Safe Sensor Tech Keeps Hospitals Healthier

The current state of point-of-use sensor technology

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In a hospital, patients, visitors, doctors and nurses have one thing in common: each depend on the facility to consistently provide safe water. Water quality dictates both the level of hand hygiene and hand-washing practices and the risk level of waterborne pathogen hospital acquired infections (HAIs).

Why is hospital water safety essential? The risks around unsafe water are too great. Hospitals and other health care settings:

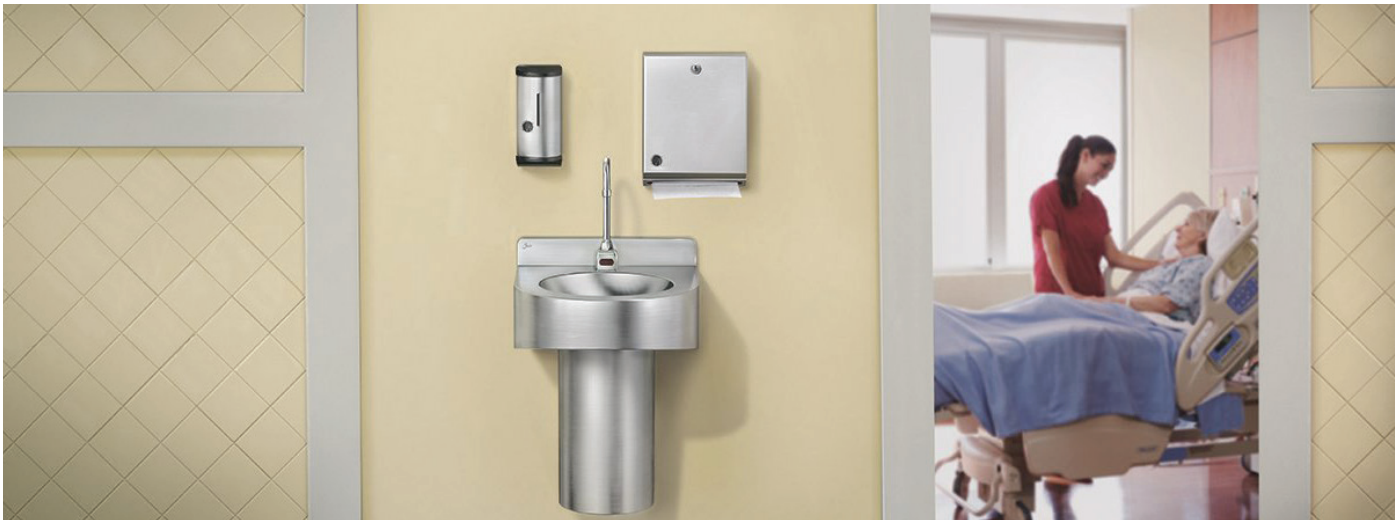
1. House people with weakened immune systems, which makes them more vulnerable to HAIs
2. Serve as a breeding ground for germs and disease-causing pathogens which then transfer via surfaces, points of use and other people
3. Have complicated plumbing systems that create an environment of water stagnation, biofilm and pathogen proliferation

The American Medical Association notes that hospital water is "perhaps the most overlooked, important and controllable source of nosocomial infections," while the Centers for Disease control says that water is a cause of up to 30% of HAIs.

Let's take a moment to look at the numbers that highlight the urgent need to deliver safe water consistently in hospitals.

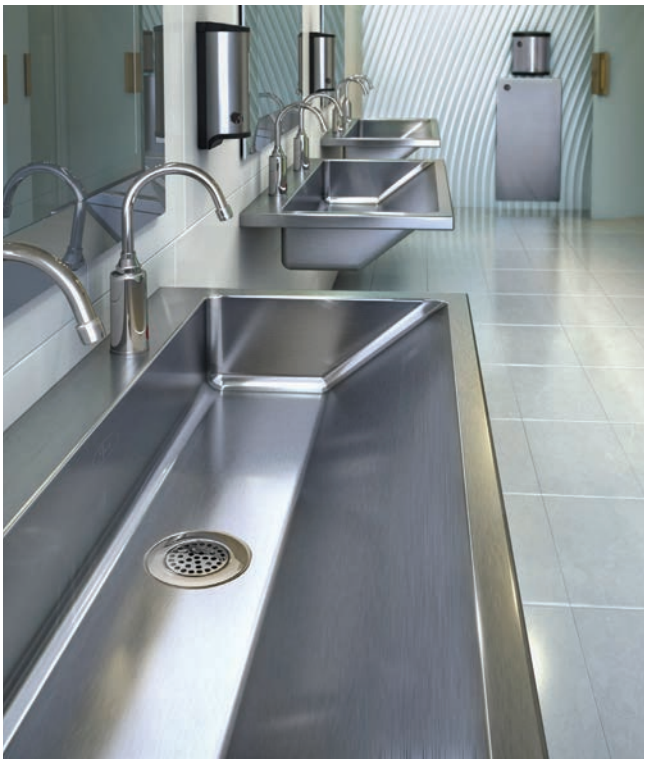
Poor water quality leads to avoidable HAIs and deaths

- Approximately 1.8 million patients (10% of the hospitalized population) contract HAIs every year, and nearly 99,000 of them die.
- The World Health Organization states that 10 out of the 12 bacteria that pose the greatest risk to human health are attributable to water.
- Although Legionella outbreaks often lead in the headlines, other pathogens pose a great risk. According to the CDC, Pseudomonas aeruginosa is responsible for 32,600 hospitalizations, 2,700 deaths and $767 million in healthcare costs in 2017. Sources for Pseudomonas, Stenotrophomonas maltophilia and mycobacteria include potable water and hot water systems.
- There are an estimated 70,000 Legionnaires' cases each year. The Centers for Medicare and Medicaid Services found that the average cost to treat a Legionella case is $86,000.



