

# Improving the Decontamination Instrument Process

By Tim Brooks

- **Director of Surgical Services Materials Management CSSPD:**  
Yuma Regional Medical Center – 20 years
- **Committee Involvement:** Infection Control Committee, Chairmen Surgical Services Value Analysis Committee, MM value Analysis, Code Committee, Operating Room Through-put & Lean Six-Sigma Committee, and OR Executive Committee
- **November 2006:** Focus group STERIS Corp, Mentor, Ohio  
Customer Panel focusing on washer decontamination process
- **January 2007:** Website: [www.csspdmanager.com](http://www.csspdmanager.com)
- **April 2007:** Published article in Infection Control Today magazine,  
" *Adopting Failure Modes and Effects Analysis (FMEA) in the Healthcare Setting* "
- **October 1, 2007:** Speaker at OR Manager, San Diego  
" *Increasing Productivity & Employee Satisfaction in Today's OR...Transforming the Relationship Between the Operating Room and Central Services* "
- **October 3, 2007:** OR Manager San Diego CA. Focus group hosted by STERIS Corp.  
" *Tells us what you think* "
- **February 26, 2008:** Webcast – Surgical Products Magazine – Sponsored by STERIS  
" *Bridging the Gap Between the operating Room and the Sterile Processing Department* ".
- **April 2008:** Published article – The OR Connection " *Consistency in the decontamination process* "

# Yuma Regional Medical Center

## 328 Bed Acute Care Hospital

- 14 total operating rooms – 10905 total procedures annually
- 4 - OR's under construction due to open November 2008
- 4 - Suite free standing on-campus out-patient surgery center
- 4 - Suite for profit off campus surgery center
- Open Heart Program
- 3-Suite Cardiac Cath Lab
- Cancer & Imagining Center
- Women's Surgery, LDRP, and Children's Center with average of 350 births per month
- Off site Corporate Center with Warehouse and Purchasing
- Wound Clinic
- 6 - Suite Endo Lab
- Second hospital site purchased for future growth
- 111 beds shield for future growth
- Parking garage scheduled for construction - 2009

# Objectives

1. Review Automated Washer Mechanical Impingement Process
2. Review Automated Instrument Washing
3. Review Manual Instrument Washing
4. Review Alternative Process
5. Review Outcomes of Process Change

# STERIS Focus Group

November 2006:

STERIS Corp, Mentor, Ohio.

Ten managers selected for Customer Panel focusing on washer decontamination process

Missing from the meeting were Instrument, and Hospital Equipment Repair providers, more importantly CS Professionals

## Recommendations

1. Increase the number of jets
2. Change placement of jets
3. Faster Wash Cycles
4. Replace solid side, perforated bottom washing trays with mesh trays

Review impingement process - 60% of the washers efficiency comes from the mechanical impingement action

NO recommendations as to placement of instruments

# Objective - 1

## Review Automated Washer Mechanical Impingement Process

### Automated Instrument Washing is Dependent On

- **60% - Mechanical Water Impingement from Spray Arm Technology**
- **40% from: Chemical / Thermal**
  - Cold and hot water hardness / temperature
  - RO water purity
  - Enzyme dilution
  - Detergent dilution
  - Lubrication dilution
  - Rinse cycle

