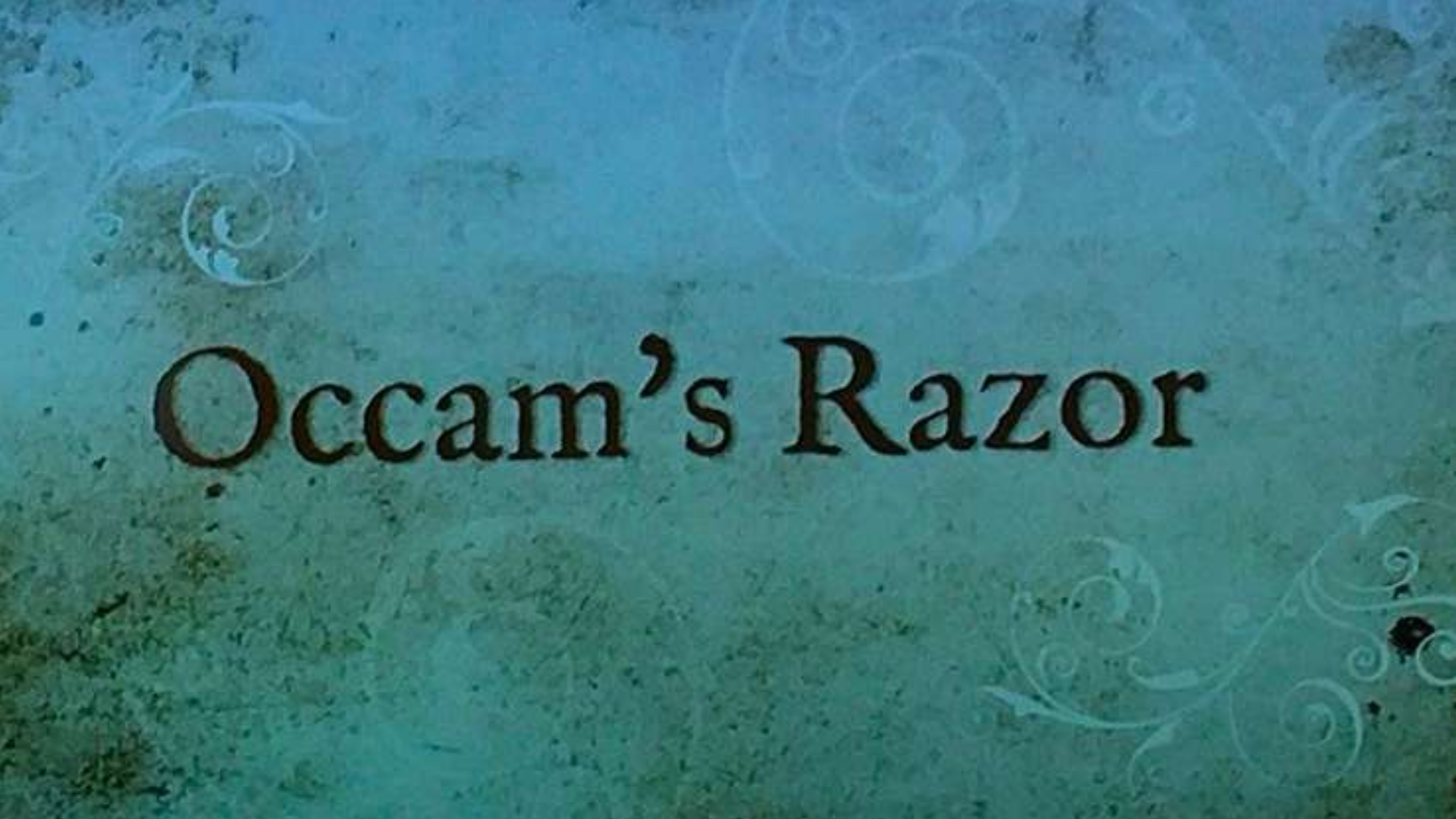


Infection Control in Dentistry

**David Carsten, DDS, Asst Professor OHSU, Chair of the Washington State Dental Commission
Chair of the Infection Control Committee, Member of OSAP
Kate Mills, RDH, Health Care Inspector, Washington State Department of Health**



What do anesthesiologists do??

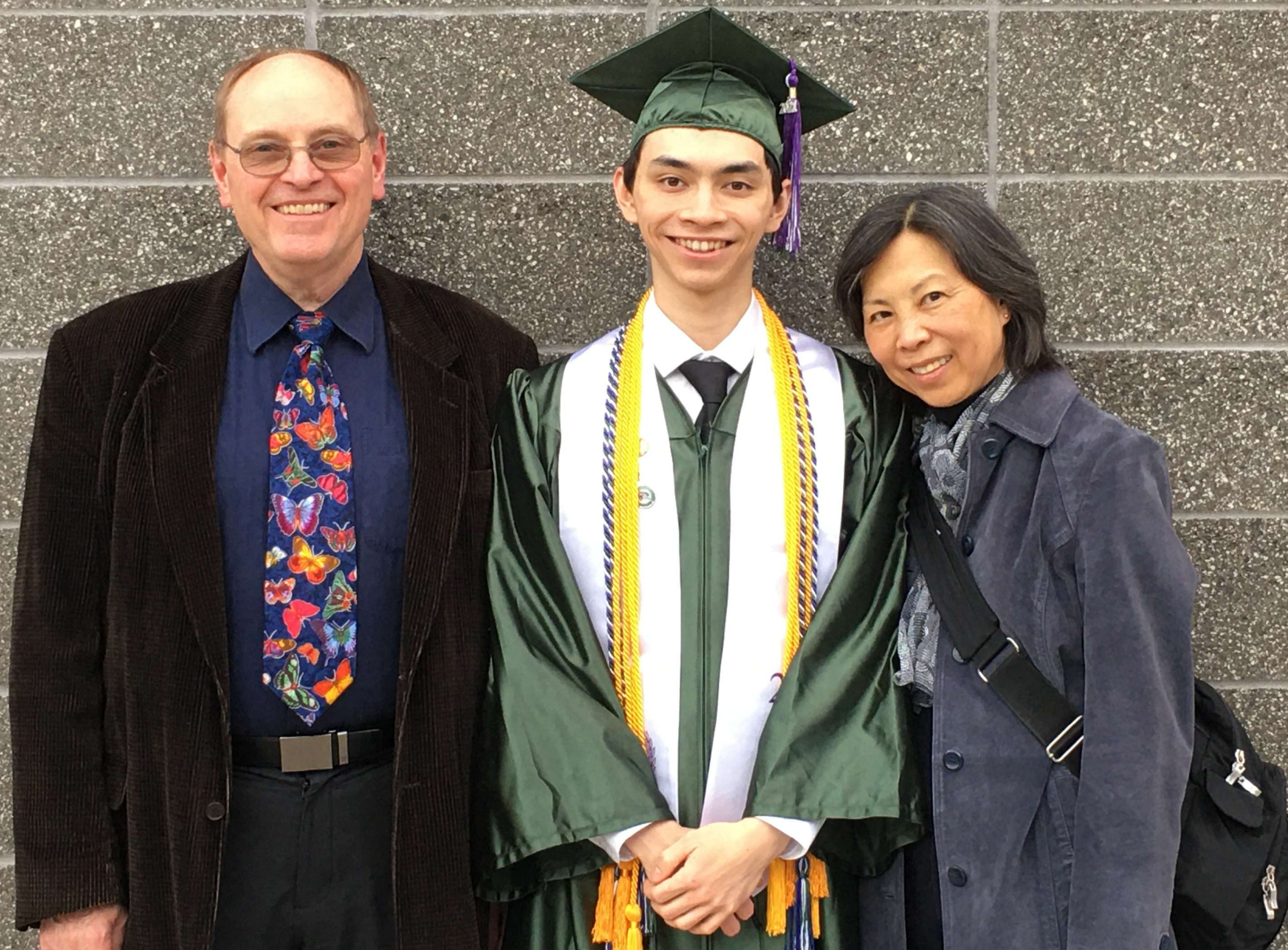


Occam's Razor





3-5 May 2024







USC University of
Southern California

What have I learned from the CDC and Hearings 2016 to 2024 Regarding Problem Areas

- Water lines
- Aerosols
- Slow Speed Handpiece sterilization or any semi critical item
- Single use items
- Items exposed in drawers
- Items exposed in operatories
- Items sitting out anywhere
- Patient screening, tissue availability, mask availability

Dave will talk about...

- How do you follow the CDC guidelines?
- Sterile versus clean and is that meaningful?
- Exposed instruments, exposed sundries, drawers in operatories, infection control stations, exposed surfaces
- Pests - rodents and insects
- Transmission - soiled versus invisible
- Aerosols - negative pressure
- Waterlines - deadlegs, biofilms, pathogens, shocking, flushing, testing, remediation
- Sterilizers - testing
- Disposables - what can be used if it is exposed
- Handpieces -
- Drug vials -
- Handwashing and gloves -
- Personal Protection - donning and doffing

Kate will illustrate

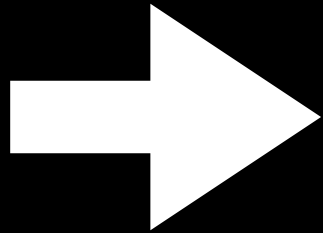
- PPE
- Sterilization-area and processes, spore testing,
- Instrument storage
- Water sources and waterline testing
- Importance of documentation
- Other health agency rules (emergency supplies and policies, exposure control plan)
- “What’s Wrong with This Picture?”
- “The Most Memorable Inspections I’ve Ever Done.

Standard Precautions are a set of infection control practices that healthcare personnel use to reduce transmission of microorganisms in healthcare settings.

Standard precautions

- Elements include:
 1. Hand hygiene.
 2. Using personal protective equipment (PPE).
 3. Respiratory hygiene/cough etiquette.
 4. Sharps safety, including engineering and work practice controls.
 5. Safe injection practices.
 6. Sterilization and disinfection of instruments and devices.
 7. Cleaning and disinfecting environmental surfaces.

Regulations and Guidelines

- 
- OSHA
 - Bloodborne Pathogens Rule
 - Hazard Communication
 - Respiratory Protection Program
 - Injury and Illness Prevention
 - State Boards of Dentistry
 - Infection control
 - EPA
 - Surface disinfectant registration
 - State Health Departments
 - Regulated Medical Waste
 - AAMI/ANSI
 - Sterilization
 - FDA
 - Manufacturer labeling, and instructions for use
 - High level disinfectant registration

CDC Guidelines 2003, 2016

Who checks offices for compliance in the state of Washington?

Kate Mills, RDH, State Inspector, DOH

Who checks offices for compliance in the state of Washington?

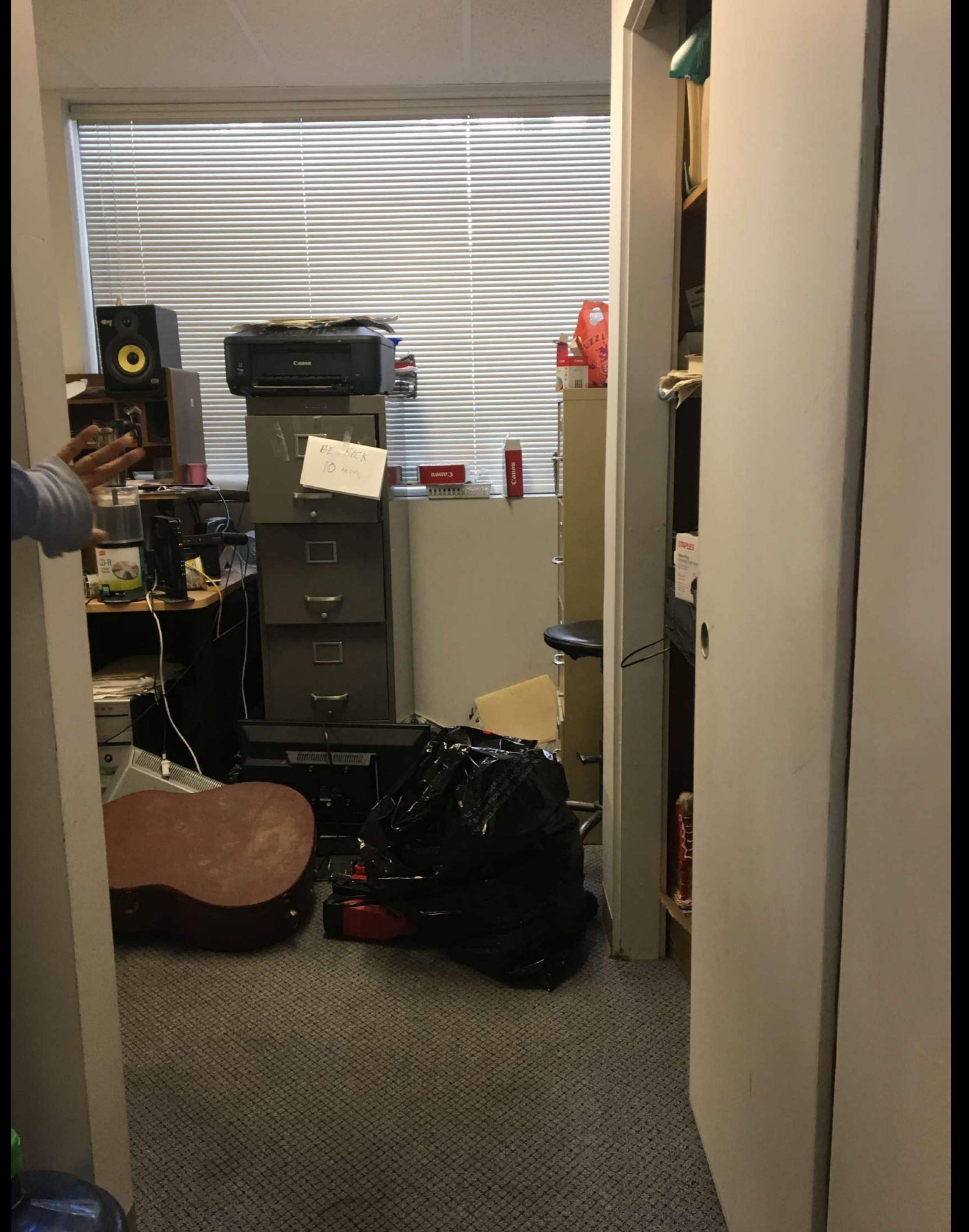
Kate Mills, RDH, State Inspector, DOH

What do you find in "real life", Kate?

Most Memorable Inspection: First Impression



Second Impression



Third Impression



Sterilization Area



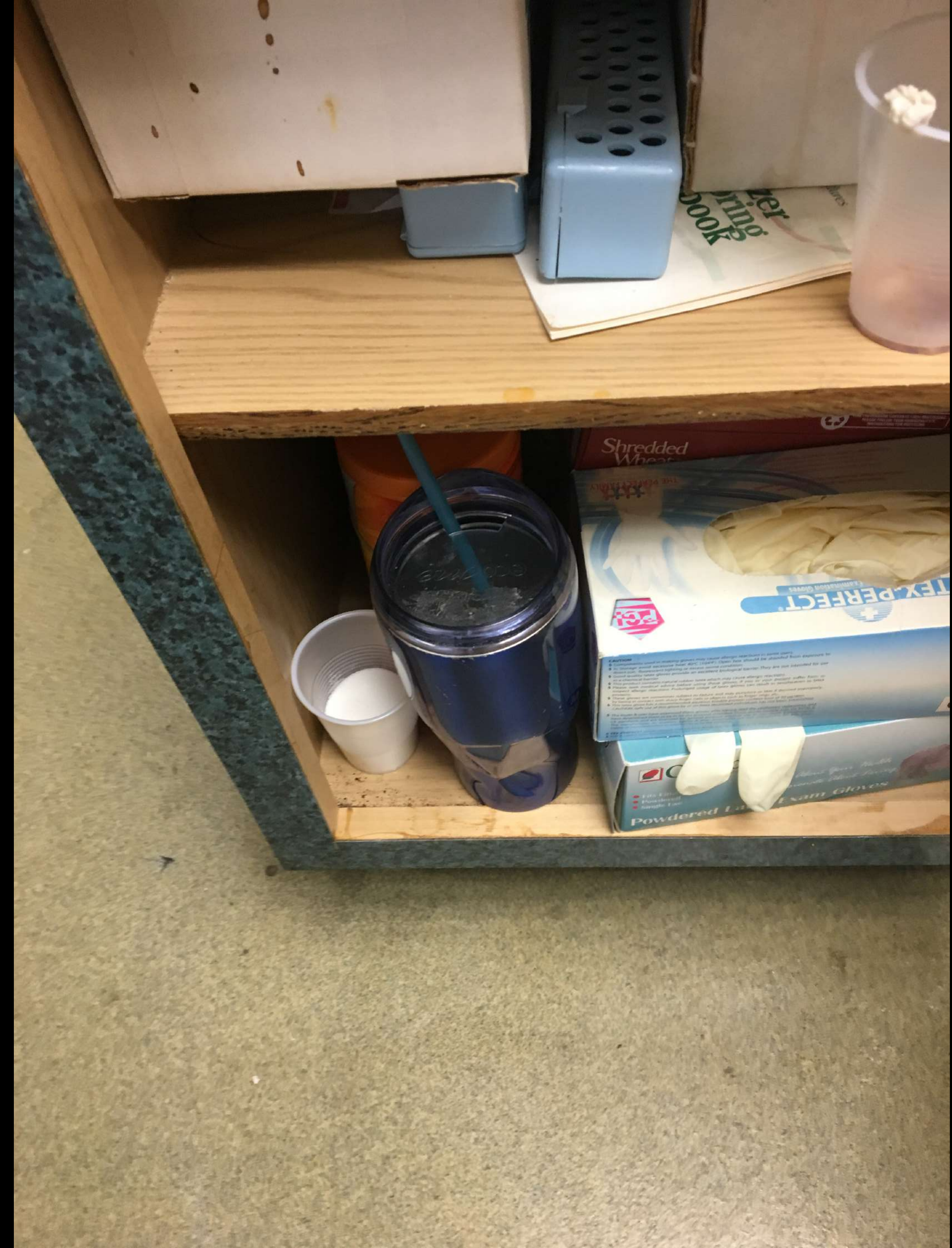
More Sterilization Area



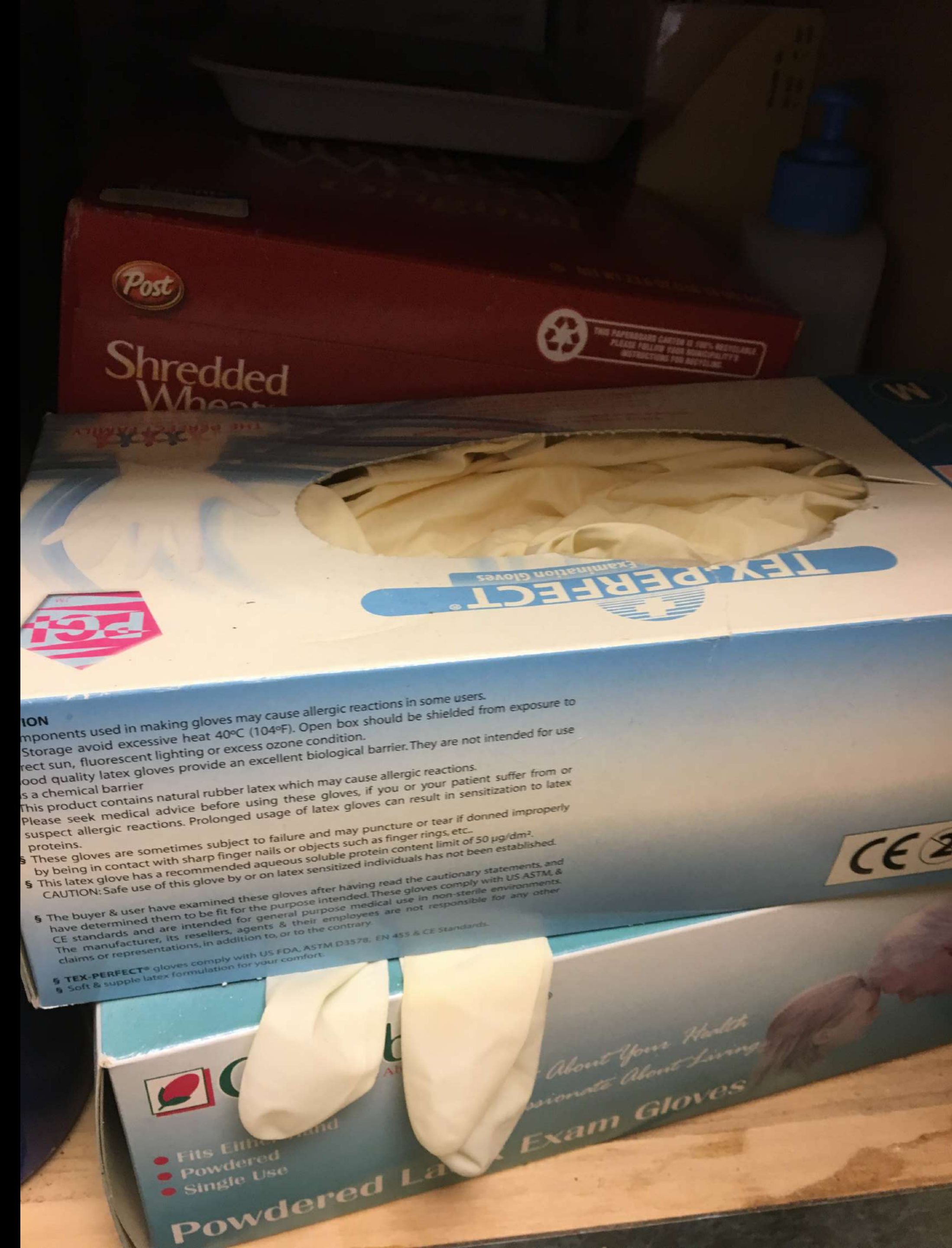
Yuck...



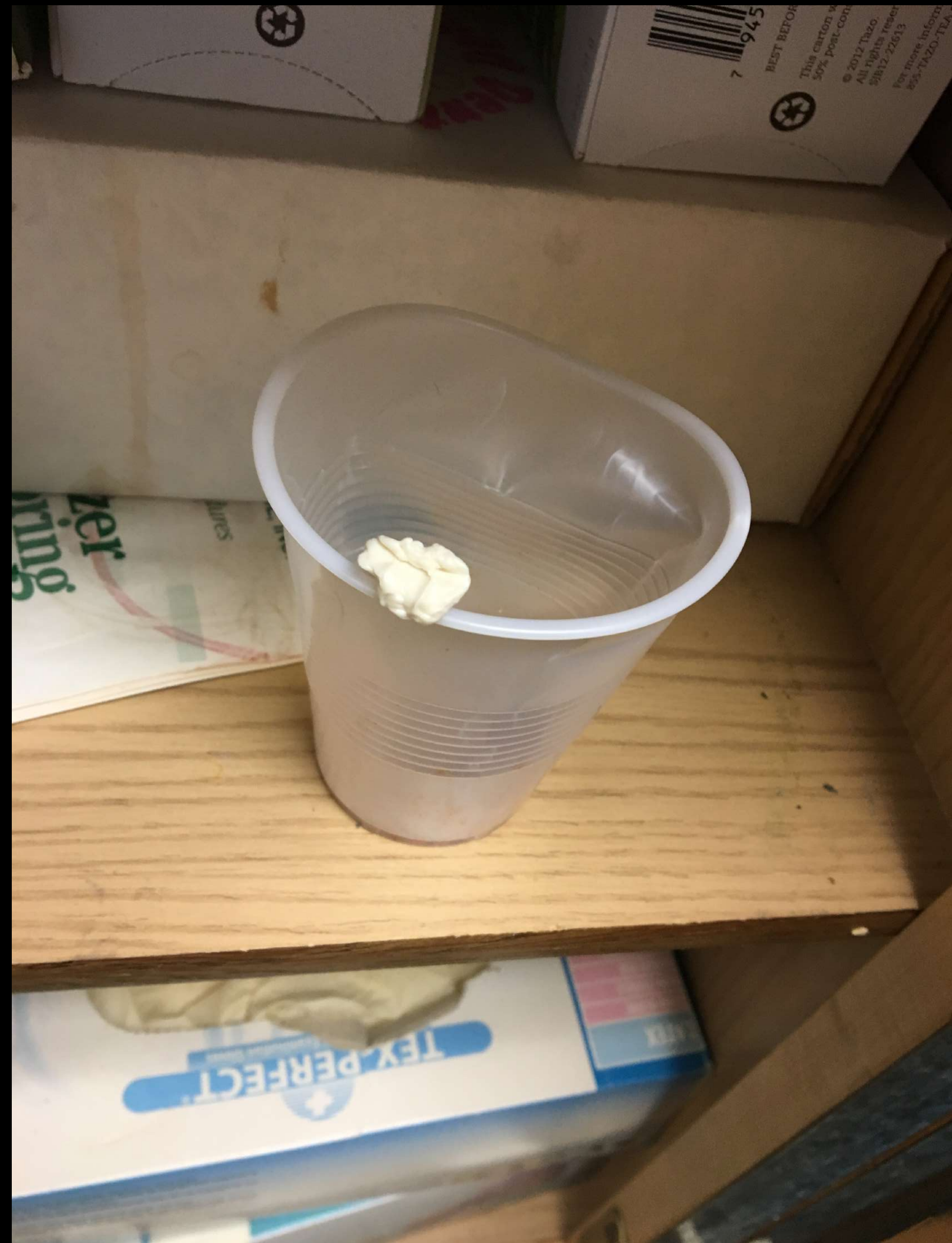
Yuck...



Yuck...



Yuck...



Nope



Post-exposure Management

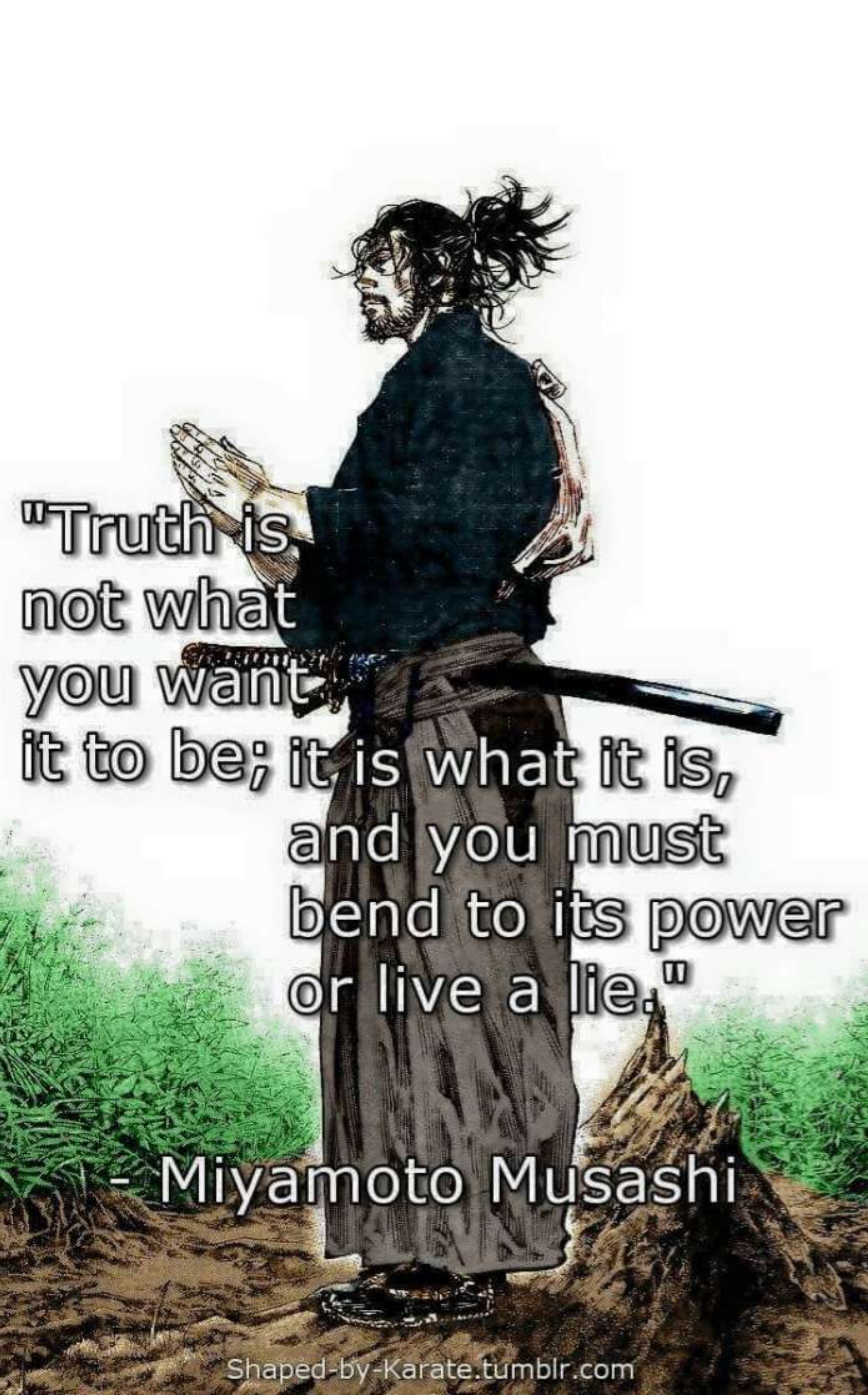
1. Prompt reporting of injuries

2. Interview of patient

3. Testing of patient and exposed worker

4. Referral for medical counseling

5. Written report
documenting details of
incident, including
whether or not a safety
device was involved



Good Clinical Outcomes Require Infection Control

**Dave Carsten, DDS, MAGD, Dentist Anesthesiologist
Assistant Professor OHSU
Chairman of the Dental Quality Assurance Commission**

September 2016

A pediatric practice had a plumbing change that created a dead end. 20 children became severely ill, sickened by *Mycobacterium abscessum*, out of nearly 1400 procedures that had that exposure. Over time many more people were identified as having been sickened. It was traced to a biofilm in a pipe. More than 100 people were affected, some permanently. The office is now closed and the lawsuits are stacking up into **the millions of dollars.**

The obvious course was testing downstream from a plumbing change with tests for quick growing bacteria that grow up in **4 to 5 days** and a second test for slow growing bacteria at **three to four weeks.**

The evidence that biofilms were a hazard had been present for many years but the **direct causation is difficult because there is often long latency.**

Mycobacterium abscessus infections among children

- 2015
 - 20 children admitted to local hospitals near Atlanta, GA, USA
 - All children had **severe illness**, 17 required surgery
 - The CDC determined the source of infections were from dental treatment water in a single clinic with **untreated waterlines**
 - All children had pulpotomies performed in the days before onset of illness
- 2016
 - A second cluster of infected children emerged in California, USA
 - At least **58 children became ill** after receiving pulpotomies at a dental clinic
 - Health officials linked infections to contamination of **dental treatment water** with *Mycobacterium abscessus*

Response of the Washington State Department of Health and the Dental Commission

By unanimous vote, the Wahsington Dental Commission opened rule making.

Dr David Carsten was assigned to chair the newly activated Infection Control Committee. The infection control rules were opened, then subsequently the scope of the rule overhaul was expanded to include all sections.

Rule making began in November 2016, with final implementation in December 2021.

Dentists are *physicians*.

- US Code of Federal Regulations
- CFR 702.404 - **Physician** defined.
 - *“The term physician includes doctors of medicine (MD), surgeons, podiatrists, dentists, clinical psychologists, optometrists, chiropractors, and osteopathic practitioners within the scope of their practice as defined by State law.”*

Response of the Washington State Department of Health and the Dental Commission

The rule included provisions regarding:

sterilization of handpiece motors,

high volume evacuation,

aerosols,

training,

single use items,

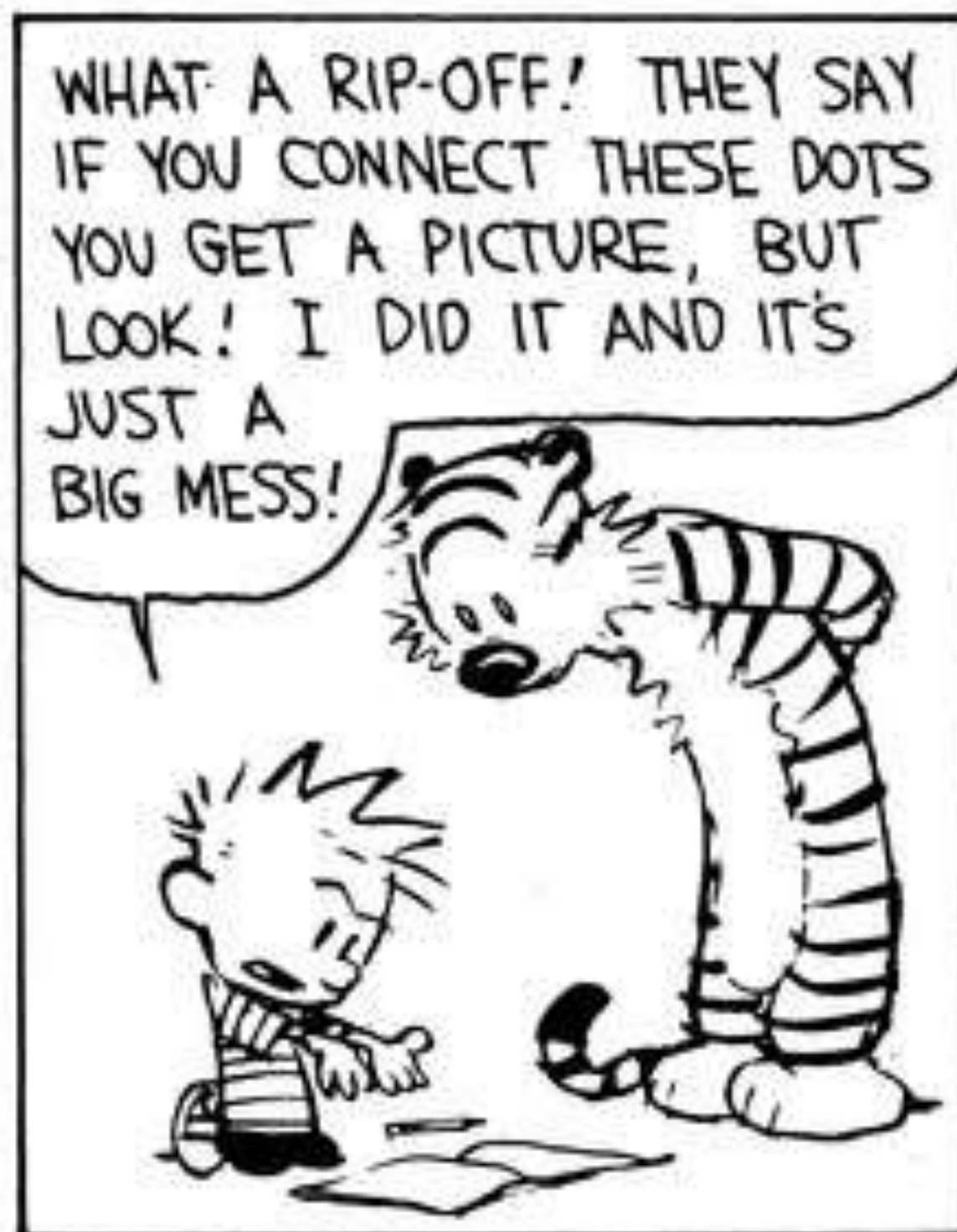
storage of items to be sent to dental laboratories,

exposure of sterile instruments,

hand washing and gloves, and

managing the exposure of the office to people that are ill.

All of the above was in an effort to follow the CDC guidelines in an enforceable way





Dave,

**Follow the light
side of the force.
Chair the
Infection control
committee.**

— Dr Bob Shaw



“Transmission you must stop. Hmmm.”

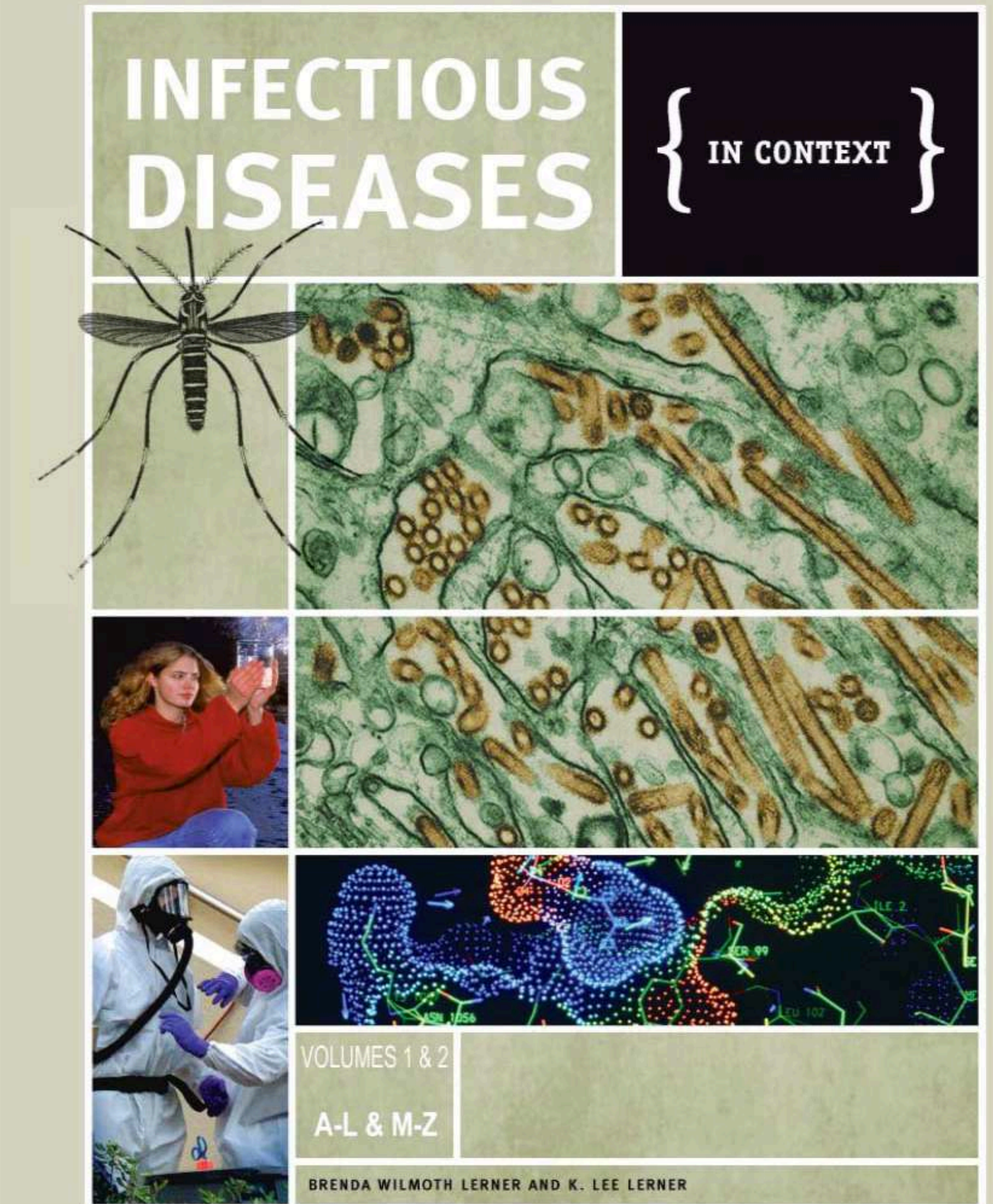
CDC and OSAP





“The sacred texts consult you should.”

