

# Killer Sterilization

## A Dental Hero's Path to Zero Infections

Presenter: Charlotte Gallagher, BSN, RN, RDH, CDIPC

Healthcare-Associated Infections Antimicrobial Resistance (HAI/AR)  
Program



# Objectives

- ✚ Identify characteristics of a well-organized reprocessing and sterilization area
- ✚ Explain the flow of tasks from safe transport to effective sterilization and storage
- ✚ Highlight the importance of equipment monitoring and maintenance per manufacturer's instructions for use (MIFU) and quality assurance guidelines

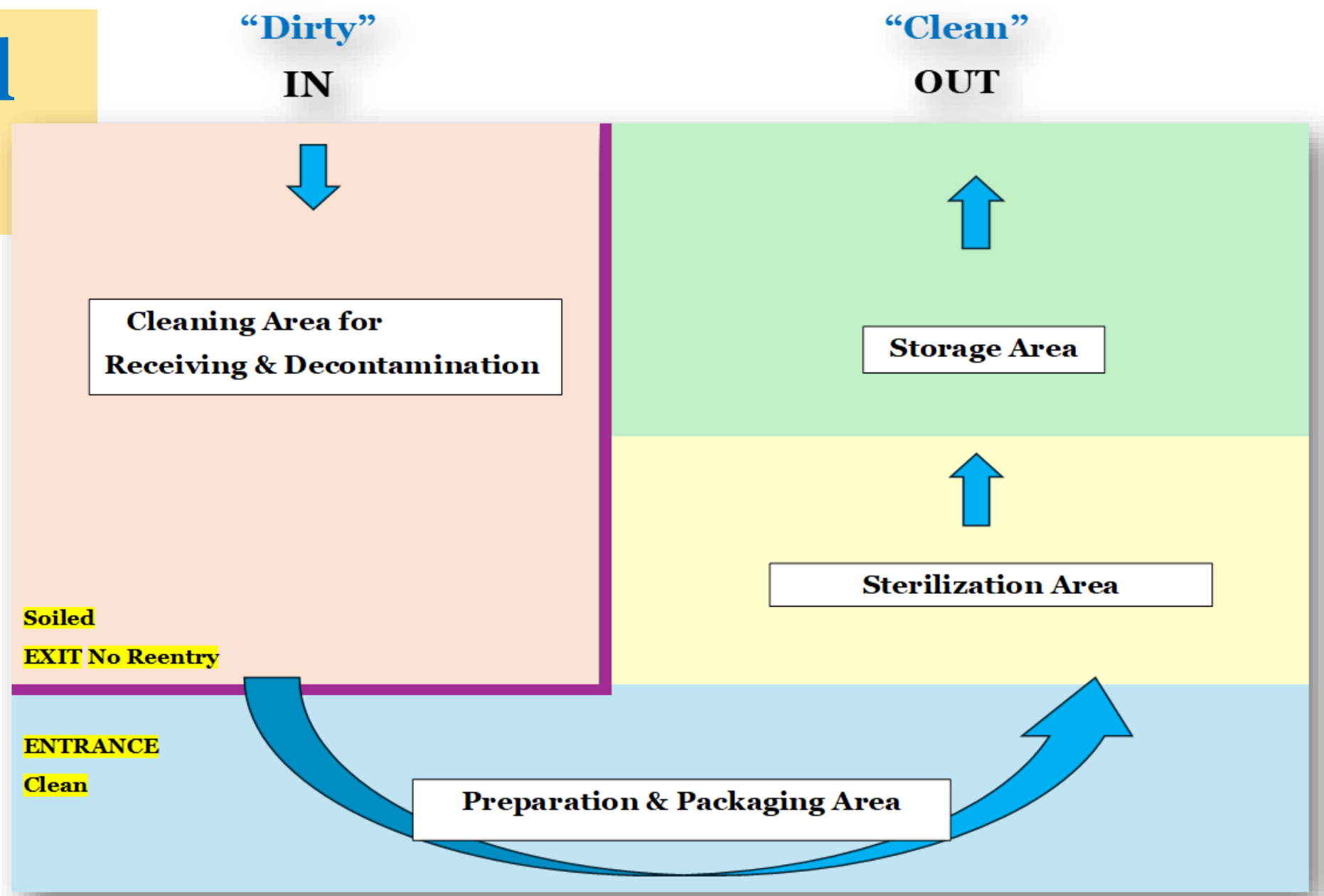
# BE ORGANIZED

## Reprocessing Area

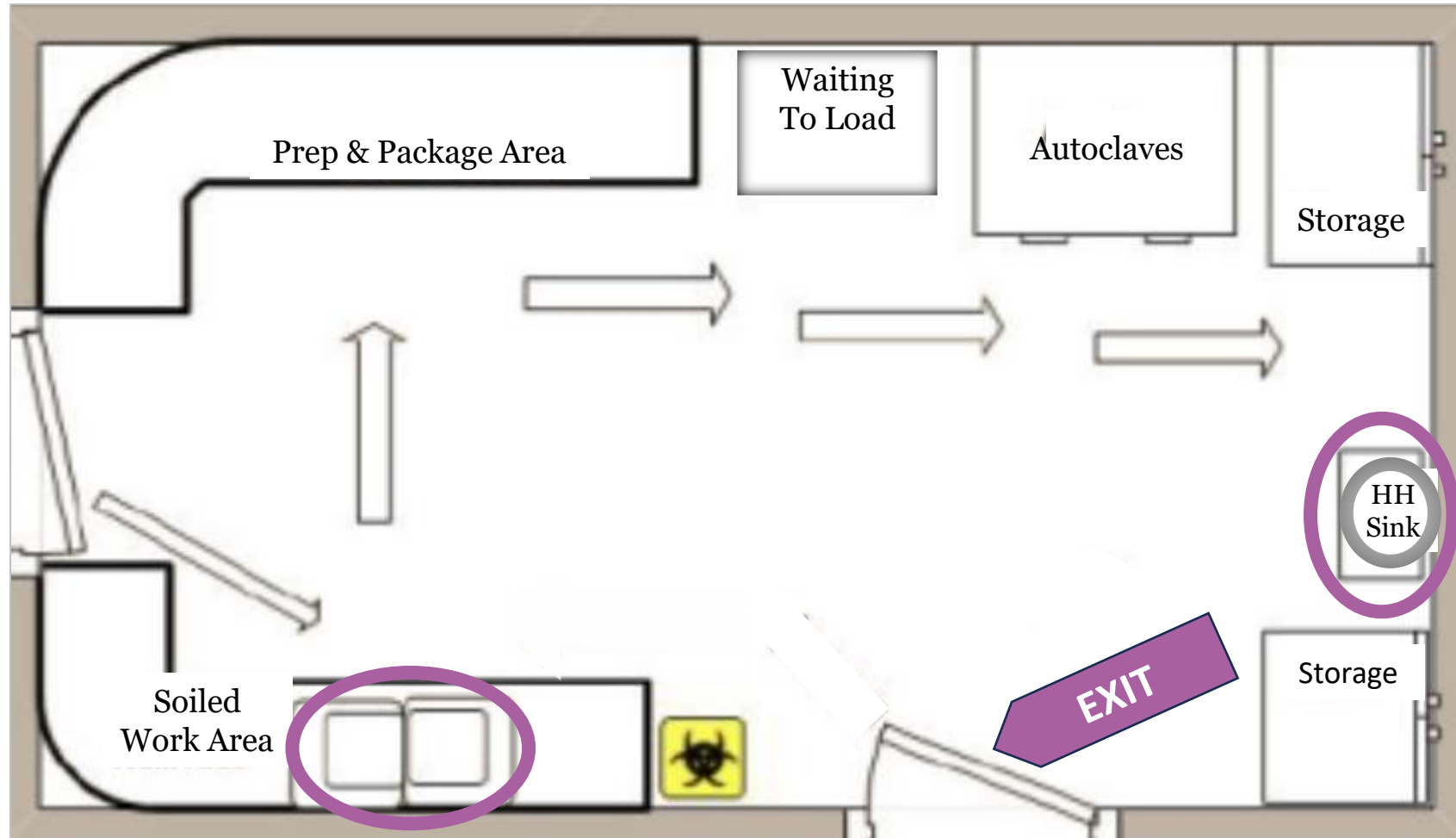
# Separate & One Way: Area Workflow

- ✓ Designated for reprocessing & sterilization tasks only
- ✓ One way flow: soiled to clean & clean to sterile
- ✓ Clearly define spaces with signage to help prevent contamination of clean/sterile processing areas
- ✓ 4 Distinct Areas:
  - Receiving-decontamination-cleaning (rinsing/drying)
  - Preparation-packaging
  - Sterilization
  - Storage

