Arm Yourself With Knowledge

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Healthcare-associated infections are running rampant within the healthcare system. According to the Center for Disease Control, there are over 1.2 million infections a year with 100,000 deaths occurring. Out of those infections, 22,000 are surgical site infections. The numbers are not broken down beyond that, and that data is from 2002.

This is equivalent to a jet plane carrying 300 passengers crashing every single day for a year. Now, has that number gone up or down?

Make no mistake about it, we are at war. Organisms are killing our patients, our loved ones, and those we care about. However, we are in a unique position to do something about it. This is a real war with strategy, weapons, soldiers, and, unfortunately, deaths. The enemy has developed very unique and advanced methods of defending itself against whatever methods we develop to destroy or disrupt them.

Accordingly, we need to adapt and educate ourselves on how to combat and interrupt and destroy that enemy.

Let’s look at a specific battle against biofilms. According to ANSI/AAMI ST79:2010, biofilms are the population of viable microorganisms on a product and/or sterile barrier system. Biofilms are an accumulation of microorganisms in which cells are stuck to each other or to a surface. These adherent cells are frequently embedded within a self-produced matrix of extra cellular polymeric substance. Biofilm EPS is a jumble of DNA, proteins, and polysaccharides.

Simply put, these organisms have unique abilities and characteristics. The microorganisms can attach and grow on surfaces. They display several adaptive behaviors that allow them to have the ability to communicate with similar organisms and form microbial communities. They cooperate, adapt, communicate, and then develop unique defense (antimicrobial resistance) and reproductive mechanisms to survive and sustain their communities.

The Five Stages Of Biofilm Development

1. Initial reversible attachment of free swimming microorganisms to surface
2. Permanent chemical attachment, single layer, bugs begin making slime
3. Early vertical development
4. Multiple towers with channels between, maturing biofilm
5. Mature biofilm with seeding/dispersal of more microorganisms

Biofilm are typically a cause of infection as pieces break off or are released causing inflammation, adhesions, and foreign body reactions. The National Institute of

Health estimates that biofilms account for over 80 percent of microbial infections in the body.

Whether in the human body, a surface, lumens of surgical instruments, or inside the holding tank of a CSSD cart washer, biofilms pose unique challenges.

How Do They Communicate?

Biofilms communicate by what appears to be cell to cell signaling. Science calls this "quorum sensing." Certain bacteria release signals and are able to even measure the concentration of these molecules within their community. This allows them to adapt and survive as conditions change. Think of antibiotic and antimicrobial resistance. The CDC states that within the biofilm matrix, bacterial cells have the ability to alter their growth rate and to turn on and off certain genes to adapt themselves to their specific environment. This gene expression and the determination of when to produce via dispersal may be regulated by quorum sensing. Bacterial cells in a biofilm can even exchange genetic material with one another to increase their resistance to antimicrobials.

What Strategies Can We Implement?

Biofilms on instruments act as a barrier to prevent effective sterilization. They act as a protective barrier to cleaning agents and disinfectants. In a similar fashion, they behave this way in the body when antibiotics try to attack them. They create a resistance and actually have the ability to share this information to the other colonies via quorum sensing.

The most effective way of removal is vigorous mechanical action with a cleaning pad or brush or cleaning pad specifically designed for the purpose of biofilm removal and the use of an effective enzyme in combination with one another. Effective processing and point of use cleaning are essential in preventing their development.

Areas Of Concern

Preventing formation is a essential to success. Effective cleaning and removal in timely manner is key. However, particulates must be considered. Particulates are a concern because biofilm or lint/particles in blood stream cause platelets to trigger. Biofilm attaches to particulates and enhance survival. Fibrin forms in an effort to seal off the invaders and anchors to anything nearby. This can cause adhesions which thicken. Adhesions cause pain and strangle organs in the human body.

Common Sources Of Particulates

- Mopping in the operating room or CSSD with non microfiber cotton mops
- Sweeping or dry dusting with non microfiber material
- Transport carts not properly cleaned
- Poor air filtration
- High traffic areas in assembly/storage

- CSSD assembly of sets using cotton towels for drying and pan liners
- The use of cotton fiber towels in CSSD and the operating room
- Dust /dirt/ hair
- Shedding
- Cotton towels
- Poorly cleaned reusable instruments
- Tissue
- Dried blood
- Biofilm fragments

Prevention of excess particulates can be achieved by utilizing non linting microfiber wipes and low lint tray lining products for CSSD, and disposable microfiber mops and cleaning kits for operating room turnovers. Reducing towel usage in surgery lowers lint and is necessary ensure they are low linting “OR-grade” towels.

Areas Of Focus: Instruments And Devices

AORN/AAMI standards and manufacturers instructions for use (IFU’s) state cleaning begins at point of use. Foam sprays and proper technique are key factors for instruments and point of use for flexible scopes is essential. Proper tools for the job are critical. Proper brush size length and diameter is determined by the IFU.
In the decontamination area of CSSD it is important to remember to clean our cleaning brushes if they are reusable devices or switch to single use. Again, proper size, diameter and bristle type is essential. Cleaning and disinfecting surface areas frequently lowers risk and removes residues from surfaces.

Keeping items and surfaces dry lowers the development of organisms. Any holding tanks on instrument processing equipment should be checked by qualified service personnel to detect any growth within. Detergent containers, whether they are handheld or drums, should never be refilled or topped off with product of an almost empty container. Organisms can grow and develop within our detergent and be transferred to the new product. Look for products with a bacteriostatic claim if possible to prevent development.

The Chinese general Sun Tzu said “Know thy enemy." This knowledge allows us to combat these organisms in the most effective way possible. Preparing for this battle can occur within a facility, among peers, or perhaps at a local or national chapter meeting.

Best practices are a great plan and the current version of AAMI ST79:2010/A3:2012. (AAMI.org) and AORN (Perioperative Standards and Recommended Practices 2013)can help get you there.

Being armed with knowledge, the most current manufacturers instructions for use and the most up to date weapons (cleaning devices etc) can ensure success in battling this and many new and yet to come variations of deadly organisms.

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