## Most Common Used Racks

3-Level



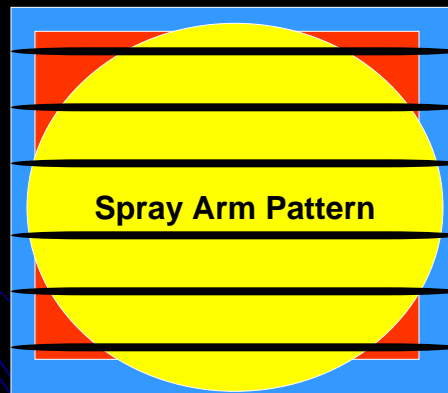
2-Level



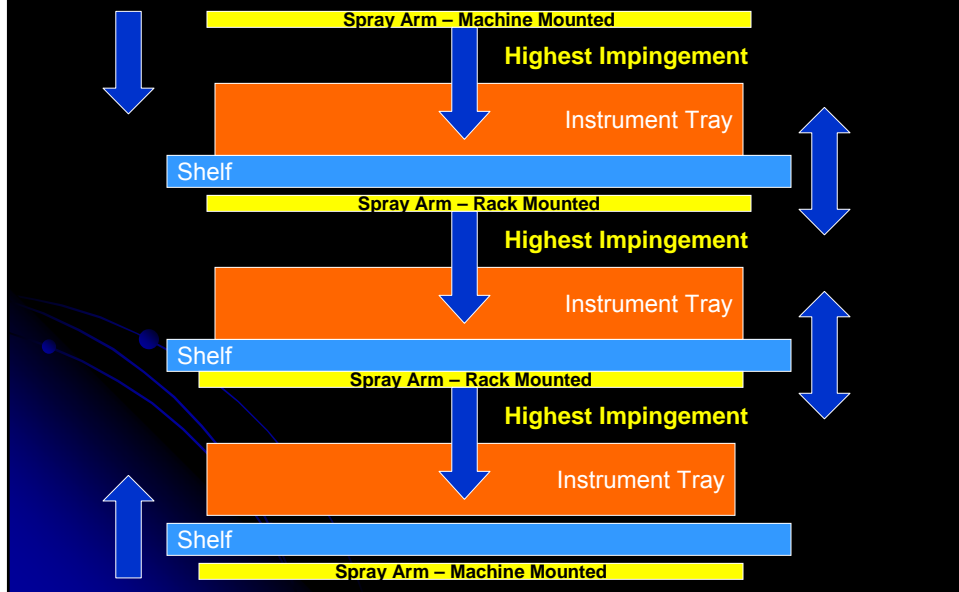
General Purpose



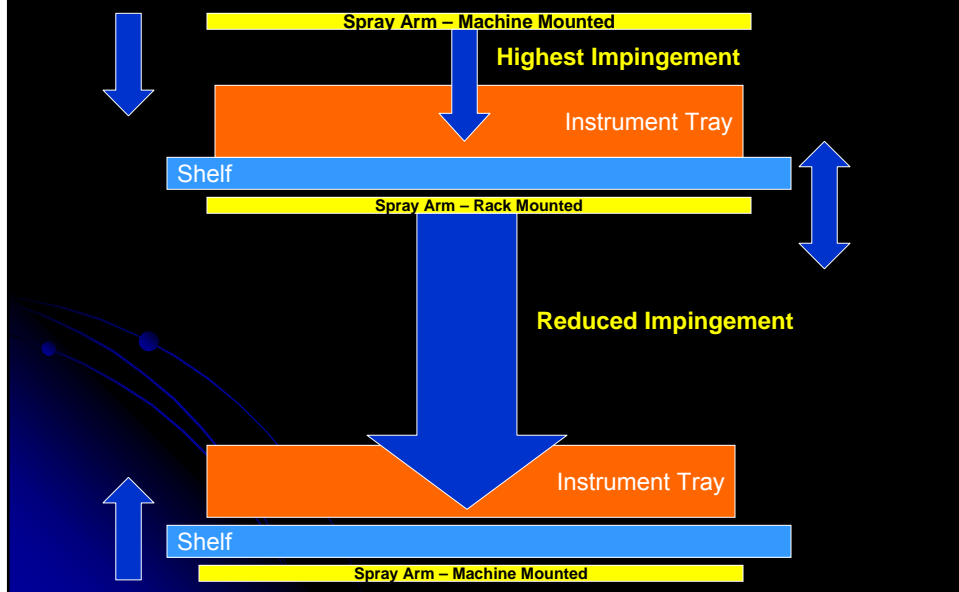
## Spray Arm Impingement Pattern



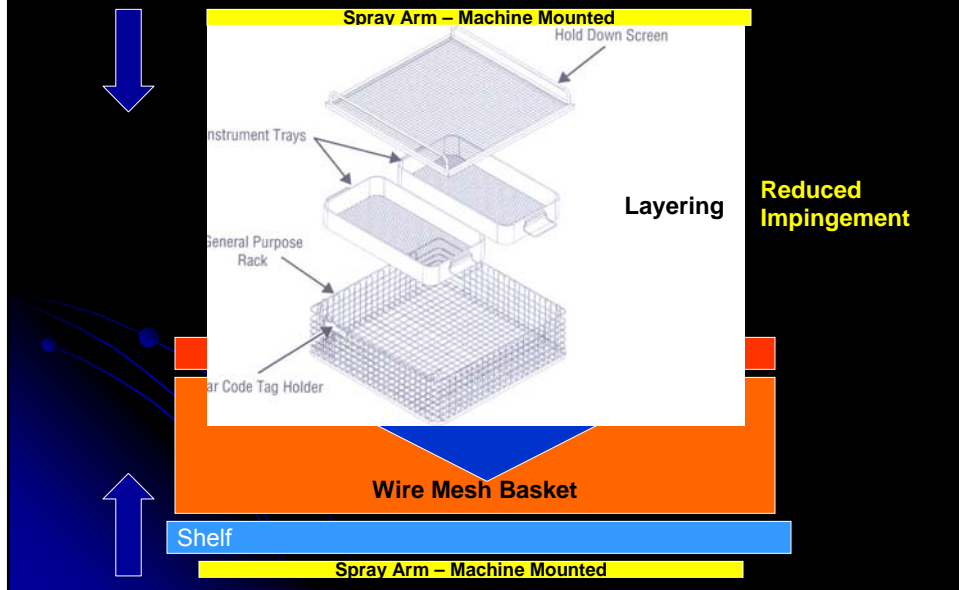
## 3 – Level Rack



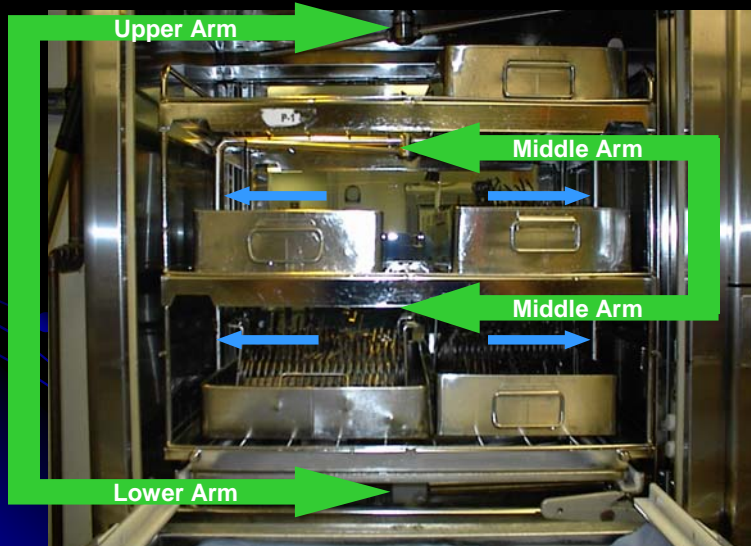
## 2 – Level Rack



# General Purpose Basket



Spray arms complete a circuit similar to a home sprinkler system



## Rack Specifications

- **Two-level manifold rack** is designed to hold trays of surgical instruments and hard goods individually on each level
- **Three-level manifold rack** is designed to hold a general purpose rack, or one or two instrument trays on the bottom level, a general purpose rack, or one or two instrument trays on the middle level, and one or two instrument trays on the upper level
- **Four-level manifold rack** is designed to hold one or two instrument trays on each level
- **Five-level manifold rack** is designed to hold two mesh instrument trays on each level

## Objective - 2

**Review automated instrument washing**

## Automated Washers

- No hospital completed standard for determining what constitutes safe to handle
- No industry or hospital defined load limits
- No industry or hospital defined load configurations
- No quantitative studies to support load limits or configurations
- No Instrument racking systems
- No instrument manufacturer racking devices or instructions to aide in the process

### Home Washer



Racking System

### Automated Healthcare Washer

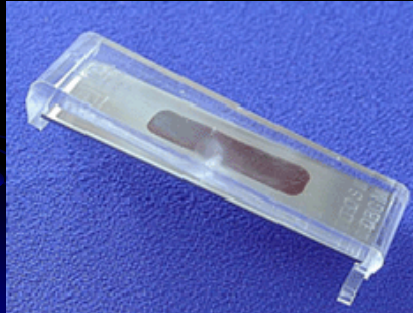


No Racking System

## Attempts to solve racking problem

### 5 inch stringer

There are no studies to support this method and it is not recommended by instrument manufacturers



Our industry has added washer testing in place of proper placement

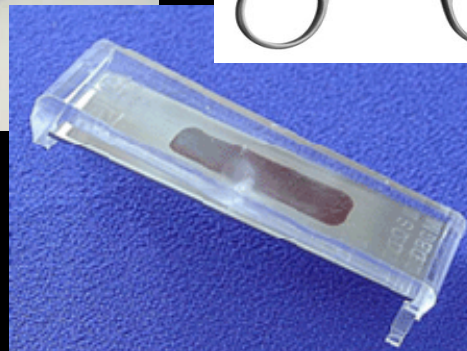


