

TO FLASH OR NOT TO FLASH Expediency or Necessity?

By Marcia Frieze and Arlene Carlo

“To flash or not to flash” is not a simple rhetorical question. According to the AORN Standards and Recommended Practices, flash (steam) sterilization should be used only in emergency situations, when there is insufficient time to sterilize an item by the preferred packaging method of wrap or container. Per AORN, flash sterilization may be used for the immediate need of an individual item¹. It may be used in instances of unplanned events when a critical instrument is missing and needs to be replaced or when a critical item is dropped in surgery. Today, however, flash sterilization is being used more and more for routine processing of surgical instruments; for example, in a planned event when there is an insufficient inventory of instruments needed for surgery.

Faster But Not Necessarily Safer

All sterilization processes require time: to properly clean and decontaminate all surfaces of surgical instruments, to remove all soil before sterilization and to be dried fully, then processed according to the manufacturer’s recommendations. The sterilization process also requires that a surgical device be confined after proper cleaning and that the package maintain its sterility until point of use.² Without these steps, no one can be assured of a high degree of sterility maintenance or of protection from surgical site infections. After all, the goal of sterilization is to contribute to positive patient outcome. Can we assume that the device has been fully cleaned and decontaminated before sterilization, and that the steam will contact all surfaces of the device to be sterilized including exterior surfaces of blades and interior surfaces of cannulated devices? How quickly this can be done varies by factors including the resistance, type and number of microorganisms, the numbers and type of items to be sterilized, the type of packaging used and the reliability of the autoclave. Steam sterilization is defined as the killing of

microorganisms under the essential conditions of time, temperature, steam and pressure. Sterilization is a statistical concept, an event that requires energy and time and the control of numerous variables.

The rapidity of our lifestyle and the need to economize often are at odds with established practices. This is especially true in today’s healthcare environment, specifically the increase in use of rapid sterilization methods, including flash sterilization. The flash sterilization process is abbreviated in terms of shortened exposure time and dry time or, alternatively, in pre-vacuum steam rapid sterilization cycles reduced pulses and dry time. In an emergency situation, flash or rapid sterilization may be required, but have we gone too far? When full instrument sets are being routinely flash sterilized, is it because of expediency rather than emergency? According to J.J. Perkins in *Principles and Methods of Sterilization in Health Sciences*, the reference guide for sterilization practices in hospitals, clinics and laboratories, “Speed has become a militant force working against sterilization. It reduces the overall factor of safety: it becomes an

accomplice of trapped air, and it demands a high degree of reliability”.³

The practice of using shortened exposure time for gravity flash raises serious questions. According to Perkins, an expert in sterilization practices, gravity sterilizers are deficient in the attainment of sterilizing temperatures in a brief period of time.⁴ Normally, a full gravity displacement steam sterilization cycle relies on time—30 minutes or more for the removal of air and displacement with steam. Nonetheless, test data to control the efficacy of the sterilization process can be uncertain. There are differences in temperature from the top to the bottom of gravity sterilizers due to uncertain conditions based on load and distribution of temperature and moisture. In addition, there are areas where air has not been evacuated from the chamber. Other variables affecting gravity displacement steam sterilization include whether the sterilizer is jacketed or not and the placement of the package within the chamber.

Gravity flash sterilization requires that an item be sterilized unwrapped. This creates additional risks of recontamination from the environment

when an article is transported in an open pan or covered with a towel, a carrier of lint and moisture. An unwrapped item can become contaminated in transport from the autoclave to the operative suite. When items are sterilized, recontamination must be avoided. That is why surgical suites in Europe and in some cases in the United States have a direct opening from the autoclave to the operating room.

Where transport through a sub-sterile area is necessary, a closed transport container prevents recontamination from the environment. In recent years, a few rigid reusable containers have been validated for flash sterilization. In some cases, when validated for this purpose by the manufacturer, the recommended shelf life is 24 hours. One container manufacturer has a closed model with a valve system that works in gravity displacement steam; another employs a lid-open position with a bottom valve which must be closed manually before transport. In the first case, the valve may or may not require attention based on function, steam or water quality. In the second case, if the container does not remain in the autoclave for an extra minute or two after closing the lid to the base, the contents or the surface could be contaminated when removed from the autoclave in the open condition. In both scenarios, moisture is a factor when it comes to abbreviated dry time. Moisture is an end result of flash sterilization, because of shortened dry time. Moisture itself can become a breeding ground for microorganisms. Per the AAMI, "The process of sterilization in health care facilities requires exposure conditions, derived from an acceptable range of temperatures, saturated high quality steam, and time of exposure, that provide a high degree of lethality to the contaminating microbial population".⁵ The fact that the exposure time of the sterilization process in

gravity flash is reduced creates greater risk that the load may not be sterile. That is why flash sterilization should be done for emergency situations only.

The Effect of Container System Type on Sterilization

When rigid sterilization containers are considered, the material of the case, whether metal or plastic, can lessen or contribute to problems of condensate formation. Of all materials used to sterilize and contain surgical instruments, aluminum sealed containers and instrument baskets have the best thermo-conductivity rating when compared to stainless steel or plastic trays. See table below:

Material	Thermal Conductivity BTU/hr ft ² ° F
Aluminum Alloy	90.0
Stainless steel type 304*	10.0
Randel® R Resin**	2.4

*Data obtained from CRC Handbook of Chemistry and Physics 55th Edition 1974-1975

**Data obtained from Westlake plastics company

Other Factors Affecting Safety

If flash sterilization is safe and effective, then why has the Joint Commission been cracking down on health care facilities, including surgery centers using flash sterilization and issuing citations?⁶ The reason appears to be human error; due to inadequate cleaning of lumened devices, not taking instruments completely apart, inadequate preparation, poor placement of instruments so that steam cannot penetrate all parts and not validating so that the parameters have been met. The other problem that is more common is that flash sterilization has become routine. This especially is true when facilities have one or two sets of instruments that have quick turnaround. It is expensive to maintain large inventories. But there are alternatives.

Alternative Solutions

Seek out alternative solutions—ways to improve efficacy. Review instrument inventories, simplify and reduce the numbers of instruments in a set. Use dedicated, properly trained staff to decontaminate and sterilize items adjacent to the operating room. Monitor and validate your loads. Keep records and follow your institution's policies and procedures. Consider alternative methods of rapid sterilization including the express cycle in some pre-vacuum units or investigate new technologies that offer shorter processing times such as gas plasma. Newer sealed sterilization containers have been validated for these methods. Ask for their validations and 510k documentation.

Flash sterilization as we know it is bound to change. Ask your colleagues in Europe or Latin America; they do not use gravity displacement steam and certainly not flash. Their exposure times for steam sterilization, even pre-vacuum steam, is 20 minutes at 250 degrees Fahrenheit or 10 minutes at 270 degrees Fahrenheit, as compared to our 3-10 minutes for gravity displacement flash or 3-4 minutes for pre-vacuum exposure cycles in the United States. To flash or not to flash is not the question. Instead the question is: Is it necessary to flash and if so, are we providing safe patient outcomes? ■

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References available upon request.