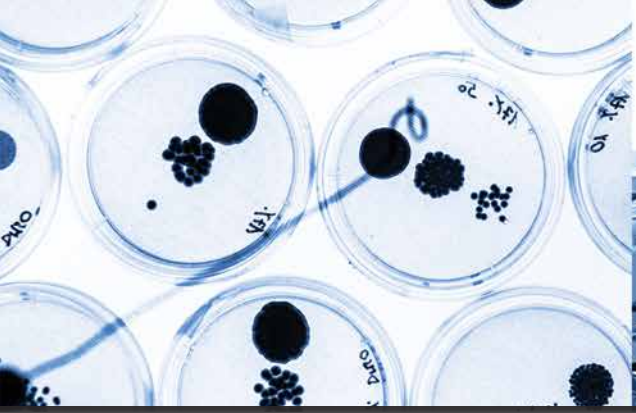

ATP Testing:
A Proven Method to Measure Cleanliness

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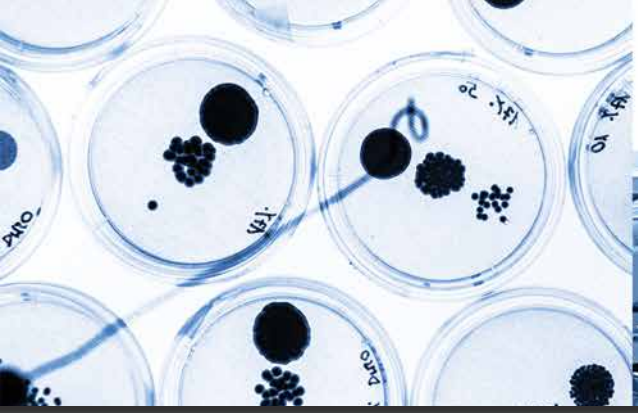

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ATP Testing: A Proven Method to Measure Cleanliness

> It is estimated that **20% to 40%** of all healthcare-associated infections are from unclean surfaces and the hands of healthcare workers (Weber, 2010).

By Karin Lillis

The most stringent hand hygiene program or expensive terminal disinfecting device is no match for poor cleaning practices. Elbow grease and the right products and tools are essential to ensure healthcare facilities remain as pathogen-free as possible.

It is estimated that 20 percent to 40 percent of all healthcare-associated infections are from unclean surfaces and the hands of healthcare workers (Weber, 2010). Research also indicates that only 34 percent to 40 percent of hospital surfaces are cleaned to policy standards (Carling, 2010).

But how can that happen?

A recent literature review helps to explain why (Amodio and Dino, 2014). "Hospital cleanliness tends to be thought of by patients and the public as an important indicator of the general quality of healthcare, primarily due to the fact that dirty surfaces can be highly contaminated by microorganisms that expose patients to the risk of acquiring infections," the researchers write.

"This risk can be alarming in hospital settings, and several studies have well documented the environmentally mediated transmission of antibiotic-resistant pathogens. Despite this finding, routine housekeeping practices are often suboptimal, and some authors have observed that disinfection can be improved to 82 percent, resulting in an average 68 percent decrease in bacteriological environmental contamination. … As a consequence, cleaning and disinfecting hospital environments have been claimed as one of the best strategies for preventing healthcare-associated colonization and infections."

Methods to Gauge Cleanliness

Healthcare organizations typically rely on one or more of the following methods to measure cleanliness (Guh and Carling, 2010). In 2010, the Centers for Disease Control and Prevention (CDC) produced a toolkit—*Options for Evaluating Environmental Cleaning*—which encourages hospitals to monitor the performance of cleaning by using an objective method (Guh and Carling, 2010). Those methods include:

- **Visual inspection:** An environmental services (EVS) supervisor or other staff member checks a room, device or equipment to determine whether it "looks" clean. While this method

> Despite this finding, routine housekeeping practices are often suboptimal, and some authors have observed that disinfection can be improved to **82%** resulting in an average **68%** decrease in bacteriological environmental contamination

is inexpensive and fast, infection control professionals view this method as unacceptable because of its lack of objectivity (Mulvey, 2011). Direct observation, however, is a useful teaching tool and can immediately assess an EVS worker's cleaning routine. "Covert monitoring of disinfection cleaning can provide an objective assessment of individual (environmental services) staff performance and compliance with cleaning protocols," the CDC toolkit states (Guh and Carling, 2010). "(The) complexity of monitoring cleaning practice in individual patient rooms without the evaluator being recognized as such might represent a difficult confounding issue."