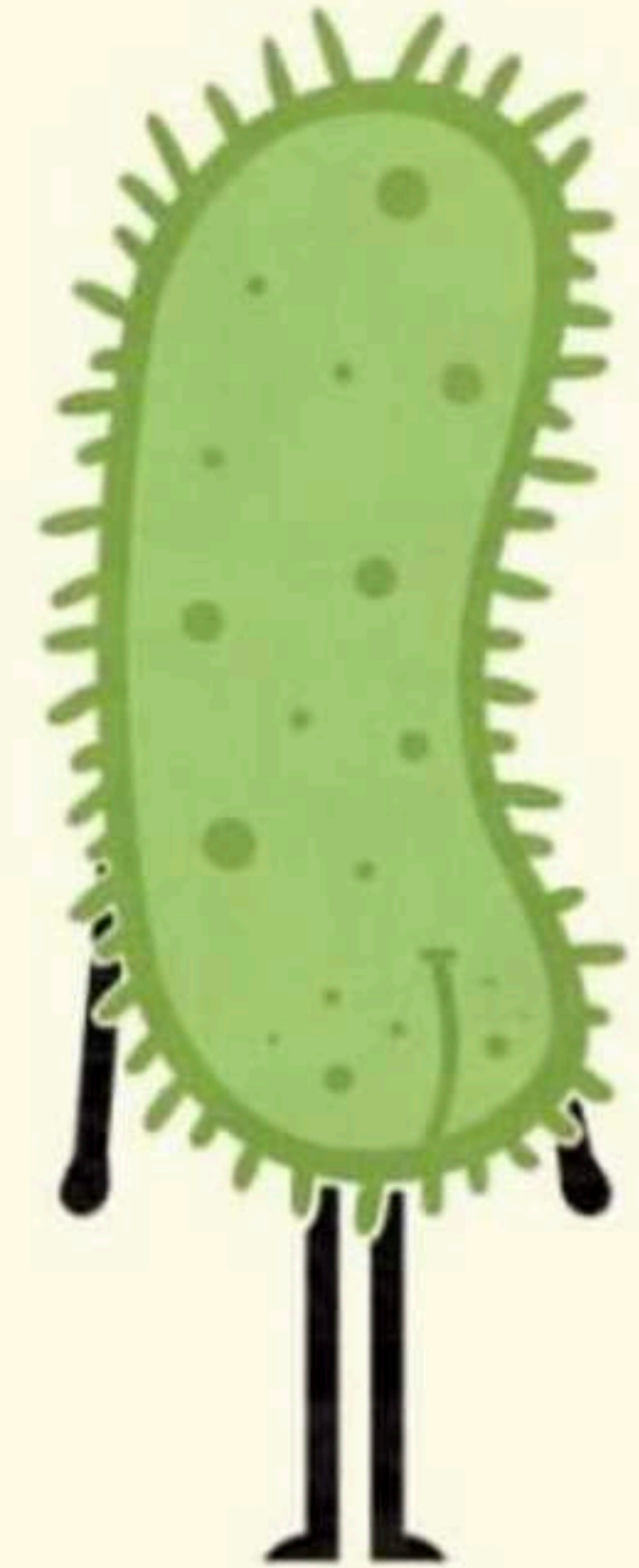
**Source material along with
relevant medical literature**



Initial scope of rule making

1. waterlines
2. exposure of sterile instruments
3. high volume evacuation
4. sterilization of slow speed handpiece motors

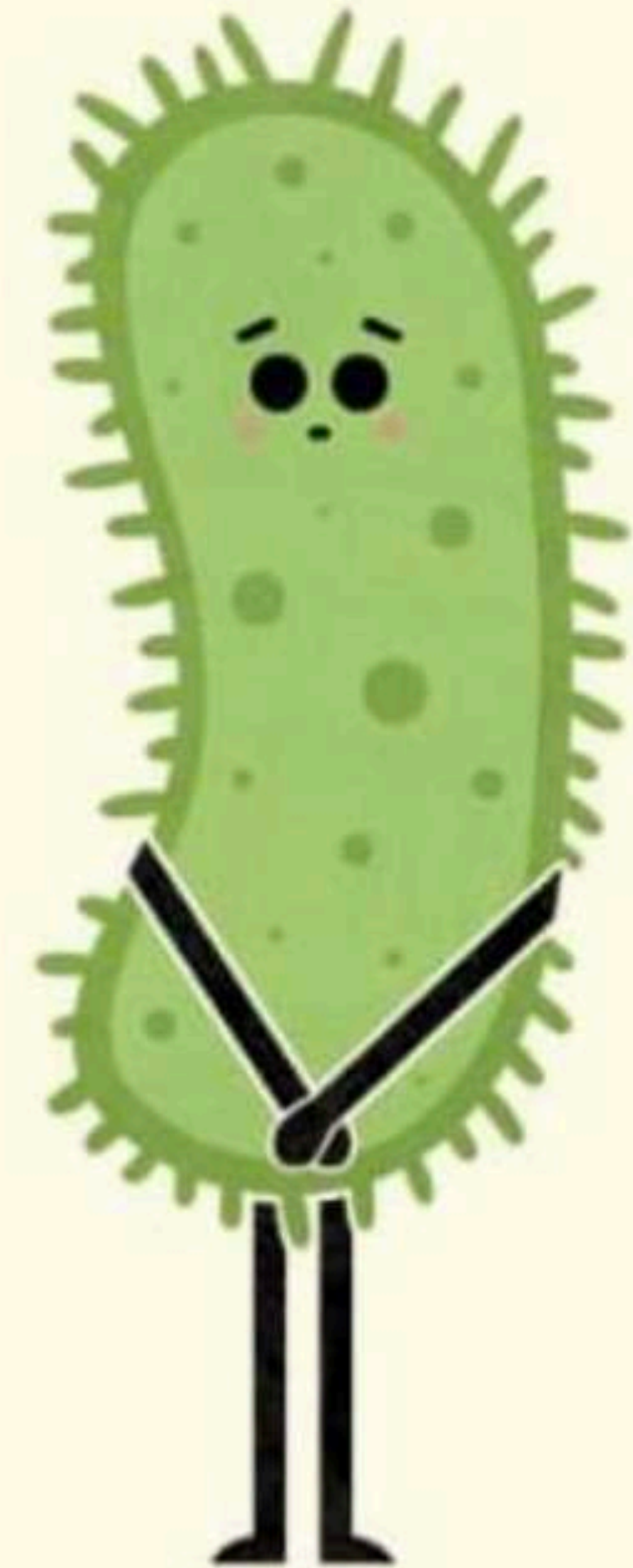
Goal - stop or minimize transmission of bacteria and viruses



BACTERIA

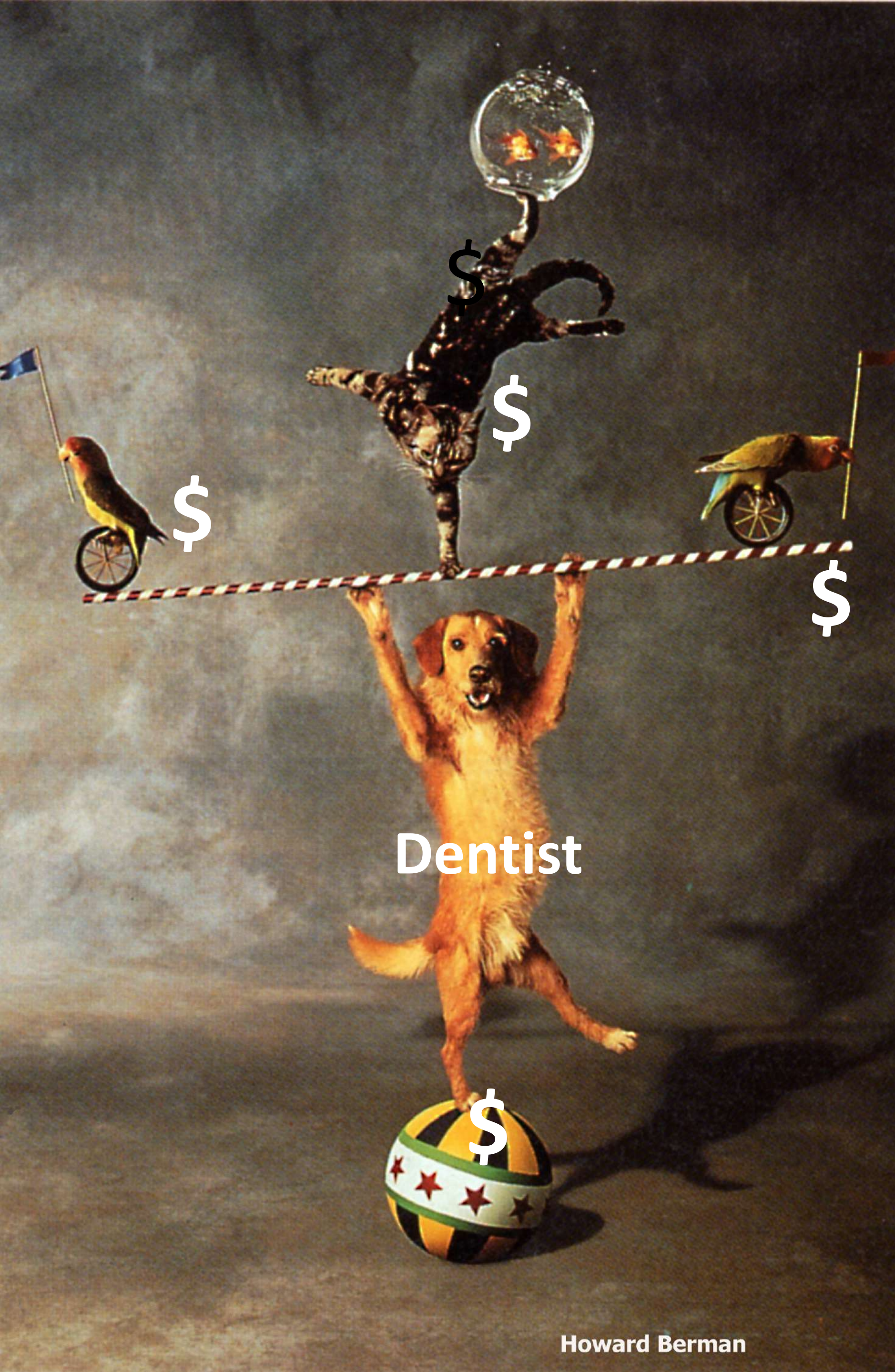
My Struggles with Stakeholders

1. Invisibility
2. Transmission
3. Latency
4. Authenticity
5. Goals of the Commission and the CDC
6. Evidence Based
7. Mindfulness and critical thinking



FRONTERIA

Dentist Perceptions





**Dentist perception of chair of the
infection control committee**

**If Saliva was
Red**

Mindfulness

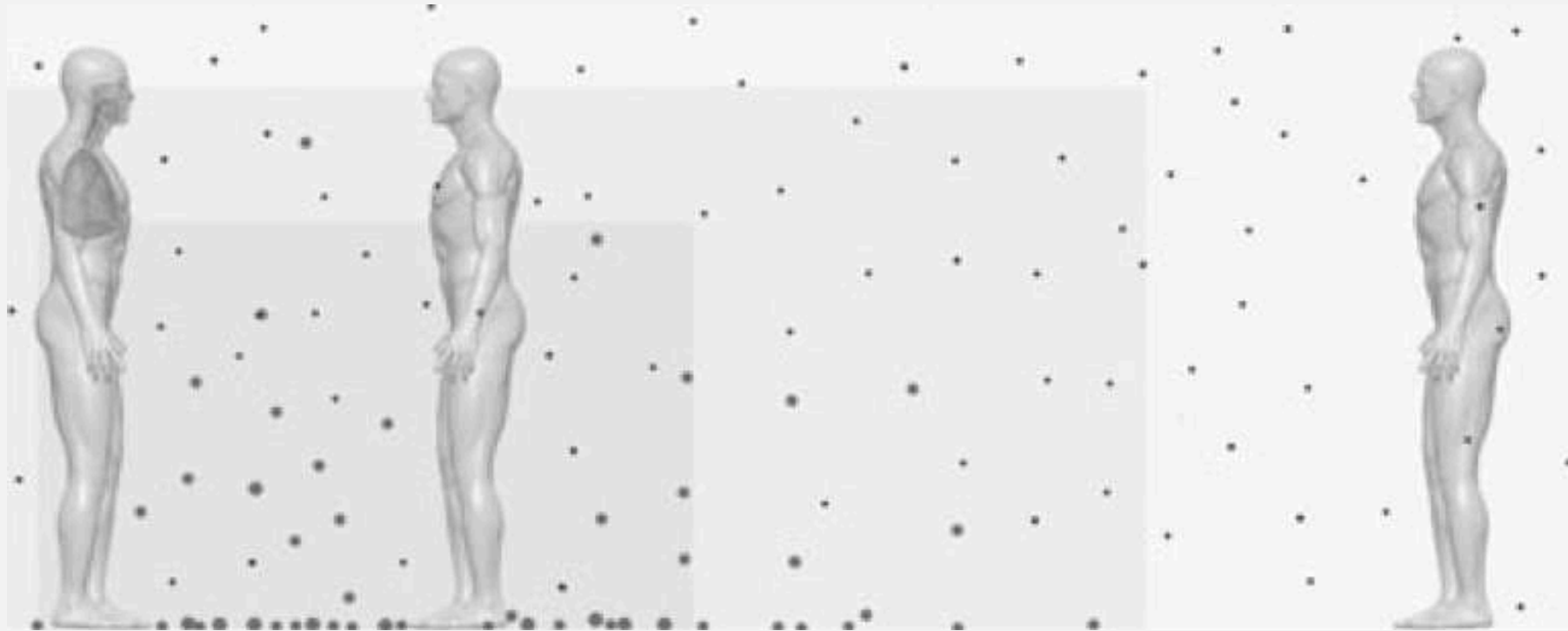


The prior video is an illustration of aerosols, droplets, and fomites, any object that is contaminated and can transmit a pathogen

Aerosols vs. Droplets

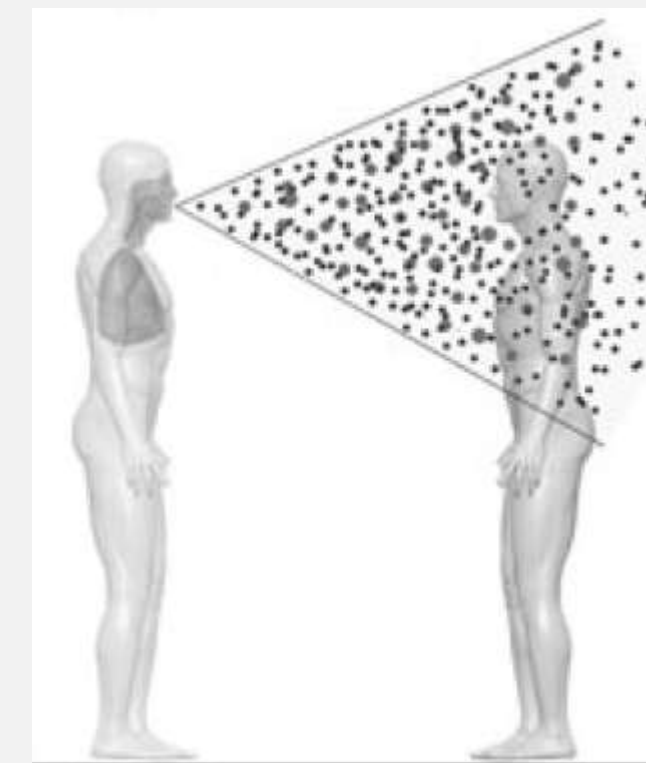
Invisible

- Aerosols:
- Suspension of particles in gas
- Suspended for more than a few seconds
- Carried on air currents
- Generally 5-10 μm or smaller



Might be visible

- Droplets:
- Suspension of particles in liquid
- Carried by force of cough/sneeze
- "ballistic trajectory"--falling under the force of gravity



Tellier, R et al: Recognition of aerosol transmission of infectious agents: a commentary BMC Infect Dis 19, 101 (2019)

Jones, R et al: Aerosol Transmission of Infectious Disease JOEM r Volume 57, Number 5, May 2015

Droplets, Aerosols and Masks

	Aerosol	Droplet
Time in air	suspended	Minimal at 30 μm or more
Distance Traveled	>2 meters	1-2 meters
Blocked by fitted N95	>95% by definition (0.3 μm)	>95%
Blocked by surgical mask HCW	¼ the risk	Good protection
Add Surgical mask cougher or sneezer	1/4 x 1/4 = 1/16	Good protection
Or double layer cloth source cougher or sneezer	Good protection	Good protection

Airborne Precautions

COVID-19

Measles

Varicella

TB

Noroviruses—possibly

HPV

AIRBORNE RESPIRATOR PRECAUTIONS
(In addition to Standard Precautions)

STOP Families and Visitors need approval before entering room.
Follow instructions from information sheet.
(If you have questions, go to Nurse Station)

Everyone must:

 Clean hands when entering and leaving the room

Doctors and Staff must:

 Wear PAPR or fitted N95 mask prior to entering room 

 Airborne Infection Isolation Room required (negative pressure)
Keep door closed 

 Washington State Hospital Association

Washington Hospitals • Collaborating to Keep Our Patients Safe

Revised 06/2019
See website for details

Droplet Precautions

Covid-19

Influenza

Meningitis

Pertussis

Common cold

**DROPLET
PRECAUTIONS**
(In addition to Standard Precautions)

Families and Visitors follow instructions on information sheet.
(If you have questions, go to Nurse Station)

Everyone must:



Clean hands when entering
and leaving room



Wear mask

Doctors and Staff must:



If contact with
secretions likely, use
gown, glove, and eye
cover



 Washington State
Hospital Association

Washington Hospitals - Collaborating to Keep Our Patients Safe

Revised 05/17
and 08/2020

Contact Precautions

MDRO (multi drug resistant organisms)

Norovirus

Head Lice

HSV (herpes)

C. Difficile: must wash, not alcohol

HPV



STOP **CONTACT ENTERIC PRECAUTIONS** **STOP**
(In addition to Standard Precautions)

Families and Visitors follow instructions from information sheet
(If you have questions, go to Nurse Station)

Everyone must

 Wash or gel hands when entering and wash on leaving room

Doctors and Staff must:

 Gown and glove at door 

 Use patient dedicated or disposable equipment. Clean and disinfect shared equipment.

 Washington State Medical Association

Washington Hospitals - Collaborating to Keep Our Patients Safe

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Transmission is deeply connected to host resistance

Host Resistance

- - innate immunity Intact skin&mucus membranes, chemical barrier - health
- - adaptive immunity Antibodies and WBC's - vaccines and past exposures
- - intrinsic immunity Anti viral defenses that are built in - genetic

Immunity can be thought of as a fence for pathogens to climb. The stronger and the higher the barrier, the less likely the infection.

Highly infectious pathogens can "jump higher" or cut through and cause infection with fewer infectious particles. A few may not cross the fence, many may cross.



The greater the number of infectious particles to challenge the fence, the more likely that they breach the wall.



Healthier people have a taller,
stronger fence.

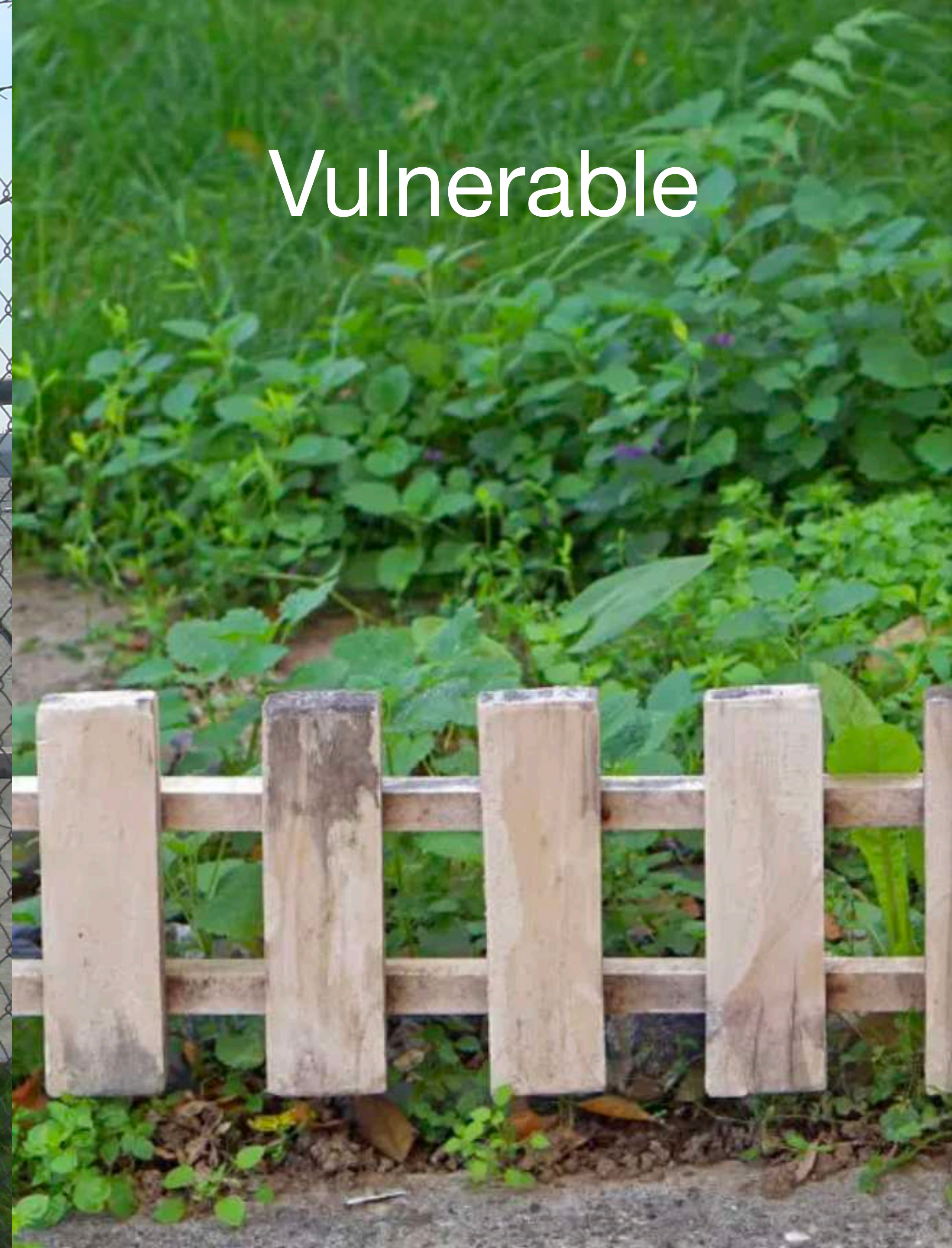
Limiting exposure gives
pathogens fewer chances to
create an infection.



Not so Vulnerable



Vulnerable



Hepatitis B

Measles/Mumps/Rubella

Varicella

Tdap

Polio

COVID-19

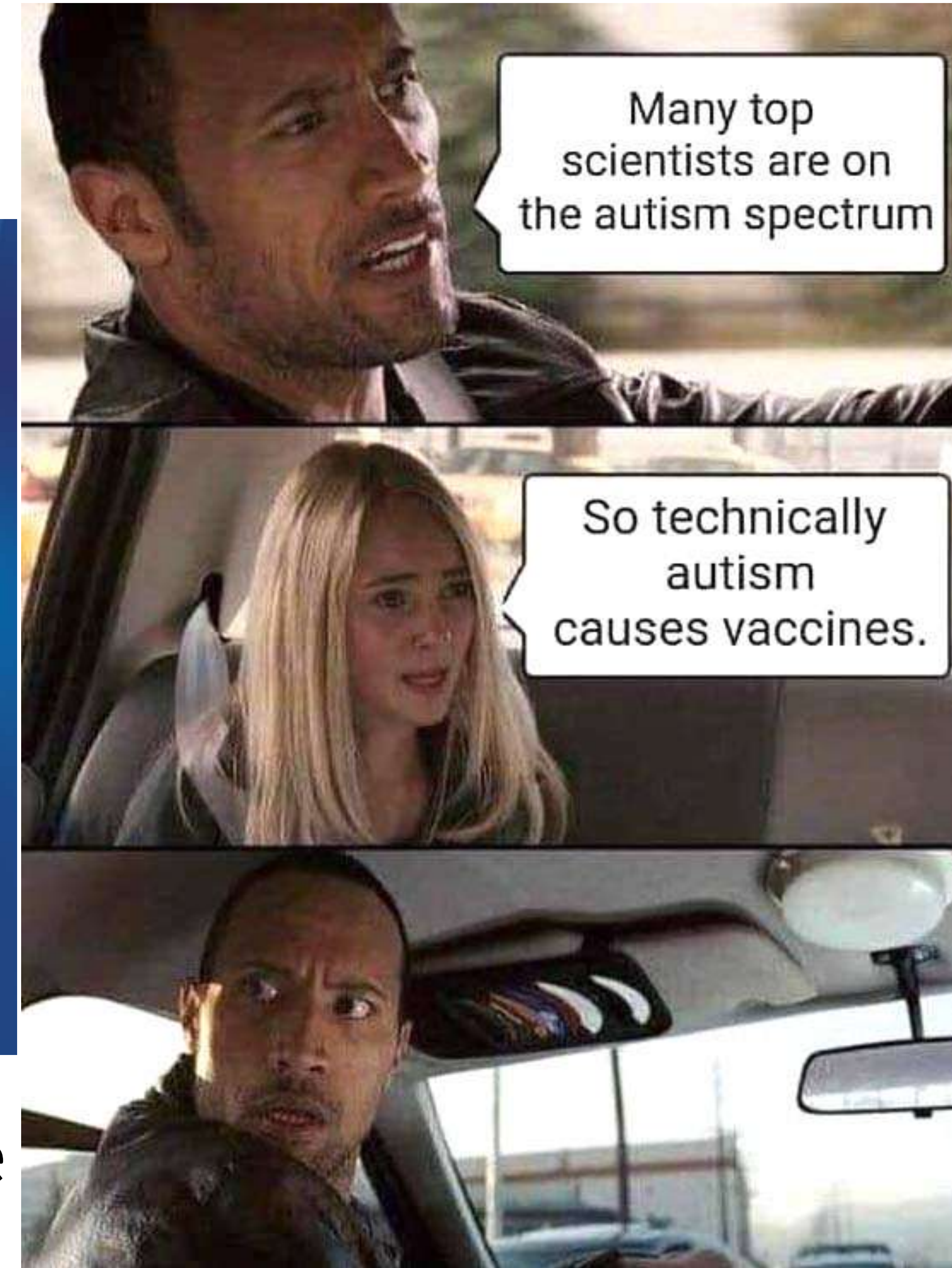
Influenza

Vaccinations
Stop
Transmission



Via Adaptive
Immunity

-adaptive immunity



HPV disease

“For persons 15 through 45 years of age, GARDASIL 9 is given using a 3-dose schedule; the second shot should be given 2 months after the first shot and the third shot should be given 6 months after the first shot.”

<https://www.gardasil9.com/adults/where-to-get-hpv-vaccine>

What about after 45?

16 subjects age 23-72 with laryngeal papilloma relapse after surgical resection were given 3 dose series HPV vaccination

Combination surgery plus vaccination suppressed in nearly 80% of the study group, correlating with the treatment responders who tested negative for HPV DNA

Protecting yourself, your staff and your patients

Interval vaccinations:

Flu annually

Td/Tdap every 10 years

Bivalent COVID—and future?

One and done vaccinations:

Hepatitis B

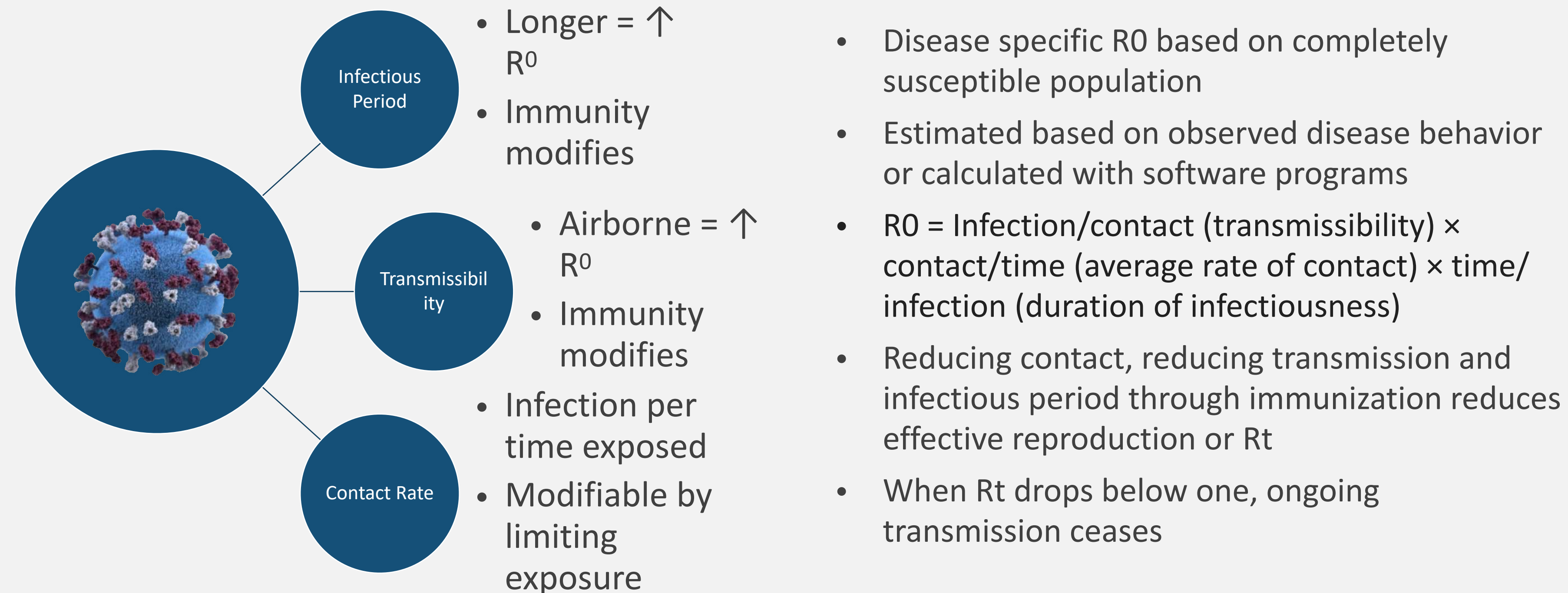
Measles, Mumps, Rubella if born after 1956

Varicella if negative serology

HPV???

Transmission related to infectivity of the pathogen

Understanding R^0



Yadav, A et al: Indian J Community Med 2021 Jan-Mar; 46(1): 7–14.

Of people exposed by one vector/person, how many of them get sick?
Measles is really high and a 95% vaccination rate is needed to stop transmission,
leprosy is really low (95% are naturally immune).

Limit Exposure

Protect you, your family, and friends by removing PPE correctly.

Doffing

A Cause of Transmission to HCP's and their families when performed out of order

Do not take contaminated garments home

HOW TO SAFELY REMOVE PERSONAL PROTECTIVE EQUIPMENT (PPE) EXAMPLE 2

Here is another way to safely remove PPE without contaminating your clothing, skin, or mucous membranes with potentially infectious materials. **Remove all PPE before exiting the patient room** except a respirator, if worn. Remove the respirator **after** leaving the patient room and closing the door. Remove PPE in the following sequence:

1. GOWN AND GLOVES

- Gown front and sleeves and the outside of gloves are contaminated!
- If your hands get contaminated during gown or glove removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Grasp the gown in the front and pull away from your body so that the ties break, touching outside of gown only with gloved hands
- While removing the gown, fold or roll the gown inside-out into a bundle
- As you are removing the gown, peel off your gloves at the same time, only touching the inside of the gloves and gown with your bare hands. Place the gown and gloves into an infectious* waste container



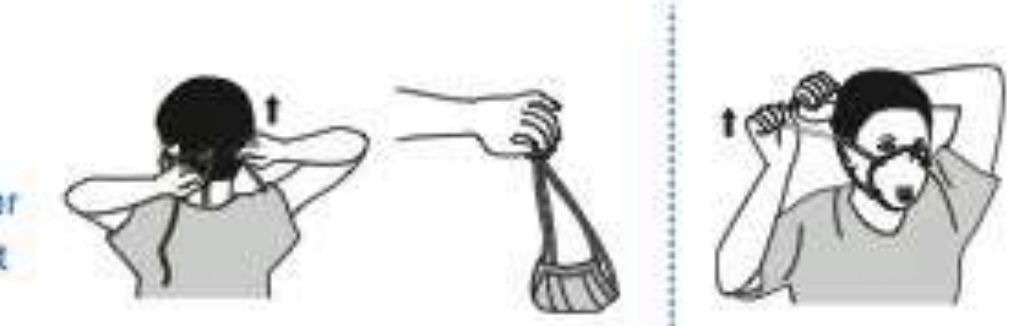
2. GOGGLES OR FACE SHIELD

- Outside of goggles or face shield are contaminated!
- If your hands get contaminated during goggle or face shield removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Remove goggles or face shield from the back by lifting head band and without touching the front of the goggles or face shield
- If the item is reusable, place in designated receptacle for reprocessing. Otherwise, discard in an infectious* waste container

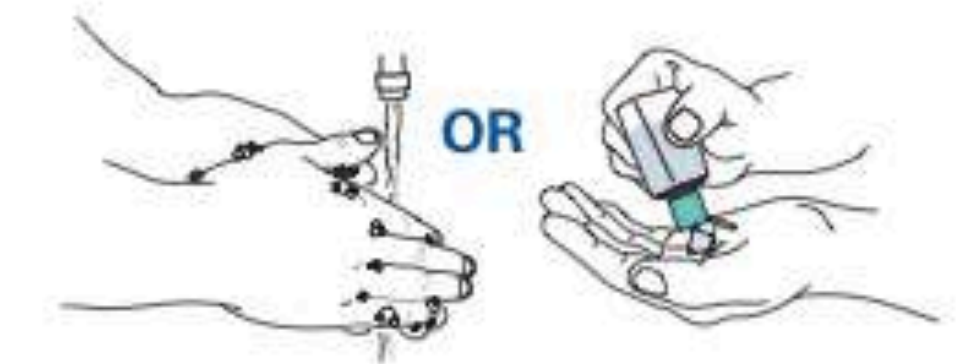


3. MASK OR RESPIRATOR

- Front of mask/respirator is contaminated — **DO NOT TOUCH!**
- If your hands get contaminated during mask/respirator removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Grasp bottom ties or elastics of the mask/respirator, then the ones at the top, and remove without touching the front
- Discard in an infectious* waste container



4. WASH HANDS OR USE AN ALCOHOL-BASED HAND SANITIZER IMMEDIATELY AFTER REMOVING ALL PPE



* An infectious waste container is used to dispose of PPE that is potentially contaminated with Ebola virus.

PERFORM HAND HYGIENE BETWEEN STEPS IF HANDS BECOME CONTAMINATED AND IMMEDIATELY AFTER REMOVING ALL PPE



Back to "How to follow the CDC guidelines..."



I'm a great listener.

30 public meetings, 24 virtual, 6 in person

Reviewed thousands of pages of journal articles, documentation, and references

Many experts including Eve Cuny, John Molinari, Teri Harris of Harris Biomedical, and others



strawman

Misrepresenting someone's argument to make it easier to attack.

By exaggerating, misrepresenting, or just completely fabricating someone's argument, it's much easier to present your own position as being reasonable, but this kind of dishonesty serves to undermine rational debate.

After Will said that we should put more money into health and education, Warren responded by saying that he was surprised that Will hates our country so much that he wants to leave it defenceless by cutting military spending.



slippery slope

Asserting that if we allow A to happen, then Z will consequently happen too, therefore A should not happen.

The problem with this reasoning is that it avoids engaging with the issue at hand, and instead shifts attention to baseless extreme hypotheticals. The merits of the original argument are then tainted by unsubstantiated conjecture.

Colin Closet asserts that if we allow same-sex couples to marry, then the next thing we know we'll be allowing people to marry their parents, their cars and even monkeys.



special pleading

Moving the goalposts or making up exceptions when a claim is shown to be false.

Humans are funny creatures and have a foolish aversion to being wrong. Rather than appreciate the benefits of being able to change one's mind through better understanding, many will invent ways to cling to old beliefs.

Edward Johns claimed to be psychic, but when his 'abilities' were tested under proper scientific conditions, they magically disappeared. Edward explained this saying that one had to have faith in his abilities for them to work.



the gambler's fallacy

Believing that 'runs' occur to statistically independent phenomena such as roulette wheel spins.

This commonly believed fallacy can be said to have helped create a city in the desert of Nevada USA. Though the overall odds of a 'big run' happening may be low, each spin of the wheel is itself entirely independent from the last.

Red had come up six times in a row on the roulette wheel, so Greg knew that it was close to certain that black would be next up. Suffering an economic form of natural selection with this thinking, he soon lost all of his savings.



black-or-white

Where two alternative states are presented as the only possibilities, when in fact more possibilities exist.

Also known as the false dilemma, this insidious tactic has the appearance of forming a logical argument, but under closer scrutiny it becomes evident that there are more possibilities than the either/or choice that is presented.

Whilst rallying support for his plan to fundamentally undermine citizens' rights, the Supreme Leader told the people they were either on his side, or on the side of the enemy.



false cause

Presuming that a real or perceived relationship between things means that one is the cause of the other.

Many people confuse correlation (things happening together or in sequence) for causation (that one thing actually causes the other to happen). Sometimes correlation is coincidental, or it may be attributable to a common cause.

Pointing to a fancy chart, Roger shows how temperatures have been rising over the past few centuries, whilst at the same time the numbers of pirates have been decreasing; thus pirates cool the world and global warming is a hoax.



ad hominem

Attacking your opponent's character or personal traits in an attempt to undermine their argument.

Ad hominem attacks can take the form of overtly attacking somebody, or casting doubt on their character. The result of an ad hom attack can be to undermine someone without actually engaging with the substance of their argument.

After Sally presents an eloquent and compelling case for a more equitable taxation system, Sam asks the audience whether we should believe anything from a woman who isn't married, was once arrested, and smells a bit weird.



loaded question

Asking a question that has an assumption built into it so that it can't be answered without appearing guilty.

Loaded question fallacies are particularly effective at derailing rational debates because of their inflammatory nature - recipients of a loaded question are compelled to defend themselves and may appear flustered or on the back foot.

Grace and Helen were both romantically interested in Brad. One day, with Brad sitting within earshot, Grace asked in an inquisitive tone whether Helen was having any problems with a fungal infection.



bandwagon

Appealing to popularity or the fact that many people do something as an attempted form of validation.

The flaw in this argument is that the popularity of an idea has absolutely no bearing on its validity. If it did, then the Earth would have made itself flat for most of history to accommodate this popular belief.

Shamus pointed a drunken finger at Sean and asked him to explain how so many people could believe in leprechauns if they're only a silly old superstition. Sean, however, had had a few too many Guinness himself and fell off his chair.



begging the question

A circular argument in which the conclusion is included in the premise.

This logically incoherent argument often arises in situations where people have an assumption that is very ingrained, and therefore taken in their minds as a given. Circular reasoning is bad mostly because it's not very good.

The word of Zorbo the Great is flawless and perfect. We know this because it says so in The Great and Infalible Book of Zorbo's Best and Most Truest Things that are Definitely True and Should Not Ever Be Questioned.

There is a deep need for teaching critical thinking



appeal to emotion

Manipulating an emotional response in place of a valid or compelling argument.

Appeals to emotion include appeals to fear, envy, hatred, pity, guilt, and more. Though a valid, and reasoned, argument may sometimes have an emotional aspect, one must be careful that emotion doesn't obscure or replace reason.

Luke didn't want to eat his sheep's brains with chopped liver and brussels sprouts, but his father told him to think about the poor, starving children in a third world country who weren't fortunate enough to have any food at all.



tu quoque

Avoiding having to engage with criticism by turning it back on the accuser - answering criticism with criticism.

Literally translating as 'you too' this fallacy is commonly employed as an effective red herring because it takes the heat off the accused having to defend themselves and shifts the focus back onto the accuser themselves.

Nicole identified that Hannah had committed a logical fallacy, but instead of addressing the substance of her claim, Hannah accused Nicole of committing a fallacy earlier on in the conversation.



burden of proof

Saying that the burden of proof lies not with the person making the claim, but with someone else to disprove.

The burden of proof lies with someone who is making a claim, and is not upon anyone else to disprove. The inability, or disinclination, to disprove a claim does not make it valid (however we must always go by the best available evidence).

Bertrand declares that a teapot is, at this very moment, in orbit around the Sun between the Earth and Mars, and that because no one can prove him wrong his claim is therefore a valid one.



no true scotsman

Making what could be called an appeal to purity as a way to dismiss relevant criticisms or flaws of an argument.

This fallacy is often employed as a measure of last resort when a point has been lost. Seeing that a criticism is valid, yet not wanting to admit it, new criteria are invoked to dissociate oneself or one's argument.

Angus declares that Scotsmen do not put sugar on their porridge, to which Lachlan points out that he is a Scotsman and puts sugar on his porridge. Furious, like a true Scot, Angus yells that no **true** Scotsman sugars his porridge.



the fallacy fallacy

Presuming a claim to be necessarily wrong because a fallacy has been committed.

It is entirely possible to make a claim that is false yet argue with logical coherency for that claim, just as it is possible to make a claim that is true and justify it with various fallacies and poor arguments.

Recognising that Amanda had committed a fallacy in arguing that we should eat healthy food because a nutritionist said it was popular, Alyse said we should therefore eat bacon double cheeseburgers every day.



personal incredulity

Saying that because one finds something difficult to understand, it's therefore not true.

Subjects such as biological evolution via the process of natural selection require a good amount of understanding before one is able to properly grasp them; this fallacy is usually used in place of that understanding.

Kirk drew a picture of a fish and a human and with effusive disdain asked Richard if he really thought we were stupid enough to believe that a fish somehow turned into a human through just, like, random things happening over time.



ambiguity

Using double meanings or ambiguities of language to mislead or misrepresent the truth.

Politicians are often guilty of using ambiguity to mislead and will later point to how they were technically not outright lying if they come under scrutiny. It's a particularly tricky and premeditated fallacy to commit.

When the judge asked the defendant why he hadn't paid his parking fines, he said that he shouldn't have to pay them because the sign said 'Fine for parking here' and so he naturally presumed that it would be fine to park there.



genetic

Judging something good or bad on the basis of where it comes from, or from whom it comes.

To appeal to prejudices surrounding something's origin is another red herring fallacy. This fallacy has the same function as an ad hominem, but applies instead to perceptions surrounding something's source or context.

Accused on the 6 o'clock news of corruption and taking bribes, the senator said that we should all be very wary of the things we hear in the media, because we all know how very unreliable the media can be.



composition /division

Assuming that what's true about one part of something has to be applied to all, or other, parts of it.

Often when something is true for the part it does also apply to the whole, but because this isn't always the case it can't be presumed to be true. We must show evidence for why a consistency will exist.

Daniel was a precocious child and had a liking for logic. He reasoned that atoms are invisible, and that he was made of atoms and therefore invisible too. Unfortunately, despite his thinky skills, he lost the game of hide and go seek.



appeal to authority

Saying that because an authority thinks something, it must therefore be true.

It's important to note that this fallacy should not be used to dismiss the claims of experts, or scientific consensus. Appeals to authority are not valid arguments, but nor is it reasonable to disregard the claims of experts who have a demonstrated depth of knowledge unless one has a similar level of understanding.

Not able to defend his position that evolution 'isn't true' Bob says that he knows a scientist who also questions evolution (and presumably isn't herself a primate).



appeal to nature

Making the argument that because something is 'natural' it is therefore valid, justified, inevitable, good, or ideal.

Many 'natural' things are also considered 'good', and this can bias our thinking; but naturalness itself doesn't make something good or bad. For instance murder could be seen as very natural, but that doesn't mean it's justifiable.

The medicine man rolled into town on his bandwagon offering various natural remedies, such as very special plain water. He said that it was only natural that people should be wary of 'artificial' medicines like antibiotics.



anecdotal

Using personal experience or an isolated example instead of a valid argument, especially to dismiss statistics.

It's often much easier for people to believe someone's testimony as opposed to understanding variation across a continuum. Scientific and statistical measures are almost always more accurate than individual perceptions and experiences.

Jason said that that was all cool and everything, but his grandfather smoked, like, 30 cigarettes a day and lived until 97 - so don't believe everything you read about meta analyses of sound studies showing proven causal relationships.



the texas sharpshooter

Cherry-picking data clusters to suit an argument, or finding a pattern to fit a presumption.

This 'false cause' fallacy is coined after a marksman shooting at barns and then painting a bullseye target around the spot where the most bullet holes appear. Clusters naturally appear by chance, and don't necessarily indicate causation.

The makers of Sugarette Candy Drinks point to research showing that of the five countries where Sugarette drinks sell the most units, three of them are in the top ten healthiest countries on Earth, therefore Sugarette drinks are healthy.



middle ground

Saying that a compromise, or middle point, between two extremes must be the truth.

Much of the time the truth does indeed lie between two extreme points, but this can bias our thinking: sometimes a thing is simply untrue and a compromise of it is also untrue. Half way between truth and a lie, is still a lie.

Holly said that vaccinations caused autism in children, but her scientifically well-read friend Caleb said that this claim had been debunked and proven false. Their friend Alice offered a compromise that vaccinations cause some autism.



What did people comment about?

Stakeholders:

60+ comments received between
November 2016 through January 2019

Concerns:

- About ½ are related to low-speed hand piece motor sterilization
- About ¼ are with waterline testing
- Several with training requirements
- Providing masks to everyone
- Storing instruments
- Timing of opening sterile packs
- HVE
- Overall costs to implement all requirements

Areas of particular confusion:

- **Low-speed motor sterilization**
- **Timing of waterline testing**
- **Timing of opening sterile packs**
- **High Volume Evacuation (HVE)**

What are we finding in the "real world"?

