

By MARK WARNER

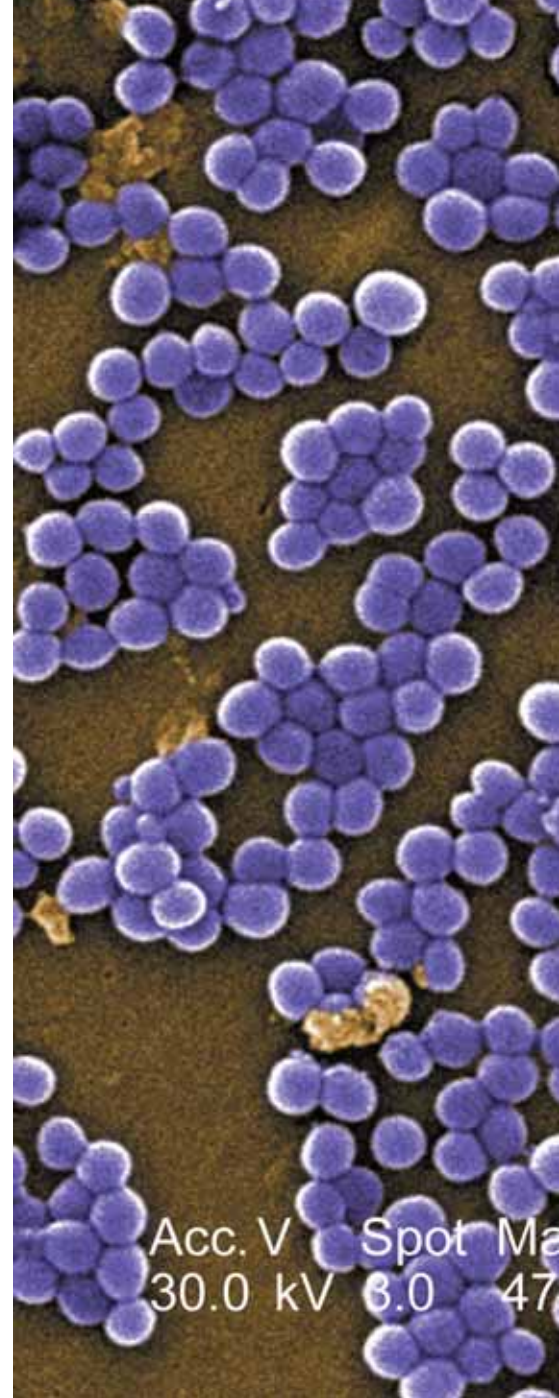
It seems we can't go a day without more press on "Superbugs." Of a bigger concern is that there seems to be a lack of information that adequately describes what cleaning people need to do to deal with them.

Infectious disease control has long been the concern of Infection Control departments in hospitals and nursing homes, but rarely has it been the concern or focus of cleaning staffs in schools, colleges, day cares, offices, government buildings or large industrial plants.

Now, because of the recent deaths, we all know that many diseases and pathogenic (disease-causing) bacteria have become more deadly than ever. In fact, beyond Methicillin-Resistant *Staphylococcus Aureus* (MRSA), there are other more horrific diseases on the horizon, things like multi-drug resistant (MDR) Acinetobacter and others that you will be hearing about in the future.