Solid side pans with perf bottoms

## Test Conflict



Test cannot measure flow through the box-lock area



## Operators Manual Statement

### Advisory -

Washer/Disinfector are intended only **to perform an initial step in the processing** of soiled, reusable medical devices. If medical devices will be contacting blood or compromised tissues, such devices must be terminally processed **in accordance with device manufacturer's instructions and/or Good Hospital Practices** before each use in human patients.

Once Known as ST46, which is now ST79

- **Indications For Use** - Washer/Disinfector is indicated for use in the cleaning and **low level disinfection** of soiled reusable utensils, trays, glassware, bedpans and urinals, rubber and plastic goods, simple hard-surfaced rigid surgical instruments (such as forceps and clamps) and other similar and related articles found in healthcare facilities.

## Product Specifications and Operation

### Product Specifications:

**will reduce or eliminate sonic cleaning, manual washing, and handling risk** with its intensive cleaning and thermal disinfection process

### Operations:

- **Loads**—Arrange trays of instruments directly onto shelves of the 2, 3, 4, or 5-level wash carts, or arrange utensils on racks and place racks on properly spaced shelves. **Use proper injection carts and racks for lumen instruments and glassware.** Once the washing cart is loaded, it is transferred to the washer using a transport trolley.

## Operators Manual Instrument Placement Instructions

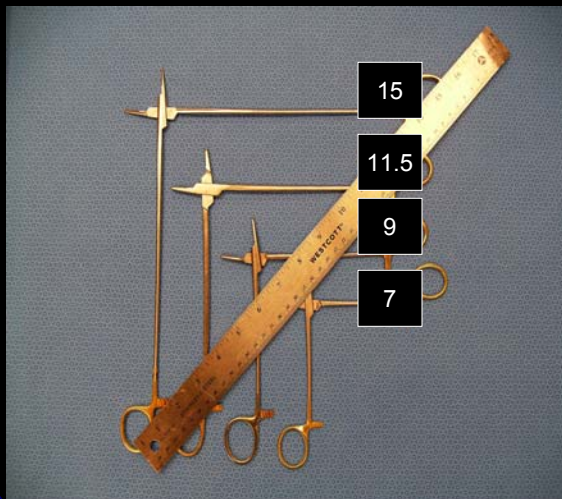
**Always use a rack designed to handle appropriate type of items to be processed**

All hinged surgical instruments with handles (such as scissors, hemostats and forceps) must be **stringed** before being placed in a rack, to **optimize cleaning of the hinges**