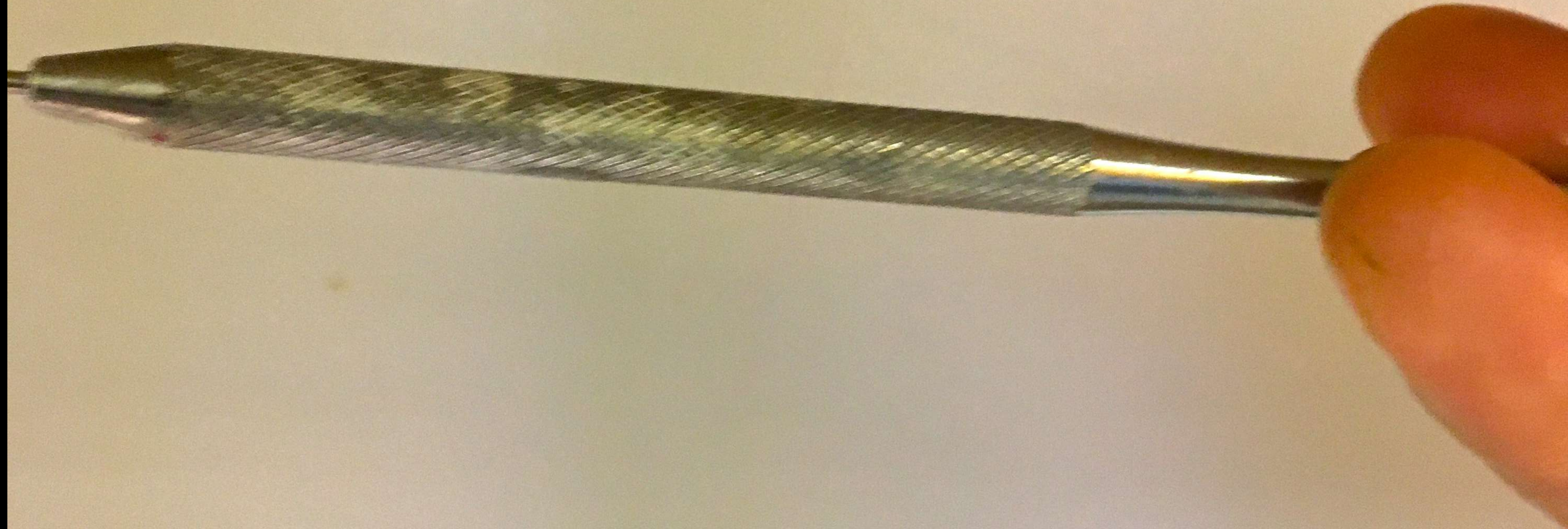
Contact Kate



**Who are
you
kidding?**



**Who are
you
kidding?**



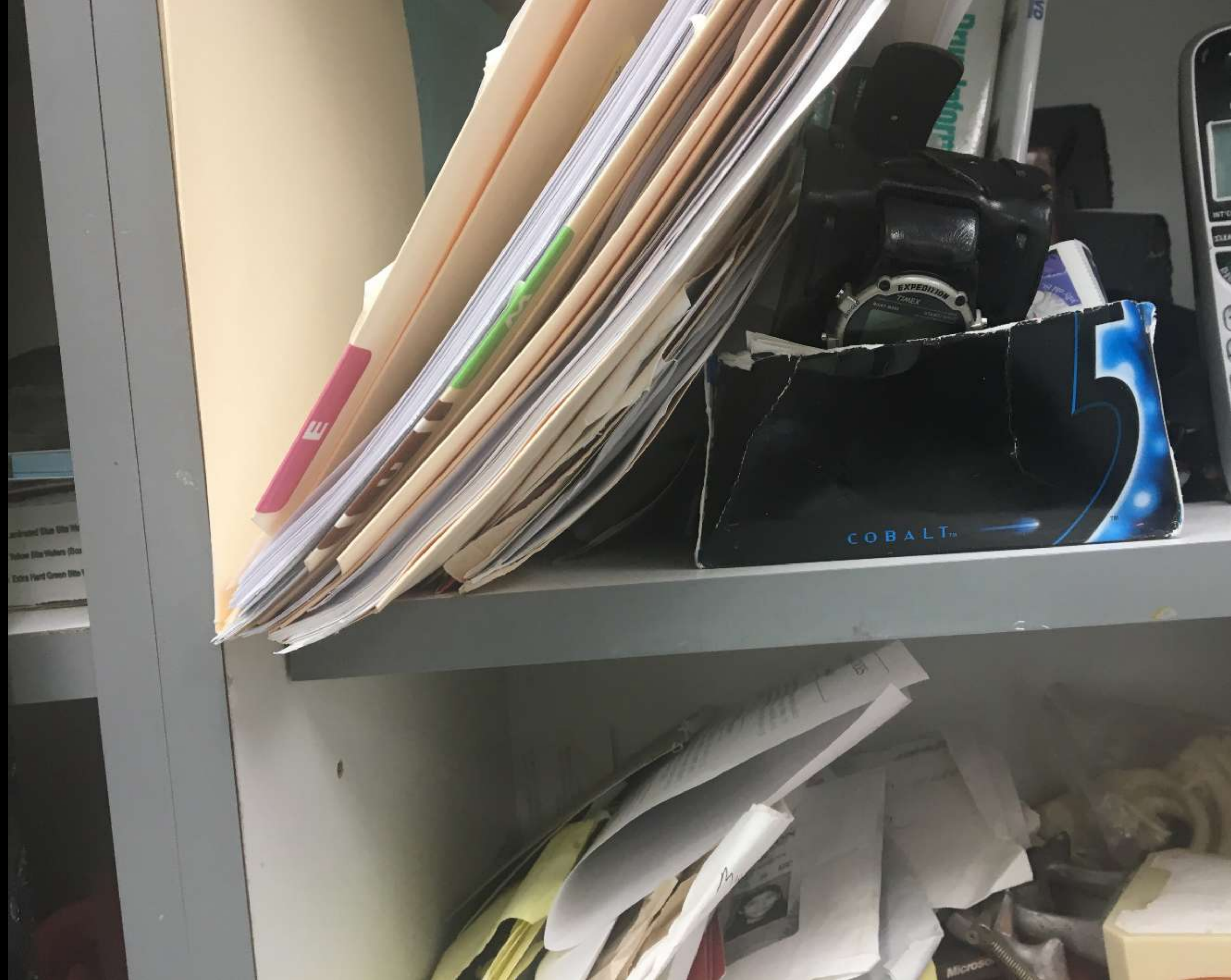
Who are
you
kidding?



Keyboard in Operator



**Adjacent to
Patient Chair**



Drawer Storage



Sterilization Area



Sterilization Area



Sterilization Area



Who are
you
kidding?

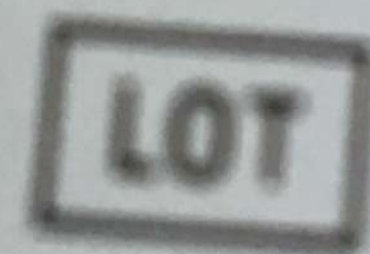
DENTSPLY
Maillefer

Arch Points

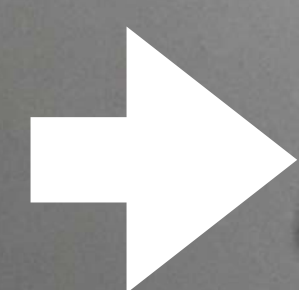
Store in a Cool Area,
Do Not Sterilize

Zinc Oxide, Coloring Agent
Contains Natural Rubber

SIZE: 45



030802



Expiration Date: 08-2006



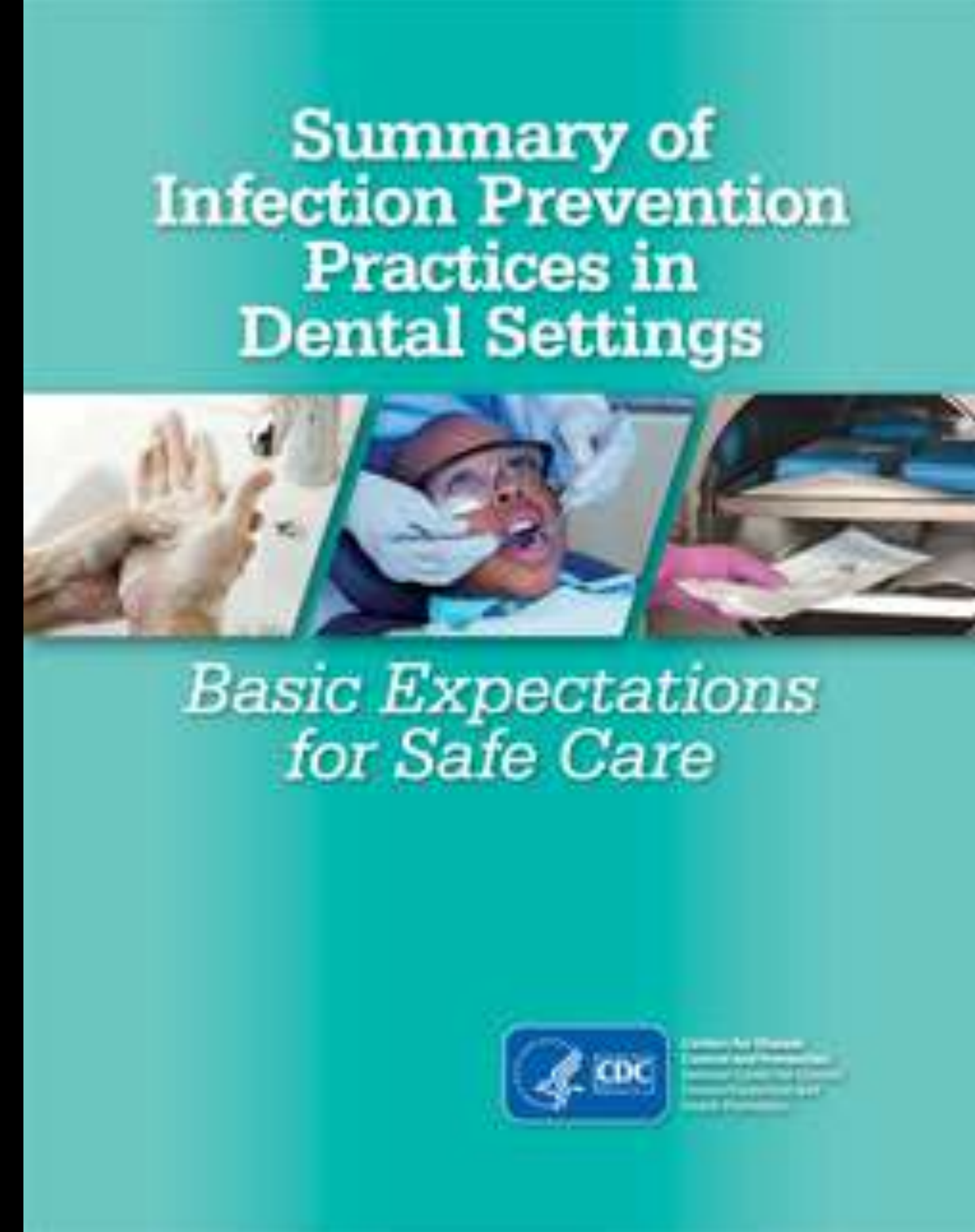
Non-Returnable
If Opened

2003, 2016

Workgroup to update

- 1. waterlines**
- 2. exposure of sterile instruments**
- 3. high volume evacuation**
- 4. sterilization of slow speed handpiece motors**
- 5. single use items**
- 6. items in open drawers**
- 7. Reviewed all items in the CDC guidelines in order to protect the public based on the best available evidence and to give HCPs clear rules**

Goal - stop or minimize transmission



Comment from a stakeholder

"We aren't medical doctors, we only work with the mouth, it is full of bacteria and besides, I have never had a problem."

By federal statute, dentists are physicians, with the responsibilities to patients same as MD's.

This applies to infection control, disease transmission, and sterilization. Dentistry is primarily surgical and therefore infection control is paramount.

There is no divide between oral and systemic.

That is completely artificial.

We follow Hippocratic Morals and Values, do no harm

Comment from a stakeholder

*"We aren't medical doctors, we only work with the mouth, it is full of bacteria and besides, **I have never had a problem.**"*

How would you know??

LATENCY AND INCUBATION

Table 1. Incubation period of microorganisms associated with healthcare infections in dentistry

Microorganism	Incubation period
Herpes simplex virus	Up to 2 weeks
Varicella zoster virus	2–3 weeks
Hepatitis B/C/D virus	Up to 6 months
HIV/AIDS	Months–years
<i>Mycobacterium tuberculosis</i>	Up to 6 months
<i>Pseudomonas</i> spp.	3–10 days
<i>Legionella</i> spp.	2–19 days
<i>Staphylococcus aureus</i>	4–10 days

Many bacteria can persist for months or years on skin and they are opportunists

4% of children and 1% of adults in the general population carry MRSA

Influenza-Latency 1 to 4 days; Viral shed from -2 to +7 from symptom onset

Human Papilloma Virus

More than 100 strains and some cause cancer

- 1. HPV virus can have a 30 years plus latency prior to the cancer diagnosis.**
- 2. It caused 16% of OroPharyngeal cancer prior to 2000. It is now 95%.**
- 3. Victims have 80% survival at 5 years.**
- 4. Since medicine knew that transmission was possible, they have taken precautions for many years.**
- 5. HPV 16 and 18 are epidemic and getting worse and no one knows why.**

Other common pathogens

C. difficile

E. coli

Serratia marcescens

Klebsiella sp.

Pseudomonas aeruginosa

Methicillin Resistant Staphylococcus Aureus (MRSA)

Mycobacterium sp

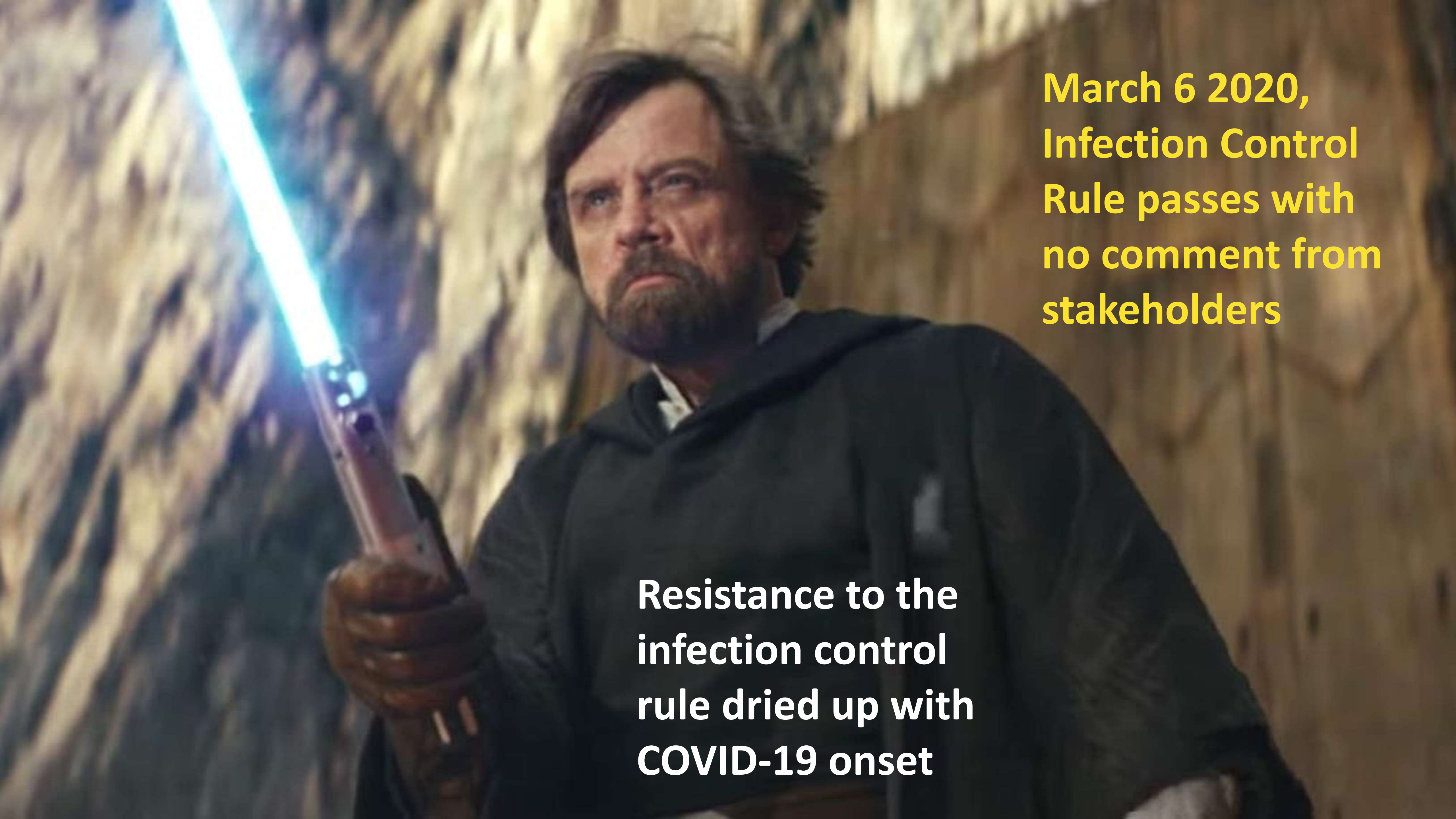
are easily transmitted and have a long latency on skin, some months or years.

There are more and more case reports of impossible to treat infections that have been very difficult to trace to the source.

DNA traces are now making that more possible.

Touching sterilized or dirty instruments with bare hands is a very bad idea.

The proposed rule was reviewed by Eve Cuny and John Molinari in the summer of 2021. Their suggestions were mostly adopted.



**March 6 2020,
Infection Control
Rule passes with
no comment from
stakeholders**

**Resistance to the
infection control
rule dried up with
COVID-19 onset**

Dave

- How do you follow the CDC guidelines?

- Sterile versus clean and is that meaningful?
- Exposed instruments, exposed sundries, drawers in operatories, infection control stations, exposed surfaces
- Pests - rodents and insects
- Transmission - soiled versus invisible
- Aerosols - negative pressure
- Waterlines - deadlegs, biofilms, pathogens, shocking, flushing, testing, remediation
- Sterilizers - testing
- Disposables - what can be used if it is exposed
- Handpieces -
- Drug vials -
- Handwashing and gloves -
- Personal Protection - donning and doffing

WAC 246-817-600

Infection Control Rule Dentist Responsibilities

WAC 246-817-615 Administrative, education, and training. (1) A licensed dentist shall develop and maintain written infection prevention policies and procedures appropriate for the dental services provided by the facility.

(2) A licensed dentist shall review with all practitioners the current office infection prevention policies and procedures annually. A licensed dentist shall maintain documentation of the annual review with all practitioners for five years.

(3) A practitioner shall complete one hour of current infection prevention standards education annually provided by a qualified individual or organization.

(4) Infection prevention standards education must include:

- (a) Standard precautions and prevention of disease transmission;**
- (b) Prevention of cross-contamination;**
- (c) Practitioner safety and personal protection equipment;**
- (d) Hand hygiene;**
- (e) Respiratory hygiene and cough etiquette;**
- (f) Sharps safety and safe injection practices;**
- (g) Sterilization and disinfection of patient care items and devices;**
- (h) Environmental infection prevention and control;**
- (i) Dental unit water quality; and**
- (j) The requirements in WAC 246-817-601 through 246-817-660.**

(5) A practitioner shall maintain their personal documentation of infection control prevention standards education for a period of five years.

(6) For the purposes of this section, a qualified individual or organization means a person or entity that has verifiable training, expertise, or experience in all aspects of infection control.

[Statutory Authority: RCW 18.32.002 and 18.32.0365. WSR 21-01-214, § 246-817-615, filed 12/23/20, effective 1/23/21.]

Hand Washing

WAC 246-817-635 Hand hygiene. A practitioner shall perform hand hygiene as defined in WAC 246-817-610 in any of these situations:

(1) When hands are visibly soiled;

(2) In the event of barehanded touching of instruments, equipment, materials, and other objects likely to be contaminated by blood, saliva, or respiratory secretions; or

(3) Before and after treating each patient.

[Statutory Authority: RCW 18.32.002 and 18.32.0365. WSR 21-01-214, § 246-817-635, filed 12/23/20, effective 1/23/21.]

Glove wear

WAC 246-817-640 Personal protective equipment.

(1) A practitioner shall wear gloves whenever there is a potential for contact with blood, body fluids, mucous membranes, nonintact skin, or contaminated equipment.

(a) New gloves are required for each patient.

(b) Gloves must not be washed or reused.

(c) Gloves selection must be based on the performance characteristics of the glove in relation to the task to be performed as applicable in WAC 296-800-16065 and 296-823-15010.

(2) A practitioner shall wear mouth, nose, and eye protection during procedures that are likely to generate aerosols or splashes or splattering of blood or other body fluids.

(3) A practitioner shall comply with Washington state occupational exposure to bloodborne pathogens WAC 296-823-150.

[Statutory Authority: RCW 18.32.002 and 18.32.0365. WSR 21-01-214, § 246-817-640, filed 12/23/20, effective 1/23/21.]

Coughing or sneezing patients

WAC 246-817-645 Respiratory hygiene and cough etiquette.

(1) A licensed dentist shall post signs in a place visible to individuals receiving services in the premises with instructions to patients with symptoms of respiratory infection to:

- (a) Cover their mouth/nose when coughing or sneezing;**
- (b) Use and dispose of tissues;**
- (c) Perform hand hygiene after hands have been in contact with**

respiratory secretions.

(2) A licensed dentist shall provide tissues and no-touch receptacles for disposal of tissues in the dental office.

(3) A licensed dentist shall offer masks to coughing patients and accompanying individuals in the dental office.

[Statutory Authority: RCW 18.32.002 and 18.32.0365. WSR 21-01-214, § 246-817-645, filed 12/23/20, effective 1/23/21.]

Needles and Sharps

WAC 246-817-650 Safe injection and sharps safety.

(1) A practitioner shall follow the CDC Summary of Infection Prevention Practices in Dental Settings: Basic Expectations for Safe Care, March 2016, guidelines for safe injection practices in dental settings.

(2) A practitioner shall use either a one-handed scoop technique or mechanical device designed for holding the needle cap when recapping needles. A practitioner shall not recap used needles by using both hands or any other technique that involves directing the point of a needle toward any part of the body.

(3) A practitioner shall place used disposable syringes and needles, scalpel blades, and other sharp items in appropriate puncture-resistant containers in each operatory.

[Statutory Authority: RCW 18.32.002 and 18.32.0365. WSR 21-01-214, § 246-817-650, filed 12/23/20, effective 1/23/21.]

Instrument handling and sterilization

WAC 246-817-655 Sterilization and disinfection, environmental infection prevention and control. A practitioner shall:

(1) Follow the CDC Guidelines for Infection Control in Dental Health-Care Settings 2003, MMWR Vol. 52, No. RR-17, Appendix C for Methods for Sterilizing and Disinfecting Patient-Care Items and Environmental Surfaces, including:

(a) Clean and reprocess through disinfection or sterilization reusable critical, semicritical, and noncritical dental equipment and devices according to manufacturer instructions before use on another patient.

(i) Effective August 31, 2022, sterilization of low-speed hand piece motors after use on a patient is required.

(ii) Sterilization is not required for those sections of a battery operated hand piece system that cannot be sterilized according to manufacturer's instructions.

However, battery operated hand piece systems that have specific engineering controls to isolate the sections that cannot be sterilized, render those sections "noncritical," must be used if commercially available; those sections that cannot be sterilized must be processed according to manufacturer's instructions between patient uses.

(b) Clean and reprocess through disinfection or sterilization reusable critical, semicritical, and noncritical dental equipment and devices according to manufacturer instructions.

(c) Clean and reprocess reusable dental equipment according to the manufacturer instructions.

(d) All disposable and single-use items, as labeled by the United State Food and Drug Administration, must be discarded after use on a single patient.

(i) Single-use items that need to be tested for size are not considered used unless cemented in the mouth. Single-use items can be cleaned or reprocessed (disinfected or sterilized) when following manufacturer's instructions.

(ii) If a single-use item is not used, but is contaminated or exposed to aerosols during the appointment by being placed on a surface ready to use, it may only be sterilized if the process of doing so does not compromise the efficacy of the item including, but not limited to, anesthetic carpules.

(2) Bag or wrap contaminated instruments in packages, containers, or cassettes in preparation for sterilization.

(a) Store sterile instruments and supplies in a covered or closed area.

(b) Wrapped packages, containers, or cassettes of sterilized instruments must be inspected before opening and use to ensure the packaging material has not been compromised.

(c) Wrapped packages, containers, or cassettes of sterilized instruments must be opened as close to the time of the procedure as possible. Opening in the presence of the patient is preferred.

(d) Instruments sterilized for immediate use do not mandate the use of a bag or a wrap. If the instrument is not used immediately, it must be bagged or wrapped.

(3) Use all mechanical, chemical, and biological monitors according to manufacturer instructions to ensure the effectiveness of the sterilization process.

(4) Test sterilizers by biological spore test method as recommended by the manufacturer on at least a weekly basis when scheduled patients are treated.

(a) In the event of a positive biological spore test, the licensed dentist shall take immediate remedial action as recommended by the manufacturer.

(b) A licensed dentist shall record biological spore tests and results either in the form of a log reflecting dates and person or persons conducting the testing or copies of reports from an independent testing entity. A licensed dentist shall maintain this documentation for a period of five years.

(5) Thoroughly rinse items such as impressions contaminated with blood or saliva. Place and transport items such as impressions to a dental laboratory off-site in a case containment device that is sealed and labeled.

(6) Disinfect all work surfaces after each patient.

- (7) Disinfect using an intermediate-level disinfectant having, but not limited to, a tuberculocidal claim, when a surface is visibly contaminated with blood.
- (8) Use only United States Environmental Protection Agency registered disinfectants or detergents/disinfectants with label claims for use in health care setting, following the manufacturer's instructions.
- (9) Use high volume evacuation (HVE) whenever possible in all clinical situations expected to produce aerosol or spatter, such as, but not limited to, ultrasonics, high-speed hand pieces and air polishing devices. HVE equipment must be installed and maintained to manufacturer's specifications to ensure proper evacuation at the treatment site. HVE devices must be used as intended for HVE. A saliva ejector does not qualify as an HVE device.
- (10) The following definitions apply to WAC 246-817-655.
- (a) "Critical," "semicritical," and "noncritical" means categories given to patient care items including, but not limited to, dental instruments, devices, and equipment depending on the potential risk of infection associated with intended use.
- (i) "Critical items" means those items used to penetrate soft tissue, contact bone, enter into or contact the bloodstream or other normally sterile tissue. Critical items must be sterilized by heat.
- (ii) "Noncritical items" means those items used to contact intact skin. Noncritical items must be disinfected with United States Environmental Protection Agency registered hospital disinfectant or detergent.
- (iii) "Semicritical items" means those items used to contact mucous membranes or nonintact skin. Semicritical items must be sterilized by heat if heat-tolerant, or by high-level disinfection if a semicritical item is heat-sensitive.
- (b) "Disinfect" or "disinfection" means use of a chemical agent on inanimate objects, such as floors, walls, or sinks, to destroy virtually all recognized pathogenic microorganisms, but not necessarily all microbial forms such as bacterial endospores.
- (c) "High-level disinfection" means disinfection that inactivates vegetative bacteria, mycobacteria, fungi, and viruses but not necessarily high numbers of bacterial spores.
- (d) "High volume evacuation" or "HVE" means the equipment used to remove debris, aerosols, and liquids.
- (e) "Remedial action" means manufacturer recommended action necessary to obtain a negative spore test result.
- (f) "Sterilize" or "sterilization" means the use of heat, chemical, or other nonchemical procedure to destroy all microorganisms.

[Statutory Authority: RCW 18.32.002 and 18.32.0365. WSR 21-01-214, § 246-817-655, filed 12/23/20, effective 1/23/21.]

Dental Water Lines

WAC 246-817-660 Dental unit water quality. (1) A licensed dentist shall use water for nonsurgical procedures that meets United States Environmental Protection Agency regulatory standards for drinking water of five hundred or less colony-forming units or CFUs/mL.

(2) A licensed dentist shall follow dental equipment manufacturer's instructions when testing the water delivery system for acceptable water quality. If manufacturer's instructions are unavailable, a licensed dentist shall test the water delivery system for acceptable water quality quarterly. A licensed dentist shall test the water delivery system five to ten days after repair or changes in the plumbing system and again at twenty-one to twenty-eight days later.

(a) Effective December 1, 2021, all water lines must be tested.

(i) All water lines for each operatory or dental unit can be pooled as one single sample.

(A) A pooled sample must use an equal amount of water from each water line.

(B) A pooled sample can have up to ten water lines included.

(C) The number of water lines pooled into one sample must be documented.

(ii) All water lines for each operatory or dental unit can be tested individually.

(b) In the event of an unacceptable level of colony-forming units or CFUs, a licensed dentist shall take immediate remedial action. For the purposes of this section, remedial action means any action necessary to reduce the CFUs to five hundred or a lesser number currently recognized by the United States Environmental Protection Agency as acceptable for drinking water.

(c) A licensed dentist shall record the water delivery system testing and maintenance either in the form of a log reflecting dates and person or persons conducting the test or maintenance or copies of reports from an independent testing entity. A licensed dentist shall maintain this documentation for a period of five years.

[Statutory Authority: RCW 18.32.002 and 18.32.0365. WSR 21-01-214, § 246-817-660, filed 12/23/20, effective 1/23/21.]

Dave

- How do you follow the CDC guidelines?

- **Sterile versus clean and is that meaningful?**

- Exposed instruments, exposed sundries, drawers in operatories, infection control stations, exposed surfaces
- Pests - rodents and insects
- Transmission - soiled versus invisible
- Aerosols - negative pressure
- Waterlines - deadlegs, biofilms, pathogens, shocking, flushing, testing, remediation
- Sterilizers - testing
- Disposables - what can be used if it is exposed
- Handpieces -
- Drug vials -
- Handwashing and gloves -
- Personal Protection - donning and doffing



Is this sterile?



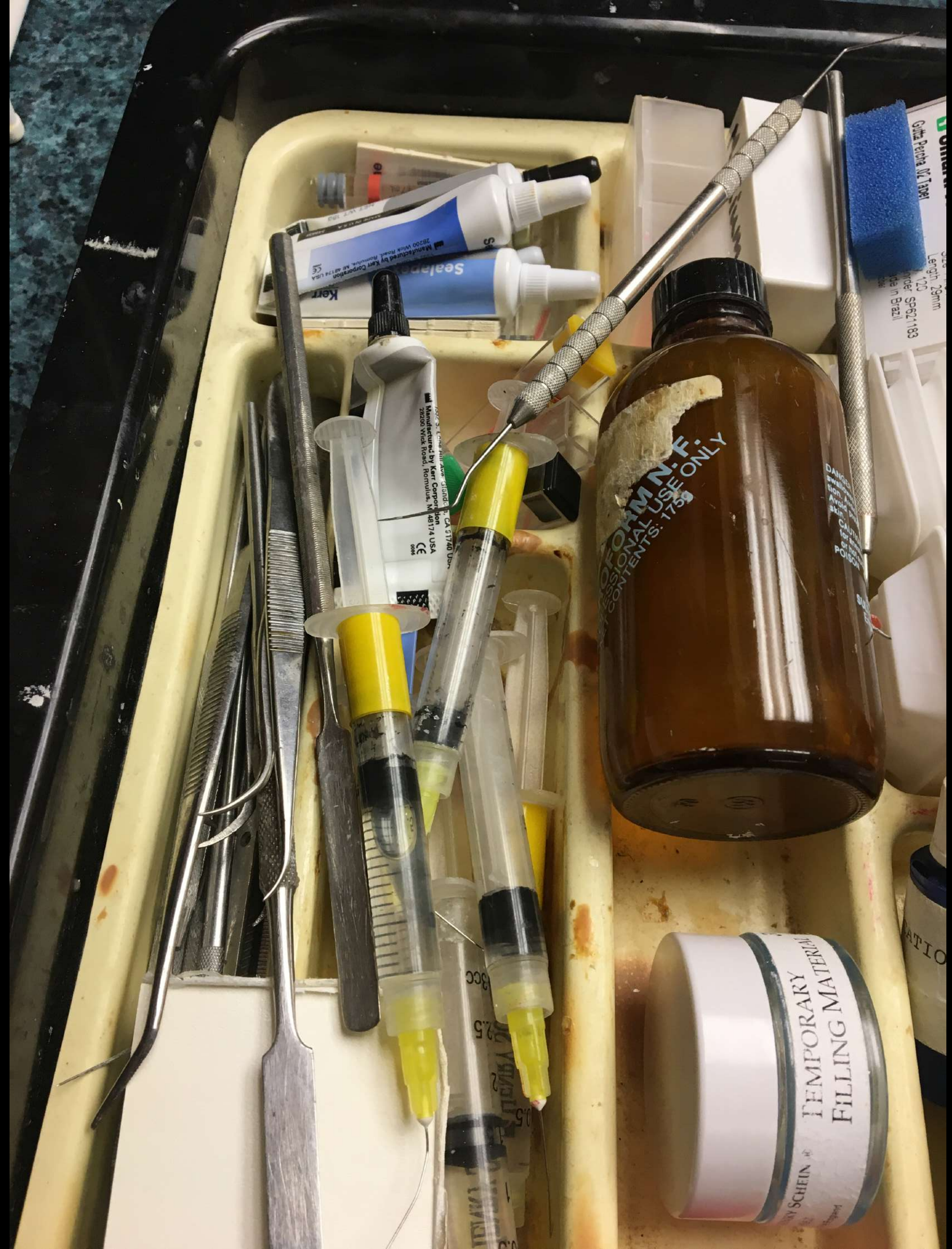
Is this Sterile?



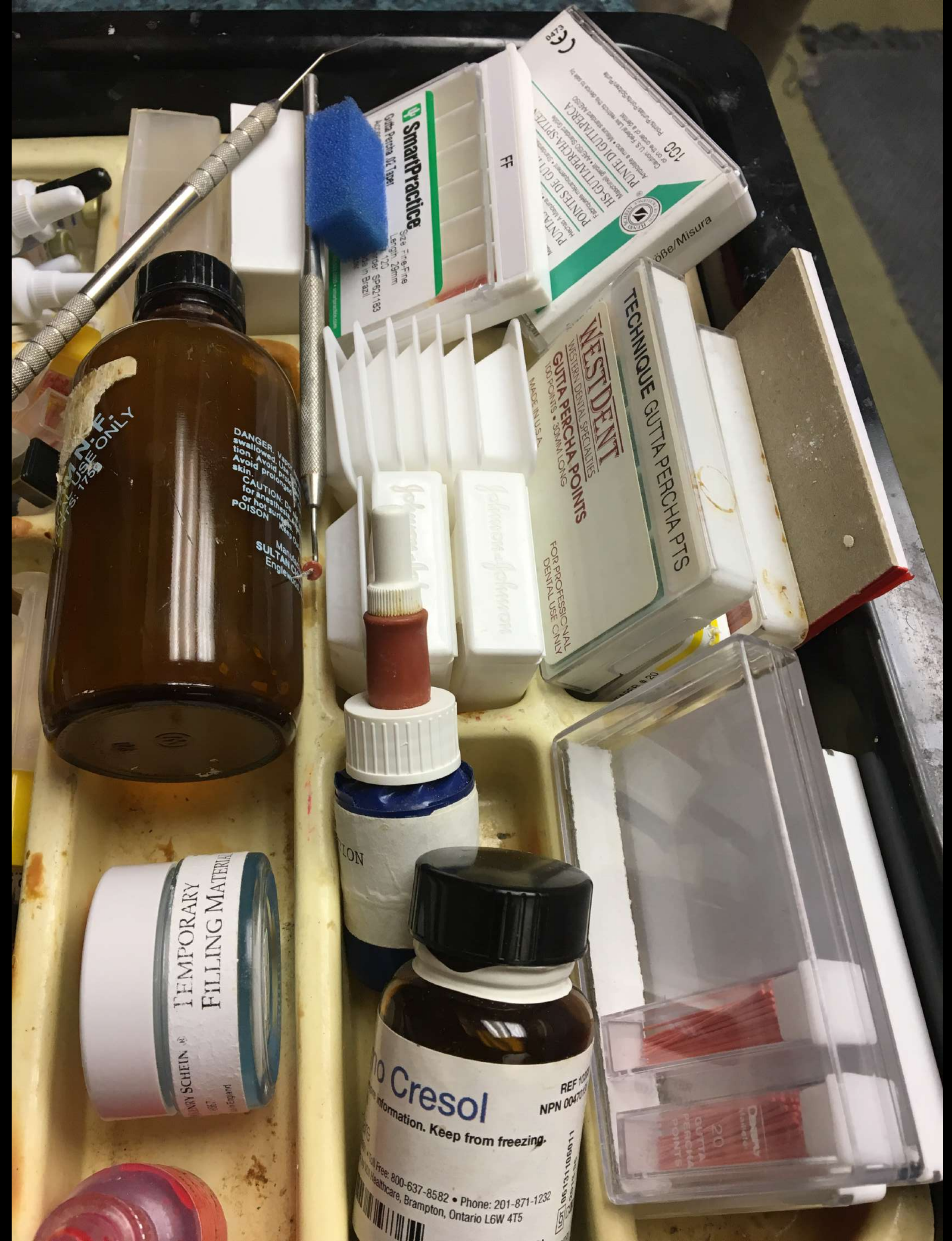
Is this sterile?



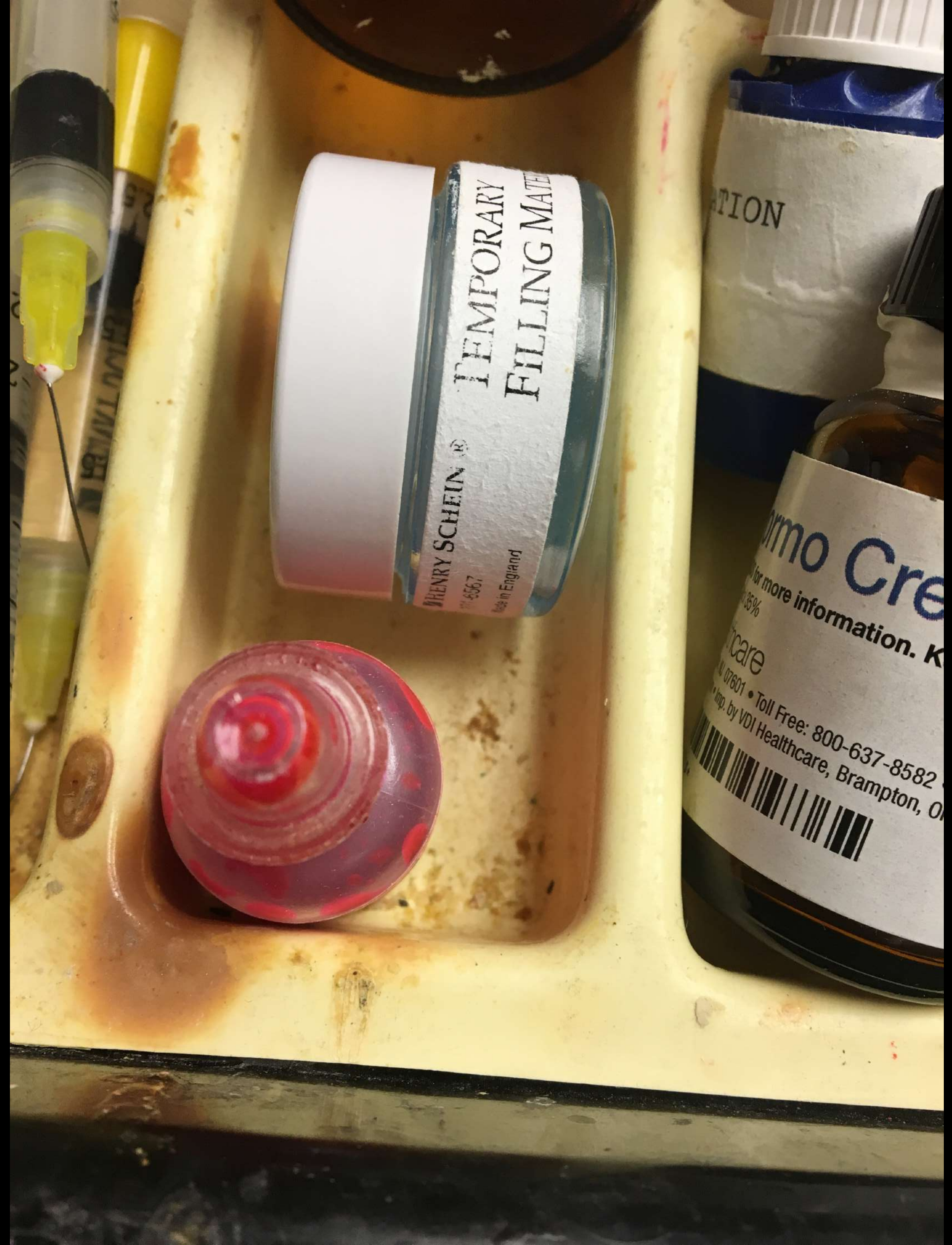
Is this sterile,
clean, or
contaminated?



Is this clean?



Is this clean?



Is this clean?



Is this clean?



What if I open a sterile pack but don't use the instruments?

- All instruments opened in the operating or procedure room should be considered contaminated whether or not they have been used.
- Rationale: Scrubbed persons might touch instruments without being aware of it. Used instruments also might come in contact with other instruments.

AAMI/ANSI

Sterile instruments opened and exposed in a very clean OR, with no people, with become contaminated within 15 minutes.

- With what?? Dust??

Skin flakes

Breaches in Sterilization

CDC Health Advisory October 2015

CDC/FDA Health Update about the Immediate Need for Healthcare Facilities to Review Procedures for Cleaning, Disinfecting, and Sterilizing Reusable Medical Devices

Numerous reports of breaches in reprocessing of instruments and devices in health care settings

Leading to notification of thousands of patients regarding potential exposure to bloodborne diseases

What if the sterilizer is not changing the color of the indicator strips?

What if a days worth of patients were seen before someone realized it?

What do you do?



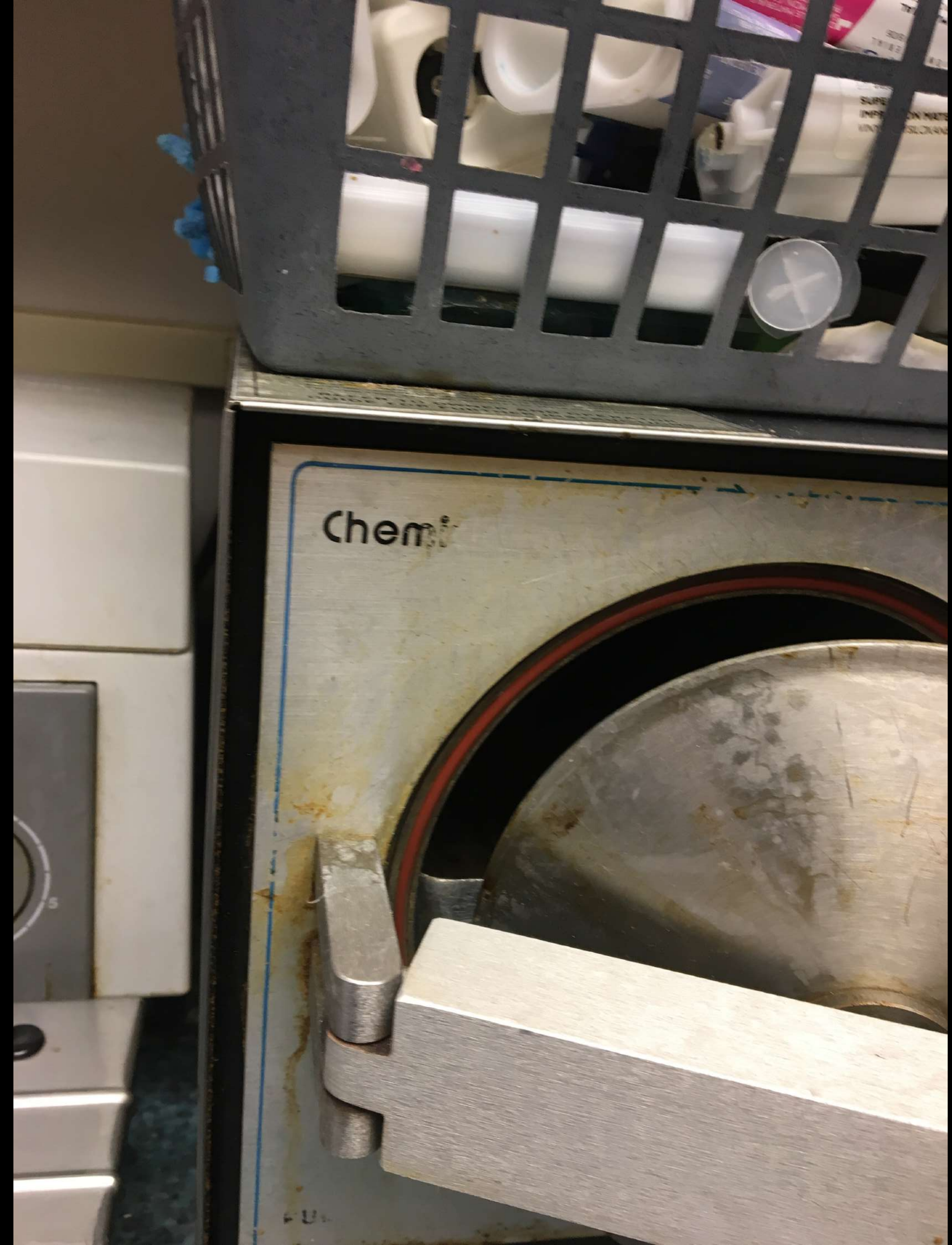
Most Memorable 4



Most Memorable Cold Sterile



Most Memorable Chemiclave



Most Memorable Chemiclave



Most Memorable Chemiclave



Most Memorable Chemiclave



Dave

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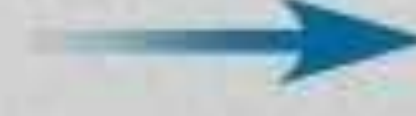
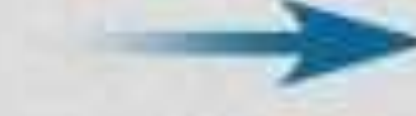
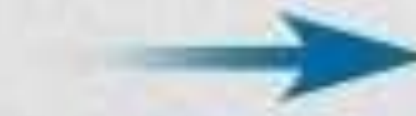
- Once a sterile instrument or sterile glove is exposed to air, it is no longer sterile
- An undisturbed but open pack of instruments will show contamination of bacteria within 15 minutes in a very clean OR. What is the most common contamination? Skin flakes that hold bacteria.