Poor water quality negatively effects hospital financials

- The built environment is directly related to patient satisfaction. Research on how the physical environment affects health outcomes began in the 1980s. Since then, according to the AHA, more than 600 studies have linked hospital-built environments to patient satisfaction, stress, health outcomes and overall health care quality. Place, or the physical environment of a hospital, is the third component to AHA's patient satisfaction approach. They note, "Creating a comfortable place for patients to get well again is integral in ensuring that they will leave the hospital with a positive outlook."[2]
- HAIs lead to longer length of stay (LOS) which drives up non-reimbursable costs. The average LOS for patients without an HAI is roughly five days. Average LOS increases to 17 days for patients with an HAI. 42% of patients with an HAI are readmitted within 30 days.[3] Under the Patient Protection and Affordable Care Act, CMS can penalize hospitals for high infection rates by tying reimbursements to readmissions, mortality rates and patient satisfaction scores.



Poor infrastructure and design leads to HAIs and their associated costs.

- New waterborne disease challenges have emerged, including aging infrastructure and chlorine-tolerant and biofilm-related pathogens, have led to approximately 7.15 million waterborne illnesses annually, resulting in 118,000 hospitalizations and incurring $3.33 billion in direct healthcare costs. This amount included $1.33 billion in commercial insurer payments, $1.52 billion in Medicare payments and $284 million in Medicaid payments.
- Most hospitalizations and deaths were caused by biofilm-associated pathogens, including nontuberculous mycobacteria, Pseudomonas and Legionella, costing $2.39 billion annually. Pseudomonas had the highest cost per hospital stay at $38,200.[4]

Point-of-use faucet and shower outlets are the hub of water hospital activity. Point-of-use outlet design has improved tremendously throughout the years in the form of materials, shapes and functions, making the delivery of water more user-friendly and safer. However, sensor technology is the number one innovation that can leapfrog hand-washing water safety practices and significantly reduce the risk of waterborne pathogen HAIs.

Sensor touchless technology has been around for decades but compared to other industries hospitals have been slow adopters of sensor technology faucets and showers. Initially, sensor faucets were adopted throughout commercial spaces to reduce the "gross" germ factor, making it possible for people to wash their hands without touching the outlets. This benefit intensified during the COVID era and has continued.

During initial adoption into the healthcare market hospitals saw the benefit of touch-free handwashing. However, some in the industry began to suspect that sensor faucets could be increasing the risk of bacteria and waterborne pathogens. This concern was validated in John Hopkins' 2011 publication, "Latest Hands-Free Electronic Water Faucets Found to Be Hindrance, Not Help, In Hospital Infection Control."

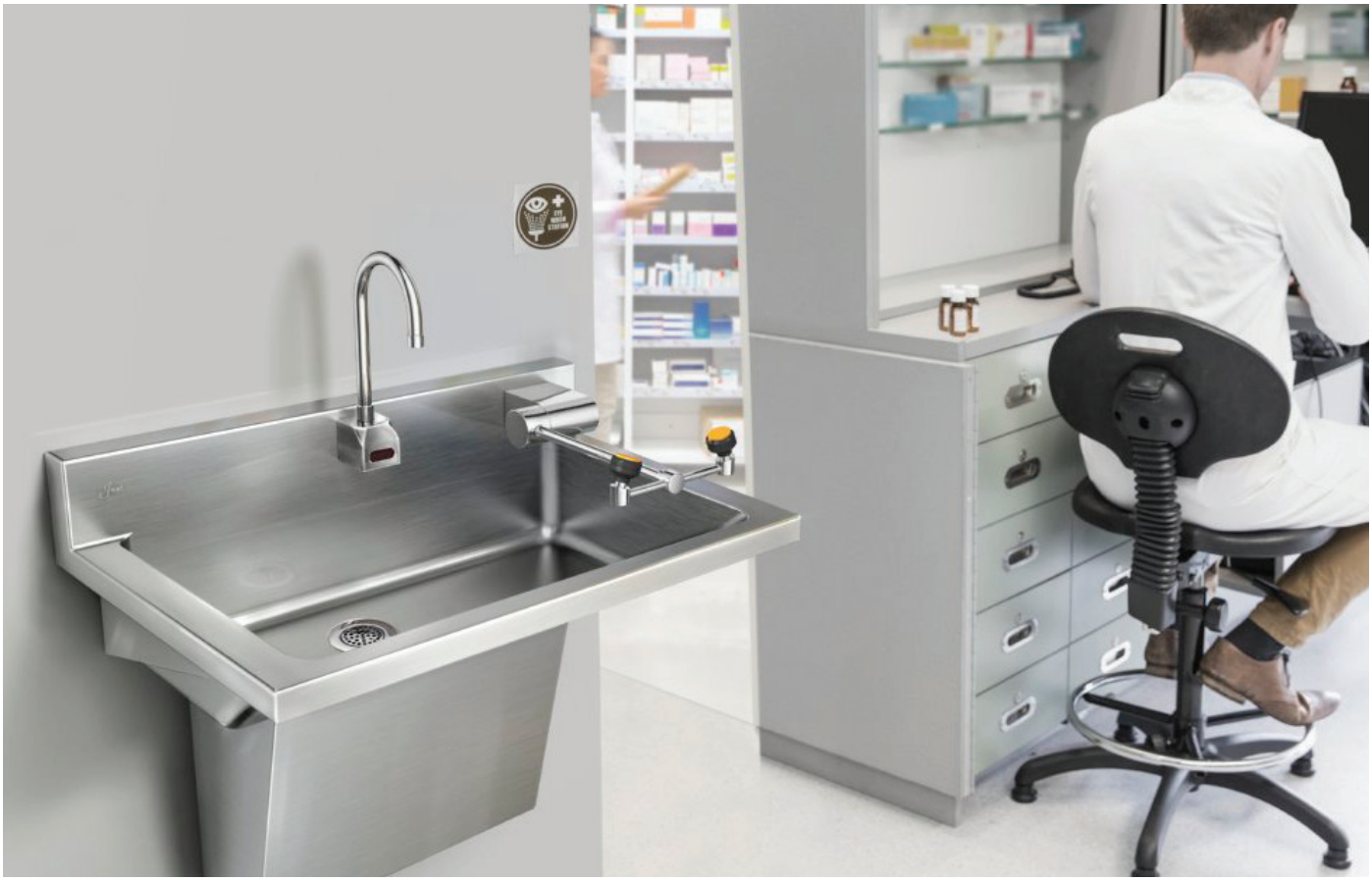
The hospital had installed touch-free faucets to lower germ-transfer and decrease daily water consumption. Upon culturing outlets, they found Legionella growing in 50% of water samples in 20 electronic eye faucets, compared to finding Legionella in 15% of 20 traditional,

manual faucets. Weekly water culture results showed twice the bacterial growth in the electronic models compared to the manual faucets. The hospital was unable to determine the specific reason for higher bacterial growth in the sensor faucets but suspected the valve component complexity offered additional surfaces for bacteria to become trapped and grow.[5]