# The Ideal Area

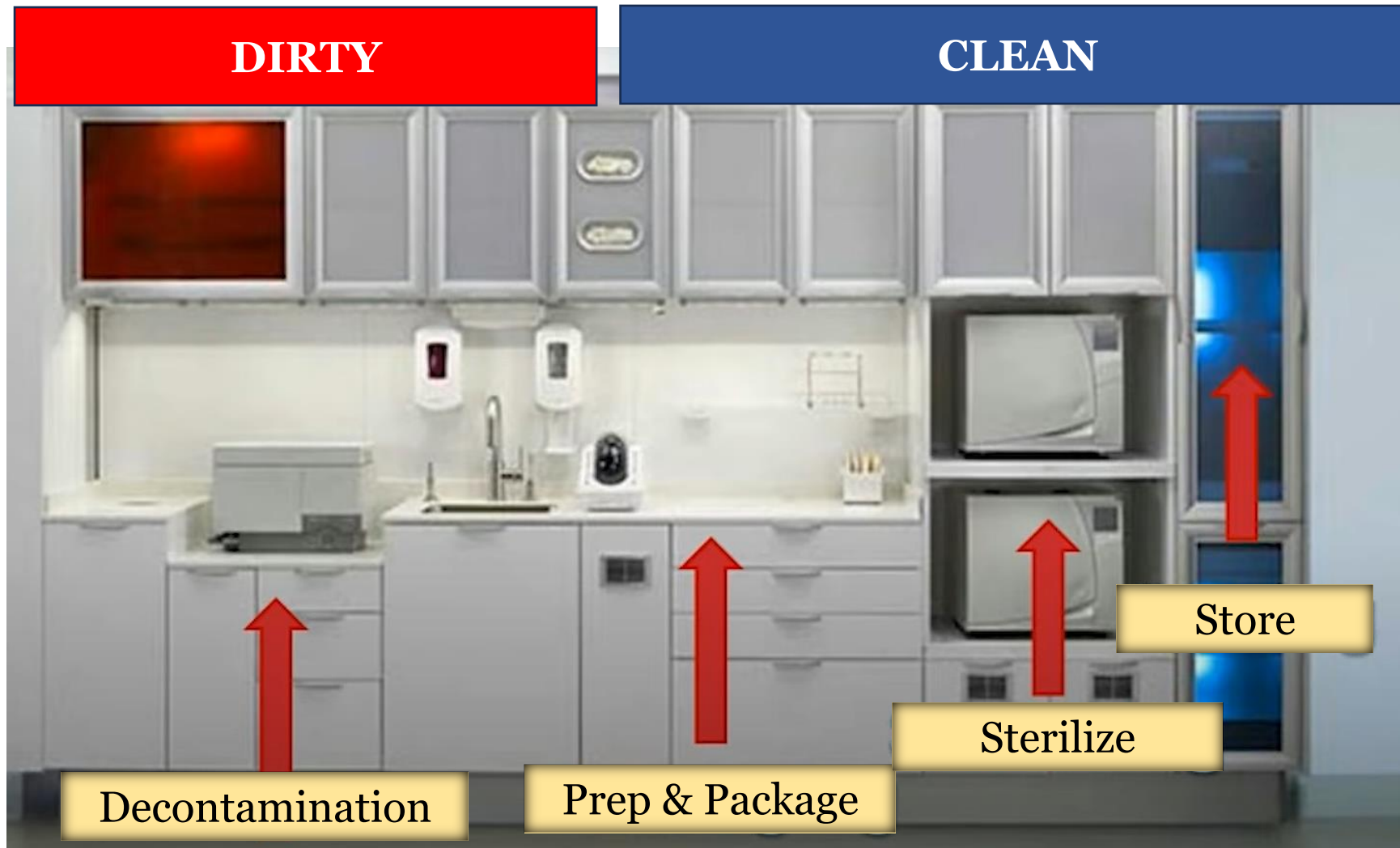


# Office-based Sterilization





# Clear Flow & Signage Choices



# Keep Readily Available

- ❖ Hand hygiene (HH) supplies
- ❖ Personal Protective Equipment (PPE)
- ❖ Measuring devices to dilute cleaners
- ❖ Clean towels
- ❖ Chemical Safety Data Sheets, logs, and/or MIFU for materials, instruments, & equipment
  - Contact manufacturers for directions, if clarification needed





# PPE

- DON PPE for chemical and biohazardous splash & sharps exposures
  - ✓ Heavy duty, puncture proof, utility gloves
  - ✓ Face shield/sided goggles
  - ✓ Fluid resistant gown
  - ✓ Mask

Face Shield /Goggles

Long Heavy-Duty Gloves

Fluid-Proof Gown



# Environmental Safety Requirements

- ❑ Required safety equipment for chemical and bloodborne pathogen (BBP) exposure:
  - ✓ **Spill kit** for blood and chemicals
  - ✓ **Eye wash station** or portable eye wash bottles:
    - 30 feet/10 second walk from potential exposure
    - Delivers 15 minute flush
    - Perform and log weekly flush checks
      - [Weekly Eyewash Inspection Sheet\\_04062022 \(nih.gov\)](#)
      - [Eyewash INFO SHEET by OSHA3818.pdf](#)
- ❑ Room Air (if able)
  - ✓ Exchanges 6-10 /hour
  - ✓ Temperature 64° F to 72° F (18°to 22° C)
  - ✓ Humidity 34-79%



# Cleaning Products & Logs

## ❖ Unexpired EPA registered cleaning products

- ❑ Surface compatible cleaners and disinfectant sprays or wipes (effective wet time for tuberculocidal)

- ❑ Write open and discard/expiration dates

## ❖ Logs

- ❑ ALL Equipment monitoring & maintenance per MIFU (**ultrasonic, washer, sterilizer**)

- ❑ Sterilizer log documents

- ❑ Date, load contents, sterilizer, operator

- ❑ Mechanical, chemical and biological indicator results

- ❑ Sharps injuries for bloodborne pathogen (BBP) exposure

## How to Read a Disinfectant Label

Read the entire label.

The label is the **law!**

Note: Below is an **example** of information that can be found on a disinfectant label

**Active Ingredients:** What are the main disinfecting chemicals?

**EPA Registration Number:** U.S. laws require that all disinfectants be registered with EPA.

**Directions for Use (Instructions for Use):** Where should the disinfectant be used? What germs does the disinfectant kill? What types of surfaces can the disinfectant be used on? How do I properly use the disinfectant?

**Contact Time:** How long does the surface have to stay wet with the disinfectant to kill germs?

**Signal Words (Caution, Warning, Danger):** How risky is this disinfectant if it is swallowed, inhaled, or absorbed through the skin?

**Precautionary Statements:** How do I use this disinfectant safely? Do I need PPE?

**First Aid:** What should I do if I get the disinfectant in my eyes or mouth, on my skin, or if I breathe it in?

**Storage & Disposal:** How should the disinfectant be stored? How should I dispose of expired disinfectant? What should I do with the container?

**ACTIVE INGREDIENTS:** Alkyl (80% C14, 30% C16, 5% C12, 5% C18) .....10.0%  
Dimethyl Benzyl Ammonium Chloride .....10.0%

**OTHER INGREDIENTS:** .....90.0%

**TOTAL:** .....100.0%

EPA REG NO. 55555-55-55555

**CAUTION**

**Directions for Use**

**INSTRUCTIONS FOR USE:** It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

**For Disinfection of Healthcare Organisms:** *Staphylococcus aureus, Pseudomonas aeruginosa.*

**To Disinfect Hard, Nonporous Surfaces:** Pre-wash surface. Mop or wipe with disinfectant solution. Allow solution to stay wet on surface for at least 10 minutes. Rinse well and air dry.

**PRECAUTIONARY STATEMENTS:** Hazardous to humans and domestic animals. Wear gloves and eye protection.

**CAUSES MODERATE EYE IRRITATION.** Avoid contact with eyes, skin or clothing. Wash thoroughly with soap and water after handling. Avoid contact with foods.

**FIRST AID: IF IN EYES:** Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. **IF ON SKIN OR CLOTHING:** Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes.

**POISON CONTROL:** Call a Poison Control Center (1-866-366-5048) or doctor for treatment advice.

**STORAGE AND DISPOSAL:** Store this product in a cool, dry area away from direct sunlight and heat. When not in use keep center cap of lid closed to prevent moisture loss. Nonrefillable container. Do not reuse or refill this container.



