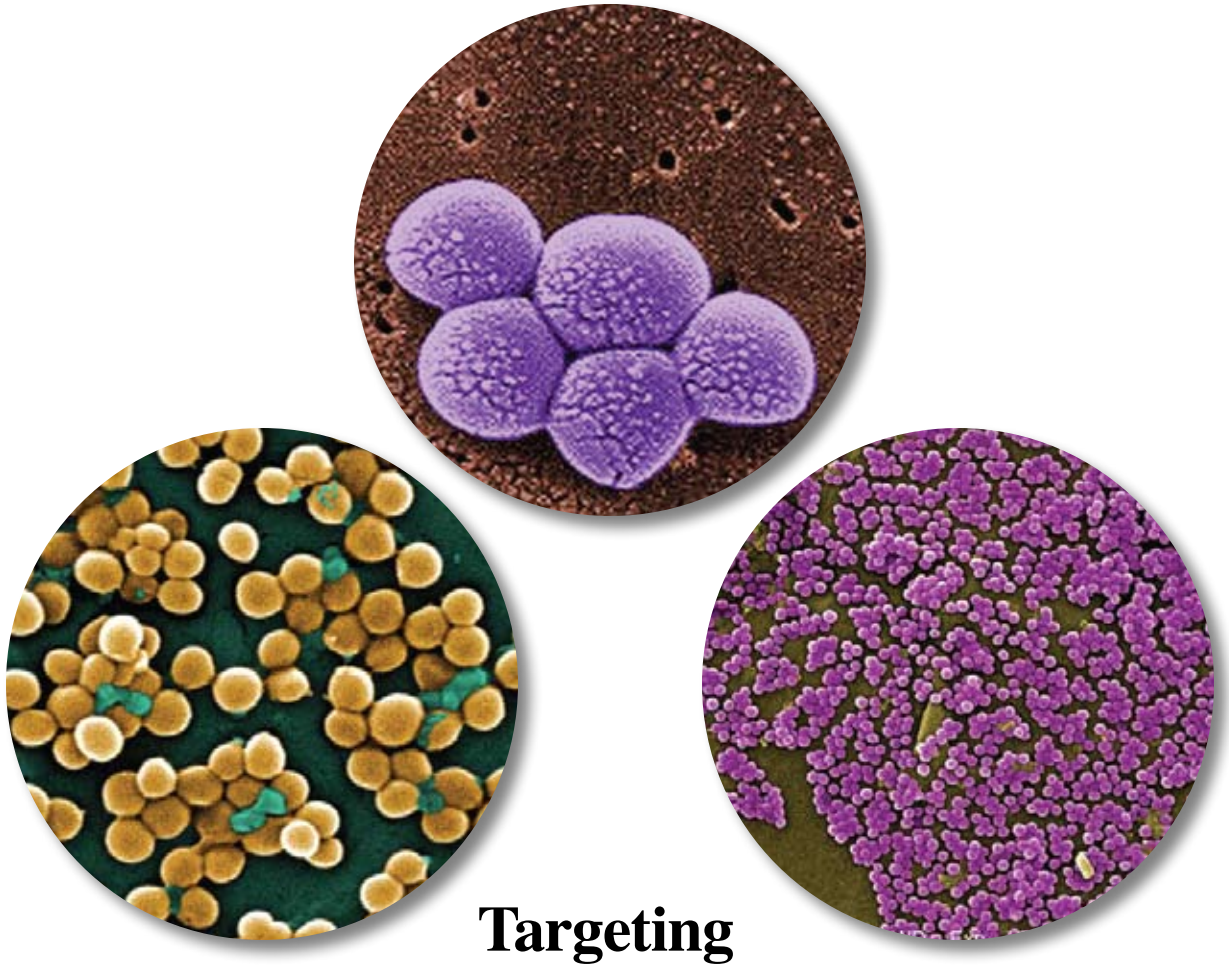


Targeting 'Super Bugs'

Professional laundering/handling can help launderers fight the spread of antibiotic-resistant 'MRSA'

By John Birckbichler

Today's healthcare launderers are well aware of the dangers posed to patients and staff by antibiotic-resistant organisms that infect patients while in hospitals—sometimes fatally. What they also should know is that professional washing and handling techniques can help control the spread of "methicillin resistant Staphylococcus aureus," (MRSA) and other 'super bugs' through healthcare textiles. This article offers an overview of MRSA and what healthcare laundries can do to help prevent its spread both in the laundries and at healthcare institutions.

What is MRSA?

The acronym "MRSA" stands for "methicillin resistant Staphylococcus aureus." It is the name given to Staphylococcus (S.) aureus that resists treatment with the antibiotic, methicillin. Staphylococcus aureus is a widespread bacterium that colonizes the skin and mucous membranes of humans and animals. Normally, colonization goes unnoticed. As S. aureus is found on the skin, it's frequently involved in infections of the skin and mucous membranes. Certain strains of S. aureus are associated with nosocomial (hospital-based) infections. People develop these infections during in-patient hospital treatment. They can cause wound infections, inflammation of the respiratory tract and blood poisoning.