Since the 2011 John Hopkins study, sensor technology and design has improved significantly, with fewer components, more simplistic design, more hygiene-friendly and less corrosive materials, and less surface area reducing the risk of bacteria growth. Connected developments include the ability to conduct auto-flushing protocols, manage and maintain temperature, regulate and monitor flow, and provide data and analytics that lead to predictive maintenance, increased compliance with the Joint Commission and the CMS Mandate, and provide proof of proactive measures to increase defensibility. These new design developments are now accepted by the industry to help reduce the risk of Legionella and other bacteria.

The healthcare industry can now confidently receive numerous benefits through faucet and shower sensor technology. To maximize the potential benefits of sensor technology, hospitals must consider multiple factors in choosing and implementing sensor housing point-of-use outlets. Here are the six rules to follow to choose the most beneficial sensor technology for a hospital or healthcare facility. Choose solutions that:

1. **Improve ROI through reduced labor expenses and increased operational efficiencies**
2. **Reduce the risk of Legionella and other waterborne pathogens**
3. **Decrease germ transfer, improve hand-washing practices, and improve overall hand hygiene**
4. **Allow the facility to make decisions based on performance and valued insights**
5. **Increase compliance and defensibility**
6. **Improve patient, visitor, staff experience and satisfaction**



IMPROVE ROI THROUGH REDUCED LABOR EXPENSES AND INCREASED OPERATIONAL EFFICIENCIES

There are four main avenues of increasing ROI through premise plumbing point-of-use sensor technologies:

1. Reduce manual labor by eliminating time-consuming tasks

Facility teams continue to shrink while the square footage they are responsible for continue to rise. Infection control professionals are burdened with hundreds of responsibilities. Environmental services teams struggle with employee turnover and lack of training for certain monitoring needs. These challenges highlight the need to reduce manual tasks that are time and labor intensive that can easily be met with connected solutions.

Sensors that include the ability to deploy and monitor safety protocols including flushing (for stagnation), temperature, and flow decrease the burden of facility, infection control and environmental services teams.

Consider a manual flushing protocol program for a 300-room hospital with two outlets per bed. If each room was flushed once a week, with thirty minutes allocated per room for flushing and traversing the building at a $30 per hour labor rate, the hospital would have wasted 78 hundred manhours at an annual cost of $230,000. At $50 per hour, the annual cost rises to almost $400,000.

Over a ten-year span, the hospital would have wasted 78 thousand manhours and spent $2.3 million.

Smart auto-flushing devices remove the need for an employee to manually flush each outlet. The facility team can remotely activate the agreed-upon flushing protocol.

The same logic can be applied to a team member having to walk room-to-room checking and recording outlet temperatures.

2. Increase Ease of Installation & Maintenance

The old adage “time is money” still holds true. Staying with the example of a 300-room hospital with two outlets per room, if a facility team can save only a few minutes per installation of each faucet they would save hundreds of manhours and substantial money.

General design choices can also save a facility time and money. Sensor faucets are generally available in above-deck and below-deck design options. Above-deck solutions can reduce installation and maintenance time because there isn’t an additional component to mount or maintain below the sink.

Connected sensor technologies can reduce maintenance time and money on both below-deck and above-deck designs. Connected technology allows the facility team to access and adjust settings on the solutions without having to disassemble enclosures. This again reduces manual labor hours and dollars, while allowing the facility team to gain usage insights, make better maintenance decisions and improve scheduling.

Fewer parts and components mean fewer parts and components that can potentially break or malfunction. Designs with fewer and higher-quality components will lower maintenance strain and the time to repair and replace.

Solutions that work for both new construction and retrofit applications should be given a higher consideration. Installing sensor technology in retrofit applications can result in large savings because there are lower upfront purchase costs, it takes less time from the facility team for installations, and it causes fewer interruptions to staff and patients.

3. Provide insights to aid in predictive maintenance and water safety decisions

Connected sensors give invaluable data and insights to the facility, infection control and environmental services teams. Insights include water usage, water flow, temperature fluctuations and hand-washing practices. Real-time insights on these data points allow teams to make better decisions more quickly leading to better safety, increased efficiency, water conservation and greater reliability throughout premise plumbing operations.

Maintenance practices and schedules can become more efficient. Equipment lifecycle costs can be decreased. Safety measures and decisions can be made on real-time water quality parameters. These predictive maintenance practices have been shown to increase productivity by 25%, reduce equipment breakdowns by 70%, and lower maintenance costs by 25%.[6]

4. Create the optimal balance between conservation and safety

Along with safer water, connected faucets and showers can help reach sustainability goals. This is achieved through automatic flushing protocols to eliminate water stagnation concerns, effective metering options, and leak detection and prevention.