- **Fluorescent markers/gels:** A surface is marked with one of these types of glow-in-the-dark products, before EVS staff enter to clean the room. Once that cleaning is performed, another supervisor or staff member shines a black light on the previously marked surface. If the fluorescent substance is still present, it is an indication that the surface might not have been properly cleaned. "Fluorescent gel dries transparent on surfaces, resists abrasions and there are several studies demonstrating the accuracy of the system in objectively evaluating cleaning practice and quantifying the impact of educational interventions on such cleaning," the CDC guidelines state (Guh and Carling, 2010). "Because these fluorescent markers are all designed to indicate physical removal of an applied substance, surfaces that are effectively disinfected but less effectively cleaned are more likely flagged as failing to meet a quality standard using one of these markers than (a) culture technique." This type of testing is relatively low-tech and simple to perform, however it can be very time consuming. The method requires two trips to the room (before and after cleaning)—and it might not determine whether the surface is actually clean. For instance, an EVS worker may wipe down the surface with a dirty rag.

- **Microbiology testing:** After a surface has been cleaned, samples are taken, usually via swab, and sent to the hospital lab to gauge which pathogens—if any—may still be present. This method has proven effective at targeting specific pathogens that may be troublesome to a healthcare facility, but cultures take two to four days to grow and typically require interpretation by a microbiologist. "Although swab cultures are easy to use, the cost of processing, including isolate identification, the delay in results, the need to determine pre-cleaning levels of contamination for each object evaluated in order to accurately assess cleaning practice, and the limited feasibility of monitoring multiple surfaces in multiple patient rooms as part of an ongoing … monitoring program represent issues which could limit the broad application of this system," the CDC toolkit states (Guh and Carling, 2010).

A second method, Agar culture testing, is used to evaluate a cleaning practice by "quantifying aerobic colony counts (ACCs)." Agar coated slides, originally designed to "simplify quantitative cultures of liquids," is also used in the healthcare setting for environmental surfaces monitoring (Guh and Carling, 2010). "Although some difficulties have been encountered in utilizing agar slide cultures on other than large, flat surfaces, they potentially provide an easy method for quantifying viable microbial surface contamination,"

> The software allows managers to generate pre-set reports that can be easily shared among EVS and other frontline staff, and with the infection control department and hospital leadership.

the CDC states (Guh and Carling, 2010). "There is a need, similar to that noted for above swab cultures, to determine pre-cleaning levels of contamination for each object evaluated in order to accurately assess cleaning practices."

- **ATP monitoring:** This measures residual organic matter that may remain after a surface, device or piece of equipment is cleaned. Adenosine triphosphate (ATP) is an enzyme that is present in all organic matter—living and once-living—including blood, saliva and bacteria. Essentially, the person conducting ATP monitoring swabs the surface to be tested and inserts that swab into a handheld unit called a luminometer. Results are available within seconds. All ATP systems also come with software that allows the user to track trends and monitor data, such as EVS personnel performance and overall cleaning thoroughness. This method, however, doesn't detect the type of bioburden or pathogens left on the surface. ATP testing is sometimes misunderstood as a microorganism detection method—but only microbiology testing can fill that role. But since any organic residue is a food source for bacteria, knowing a surface's general cleanliness is just as valuable for cleaning.

"Although it is likely that part of the lack of correlation between ATP readings and ACCs … relates to the fact that ATP systems measure organic debris as well as viable bacterial counts, several studies have noted additional environmental factors which may increase or decrease ATP readings," the CDC toolkit notes (Guh and Carling, 2010). "Because a large proportion of surface containing ATP is non-microbial in origin, surfaces that are effectively disinfected but less effectively cleaned may be more likely flagged as failing to meet a quality standard."

The last method—ATP monitoring—has shown promise as an objective and reliable means to measure cleanliness. Products like Hygiena's SystemSURE Plus ATP cleaning verification system allow users to simply swab any surface and drop the swab into a handheld detection unit (luminometer) that immediately measures the results, and report and analyze the data through a specialized software system.