As for MRSA, we have been fight-

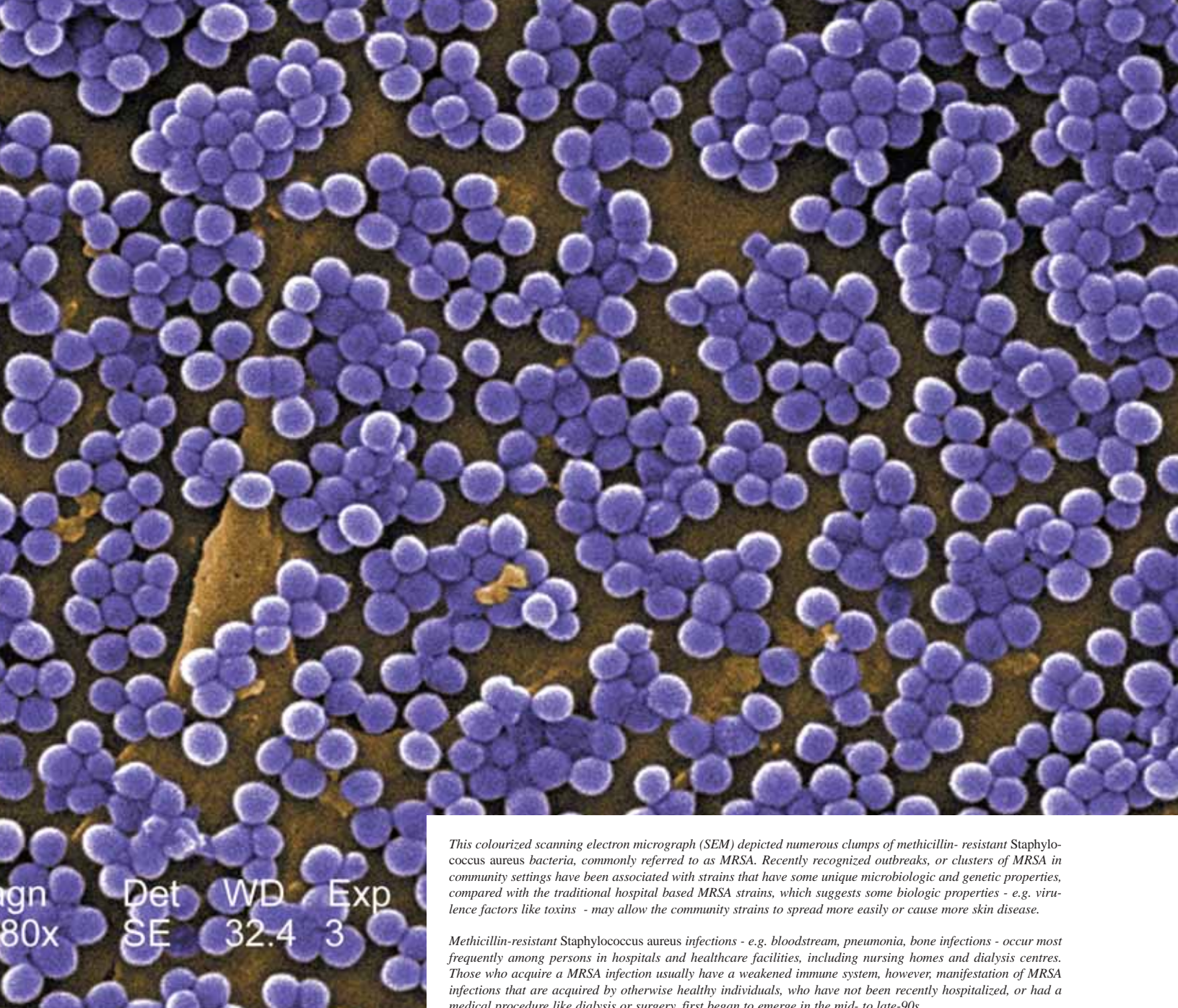
ing this 'Superbug' for years. There are stories about MRSA and other "flesh eating bacteria" that appeared in *U.S. News and World Report*, *The New York Times* and *Time Magazine* over 15 years ago. To deal with MRSA and other Superbugs, it is extremely important that we understand what the threat level is so we can adjust our cleaning program accordingly. What we need to do and when we need to do it are totally dependent on the environmental



# Warning:

# SUPERBUGS

## MRSA Disinfection and Decontamination Procedures



*This colourized scanning electron micrograph (SEM) depicted numerous clumps of methicillin-resistant Staphylococcus aureus bacteria, commonly referred to as MRSA. Recently recognized outbreaks, or clusters of MRSA in community settings have been associated with strains that have some unique microbiologic and genetic properties, compared with the traditional hospital based MRSA strains, which suggests some biologic properties - e.g. virulence factors like toxins - may allow the community strains to spread more easily or cause more skin disease.*

*Methicillin-resistant Staphylococcus aureus infections - e.g. bloodstream, pneumonia, bone infections - occur most frequently among persons in hospitals and healthcare facilities, including nursing homes and dialysis centres. Those who acquire a MRSA infection usually have a weakened immune system, however, manifestation of MRSA infections that are acquired by otherwise healthy individuals, who have not been recently hospitalized, or had a medical procedure like dialysis or surgery, first began to emerge in the mid- to late-90s.*

degree of danger and on having a complete understanding of the different types of contagious pathogens that we need to confront.