U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention



WWW.CDC.GOV/PROJECTFIRSTLINE

# CLEANING Soiled Instrument Handling



# Exam Room Prep for Transport

Prepare instruments for transport to decontamination

- ❑ Discard single use items, sharps, and hazardous waste
- ❑ Point of Use Cleaning: wipe tips **during** treatment with moistened 2x2 gauze or sponge to reduce drying of blood & gross debris



Single-use Symbol  
Do Not Use Twice





# Equipment: Flush Then Disassemble

- Flush equipment and tubing with air/water for minimum 20- 30 sec.
  - Air/water syringe
  - Handpieces & Cavitron lines
- Disconnect & disassemble per MIFU
- **Heat sterilize dental handpieces**
  - Saliva/blood are retracted onto internal surfaces and can be transmitted to subsequent patients
  - Remove entire unit & separate tip and motor attachment
  - [CDC Statement on Reprocessing Dental Handpieces](#)





# Transport to Reprocessing Area

- Per OSHA, instruments should be transported to reprocessing area in a covered, leakproof, puncture-resistant container labeled biohazard
  - Don't transport LIQUIDS
- \*TIP: Place instruments directly into ultrasonic baskets prior to transporting to reduce handling risks when transporting, cleaning and rinsing



# Preclean: Prevent Drying of Debris

In receiving area, preclean/presoak to keep debris moist **IF** unable to start cleaning immediately:

- ❖ Submerge items in dedicated “dirty” holding container of detergent solution or liberally spray on gel
- ❖ Prevents debris hardening that hinders cleaning and steam contact



# Cleaning

1. Unlock and open hinged devices (scissors, forceps, pliers)
2. Handle hard-to-reach items with pliers or forceps
3. Irrigate lumens with air via syringe, MIFU recommended brush, or commercial flush and lubrication devices
- 4. Clean ALL instruments via automated or manual method, per MIFU**



**HANDPEICE CLEANING  
LUBRICATION SYSTEM**

# Cleaning Methods

- ❖ Ultrasonic cleaner
- ❖ Washer/disinfector
- ❖ Manual scrubbing
- ❑ Automated methods **always** preferred over manual scrubbing
  - ❑ Minimizes risk of sharps injury during handling
- ❑ For each instrument, follow MIFU for cleaning method compatibility
- ❑ All instruments should be heat tolerant



# Ultrasonic Cleaner

## Vibrations form cavitation bubbles that dislodge debris

1. Unlock & open hinged devices
2. Insert instruments into basket
  - ❑ Don't overload
3. Entirely **Submerge** load in unit's suggested detergent
4. Put **lid on** to prevent contamination of surfaces with aerosols or droplets
5. Set timer for when instruments should be clean, per MIFU (usually 15-30 minutes)





# Ultrasonic Cavitation Testing & Documentation



- ❑ Fill detergent AM, empty & dry PM, and if cloudy or odorous
- ❑ Use commercial test strips and/or foil tests for acceptable detergent and cavitation parameters per MIFU
- ❑ Commercial devices can test temperature and strength of cavitation & detergent
- ❑ Document monitoring results

Good Foil Test



Bad Foil Test



## Examples:

### **Cavitation**

- ❑ Testing the performance and quality of your ultrasonic cleaner - foil test
- ❑ Resurge: Dental Ultrasonic Cleaner

### **Test Log**

- ❑ 704\_N1656\_Ultrasonic Cleaning Monitor Record Sheet\_0316.indd



# Rinsing Following Ultrasonic Cleaning

1. At cycle completion, remove lid & transport to sink by basket handles
2. **Thoroughly rinse off** detergent with tap water in a disinfected sink
3. Retrieve sharps from basket with utility gloves or forceps
4. Transport items safely to drying area



# Automatic Washers

❖ Washer-sterilizers offer the highest level of disinfection & drying stage saves time

1. Load and maintain per MIFUs
2. Allow a complete drying cycle if unit provides
3. Perform daily and periodic maintenance per MIFU's and document all findings

Example: VERIFY All Clean Test Washer Indicator | STERIS



# Manual Scrubbing

1. Scrub 2-3 items with long handled brush and detergent, under water (80-110°F), down-away motion
2. Replace brush daily or if damaged (soft toothbrush)
3. Never reach into sinks or containers holding sharp instruments that cannot be seen, such as a container of soapy water
4. Use pliers or forceps for hard-to-reach items.
5. Rinse items **thoroughly** with tap water

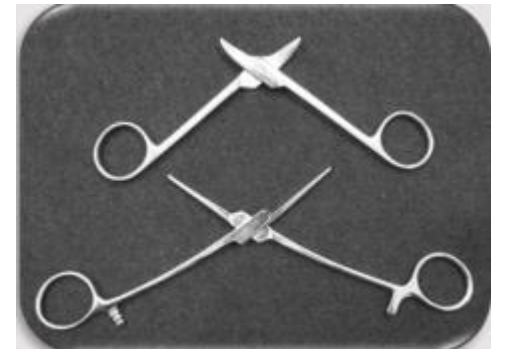




# Final Cleaning Step: Dry Completely

## ❖ Prevent wet packs and corrosion & allow complete steam contact

1. Place wet items on absorbent pad or towel in a dedicated clean space (3 feet from splash zone)
  - ❑ Leave air dry or carefully pat with clean, lint-free towels
  - ❑ Flush lumen/hollow devices with air via empty syringe, per MIFU (e.g., air water syringes)
2. If space allows, use rigid bin to transport to prep and packaging for inspection