**A maximum of 50 items, open at a 90 degree angle, may be placed in each instrument tray**

**90° = 15 inch stringer**

**In total you would need 9 different stringers**



**Currently there are 6, 9, and 12 inch available**

## Processing Stringed Instruments in an Washer Decontaminator

- Limits washer impingement
- Adds time to decontamination
- Increases post-washer drying time
- Increase post-washer cooling time
- Requires de-stringing to inspect scissors, needle holders, and box locks
- No ability to milk box locks
- Box locks are completely closed

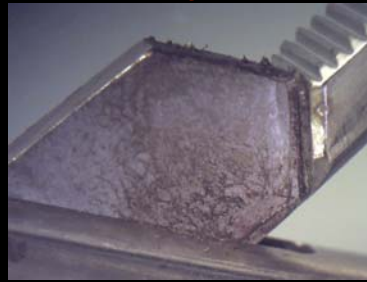


## Symptoms of Poor Manual Process and Pre-stringing Instruments



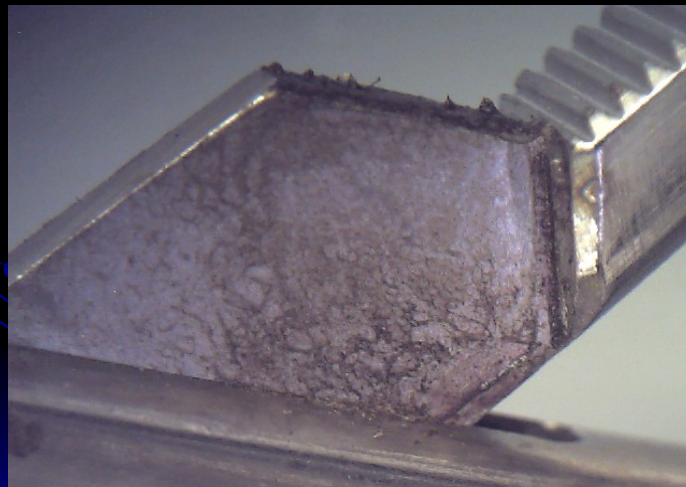


## **Stringing Hinders Washers Impingement Ability**



**Impingement is extremely important in the rinse cycle**

**This instrument was hand washed, placed on a stringer, sent through an automated washer, and packaged for sterilization.**



## Failed Washer Tests

- **Completed 5 test per stringer set-up**
  - Stringed laying on side – 47 instruments
  - Stringed standing up – 47 instruments



General Lap Tray – 89 instruments

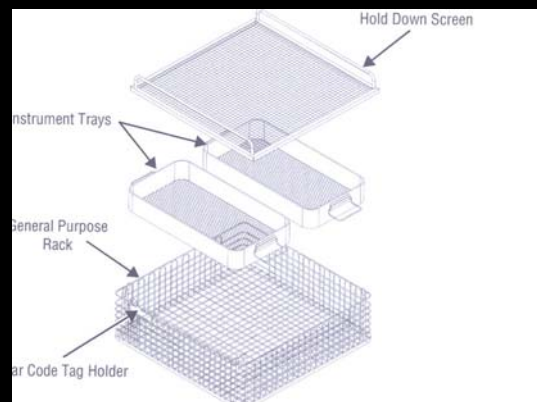
## Other Questionable Methods Used In Hospital Sterile Processing Departments

## Not recommended by Washer Manufacturer or Instrument Manufacturers



**Hold-down screen** (see Figure 4-7) is designed to retain small miscellaneous objects in place. Use in combination with instrument trays, two-level manifold rack and three-level manifold rack.

**Reduces washers ability to complete impingement and there are no studies to support using hold down screens for complete sets**



**Layering Decreases Impingement Action**

## Overall Performance of Automated Washers

### Pros:

- Regulated water temperatures
- Regulated chemical dilutions
- Provides ultimate impingement to chemical ability (as long as spray arms function)
- Improves safer to handle for staff

### Cons:

- No Instrument racking system for ring-handled instruments and forceps the bulk of the surgical instrument inventory

## Objective - 3

Review Manual Instrument Washing

# Spaulding Classification System

Classification of devices, processes, and germicidal products

Device classification	Device (examples)	Spaulding process classification	EPA product classification
<b>Critical</b> (enters sterile tissue or vascular system)	Implants, scalpels, needles, other surgical instruments, etc.	<b>Sterilization</b> - sporicidal chemical prolonged contact	Sterilant/disinfectant
<b>Semicritical</b> (touches mucous membranes [except dental])	Flexible endoscopes, laryngoscopes, endotracheal tubes, and other similar instruments	<b>High-level disinfection</b> - Sporicidal chemical; short contact	Sterilant/disinfectant
<b>Noncritical</b> (touches intact skin)	Thermometers, hydrotherapy tanks	<b>Intermediate-level disinfection</b>	Hospital disinfectant with label claim for tuberculocidal activity
	Stethoscopes, tabletops, bedpans, etc.	<b>Low-level disinfection</b>	Hospital disinfectant without label claim for tuberculocidal activity

## Manual Process

- There is no standard for determining what constitutes safe to handle
- There are water temperature recommendations ranging 50°F to 140°F (max hospital allow 120°F—average 116°F)
- There is no consistent method to measure and maintain water temperature during manual washing
- Cooler water temperature should be below 109°F which may not activate the detergent, water hotter than 140°F will coagulate the protein
- No ability to maintain chemical to water ratio

