Hand Washing Webinar

Hand Hygiene
What is Old and New in 2018

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Financial Disclosure: I disclose that I am the owner of Mastel Precision Surgical Instruments, Incorporated. Our company is representing a faucet system that produces ozonized water used for high level disinfection. Sales of this product would result in revenue to Mastel which would benefit me financially.

Unlabeled Usage Disclosure: I have disclosed that I will not be discussing unlabeled use of approved products and/or investigational use of commercial products that are not yet approved by the U.S. Food and Drug Administration (FDA) for any purpose.
History of Handwashing and Hygiene

Washing History BCE:

There is scarce historical information. The ancients did not know of microscopic life forms. Yet there are plenty of historical records regarding epidemics.

Q: What were their Hygiene Practices?

The word Hygiene comes from Hygeia, the Greek goddess of health, daughter of Aesculapius, the god of Medicine.

Hygiene “Golden Age” BCE:

2800 BC – Babylonia; Signs of soap-like products found in clay cylinders. Inscriptions say that fats were boiled with ashes.

1550-1200 BC – Ancient Israelites had laws governing personal cleanliness for health and religious purification.

1500 BC – Egypt: Ebers Papyrus, a medical document. Egyptians bathed regularly mixing vegetable oils with alkaline salts to form a soap-like material.

1200-200 BC – Ancient Greeks bathed with Blocks of clay, sand, pumice and ashes. Skin anointed with oil was scraped off the oil and dirt with a Strigil (metal instrument).

600 BC – Ancient Greeks start using public baths.

300 BC – Romans used wiping techniques in their toilet habits with wool and rosewater or a salt watersponge.
Hygiene “Dark Ages” 300AD – 1900AD:
- 476 AD: Romulus, the last Roman Emperor, was overthrown by the Germanic leader Odoacer, a Barbarian ruled Rome. Roman order of 1000 years was no more.
- 1308 Britain: The Barber removed problem teeth! A guide for Barbers was established, teaching barbers surgery skills.
- 1567: King James VI of Scotland wore the same clothes for months on end and did not take a bath as he thought it was bad for his health!
- 1580 – New developments in teeth cleaning by rubbing teeth with the ashes of rosemary, sage. Vinegar and wine for mouthwash. Barbers (Dentists) began to learn more about dentistry.
- 1800's: Doctors were offended at the suggestion that they should wash hands.
- 1833 – Sir Joseph Lister, Glasgow Royal Infirmary, a British surgeon and a pioneer of antiseptic surgery. He promoted the idea of sterile surgery.
- 1920 – Lysol was sold as a genital disinfectant and birth control method. A caustic poison causing burns and etchings. 

Epidemiology and Hygiene History; Notable Physicians:

Ignaz Philipp Semmelweis (1818-1865) was a Hungarian-German physician known as an early pioneer of antiseptic procedures. Described as the “Savior of Mothers”.

1847: Semmelweis discovered that the incidence of Puerperal Fever could be drastically cut by the use of hand disinfection in obstetrical clinics. He found students who assisted in childbirth did so after autopsies. He proposed the practice of washing hands with chlorinated lime solutions.

Deaths dropped by 20 fold. He published results where hand washing reduced mortality to below 1%.

Semmelweis’s observations conflicted with the established scientific and medical opinions of the time and his ideas were rejected by the medical community.

Doctors were offended at the suggestion that they should wash their hands.

In 1865, Semmelweis was committed to an Insane Asylum, where he died at age 47 of Pyaemia, after being beaten by the guards.

Semmelweis’s earned widespread acceptance only years after his death.

John Snow (1813 –1858) an English physician and a leader in the adoption of Anaesthesia and Medical Hygiene. He is considered one of the fathers of modern epidemiology, in part because of his work in tracing the source of a cholera outbreak in Soho, London, in 1854.

Louis Pasteur (1823 –1895) French biologist, microbiologist and chemist renowned for his discoveries of the principles of vaccination, microbial fermentation and pasteurization. He had remarkable breakthroughs in the Germ Theory of disease in clinical medicine. He is popularly known as the “father of microbiology”. 

Eduardo Liceaga (1839-1920) was a Mexican physician known as a “most distinguished hygienist of late-nineteenth century”. He established the General Hospital of Mexico. President of the American Public Health Association (1886). Dr. Liceaga wrote numerous scientific papers on hygiene and public health, medicine and surgery. President of the Board of Health of Mexico, he took an active part in writing the Sanitary Code of the City of Mexico. During his administration Rabies vaccination was established, Cholera, Yellow Fever, and Bubonic Plague were brought under control.

https://www.historylearningsite.co.uk/a-history-of-health-and-hygiene-timeline/
History of Washing 1980 - Present

It’s about Time!