#### ENVIRONMENTAL ISSUES – THE DEGREE OF DANGER

We need to understand the environmental degree of danger. This means we have to understand how to identify threat levels and adjust the procedures, chemistries and tools to fit the situation. To better explain this philosophy, we use the DEFCON ranking system.

- ***The degree of the environmental threat determines the procedures that need to be implemented.***

#### DEFCON 1 – No Threat

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Normal, everyday cleaning procedures can best be described as a DEFCON 1 threat level – no threat. Although there are minor adjustments that can be made, most of these adjustments are related to the facility's appearance. One can assume that the existing cleaning program is adequate if the facility looks and smells clean. Regular neutral floor cleaners or half-ounce per gallon disinfectant cleaners are usually preferred to keep end-use costs minimized.

The biggest concern is to not allow any used cleaning solution to sit in a mop bucket or the recovery tank of a machine. Bacteria can thrive and multiply around moisture on exposed

bucket or recovery tank surfaces. If the used solution is a disinfectant solution, yet is highly soiled, its disinfection capabilities can be severely compromised, allowing a massive growth explosion of bacteria in the used solution itself. There has always been serious concern about bacteria being unknowingly spread by the very people who are doing the cleaning. That's how it happens.

- ***Everyday housekeeping procedures may not need to change, assuming all the proper procedures are already in place.***

#### DEFCON 2 – Threat In The Community

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The most important time to ramp up our game is when we know that there is a threat in our community (DEFCON 2). At this point, the normal, everyday procedures need to be more aggressive. Basic chemical disinfectants need to be replaced with hospital-grade disinfectants that are specific to the pathogenic threat (like MRSA). It is generally preferred to move to a disinfectant cleaner concentrate with higher parts per million like a two ounce per gallon disinfectant or a “super concentrated” 256. The key is to increase the cleaning efficacy of the disinfectant.

Hard floor cleaning procedures need to be exemplary. Traditional mop buckets need to be monitored in regard to frequent and consistent solution changes. Disinfectant solutions lose their killing efficacy, as they are loaded with bacteria and soil picked up from the floor. Even solution that appears clean can be overloaded with bacteria and since bacteria are microscopic, it may be assumed that the solution still has killing power. It may not! There are several answers to this dilemma including the use of automatic floor scrubbers and pressurized self-contained flat mop systems. Both focus on the use of clean, fresh solution being applied to the floor, without the danger of used solution being introduced to the clean solution.

In addition, we need to look at the different chemistries needed for soft, porous surfaces such as carpeting and

upholstery. Because carpet and fabrics are porous, they can't be disinfected like hard non-porous surfaces. In any case, always try to minimize moisture levels using low moisture systems if possible. The goal is to have the carpeting and fabrics completely dry within two hours to greatly minimize the chances of the formation of bacteria colonies, mould or mildew.

Tools and equipment may need to be upgraded, but more importantly, all the tools and equipment need to be disinfected on a daily basis. Also, supply carts, storage areas and the housekeeping offices need to be completely cleaned and disinfected, since they are at the hub of activity that reaches into all areas of a facility.

• ***Specialty disinfectants, disinfected cleaning equipment and more aggressive procedures need to be implemented.***

#### DEFCON 3 – Threat In The Facility

When there is an outbreak in the facility (DEFCON 3), there are many more things we need to do. We need to use the strongest, most efficacious disinfectants possible, preferably a tuberculocidal-rated disinfectant. The tuberculocidal rating is an indicator of the power and strength of the disinfectant. For example, when faced with microorganisms that are difficult to kill, the CDC in Atlanta always recommends the use of tuberculocidal disinfectants.

At this point, it is critical that we

recognize that different procedures are needed for each of the different kinds of contamination. We may be facing contaminated blood or body fluids as well as contaminated surfaces and substrates.

For blood and body fluids, we need to make sure we are following CDC's recommendations. This includes the use of the proper disinfectants and absorbents, scooping tools, personal protection equipment (such as disposable gloves, masks and goggles), and a red biohazard bag with a permanent closure. It is also critical to use a hand sanitizer after removal of the gloves in the event there was a tear or breach in the glove.