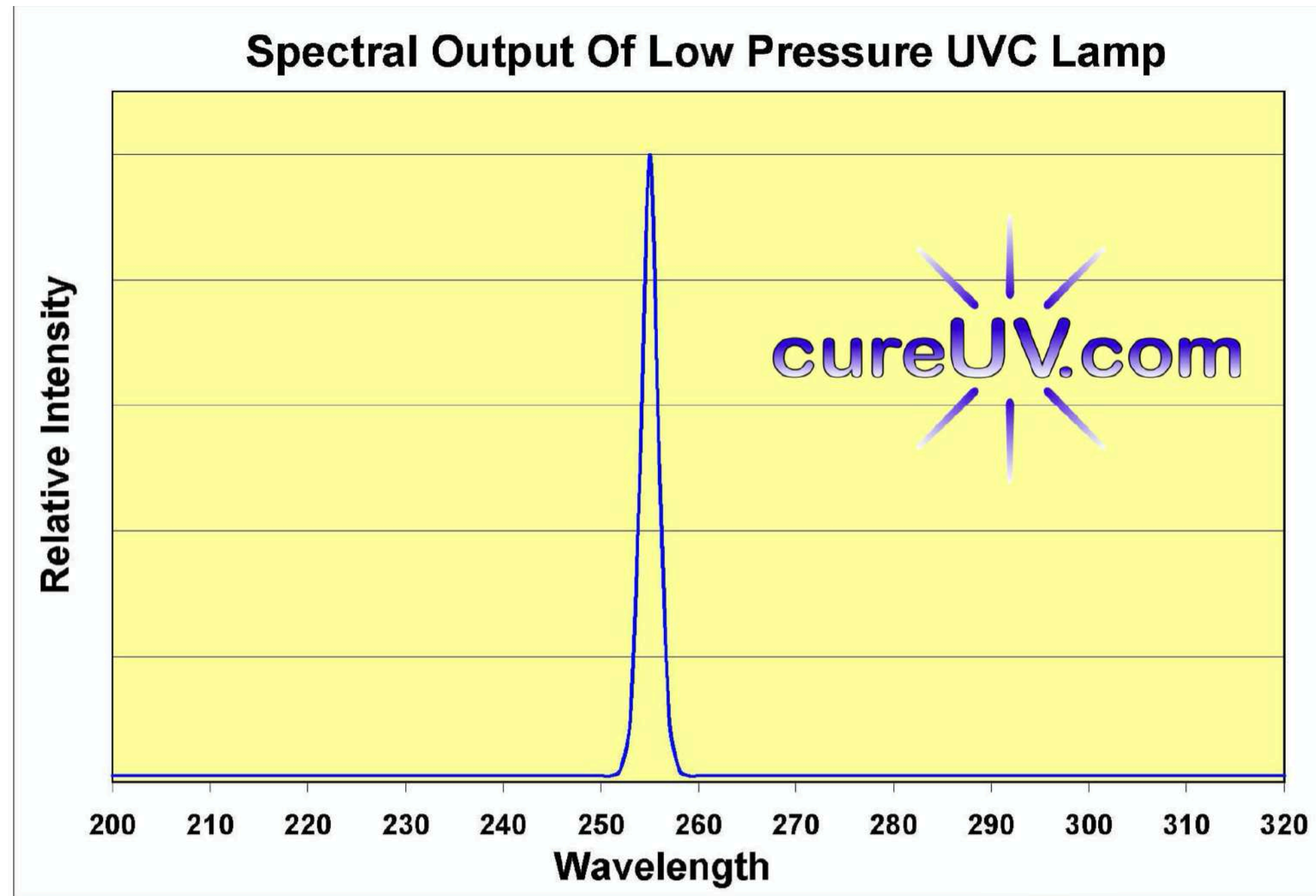
- Can you sterilize surfaces?
- What is the consequence of not cleaning surfaces?

UVC

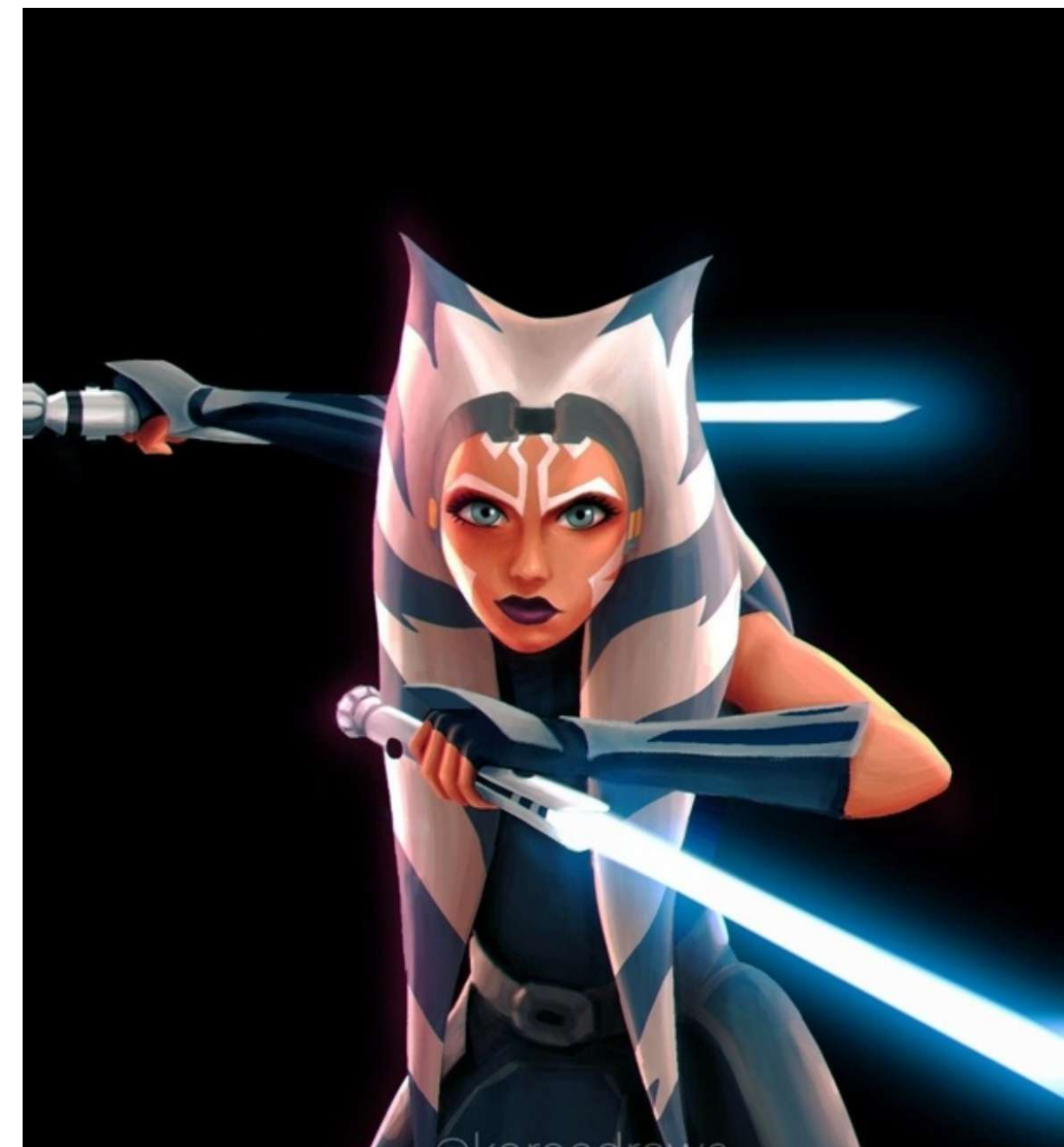
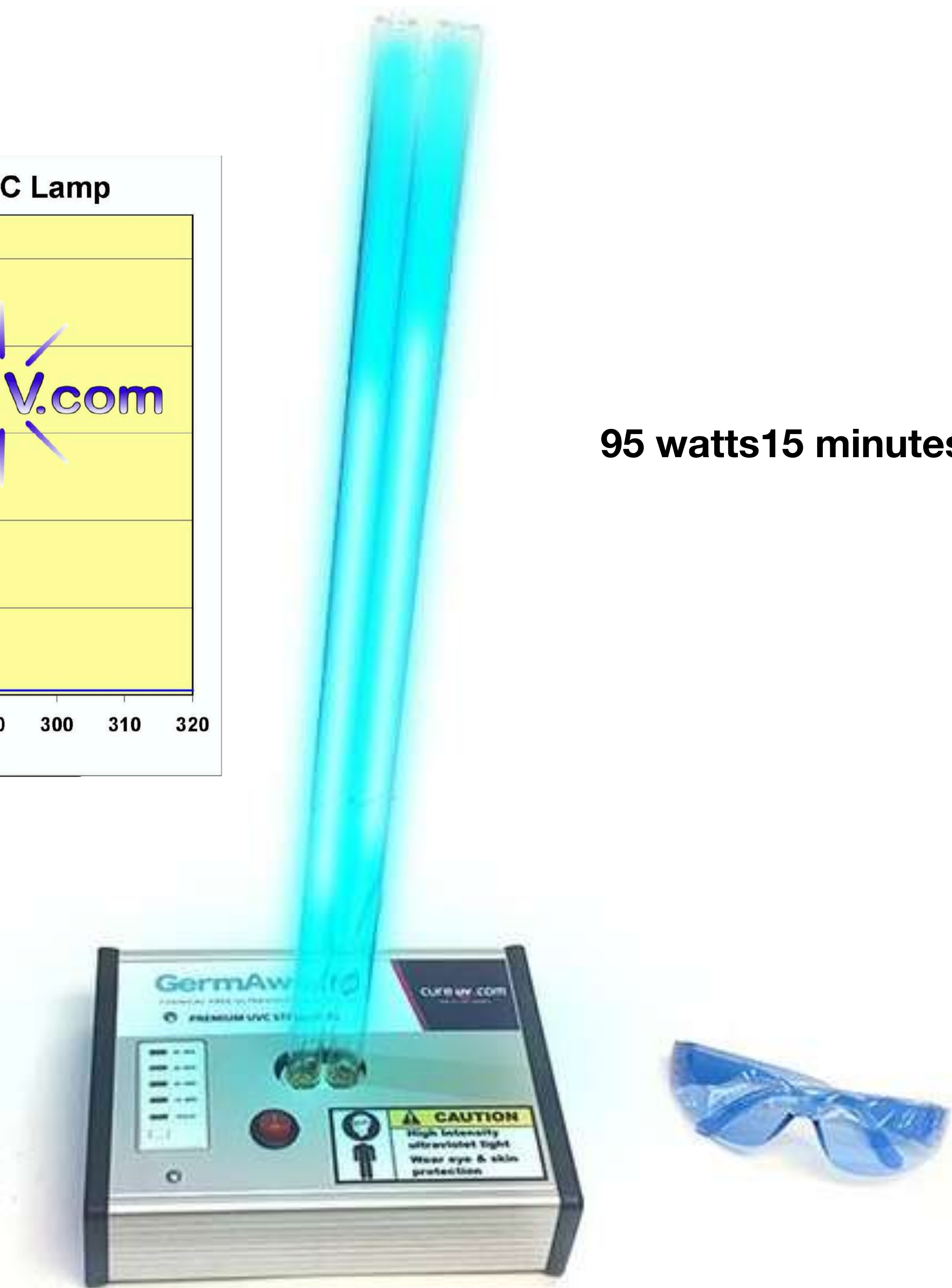


Cabinet





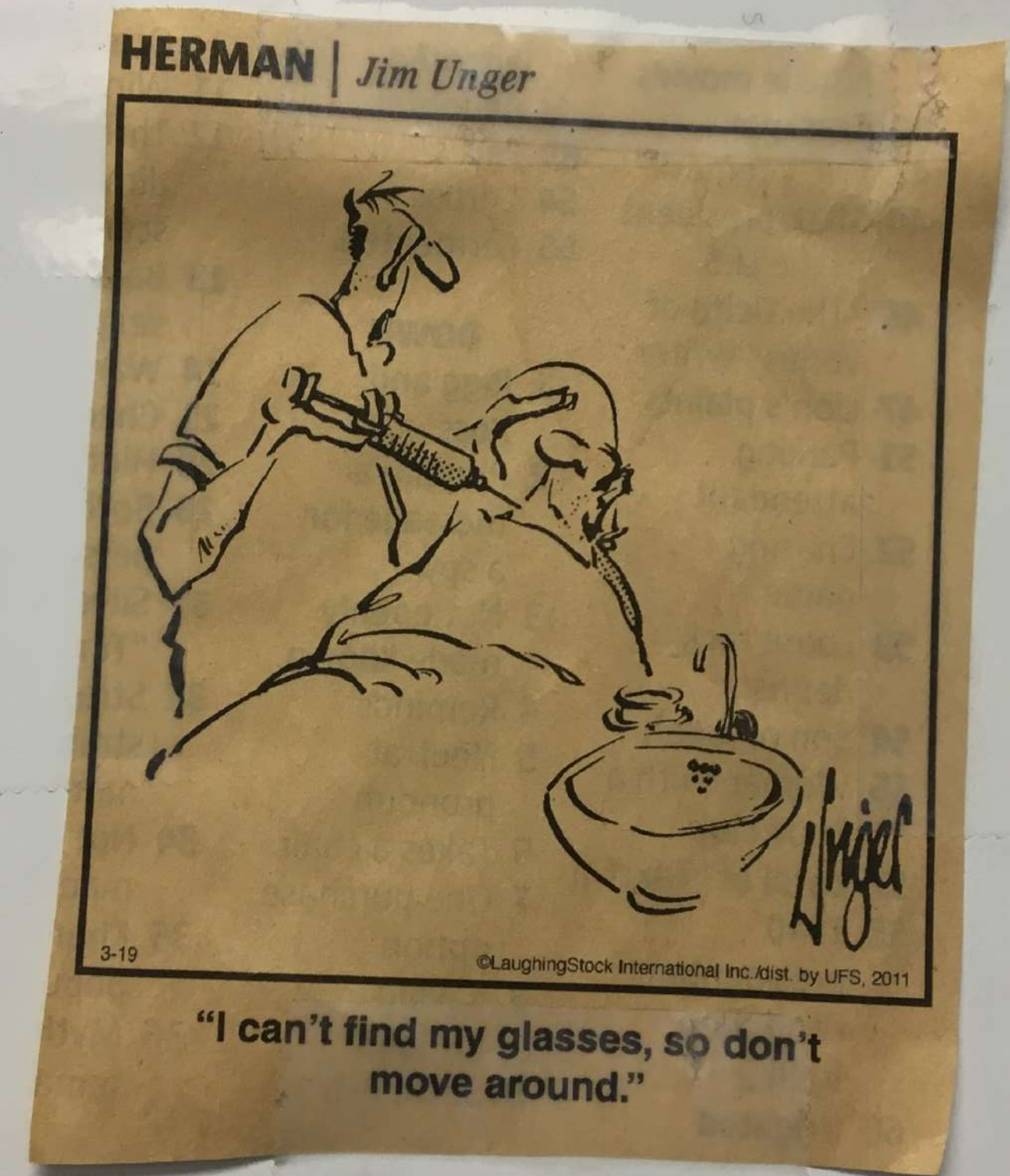
95 watts15 minutes



Most Memorable Inspection 3



Most Memorable Inspection 3



Most Memorable Inspection 3



Most Memorable Inspection 3



Most Memorable Inspection 3



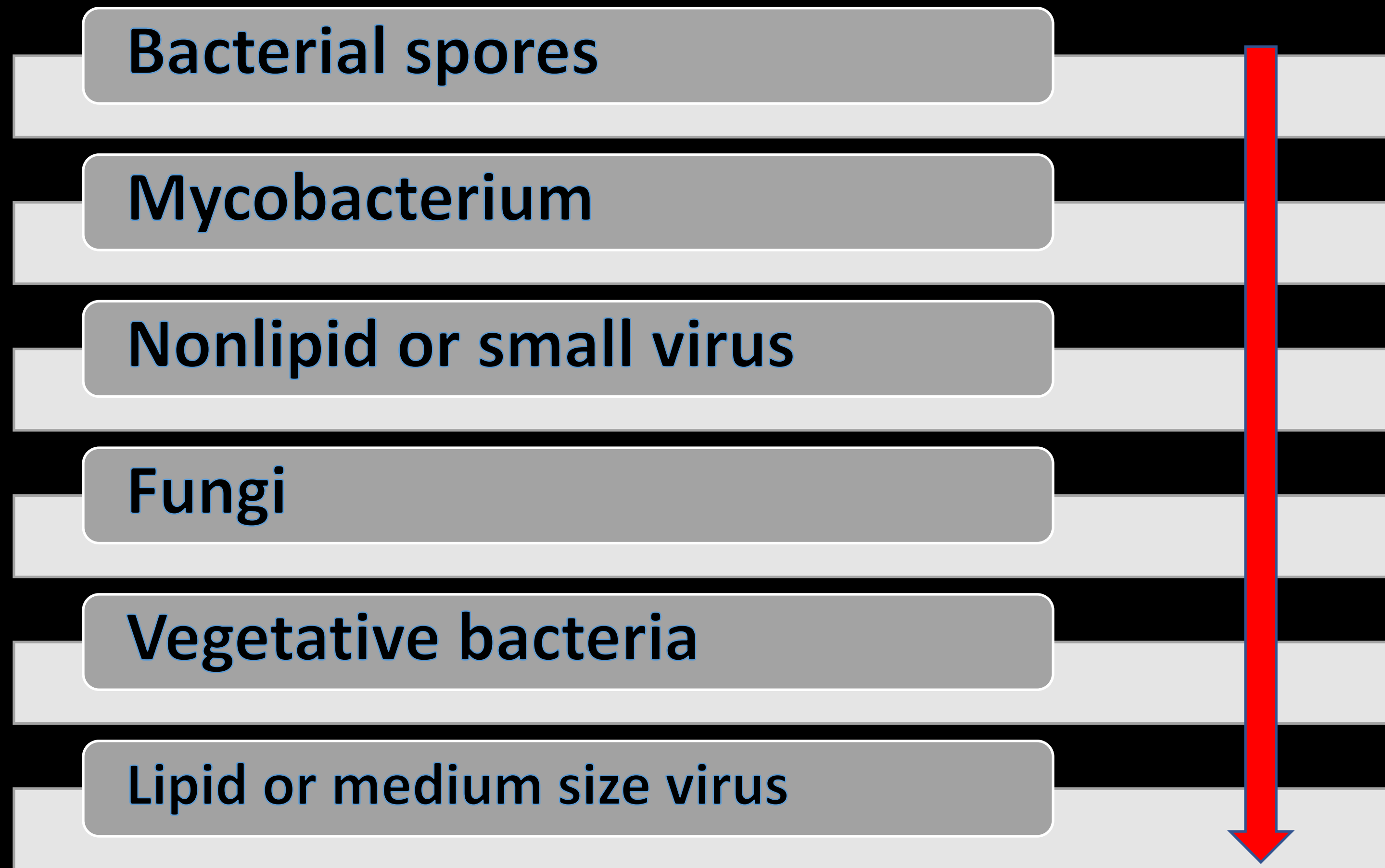
Clinical Surface Disinfection

Why worry about surfaces?

Latency is a big problem

HIV	• Hours
HSV	• Hours
Rhinovirus	• 14 Hours
Staph	• 5 Days
HBV	• 7 Days
HCV	• 6 Weeks
TB	• 6 to 8 Months

Resistance to Chemical Germicides is a Big Problem



Classification of disinfectants

Low-level

Kill most vegetative bacteria, some fungi, and some viruses in a practical period of time (≤ 10 minutes). Do not kill mycobacteria.

Intermediate-level

Kill mycobacteria, vegetative bacteria, most viruses, and most fungi but do not necessarily kill bacterial spores.

High-level*

Will kill all microorganisms except large numbers of bacterial spores.

Some high-level disinfectants will kill spores with prolonged exposure times (3–12 hours); these are called high level disinfectants/sterilants

Spray – Wipe – Spray

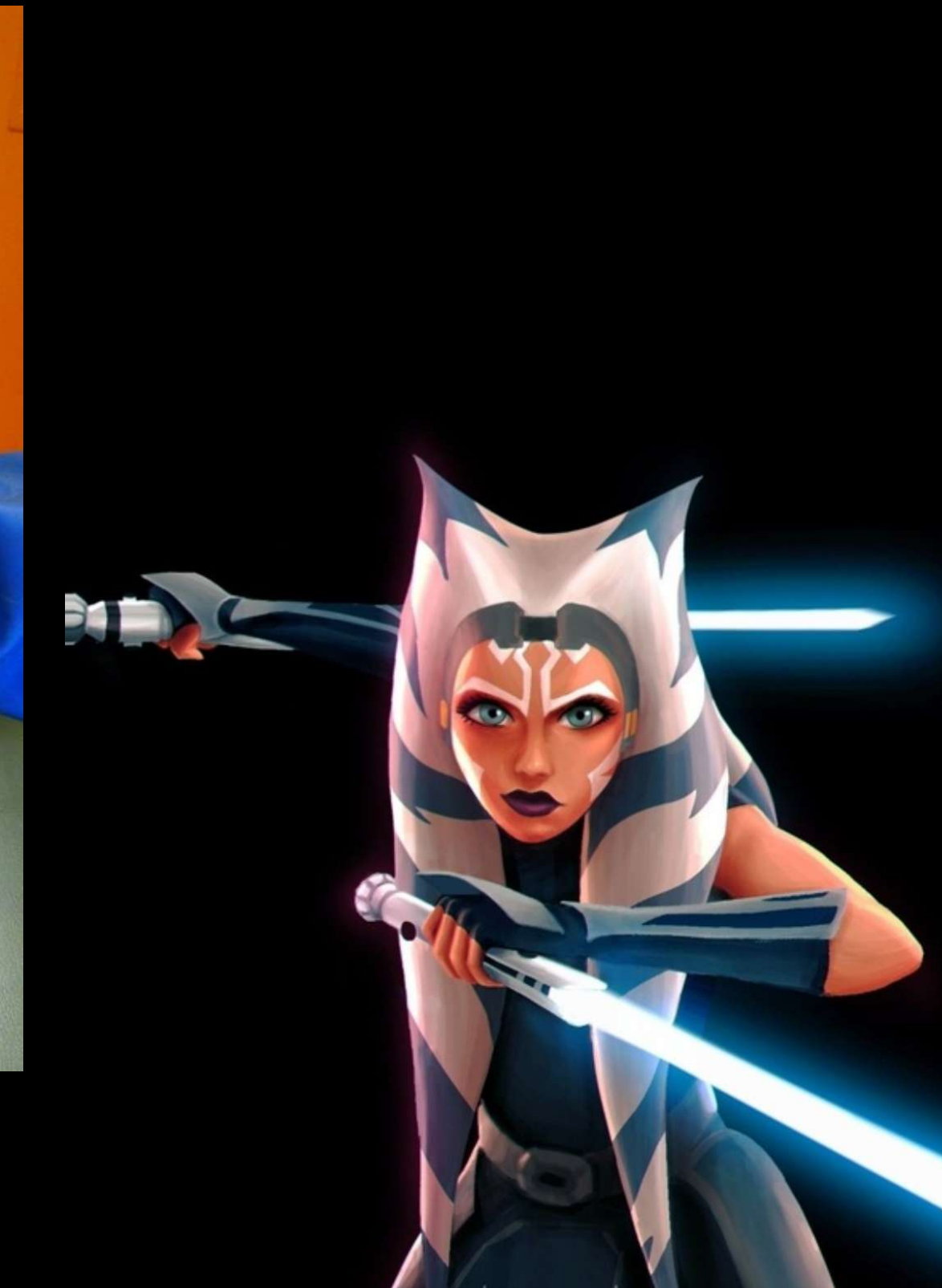
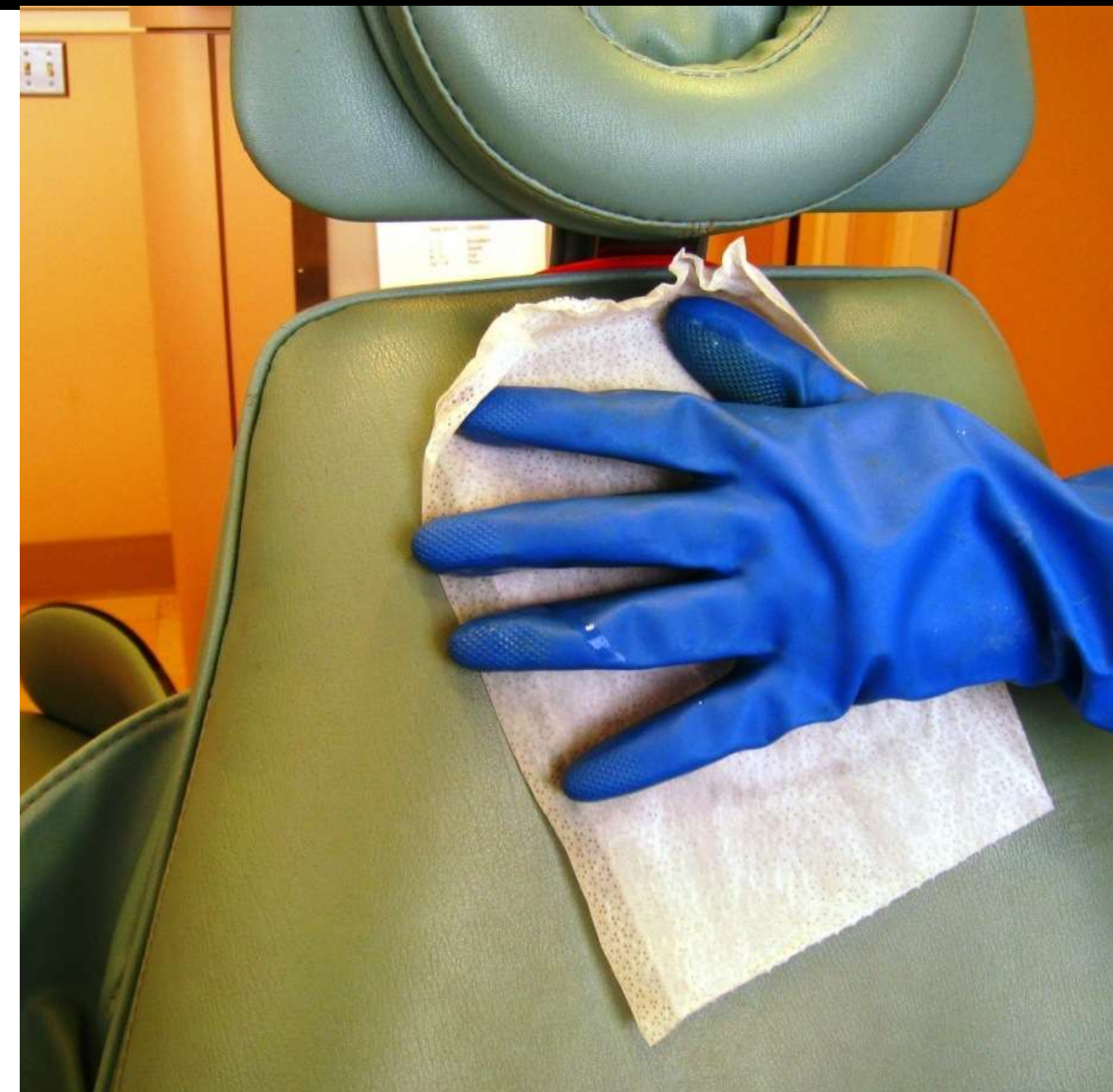
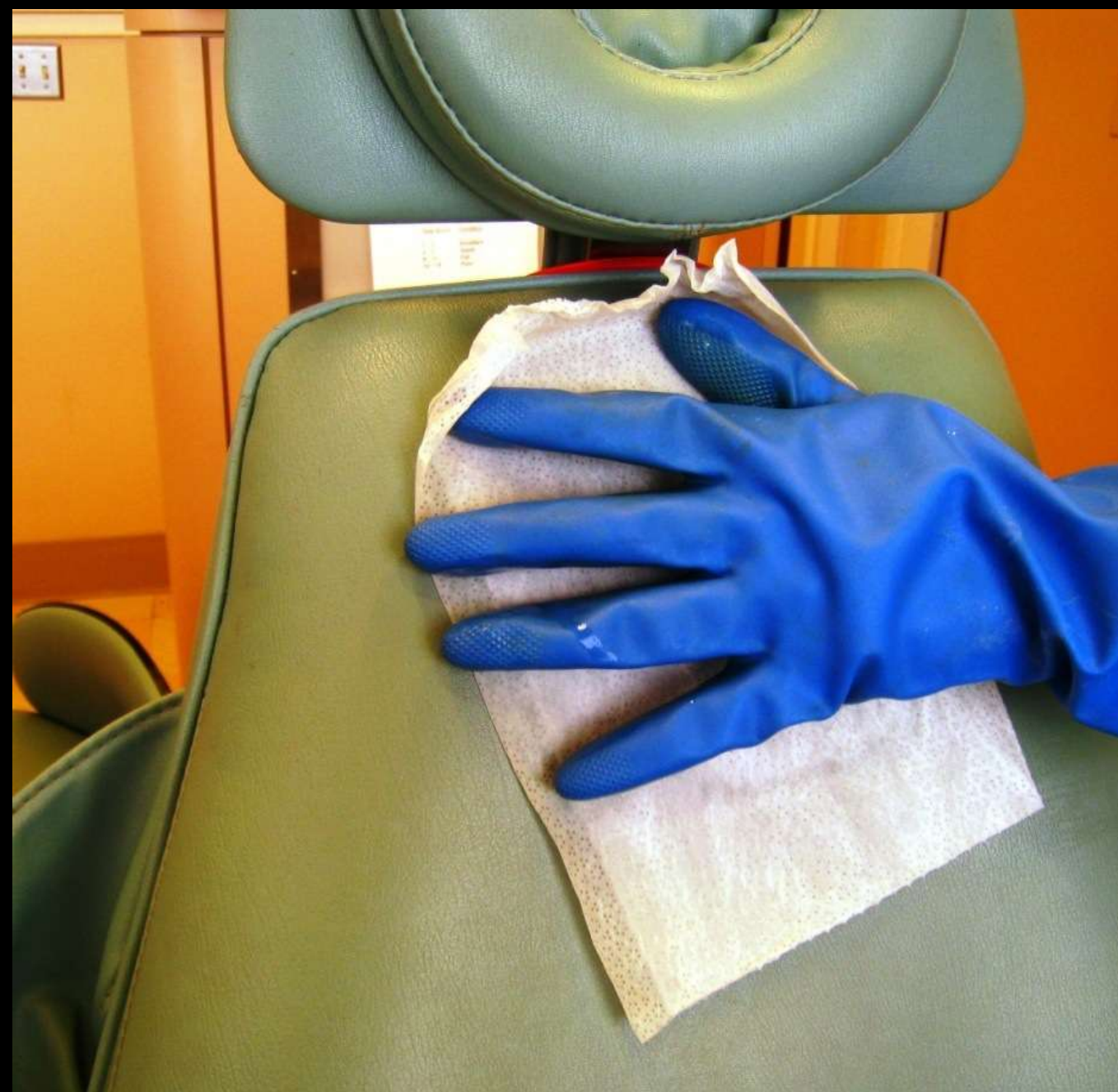
1. Spray on cleaner (or cleaner disinfectant)
2. Wipe to clean
3. Spray on disinfectant and then WAIT
– follow label directions for contact time



Wipe – Throw – Wipe

EVE CUNY

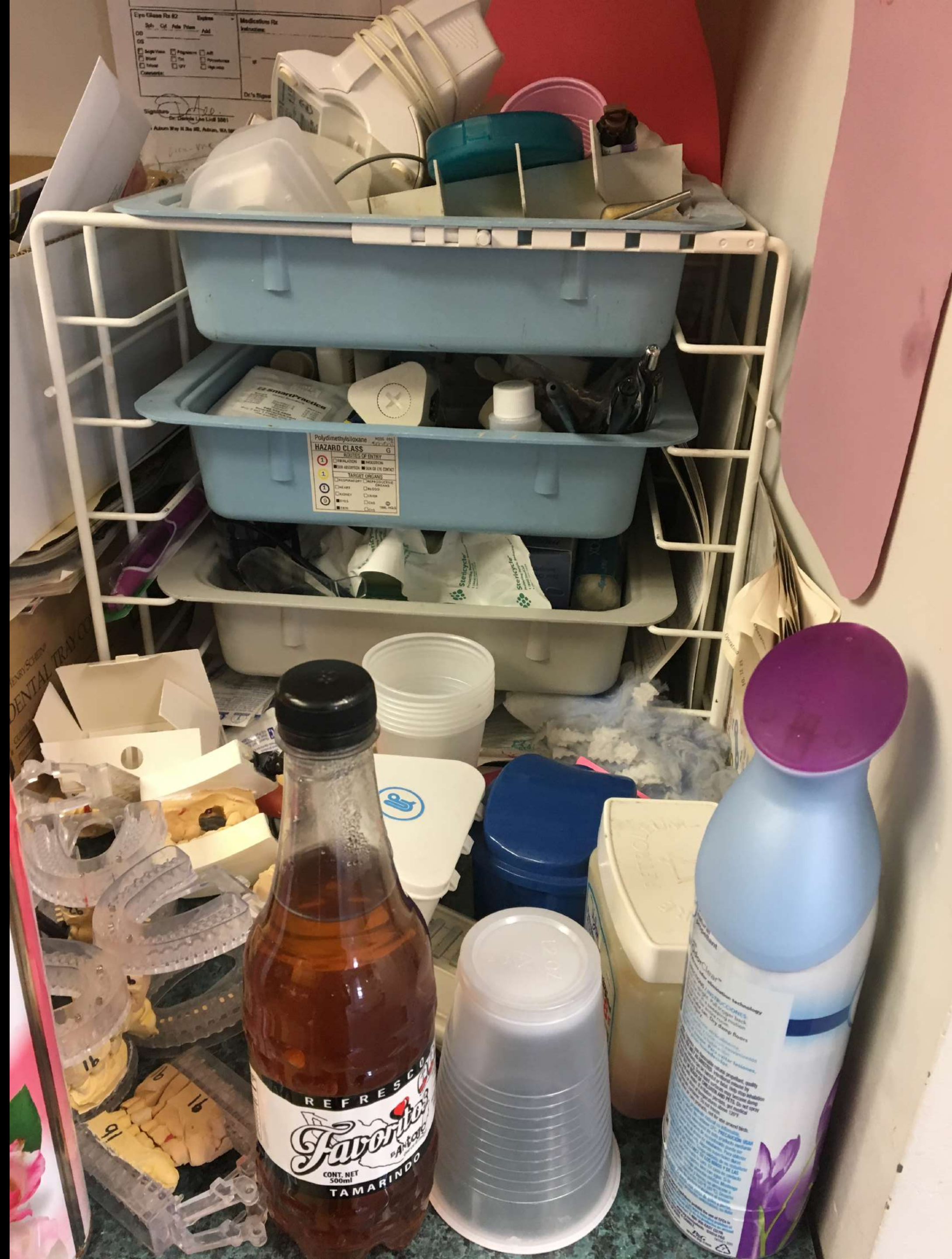
1. Wipe on cleaner (or cleaner/disinfectant) with premoistened towelette
2. Throw away wipe (multiple surfaces will require multiple towelettes)
3. Wipe with fresh towelette(s) and WAIT
– allow surface to remain wet for time indicated on the label



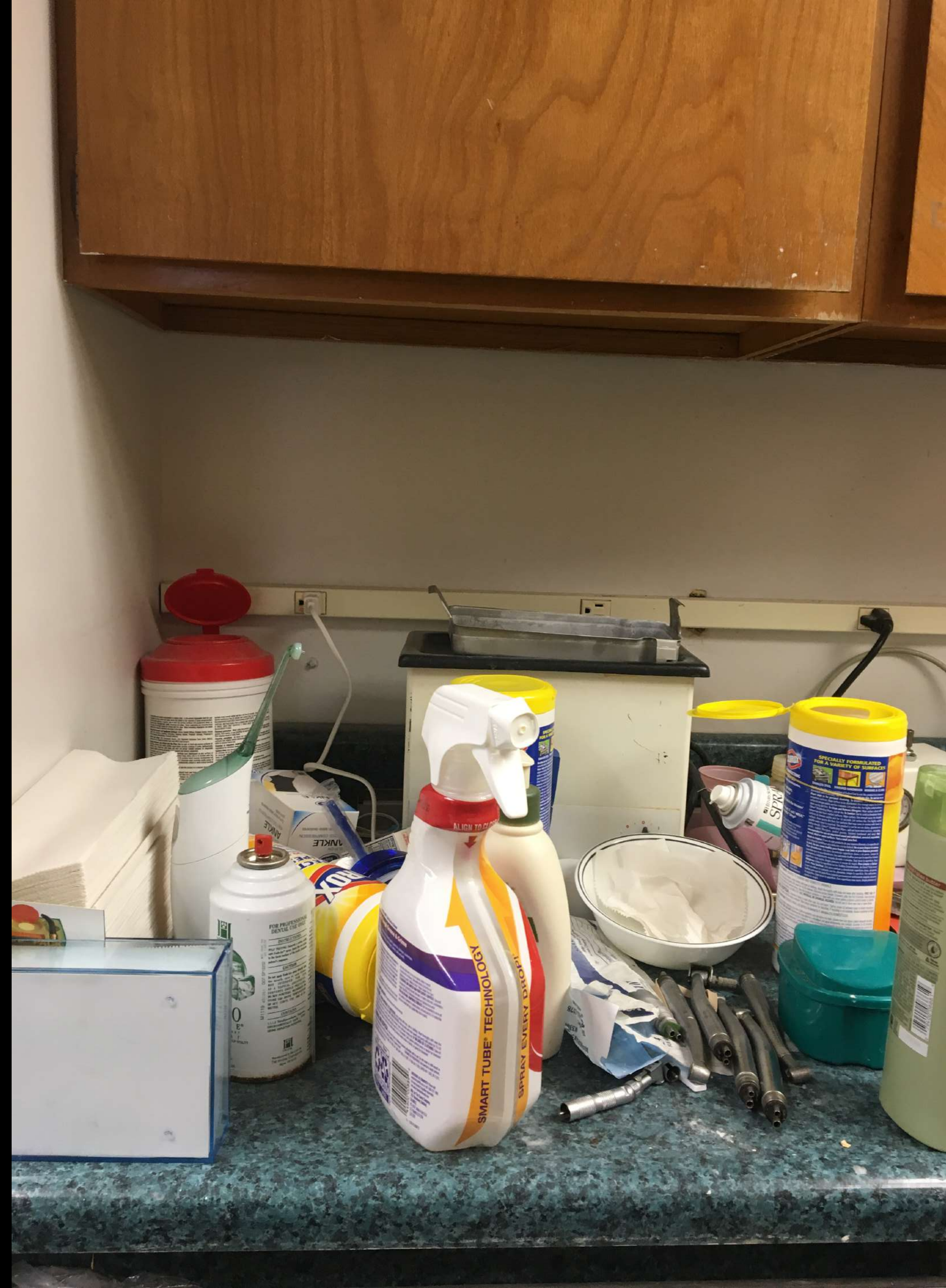
Most Memorable Inspection 2 Clean side



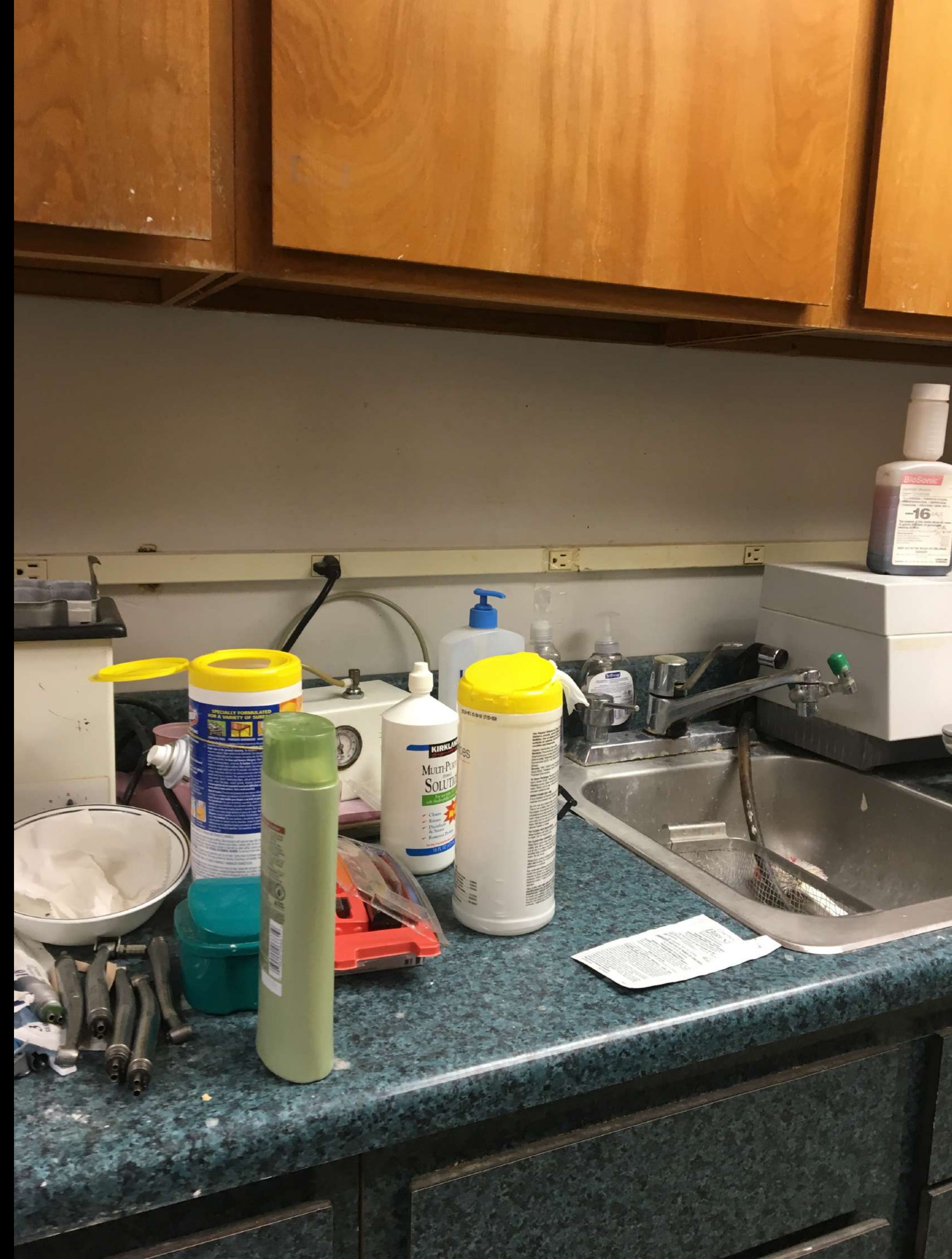
Most Memorable Inspection 2 Clean side



Most Memorable Inspection 2 sterilization



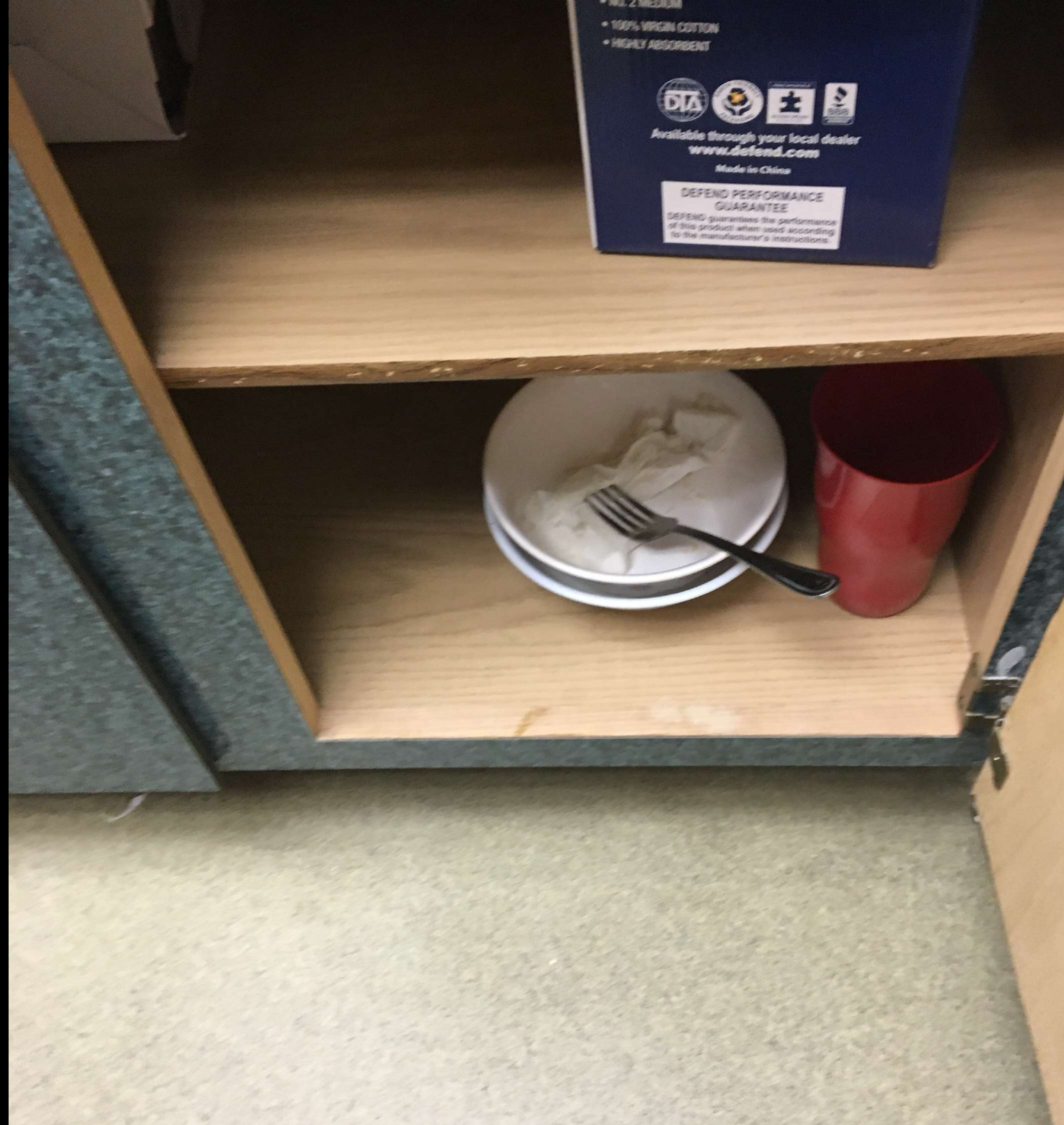
Most Memorable Inspection 2 sterilization