- 1980s represented a landmark in the evolution of concepts of hand hygiene in healthcare. The first national hand hygiene guidelines were published in the 1980s.
- 1995 and 1996, the CDC/Healthcare Infection Control Practices Advisory Committee (HICPAC) in the USA recommended that either antimicrobial soap or a waterless antiseptic agent be used.
- 2000, Pittet et al. reported the experience of the Geneva’s University Hospitals with the implementation of a strategy based on several essential components and not only the introduction of an alcohol-based handrub. The study showed remarkable results in terms of an improvement in hand hygiene compliance improvement and HCAI reduction.
- 2007-2008 - WHO Hand Hygiene Improvement Strategy GUIDE TO IMPLEMENTATION recommendations precluded the present guidelines.

Washing and Hygiene Today

The CDC Clean Hands Count Campaign offers an education course and promotional videos for healthcare providers.

The Clean Hands Count Campaign aims to:
- Improve healthcare provider adherence to CDC hand hygiene recommendations.
- Address the myths and misperceptions about hand hygiene.
- Empower patients to play a role in their care by asking or reminding healthcare providers to clean their hands.

May 5th was World Hand Hygiene Day
What Pathogens are on the Hand?

**Bioload of the Hand:**
What did we touch?
Patients, HC Workers, Toilet, Medical Surfaces, Body Fluids, etc.
Types of Pathogens: Bacteria, Viruses, Molds, Spores, etc
Did Worker follow Hand Hygiene Protocol?
What is in the Tap Water?

**Common Bioload on the Hand:**
Staphylococcus, Streptococcus, Salmonella, Escherichia coli, Mycobacterium tuberculosis, Clostridium difficile, Fungi, Viruses, Spores and Protozoa.

**Hand Microbiome Study Data:**
Bacteria from four phyla are found across all studies of the hand microbiome (most to least relative abundance):
Firmicutes, Actinobacteria, Proteobacteria, Bacteroidetes.


What Pathogens are in Tap Water

*Warning: Tap Water contains Legionella and other opportunistic pathogens in building water systems.*

WHO WHY WHAT WHEN HOW

World Health Organization (WHO) has developed evidence-based WHO Guidelines on Hand Hygiene in Health Care to support healthcare facilities to improve hand hygiene and thus reduce HCAI (2009).

The 5 part WHO Multimodal Hand Hygiene

Alcohol-based Handrub

The 5 part WHO Multimodal Hand Hygiene Improvement Strategy

Promoting A System Change

Alcohol-based Handrub

1. Alcohol-based Handrub at the Point of Care
2. Training and Education
3. Observation and Feedback
4. Reminders in the workplace
5. Creating a Culture of Safety

7 Steps of Handwashing with Hand Sanitizer

- Step 1: Rub a small amount of hand sanitizer covering all hand surfaces and rub hands together.
- Step 2: Palm to palm
- Step 3: Right palm over left, scrub well.
- Step 4: Palm to palm, fingers between
- Step 5: Rub all fingers between hands
- Step 6: Rub hands together, ensuring all surfaces are covered
- Step 7: Rinse with soap and water, then wipe dry
WHO Alcohol-Based Handrub Techniques:
Are we ready to care enough about others to wash our hands?

Hand Hygiene with Alcohol-Based Handrub 3 mL
Purpose: Reduction of bacterial counts when hands are NOT visibly soiled
• Apply product to palm of one hand.
• Rub hands together. • Cover all surfaces of hands and fingers.
• Rub until hands are dry.

Alcohol hand rubs generally not enough to curb hospital infections!
Alcohol not effective vs non-enveloped viruses

FDA
• Rubs are leave-on products, or hand “sanitizers,” as well as antiseptic wipes.
• These products are intended to be used when soap and water are not available, and are left on and not rinsed off with water.
• Resistant bacteria and spores can hide in the sanitizer (gels).

WHO Handwash Hygiene Technique

Q: Are we ready to Care enough about others, to Wash our Hands?

