Improving Your Cleaning Process: 
Proper Use of the Medical Automatic Cart Washer 
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This article appeared in Managing Infection control March 2009 and has not been updated since the date of publication.

About a year ago I received a phone call asking whether orthopedic trays can be processed in a cart washer. I told the caller to check with both the orthopedic tray manufacturer and the maker of the medical automatic cart washer, but that to my knowledge orthopedic instruments should not be run through a cart washer.

This question raised my curiosity about how health care professionals perceive the automatic cart washer. The call made me aware that cart washers were being used in ways they were not intended, and that as a result patients could be being put in harm’s way. Thus I developed a short survey to determine how cart washers are used and perceived by central service personnel. The eight-question survey was sent to 50 central service professionals, 27 of whom completed and returned it.

The results of my survey served as the springboard for this article, which will review the efficient operation and maintenance of medical cart washers and also recommend purchasing strategies.

Definition and Uses
ANSI/AAMI defines a cart washer as “mechanical cleaning equipment that helps reduce microbial contamination and renders items safe for staff to handle and for patients to use.” (ST 79, 2006; 7.5.3.3 and 7.6.2.3)

A medical automatic cart washer (also referred to as a cage, utensil, or utility washer) “is a heavy duty, large capacity, hydro-spray washer/dryer designed for use in Dietary and Central Processing Departments to clean, sanitize, and dry
surgical cases, general purpose carts, dietary carts, racked utensils, and utility items used in health care facilities.”¹

The cart washer “is a high capacity mechanical washer/disinfector intended for use in the efficient washing, low-level disinfection, and drying of utensils, carts, and other miscellaneous reusable items used in the care of patients.”²

Many hospitals also use a cart washer to low-level disinfect such items as transport carts, containers, tote-bins, bowls, wheelchairs, basins, and other bulk items that are reprocessed in health care decontamination departments. One hospital employee described how his facility used the cart washer to clean wheelchairs:

“…Because the goal was to eliminate MRSA (infection) on 4 West, and because wheelchairs are shared among all units, the first order of business was to thoroughly clean every wheelchair in the three-hospital (system), beginning with the acute care hospital. The group hit upon the idea of using a cart washer in another unit to clean the wheelchairs thoroughly. The cart washers, enclosed units similar to dishwashers, use high-pressure hot water to clean the chairs
thoroughly. During off hours, the wheelchairs were processed one by one, and in 12 days, the whole fleet had been washed. The effect was dazzling—wheelchairs that looked brand new. Not only were staff members proud of the way the wheelchairs looked, they knew they were clean and safe for their patients… “3 This is a case of appropriate use of the cart washer by a department other than central service.

Survey Results and Concerns
The cart washer may seem like a simple machine, but it plays a vital role in reducing the occurrence of hospital-acquired infections. Hospital personnel must realize, however, that use of the cart washer has its limits.

My cart washer survey, although quick and informal, elicited some alarming responses that in turn prompted important questions. For example, responses to question #3 showed that some CS staff believe the cart washer provides “high-level disinfection.” To my knowledge the FDA has not cleared any automatic cart washer for use in high-level disinfection in a hospital setting. Who is giving CS staff the impression that their equipment can provide this type of disinfection?
In question #4, 26% of respondents said that they have used a cart washer to process orthopedic instruments. Why would CS employees do this? Are they under pressure to turn instruments around? Are they being told to clean instruments immediately, even if they think cleaning them in the cart washer is unsafe? Does staff not feel educated enough to make a stand and refuse to use the cart washer for this purpose? Maybe the “orthopedic sales person” said it was OK to process the instruments that way (most likely without documentation). Whatever the reason, this is an issue that needs to be addressed.

Question #4 is worded “Have you at any time processed an orthopedic set in your washer?” A yes answer could mean that a facility did so at one time but no longer does. But the fact that it has been done in 26% of the facilities is alarming. My research via the internet provided no information stating that orthopedic instruments should be cleaned in an automatic cart washer. So who is telling medical facilities to process items in this manner?

The responses to question #5 showed that only 35% of staff receive yearly in-service training on the cart washer. Why? Are the cart washer salespeople not offering proper training, or are hospital staff not asking for it or even refusing it if offered?

To summarize my concerns, it appears that: a) medical automatic cart washers are being used inappropriately to clean surgical instruments; b) cart washers are erroneously perceived as able to provide high level disinfection; and c) staff are not receiving yearly in-service training.

**Efficient Operation of the Automatic Cart Washer**

To help prevent infections, all equipment (carts, wheelchairs, stretchers, baskets, etc.) must be disinfected between uses according to the Spaulding classifications. Automatic cart washers must function to their full ability in accordance with these classifications.

