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Surgi-View
A SPECIALIST NEWSLETTER ON SURGICAL AND OPERATING ROOM TOPICS FOR HEALTHCARE PROFESSIONALS

Are There Economic Benefits of Using Low-Temperature Sterilization Instead of Steam?

There has been tremendous growth in the volume of surgical procedures performed using minimal invasive (MIS) surgical techniques. It is estimated that more than 60% of the surgical procedures performed in the USA are performed using MIS. This has resulted in an increase in the number of complex and heat sensitive surgical instruments that need to be reprocessed. There has also been an increased focus on sterilization of heat sensitive devices instead of using high level disinfection, as a result of risks of possible transmission of disease via contaminated surgical instruments and devices *(McCreanor & Graves, 2017).*

These combined factors have increased the need for low-temperature sterilization systems. According to Schneider (2013) drivers of innovation in low-temperature sterilization methods include shorter cycle times, material compatibility, reduced costs and environmental friendliness.

Four methods of low-temperature sterilization are available, but not all are used in the South African context. They are Ethylene oxide, Ozone, Liquid chemical sterilization and Hydrogen peroxide gas sterilization.

Hydrogen Gas Sterilization
There are advantages and disadvantages of hydrogen peroxide gas sterilization methods.

Advantages:
- Relatively short cycle times
- Compatibility with heat and moisture sensitive device
- No cool down after sterilization
- Environmentally-safe sterilant that decomposes into oxygen and water
- Easy to install and operate

The disadvantages include limited penetration which influences the diameter and length of lumens that can be sterilized in a load, as well as the need to use specialised packaging.

McCreanor *et al* (2017) logically states that: "It is important for healthcare facilities to understand fully the costs and effects associated with different sterilization techniques." An economic evaluation that compared the sterilization of heat-sensitive equipment using low-temperature hydrogen peroxide gas plasma systems instead of steam was published in the American Journal of Infection Control. In this study ethylene oxide and other low-temperature sterilization methods were not considered. It was assumed that the types of instruments to be sterilized will be those that can be steam autoclaved but are heat sensitive, and costly to purchase and repair.

In the economic comparison it was also assumed that instrument repairs were only covered by warranty in 30% of the cases (based on previous research cited in the paper). This is the first paper of this nature that has analysed the economic benefits of low temperature sterilization system. The model used for the calculations examined the changes to costs and the frequency of repairs that could be expected over 10 years (as a result of sterilizing instruments in a low-temperature sterilizer instead of steam). The calculation in the model reported a savings of over $738 000 dollars over 10 years. The results of the study didn't even take into account the possible effects that steam could have on the image quality of the instruments, another factor that could lead one to prefer low-temperature sterilization for relevant devices.

Although sterilizing surgical instruments using low-temperature sterilization is more expensive than steam, "once repair costs are taken into account, savings are realized". *(Mc Creanor & Graves, 2017).*

Total Cost of Ownership
When the time comes to purchase or replace a low-temperature sterilizer, a decision has to be made as to which one to purchase. That is when total cost of ownership should be considered. Total cost of ownership is a cost benefit analysis performed by procurement to compare medical devices before purchasing them. This processes takes into account direct costs, indirect costs, recurring costs and value-added services. Direct costs in this regard include the cost of actual machine, installation costs, utilities (electricity), training costs and packaging costs. Recurring costs that need to be considered are consumables (sterilant, biological indicator and chemical indicators), cycle costs (how much can go in a load to make it productive), aborted cycles and service requirements.

All things considered it seems it would be wise to invest in low temperature sterilization for the right reasons.

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V-PRO®

V-PRO Low Temperature Sterilizers Increase Productivity in Your CSSD

RELIABLE

GENTLE

LARGE COMPATIBILITY

COST EFFECTIVE

V-PRO® 60

Low Temperature Sterilization System

- Cart mounted or counter top sterilizer
- 60 litre processing chamber
- Three cycles for a variety of instruments

V-PRO® maX

Max Low Temperature Sterilization System

- 136 litre processing chamber
- Three cycles for a variety of instruments
- Double door pass through option available

Sterilization Cycle Times

	V-PRO® Max	V-PRO® 60
Non Lumen Cycle	28 min	28 min
Flexible Scope Cycle	35 min	38 min
Lumen Cycle	55 min	60 min

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Installing a Track-and-Trace Instrument Management System In a Hospital with 30 Operating Rooms. Was it Worth It?