Handwashing with Plain or Antimicrobial Soap
WHO Hand wash Hygiene Technique
“Caring about others”

Handwashing with Plain or Antimicrobial Soap

Purpose: Physical removal of soil and transient microorganisms, including bacterial spores:

1. Wet hands with water.
2. Apply soap to hands, per manufacturer’s directions.
3. Rub hands vigorously together for at least 15 secs.
4. Cover all surfaces of hands and fingers.
5. Rinse hands well to remove soap residue.
6. Dry with paper towel.
7. Use towel to turn off faucet.

Handwashing Technique - Wash Responsibly

Fingernails and Rings

- Pathogenic organisms can survive under and around fingernails.
- Trim Finger Nails before washing.
- Clean areas under fingernails if they are visibly dirty, and pay special attention to these areas when washing and/or use alcohol hand rubs for cleaning hands.
- Freshly applied nail polish does not increase the numbers of germs present, but chipped nail polish may harbor bacteria.
- Persons with artificial nails are more likely to harbor higher bacterial counts.
- Healthcare personnel who work in high risk areas should not wear artificial nails.
- Avoid / Remove Rings or Hand Jewelry.

Hand Hygiene Behaviors: Are we ready to care enough about others to wash our hands?

Hand Hygiene Initiatives by Healthcare Accreditation Agencies to Improve Hygiene Compliance

Most governmental agencies, the CDC and the World Health Organization have determined that healthcare-acquired infections must be reduced through enhanced hand washing and sanitation.
Hand Hygiene and CDC

According to the CDC: **Poor Hand Hygiene by Healthcare Employees is A Major Cause of Hospital-acquired Infections.**

**Estimate:** over 700,000 Hospital-Acquired Infections occur yearly in the U.S., causing as many as 75,000 Deaths after an inpatient stay.

Hand Hygiene

- Accreditation Agencies have recommended frequent and wash prior to and after patient contact.
- Since 2004, the Joint Commission has required facilities to implement and improve compliance with a national hand hygiene program.
- Sadly, in a recent hospital study, only 18% (9 out of 50) Surgical hand antisepsis observations were fully compliant with the recommended application techniques.

Hand Hygiene Implementation

**Let's Get Started!**
WHO 5 Moments for Hand Hygiene

- Before Touching A Patient,
- Before Clean/Aseptic Procedures,
- After Body Fluid Exposure/Risk,
- After Touching A Patient, And,
- After Touching Patient Surroundings.

WHO 5 Steps to Implementation 2007

Step 1: Facility Preparedness
Step 2: Baseline Evaluation
Step 3: Implementation
Step 4: Follow-up Evaluation
Step 5: Action Planning & Review
In 2008, the Joint Commission Center for Transforming Healthcare began work on addressing failures in hand hygiene.

Hand Hygiene Targeted Solutions
- The Hand Hygiene Project focuses on improving and sustaining hand hygiene compliance. Hand hygiene is critically important to safe, high quality patient care.
- To sustain improvement and make a difference, a simple slogan or campaign is not enough; demanding that healthcare workers try harder is not the answer.
- Comprehensive, systematic sustainable change is the only solution.

https://www.centerfortransforminghealthcare.org/

Joint Commission Zero Tolerance

Effective Jan 1, 2018 TJC has established a strict Zero Tolerance for Poor Hand Hygiene.

Joint Commission Zero Tolerance for Poor Hand Hygiene
- If the Joint Commission’s surveyor spots even a single staff member not washing the hands per protocol, then the “One-strike-and-you’re-cited” initiative will be applied.
- Both Hospitals and Ambulatory Surgical Centers must comply with new standards in Hand Hygiene Compliance.
- Rationale: Facilities have had more than a decade to create and monitor the effectiveness of their hand hygiene programs and it is now time for assessment of penalties for failure to comply.
- Sustaining and spreading a culture of hygiene improvement is now the norm. Lowering HAI rates to Zero or near-zero is the goal.
Hand wash Monitoring

- Hospital Acquired Infections (HAIs) are a global concern. HAIs cost US hospitals an estimated $9.8 billion/year.
- Compliance with recommended hand hygiene (HH) guidelines by Healthcare Workers is needed to reduce the spread of HAIs.
- An effective measure of compliance is elusive.
- Hand Wash Guideline Compliance is currently POOR (40% per CDC), forcing hospitals to implement controls.
- Data is lacking and handicaps a hospital’s ability to improve this metric and reduce the spread of infections.
- Direct Observation of hand sanitation by Trained Observers is the current standard for monitoring compliance, which requires paid human observers, is costly, sporadic and can be biased.
- Monitoring Options include: Electronic Hand Washing Monitoring for hand hygiene compliance using a monitoring App. Real-Time using a hospital’s Wi-Fi network to transmit information. Many companies are developing such devices.