Hygiena's SureTrend software application helps EVS managers track ATP test results, quickly home in on problem areas, and compare results among different units or multiple facilities. The software allows managers to generate pre-set reports that can be easily shared among EVS and other frontline staff, and with the infection control department and hospital leadership. SureTrend also allows healthcare facilities to maintain records to ensure compliance with in-house and regulatory practices and policies.

Scrapping a 'Pretty Basic' Monitoring Program

Before introducing ATP testing, HealthSouth Deaconess Rehabilitation Hospital in Evansville, Ind. relied on a "pretty basic" program—a "cleaning detective" would spray a fluorescent solution on a surface prior to cleaning, allow the EVS staff to perform the cleaning, and then check the surface with a black light, says Eddie Gomez, senior manager of information systems, environmental services and laundry.

"There was no software to tabulate the scores. We just scored 'pass' or 'fail,' and then

> ATP testing, has helped EVS staff maintain control of the cleaning process and understand "how we were failing with our old process."

obtained a percentage for that nursing unit and for the whole hospital," he notes. "I was not very convinced this would work. My fears were confirmed. The spray left spots on some areas that remained after weeks of being cleaned. The spots still showed up under the blacklight, which made me question that method's effectiveness. I suspended the program until I found something better."

During his experience in the restaurant and dietary field, Gomez says he had heard about ATP testing and "thought it was something we could trial—since it had started taking off in the EVS field." He also was searching for a software tabulation program that would allow him to organize and break down results by more than just one nursing unit.

"We wanted to determine a certain number of results per day, based on individual EVS workers," Gomez says.

ATP testing, he says, has helped EVS staff maintain control of the cleaning process and understand "how we were failing with our old process." ATP verification allowed Gomez and EVS leaders to better educate staff and to create a sense of urgency around proper cleaning.

HealthSouth first introduced ATP testing as a pilot project in October 2014. During the trial phase, project leaders created a benchmark and dedicated their time to "understanding the system and how it worked," says Gomez. The hospital first launched ATP testing on one nursing unit before integrating the technology hospital-wide.

"EVS staff took it seriously and personally. When the luminometer showed higher readings, staff were astonished by the results," Gomez says. "Visually, things looked cleaned—but the luminometer said otherwise. This was an eye-opening experience for all of us—hospital staff and management teams included."

With the help of HealthSouth's infection control coordinator, Gomez introduced ATP testing in the facility. "It's something we could not live without now," he says. HealthSouth Deaconess is currently considering expanding ATP testing to dietary services, inpatient therapy gyms and medical practice offices.

Before launching the hospital's ATP testing program, Gomez says he researched the method and obtained feedback from local hospitals that already use the technology. "I spoke with Hygiena's representative as well. We had several calls and discussed the many pros and cons before I decided to propose ATP testing to our CEO and CFO," Gomez says. "The feedback and support was amazing."

Gomez presented the proposal to the hospital's quality and safety councils for approval. "Once we obtained that approval, we informed our EVS staff how this program was going to work. Support from the EVS department was about 50-50. Staff knew ATP testing wouldn't make the cleaning process easier at first, but eventually they all understood that we had to try it before we could say, 'No, this isn't going to work,'" Gomez notes.

During the first few months of implementation, Gomez says, the EVS department struggled to meet the hospital benchmark—but the "will to persevere from everyone was unbelievable." Recently, the hospital has reported "some of the best results we've had in many years," he says.

> Before, you might walk into a room, verify that it looked and smelled clean—and hope that it actually was clean. Now, you know whether that room is clean or not. It gives you peace of mind—and a qualitative approach to sharing data with your staff.

"ATP testing has truly helped us become aware of our cleaning techniques," Gomez says. "We now hold educational meetings to discuss the program's success and areas where we still have trouble—to make sure we're quick to correct any problems that consistently show up in our 'fails' report."

ATP testing, Gomez says, provides beneficial education and awareness for EVS staff, but it also "gives the sense of cleanliness" to hospital staff and patients.

"I am very happy I made the changes, and so are many of my staff," Gomez says. "They love how we can tell them—on the spot—whether something was properly cleaned. It has also created a little bit of friendly competition within the department. No one wants to get low scores."