For general surface disinfection, it is critically important to focus on all the largest environmental reservoirs of bacteria. Obviously, most people are preoccupied with touch-points. Although they are important to disinfect, touch points represent the third largest reservoir of pathogenic bacteria. The largest reservoirs of bacteria are the largest horizontal surfaces in a facility. Floors almost always show the highest bacteria counts, followed by desks and countertops. The floors tend to be where the most bacteria travel. They “hitch-hike” on the soles of peoples' shoes and, it has been documented that the average person has incidental contact with the floor over 50 times a day. Things like purses, briefcases and travel bags are set on the floor and later set on desks and countertops. Also, shoe-

laces, pens, reading glasses, papers and other assorted items tend to come in contact with the floor from time to time. Then we touch them. Remember, there is no such thing as a “Five-Second Rule.” If it touches the floor, it can pick up bacteria and carry it anywhere.

Keep in mind, to perform a decontamination-level of disinfection, the surface needs to be cleaned first with a disinfectant cleaner. Then, and only then, it can be completely disinfected (with the appropriate dwell time). All hard, non-porous surfaces need to be completely disinfected. Remember, every surface must be cleaned first, then disinfected second. Yes, do it twice.

In addition, we need to be conscious of the need to eliminate disease-causing bacteria or viruses found in the air and hidden inside floor grout, concrete and wood floors, under carpeting or vinyl tile or even inside the walls. Disinfectants, by definition, can't penetrate into a substrate to kill the bacteria. The definition of disinfection relates to pre-cleaned surfaces only. We need to use bio-remediation technology to go after bacteria colonies in substrates. This is accomplished with the use of bacteriological and bio-enzymatic products that consume the food sources that the pathogenic bacteria need to survive. In this way, the pathogenic bacteria are displaced with safe, non-pathogenic bacteria that die when the food source is completely gone.

For the air in occupied buildings, a popular and effective tool is the use of wall-mounted or floor-standing lamp units that produce UV-A and UV-C light in a protected vent chamber or tube. These units will sterilize all the air passing through them. Over time, they will greatly reduce the airborne bacteria counts to levels less than necessary to cause infection, literally sanitizing the air. Ozone is an effective way to treat the air during times when a room isn't occupied. It has the ability to oxidize organic molecules and bacteria in the air, destroying them by corroding them.

- **A three-dimensional approach**

***needs to be used so that surface, sub-surface and airborne bacteria are addressed effectively, as well as strict adherence to proper procedures for blood and body fluid clean up.***

#### DEFCON 4 – Weapons-Grade Pathogens In A Facility

The most extreme level is DEFCON 4. There may be a time when we need to completely decontaminate a facility exposed to bio-terrorism or weapons-grade pathogens. Keep in mind, any contagious pathogen that has been determined to be lethal to 85 per cent or more of its host needs to be handled at this level... and there have been naturally occurring diseases that met this criterion. A good example of this was the Ebola outbreak in Zaire in 1998. It had a 90 per cent kill rate.

This decontamination operation is performed on an unoccupied (or evacuated) building. The most common approach for this operation is the use of radiation with Alpha or Beta particle sources or the use of gases and free-radical technology. These include gases like Chlorine, Formaldehyde, Glutaraldehyde, Bromine, Ethylene, Oxide, etc. Some are very dangerous, even explosive, so knowledge and experience are critical. Also, there has been new research in the areas of electrostatic corona discharge cold plasma technology (similar to a miniature solar flare) and extreme electro-magnetic flux (EMF) technology (similar to an EMP bomb). We should expect to hear much more about these technologies in the future.

• ***This level of decontamination requires special protective equipment, tools and training. It should only be performed by professionals, experienced in this kind of procedure.***

#### SPECIFIC SITE-RELATED ISSUES

Obviously, every facility has its own unique challenges. To implement decontamination procedures in a specific facility, we need to break up all areas and procedures into three categories: critical, semi-critical and non-critical.

These areas and procedures can change depending on the facility's traffic patterns and primary functions, and the environmental threat level.

In summary, the most important message is that we need the proper chemistries, the proper tools and the proper procedural knowledge to have any chance of being successful. Also, we need to have some way to verify or validate that we have accomplished what we wanted to accomplish – the elimination of the disease-causing bacteria or viruses. Equipment like ATP hygiene monitoring devices and swab cultures may be necessary.

Keep in mind, when the threat is high and the cost of failure is high, we need to clean everything. The enemy in this case is invisible, so we need to assume that what looks clean may not actually be clean. In this day and age, we really can't be too vigilant. Forewarned is forearmed.

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