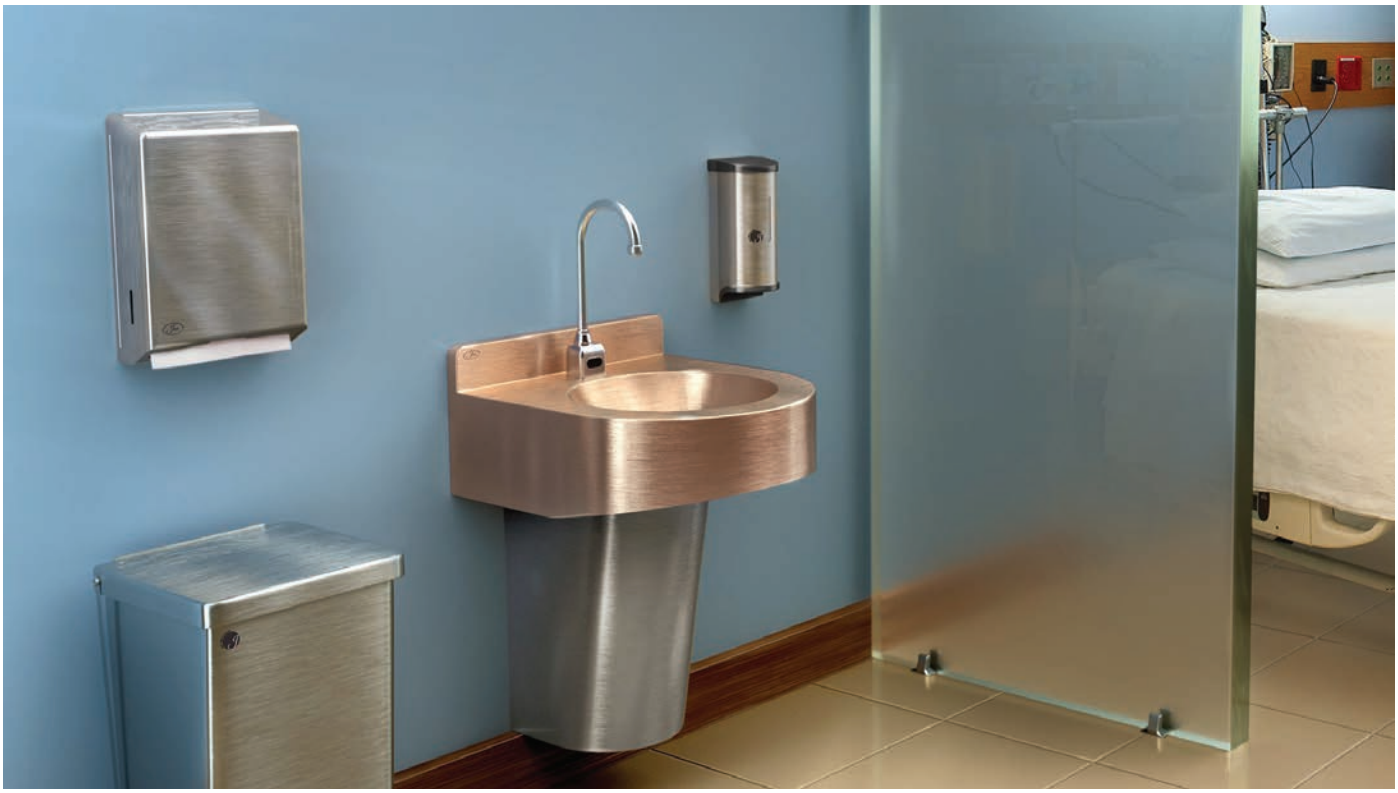
Sensor faucets and showers should be technologically enabled to deploy auto-flushing protocols to reduce water stagnation. The technology should include multiple scheduling options so hospitals can choose the option that best fits their combined safety and conservation goals. Options include auto-flushing on multiple pre-determined schedules regardless of outlet usage and auto-flushing based on outlet usage.

Sensor faucets should be technologically enabled to deploy an array of metering options. Metering options should consider two elements: the type of outlet and the personal experience. Time of water output and pressure of outlet needs will vary depending on the type of fixture. For example, a scrub sink has different requirements than a patient room sink or public bathroom. Metering options should include not only personal preference but meet all regulatory requirements.

The personal experience for patient, staff, and visitor satisfaction is important. People expect and demand a good experience at the sink. Metering options should meet the requirements of a positive user-friendly experience, ensuring the water runs long enough, at the desired temperature, and with the correct pressure while also meeting the goals of the facility's sustainability and safety requirements.

Sensor faucets and outlets should have leak and flood detection and prevention, including the ability to notify personnel with alerts and warnings. Facilities should consider automatic faucets with pre-set timeouts that have adjustable intervals, which can save hospitals money by preventing flooding, water damage and mold, which can lead to lost revenue if surgical suites or wings need to be closed. Avoiding this also means savings come in the form of decreased insurance premiums, avoiding remediation and reducing claims and lawsuits from slips and falls. Both internal and external fixtures and outlets should have leak and flood detection capabilities, regardless of whether they are public or facility-facing.

The average return on investment for sensor devices is approximately 30% depending on water costs. Dependent on water costs payback period is usually between three and six months. Water consumption can be reduced by as much as 50% depending on deployed settings.



REDUCE THE RISK OF LEGIONELLA AND OTHER WATERBORNE PATHOGENS

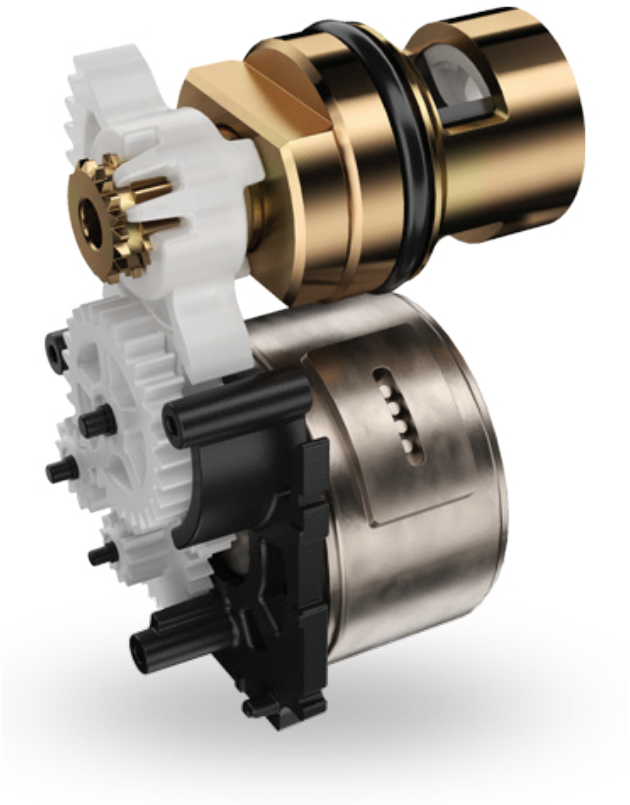
Sensor technology succeeded at decreasing germ transfer by ending the need to touch the faucet, but were not designed to reduce the risk of waterborne pathogens. Previous solutions included too many components and design choices, which led to a greater risk of stagnation, biofilm development, and the potential to transmit bacteria-filled water by touch, inhalation or aspiration.