A 'Trust but Verify' Approach

The Western Connecticut Health Network has used Hygiena's ATP system for three years, says Michael Murphy, CHESP, REH, director of support services and system specialist at the Norwalk, Conn.-based healthcare system. An EVS supervisor or manager swabs high-touch areas in 10 rooms on each shift—day and night, occupied or unoccupied. The hospital also conducts random testing that includes equipment like stretchers and wheelchairs.

Before the hospital launched its ATP testing system, EVS staff relied on visual inspection and fluorescent markers to gauge a room's cleanliness. Neither technique was especially objective or fool-proof, Murphy says. The second method was especially cumbersome.

"A supervisor had to run in the room and mark high-touch areas with the glow stick. If a housekeeper saw the supervisor coming out of the room, he or she knew something was up," Murphy says. "I knew there must be a better way to monitor cleanliness."

ATP testing, he says, is a "trust but verify" approach to monitoring cleanliness. "Before, you might walk into a room, verify that it looked and smelled clean—and hope that it actually was clean. Now, you know whether that room is clean or not. It gives you peace of mind—and a qualitative approach to sharing data with your staff."

He explains how the process works: "We'll approach a housekeeper and ask if he or she is done cleaning. We'll walk in the room behind that staff member and start swabbing. We check both discharge and occupied rooms—one to 10 swabs in each room. The EVS employee sees the score and signs off on it."

Recently, a review by an independent company netted the healthcare system the highest score for cleanliness among the more than 600 facilities the company surveyed. Murphy says ATP testing played a significant role in that achievement.

The EVS department also reports results of ATP inspections to the infection control specialist and committee. "Our infection control specialist has actually watched us do our inspections to see how staff performs that duty," Murphy says. "Our infection rates are very low—and that's a credit to everyone."

ATP testing, he notes, "keeps everyone honest and on their toes. We have good employees who want to do good work—and want to know they're doing good work. We have a great staff who don't want to miss anything."

“ATP readings can provide real-time feedback to housekeepers regarding their performance, an advantage over the **24 to 48 hours** required to obtain results using microbiological methods.

The Science behind the Programs

In a two-phase study at a university-affiliated teaching hospital, researchers showed that educating housekeeping staff leads to lower ATP readings (Boyce, 2009).

The first phase targeted five high-touch areas in 20 patient rooms—bedside rails, overbed tables, television remote controls, toilet seats and grab bars in patient bathrooms. Samples were taken shortly before EVS staff entered the room and about 10 minutes after they left, to allow the surface disinfectants time to dry. “The major goal of phase two of our study was to establish with greater certainty the range of ATP readings to be expected on high-touch surfaces in patient rooms before and after daily cleaning,” the researchers write.

During the second half of the study, the researchers wanted to determine if and how educating housekeeping staff “would result in improved cleaning practices.” At the beginning of phase two, a member of the infection control team reviewed the results of phase 1 with EVS staff. The sessions focused on the “role of daily cleaning to prevent the spread of pathogens on contaminated surfaces.”

During the second phase, two EVS managers were trained to use the swabs and ATP luminometers. They also notified housekeeping staff that they were monitoring certain surfaces in patient rooms. This time, more than 1,000 before-and-after samples were taken from the same five high touch areas, from 105 patient rooms on 16 wards.

“High-touch surfaces were significantly cleaner” during phase two, the researchers write. “This assay could also be used to evaluate the final cleaning procedures. ATP readings can provide real-time feedback to housekeepers regarding their performance, an advantage over the 24 to 48 hours required to obtain results using microbiological methods.

Another study in Glasgow, Scotland (Mulvey, 2011) evaluated methods for monitoring hospital cleanliness benchmarks, including visual inspection and ATP monitoring. Over a four-week period on two hospital wards, the researchers collected samples from a handful of clinical areas before and after “detergent-based cleaning,” the researchers write. “Microbiological and ATP monitoring confirmed environmental contamination, persistence of hospital pathogens and measured the effect on the environment from current cleaning practices.”

Specifically, samples were taken on one medical and one surgical ward at a teaching hospital in Glasgow. ATP monitoring was conducted two to three times a week on areas including the bedside locker, bed frame, overbed table, bedside curtain, computer keyboards and restroom door push plate.