MRSA was first identified in 1961 and is now widespread throughout healthcare facilities, including hospital and outpatient settings. The most common source for transmission of MRSA is by direct or indirect contact with people who have MRSA infections or are asymptomatic (not showing signs of the illness) carriers. In

1972, MRSA accounted for only 2% of all Staphylococcus aureus infections. Today it's responsible for 50%-70% of these infections.[2] MRSA is among those microorganisms commonly referred to as a "super bug." MRSA may be community- or healthcare-associated. The morbidity and mortality of these bacteria are staggering. On average, hospitalizations for the treatment of MRSA vs. other infections have a length of stay approximately three times longer and are three times more expensive.[2] Additionally, the risk of death is 3-5 times greater for patients infected with MRSA vs. methicillin-sensitive Staphylococcus aureus.

In the Federal Institute for Risk Assessment, the authors provide detailed information about contaminated textiles and fabrics, stating that "Contaminated textiles and fabrics often contain high numbers of microorganisms from body substances, including blood, skin, stool, urine, vomitus, and other body tissues and fluids. When textiles are heavily contaminated with potentially infective body substances, they can contain bacterial loads of 10^6–10^8 colony forming units (CFU)/100 cm^2 of fabric. Disease transmission attributed to healthcare laundry has involved contaminated fabrics that were handled inappropriately (i.e., the shaking of soiled linen). Bacteria (Salmonella species, Bacillus cereus), viruses (hepatitis B virus [HBV]), fungi (Microsporum canis), and ectoparasites (scabies) presumably have been transmitted from contaminated textiles and fabrics to workers via a) direct contact or b) aerosols of contaminated lint generated from sorting and handling contaminated textiles."[1]

Staphylococcus aureus also plays a role as a pathogen in foodborne intoxications. When the pathogen multiplies readily in a food, enterotoxins are formed that may lead, when the food is consumed, to typical intoxication symptoms like vomiting and nausea.[2]

Understanding resistant strains

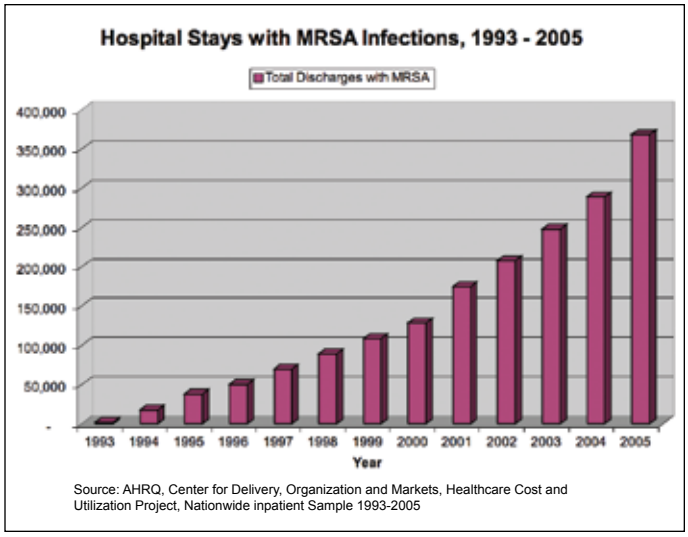
The Federal Institute for Risk Assessment (BfR) has compiled Frequently Asked Questions about MRSA and possible sources of human infection.

When these bacteria penetrate the skin or invade other parts of the body, a staph infection may result. Staph bacteria that are resistant to the action of methicillin and related antibiotics are referred to as "methicillin-resistant S. aureus" or MRSA. MRSA isn't only resistant to all penicillin-like antibiotics, but it's often resistant to many other types of antibiotics as well. Infections with MRSA can be costly and difficult to treat because of limited antibiotic options.

Methicillin is part of a class of drugs called beta-lactam antibiotics. Antibiotics work by targeting specific cellular sites in the organism such as a particular location on an enzyme. To use the analogy of a "lock and key" mechanism, antibiotics fit like a key into a lock to perform their purpose. As with a lock and key mechanism, minor changes in the lock will make the key useless; a single mutation in an organism can make it resistant to an antibiotic, thereby rendering the antibiotic ineffective. Methicillin is a specific classification of antibiotics that's in the same family as penicillins. Methicillin is no longer clinically used, but it is the name that's been given to this particular strain of penicillin-resistant bacteria.

EPA-registered hard-surface disinfectants and sanitizers along with skin antiseptics aren't specific in their microbial attack mechanism as antimicrobial agents. These products oxidize, denature or attack organisms in multiple ways. Unlike antibiotics, these products are used outside the human body (in the environment) at concentrations that are several thousand times higher than the concentrations of an antibiotic that's used in the body. Using the "lock and key" analogy, antimicrobials are the equivalent of battering rams. If you use a battering ram to open a door, a small change in the door lock wouldn't lessen the effect of the battering ram; a single mutation in an organism won't make it resistant to an antimicrobial.