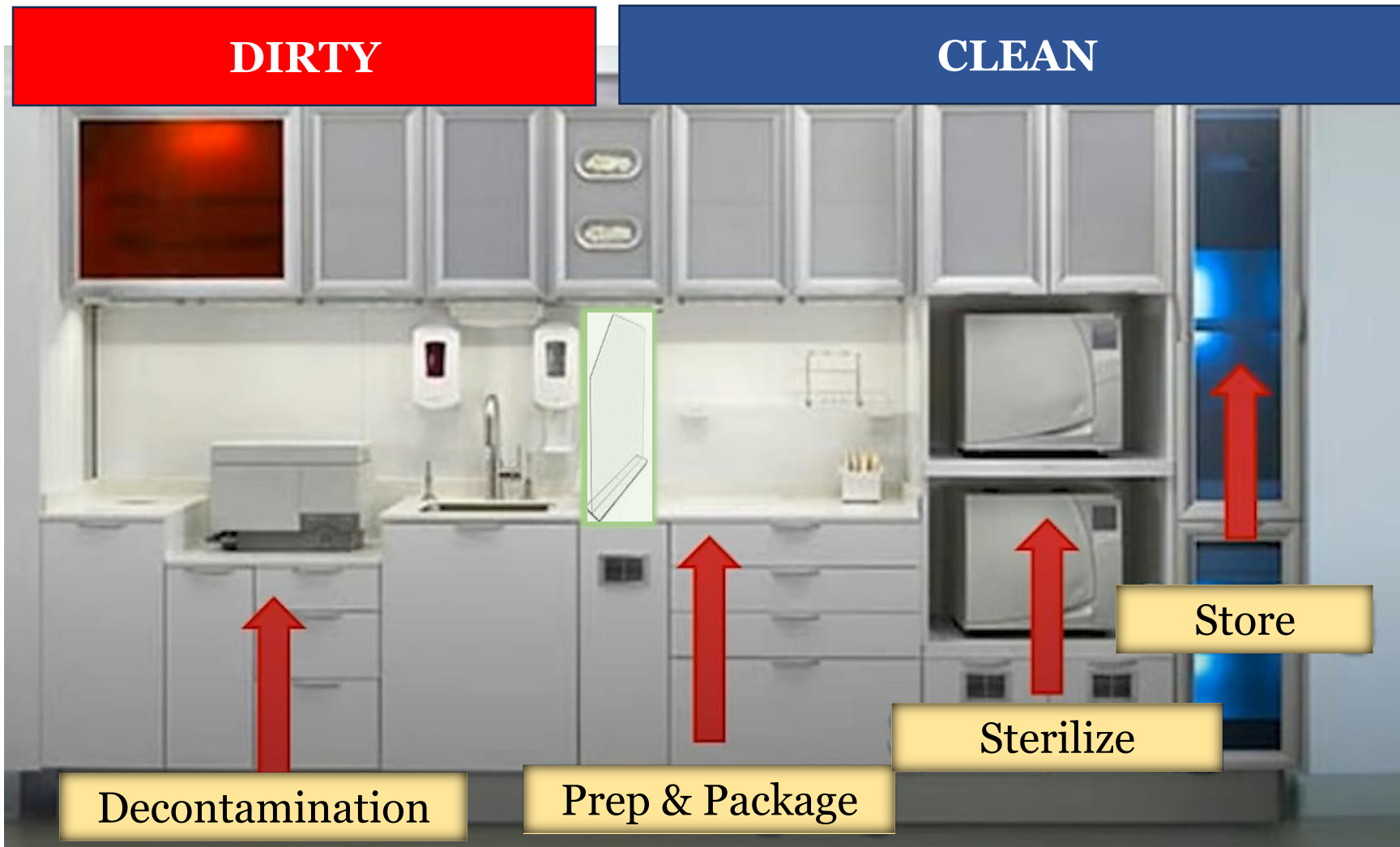


# Keep Limited Space Clean

- **Keep cleaned instruments 3 ft from sink “Splash Zone”**
- **Limited Space:**
  - ❑ Do not perform decontamination and clean tasks (e.g., drying and packaging) at the same time
  - ❑ Disinfect shared surfaces between dirty and clean tasks (sinks, countertops, containers)
  - ❑ Use clean surface barriers (pads)
  - ❑ Use splash guards



# A Solution Separate Limited Space





# Wrap-Up Dirty Duties

1. Disinfect transport container, countertops & sink
2. Remove PPE before exiting “dirty” area
  - **Discard** disposable PPE
  - **Disinfect** reusable PPE: utility gloves, shields /goggles
3. Launder reusable gowns & towels
  - **Don't** enter clean areas **OR** reuse soiled PPE for any patient care
  - **Do** always perform HH after any PPE is doffed

# Preparation & Packaging



# Preparation

1. Ensure prep/package area is clean/disinfected/dry
2. Perform HH & DON clean utility gloves
3. Use good light & magnification lens
4. Inspect for debris, damage
  - Return soiled for recleaning
  - Remove if rusted, pitted, over sharpened blades, broken tips; replace to complete sets
5. Assemble **functional** group setups
6. Lubricate and apply rust inhibitors on hinges or handpieces, per MIFU
  - Remove excess using a clean cloth



[LUMAPRO LED, 1.75x, Round Magnifier Light - 10C906 | 10C906 - Grainger](#)

# Add Chemical Indicators

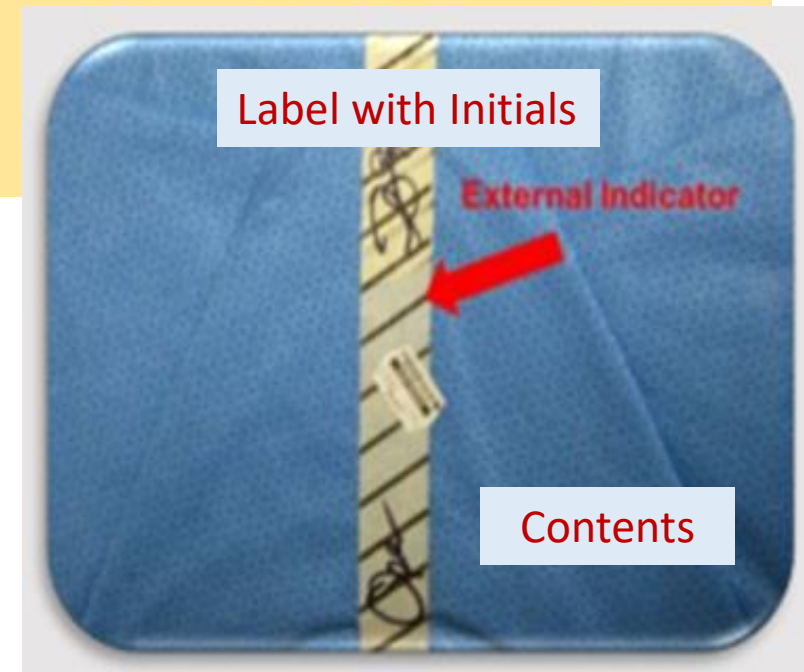
- See through pouches with built in internal/external chemical indicators (CI) are ideal to view items and open without contaminating contents
- Cassettes require inserting CI strips internally before sealing
- CI tape is used externally when internal CI is not visible
- CI's measure time/temp/pressure -> color change only visible when parameters have been met
- **Only biological indicators verify sterility: spore test is performed weekly & placed in center of full load**