## Standard Manual Process

Hand wash with a toothbrush below the water service



Sort

Following the Instrument Manufacturers recommendations

Opened and Piled on Top of Each Other  
Limiting Impingement in the Washer



Exceeds 90° requirement for STERIS automated washing



## Additional Manual Washing Short-comings

- Poor ergonomics
- Poor Lightening
- Poor Ventilation
- Insufficient counter space
- No quantitative standards exist for manual cleaning



## Improved Layout



## Inconsistent Instructions from Instrument Manufacturers

### RINSING

- Thoroughly rinse the clamps with distilled water to remove all traces of the disinfecting solution

**USE STERILE WATER ON THE FINAL RINSE**

### DRYING

1. Clamps must be thoroughly dried to remove residual moisture before they can be stored. Moisture that is not removed may cause clamp corrosion
2. Use a soft, absorbent towel, cloth, filtered compressed air, or a 70% alcohol rinse to aid the drying process

## Instrument Manufacturer Instructions in a Washer

### Machine Cleaning/Disinfection

- Select the program according to the material (e.g. stainless instrument steel, aluminum) of the instrument to be cleaned
- **Follow the machine manufacturer's instructions**
- Final rinsing to be done with deionized water
- **Leave sufficient time for drying**
- Remove the instrument from the machine immediately after the program is done

## Out-Comes of Poor Manual to Automated Washing

1. Increased employee risk of exposure
2. Increased long-term chronic back injuries
3. Increased dependence on a manual process
4. Increased instrument refurbishing costs
5. Increased labor cost due to manual process
6. Increased consumable cost, cleaners and brushes
7. Longer processing time in decontamination slows down prep and pack

## Visible Bio-Burden Reduction Level for Surgical Instruments Prior To Sterilization

Reduction level	Process
<b>HIGH LEVEL</b> Automated Mechanical Washer	<b>Disinfection: Thermal</b> <ul style="list-style-type: none"> <li>• Thermal – water temperature 170°F - 220°F</li> <li>• Proper racking device</li> </ul>
<b>INTERMEDIATE LEVEL</b> Manual Mechanical Hand Washing	<b>Decontamination: use of physical or chemical</b> <ul style="list-style-type: none"> <li>• Water temp below - 110°F to 120 °F (safe for staff)</li> <li>• Removal of visible bio-burden with brush</li> <li>• Inspection &amp; sort</li> </ul>
<b>LOW LEVEL</b> Manual Process	<b>Cleaning: Soaking &amp; Sort</b> <ul style="list-style-type: none"> <li>• Post-op - utilizing enzyme spray prior to transport</li> <li>• Enzyme detergent soaking in appropriate water temperature</li> <li>• Manual sort and disassembly</li> <li>• <u>Use of ultrasonic cleaning when applicable</u></li> </ul>

# Objective - 4

## Review Alternative Process

Always use a rack designed to handle appropriate type of items to be processed



**Racks  
Developed and  
available for  
use**



**Peel Pouch Racks**

# Instrument Cradle



## Meeting the STERIS Tray Limit

A maximum of 50 items, open at a 90 degree angle, may be placed in each instrument tray.

Passed five test



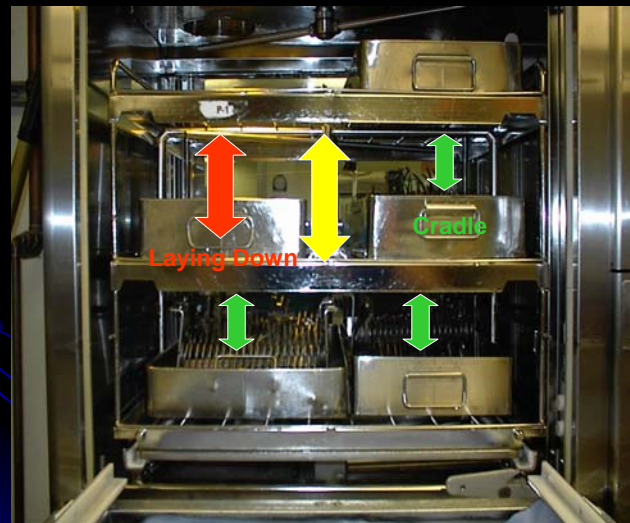
89 total instruments – 42 in left tray & 47 in right

## Response to 90° instructions

- The cradle allows for 60° to 90° openings for all ring-handled instruments including bariatric and long instruments
- Patented pending methodology on the use of the cradle

“Always use a rack designed to handle appropriate type of items to be processed”

## Distance from Spray Arm Impingement



## Using the Cradle



1. Allows for full impingement
2. Eliminates pre-stringing
3. Almost completely eliminates hand washing of ring-handled instruments, and forceps
4. Improves employee physical requirements by reducing back fatigue
5. Racking in place of sorting and hand washing
6. Faster post washer drying time
7. Faster post washer cooling time
8. Allows ability to decrease wash cycle time
9. Decrease chemical oz. per cycle expense
10. Reduces costs of cleaning supplies
11. Reduces water consumption
12. Fits current flash pans