<table>
<thead>
<tr>
<th>Body Contact</th>
<th>Disinfection Requirements</th>
<th>Spaulding</th>
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</thead>
<tbody>
<tr>
<td>Intact skin</td>
<td>Low level</td>
<td>Non-critical</td>
</tr>
<tr>
<td>Mucous membranes</td>
<td>High level</td>
<td>Semi-critical</td>
</tr>
<tr>
<td>Sterile body cavity</td>
<td>Sterilization</td>
<td>Critical</td>
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Just like any piece of equipment, a cart washer will fail if not properly maintained. Staff can reduce the amount of downtime for the washer if they understanding the reasons for failure and by using a quality process to monitor the washer’s function. Monitoring also makes staff more aware of their cleaning process.
What variables or factors interfere with the disinfection process?

**Variables/Factors**
Several variables affect the performance of the cart washer, which in turn affect a facility’s ability to produce items that are safe to handle and use. The cart washer provides only low-level disinfection, so it is very important that the process works every time and that a back-up plan exists in case of failure.

Major variables that affect the performance of an automatic cart washer are:

- Water quality
- Temperature
- Cleaning solution
- Loading
- Cycle selection
- Mechanical issues
- Training
- Safety
- Process verification

Let us look at each of these factors and the role each plays in ensuring that the washer is working properly.

**Water Quality**
Poor quality water will hamper the performance of the cart washer. Hard water can cause spotting and block the spray jets; it can also cause hospital staff to use more cleaning solution than needed.

If the water’s pH level is not compatible with the cleaning solution the solution’s effectiveness will be compromised. No two cleaning solution are formulated the same, so it important to use the one that is designed for the washer in question. Staff should ask the cleaning solution manufacturer to recommend proper parameters (temperature, dosage) to optimize the solution’s cleaning power.

**Temperature**
Water temperature is important because the water’s heat delivers disinfection. The washer manufacturer should tell the users what the proper water temperature must be in order for the machine to be optimally effective. If staff know what the temperature must be, they can monitor it and thus be assured that the correct level of disinfection is taking place.

Temperature also plays a role in both the pre-rinse and cleaning solution activity. A pre-rinse temperature that is too high at the start of the cycle can actually make cleaning more difficult, by “cooking” the proteinous soils on to the item. A colder temperature (under 100°F) for a pre-rinse is best. During the cleaning stage, the
water temperature should reach the “target” or “optimum” level specified by the solution manufacturer.

Hospital staff can verify the water temperature via the printout or, if the machine does not have a printout, by using an independent source of verification (see sidebar #2) or their PMA records (where a technician checks the temperature on the required schedule maintenance and documents the result).

**Cleaning Solutions**
Proper use of the cleaning solutions is essential. Solutions must be mixed properly and administrated at the right concentration and temperature to be effective. Cart washers are used to clean many different items, so staff must take care to use a solution that is appropriate for the item being cleaned. Use of the wrong solution could result in damage to the items.

Proper functioning of the delivery pump is critical to the washer’s ability to clean. Thus staff must remember to follow the preventative maintenance schedule for the pump.

**Loading**
Hospital employees frequently overload the cart washer. If items are too crowded or are placed in the cart washer incorrectly, they will not receive the proper cleaning. Staff need to be trained to properly position various items in the cart washer to ensure adequate exposure to the cleaning solution.

**Cycle Selection**
Different washer models will have different cycle selections. Older units might only have only two or three programs and may not be able to process all of a facility’s items. Newer washers have multifunctional programs that allow users to modify a cycle to meet their particular needs.
(Different Key Pads)
**Mechanical**
The mechanical function of the cart washer involves the pumps, the spray action, and features such as tilting during cleaning. Staff can ensure that these mechanical functions are performing optimally by following the cart manufacturer’s preventative maintenance procedures. Alternatively, staff can verify proper mechanical function via an independent means and example is the CartWash test.

<table>
<thead>
<tr>
<th>Before or complete fail</th>
<th>Pass (if target 150°F)</th>
<th>Water pass, temperature fail</th>
<th>Water fail, temperature pass</th>
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</table>

**CartWashTest**

**Training**
Poorly trained staff inevitably cause problems. As such, it is important to provide employees with in-service training by qualified professionals at least once a year. This training should review the following, at a minimum:

- Hospital guidelines for use of the medical automatic cart washer
- Contents of the cart washer manual
- Explanation of the various cycles -- when to use them and on which equipment
- Loading of equipment
- Preventative maintenance as outlined by the manufacturer
- Relevant safety issues

Staff should be able demonstrate the necessary skills following the in-service. (It goes without saying that training should be for ALL staff on ALL shifts).

The pictures below show what can happen when staff are not properly trained. Cart washers typically have various screens that need to cleaned daily or they will become clogged with debris. This interferes with the flow of water to the pumps, which strains the pumps and leads to early burn out.
Safety
Safety is a broad issue involving staff, patients, and the hospital work environment.