Hand Hygiene Compliance Monitoring Systems

Examples:
Many Commercial Systems are electronic, wireless, data driven.

- https://home.swipesense.com/
- http://cleanhands-safehands.com/
- https://debmed.com
- https://www.centrak.com/handhygiene-compliance/
- https://www.airistaflow.com
- http://ir.hillrom.com/releasedetail.cfm?releaseid=919668

Hand Hygiene Initiatives

- Need Leadership engagement
- Healthcare workers hand hygiene compliance must be hardwired.
- Hand hygiene can be improved with a concentrated effort
- A variety of motivators are needed to reach all types of people
- A substantial auditing program is required to measure performance
- All staff must be accountable
Introduction to Old and New Methods of Achieving Successful Hand Hygiene:

Methods and Agents:
1. Soap alone
2. Alcohol
3. Chlorhexidine
4. Povidone-iodine
5. Bleach
6. Peroxide
7. Ozonated Water

Hand wash Options for Surgical Scrub

Soap and Tap Water Scrub

- Soap is a surfactant that suspends microorganisms and physically removes them with a water rinse.
- Cleaning is due to the physical removal of foreign material or microorganisms.
- Plain soap does not kill microorganisms.
- Not effective alone for surgical sanitation.
- Dermatitis and other skin irritation can occur.
- Tap water can carry its own forms of pathogens and chemicals. Legionella, Salmonella, Water-borne toxins.
**Bleach**

*Bleach - Sodium Hypochlorite Solution:*
- Sodium Hypochlorite denatures proteins in micro-organisms and is effective in killing bacteria, fungus and viruses.

**Toxicity:**
- On skin: causes irritation, drying, burns.
- Inhalation of bleach fumes can damage the lungs.
- Not used in the Eye or as a Scrub agent.
- Bleach splashed in the eyes can cause corneal damage.

**Environmental Consequences of Chlorine:**
- May generate chlorinated volatile organic compounds.
- Chlorine itself usually does not cause environmental harm, but it combines rapidly to form chemicals eg Dioxins that pollute water.

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**Isopropyl Alcohol** is a Broad based anti-microbial.
- FDA recommends it only when soap and water not available.
- Not effective against non-enveloped viruses and spores.
- All rubbing alcohols are volatile and flammable
- Poisoning can occur from ingestion, inhalation, absorption, or consumption.

Industry is still trying to reformulate solutions:

> Development and evaluation of a new alcohol-based surgical hand scrub formulation with persistent antimicrobial characteristics and brushless application.


**US Legislation for Denatured Alcohol:**
To prevent alcohol abuse, all preparations classified as Rubbing Alcohols (containing ethanol) must have poisonous additives to limit human consumption in accordance with the requirements of the US Treasury Department, Bureau of Alcohol, Tobacco, and Firearms, using Formula 23-H (8 parts by volume of acetone, 1.5 parts by volume of methyl isobutyl ketone, and 100 parts by volume of ethyl alcohol). 87.5-91% by volume of absolute ethyl alcohol. The rest consists of water and the denaturants, color additives, perfume oils, sucrose octaacetate or denatonium benzoate, suitable stabilizer.

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**Povidone-Iodine Scrub**
- *Iodopovidone* antiseptic used for skin disinfection before and after surgery. Used both to disinfect the skin of the patient and the hands of the healthcare providers.
- *Povidone-iodine* works by releasing iodine onto organism cell wall.
- *Broad range* of activity against bacteria, fungi, protozoa, viruses given enough contact time in vitro. Bacteria Resistance is rare...
- Commonly combined with alcohol.
- Eye: *Povidone-iodine* turns the eye brown for a few minutes proving that it has been applied. I am unaware of any controlled randomized trial of the use of povidone-iodine to treat ocular infections.
- Eye: In the appropriate concentration, it is not toxic to the eye, as are other iodine bearing compounds.
Hydrogen Peroxide Scrub

Hand: Hydrogen Peroxide (H2O2)
is an oxidizing agent. Has antiseptic properties, but the challenge has been to stabilize peroxide in a commercial preparation, eg foam H2O2 hand wash.