## Pre-Soak

- Only when needed to keep instruments moist



## Small Ring-Handled Instruments



## Forceps



## Vascular Clamps



## Forceps & Ring-handled



## Forceps & Ring-handled



**Top View – Long Instruments – 3 Cradles**



**Automated Healthcare Washer**



**Now with racking system**

## Objective - 5

- Review outcomes of process change

### Employee Safety

Sharps Injuries related to the  
use of the cradle

**NONE**

For the past 18 months  
Pre or Post washer

# Financial Outcome Fiscal Year 2008

YUMA REGIONAL MEDICAL CENTER							
January	Budget Comparison						
2008	Name	STERILIZATION	YEAR TO DATE				
	Dept #	6251					
EXPENSES	Sub Act	Classification	YTD ACTUAL	YTD BUDGET	YTD LFY	Diff	%
	3600	MEDICAL SUPPLIES	24,337	26,350	27,637	(3,300)	-12%
	3601	GENERAL SUPPLIES	38,413	36,187	34,464	3,949	11%
	3603	CLEANING SUPPLIES	11,914	14,756	14,932	(3,018)	-20%

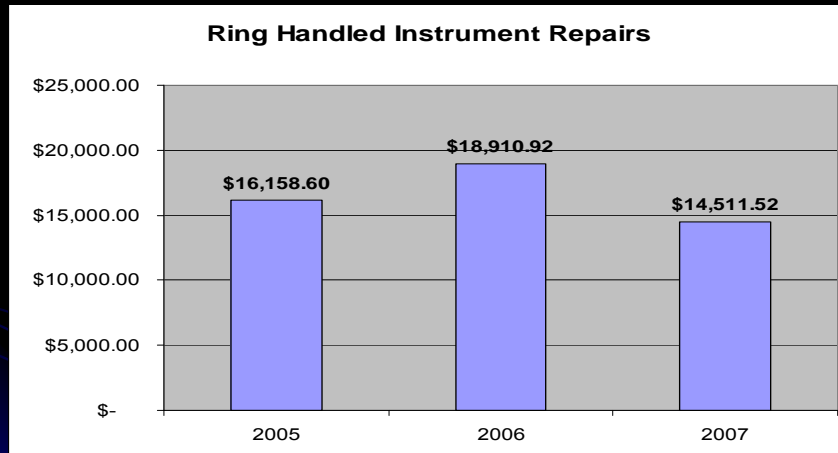
**It is not your job to save the hospital money. It is however your responsibility to use your resources correctly which will reduce long term costs associated to repairs and replacements**

# ROI

**35%  
Return on  
investment  
within 15 months**

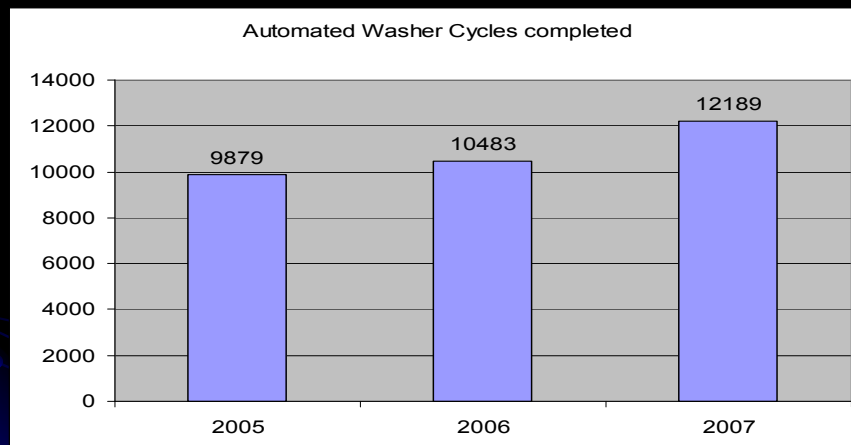
YUMA REGIONAL MEDICAL CENTER <i>Caring for the present with a vision for the future</i>			
ROI	Instrument Cradle	15 - Months	
Start Date:	10/01/2006		
End Date:	12/30/2007		
		PY2006	PY2007
Wash Cycles		10480	12189
Enzyme Expense per cycle	\$ 0.70	\$ 0.48	
Enzyme Detergent Cost for Manual Washing	\$ 7,336.24	\$ 5,832.18	\$ (1,504.06)
Repairs - Ring-handled instruments	\$ 18,919.92	\$ 14,511.52	\$ (4,399.40)
Automated Washer Chemical Reduction Adjustment to Usage Expense 1st Qtr. FY2008	\$ 6,084.04	\$ 4,838.31	\$ (1,255.73)
<b>Total</b>			<b>\$ (7,159.21)</b>
Instrument Cradle Cost - \$225.00 x 90	\$ 20,250.00		\$ 20,250.00
Amount Returned			\$ 7,159.21
Gain or Loss			\$ (13,090.79)
Percent Gain or Loss			-65%
Return on Investment - 15 months %			35%
Submitted by Tim Brooks, Director of Surgical Services Materials Management CS/SPD			
Yuma Regional Medical Center 2400 Ave. A Yuma, Arizona 85364			
Office Phone: 928-336-7003 E-Mail: tbrooks@yumaregional.org			

## Repair Reduction



**NO refurbishing of complete trays in over 12 months  
and less complaints regarding dull scissors**

## Washer Cycles



**Decreased washer cycle time and detergent  
injection per oz.**

# Independent Review

- Healthmark Industries
  - Completed washer testing
- STERIS Service Rep
  - Adjusted spray arms and chemicals to Healthmark's Recommendations
- Staff
  - Trained to complete PM on washer to include spray arms maintenance, descale, and screen cleaning