The Singapore General theatre sterilization unit (TSSU) and operating rooms undertook a five-year project to install a system that allowed them to standardise instrument naming, implement electronic tracking and tracing including traceability of instruments in the operating rooms.

What Lead to This Decision?

The staff at Singapore General were confronted with an increase in the number and types of instruments they dealt with on a daily basis. There was an increase in minimal invasive surgical (MIS) techniques that resulted in the staff reprocessing more complex instruments that need specialised care. The TSSU processed 4 000 kinds of instruments and over 700 types of sets. The staff used hard-copy check lists and a manual tracking system, requiring many pieces of paper. The set check lists where not updated when changes were made, leading to many errors in set packing. There was a lack of accountability (as it is difficult to know who did what) and loss of inventory as instruments could not be traced.

How Was This System Implemented?

An IT-based system, including bar coding of each set, needed to be put in place. It was hypothesized by the TSSU management that the installation of the system would result in increased productivity, quality and savings. It was decided to implement this over three phases. Measures were put into place in the event of system issues, including being able to revert back to a manual system if all else failed.

Phase 1:

The goal of this phase was to be able to trace all sets through each step of the decontamination process in TSSU. A series of workstations (computers) and scanners had to be installed at each point of reprocessing. All the instruments sets (and their contents) had to be loaded on the system. Each set was given a unique, identifying barcode which needed to be attached to the tray. The system was able to track each set through each critical phase of decontamination namely: cleaning, assembly and packaging, sterilization and sterile storage.

The sterilization method required for each set was captured on the system and if anyone scanned a set into the wrong sterilization method, it triggered and alert warning the user of a potential error.

Phase 2:

In this phase, workstations (computers) and scanners where installed in the major operating rooms. This allowed the operating room staff to scan the instrument sets as they were used, in realtime and associate them to a particular patient.

Phase 3:

This phase extended the process to the specialised operating rooms and day theatres serviced by the TSSU.

Education and Training

Training was provided by the vendor to the staff members. The hospital identified key persons from Singapore General to serve as project champions. The project champions could then provide initial support and assistance when required.

Results

The installation of the system had a profound effect on the production times, inventory management, instrument repairs, quality management and staff well being.

Reduced Production Time

Singapore General calculated that by saving five minutes production time per instrument tray they saved 1974 production/ processing hours per month.

Inventory Management

The system enabled an electronic trail of sterile instruments and sets that were processed. This allowed staff to follow up on any sets not returned to the TSSU, and prompted staff to collect soiled instruments timeously. The prompt collection of soiled instruments can reduce staining and corrosion, and increase the effectiveness of cleaning. The system provided information that allowed TSSU to identify heavily-used sets and instruments enabling it to better prioritise what needed replacing. Singapore General was also able to reduce its inventory of sets from 4149 to 3219 saving both time and money.

Instrument Repairs

The system was able to track how frequently equipment was being used, and prompt staff when routine servicing and maintenance was required.

Quality Management

As a track-and-trace system requires each individual to input their ID when performing steps in the CSSD, the system enable accountability. This ensured that possible causes for error could be dealt with, staff could be retrained and sets could be easily recalled if needed. **Based on these results it can be concluded that it is well worth it to install a track-and-trace instrument management system in a CSSD no matter what size the unit.**

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Tracker - Track And Trace Software For Central Decontamination Units

Managing The Full Reprocessing Path Of Your Reusable Surgical Devices

Tracker is designed to deliver a best-in-class equipment decontamination management process that ensures:

- ✔ Cost reductions
- ✔ Asset management
- ✔ Enhanced patient safety
- ✔ A reduction in the risk of hospital-acquired infections

We achieve this by providing the real-time insight needed to:

- ✔ Drive continuous improvement
- ✔ Follow Standard Operating Procedures
- ✔ Deliver streamlined performance
- ✔ Identify the need for targeted staff training
- ✔ Provide an audit trail

Tracker is designed to meet the needs of central decontamination units. It guides operators through the complete decontamination process in a methodical and intuitive way. This enables them to follow Standard Operating Procedures (SOPs) to ensure patient safety and a reduction in the risk of hospital-acquired infections.

In addition, **Tracker** ensures that a hospital has complete control of their medical devices and surgical instruments, knowing what assets they have and where they are at all times.

Tracker captures data at all steps in the decontamination process.

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