The Centers for Disease Control and Prevention (CDC) has developed guidelines for environmental infection control in healthcare facilities. The CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC) issued a 249-page document extensively detailing their recommendations concerning, in part, the principles of cleaning and disinfecting various surfaces, including bed linens. The CDC cited numerous well-controlled studies indicating that MRSA can be spread by contaminated surfaces.



The 12-year chart above tracks the steady increase in MRSA infections that resulted in hospital stays. Sometimes referred to as a 'super bug,' MRSA accounted for only 2% of all Staphylococcus aureus infections in 1972. Today, it's linked to 50%-70% of those infections.

The laundry process

It's well known that the laundry process decontaminates textiles through the interaction of several factors, including:

- Dilution: Several water changes during the cleaning process physically remove and flush away microorganisms.
- Mechanical action: Flexing of the textile adds energy to the washing process and helps loosen materials trapped in the textile.
- Thermal energy (heat): Heat will deactivate most common microorganisms.
- pH: The pH changes in the washing process vary from a high of 12.0 to a low of 5.0. These dramatic swings in pH deactivate microorganisms.
- Oxidation (bleaching): The use of oxidizing agents contributes to microorganism deactivation.

Typical healthcare laundering conditions effectively destroy MRSA and all bacteria to a level that will not cause human health issues. MRSA has no special mutation that protects it from deactivation by the typical factors found in a well-designed healthcare laundry process. So it's not necessary to change time-proven laundry procedures because of MRSA.

- Chemical sanitizers or bacteriostats: As an extra precaution, chemical sanitizers or bacteriostatic agents are used. They act to either prevent the further growth of microorganisms or destroy them. Sanitizers kill 99.9% of bacteria when used according to their labels.
- Additional thermal energy (drying or ironing): Surface drying temperatures, at or above 180° F, deactivate any remaining microorganisms.

The Veterans Administration sponsored a research study that investigated the effect of low temperatures and chemical oxidation on the "hygienically clean" aspects of the laundering process used in their laundry facilities. This study is titled, *Killing of Fabric-Associated Bacteria in Hospital Laundry by Low Temperature Washing* (Blaser, et al., Journal of Infectious Diseases, Vol. 149, No. 1, Jan. 1984, 48-57). The article concluded that there was sufficient reduction of pathogenic bacteria, even in low-temperature washing (22ºC, 72ºF). The study also noted that even with the elimination of chlorine bleach, adequate reduction in pathogens was observed when compared to traditional high temperature (71ºC, 160ºF) washing processes.

In the laundry, bacteria are deactivated in several ways, as noted above. MRSA are NOT resistant to these chemical and physical "battering rams." Typical healthcare laundering conditions effectively destroy MRSA and all bacteria to a level that will not cause human health issues. MRSA has no special mutation that protects it from deactivation by the typical factors found in a well-designed healthcare laundry process. So it's not necessary to change time-proven laundry procedures because of MRSA. A well-designed laundry sorting, washing, drying/ironing and handling process, even with oxygen or peracid bleaches or sanitizers, yields all the protection needed.[4]

It must be stated that even after all of these steps and exposures have occurred, the textiles can become recontaminated through handling, contact with contaminated surfaces and improper transportation methods.

Handling techniques

While soiled linen could harbor pathogenic microorganisms, the risk of transmitting disease decreases if the linens are handled, transported and laundered in a safe manner, the CDC says. It recommends using "common sense hygienic practices for processing and storage of linen."[5]

The most recent guidance comes from the CDC's Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings, issued in June. It repeats many of the agency's earlier recommendations.

- Soiled laundry shouldn't be shaken or handled in a way that aerosolizes infectious agents.
- Handlers should not allow their bodies or personal clothing to come into contact with the soiled items. (Gloves and other appropriate protective apparel such as gowns, masks, etc., are to be worn while sorting soiled linen.)
- Soiled items are to be contained in a laundry bag or a designated bin.
- When used, laundry chutes must be properly maintained and sanitized with an EPA-registered sanitizer to minimize dispersion of microorganisms from soiled textiles.
- When laundering occurs outside a healthcare facility, the clean items must be packaged or completely covered and placed in an enclosed space during transport.
- Institutions are required to launder garments used as personal protective equipment and uniforms visibly soiled with blood or infective material.[3]

Take protective action

MRSA is a pernicious, difficult-to-treat microorganism that's caused untold suffering to its victims. It's also a costly challenge for healthcare providers that don't succeed in preventing the spread of MRSA in hospitals.

For textile service companies, continuing to follow standard protective measures for dealing with healthcare linens during soil sorting, processing and distribution, will help you fight MRSA. Staff should be receiving training in proper laundering techniques. For example, they should know that aerosolizing can occur if linens that are wet with body fluids are shaken in the laundry (thereby allowing bacteria to circulate through the air). Gloves and other standard PPE are also a must for employees who handle soiled healthcare textiles. Training in and adherence to established laundering and transportation/storage procedures also can help laundries do their part to control the spread of MRSA. **TR**

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