- Eye: Hydrogen peroxide is an effective and commonly used contact lens disinfectant that is also used as a preservative in certain ocular medications.
- Study 1991: Corneas with intact epithelium did not allow the H2O2 fluid to cross in, even with the lenses containing the highest (20 mM) concentration of peroxide. Optometry and Vision Science: Official Publication of the American Academy of Optometry [01 Jul 1991, 68(7):546-551]

Chlorhexidine Scrub

Hand wash Options: to disinfect the skin of the patient and the hands of the healthcare providers.
- Chlorhexidine is a Broad based anti-microbial antiseptic agent.
- Exhibits bactericidal activity against a wide range of microorganisms.
- Unlike bleach, chlorhexidine is safe to use on the skin and other bodily surfaces.
- The potential for producing skin reactions is extremely low. Possibly cause dermatitis, anaphylaxis and skin irritations
- May have environmental consequences. Concerns with Aquatic Toxicity.
- Available as a Hand Antiseptic with Moisturizers; eg Chlorhexidine Gluconate 1% Solution and Ethyl Alcohol 61% Surgical Rub.

Ozonated Water Surgical Scrub

Hand wash Options:
- Ozonated Water is an Oxidizing agent, like Peroxide.

Aqueous Ozone = Ozonated Water
- Easy to use, just Soap and O3 Water
- Effective against all known pathogens, on contact.
- Highly Effective depending on Contact Time.
- Prevents the transmission of disease.
- Easy substitution for sterile water.
- Effective at low concentrations, no adverse effects on skin. No environmental consequences
- O3 is an unstable molecule and returns to plain water within minutes.
- Affordable.
Ozone Water for Hand Sanitation:
A “new” Technology is here

Ozone Long History and Uses

- Greeks noticed the “Ozein” odor after lightning strike.
- Ozone (Triatomic Oxygen) was discovered in 1780s.
- First Municipal Water Ozone Installations at Oudshroom, Netherlands (1893) Niagara Falls, USA (1903) and Nice, France (1906). Los Angeles installed in the early 1980’s.
- 1996 FDA approves O3 to wash chicken.
- 2011 FDA approves direct contact on meats and food.
- EPA lists Ozone as DBPR Compliant.


Considerations consistent with WHO Guidelines:

- Need Access to O3 Water at a Hand Sanitizing Station.
- Wash per Protocol.
- Promotion of Compliance with Hand Hygiene Protocol is of greatest importance.
- Skin irritation: (dryness, odor, dermatitis, damage) and allergies are RARE.
- Use Skin emollients to keep skin healthier.
Handwashing @ Surgery Center in California

ASC in Fullerton, CA has implemented enhanced compliance with hand wash protocol.

In 2016, Ozonated Water Stations were installed at Surgical Nursing Station, Surgical Scrub Station and Clean/Dirty Utility Room.

Handwashing – In the Medical Office

Pain Center in Fullerton, CA, Cares for chronically ill Pain patients.

One Back Office Ozonated Water Faucet Station Unit was installed in 2016.

Employees, nurses and doctors have been preferentially using these ozonated water faucets at these facilities, as compared to the non-ozone faucets.

Ozone Water Negatives:

- "FDA approval" means that the FDA has decided the benefits of the approved item outweigh the potential risks for the item’s planned use. FDA classifies medical devices based on the risks associated with the device. Slow process.
- Devices are classified into one of 3 categories—Class I, Class II, and Class III.
- O3 Not yet fully FDA approved as a drug/antiseptic.
- Currently Class 1 Device.
- Class 2 is pending: for use as antiseptic.
- Currently physicians use it as “Off Label” technique.
- Requires under sink retrofit of a new faucet device.
- User must test O3 output concentration.
- Use Cool water temps, normal pH.
But Wait!  
What is Ozone?

**Oxygen vs. Ozone**

<table>
<thead>
<tr>
<th>Oxygen O2</th>
<th>Ozone O3</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Color</td>
<td>Bluish Color</td>
</tr>
<tr>
<td>32 Mol. Wt.</td>
<td>48 Mol. Wt.</td>
</tr>
<tr>
<td>No Odor</td>
<td>Clean smell</td>
</tr>
<tr>
<td>183 degrees C Boiling Point</td>
<td>112 degrees C Boiling Point</td>
</tr>
<tr>
<td>Nonflammable</td>
<td>Nonflammable</td>
</tr>
<tr>
<td>Oxidizes metals</td>
<td>Degrades some Materials</td>
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**Ozone Water can be made by a Point of Care Faucet Device**
*(Under the workstation sink)*

Ozone (O3) Tri-Oxygen is induced by an electrical charge between two plates. 
**Coronal Discharge** creates Ozone in water.
How Ozone Kills

- Ozone O₃ contacts the outer wall of the cell. (Bacteria, Fungus, Viruses, Spores, Protozoa)
- O₃ bonds with the organic compounds in the cell wall.
- Ozone penetrates the cell membrane oxidizing the cell wall, destroys the integrity of the cell causing it to fall apart and die. In milliseconds, the kill is complete. Ozone continues to oxidize the pathogen and any released organic components.