## Cycle Time Reduction

- Instrument Cycle Time – Old – 50 min
- Instrument Cycle Time – New – 43 min
  - Improvement = 7 minutes or 2 additional loads

### Chemical Dilution Rate

- Detergent – from 3/4oz per gal to 1/2oz
- Enzyme – 1oz per gal
- Lubricant – 3/4oz per gal to 1/2oz

Increase rinse cycle time

```
=====
CYCLE - INSTR.
=====

CYCLE START  1:59:10A
CYCLE DATE   3/27/08
CYCLE NUMBER 0033299
UNIT NUMBER  3610499005
MOTOR SPEED = HIGH

TREATMENT  TIME
-----
PRE-WASH1   1:59:10A
ENZYME W.   2:05:25A
WASH 1      2:13:59A
RINSE 1     2:19:31A
THERMAL     2:21:54A

THERMAL RINSE
COMPLETED AT  2:25:53A

P. WATER1    2:27:38A
DRIVING      2:29:13A

COMPLETED AT  2:42:13A

CYCLE TIME = 0:43:05

=====
=  READY TO UNLOAD  =
=====
DOOR OPEN     6:27:01A
```

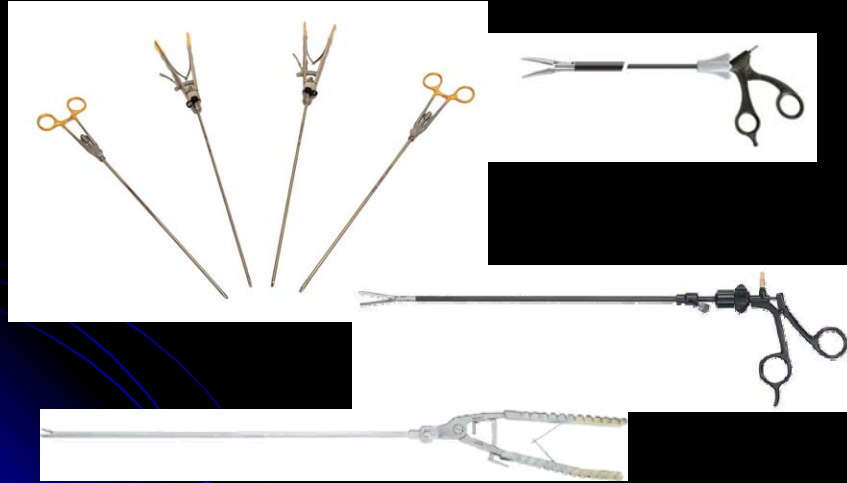
# Focus Repairs On

- Routine washer maintenance program
- Stop use of rust removers
- Routine monthly instrument service
  - Sharpening
  - Alignment
- Lap-chole and non-take-apart instruments
  - Ronguers
  - Non-take-a-part lap-chole instruments
  - Lap-chole insulation inspections

## Non-take-a-parts



## Lap Chole Instruments



## RIGID MIS INSTRUMENT RACK



# Washer Maintenance

1. Weekly descale
2. Weekly cleaning of spray arms
3. Daily cleaning sump screen
4. Establish log book to record cleaning of racks
5. Number all washer racks for maintenance tracking
6. Keep spray arm repair parts inventory
7. Closing procedure for decontamination

# Weekly Maintenance

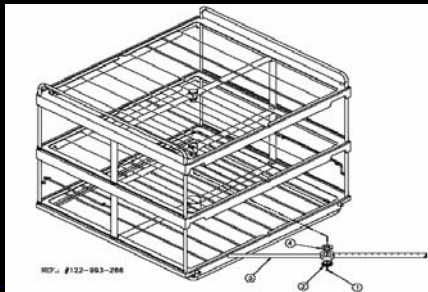


Figure 9-38. Three-Level Rack Assembly



**Keep extra spray arms and bushings in stock for routine maintenance**

FIG. & INDEX NO.	PART NUMBER	S V C	DESCRIPTION	UNITS PER ASSEMBLY
9-38			THREE-LEVEL RACK ASSEMBLY .....	X
1 P	117950 827		SCREW, S/S, Flat Head, 8-32 x 3/8" .....	1
2 P	117904 606		WASHER, Top Rotary Spray Holding .....	1
3 P	117904 808		ARMS, Rotary Spray Arm Assembly .....	1
P	117905 448		• HUB, Rotary Spray, S/S .....	1
P	117951 017		• SCREW, S/S, Hex Head, 8-32 x 1/4" .....	2
P	117904 613		• ARM, Rotary Spray, #2L .....	1
P	117904 614		• ARM, Rotary Spray, #2R .....	1
4 P	117905 384		• BUSHING, ULTEM .....	2

## Other Factors Associated to Staining

1. Over use of stain removers
2. Utilizing metal wire brushes
3. Improper washer cycle settings
4. No routine descale process in place
5. No DI/RO water rinse or reduced rinse cycle
6. Poor manual process
7. Improper chemical per oz. application
8. Improper washer installation

## Service Contract Owner Required

It is the owners responsibility to complete routine daily and weekly maintenance unless written into the annual service contract

***NOTE: It is the responsibility of the customer to perform the decontamination of their unit once a week***

## Daily Cleaning – Closing Procedure

1. After last cycle of day, allow unit to cool, and then remove and clean bottom filters of wash chamber. Always clean filters while still wet, before foreign matter dries.
2. Remove riser valve and inspect for debris. Brush off and rinse under tap water if necessary.

