Cleaning and Disinfection of Vacuum Regulators
Benjamin Franklin is famously quoted as saying, “An ounce of prevention is worth a pound of cure” and these words surely resonate throughout the medical profession. In healthcare, it is always better to try to prevent a disease as opposed to treating one. For example, the simple precaution of hand washing has had a tremendous impact on reducing the spread of bacteria in hospitals and is certainly a much more cost effective means of protecting patients, caregivers and visitors than requiring everyone to take antibiotics prior to leaving the hospital.

First introduced in the 1950s, modern day suction regulators have provided a safe and effective means to evacuate bodily fluids from hospitalized patients. Millions of suction procedures are performed yearly on a variety of patient types and a review of the literature has yielded no documented evidence of a patient becoming infected by bacterial transmission associated with a suction regulator.

An evaluation of the proper set up and use of a suction regulator will show that the suction system is one that pulls fluids away from the patient and may utilize in-line collection canisters with biofilters that provide 99.99% effectiveness at filtering bacteria.1 Should a caregiver inadvertently conduct a suction procedure without the proper use of a collection canister, most suction regulator manufacturers provide and recommend safeguards, such as overflow safety traps and inline hydrophobic filters as redundant safety systems to protect the suction regulator, the in-room vacuum outlet and the in-house vacuum system. Proper use of collection canisters with biofilters, overflow safety traps, and in-line hydrophobic filters are an easy and cost effective “ounce of prevention” in preventing contamination of a hospital’s suction regulators and medical vacuum system.2

A five year old bench study entitled; “Suction Regulators: A Potential Vector for Hospital-Acquired Pathogens,” Infection Control and Hospital Epidemiology (July 2010); has raised questions in the marketplace about the need for sterilizing vacuum regulators. Our review of this publication offers a few observations and concerns. First, the authors collected and sampled 470 regulators from 11 institutions from five different States and found 173 or 37% with some form of pathogen. The authors neglect to state, however, whether the contaminated regulators were being properly used with inline filtered suction canisters, overflow safety traps and hydrophobic filters as well as wiped down with disinfectant between patients per manufacturer recommendations to prevent contamination in the first place. In other words, were the 297 or 63% of regulators that were free from pathogens used properly and the 173 contaminated ones not?

Secondly, the bench study authors claim that bacteria migrated against the vacuum flow path from a contaminated intermittent suction regulator through 6 feet of suction tubing and were found to contaminate a collection canister in less than 30 minutes. What is unknown is whether the authors used proper technique and a filtered collection canister in setting up the intermittent suction system. It is required that when using intermittent suction, the collection canister must be placed above the patient’s
midline to prevent potential retrograde migration when the intermittent regulator cycles to the “off” mode. A review of Figure 1 within the bench study shows the collection canister level with the simulated stomach. If this is an accurate depiction of the technique used in the study, then this would not accurately reflect proper technique used in hospitals. A simple understanding of the principles of vacuum and/or the effects of syphoning could explain the phenomenon of bacterial migration in the mock up study witnessed by the authors.

The authors rightly demonstrate that regulators can become contaminated but do not address the source so that end users may apply the “ounce of prevention.” Manufacturers of all products utilized in a suction set up recommend proper use of their products. In order to provide appropriate protection to patients, caregivers, and the hospital’s vacuum components, suction regulator manufacturers suggest a proper set up and maintenance of the suction system. This includes using a disinfectant to wipe down the unit between patients, use of a filtered collection canister at the proper patient height, and use of an overflow safety trap and/or an inline hydrophobic filter as a secondary precaution to provide appropriate protection to the patient and vacuum system.

The National Fire and Protection Association (NFPA) which governs the standards for medical vacuum systems states that “Liquid or debris shall not be introduced into the medical-surgical vacuum or WAGD systems for disposal” (NFPA99). As such, in order to adhere to this guideline, it is common clinical practice to use a filtered collection canister, an overflow safety trap, and an in-line filter with each suction regulator. This proper technique can be observed in most hospitals in the United States and has been a proven cost effective standard of care for many years.

When contrasting the current practice of using in-line filters and overflow safety traps (“ounce of prevention”) against the cost of sterilizing every suction regulator between each patient (“pound of cure”), the cost to the U.S. healthcare system would be substantial. Even the bench study authors acknowledge in their study’s conclusion (by referencing the CDC guidelines) that sterilizing regulators “is costly and is not the presently recommended practice.”

In today’s cost conscience healthcare environment, caregivers must make appropriate cost/benefit decisions to provide the best outcome for their patients. If there is to be a significant change in clinical practice whereby every suction regulator is required to be sterilized between patients, the ensuing cost to the healthcare system would need to be evaluated and contrasted against the benefit of sterilization. Since there is no evidence across suction procedures to suggest that a single patient has ever become infected from a contaminated suction regulator, we question the benefit of changing current clinical practice.
To conduct a simple evaluation, contrast the cost of an overflow safety trap and hydrophobic filter, which is an accepted common practice and costs only a few dollars per patient, against the cost of all suction regulators going through a “sterilization process.” This process would require having a significant number of additional suction regulators available to circulate between patient use and sterilization processing. The “sterilization process” may include collecting the suction regulator after patient use and transporting it to central service or biomedical engineering for disassembly. Next steps may include transporting the component parts to a sterilizer while keeping each individual unit’s components segregated for later re-assembly. Lastly, component parts are sterilized, transported back to biomedical engineering for reassembly and calibration, and then returned to the patient room. An institution could conduct their own financial analysis on the cost of this process but our past experience would estimate it in excess of $100 per regulator per sterilization. Multiply this additional cost across all patients receiving suction in hospitals each year and the cost to an individual hospital could be significant. In the end, the sterilized vacuum regulator goes back into a patient’s non-sterile room to be connected back into a non-sterile vacuum outlet, thereby defeating the entire cost and purpose of sterilizing a vacuum regulator.

In summary, current clinical practice for suction procedures, if followed properly, has a 60+ year track record of providing clinicians with a safe and cost effective means for fluid evacuation. We can find no evidence in the literature of a documented case where a suction regulator contributed to the migration of pathogens from the suction unit to a patient. Following manufacturers’ guidelines of preventing a unit from becoming contaminated is a far superior means to cost effective healthcare.

For additional reading please refer to the following articles and proof sources available on the Ohio Medical web site, www.ohiomedical.com.

References:
1 Bemis/Medi-Vac/Hi Flow Suction Canisters (Cardinal) – An Aerostat® filter has a 99.99% filtration efficiency of aerosolized micro-organisms and particulate matter.