Most Memorable Inspection 2 sterilization



Most Memorable Inspection 2 sterilization



Dave

- How do you follow the CDC guidelines?
- Sterile versus clean and is that meaningful?
- Exposed instruments, exposed sundries, drawers in operatories, infection control stations, exposed surfaces

• Pests - rodents and insects

- Transmission - soiled versus invisible
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- Handpieces -
- Drug vials -
- Handwashing and gloves -
- Personal Protection - donning and doffing





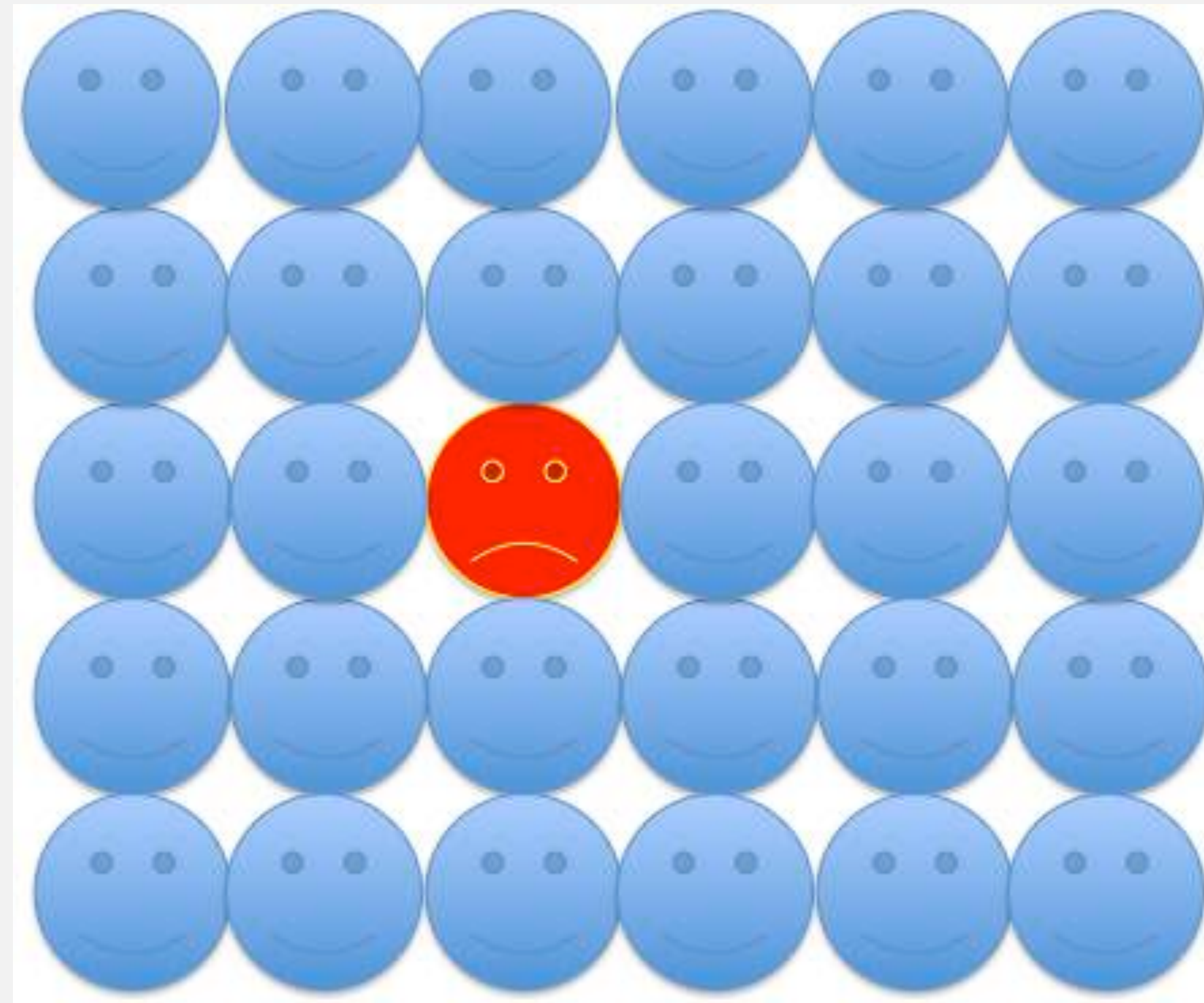
Dave

- How do you follow the CDC guidelines?
- Sterile versus clean and is that meaningful?
- Exposed instruments, exposed sundries, drawers in operatories, infection control stations, exposed surfaces
- Pests - rodents and insects

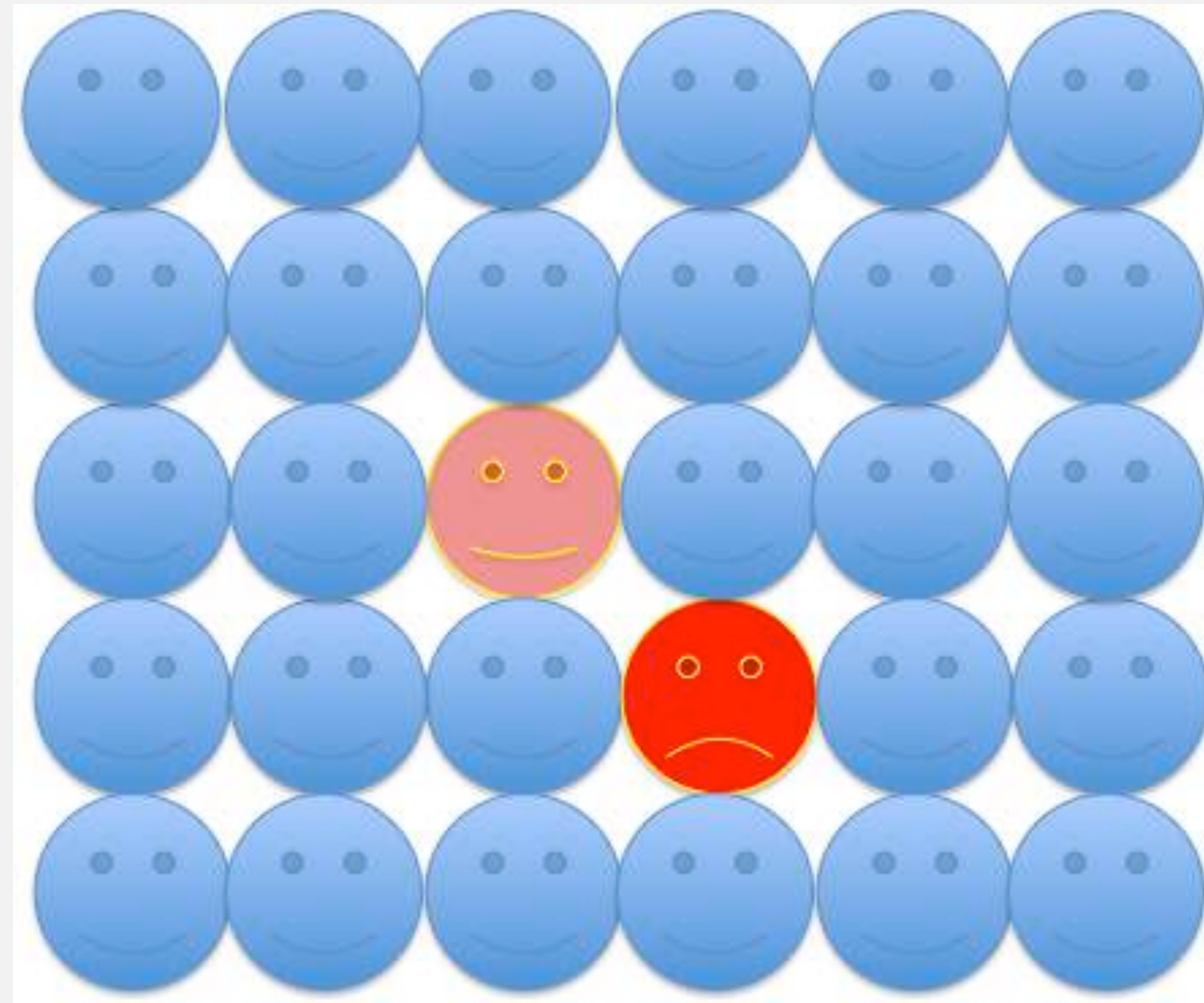
•Transmission - soiled versus invisible

- Aerosols - negative pressure
- Waterlines - deadlegs, biofilms, pathogens, shocking, flushing, testing, remediation
- Sterilizers - testing
- Disposables - what can be used if it is exposed
- Handpieces -
- Drug vials -
- Handwashing and gloves -
- Personal Protection - donning and doffing

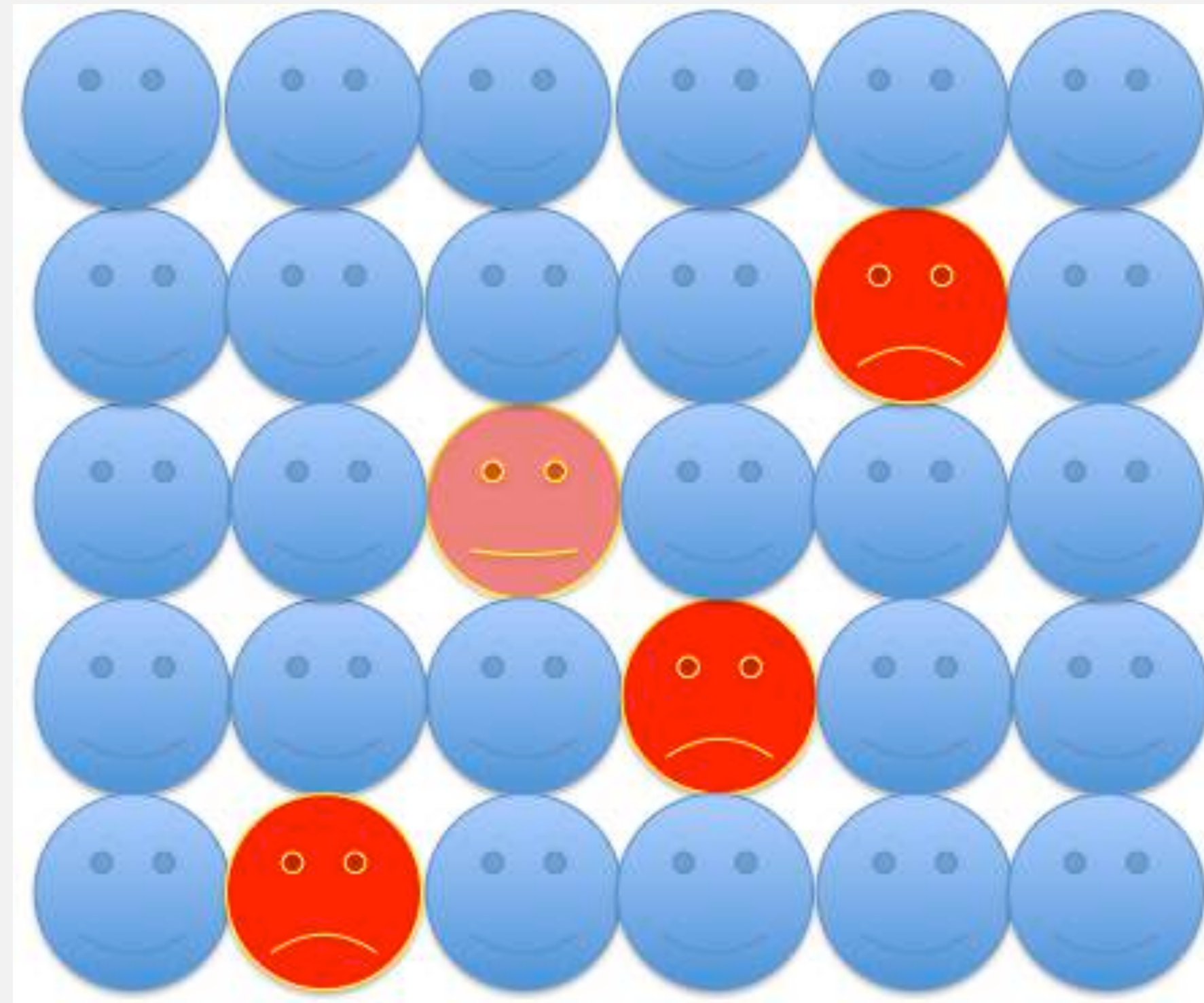
One child with Measles...



2 doses MMR, 97% Protection

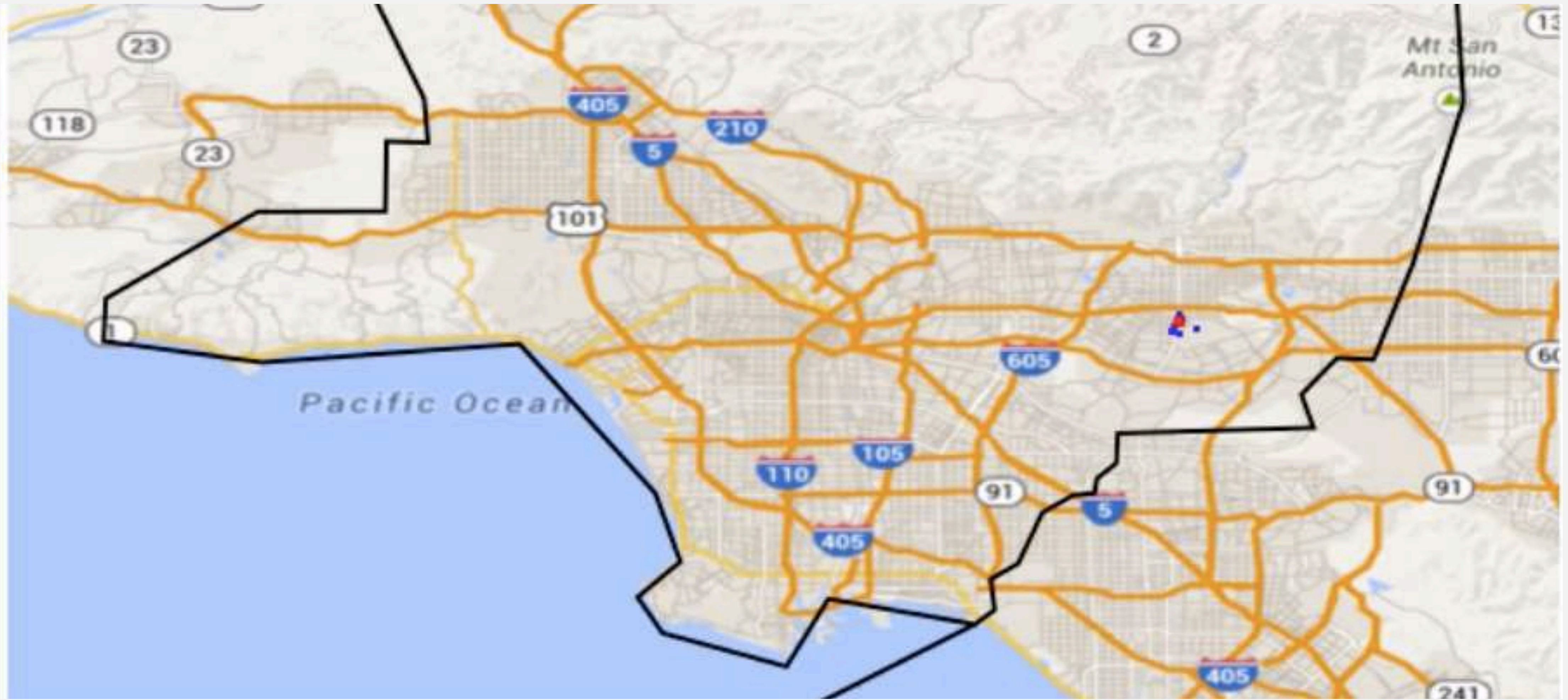


1 dose MMR, 90% Protection

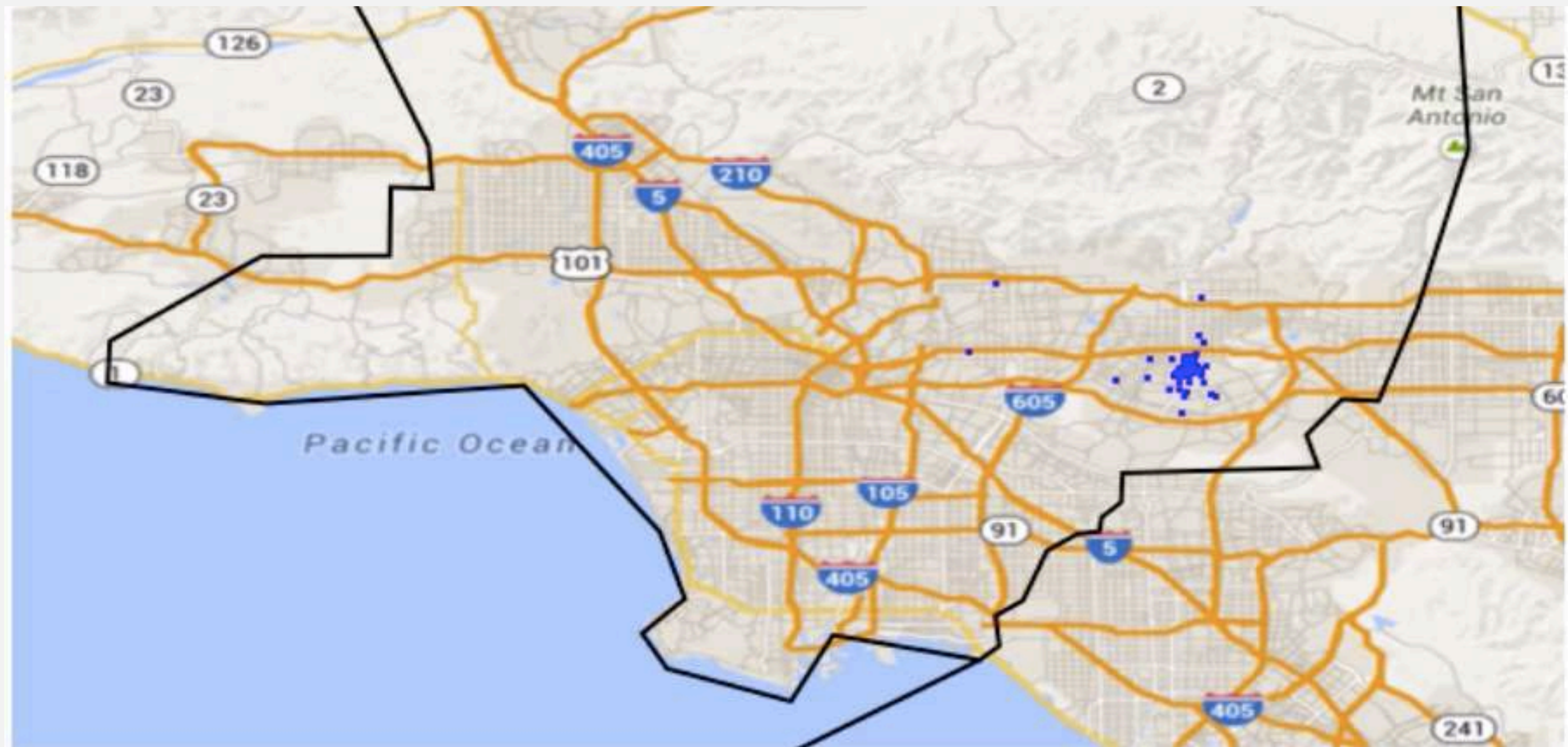


80% MMR Coverage: Day 30

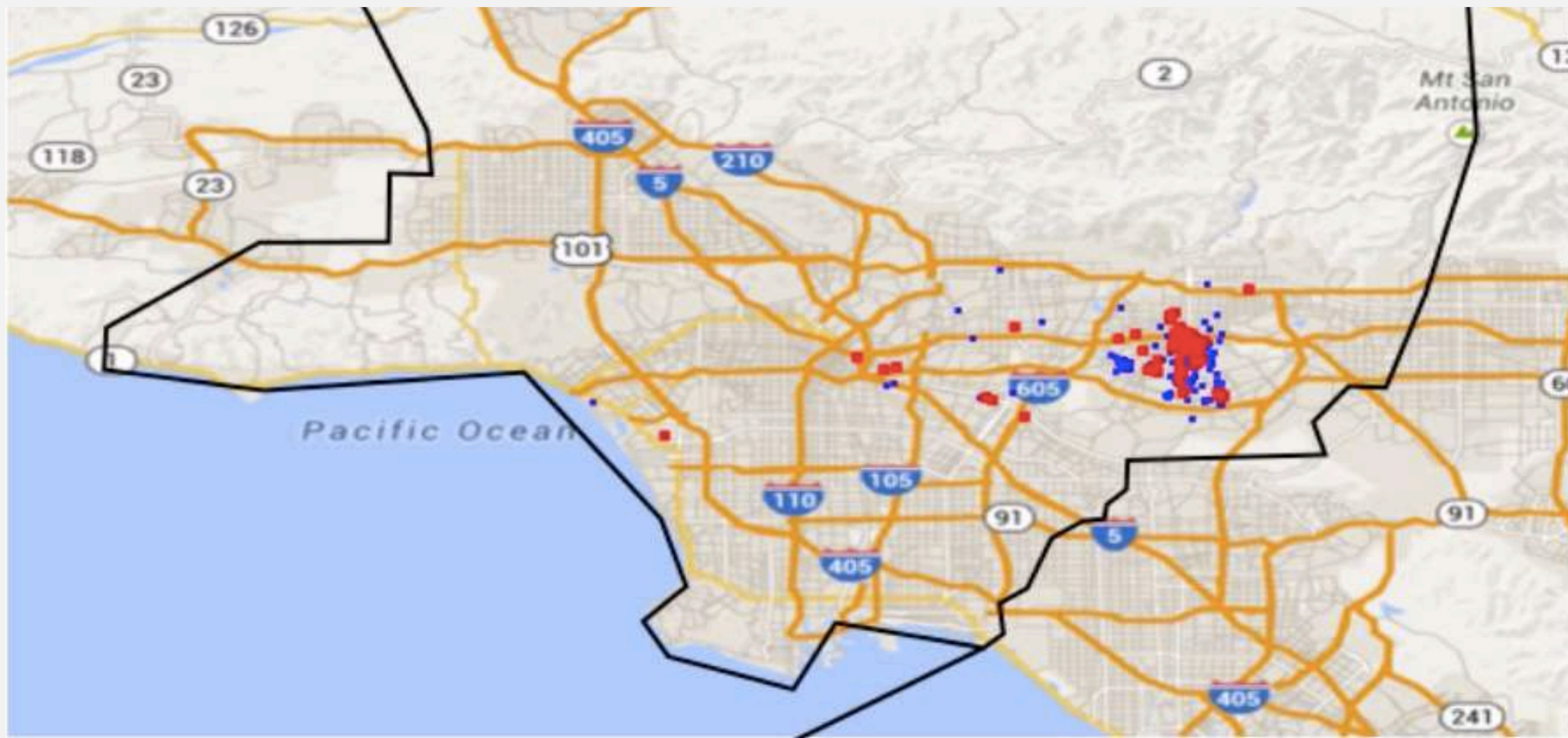
<https://fred.publichealth.pitt.edu/measles>



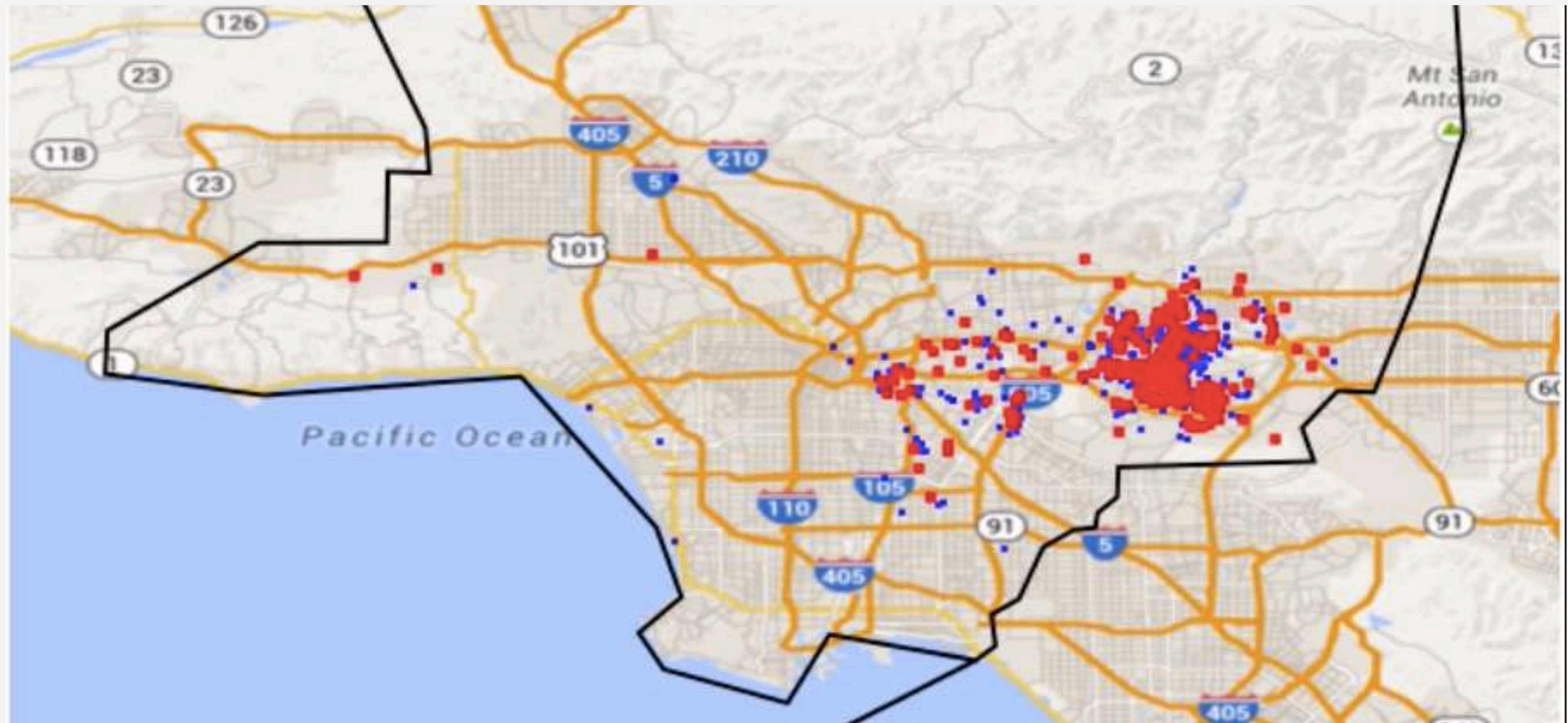
80% MMR Coverage: Day 60



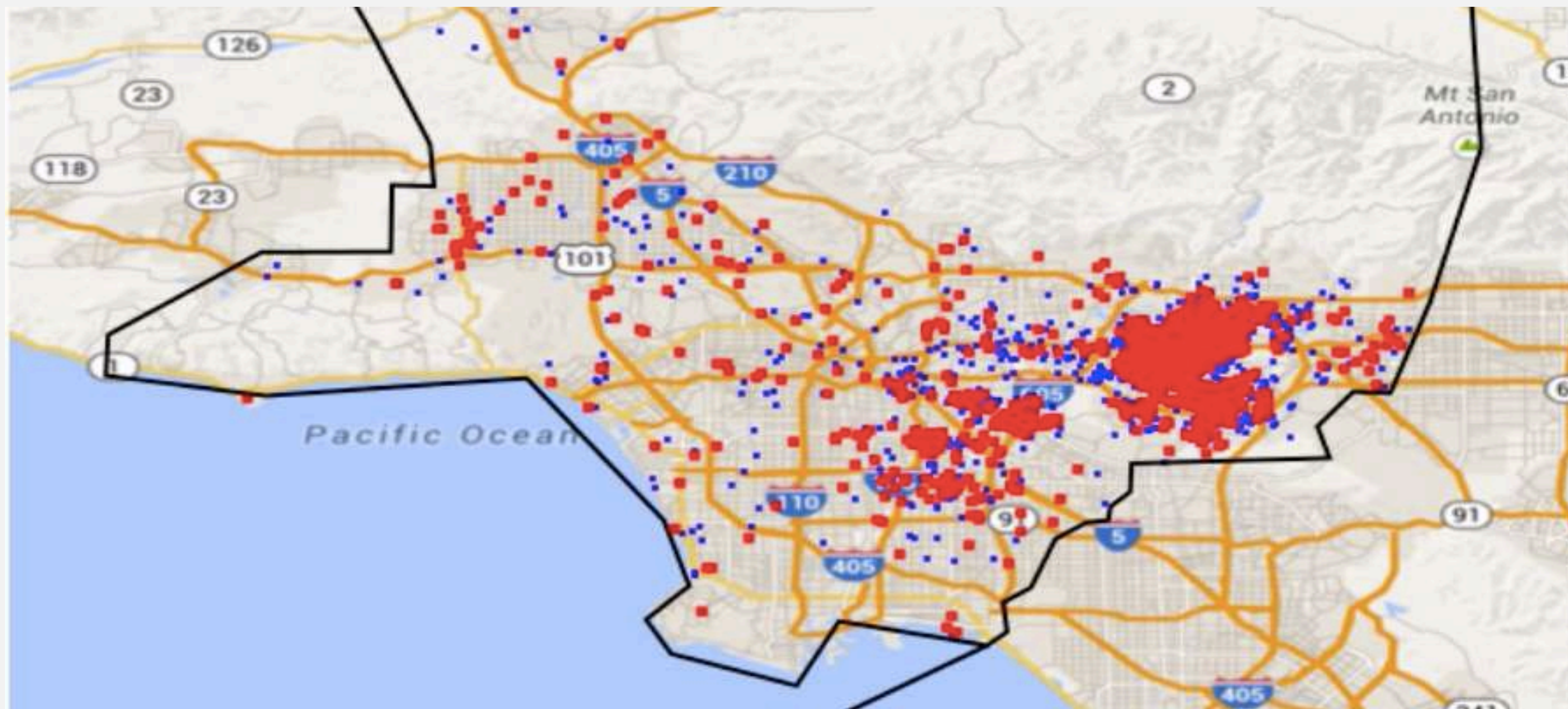
80% MMR Coverage: Day 90



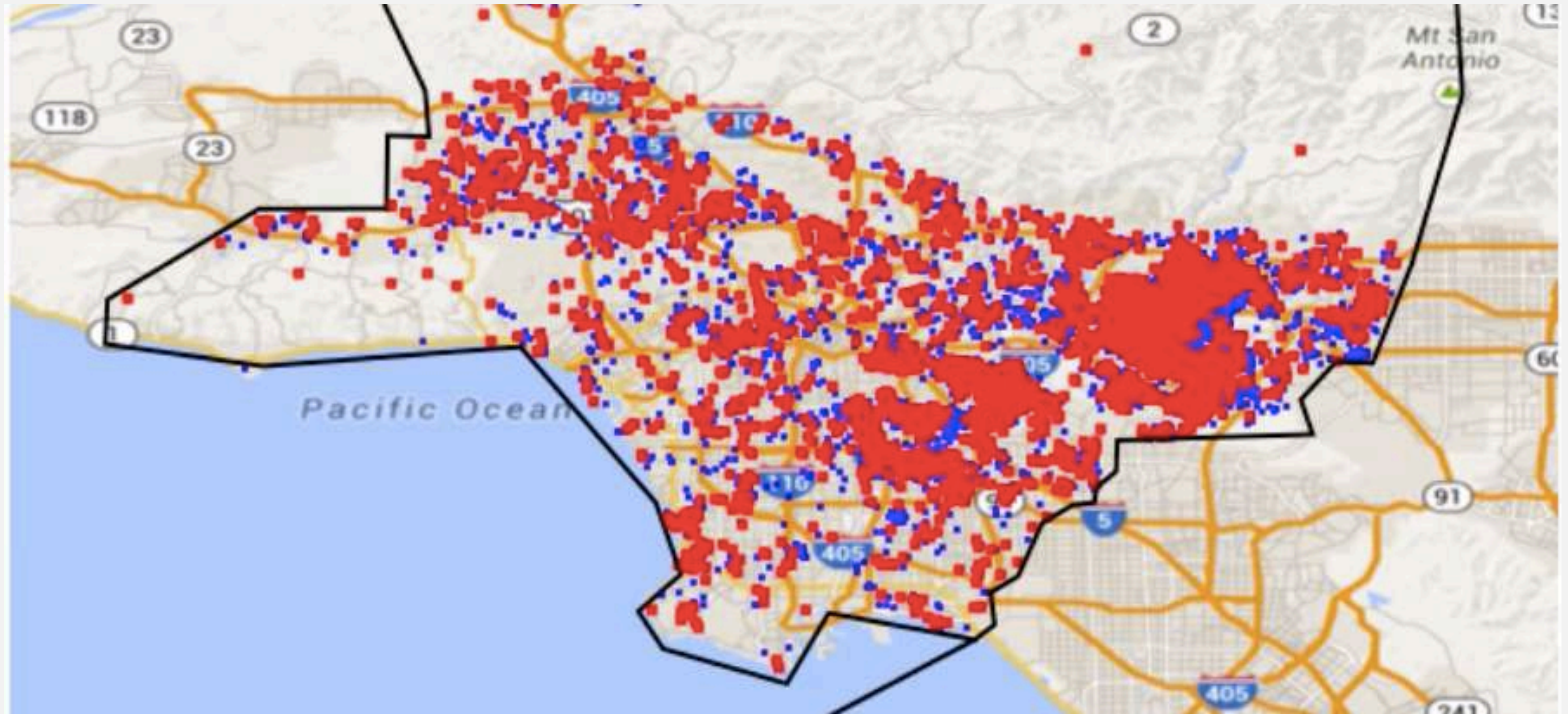
80% MMR Coverage: Day 120



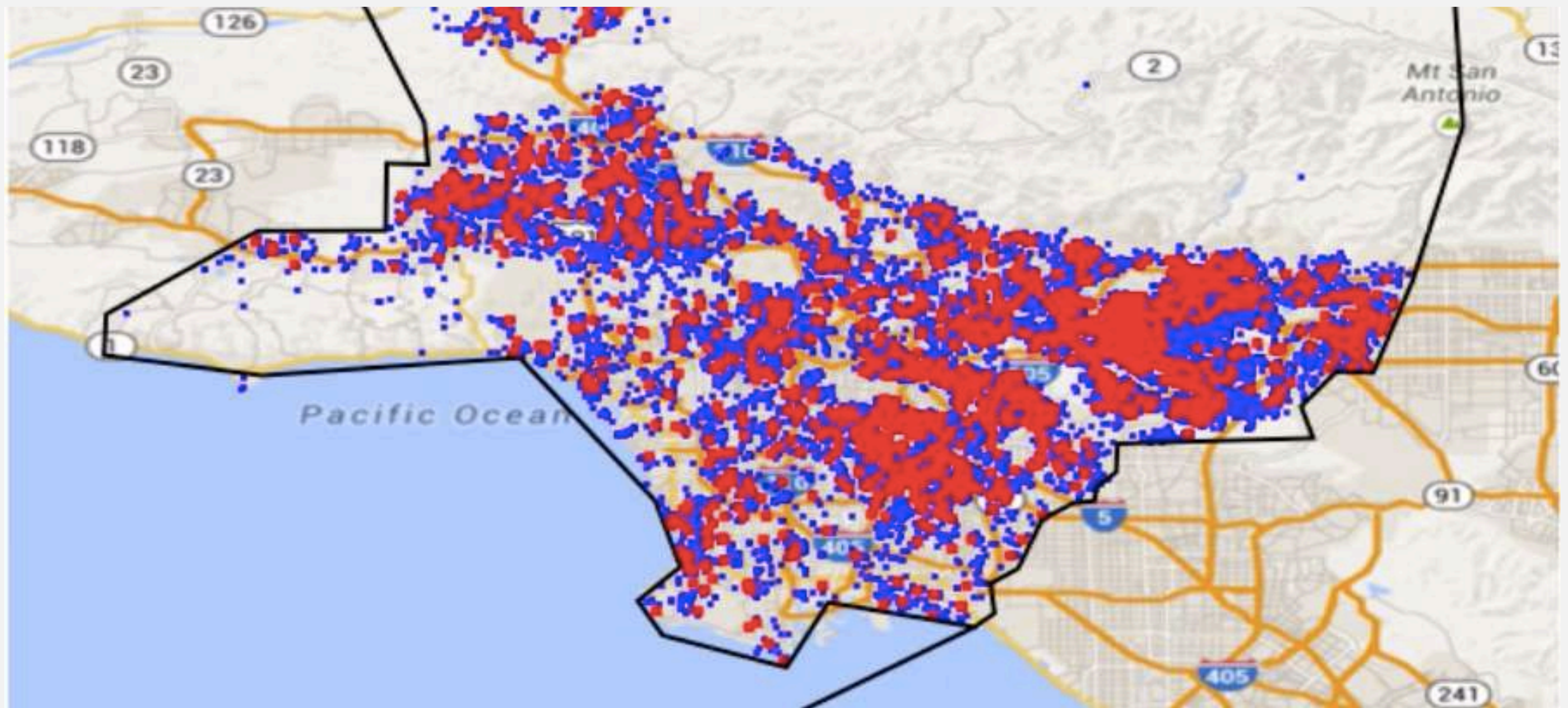
80% MMR Coverage: Day 150



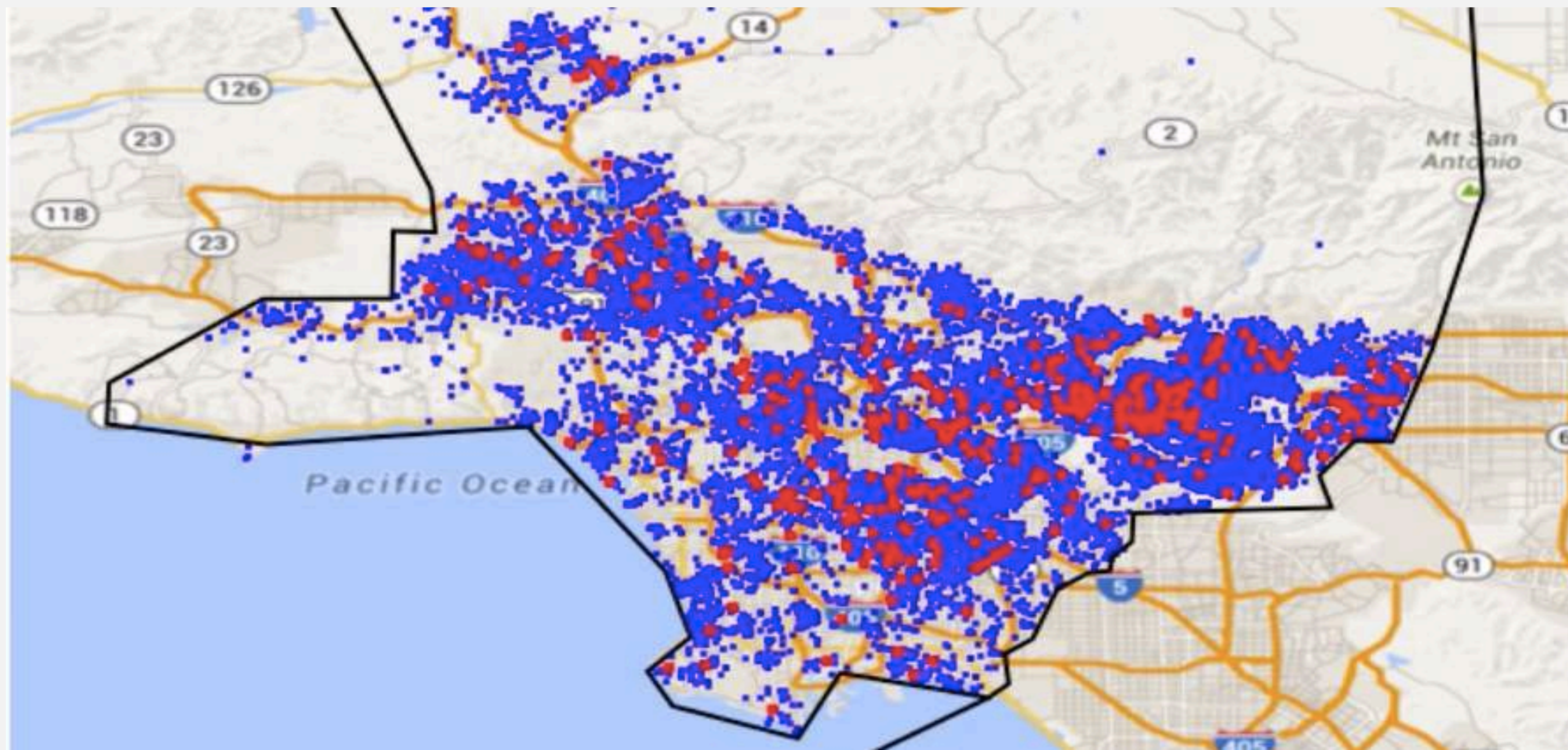
80% MMR Coverage: Day 180



80% MMR Coverage: Day 210



80% MMR Coverage: Day 230



Examples of potentially ineffective infection control.

Anyone here use the bathroom at Costco?

Public toilets usually have seat covers available, barriers. Do they work?

No, even 10 layers can still lead to transmission.

But the seats are regularly disinfected to reduce transmission.

A bigger danger is the aerosols from the flush. They contaminate the surfaces.

There are bacteria and viruses deposited on handles, walls, and toilet paper.

The toilet paper is **not sterilized or even disinfected**.

Think about that.

The power hand dryer creates aerosols that spread pathogens, mostly because people **don't wash their hands well**.

It takes about 30 minutes for the majority of the aerosol to settle.

Measles remains in the air for hours.

Influenza remains infective for at least 30 minutes.

Airborne virus particles

Influenza statistics CDC

Flu Season	Symptomatic Illnesses	Medical Visits	Hospitalizations	Deaths
2011-2012	9,300,000	4,300,000	140,000	12,000
2012-2013	34,000,000	16,000,000	570,000	43,000
2013-2014	30,000,000	13,000,000	350,000	38,000
2014-2015	30,000,000	14,000,000	590,000	51,000
2015-2016 *	25,000,000	12,000,000	310,000	25,000
2016-2017 *	30,000,000	14,000,000	580,000	51,000
2017-2018 *	49,000,000	23,000,000	960,000	79,000

H1N1 recurs as a risk, periodically.