“Since visual assessment does not offer reliable information on infection risk to patients, high-risk (hand touch) surfaces in hospitals should be subjected to a scientific screening method in order to monitor overall levels of microbial dirt. If integrated into a formal monitoring regimen, ATP … would help identify unacceptable soil levels and associated patient risk, provided they are systematically collected over time and interpreted correctly,” the researchers write.

> Before, you might walk into a room, verify that it looked and smelled clean—and hope that it actually was clean. Now, you know whether that room is clean or not. It gives you peace of mind—and a qualitative approach to sharing data with your staff.

A small study at an 1,800-bed hospital in Taiwan further strengthens the case for ATP testing as an effective way to monitor hospital cleanliness (Chan, 2015). A two-phase study on a cardiology intensive care unit and a medical intensive care unit "evaluated the use of ATP bioluminescence as an important adjunct in establishing and monitoring effective cleaning and disinfection of environmental surfaces, especially for areas in the hospital with a considerable patient safety risk."

The first phase of the study, which ran from April to June 2013, was to "assess baseline cleaning efficiency. Visual audits to verify cleaning efficacy and an ATP swab audit was performed randomly," the authors write. The second phase (July to September 2013) included two elements—an infection control program for environmental services staff and a new cleaning protocol that included using disposable wipes to reduce the risk of cross-contamination. During phase one 43.9 percent of 221 tested surfaces passed ATP inspection. At the end of the second phase, that number jumped to 88.1 percent of 270 surfaces that were sampled.

One paper—a literature review—suggested that established research supports ATP as a "useful method for performing rapid assessment of hospital cleanliness" (Amodio and Dino, 2014). "Quick and objective feedback on surface cleanliness is of paramount important for continuously educating housekeeper and hospital staff," the authors write, "and is necessary to achieve compliance with recommended cleaning practice."

Based on the studies surveyed for the paper, ATP testing can help identify areas that may require additional cleaning or adjustment to cleaning schedules and methods. "ATP readings played a very important role in providing quantitative evidence of improved cleanliness of high-touch surfaces after the implementation of an intervention program," the researchers write.

In the Long-Term

"Realizing that our surfaces were not as clean as we thought was—quite honestly—a slap in the face. But it was a good wakeup call for everyone, especially me," says Gomez. "As EVS leaders we sometimes think our processes are flawless and we don't make mistakes because we've been in the industry for so long. We become overly confident—and that can be our worst quality. We have to be open to the idea that we are bound to make mistakes. How from those mistakes and improve our processes is what will help us to become confident and assertive leaders."

Gomez adds that research indicates many healthcare agencies are "putting the pressure on EVS departments for thorough inspections with statistics that are accurate and can't be manipulated. I would challenge EVS professionals to look into the long-term benefits of this program."

And as Murphy advises, "ATP It is the right way to go to validate the progress of your cleaning program."

SIDE BY SIDE METHOD COMPARISON				
METHODS	ATP Monitoring	Microbiology Testing	Blacklight	Visual Inspection
EASE OF USE Can it be used by any level user?	★★★	★	★★★	★★★★
OBJECTIVE Does it measure without bias?	★★★★	★★★★	★★	★
SPECIFIC Does the method detect microbiological matter?	★	★★★★		
QUANTITATIVE Are results numeric and measurable?	★★★★	★★★★		
QUALITATIVE Can results be categorized as Pass/Fail?	★★★★	★★★★	★★★★	★★★★
TIMELINESS Does the method minimize time investment?	★★★★		★★	★★★★
LOW COST Are supplies and other costs affordable?	★★		★★	★★★★
TRAINING TOOL Does the tool confirm proper cleaning?	★★★★	★	★★★★	★★
MANAGEMENT TOOL Is the data collected powerful for managers?	★★★★	★★★★	★	★
FRAUD-PROOF Are results protected from manipulation?	★★★★	★★★★		
SOFTWARE ANALYSIS Does the product come with software?	★★★★		★	★
GRAND TOTAL	**38** ★	**26** ★	**19** ★	**21** ★

Source: Data sourced from Guh and Carling (2010); chart courtesy of Hygiena

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