Safety concerns pertaining to the automatic cart washer begin with its placement. Vapor and moisture that escape from the washer (even one with an exhaust fan) can present problems for the sterile storage area. Therefore it is important to position the machine so that the exit door is not near sterile storage items.

Staff must also know the location of the emergency shut-off buttons (both inside and outside), and how to open the door, should someone inadvertently enter the chamber while the equipment is turned on. Also, staff must wear the proper personal protection equipment when working with the cart washer. Inappropriate protective wear can result in exposure to harmful organisms.

Departments need a back-up plan for cleaning should the automatic washer break down or need repair. Some departments use a steam gun others manually clean the items. Each medical facility should have a written back-up policy and procedure, which should be reviewed by both Infection Control and Risk Management.
Safety issues impact not only staff but the patients who will be exposed to the equipment after it is processed in the cart washer. Because cart washers are used for more than case carts, and since not all washers are created equal, a list of equipment that can be processed in the washer should be clearly posted near the machine.

**Process Verification**

"A problem analysis should be completed for any problem with any aspect of decontamination that can pose a risk to personnel or patients. The problem analysis should define and resolve the problem and the system should be monitored to ensure that the problem has been corrected".  

JCAHO states in standard E.C.6.20: “medical equipment is maintained, tested and inspected.” The automatic cart washer is considered a piece of medical equipment, and thus must comply with the standard.

Process verification involves three components.

The first component is staff documentation. Staff need to observe how the machine functions, and ask question such as:

- Is it making a strange noise?
- Are the water jets clean of debris? Are they clogged?
- Are there staining/spots on the chamber wall?
• Are there staining/spots on the equipment after it is processed?
• Are spray arms present and spinning?

Observations should be noted and recorded by staff.

The second component of verification is the use of some independent means to check water quality, equipment function, and water temperature.

Water quality can be monitored using a simple dip stick. If the result shows deviation from the norm, a more detailed report can be ordered (the pictures below are examples of calcium build up in a cart washer).
Temperature data loggers that monitor and graph the temperature of the cleaning cycle are now available. A data logger is one method of independently verifying temperature during the washer’s various stages.

Coming to market are new products which are designed to challenge the performance of a cart washer.

One such product is a test square that is quickly and easily adhered to any surface with a peel-off adhesive that leaves no residue. The test can be placed on surfaces that are farthest from the medical cart washer jets or in an area where the user suspects coverage is most difficult. The special hydrochromic ink will change color only if moistened by water. A color change indicates that water is reaching the test area and that proper mechanical action is occurring in the washer. Further, the test also indicates what temperature has reached starting at 120 ºF, which is the lowest maximum temperature for cleaning items in the washer to a maximum of 180ºF. Example below of the CartWashCheck.

<table>
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<tr>
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<td>Tempachek™</td>
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The third component of verification is adherence to the preventative maintenance schedule prescribed by the equipment manufacturer. This needs to be performed by a qualified, well-trained technician. At a minimum, staff should review the preventative maintenance log books to determine what has been done and where improvements can be made.

Purchasing
Many of the above concerns can be mitigated by purchasing the right automatic washer in the first place.
Selecting the appropriate cart washer for a facility is not easy. One article details some of the issues that need to be considered:

- “… the key in determining the size and number of cart washers needed is to estimate the average number of carts per surgical procedure…. Let’s assume that the hospital estimates that every procedure will yield three
36-inch soiled carts. This represents 18 soiled carts every three hours or six carts per hour.”

- “Options include wiping the carts manually, assuming that it will take no more than 10 minutes to wash and dry a cart. If this option is chosen, a washing room with a spray gun is recommended. The cost of this option will be mostly labor, water and chemicals.”

- “A cart washer will do a more thorough job. When selecting a cart washer it is necessary to look at the net usable dimensions and cycle time. Generally, the recommendation is to use the largest cart washer that will fit in the area as the cycle time will be the same and the price difference and the utility consumption are normally insignificant compared to the benefits of a higher throughput.”

- “Consider a cart washer that has a cycle time of 10 minutes. This means a throughput of six carts per hour if it accommodates one cart. However, if we select a cart washer with larger net usable dimensions that will process two carts per cycle, it is possible to wash the same number of carts in half the time. The extra half-hour that is gained will become particularly useful during peak periods and when the cart washer needs servicing. In addition, basins and containers can be washed through the cart washer, reducing the load on the washers. Revisiting the example above, if all the basins are washed through the cart washer, the fully automated washing system can be reduced to three washers since we are reducing two cycles per hour.”

Staff who know the capabilities and uses of an automatic cart washer will be better able to justify the purchase of one.