**You should stay away from a health care facility either 7 days past symptom onset
or 24 hours symptom free, whichever is longer.**

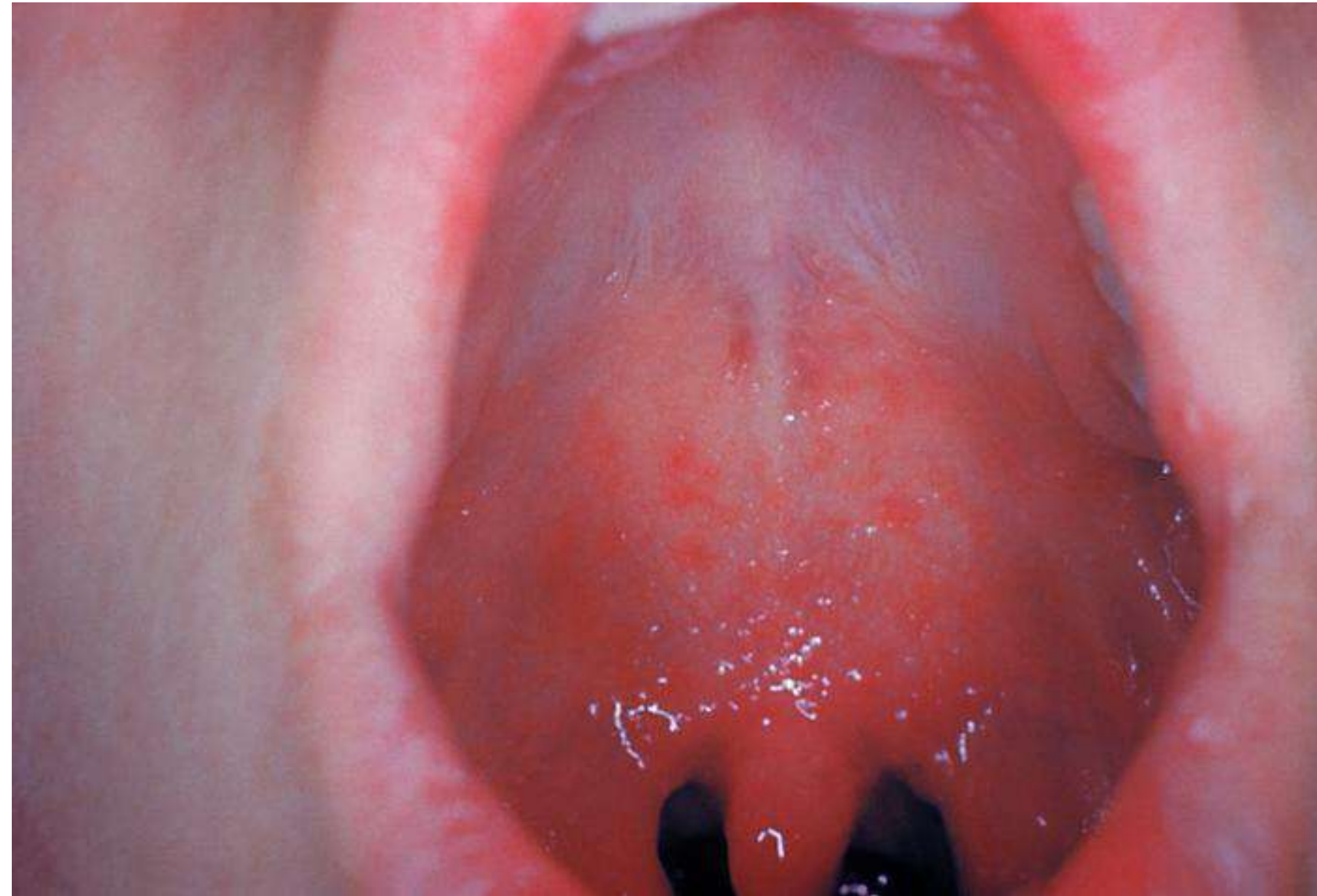
Airborne virus particles

Measles virus can live for up to two hours in an airspace where the infected person coughed or sneezed.

If other people breathe the contaminated air or touch the infected surface, then touch their eyes, noses, or mouths, they can become infected.

Measles is so contagious that if one person has it, 90% of the people close to that person who are not immune will also become infected.

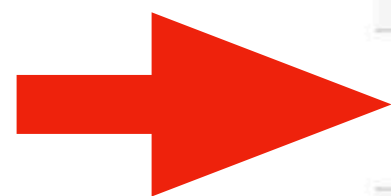
Infected people can spread measles to others from four days before through four days after the rash appears.



Airborne virus particles - HPV

Number of HPV-Associated and HPV-Attributable Cancer Cases per Year

Cancer site	Average number of cancers per year in sites where HPV is often found (HPV-associated cancers)	Percentage probably caused by any HPV type ^a	Number probably caused by any HPV type ^a
Cervix	11,866	91%	10,751
Vagina	846	75%	635
Vulva	3,934	69%	2,707
Penis	1,269	63%	803
Anus ^b	6,530	91%	5,957
Female	4,333	93%	4,008
Male	2,197	89%	1,949
Oropharynx	18,226	70%	12,885
Female	3,412	63%	2,160
Male	14,814	72%	10,725
TOTAL	42,671	79%	33,737
Female	24,391	83%	20,260
Male	18,280	74%	13,477



^aHPV types detected in genotyping study; most were high-risk HPV types known to cause cancer (Saraiya M et al. [U.S. assessment of HPV types](#)

Pathogen Biofilms in waterlines

EPA, 2002

Table 1: Primary Bacterial Pathogens Capable of Causing Waterborne Disease

Organism	Major Disease ³	Primary Source	WBDO ¹	CCL ²
<i>Salmonella typhi</i>	typhoid fever	human feces	X	
<i>Salmonella paratyphi</i>	paratyphoid fever	human feces	X	
<i>Salmonella typhimurium</i>	gastroenteritis	human/animal feces	X	
Other <i>Salmonella</i> sp.	gastroenteritis (salmonellosis)	human/animal feces	X	
<i>Shigella</i>	bacillary dysentery	human feces	X	
<i>Vibrio cholerae</i>	cholera	human feces, coastal	X	
Enterovirulent <i>E. coli</i>	gastroenteritis	human feces	X	
<i>Yersinia enterocolitica</i>	gastroenteritis	human/animal feces	X	
<i>Campylobacter jejuni</i>	gastroenteritis	human/animal feces	X	
<i>Legionella pneumophila</i>	Legionnaires Disease, Pontiac fever	warm water	X	
<i>Helicobacter pylori</i>	peptic ulcers	saliva, human feces?		X

¹ Documented waterborne disease outbreak in U.S.

² Pathogen is on EPA's Contaminant Candidate List (CCL) of March 1998

³ Disease symptoms described in Benenson (1995)

Table 2: Opportunistic Bacterial Pathogens Detected in the Distribution System and/or Biofilms

Opportunistic pathogens	Health Effects	Information on:			WBDO ¹	CCL ²
		Disease	Presence in DS	Biofilm Presence		
<i>Acinetobacter calcoaceticus</i>	pneumonia, meningitis, infections of urinary tract, septicemia	Davis et al., 1973, Horan et al., 1988	Geldreich, 1990	LeChevallier et al., 1987; Geldreich, 1990		
<i>Aeromonas hydrophila</i>	sepsis, gastrointestinal illness, respiratory tract infections	Davis et al., 1973	Geldreich, 1990	Reasoner, 1991, van der Kooij and Hijnen, 1988		X
<i>Citrobacter</i> spp. ³	septicemia, pneumonia	Keusch and Acheson, 1998	Geldreich, 1990	Geldreich, 1990		
<i>Enterobacter</i> spp. ³	septicemia, pneumonia	Keusch and Acheson, 1998	Geldreich, 1990	Geldreich, 1990		
<i>Flavobacterium</i> spp.	septicemia, meningitis	Davis et al., 1973	Geldreich, 1990	Geldreich, 1990		
<i>Klebsiella pneumoniae</i> ³	septicemia, pneumonia	Keusch and Acheson, 1998	Geldreich, 1990	Geldreich, 1990		
<i>Moraxella</i> spp.	pneumonia, conjunctivitis, septicemia, otitis, urethritis, meningitis, bronchitis, sinusitis	Benenson, 1995, Davis et al., 1973, Walker, 1998	LeChevallier, 1987	LeChevallier, 1987		
<i>M. avium</i> complex	chronic diarrhea, chronic lung disease	Schaechter et al. 1998	Geldreich, 1990	Norton et al., 2000	X	X
<i>Pseudomonas cepacia</i>	foot infections	Tally, 1998	Geldreich, 1990	LeChevallier et al., 1987		
<i>Pseudomonas aeruginosa</i>	infections when severe burns, cancer patients, lungs when cystic fibrosis, pneumonia, meningitis, others	Toder, 1998	Geldreich, 1990	Geldreich, 1990		
<i>Serratia marcescens</i> ³	septicemia, pneumonia	Schaechter et al. 1998	Geldreich, 1990			

¹ Documented waterborne disease outbreak in U.S.² Pathogen is on EPA's Contaminant Candidate List (CCL) of March 1998³ Some species are coliforms

Prevention Basics

1. If a contaminated object is touched with gloved hands, the **gloves are contaminated and must be changed**. If a sterile object is touched by skin or a contaminated glove, it is contaminated. It must be resterilized.
2. **Skin can harbor pathogens** for months or years without causing illness in the host. Sterile instruments must be handled with uncontaminated gloved hands to remain uncontaminated.

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5. **Disinfection reduces but does not eliminate all microbials**. This is definitely not a perfect solution and used only on low risk, easily cleaned items that are not directly exposed to fluids or not near the patient.

Prevention

1. Washing hands after patients and before regloving is needed because even surgical gloves do not eliminate transmission and bacteria quickly grow under gloves. Inexpensive **exam gloves may reduce transmission by only 70% even with good handwashing**. This is not a perfect solution. Great hand hygiene and good gloves are reasonable solutions.

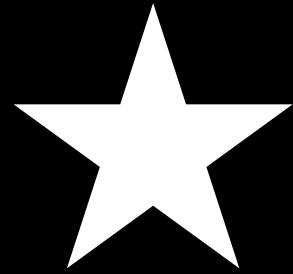
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2. **Aerosols are an effective means of transmission. Using a standard mask as a barrier has modest to low effectiveness. High efficiency masks are expensive and uncomfortable. The most **cost effective approach is to use high volume suction** that can remove the aerosol. Viral and bacterial pathogens can be transmitted via aerosol and many have a very long latency. This is not a perfect solution but very high volume suction is an effective and reasonable solution.**

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3. Exposure to **sick people** is an effective means of transmission. Reduce or eliminate exposure to people that have respiratory or other infections. That **can mean staying home, sending someone home, or if it is not avoidable (an emergency), proper cough etiquette, barriers, tissues, and handwashing**. This is not a perfect solution but a reasonable solution. A warning sign can prevent the situation from occurring.

Prevention



Contaminated water can be an effective source of transmission. **Water lines in dental units, cavitrons, and other equipment develop biofilms that contain pathogens.** Regularly cleaning and testing lines will reduce transmission. Quarterly testing prevents a very extended opportunity for transmission. This is not a perfect solution but a reasonable solution.

★ **Person-to-Person Touch**

- ★ Rhinitis, a cold for example — the hand of a person who has a cold and who has just used their hand to wipe their dripping nose.

★ **Contaminated blood or other bodily fluids**

- ★ Hepatitis B, HIV, and likely HPV
- ★ cold or the flu — the saliva of an infected person
- ★ measles

★ **Air**

- ★ Measles, mumps, influenza, and tuberculosis by coughing or sneezing,
- ★ Skin cells

★ **Food**

- ★ surface to food while eating. cross-contamination can easily happen in a dental office, keep food out of clinical areas

★ **Water**

- ★ human or animal feces in biofilms are common

★ **Insects**

- ★ Mosquitos - Malaria, Zika, West Nile
- ★ Fleas - Bubonic plague - Yersinia pestis.
- ★ House flies - Salmonella and E.coli O157
- ★ Cockroaches - Salmonella, E.coli O157, and more

★ **Fomites**

- ★ objects such as equipment, towels, toys

Dave

- How do you follow the CDC guidelines?
- Sterile versus clean and is that meaningful?
- Exposed instruments, exposed sundries, drawers in operatories, infection control stations, exposed surfaces
- Pests - rodents and insects
- Transmission - soiled versus invisible

• Aerosols - negative pressure

- Waterlines - deadlegs, biofilms, pathogens, shocking, flushing, testing, remediation
- Sterilizers - testing
- Disposables - what can be used if it is exposed
- Handpieces -
- Drug vials -
- Handwashing and gloves -
- Personal Protection - donning and doffing



Enclosed operatories
Negative pressure

Air pressure of the room is monitored, the air in the room must be completely changed 6 to 12 times every hour, and the exhausted air is passed through a HEPA filter the filter is changed at regular intervals.



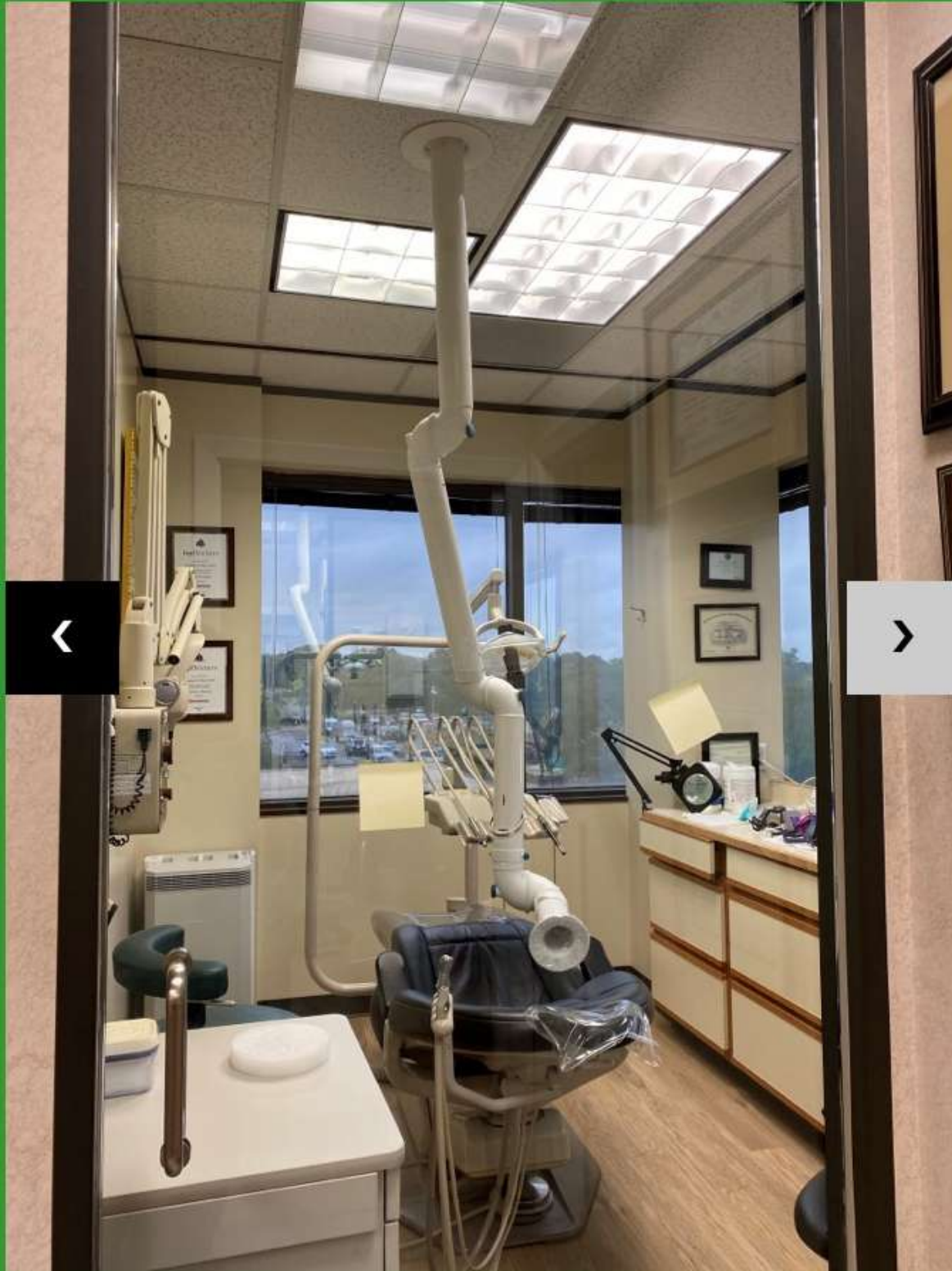
28 air exchanges per hour



Dr Julia Richman

Covington, Washington

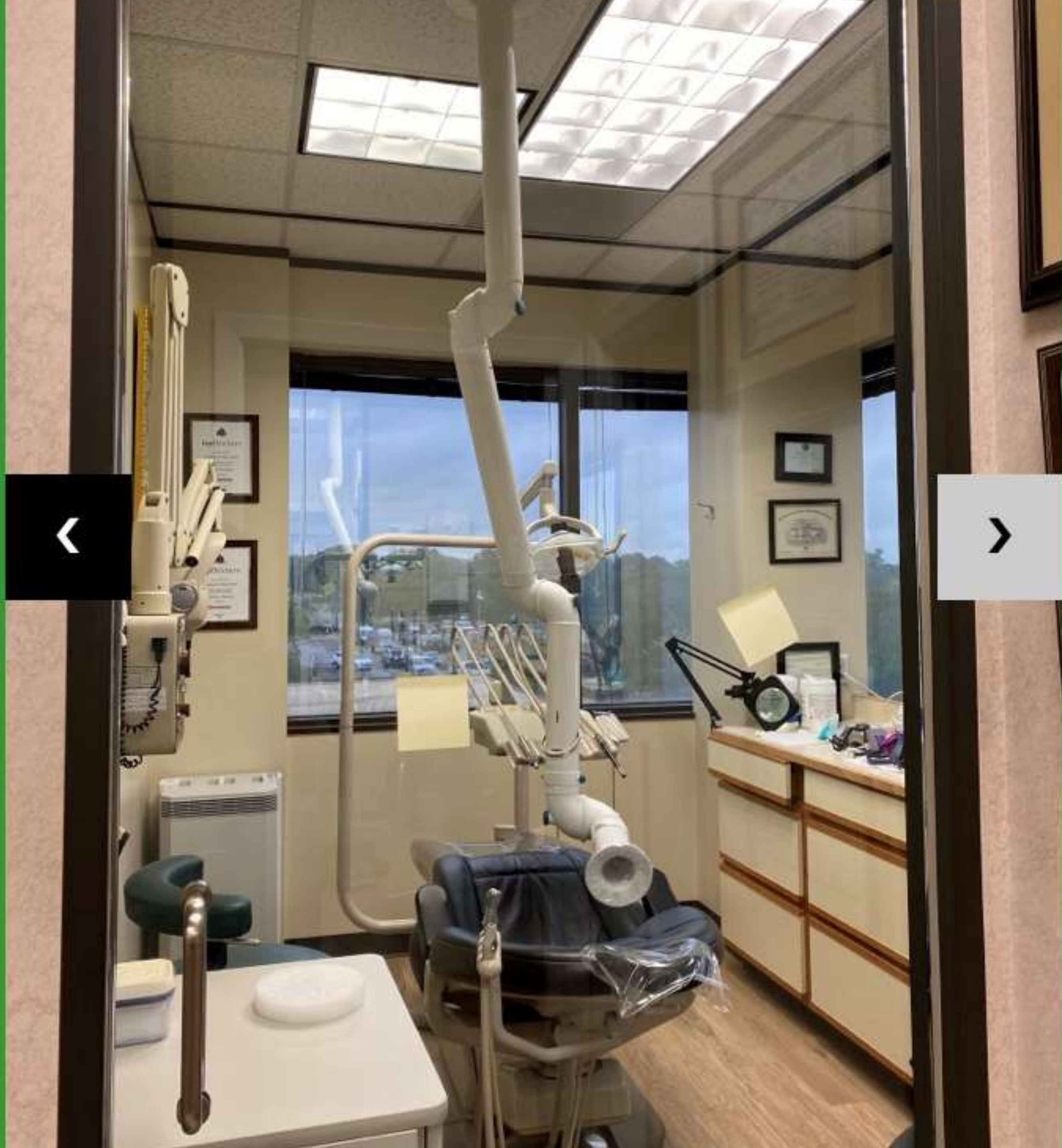
Norman Russell Chu,
DDS, FACD, FICD –
Houston, TX



Objective: "The objective was infection control for aerosol generation and a negative pressure operatory design due to the COVID-19 pandemic."

Advice: "Analyze airflow HVAC uptake and outflow and custom cabinetry to create more storage for PPE supplies."







Dave

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Deadlegs



WATERLINE TESTING LOG

IN-OFFICE DENTAL WATER TEST

Practice Name: [redacted] Practice Address: [redacted] City, State & Zip: [redacted]

Treatment: Water testing 1x a month Shock Treatment: monthly Shock Protocol Frequency: weekly

Sampling Date	Team Member	Location (Room/Chair/Operator)	Device	Date of Results	Pass or Fail	Safety Level (Check One)	Corrective Action (If Necessary)
1/31/23	[redacted]	OPB	☒ AW Syringe ☐ Source Water ☒ Scaler ☐ Handpiece ☐ Combined				
1/31/23	[redacted]	OP A	☒ AW Syringe ☐ Source Water ☐ Scaler ☐ Handpiece ☐ Combined	2/7/23	P	☒	
1/31/23	[redacted]	OPB	☒ AW Syringe ☐ Source Water ☐ Scaler ☐ Handpiece ☐ Combined	2/7/23	F	☒	use "liquid"
1/31/23	[redacted]	OPC	☒ AW Syringe ☐ Source Water ☐ Scaler ☐ Handpiece ☐ Combined	2/7/23	P	☒	
3/21/23	[redacted]	OPB	☐ AW Syringe ☐ Source Water ☐ Scaler ☐ Handpiece ☐ Combined	3/24/23	F	☐	
3/28/23	[redacted]	All	☐ AW Syringe ☐ Source Water ☐ Scaler ☐ Handpiece ☐ Combined	3/31/23	F	☐	
6/13/23	[redacted]	OP A	☐ AW Syringe ☐ Source Water ☐ Scaler ☐ Handpiece ☒ Combined	6/12/23			
6/9/23	[redacted]	OP C	☐ AW Syringe ☐ Source Water ☐ Scaler ☐ Handpiece ☐ Combined	6/12/23	P		
6/9/23	[redacted]	OP 1	☐ AW Syringe ☐ Source Water ☐ Scaler ☐ Handpiece ☐ Combined	6/12/23	F		
6/9/23	[redacted]	OP 2	☐ AW Syringe ☐ Source Water ☐ Scaler ☐ Handpiece ☐ Combined	6/12/23	F		
6/9/23	[redacted]	OP 3	☐ AW Syringe ☐ Source Water ☐ Scaler ☐ Handpiece ☐ Combined	6/12/23	P		
6/13/23	[redacted]	OP A	☐ AW Syringe ☐ Source Water ☐ Scaler ☐ Handpiece ☒ Combined	6/14/23	P		
6/13/23	[redacted]	OP C	☐ AW Syringe ☐ Source Water ☐ Scaler ☐ Handpiece ☒ Combined	6/14/23	F		
6/13/23	[redacted]	OP 1	☐ AW Syringe ☐ Source Water ☐ Scaler ☐ Handpiece ☒ Combined	6/14/23	P		
6/13/23	[redacted]	OP 2	☐ AW Syringe ☐ Source Water ☐ Scaler ☐ Handpiece ☒ Combined	6/14/23	P		
6/13/23	[redacted]	OP 3	☐ AW Syringe ☐ Source Water ☐ Scaler ☐ Handpiece ☒ Combined	6/14/23	P		

00399



Failed line? Consult with a safe water specialist today: 888.843.3343 | support@proedgedental.com | proedgedental.com/c

Downstairs



WATERLINE TESTING LOG

IN-OFFICE DENTAL WATER TEST

Practice Name: [redacted] City, State & Zip: [redacted]

Treatment: [redacted] Shock Treatment: monthly Shock Protocol Frequency: weekly

Sampling Date	Team Member	Location (Room/Chair/Operator)	Device	Date of Results	Pass or Fail	Safety Level (Check One)	Corrective Action (If Necessary)
1/31/23	[redacted]	OPB	☒ AW Syringe ☐ Source Water ☒ Scaler ☐ Handpiece ☐ Combined				
1/31/23	[redacted]	OP A	☒ AW Syringe ☐ Source Water ☐ Scaler ☐ Handpiece ☐ Combined	2/7/23	P	☒	
1/31/23	[redacted]	OPB	☒ AW Syringe ☐ Source Water ☐ Scaler ☐ Handpiece ☐ Combined	2/7/23	F	☒	use "liquid"
1/31/23	[redacted]	OPC	☒ AW Syringe ☐ Source Water ☐ Scaler ☐ Handpiece ☐ Combined	2/7/23	P	☒	
3/21/23	[redacted]	OP B	☐ AW Syringe ☐ Source Water ☐ Scaler ☐ Handpiece ☐ Combined	3/24/23	F	☐	
3/28/23	[redacted]	All	☐ AW Syringe ☐ Source Water ☐ Scaler ☐ Handpiece ☐ Combined	3/31/23	P	☐	
			☐ AW Syringe ☐ Source Water ☐ Scaler ☐ Handpiece ☐ Combined				
			☐ AW Syringe ☐ Source Water ☐ Scaler ☐ Handpiece ☐ Combined				
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Waterline behaviors - self selected ADA survey - Dr Ruth Lipman, lead researcher, 1 June 24

Available on June 1st

EDITORIAL COMMENTS

- Assistants do most of the work and management, they are directed by dentists very generally and the dentist often does not know what is specifically happening.
- Many practitioners are not following best practices
- Dental boards are inconsistent
- State regulations that say they follow the CDC guidelines tend to be contextual and conditional.
- Dentists and hygienists seem overconfident that they know what to do.
- Good intentions do not address knowledge gaps. Patient harm is a likely occurrence.

How do waterlines become contaminated?

Biofilm forms on the inner lining of tubes delivering water to dental devices

- Biofilm provides a nutrient-rich environment for the colonization of certain bacteria
- Over time, if untreated, the biofilm becomes laden with enough bacteria to result in water that would not be considered suitable for drinking
- Studies have shown untreated lines produce 100,000 - >1,000,000 cfu/mL of bacteria*

*Szymanska J, Sitkowska J. Bacterial contamination of dental unit waterlines. Environ Monit Assess. 2013 May; 185(5): 3603–3611.

Dental Waterline Management

- CDC guidelines establish 500 CFU of heterotrophic bacteria as the goal for maintaining water quality
- Use products designed to control biofilm in water lines, not surface disinfectant or other products
- Test water for heterotrophic bacteria on a regular basis and retreat with initial treatment if bacteria is increasing
- Initial treatment with a product to remove biofilm is usually needed

Reservoirs

- Tablets or liquids added to treatment water
- Follow instructions for use provided by the treatment product manufacturer
- Do not use surface disinfectants
- Diluted bleach has been used but may cause damage to internal components of dental unit
- Water testing may be needed to ensure water quality is maintained



CDC Guidelines 2003

Dental Unit Waterlines and Water Quality

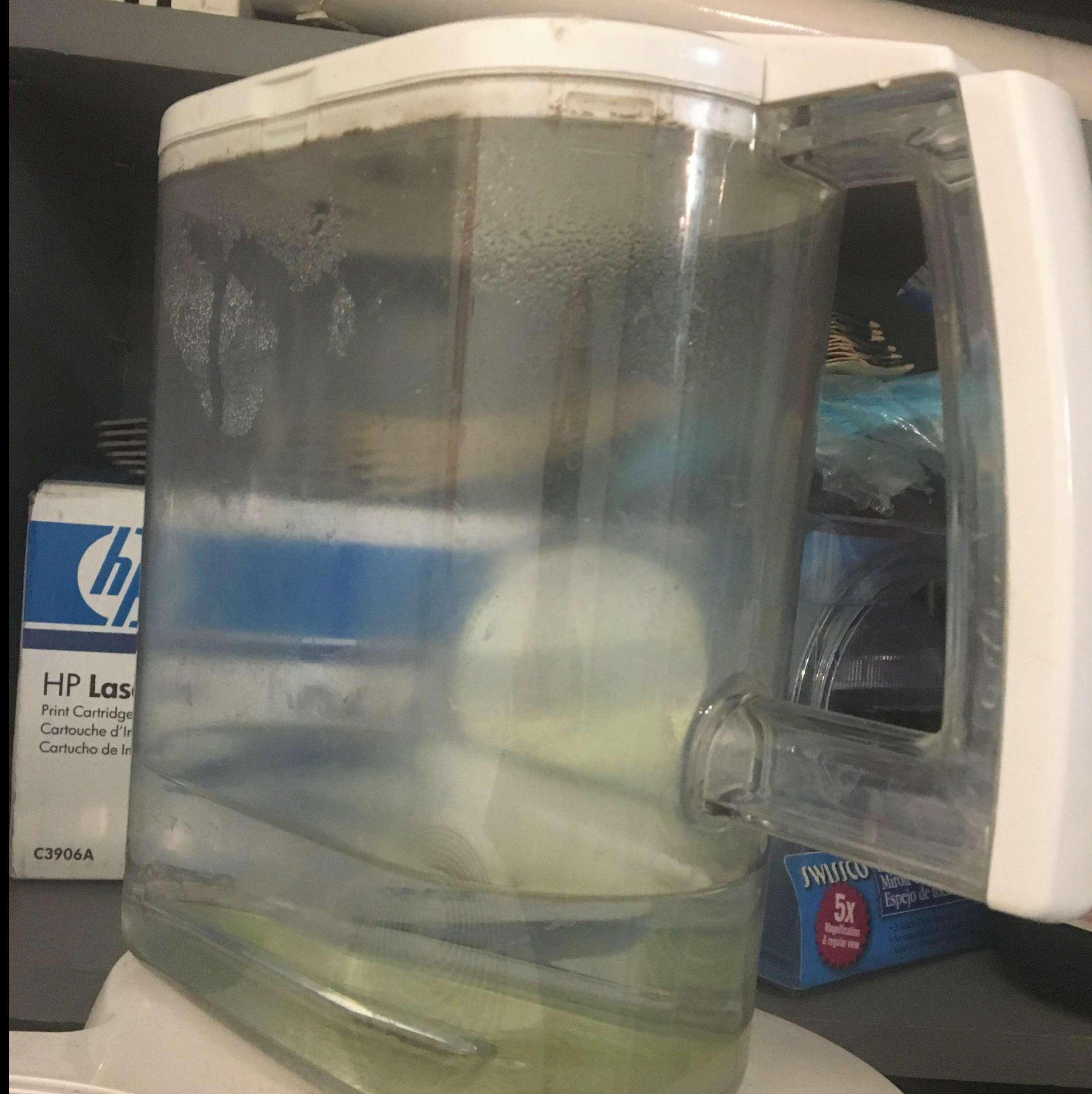
- For non-surgical treatment use water that meets EPA drinking water standards (< 500 CFU/mL of HPC bacteria)
- Consult with dental unit manufacturer for appropriate methods to maintain dental water quality
- Follow manufacturer recommendations for monitoring water quality
- *In July 2023 a working group was formed within HICPAC to develop guidelines for dental waterline biofilm control.*



Water Distiller



Distilled Water



The Scientific Basis for Water Management in the Dental Operator

- Matthew J Arduino, MS, DrPH, FSHEA, M(ASCP)
- Division of Healthcare Quality Promotion
- Centers for Disease Control and Prevention

Municipal Water

Municipal or Drinking Water Supplier is only responsible to ensure water that reaches the meter meets drinking EPA drinking water quality.

Contaminants – microorganisms which may come from feces, eg., *Cryptosporidium*, *Giardia*, *Escherichia coli*, Fecal coliforms, Enterococci, etc. (usually enter from a failure from municipal supplier or cross-connection, or potential backflow incident in the facility)

Once inside the building water becomes the building owner's responsibility

Facility Water

1. Municipal, well, or surface water is not sterile it contains viruses, bacteria, fungi, and protozoa
2. Many of these bacteria are not true contaminants, they are natural flora
 - a. heterotrophs (use organic carbon for growth)
 - b. oligotrophs (can live in environments having extremely low levels of nutrients)
3. Some are tolerant to disinfectants found in drinking water
4. Free-living amoebae may play a role in the survival, and increase virulence of some of these organisms
5. Some are opportunistic pathogens - microorganisms which normally do not produce disease in a healthy host

What influences water quality in buildings?

1. Nutrients Present in incoming water and facility water (Assimilable Organic Carbon)
2. Dissolved oxygen
3. Piping materials in the distribution system
 - a. Copper, PEX, PVC, Teflon, Brass, Stainless steel, etc
 - b. plumbing fixtures, attached equipment, etc
4. Design of the distribution system
 - a. Storage tanks
 - b. dead legs, dead ends, joints
 - c. loops
 - d. high surface to volume (pipe diameter, length)
5. Stagnation
 - a. low to no flow
 - b. water age
6. Water temperature (Optimum growth range 20°- 45°C; *Mycobacterium xenopi* can survive up to 50°C)
7. Presence/absence of residual disinfectant

Some Opportunistic Pathogens of Premise Plumbing (OPPP)

Acinetobacter spp.

Burkholderia cepacia complex

Elizabethkingia meningoseptica,

E. anopheles

Methylobacterium mesophilicum

Pantoea agglomerans

Pseudomonas aeruginosa

Nontuberculous mycobacteria

Ralstonia spp.

Serratia marcescens

Sphingomonas paucimobilis

Stenotrophomonas maltophilia

Fungi^{1,2}

¹Annaissie EJ, et al. *Clin Infect Dis* 2001;33:1871-8.

²Raad I, et al. *Infect Control Hosp Epidemiol* 2002;23:532-7.

Microbiota enter facilities

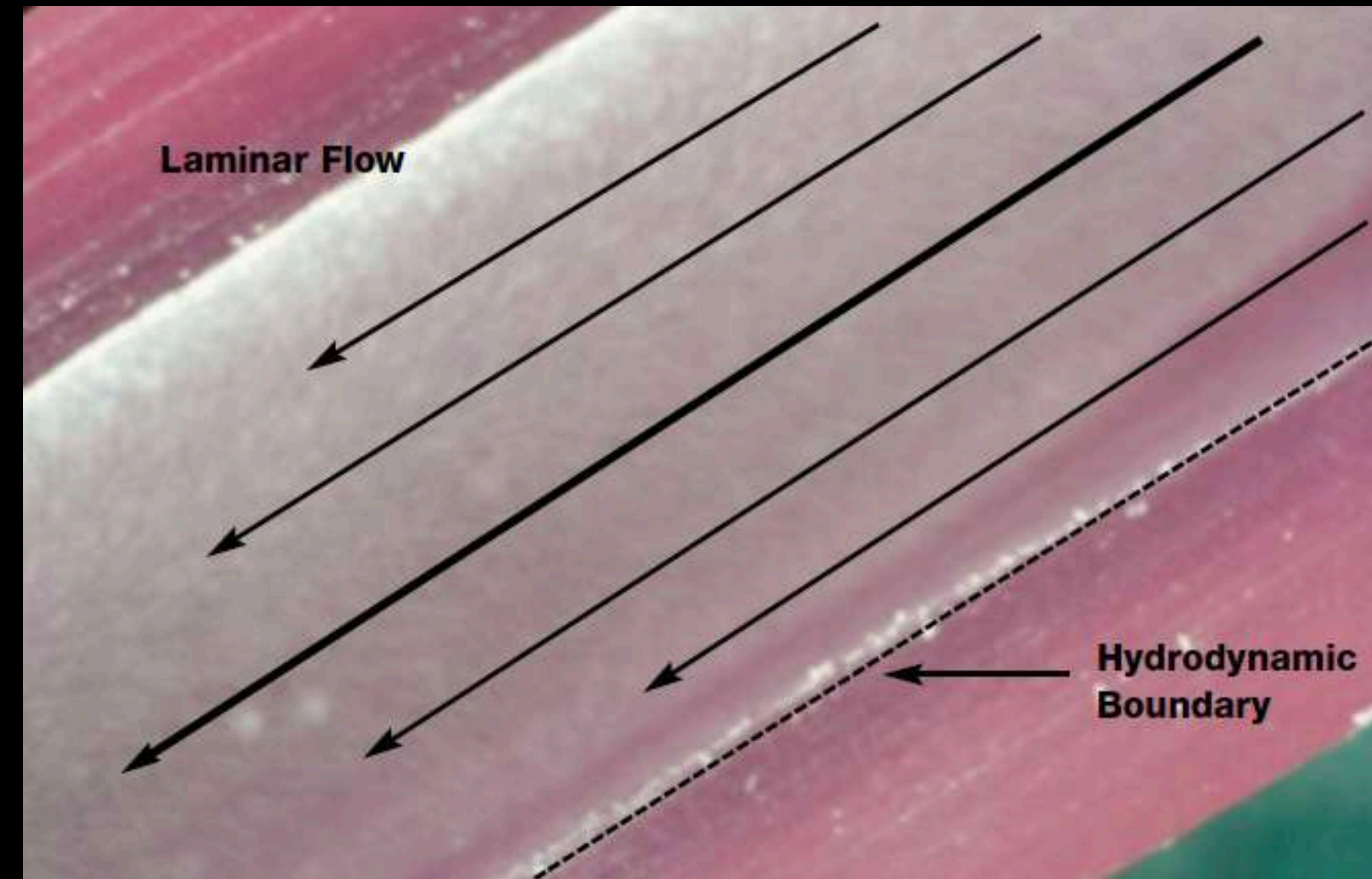
1. Particulate matter
2. Sheared biofilm from drinking water distribution system
3. Planktonic cells
4. Within free-living amoeba (*Acanthamoeba* spp, *Hartmannella* spp)

Biofilms

1. A biofilm is an assemblage of microbial cells that is irreversibly associated with a surface and enclosed in a matrix of primarily polysaccharide material.
2. Water system biofilms can be complex
3. Surface/water interface plays a role with attachment
4. microorganisms attach more rapidly to hydrophobic, nonpolar surfaces such as Teflon and other plastics than to hydrophilic materials such as glass or metal

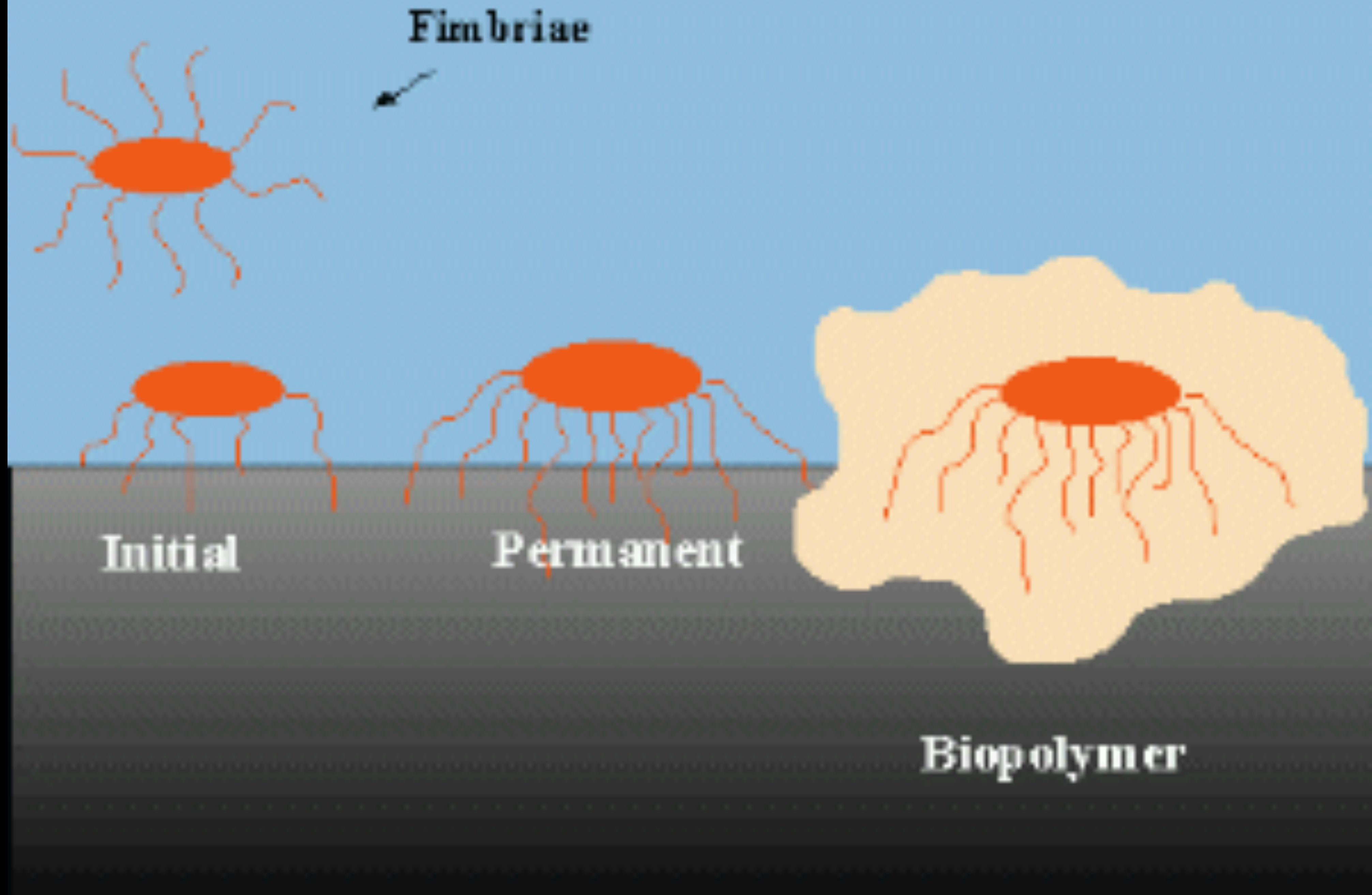
Cells attach to surfaces depending on Texture and Speed

1. Laminar water flow through plumbing faster through the center
2. Friction causes slowing towards the pipe walls
3. Surface boundary, conditioning film