Early sensor faucets and showers had an increased number of internal components and more surface area and crevices where water stagnation and biofilm accumulation could occur. Some features that aided in complexity and bacteria proliferation included solenoid operations, aerators, inefficient sensor activation, and overall design complexity. However, recent sensor technology has offered better solutions that eliminate or greatly reduce the downsides of past designs and components, leading to a steady stream of point-of-use sensor technology adoption at hospitals.

Design Improvements. There are two general types of sensor product actuation - solenoid and motor-gear operation. How do solenoid sensors work? Solenoid technology combines an infrared sensor, solenoid valve, power source, and electronics module to physically start and stop waterflow, using push/pull movement. Once it senses an object's presence in front of the faucet or flush valve, the solenoid pulls open to initiate the flow of water. When the object is no longer present, the sensor and control electronics push the solenoid valve to terminate the flow of water, but only after a predetermined time has passed.

Another differentiator is the location of the technology. Solenoid valves are positioned in the direct path of the water flow to properly sense the user. This can be problematic over time as dirt and debris accumulate. When that does occur, the fixture may cease to actuate, leading to repairs or replacements.

Gear-operated faucets and flush valves remove the solenoid from the waterway using a ceramic disc. Solenoid free, motor-gear ceramic operation sensor faucets eliminate old compression sealing technology. There are fewer moving parts to disrupt the water pathway and less wear on the system, which adds up to a longer lifespan.



The ceramic disc cartridges wipe against each other in a way that self-cleans and prevents debris buildup. TPE-constructed components, such as the diaphragm, gaskets, and seals, resist corrosion. The combination of these attributes and components allows motor-gear solutions to tack on more years to their lifespan—typically lasting around one million cycles more than solenoid operated solutions.

More importantly, this technology minimizes the number of moving parts in direct contact with the water and optimizes flow path to prevent trapped stagnant water and biofilm development. Fewer components reduce the risk of waterborne pathogens because there is less surface area and fewer crevices for water to become stagnant and biofilm to form.

Added features take the benefits from the maintenance team to the patient experience. The technology's soft-close activation and slow and steady turn of the gears create prevents water hammer and creates a seamless, quiet flow.

Motor-gear faucets tend to deliver greater precision. Ergonomically designed, their downward and forward angled IR sensors precisely detect users without delay, creating an intuitive user experience without wasting water. This improves the patient experience.

Multiple Power Options. Facilities need sensor faucets to have multiple power options. Multiple options provide flexibility in retrofit and new construction applications.

Facility teams can choose a technology with the option that best suits their team size and capacity for maintenance. Battery-operated devices and self-generating power devices require less demand on the facility team by limiting the need to manually replace batteries. Battery-backup options can provide peace of mind for a consistent and reliable option, while reducing demands on the facility team. Working with the internal IT team, facility teams can choose the best method to connect the devices.

There are also sensor faucets that improve energy efficiency by providing their own continual energy source. Energy is harvested through the water flowing through the faucet via a hydrogenator which can operate the sensor and deliver up to 10 years of uninterrupted battery life. As few as four uses a day generates enough power to operate the sensor with power flow optimization. High-efficiency power flow optimization creates maximum power at the lowest industry flow rates down to 0.35 gpm to 0.5 gpm. At low flow rates all water passes the nozzle and the turbine, at higher flow rates the bypass valve opens to reduce the pressure loss.

Auto-Flushing. Flushing should be a critical component in all hospital water management plans. Hospitals should choose point-of-use sensor technology that includes auto-flushing capabilities based on a predetermined schedule and based on usage. Auto-flushing is a key activity that can improve water quality and reduce the risk of Legionella and other waterborne pathogens. Sensor technology enables hospitals to easily implement and execute a successful flushing protocol.

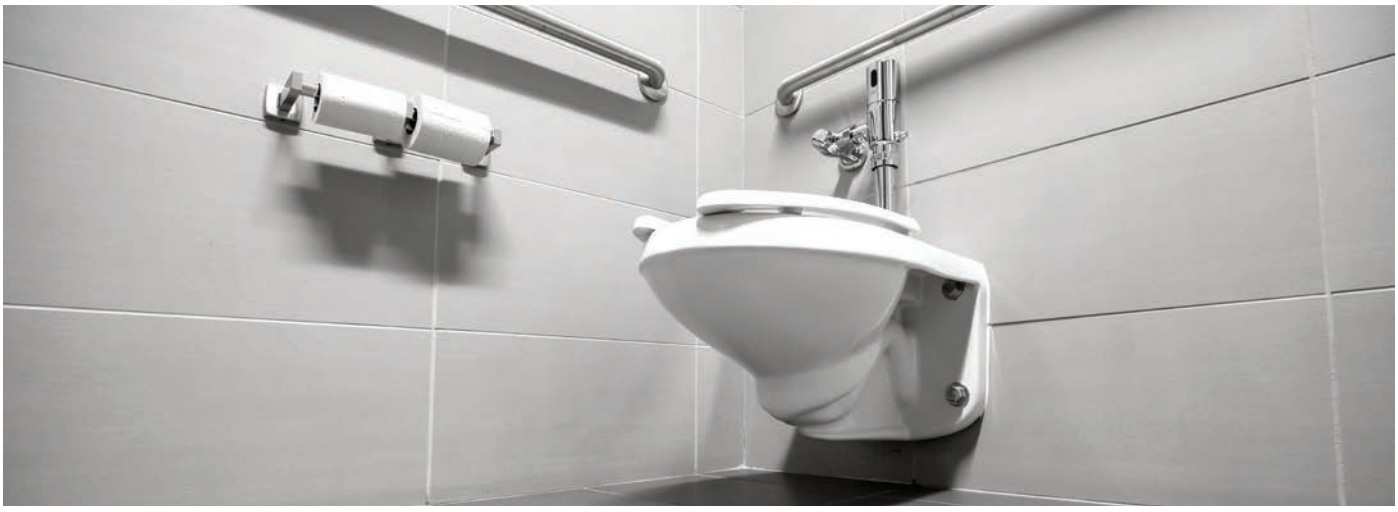
The industry agrees that flushing improves water quality, reduces water age, increases the circulation of disinfectant, and can aid in temperature regulation — which can reduce Legionella and other waterborne pathogens.

