COMPETITIVE COMPARISON

Peracetic Acid vs. Aldehyde Chemistry for High-Level Disinfection

Chemicals commonly used in the high-level disinfection of endoscopes and other semi-critical medical devices include aldehydes (i.e., glutaraldehyde and ortho-phthalaldehyde) and Peracetic Acid.[1] While aldehydes and peracetic acid (PAA) are both effective, FDA-approved classes of disinfectants, PAA offers several other benefits over aldehydes that are of value to hospitals and their patients. Of particular note is improved performance against biofilms; a safer alternative for staff, patients and the environment; and improved department efficiency. In addition, aldehydes are being used less often in modern facilities because of practicality and safety issues.[2]

PERFORMANCE

A biofilm is a thin layer of micro-organisms that adhere to a surface. These cells produce a matrix of extracellular polymeric substance (EPS), which is a sticky, glue-like material. The EPS protects viable microorganisms that can be responsible for a wide range of health-related infections. Medical devices are especially prone to biofilm growth.

Scientific studies on reusable flexible endoscopes showed that 100% of patient ready endoscopes had biofilm present in their air/water channels.[3]

In endoscope reprocessing, the majority of biofilm reduction happens during manual cleaning. Any residual biofilm left behind on an endoscope following manual cleaning is more likely to contribute to biofilm creation when an aldehyde chemistry is used for high-level disinfection. Aldehydes are fixative chemistries, which means they kill bacteria by forming links between and within bacterial proteins. This kills the bacteria, but also makes the bacteria sticky and more likely to adhere to the surfaces inside an endoscope.

Peracetic acid offers superior performance against residual bioburden following manual cleaning with a surfactant-based detergent. PAA works by oxidizing bacteria, effectively killing the bacteria without producing the "sticky" effects of a fixative chemistry.

SAFETY

The negative impact of aldehydes on human health has been well-documented.[4]

For staff who routinely handle and operate with aldehydes, there are significant risks of skin and respiratory sensitization. In addition, aldehydes may aggravate pre-existing respiratory and skin issues.[5,6]

For patients, the risks of being treated with an endoscope that hasn't been appropriately rinsed after being disinfected can be serious. Several studies have shown that improperly rinsed endoscopes disinfected with aldehyde have been linked to colitis and other severe exposure symptoms in patients.[7,8,9]

In the environment, PAA is a safer alternative to aldehydes. PAA was given the highest ranking (green) by the EPA's Safer Choice Program, which identified it as "low concern based on experimental and modeled data". This is the highest approval rating the EPA can give for an antimicrobial agent. Alternatively, neither OPA or glutaraldehyde even qualified for the lowest ranking in this system.[10]

"When an alternative to glutaraldehyde is available… consideration should be given to whether the alternative is safer for employees."[11] -OSHA

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EFFICIENCY

PAA offers GI departments improved efficiency through ease of use, shorter contact times and multiple methods of disinfection.

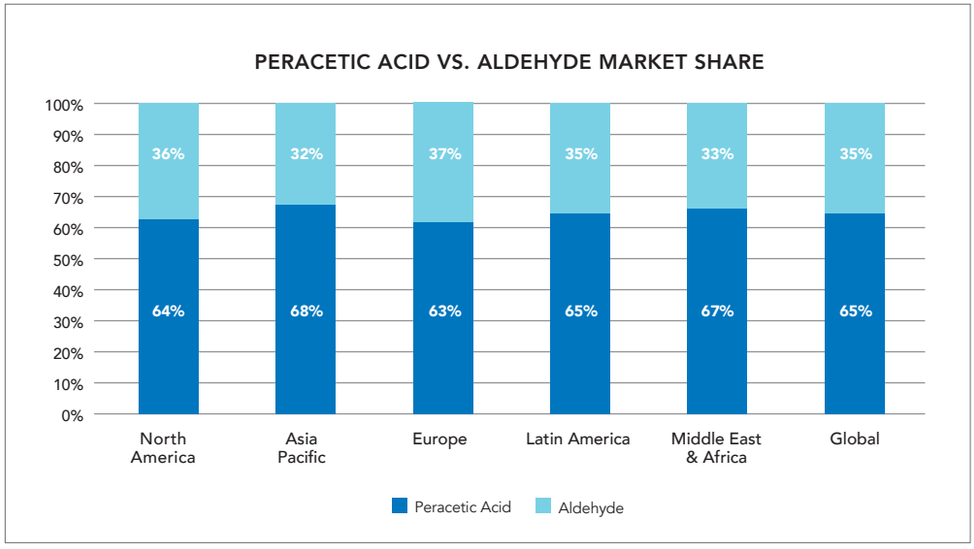
Automated endoscope reprocessors that use PAA require less chemical handling compared to aldehyde systems. Users connect chemistry bottles to the machine, which then doses the chemistry for use and disposes of the chemistry after each cycle, eliminating user contact. Most states allow the use solution of PAA to be disposed down the drain.

By contrast, aldehydes must be pumped out of the basin after use and disposed of in accordance with local, state and federal regulations. Some counties require aldehydes to be treated as hazardous waste, which means it must be removed by a hazardous waste handler.

PAA offers an unparalleled ability to kill bacteria. It acts through various mechanisms of disinfection which provide a lower possibility of bacterial resistance generation compared to aldehydes.[12] It denatures proteins, inhibits cell transport, inactivates essential metabolic enzymes, degrades cell membranes, and denatures nucleic acids. In addition, it requires shorter contact times for bacterial kill claims than glutaraldehyde.[13] This means that PAA is more robust in its ability to kill bacteria – it kills in more ways and it kills faster.[14]

GLOBAL TRENDS

There is a global trend towards PAA chemistry. In 2015, PAA made up nearly two thirds of the global high-level disinfection market. The trend towards PAA chemistry is expected to continue through 2020.[15]



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