Mills SE. *JADA* 2000;131:1427-1441

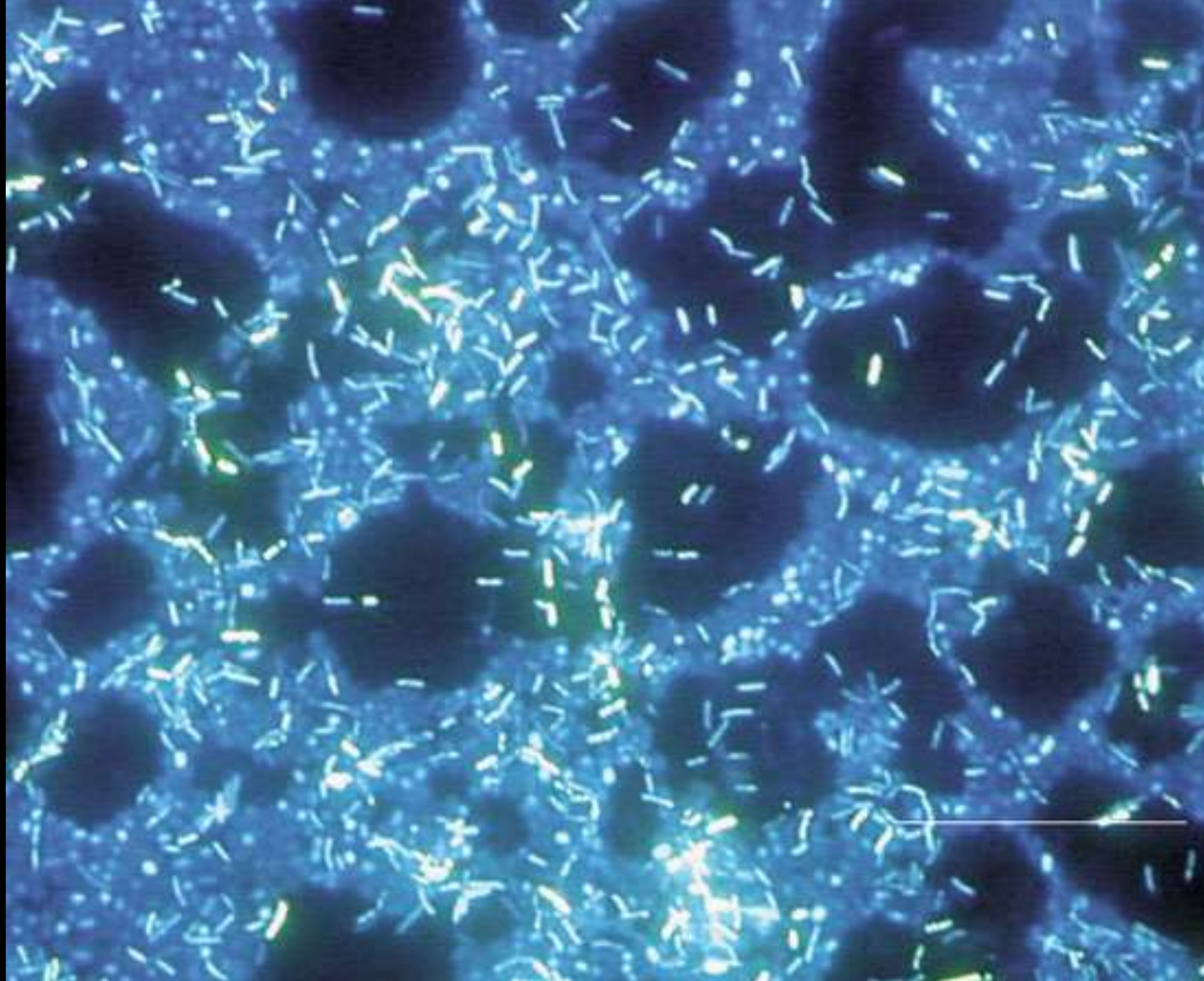
Biofilm formation



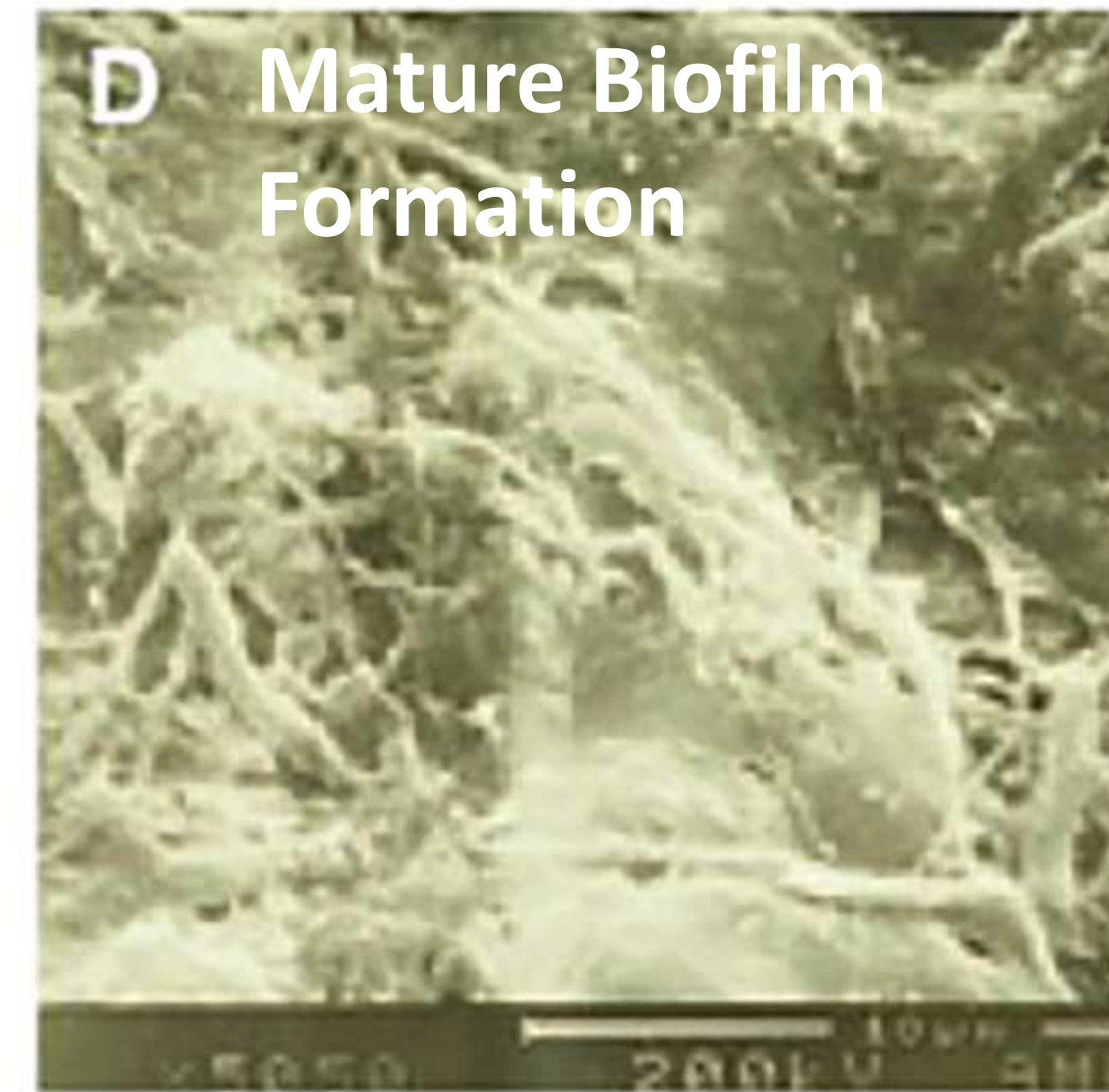
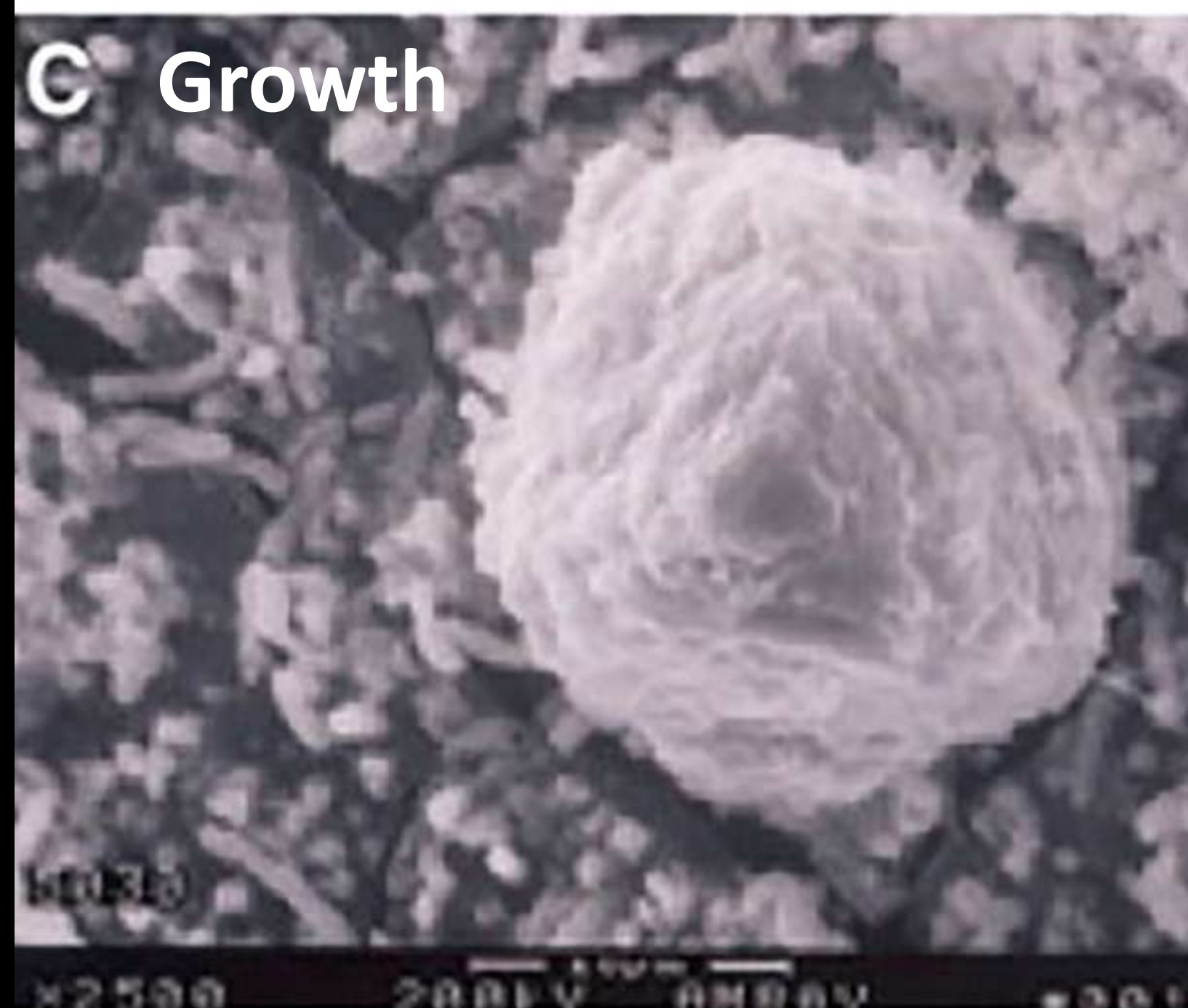
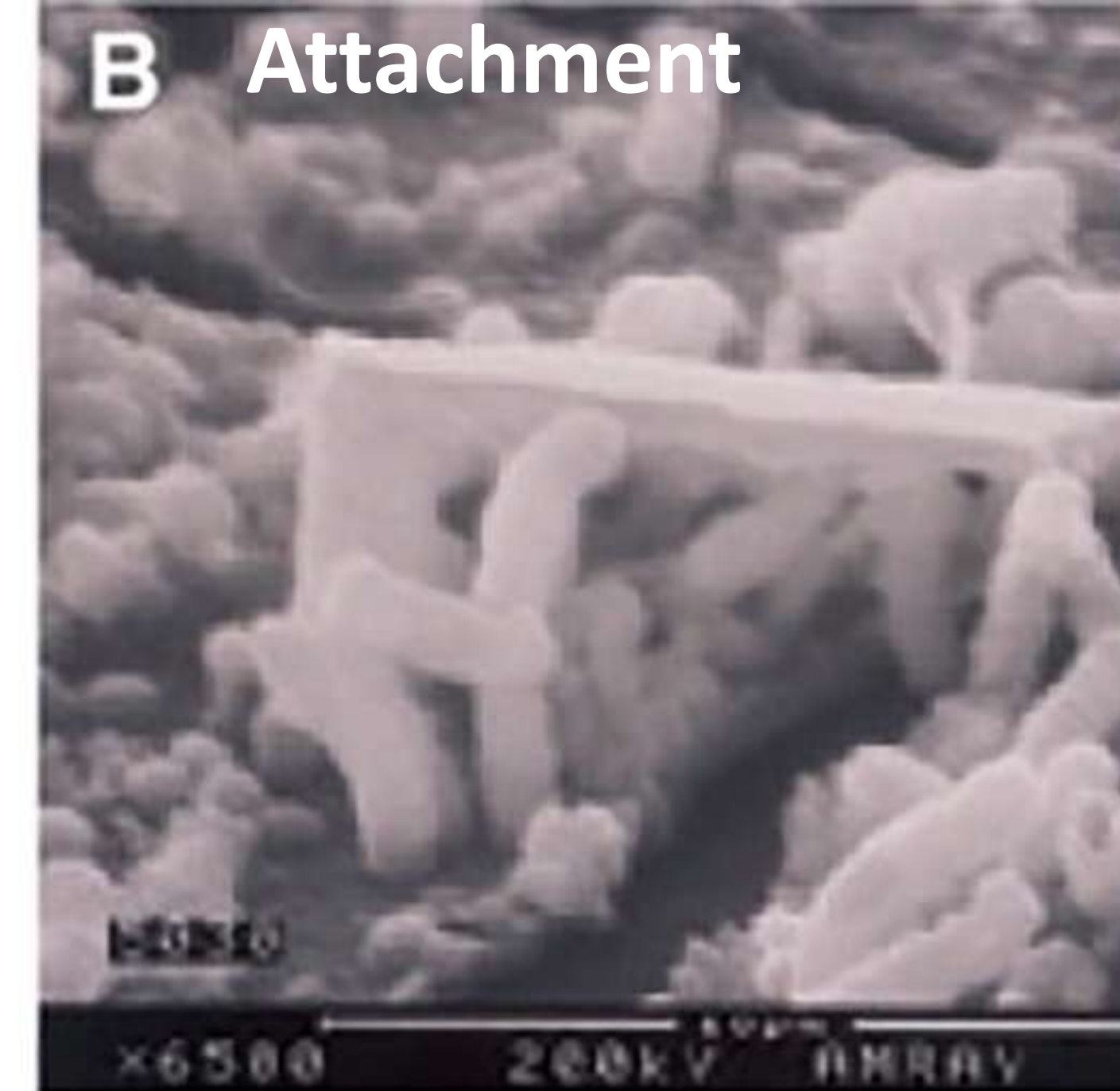
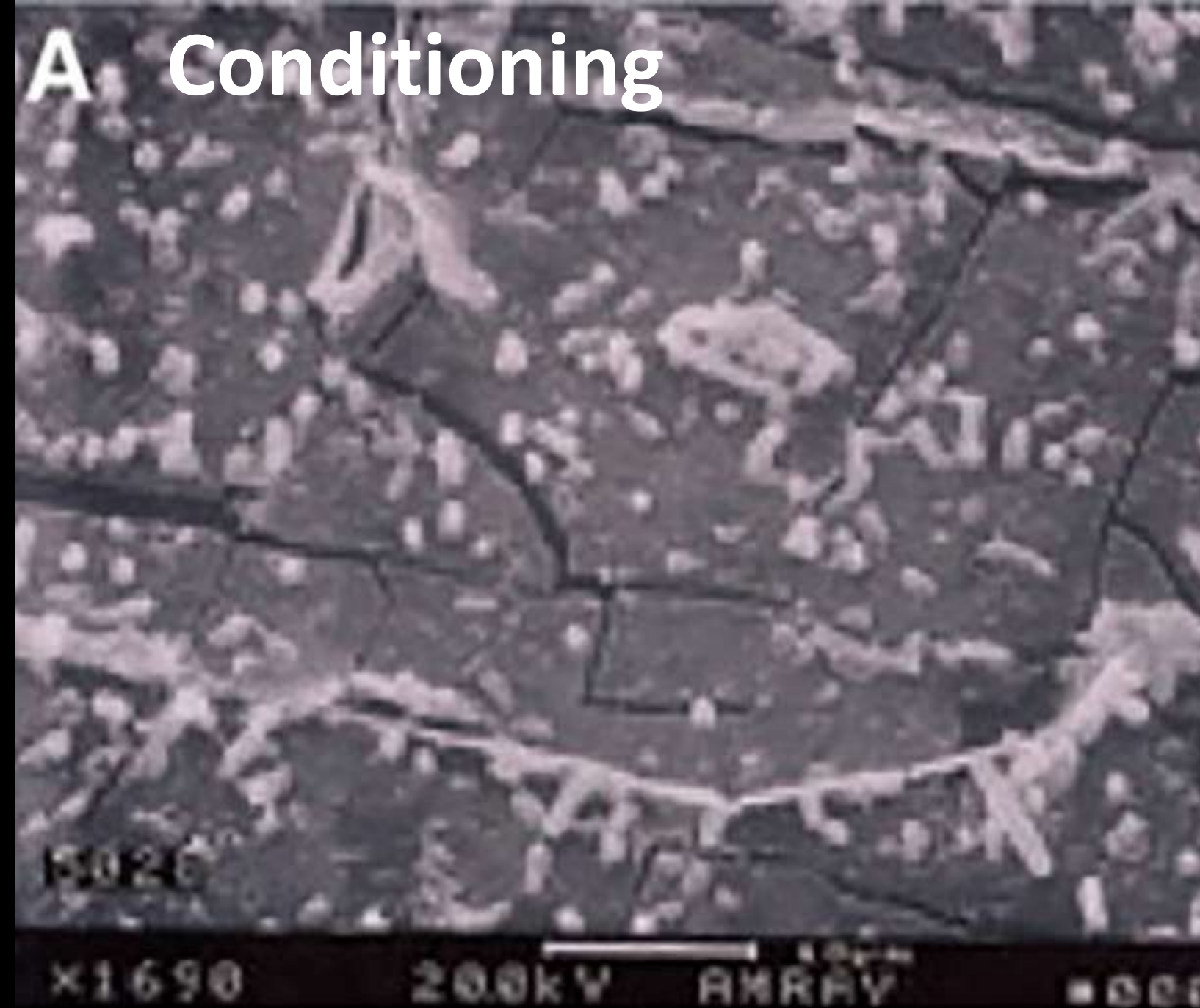
Drinking Water Biofilm

Polymicrobial biofilm
grown on a stainless steel
surface in a laboratory
potable water biofilm
reactor for 14 day.

Donlan RM. [EID 2002;8\(9\):881-90](#)



Biofilm colonization sequence on dental unit waterline surface



Physiological state of cells in the biofilm

1. Cells adapt to live in nutrient poor environments
2. Diffusion gradients
3. Cells become resistant/tolerant to antimicrobial agents
4. Metabolisms slow
5. Living but not culturable cells/persister cells

Where will biofilms form

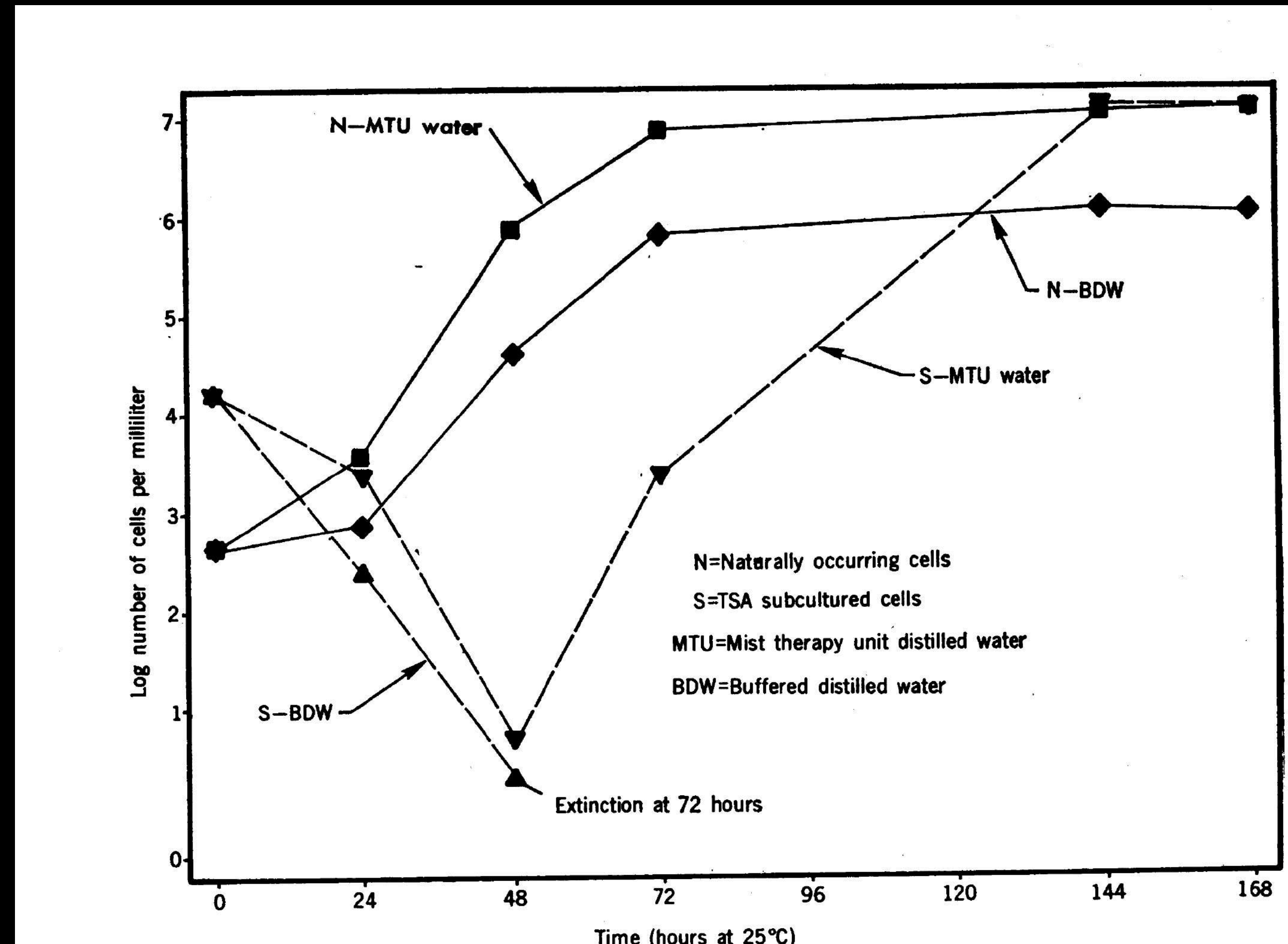
1. Dental unit water lines
 - a. any tubing containing water
 - b. storage vessels
2. Premise plumbing
 - a. Plumbing fixtures, aerators
 - b. valves, flow restrictors
3. Surfaces that remain wet/moist
4. Sanitary Plumbing
 - a. p-traps
 - b. sink drains

Biofilm dispersion

- Sloughing events
 - a. Physical shock (eg., turbulence, water hammering, other physical means)
 - b. Erosion of upper levels due to shear forces
- Quorum sensing (cellular communication), change in nutrient levels, lead to detachment and the shedding of daughter cells

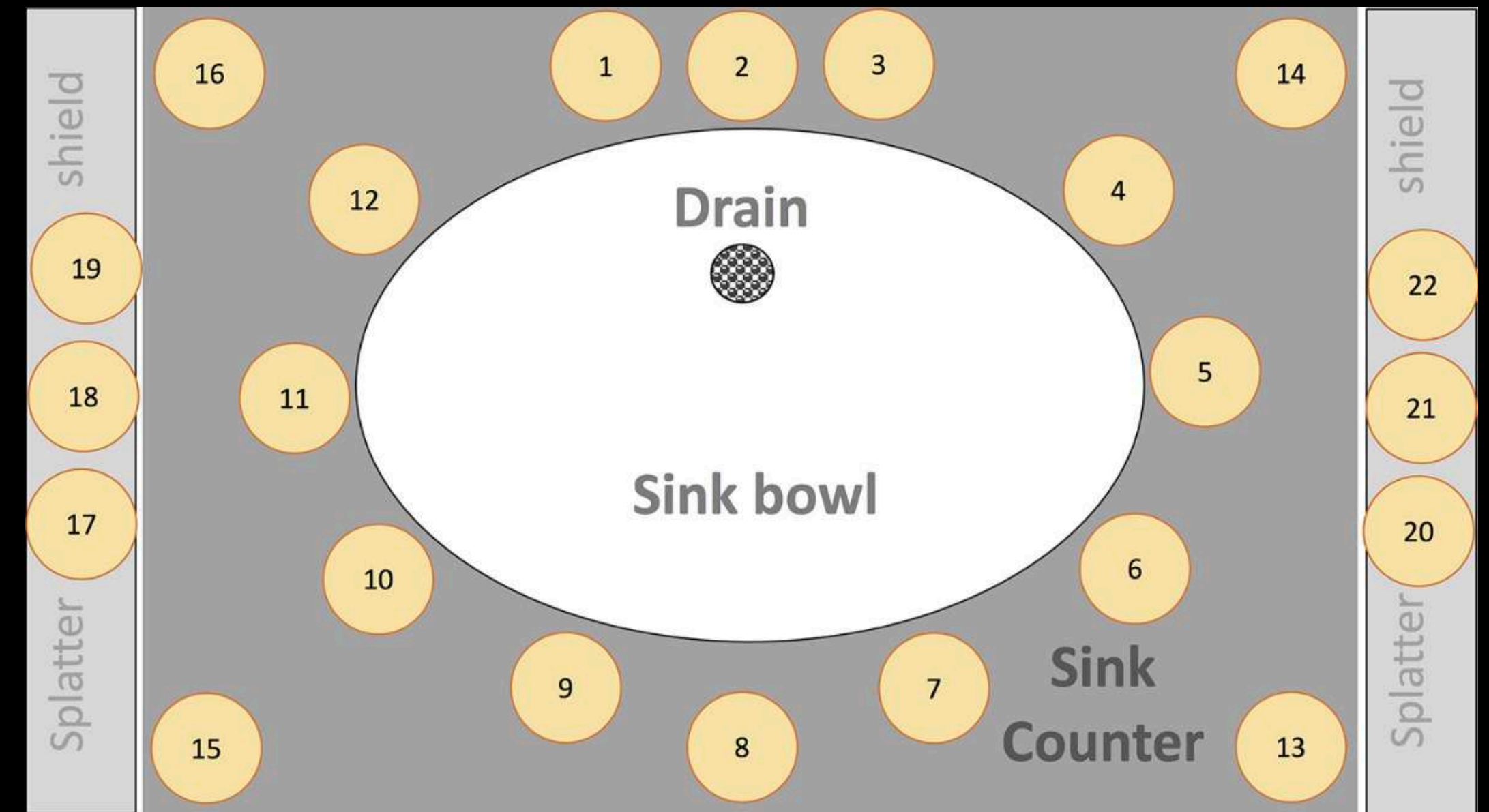
Pseudomonas aeruginosa in Purified Water

Difficult to eradicate



Favero MS, et al. Science 1971;173((39999):836-8

Aerosols, Splatter, and Droplets can contaminate nearby objects



Harrell S, Molinare J. Aerosols and splatter in dentistry. *JADA* 2004;135:419-437

Kotay SM, et al. Droplet-Rather than aerosol –mediate dispersion in the primary mechanism of bacterial transmission from contaminated hand-washing sink traps. *AEM* 2019;85(2): e01997-18

Routes of Transmission of OPSP to Patients

1. Direct and indirect contact
 - a. indirect: contamination of injectable medications, healthcare worker hands, etc
 - b. direct: bathing, direct inoculation into open wound
2. Ingestion and aspiration
3. Inhalation of droplets or aerosols



Attempts to Control Biofilm

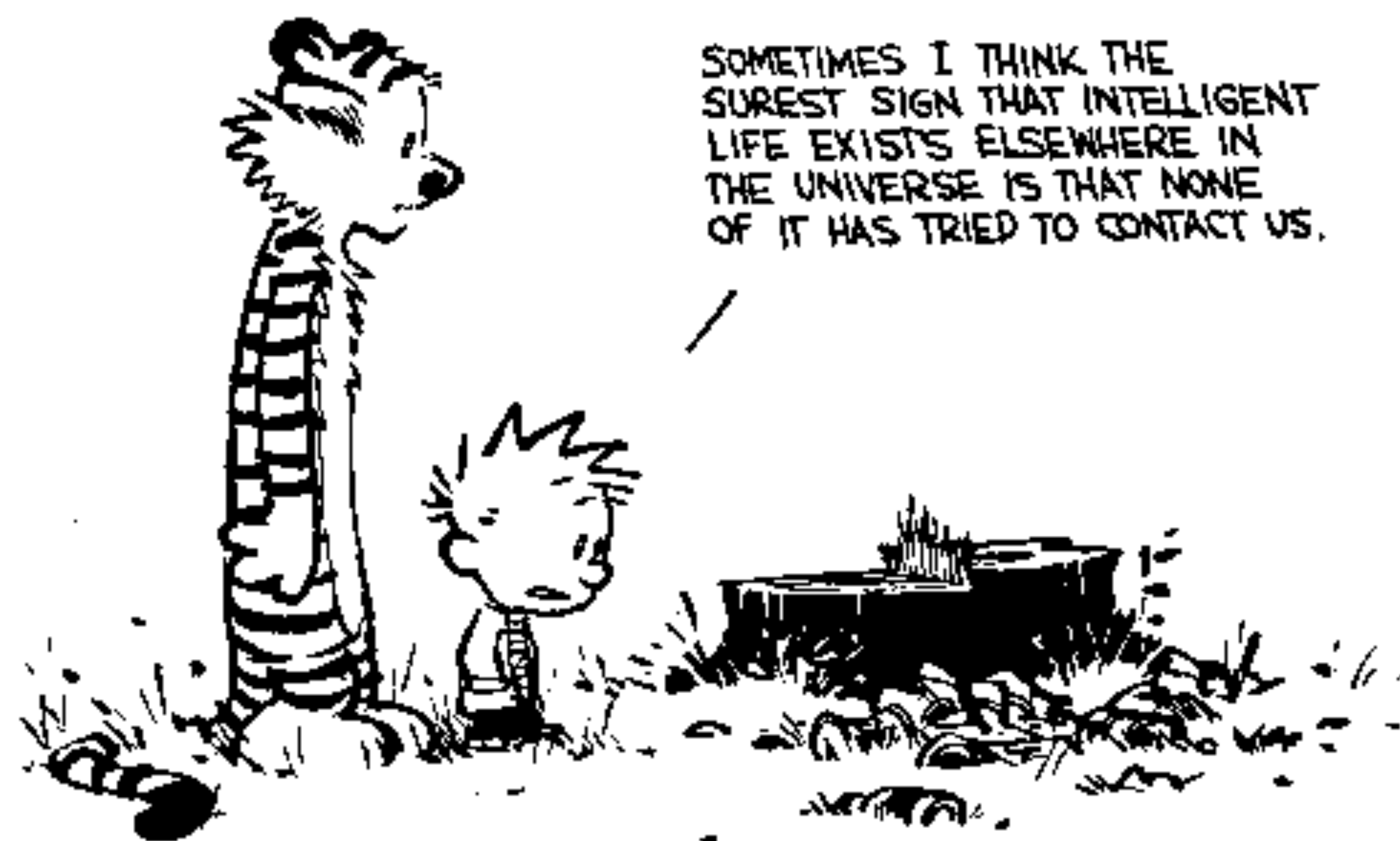
1. Mechanical cleaning
2. Chemical germicide treatment
3. Replacement of contaminated materials
4. Eliminate nutrient source
5. Low level current + biocide
6. Materials selection
7. Prevent Adhesion/Attachment
8. Good Systems Design & Maintenance
9. High Shear Forces

Follow Recommended Practices

1. CDC Infection Guidelines: <https://www.cdc.gov/oralhealth/infectioncontrol/guidelines/index.htm>
2. Dental Unit Water Quality
 - a. Use water that meets EPA regulatory standards for drinking water (i.e., ≤ 500 CFU/mL of heterotrophic water bacteria) for routine dental treatment output water.
 - b. Consult with the dental unit manufacturer for appropriate methods and equipment to maintain the quality of dental water.
 - c. Follow recommendations for monitoring water quality provided by the manufacturer of the unit or waterline treatment product.
 - d. Use sterile saline or sterile water as a coolant/irrigant when performing surgical procedures.
3. Maintain Good Records
4. Practice good sink hygiene

Sink Hygiene

1. Keep medications and clean supplies outside of the splash zone (typically about 1 meter)
2. Separate clean and contaminated procedures (there should be a dedicated hand washing sink(s))
3. For some uses of water Point of Use (POU) filters may be considered.



Alternative to unit waterlines

1. Sterile water with...
2. Replaceable water line



Surgical handpiece for Implantmed Plus

The first choice for apical resection, osteotomy, sequestrotomy, bone modelling and bone smoothing and also for extraction of wisdom teeth



Dave

- How do you follow the CDC guidelines?
- Sterile versus clean and is that meaningful?
- Exposed instruments, exposed sundries, drawers in operatories, infection control stations, exposed surfaces
- Pests - rodents and insects
- Transmission - soiled versus invisible
- Aerosols - negative pressure
- Waterlines - deadlegs, biofilms, pathogens, shocking, flushing, testing, remediation

• Sterilizers and spore testing

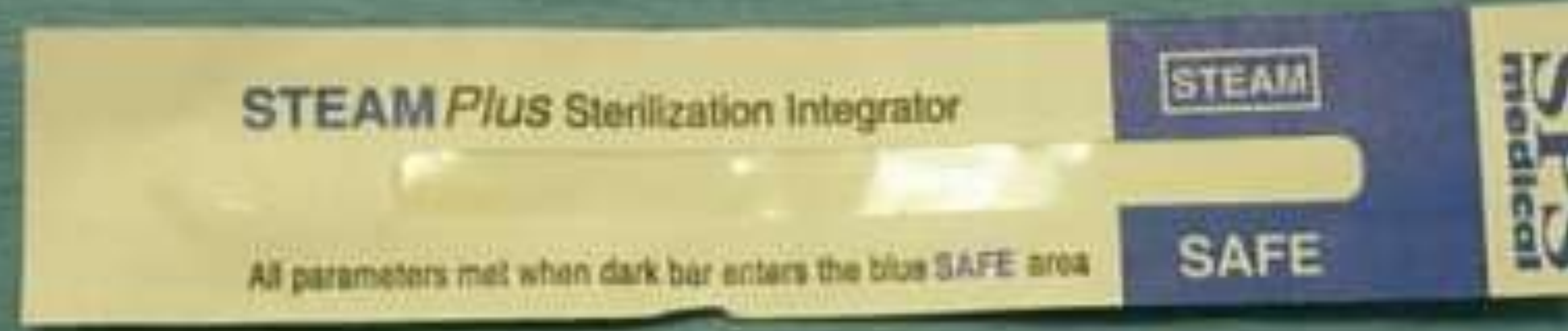
- Disposables - what can be used if it is exposed
- Handpieces -
- Drug vials -
- Handwashing and gloves -
- Personal Protection - donning and doffing



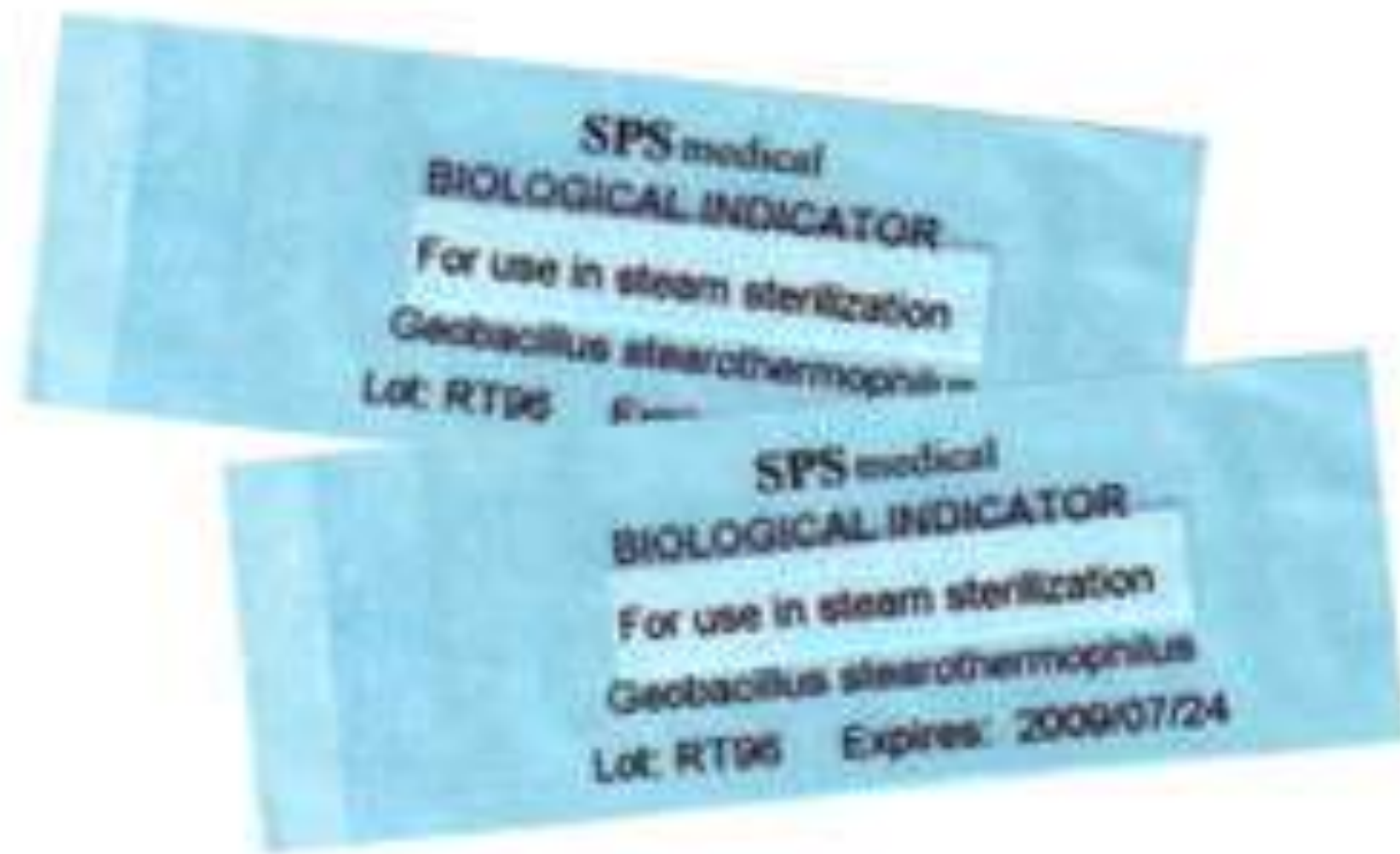
emi



Chemical Indicators



Biologic Monitoring (Spore Test)



Sterilization Area



Sterilization Area



Sterilization Area



Sterilization Area

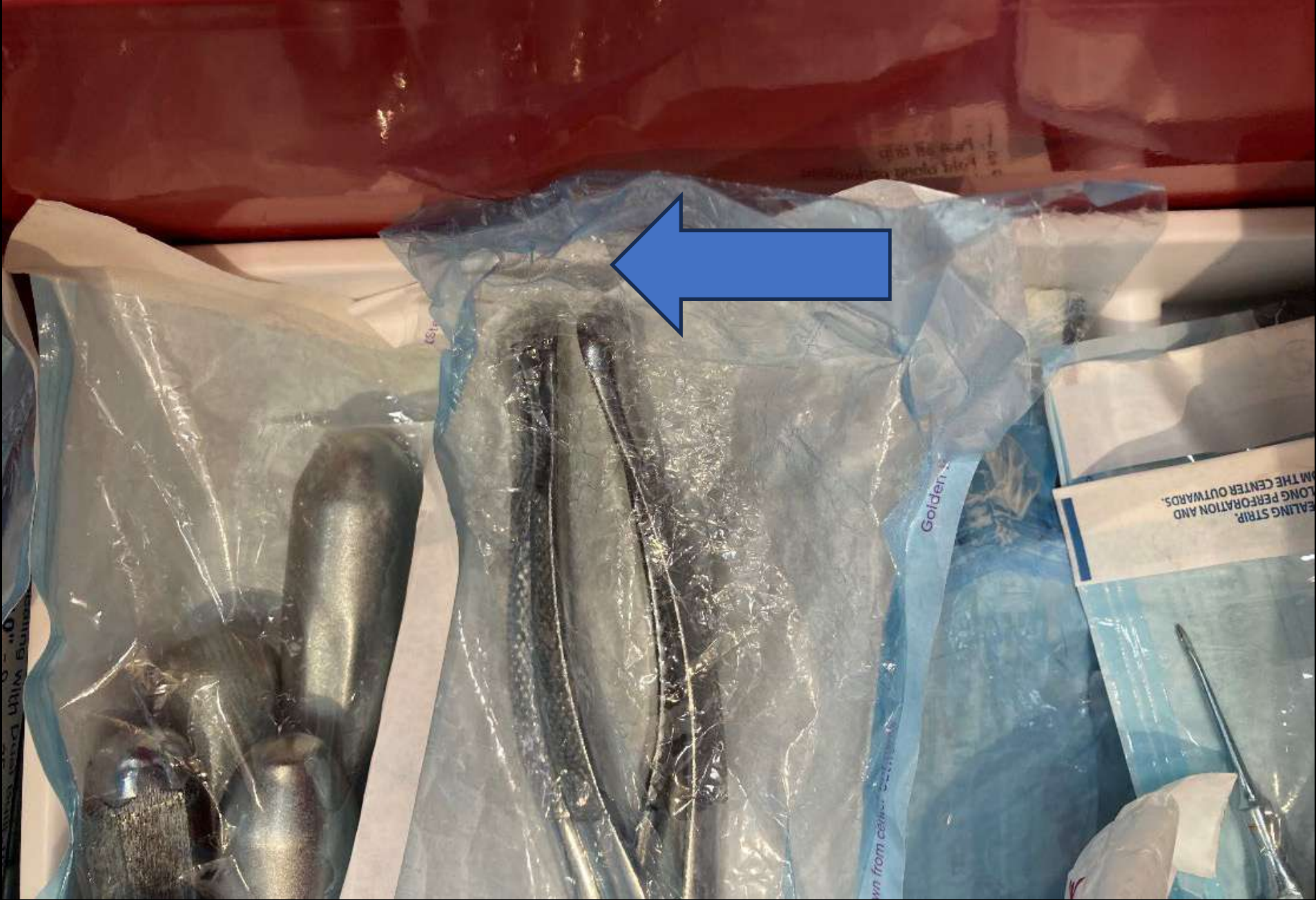


**Sterilization
Area**

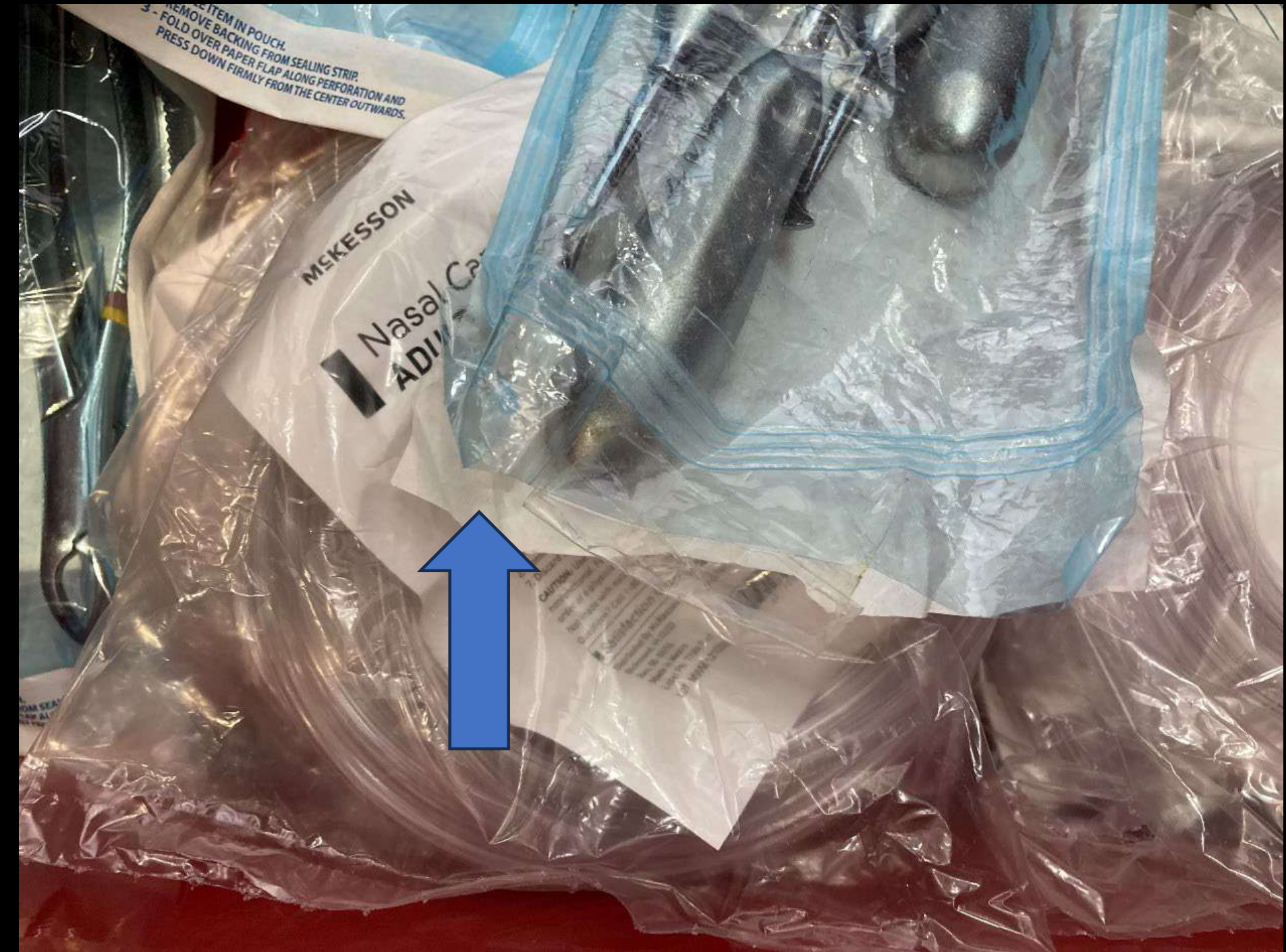
Overfilled



Autoclave Pouches



Autoclave Pouches



Autoclave Pouches



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SAFE SEDATE NITROUS MASK SYSTEM

Product Description:

*12 Safe Sedate[®] masks per case.
Two sizes are available: Small
and Large.*

In the time of COVID-19, it is
more critical than ever to reduce
or eliminate cross-contamination
sources, particularly in ways that



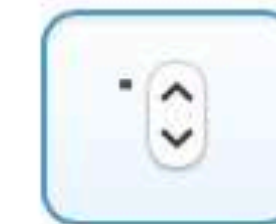
Shape / Size*

☒ SMALL

☐ LARGE

QTY

PRICING



\$131.99

100% disposable circuit and mask, just like in anesthesiology



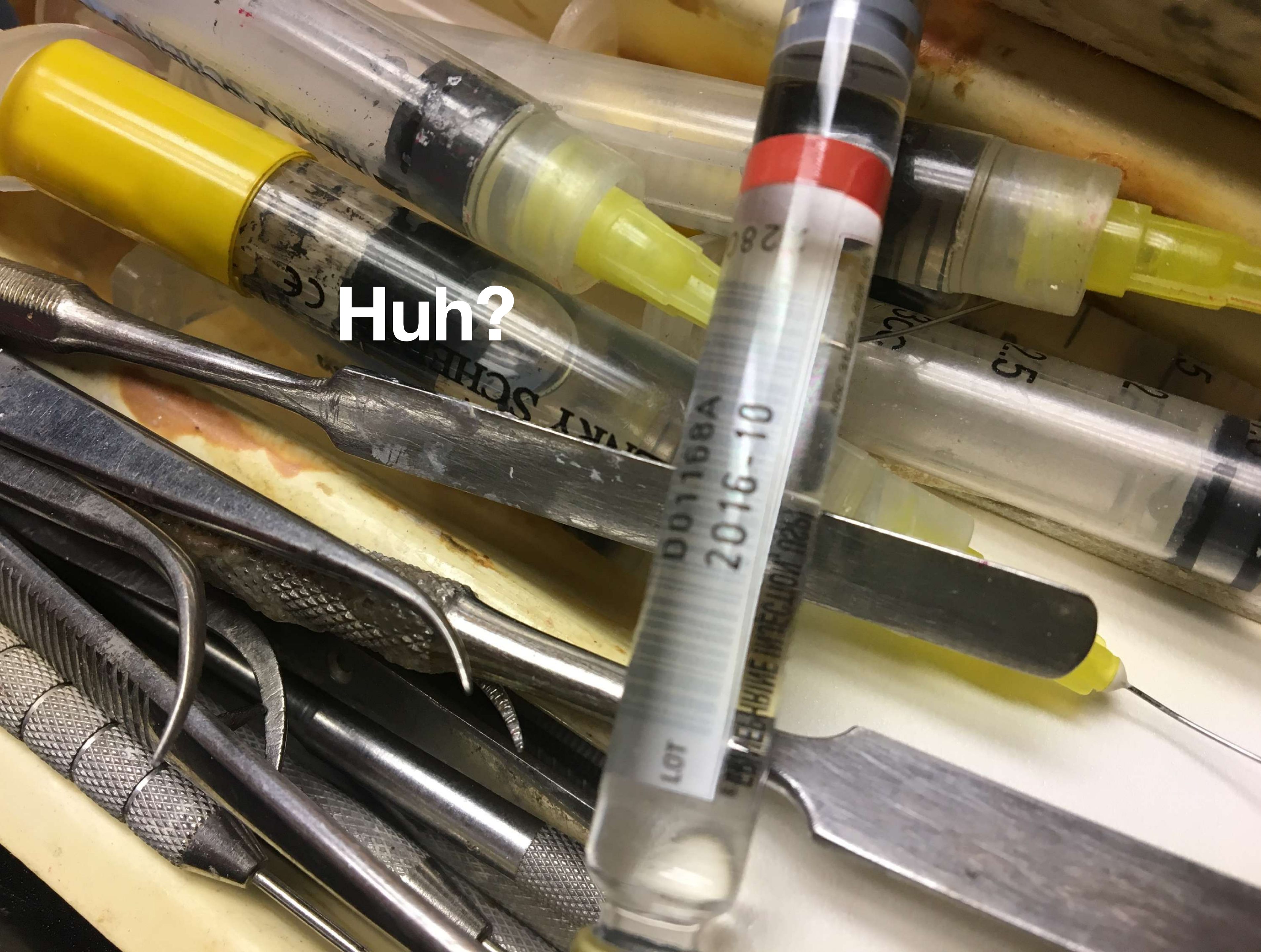
Single-use Items

Used for one patient and discarded

- Plastic prophy angles, prophy cups and brushes, plastic high volume evacuator tips, saliva ejectors, disposable air/water syringe tips
- Gloves
- Local anesthetic cartridges
- Disposable trays
- Are burs single use?
Can they be cleaned?