Foremost, flushing increases patient safety. Hospitals that activate industry best practices and utilize auto-flushing devices ensure their flushing program most effectively reduces the risk of poor water quality, meets current requirements, standards, and guidelines, and provides a record of flushing activity for defensibility needs.

The most common best practice utilized by hospitals is flushing each outlet (faucets and showers) five minutes on both the cold and hot lines. Some facilities choose to flush the cold side for five minutes and flush the hot until it reaches the maximum temperature (as designated in their water management plan), and then flush for an additional two minutes.

There are variances in how often to flush. Many hospitals and other facilities have implemented a weekly flushing protocol. This practice does not consider occupancy or outlet usage. Other facilities choose to flush based on occupancy. Often this would take place at the time of room turnover.

Facilities with connected sensors can also monitor the exact usage of each outlet, and implement flushing at specific outlets when usage is low or at zero over predetermined times, as outlined in their water management plan.



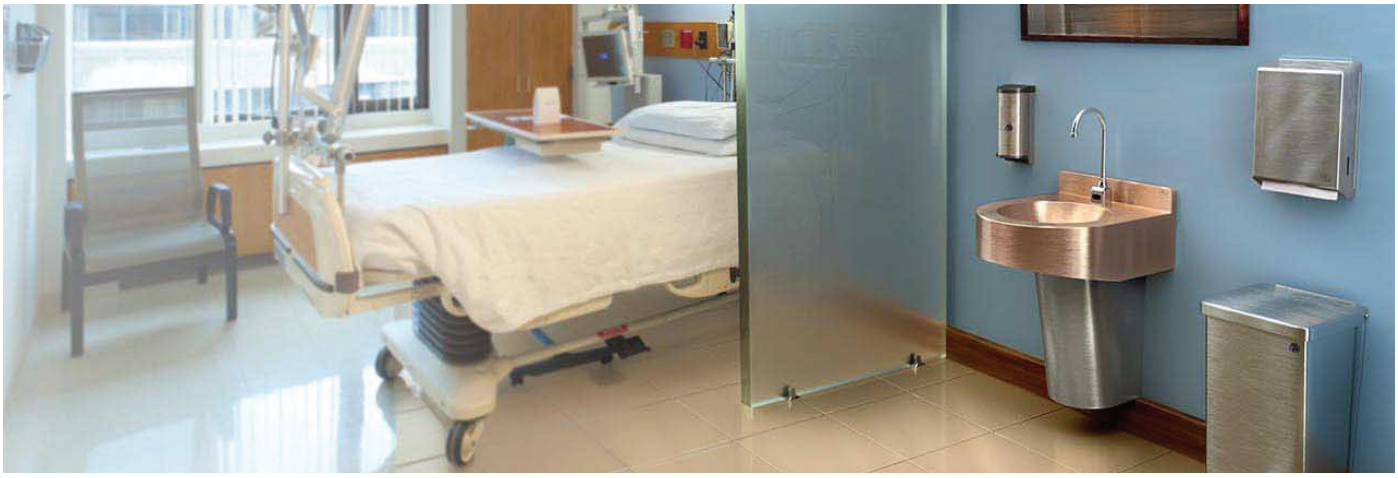
No matter what flushing schedule a hospital adopts, a key to success is required documenting of all activity. Sensor technology makes documentation easy to execute. All details of the plan should be documented, including the schedule, flushing time requirements for both hot and cold water, outlets to be flushed, and in the case of flushing based on inactivity, the definition of inactivity.

Once the protocol has been determined in the water management plan, ongoing documentation of activity must be recorded. Data to be recorded includes who conducted the flushing, how the flushing was activated, which outlet was flushed, the time of the flushing, and how long the hot and cold water at the outlet was flushed. Point-of-use outlets that have auto-flushing capabilities make this process automatic.

Technology is a hospital's water management plan's best friend. By deploying auto-flushing devices, a hospital can conduct an efficient and effective flushing program that leads to improved water quality, reduced risk for Legionella and other waterborne pathogens, and a successful, compliant and defensible water management plan. Other benefits of connected auto-flushing devices include:

Accurate documentation provides three essential benefits for the hospital:

1. **Proof of compliance for the Joint Commission, CMS Mandate and other organizations with jurisdiction.**
2. **Providing defensible evidence in the event of an outbreak.**
3. **Protect the employee(s) administering the flushing.**



1. **Reduction of time and labor.** A manual flushing program can be an expensive and time-consuming activity, often the responsibility of the environmental services team or the facilities team, which are both heavily burdened with other responsibilities, labor shortages, and labor turnover.

   Connected auto-flushing devices remove the need for an employee to manually flush each outlet. The facility team can remotely activate the agreed-upon flushing protocol.

2. **Easier to meet compliance and pass inspections.** By deploying a connected auto-flushing program, a hospital benefits from flushing activity data being automatically available and uploaded into a water management plan and BIM system.

   Having a record of all flushing activity readily available can aid in passing Joint Commission and CMS Mandate inspections.