# Labeling

## Label peel pouches or cassette wraps with:

- Load#, sterilizer#, date & expiration date and contents, if applicable
- Packager's initials- captures process or operator errors
- Allows for retrieval and reeducation in sterilizer failure



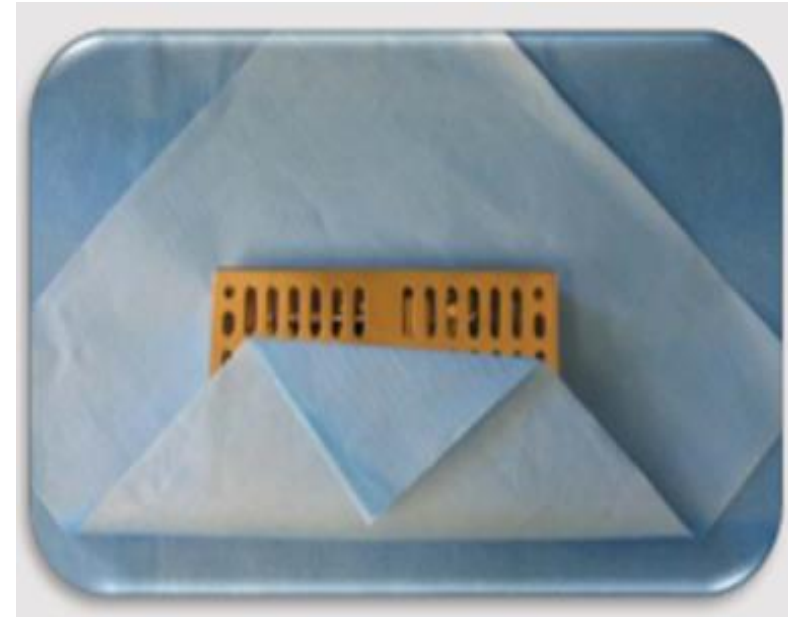
SUTURE TRAY  
**STERILE**  
Unless Package Opened  
or Damaged  
Check Before Use  
#299024-1

Load No. Ster. No.  
**6 3**  
STERILIZED  
INDEFINITE SHELF LIFE  
09/04/2023



# Packaging

- Adequately sized, clean, dry, intact peel pouches or wraps as it will protect sterility during storage
  - ❖ Tears are created when over filled - get bigger packages or pack less
- Don't over fold, gap, or crease at adhesive seals
- Place clean packages in designated clean container marked “**Clean NOT Sterile**” to prevent reuse or begin loading sterilizer trays



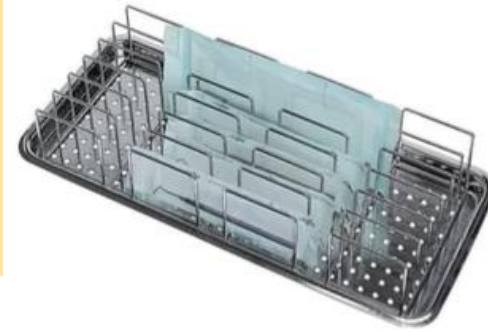


# STERILIZATION



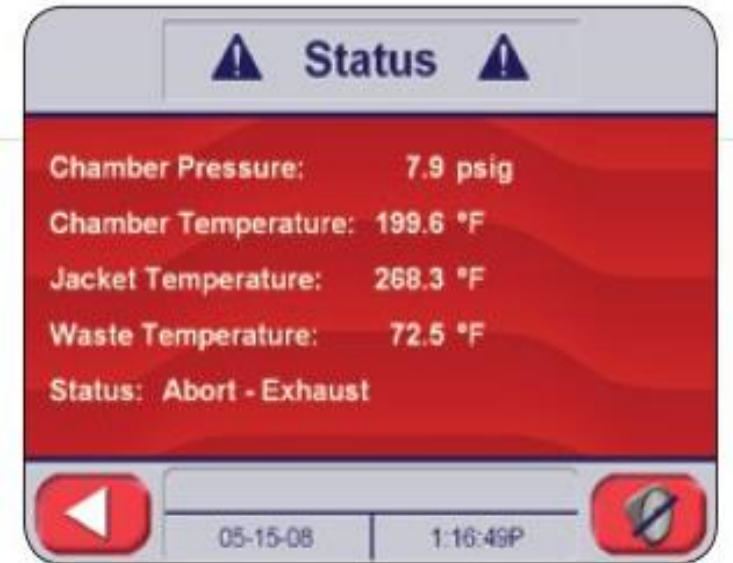
# Loading

- Place packages on trays, per MIFU
  - **Overloading** causes ineffective sterilization & drying
  - Adequate space allows steam contact and complete drying of instruments
- Paper up or down on flat trays per MIFU's - no stacking (**wet packs**)
- Best on side