Why is Ozone Water Beneficial?

Ozone is Nature’s most powerful oxidizer.
- Ozone Water: Effective Anti-microbial Disinfectant.
- Disinfects and Sanitizes without Chemicals.
- Kills Bacteria, Fungus, Viruses, Spores On Contact.
- More Effective Than Chlorine. = Equal to Chlorhexidine.
- Ozone at 0.8 – 1.4 PPM is safe and effective.

- Ozone is Environmentally Friendly and Green.
- O₃ decomposes into Oxygen O₂. Safe.
- Ozone does not produce by-products or chemicals.
- Ozone has no effect on pH levels.
- O₃ works best at cooler water temperatures. No Hot Water Needed.

Measuring Bioload... ATP

Bioload is Living Tissue, Dead Tissue, Blood, Mucus, Bacteria, Mold, Viruses, Spores, Parasites, Skin, etc.

Bioload can transmit infection.

Adenosine Triphosphate: ATP is a nucleotide that is the primary source of energy in all living organisms.

We measured ATP as a indicator of Bioload.
We decided to Test and Measure the Effectiveness of Ozone Water in the Healthcare Setting.

- In 2017, we conducted a series of Ozone Water Studies using ATP Levels as a Measure of Bioload contamination on Hands, Surfaces, Instruments and Skin.

Hand Hygiene Skin ATP Study Jan 2017

Hand Washing with Tap Water and Soap vs. Ozonated Water and Soap vs. Antiseptic and Ozonated Water vs. Antiseptic and Tap Water. A Unique Comparison in regard to Adenosine Triphosphate (ATP) Reduction on the Skin, as a Measure Of Biologic Material Reduction

By Alvaro Liceaga MD, Elvin Mercado CST.; Mary Narcaroti R.N.MSHA; Lisa Liceaga B.S.

Percent ATP Reduction Rate

Ozonated Water with Soap vs. Ozonated Water with Hibiclens vs Tap Water with Soap vs Tap Water with Hibiclens

Remaining 2.5% is Skin ATP
Ozone Water in Hand Hygiene

It is believed that the new development and availability of Ozone water at the point of care, may help change the future of hand hygiene in the US and the world.

- Ozone Water is an Effective Anti-microbial Disinfectant.
- O3 Kills Bacteria, Fungus, Viruses, Spores On Contact.
- Disinfects and Sanitizes without Chemicals.
- O3 decomposes into Oxygen O2. Safe.
- Ozone does not produce by-products or chemicals.

Tap Water

2017, CMS expects Medicare Certified Healthcare Facilities to have water management policies and procedures to reduce the risk of growth and spread of Legionella and other opportunistic pathogens in building water systems.

Healthcare facilities are expected to comply with CMS requirements to protect the health and safety of its patients. CMS will cite non-compliance accordingly.

Contact: For questions regarding this policy memorandum, please contact Dr. Daniel Schwartz at Daniel.schwartz2@cms.hhs.gov.


Effective June 2017.

Interestingly, there is a solution.

Ozonated Water Technology at the Hand Sanitizing Station can Achieve the Goal of Eliminating Legionella in Water from facility faucets.
What about Hand Health with such frequent washing with Ozonated Water?

Employees were asked to evaluate the condition of their skin after frequent use of ozone water and soap.

Survey Summary:
- No employee or staff member complained that there was additional irritation to the skin.
- No reports of rashes, fissures, lesions, boils or other manifestations of skin irritation.
- Many noted pleasant and soft skin sensation after each use.
- Many commented on pleasant smell after washing.
- 2 staff suffered from chronic Eczema and washing with ozone water actually improved their condition through better hygiene.
- Impression: No significant irritation to the skin despite frequent handwashing.

Take Aways:
- Change the Hand Hygiene Culture
- "Care" about others
- Monitor Compliance and Outcomes
- Develop and Use New Technologies
- Be Compliant with Guidelines
  1. Promote Training and Education
  2. Observation and Feedback
  3. Use Workplace Reminders
  4. Promote a Culture of Safety