   Water management plans as described by the Joint Commission and CMS Mandate require that control limits be set, and that verification occurs. Connected auto-flushing devices can provide proof that flushing protocols are being conducted in accordance with the hospital's stated plan.

3. **Improved defensibility**. Accurate records of auto-flushing serve as proof of a hospital's proactive approach to mitigating Legionella and waterborne pathogen risks. This helps protect the hospital in the event of an outbreak or potential lawsuits.

Thermal control capabilities. Like flushing protocols, the industry agrees that thermal control is an important part of a water management plan to reduce the risk of Legionella. The CDC and numerous regulatory bodies and guidelines including ASHRAE188 and the Joint Commission advocate or require that premise plumbing temperature be monitored. Temperature should be monitored, validated, and verified within parameters set within a hospital's water management plan.

Legionella bacteria proliferate best when water temperature is between 77-120°F. Hot water temperature should be maintained no lower than 120°F (49°C). As temperature rises above the optimal range, growth slows, then Legionella bacteria begin to die. The higher the temperature, the more quickly the bacteria will be killed; water temperatures 120-140°F will slowly kill Legionella, while temperatures above 160°F will rapidly kill the bacteria.[7]

When considering water temperature anti-scalding efforts must be applied according to code. At the temperature 140°F (60°C), water can cause third-degree burns in children in one second and adults in five seconds. The U.S. Consumer Product Safety Commissions states that approximately 3,800 injuries and 34 deaths are directly related to dangerously hot tap water in residences.

Sensor technology can play an important role in preventing both waterborne pathogens and scalding. A hospital should choose point-of-use faucet and shower sensor-enabled outlets that monitor, record and document temperature fluctuations. This is vital for a water management plan to be successful and to ensure safety. The sensors should be able to send alerts and warnings when temperature falls below or exceeds temperatures, which increase the risk of Legionella or are within scalding ranges.

DECREASE GERM TRANSFER, IMPROVE HAND-WASHING PRACTICES, AND IMPROVE OVERALL HAND HYGIENE

It is common knowledge that practicing good hygiene prevents the spread of germs and helps keep people healthy. However, people still struggle with good handwashing practices. Hygienic-friendly restroom fixtures are essential to promote healthy handwashing and good hygiene. Sensor technology is the most effective way to promote a germ-free zone and proper hygiene within a restroom.

Sensor technology activates and shuts off water flow through motion detection, eliminating the need to touch faucet handles and other outlets, which can breed germs. Manual faucet handles specifically have been proven to proliferate HAIs.

The most effective touch-free faucets must activate consistently and appropriately to ensure users complete safe and effective handwashing practices. Touch-free faucets are not only for patients; they must also encourage consistent and compliant usage by nurses and doctors. Faucet sensors should be programmable according to the type of user, specifically on clinical and scrub sinks to ensure proper and compliant handwashing by surgeons and assistants.

They should also be designed for easy cleaning by the environmental services team. For a sensor faucet to encourage proper hand-washing practices outlined by the CDC the faucet must accurately and consistently perform three steps:

1. **Identify the target.** An infrared sensor signal is emitted to identify the target (user's hand) – must do this quickly and consistently – nothing is more frustrating than waving your hands around with no response.
2. **Recognize the target.** Once the target is recognized, a second infrared sensor signal is sent back to the sensor receiver which then tells the faucet solenoid (electromagnetic device) to open water flow. Once solenoid is open the water flows through the faucet.
3. **Must be designed to keep water flowing long enough for proper handwashing.** The most effective sensor technology will have multiple metering options that can be programmed for different lengths of time for different faucet functions (public restrooms, patient rooms, surgical sinks, etc.) to encourage complying with CDC handwashing guidelines.

In addition to faucets and showers, toilets are a large part of the germ-free sensor technology equation. Flushometers allow for touch-free usage and wall-mounted toilets allow for easier and more effective cleaning.

MAKE DECISIONS BASED ON PERFORMANCE & VALUED INSIGHTS

Sensor technology enables hospitals to make educated maintenance, operational, and safety decisions based on performance and real insights. Performance should be a facility team's guide for efficiency and safety. Real-time data and tailored alerts from sensor technology delivers multiple benefits to a hospital.

Maintenance - Sensor technology can reduce emergencies, maximize labor hours and schedules, and reduce equipment and installation breakdowns.

- Reduces the number of "fires to put out"
- Can identify the problems before they occur such as leaks and flooding – know when leaks or flooding occur and be able to stop them immediately.
- Enables facilities managers to create smarter demand led maintenance with usage, water consumption, water pressure and customer satisfaction levels
- Create a proactive automated maintenance calendar based on actual usage
- Maintain function at all outlets to improve patient and visitor satisfaction scores
- Pinpoint peak hours for scheduling
- Detect equipment degradation and potential issues before they become problems

Operational – Sensor technology can increase ROI by reducing labor costs, identifying, and improving energy and water efficiencies, extending equipment and installation life cycles, and keeping all hospital functions and rooms operating.

- Minimize or eliminate staff overtime costs
- Reduce water consumption – know the top consuming fixtures and keep them operating optimally
- Identify demand usage for future projects and capital planning
- Align with organizational sustainability goals
- Avoid catastrophic equipment failures
- Minimize component and replacement parts
- Lower or eliminate equipment downtime
- Increase maintenance room reliability and efficiency by utilizing equipment with optimal operating level
- Extends life of outlets and outlet components
- Keep all patient rooms, surgery suites and procedure rooms operational

Safety – Safety is the heart of sensor technology. Point-of-use sensor outlets can alert a hospital of potential risk and allow facility and infection prevention teams to make educated decisions to reduce risk and avoid future risk.

- Initiate flushing protocols based on usage and triggered by alerts and warnings
- Quickly react to out-of-range temperature fluctuations
- Document flushing, flow and temperature activity in a water management plan and track trends to validate and verify the activity and plan and then change plan according to need
- Dive deeper into trends to help identify and pinpoint exact reasons and locations of increased risk

Hospitals should carefully study the data the sensor technology they choose gives them access to. Not only what data the sensors give but how the data is delivered, stored, and communicated. It should be easy to access and understand. The data should be useful information given in an insightful form that is easy to apply.