# Turn On the Heat!

1. Follow MIFU for time, temp, and pressure parameters, correct use of cassettes, wraps, and chemical or biological indicators
2. Ensure door seal is in place and lock door
3. Select and run sterilizer cycle  
(Time/Temp/Pressure) **per load contents, per MIFU**



# Monitor Mechanical Indicators

1. Monitor: time, temp, pressure readings
2. **If they fail: Do not use instruments**
  - ❑ Review all processes for operator error & rerun items to check if parameters were met
  - ❑ First sign of equipment/load failure
  - ❑ Service malfunction early prior to complete unit breakdown or eventual biological indicator (BI)/spore test failure



# Drying, Cooling, & Inspecting

1. **LET CYCLE COMPLETE** drying and **cooling** to avoid condensation from hot pack on cool counter/trays
2. **LEAVE DOOR CLOSED UNLESS STATED OTHERWISE IN MIFU**
3. Open sterilizer after cycle end light or alarm signal
4. Remove packages for storage with clean hands or gloves
5. **Inspect CI for color change** before storage
  - In pouch (if visible) or external indicator/tape





# Document

Maintain up-to-date sterilizer log:

1. Mechanical & CI monitoring **each load**

2. Weekly BI/spore test

✓ **One BI test is placed in center of a load in each sterilizer**

3. Document daily preventative maintenance per MIFU

✓ Check drain/filter/gaskets (daily) & Bowie-Dick air removal test

4. All contracted scheduled maintenance and emergency repairs

# Document

**Sterilization Log Sheet**

**Month/Year:** \_\_\_\_\_

**Location:** \_\_\_\_\_

**Sterilizer Identification:** \_\_\_\_\_



Date (dd/mm/yy)	Contents	Cycle Start Time	Cycle End Time	Cycle Length	Temp. *F or *C	Pressure	Internal/ External Chemical Indicator Color Change (Y/N)	Biological Indicator Used (Y/N)/ Result (pass/fail)	Operator's Initials	Comments
							/	/		

**Biological spore test strips are submitted weekly**

# Rules for Unpackaged Items

- ❖ Emergency only!
- ❖ Not for reasons of convenience, alternative to buying additional instrument sets, or saving time or packaging costs
- ❖ Ensure there are enough sterile instruments available to discourage the need for a quick turn around
- ❖ **Packaging acts as barrier to maintain sterility**

# Warning for “Cold Sterile”

Liquid sterilization is discouraged  
**Evaluate: exposure risks outweigh any benefits**

- ❖ No BI test to ensure sterility
- ❖ Requires expensive copious sterile water rinsing
- ❖ Overall, cost effective to replace instruments with disposable or heat tolerant items

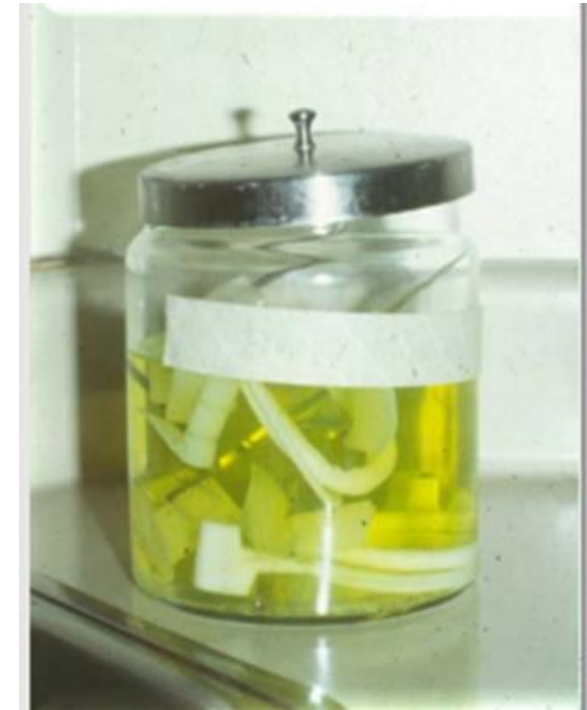


# More on “Cold Sterile”



## If you must:

- ❖ Safety Data Sheet Regulations must be followed precisely & documented
  - Monitoring effectiveness: Dilution, immersion time, effective strength, temperature
  - Safety precautions for using as chemical sterilant or high-level disinfectant
    - Inhalation, splash & contact PPE: Respirator, heavy-duty gloves, gown & goggles/face shields
    - Minimum 10 air exchanges per hour or exhaust hood
    - Disposal





# STORAGE



# Never Store or Use

## FAILED INDICATORS, TORN, STAINED, OR WET PACKS

### Wet packs compromise sterility

- Water pulls hand/surface contaminants through wet pack micropores = wicking

### Inspect for teaching moments:

- Wet packs, CI, BI, load failures from errors loading/packaging

❖ **NO FANS!**



# Storage Area

- Keep packages in a **clean, dry, enclosed area**, away from sources of contamination (aerosol, droplet, water, windows, direct sunlight)
- Sterile storage: maintain temperature  $<75^{\circ}\text{F}$  relative humidity  $< 70\%$
- Store in a manner that prevents packages from being crushed, bent, compressed or punctured
- Rotate packaged instruments; first in first out



# Dispensing Sterile Instrument Packs

1. Maintain **integrity**: handle packages from storage with **clean hands**
2. Inspect expiration before use
  - “Expired by Status” = shelf life determined by instrument package
  - Wet, stained, torn, damaged, previously opened: reclean, repackage, and resterilize
  - Dropped pack rule - if package cracks (torn, ripped) take it back (reprocess)
3. Do not open sterile packaging until ready for actual use with patient observing



# Spore Testing

## Biological Indicators



# Spore Testing Options

## In-office spore testing

- ✓ Requires incubator purchase
- ✓ Quicker result turnaround—usually @ 48 hours
- ✓ Follow MIFU timelines