**New Advances**
Cart washer manufacturers make improvements in their equipment every year. For example, Getinge and MidBrook now offer the option of full a view-glass door on their cart washers. This safety feature allows better visibility and lighting.

In another advancement, major manufacturers are offering more flexibility in the programming of cycles for their cart washers. Some manufacturers provide a list of questions that each staff person must complete after an in-service (which consists of written information and live demonstrations).

In addition, some companies now offer quality-improvement programs and independent tests for monitoring and verifying equipment performance.

Keeping up with such improvements is key to making a good purchase decision.
Conclusion
The medical automatic cart washer is an effective tool in reducing the incidence of hospital acquired infections. As does any piece of equipment, the cart washer must be used by properly trained staff, maintained according to the manufacturer’s instructions, and monitored to verify that it is working properly.
Survey Results

1. Does your healthcare facility have a medical automatic cart washer (MACW)?
   - Yes (26) 96%
   - No (1) 4%
   (Please note 26 is the number used to calculate % for the rest of the questions).

2. Is the MACW located in the Central Service department (CPD, CS…)?
   - Yes (26) 100%
   - No

3. What level of disinfection do you feel your MACW provides for the medical devices (equipment) that are processed in this equipment? (circle the highest level you perceive your equipment provides)
   - Low (10) 38%
   - Intermediate (13) 50%
   - High (3) 12%

4. Have you at any time processed an orthopedic set (trays and instruments) in your MACW?
   - Yes (7) 26%
   - No (19) 74%

5. Does your staff receive yearly in-service training on the operation, safety issues and proper use of the MACW?
   - Yes (9) 35%
   - No (12) 65%

6. Is the MACW maintenance done (provided) by the original manufacturer of the equipment?
   - Yes (13) 50%
   - No (12) 46%
   (Note: one response stated both yes and no (1) 4%)

7. Do you have a steam gun in your department?
   - Yes (3) 12%
   - No (23) 88%

8. What is the strangest medical equipment you have processed in your MACW? Please list
   - Hospital beds
   - RX Med racks
   - Wire Shelving
• Commodes
• Bins
• Rigid Containers

**Important questions to ask a manufacturer before buying a cart washer:**

**Construction**
How many cycles are offered? List them and their times
What is the washer’s chamber size? How many carts can be processed at one time per given cycle?
Can the cart washer be installed in a barrier wall?
What are the interior parts made of?
What type of disinfection is obtained on each cycle list?
  - low
  - medium
  - high
How does the washer ship?
Do you test the washer before it ships?
Do you test after installation?
Do you have a test method after installation to make sure it is performing properly?

**Cost**
Are you part of any buying group for discount pricing?
What is the list price of the unit being quoted?
What is the average cost of installation?
What is the operating cost (and usage) of each cycle?
  - Water
  - Electricity
  - Cleaning solution
  - Other costs

**Operation**
Is water re-circulated during the cleaning process?
Do I need special plumbing or electrical hook ups? What other items can be processed in the cart washer (list)? What type of washing/rinse spray system is used?
  - High pressure
  - Low pressure
  - Moving booms (more than 1)
  - Rotating spray arms
  - Stationary spray
  - Other method

**Maintenance**
Do you have a repair service? If so, is it sub-contracted?
Do you have a program for rebuilding the cart washer to an “as new” condition with a new warranty after the life of 10 years?
How long has this model been in production?
What is the model’s service life?
  10 years
  15 years
  more than 15 years
What is the yearly maintenance cost of this model?
How many years does the cart washer last under normal conditions?

**Training**
Do I get technical assistance after the purchase?
Will my staff and maintenance staff receive training?
  - Upon installation
  - Yearly
  - As needed with new employees

**Other**
Share a list of 10 users of this model cart washer
Is a site visit possible to see this model?
Has a white paper been published on this piece of equipment?
Does the unit have a CE MARK?
Is the unit UL LABELED?
What is the FDA classification for this cart washer?

**About the Author**
Stephen M. Kovach is the Director of Education for Healthmark Industries in Fraser, Michigan. Stephen was the Educational Chairperson 2008-2010 for AORN Specialty Assembly for SP/MM. He is a member of AORN Lakeshore Chapter 2307 is also a member of IAHCSMM and his State Central Service Professional Group MSHCSP. Stephen is on many AAMI standards committees. Stephen is always proud to say he has “Worked in Central Service”.

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4. [ANSI/AAMI ST79:2006;11.2.2;PAGE 111](http://jeny.ipro.org/attachment.php?attachmentid=1027&d=1131483246)
5. [www.jcaho.org](http://www.jcaho.org)
6. [http://www.infectioncontroltoday.com/articles/2c1inside.html](http://www.infectioncontroltoday.com/articles/2c1inside.html)