## Weekly – Closing Procedure

1. Clean washer exterior as outlined below.
2. Wash chamber interior
3. Clean wash chamber rotary spray arm assembly
4. Clean bottom rotary spray arms in same way as top rotary spray arms.
5. Clean rotary spray arms on accessories in same way as chamber spray arms.

## Determining Quantities

For Each 3-level Rack



18 Cradles



6 flash pans



## Decontamination Equipment in Service at Yuma

- 90 - Cradles
- 2 - STERIS 444 Washers – 12 years old
- 4 - 3-level washer racks
- 2 - 2-level washer racks – small containers/instruments
- 2 - Lap-chole instrument racks
- 30 - standard flash-pans
- 12 - large flash-pans
- 1 - Sonic Washer
- 1 - Cart Washer – used for containers & case carts
- 1 - 2 sided, 5-sink island work-station
- 1 - manual rack return window
- 4 - rack carts on dirty side, 2 - on prep and pack
- 12189 cycles annually

## Storage



## Department Staffing

**1<sup>st</sup> shift – 6:00am to 2:30pm**

**18269 items process per month**

- 4 - Sterilization Technician
- 2 – Decontamination Technician
- 1 – instrument Coordinator

**2<sup>nd</sup> shift – 2:00pm to 10:30pm**

**12179 items process per month**

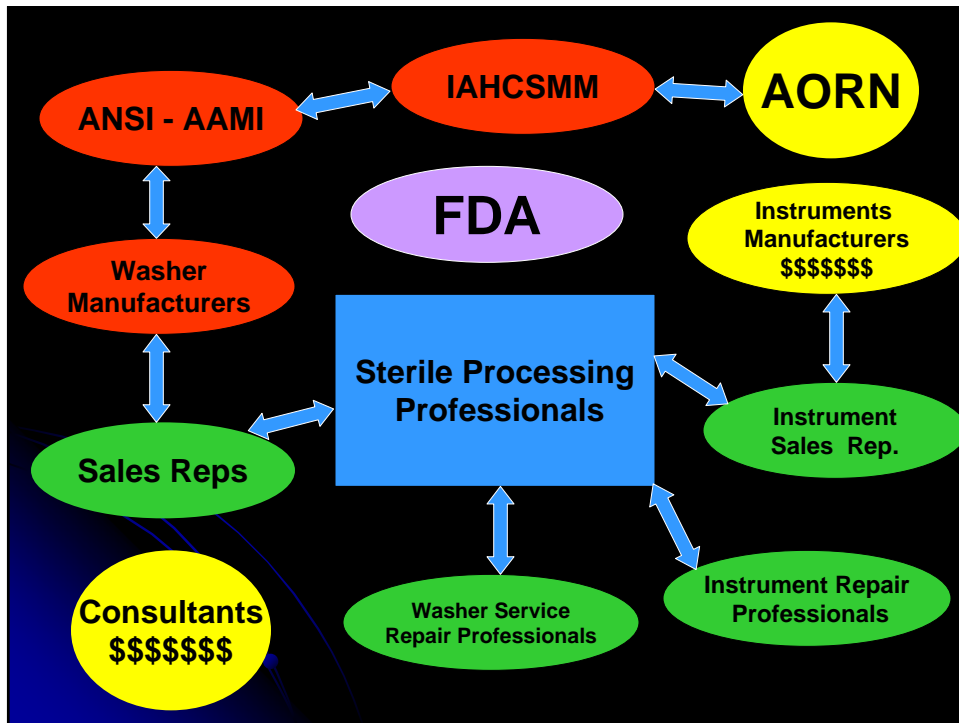
- 4 – Sterilization Technicians
- 1 – Decontamination Technician
- 1 – instrument Coordinator

## Consistency Needed

- Washer Manufacturers Instructions
- Instrument Manufacturers Instructions
- AAMI Voluntary Guidelines
- CS Training Books
- OSHA Recommendation
- FDA

## Validation of Process

There are no quantitative hospital based studies and few if any published industry studies to validate soil reduction levels from a manual process through automation



## Surgical Site Infections

- Its is reported that 2-million people will acquire surgical site infections annually
- It is also reported that 89,000 people will die form surgical site infections annually
- SSI's are also the forth leading cause of death in the US

## References

- **ANSI/AAMI ST79: 2006**
- **STERILIZATION TECHNOLOGY for the Health Care Facility, Second Edition, AN ASPEN PUBLICATION**
- **The Basics of Sterile Processing – Second Edition**
- **STERIS Reliance 444 Single Chamber Washer/Disinfector Operators Manual – 2007-06-26**
- **STERIS Reliance 777 Automated Multi-Chamber Washer/Disinfector Operators Manual – 2004-06-30**
- **Getinge 8668 Washer/Disinfector Product Specifications**
- **IAHCSMM - Lesson Plan CRCST 93 Cleaning and Decontamination of Medical Devices [Reprinted from Communiqué: March/April 2007]**
- **STERIS technical Bulletin #2013 “THE CHEMICAL CLEANING OF SURGICAL INSTRUMENTS (6/99)**

# The End