## Off-site mail-in lab testing

- ✓ Longer wait on results @ 1-2 weeks
- ✓ Independent third-party results
- ✓ Failure yields increased instrument recalls and patient notifications

# Components and Frequency

- ❖ Test and control vials: each contains live bacteria and should be from same lot number (found on box or test)
  - ❑ Sterilizer MIFU specifies required type of bacterial spore test
- ❖ Test Frequency:
  - ❑ Weekly
  - ❑ ANY load that contains surgical implants
  - ❑ New personnel, equipment or packaging



# Spore Testing Process

1. Test vial/strip placed in the sterilizer, but control is not
2. Test and control are both incubated
3. **Control vial** should always show growth. No growth indicates the test did not work and a retest is required from new lot number.
4. If **test vial** is:
  1. Negative: no growth after incubation =PASS (spores from the test vial were killed)
  2. Positive: spore growth in test vial/strip = FAIL (sterilizer did not kill spores)



# Response: Positive/ Failed Spore Test

❖ Audit all operator techniques - Operator error #1 cause of sterilizer failure

- Improper packaging, loading, timing, temperature or method
- Reeducate

❖ Rewrap, reload with proper process and **retest**

- Negative growth: Passed Test, sterilization achieved
  - Resume use of sterilizer
- 2nd Positive: Failed sterilizer



# Second Failure: Notification Protocol

- Notify leadership, per protocol
- Take sterilizer out of use until repaired
  - Rental/replacement of autoclave may be required until equipment is verified as repaired (3 empty cycle passes)
- Recall, reclean, repackage all instruments processed since last pass date for **complete reprocessing**
- **Investigation:** List Potentially Exposed Patients
- Notify PDPH about breach and patients notified
  - ✓ [Outbreaks and Patient Notifications | HAI | CDC](#)
  - ✓ [Introduction to the Patient Notification Toolkit | Injection Safety | CDC](#)



# Keep A Spore Test Record

## ✓ Record:

- BI test and control results (-/+)  
in sterilization log
- Failed test response details
- Repair & maintenance invoices
- Store sterile monitoring records  
for 3 years for verified for  
regulatory review



# QUALITY CONTROLS

# Effective Policy Includes Continuous Education

- ❖ **Create reprocessing and sterilization policies & procedures**
  - ❑ Base policies and procedures on MIFU's and keep them **available** for easy staff reference
  - ❑ Review policies yearly and whenever new processes are implemented
- ❖ **Training** with competency validation
  - ❑ On hire, yearly & with new items or processes
  - ❑ Maintain records of training
    - ✓ ongoing ceu record v2.xls
- ❖ **Auditing** with feedback assures quality compliance

# SUMMARY

- ✦ **Effective decontamination starts in exam rooms and ends with complete rinsing and drying**
- ✦ **A one-way reprocessing flow, correct use of PPE, cleaning and disinfection prevents instrument recontamination**
- ✦ **All instruments and supplies should be heat sterilizable or single use**
- ✦ **Mechanical and chemical indicators assess adequate sterilizer parameters are met, but sterility is verified by weekly spore testing**
- ✦ **All instruments and supplies should be sterilized and stored packaged**
- ✦ **Sterilization policies are guided by equipment MIFU and include all documentation of equipment testing and maintenance, and staff training on reprocessing duties**

# Thank You For Your Time & Attention

QUESTIONS?



# Web Resources

[Guidelines for infection control in dental health-care settings - 2003 \(cdc.gov\)](#)

[Sterilizing Practices | Infection Control | CDC](#)

[Sterilizing Practices | Disinfection & Sterilization Guidelines | Guidelines Library | Infection Control | CDC](#)

[Summary of Infection Prevention Practices in Dental Settings: Basic Expectations for Safe Care](#)

[Best Practices in Dental Infection Prevention and Control](#)

[Foundations: Building the Safest Dental Visit](#)

[Basic Expectations for Safe Care Training Modules](#)

[Course Overview for Foundations: Building the Safest Dental Visit \(youtube.com\)](#)

[Guideline for Disinfection and Sterilization in Healthcare Facilities, 2008 \(cdc.gov\)](#)

[BESC Module 7 – Sterilization and Disinfection of Patient-Care Items and Devices \(cdc.gov\)SC; Presenter's Script; Module 7. \(cdc.gov\)](#)

[Summary of Infection Prevention Practices in Dental Settings: Basic Expectations for Safe Care \(cdc.gov\)](#)

[Guide to Infection Prevention for Outpatient Settings: Minimum Expectations for Safe Care \(cdc.gov\)](#)

[108. Sterile Processing | Infection Prevention for Support Services and the Care Environment | Table of Contents | APIC](#)

<http://c.ymcdn.com/sites/www.osap.org/resource/resmgr/>

[Symposium 2015 - Presentations/FDA.pdf](#)

[Reprocessing Medical Devices in Health Care Settings: Validation Methods and Labeling | FDA](#)

[Association for the Advancement of Medical Instrumentation. ANSI/AAMI ST79:2017: Comprehensive Guide to Steam Sterilization and Sterility Assurance in](#)

[Health Care Facilities. Arlington, VA: \*\*Association for the Advancement of Medical Instrumentation\*\*; 2017.IMAGES](#)

[108. Sterile Processing | Infection Prevention for Support Services and the Care Environment | Table of Contents | APIC](#)

[Sterilization Guidelines: Third Edition | International Committee of the Red Cross \(icrc.org\)](#)

[Spore Testing for Your Autoclave: Why, How and When | Tuttnauer](#)

[Sterilization: Monitoring | FAQs | Infection Control | Division of Oral Health | CDC](#)

[20WEB0010 - VIDEO \(mycrowdwisdom.com\)](#)

[spiceducation | Instrument Reprocessing: High Level Disi... | Module 4 \(talentlms.com\)](#)

[SumTotal Content Player-If It Ain't Broke: Sterilizer Monitoring & Testing](#)