INCREASE COMPLIANCE AND DEFENSIBILITY

Hospitals are required by multiple regulatory authorities including the Joint Commission, local and state health departments, ASHRAE 188, and the CMS Mandate to have an effective water management plan.

Point-of-use sensor technology significantly eases the burden of the water management team to provide proof of validation and verification and program documentation, all required by the regulatory bodies. Specifically, point-of-use sensor outlets should meet the following requirements of ASHRAE 188:

6.2.6 Monitoring.
The program team shall **establish a system for monitoring** whether the measured physical and chemical characteristics of control measures are within control limits. The system should include the **means, methods, and frequency of monitoring activities.**

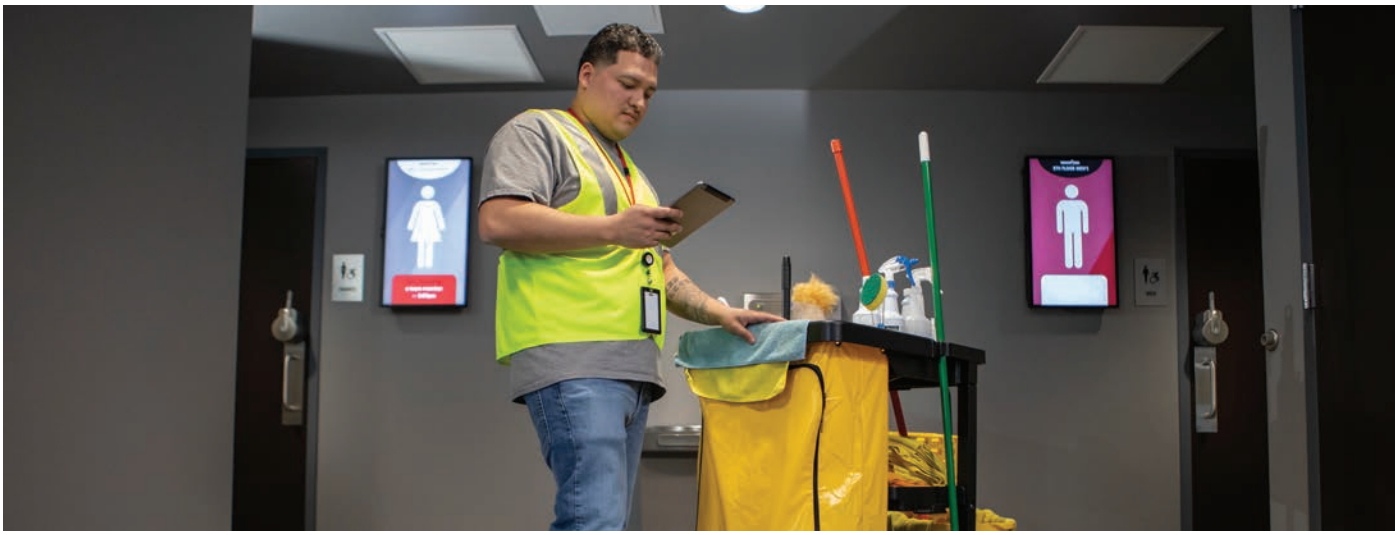
6.2.7 Corrective Actions.
For each control location the program team shall **establish procedures for corrective actions** to be taken when **monitoring shows that control measures are outside of established control limits.**

6.2.8 Program Confirmation.
The program team shall **establish procedures to confirm**, both initially and ongoing, that the program is implemented as designed. The resulting process is **verification**. The program team shall establish procedures to confirm, both initially and ongoing, that the program, when implemented as designed, controls the hazardous conditions throughout the building water. The resulting process is **validation**.

6.2.9 Documentation and Communication.
The program team shall establish **documentation and communication procedures for all activities of the program.**

Sensor faucets and showers can streamline industry inspection success. The technology reduces facility and infection control labor hours and other associated costs and resources spent on preparing for CMS and Joint Commission inspections. Sensor technology can produce a detailed history of water quality, validation, preventative maintenance, and proactive actions at a hospital's fingertips making inspections easy to pass and less stressful to the organization. By deploying a connected faucet and shower program, a hospital benefits from activity data being automatically available and uploaded into a water management plan and/or BIM system.

Sensor technology can also assist with legal defensibility because it provides proof of historical proactive action with extensive data and activity record management. The sensor activity documentation can provide defensible evidence in the event of an outbreak or potential lawsuit.



IMPROVE PATIENT, VISITOR, STAFF EXPERIENCE AND SATISFACTION

Restroom experience, whether in a public setting or in a patient room, is a key driver of overall satisfaction at hospitals. Patients, visitors, and staff expect water to not only be safe but be delivered consistently and at the correct temperature. Expectations also include appropriate aesthetics, clean and dry surfaces, and quiet water flow.

Increasing aesthetic and comfort demands by patients must be heard and acted upon by hospitals, since patients have choices on where to get services and patient satisfaction scores can positively or negatively affect regulatory body reimbursement rates.

Point-of-use sensor technology should meet all of these human satisfaction demands to be successful in a hospital.

CONCLUSION

Faucet and shower sensor technology continues to advance and is proven to be safe and effective in healthcare settings. Improved design with fewer components, less complexity, and more hygiene friendly materials allows hospitals to receive the many advantages sensor technology offers.

Point-of-use sensor technology started as a method to create hand-free zones at faucets and toilets and continues to reduce germ transfer and lower HAIs. Reducing germ-transfer is now just one of many gains a hospital can realize by using auto faucets and showers. Hospitals can

1. Improve ROI through reduced labor expenses and increased operational efficiencies
2. Reduce the risk of Legionella and other waterborne pathogens
3. Decrease germ transfer, improve hand-washing practices, and improve overall hand hygiene
4. Make decisions based on performance and valued insights
5. Increase compliance and defensibility
6. Improve patient, visitor, staff experience and satisfaction

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