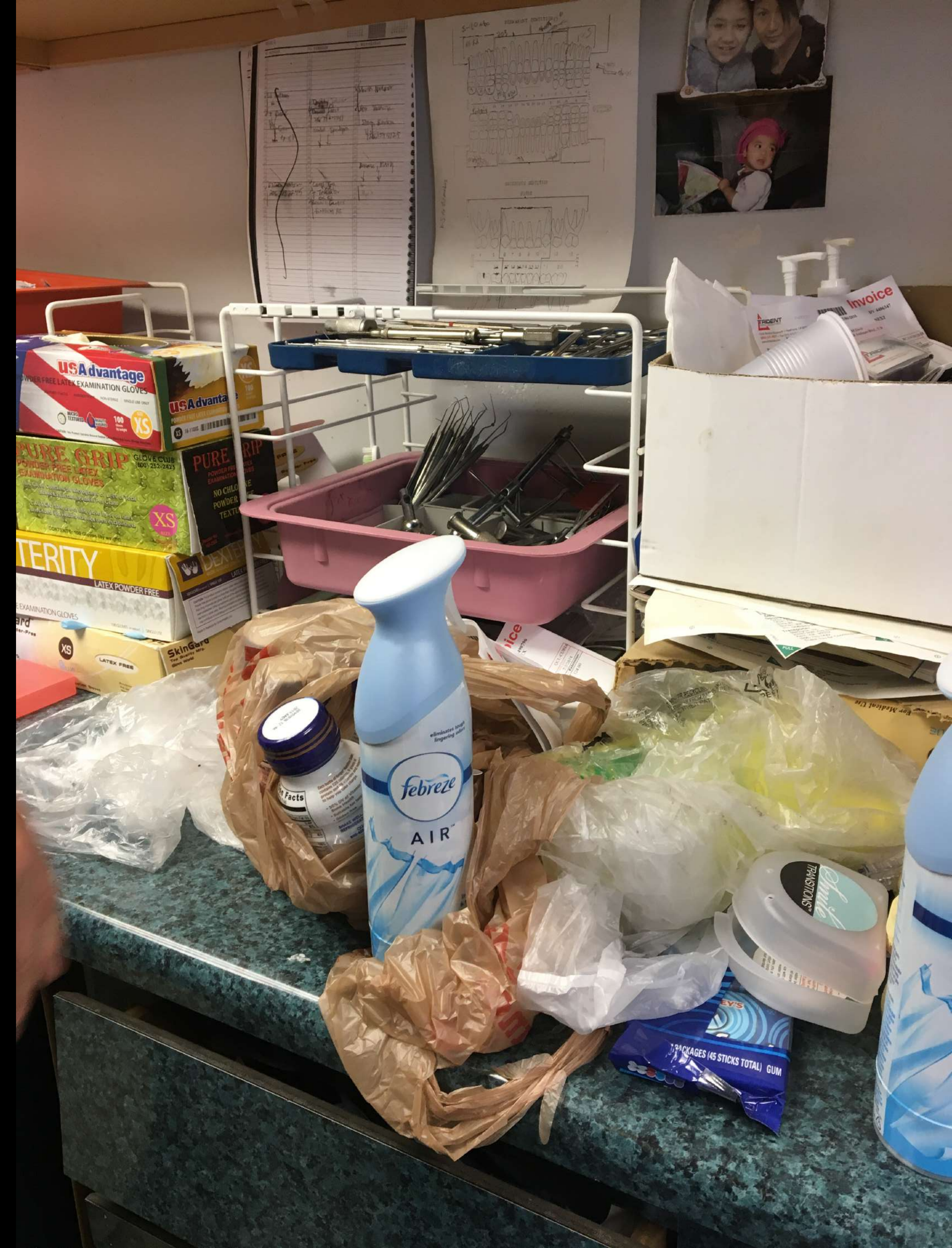
Huh?



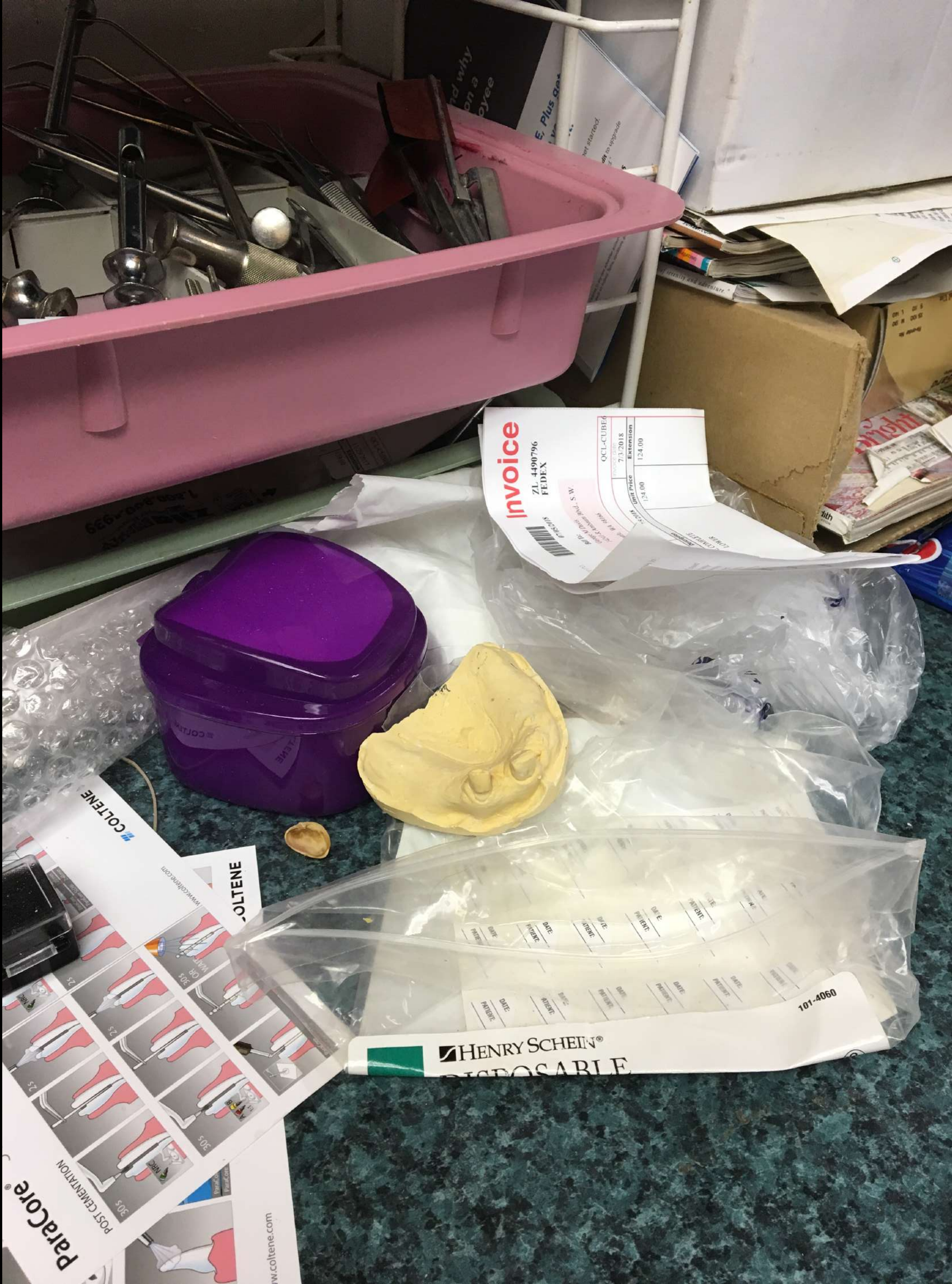
Can you wipe down
that Counter?



Hmmm



Hmmmm



Hmmm



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- Handwashing and gloves -
- Personal Protection - donning and doffing

The ADA urges all practicing dentists, dental auxiliaries and dental laboratories to employ appropriate infection control procedures as described in the 2003 CDC Guidelines and 2016 CDC Summary

- **From the CDC** This is not stated as a guideline. Dental Handpieces and Other Devices Attached to Air and Waterlines. How should dental handpieces and other devices attached to air and waterlines be reprocessed between patients?
- Handpieces and other intraoral instruments that can be removed from the air and waterlines of dental units are considered semicritical devices. In addition, studies show that the internal portions of high-speed handpieces and low-speed handpiece motors can become contaminated and that it is possible for retained patient material to be released into the mouths of subsequent patients. Therefore, **handpieces and other intraoral instruments should be removed from the air and waterlines of dental units, cleaned, and heat-sterilized between patients.** Follow the manufacturer's instructions for cleaning, lubrication, and sterilization. Do not surface-disinfect, submerge in liquid chemical sterilants, or barrier-protect these instruments because these methods cannot adequately clean, disinfect, or sterilize the internal components.
- These instruments include, but are not limited to, high-speed, low-speed, electric, endodontic, and surgical handpieces, **as well as all handpiece motors and attachments** such as reusable prophylaxis angles, nosecones, and contra-angles.

- References

- CDC. Guidelines for infection control in dental health-care settings – 2003. MMWR 2003; 52(No. RR-17):1–66. <https://www.cdc.gov/mmwr/PDF/rr/rr5217.pdf>[PDF-1.2M]. Accessed March 17, 2016.
- Chin JR, Miller CH, Palenik CJ. Internal contamination of air-driven low-speed handpieces and attached prophylaxis angles. J Am Dent Assoc 2006;137:1275–1280.
- Chin JR, Westerman AE, Palenik CJ, Eckert SG. Contamination of handpieces during pulpotomy therapy on primary teeth. Pediatr Dent 2009;31:71–75.
- Harte JA, Molinari JA. Sterilization procedures and monitoring. In: Molinari JA, Harte JA eds. Cottone's Practical Infection Control in Dentistry, 3rd ed. Baltimore: Lippincott Williams & Wilkins, 2009: 148–170.
- Herd S, Chin J, Palenik CJ, Ofner S. The in vivo contamination of air-driven low-speed handpieces with prophylaxis angles. J Am Dent Assoc 2007;138:1360–1365.
- Rutala WA, Weber DJ, and the Healthcare Infection Control Practices Advisory Committee. Guideline for disinfection and sterilization in healthcare facilities, 2008:1–158. https://www.cdc.gov/hicpac/pdf/guidelines/Disinfection_Nov_2008.pdf[PDF-948K]. Accessed March 17, 2016.

Sterilization of Instruments

1. Critical and semicritical instruments
 - a. Cleaned
 - b. Heat sterilize
 - c. High level disinfect or sterilize using chemical germicides only if item cannot be heat sterilized
 - d. Discard if disposable
2. Heat sterilize all high-speed handpieces, low-speed handpieces, rotary components and all other attachments (e.g.: reusable air/water syringe tips, ultrasonic scaler tips, etc.)



Let me put
this in
your mouth



Let me put
this in
your mouth



**Let me put
this in
your mouth**



**Let me put
this in
your mouth**



Let me put
this in
your mouth



TABLE 1

Number of prophylaxis angle/handpiece units showing spread of bacteria from the prophylaxis angle head to the handpiece motor gears.

PROPHYLAXIS ANGLE*	TYPE OF PROPHYLAXIS ANGLE	SINGLE-UNIT HANDPIECE†	TWO-UNIT HANDPIECE†
Acclean	Disposable	1/10	3/10
Classic Traditional Web	Disposable	0/10	8/10
Classic Twin Rib GUM	Disposable	2/10	2/10
Clinpro	Disposable	0/10	2/10
DENSCO Firm Yellow	Disposable	1/10	2/10
Nupro revolv	Disposable	0/10	8/10
Original Green	Disposable	2/10	0/10
TS2 Prophylaxis Angle	Metal	1/10	0/10
TOTALS	Not applicable	7/80	25/80

* The angles' manufacturers are as follows: Acclean firm cup (Henry Schein, Melville, N.Y.); Classic Traditional Web (Young Dental, Earth City, Mo.); Classic Twin Rib GUM (Sunstar Butler, Chicago); Clinpro Firm (3M ESPE, St. Paul, Minn.); DENSCO Firm Yellow (Waterpik Technologies, Newport Beach, Calif.); Nupro revolv (Dentsply, York, Pa.); Original Green regular (Denticator, Earth City, Mo.); TS2 Prophylaxis Angle (Young Dental).

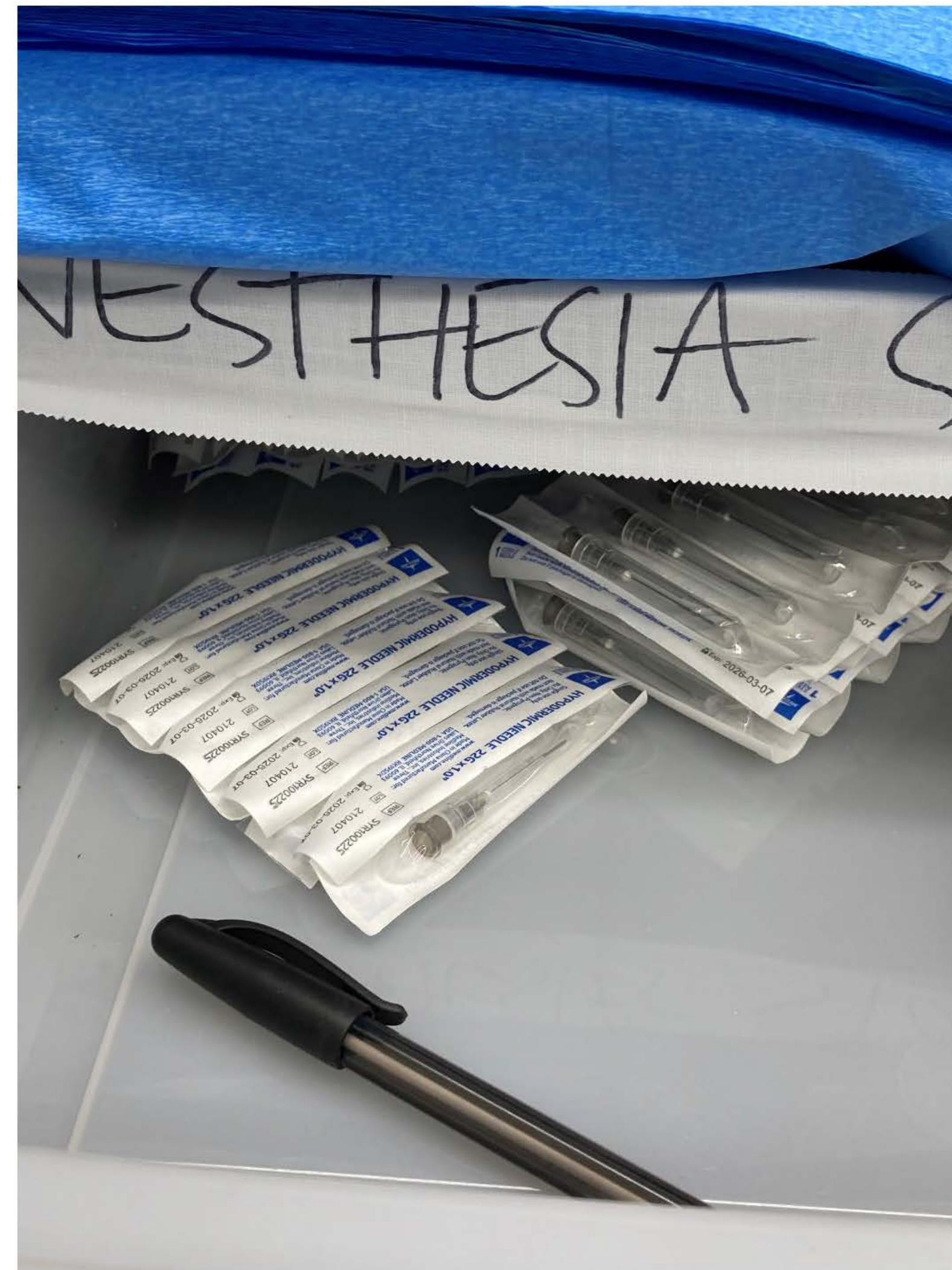
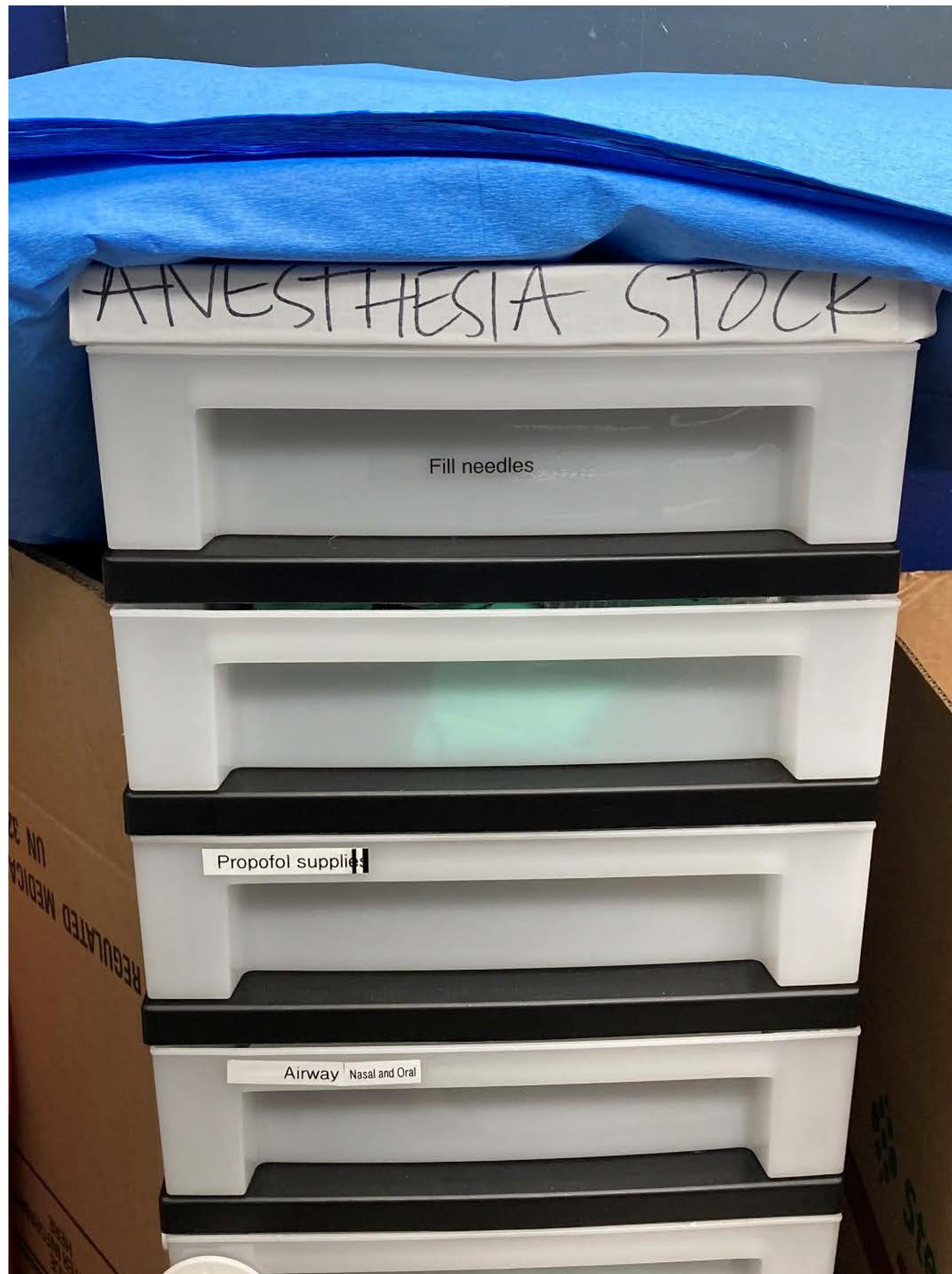
† Number with positive motor gears over total number of units tested.

Dave

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- Handpieces -
- **Drug vials -**
- Handwashing and gloves -
- Personal Protection - donning and doffing



Controlled Substance Storage



Controlled Substance Storage



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- Alcohol-based hand sanitizers can quickly reduce the number of microbes on hands in some situations, but sanitizers do not eliminate all types of germs.
- Why? Soap and water are more effective than hand sanitizers at removing certain kinds of germs, like Cryptosporidium, norovirus, and Clostridium difficile



Hand Hygiene – Soap and Water

1. At the start and end of each workday
2. If hands are contaminated or visibly soiled
3. Before placing and after removing gloves

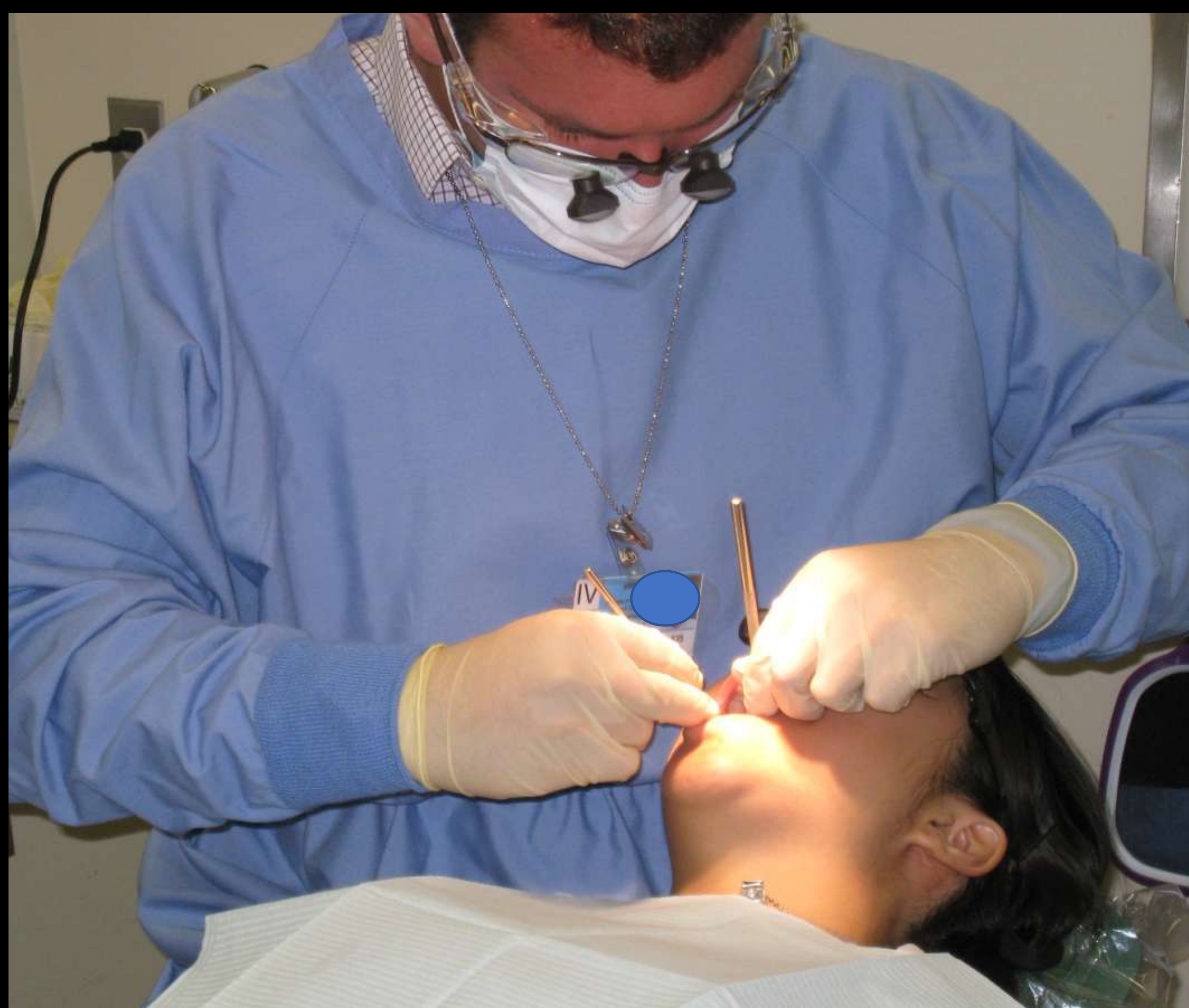
Visibly soiled?

How about invisibly soiled?



Exam Gloves

1. For contact with mucous membranes, blood, OPIM (other potentially infectious material)
2. Appropriate for most dental procedures
3. Sterile gloves for surgical procedures



Heavy-duty utility Gloves

- ★ Heavy-duty utility gloves
When handling contaminated sharp instruments and devices during reprocessing



Alcohol-based Hand Sanitizers

1. Alternative to soap and water
2. For hands free of debris
3. Good antimicrobial
4. Not a cleaning agent

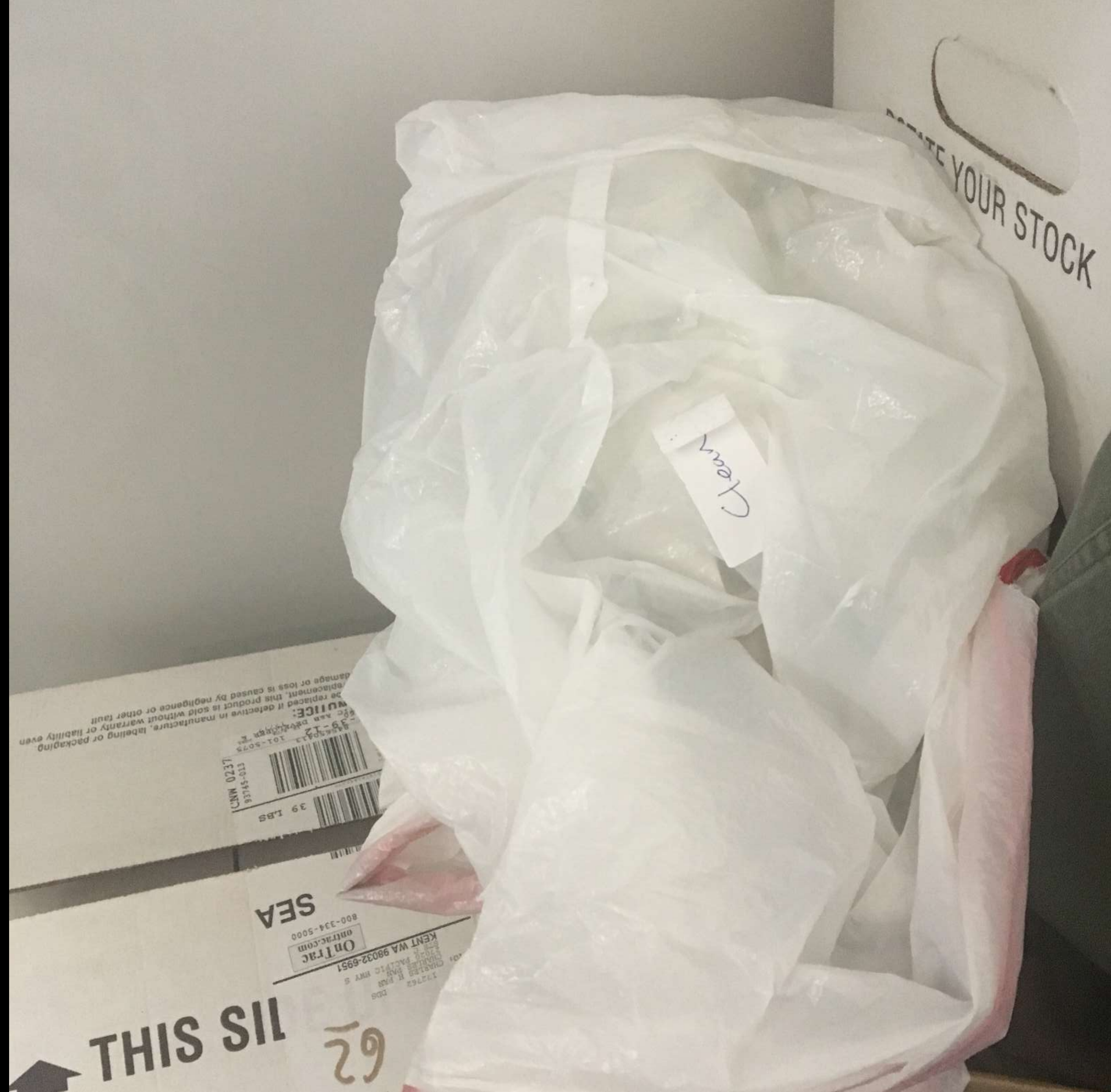


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PPE Storage





SA100 PSK, You can wear it all day.

PAPR - Powered Air Purifying Respirator

**CERTIFIED ASTM
1670/F1671**
(PER CDC STANDARDS)

**REUSABLE &
WASHABLE**

**LIGHT WEIGHT
& DURABLE**

**DEVELOPED FOR
PROLONGED USE**

**PATENTED EXTERNAL
COOLING FABRIC**

**ALLOWS BODY FOR
TEMP MONITORING**

**COST EFFECTIVE
PROTECTION**

**ADVANCED INFECTION
CONTROL C-SUIT**



**STANDARD PPE
DISPOSABLE SUIT**





**Standard PPE's for
aerosol producing procedure**

Andrew Lane, DDS

Pediatric Dentist

The Hsu Team



Ronald Hsu, DDS, MS
Vancouver, WA



Football Game, 1919



Guide to Face Mask Selection and Use

Choose the right mask for the task Select the mask design, fit and filtration that matches the protection needs for each procedure or risk level. MaskEnomics™ makes it easy to find the level of filtration required, including ASTM Level 3, 2 and 1.

MAXIMUM FILTRATION

NIOSH Approved N95 Particulate Respirator

High Fluid Resistance 160 mmHg
Filtration Efficiency PFE = 99.9% @ 0.1 micron
Breathability - Delta P > 5.0 mm H₂O/cm²
Flame Spread Class 1

N95

Indicated for use when treating patients with airborne diseases such as TB or influenza.*

Meets CE 0121 – In reference to EN 149:2001 FFP2 NR

Pictured: Isolator Plus™ N95 Particulate Respirator



ASTM LEVEL 3

High Fluid Resistance 160 mmHg
Filtration Efficiency BFE ≥ 98%
PFE ≥ 98% @ 0.1 micron
Breathability - Delta P < 5.0 mm H₂O/cm²
Flame Spread Class 1

LEVEL 3

Ideal for procedures where heavy to moderate amounts of fluid, spray and/or aerosols are produced.

Meets EN14683 Rating – Type NR Standard.

Pictured: Ultra® Sensitive Earloop with Secure Fit® Mask Technology



ASTM LEVEL 2

Moderate Fluid Resistance 120 mmHg
Filtration Efficiency BFE ≥ 98%
PFE ≥ 98% @ 0.1 micron
Breathability - Delta P < 5.0 mm H₂O/cm²
Flame Spread Class 1

LEVEL 2

Ideal for procedures where moderate to light amounts of fluid, spray and/or aerosols are produced.

Meets EN14683 Rating – Type NR Standard.

Pictured: Procedural Earloop with Secure Fit® Mask Technology



ASTM LEVEL 1

Low Fluid Resistance 80 mmHg
Filtration Efficiency BFE ≥ 95%
PFE ≥ 95% @ 0.1 micron
Breathability - Delta P < 4.0 mm H₂O/cm²
Flame Spread Class 1

LEVEL 1

Ideal for procedures where low amounts of fluid, spray and/or aerosols are produced.

Meets EN14683 Rating – Type N Standard.

Pictured: Isofluid® Earloop with Secure Fit® Mask Technology



LOW PERFORMANCE

Surgical Molded Utility Mask
Physical Barrier Only
No LEVEL Performance Level **
Filtration Efficiency N/A

**Unless mask manufacturer certifies mask meets ASTM performance Level 1

Ideal as a comfortable substitute for earloop face masks, this mask is a simple physical barrier for exams and visitations or for dry, short procedures that do not produce fluid, spray or aerosols.

Pictured: Surgical Molded



MINIMUM PERFORMANCE

Utility Mask (Tissue/Tissue)
Physical Barrier Only
No LEVEL Performance Level
Filtration Efficiency N/A

Ideal as a simple physical barrier for exams and visitations or for dry, short procedures that do not produce fluid, spray or aerosols.

Pictured: Isofluid® Earloop





Z95 mask with social distancing tool.

Key Take Aways

Infectious Disease

- 1. Infectious diseases are transmitted from person to person by direct or indirect contact.**
- 2. Infectious diseases are transmitted by fomites, inanimate objects.**
- 3. Infections are transmitted by means of aerosols, tiny droplets of fluid.**
- 4. Viruses, bacteria, parasites, and fungi can all cause infectious disease.**
- 5. Malaria, measles, HPV, and tuberculosis are examples of infectious diseases that can be transmitted by fluids, aerosols, and skin contact.**

Barriers and Reducing Exposure

- 1. Simple preventative measures, such as frequent hand washing can REDUCE disease transmission from and to health care providers.**
- 2. Barriers are also simple measures that REDUCE, not eliminate, transmission.**
- 3. Barriers may be reasonable for some items.**
- 4. Barriers include gloves, masks, and plastic covers.**
- 5. Barriers must be removed and disposed properly or they won't work.**

Gloves

- 1. Exam gloves are not impervious and require excellent hand washing**
- 2. There is about a 75% reduction in transmission with proper hand washing and exam gloves**
- 3. Sterile gloves with surgical scrub are best for surgical procedures**

Masks

- 1. Standard exam masks are only partially effective for aerosols.**
- 2. They are vulnerable to virus penetration.**
- 3. Masks have to be worn correctly to work. Find a comfortable mask**
- 4. N95 and N99 masks are MUCH better but can be uncomfortable.**
- 5. P100 absolutely works but is very expensive and bulky.**

The Key is Reducing Transmission

- 1. Barriers reduce transmission from objects and aerosols.**
- 2. Heat sterilization nearly eliminates transmission when done properly.**

Aerosols

Aerosols have to be:

- 1. Avoided by removal**
- 2. Excluded by barriers**
- 3. Not generated in the first place**

The more aerosols that are controlled, the less transmission occurs.

Ethics of Infection Control

- 1. Wash your hands, make sure others wash their hands. Use gloves properly.**
- 2. Wear a mask properly, especially with aerosols.**
- 3. Use high-volume evacuation whenever there are aerosols.**
- 4. Properly sterilize items that become contaminated.**
- 5. Do not let sterilized items become contaminated by leaving them uncovered.**
- 6. If items cannot be re-sterilized, they must be discarded.**

Ethics of Infection Control

- 1. Storage in drawers of uncovered items is never acceptable.**
- 2. Maintain your equipment.**
- 3. If you are sick and especially if you have a fever, stay home.**
- 4. A standard surgical mask is not effective for viruses. Keep that in mind for anyone that enters your office.**

Be Mindful

- 1. Coughing and sneezing exposes everyone that is nearby in time and or space.**
- 2. Don't touch your face.**
- 3. Have reminders regarding cough and hand hygiene.**
- 4. Surface contact is hard to avoid.**

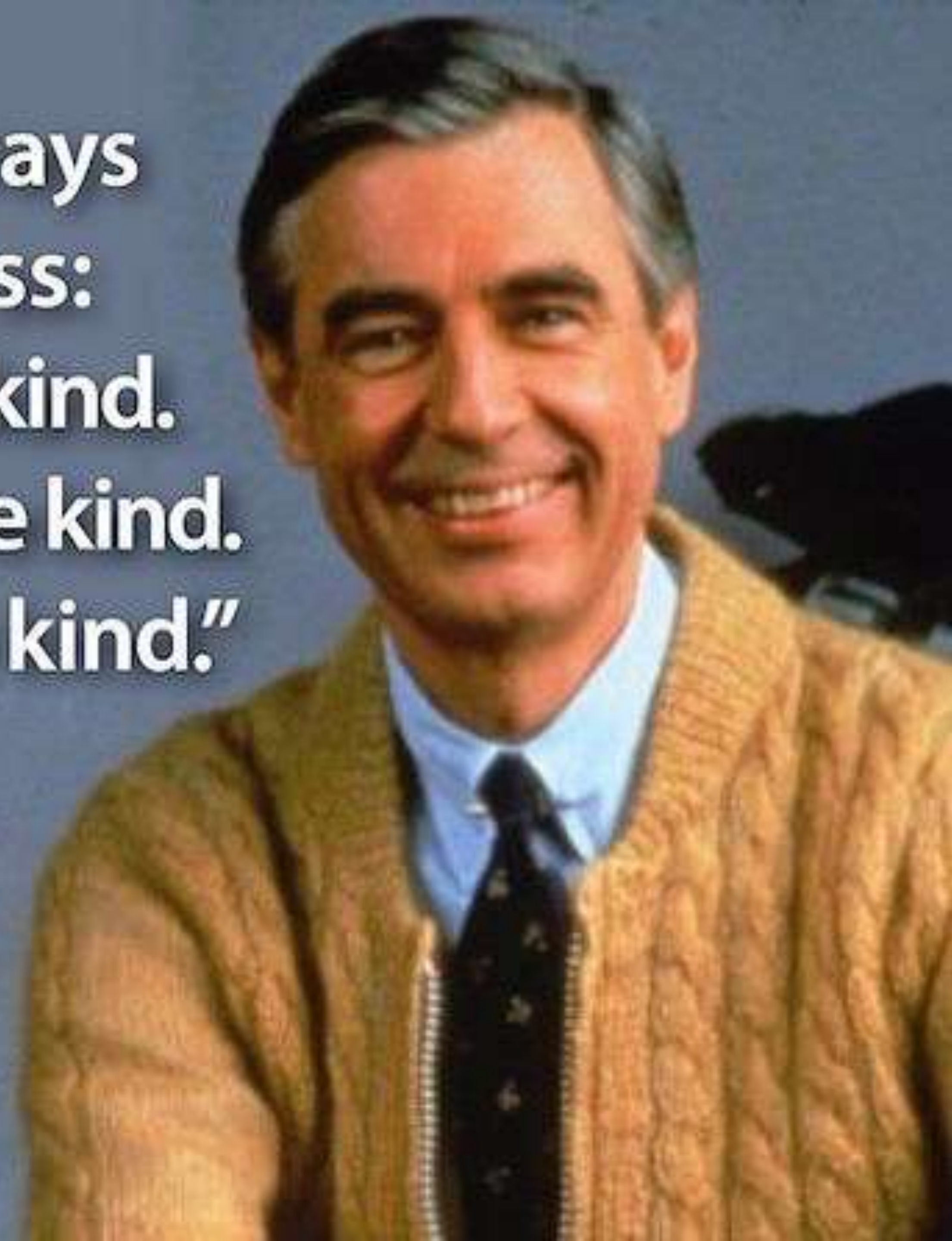
Questions

Dave Carsten, DDS, DQAC Chairman
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360-600-2848

Kate Mills, RDH, DOH Investigator
kathleen.Mills@doh.wa.gov

**"There are three ways
to ultimate success:
The first way is to be kind.
The second way is to be kind.
The third way is to be kind."**

Mr. Rogers



Thank you for protecting everyone.