

## Keeping It Clean: Hygiene of Textiles, Laundry Facility is Key to Preventing Infections

This report summarizes the imperatives of keeping healthcare textiles — and the facility in which they are laundered and processed — free from contaminants that may be implicated in healthcare-associated infections (HAIs).

***By Karin Lillis***

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# Keeping It Clean: Hygiene of Textiles, Laundry Facility is Key to Preventing Infections

By Karin Lillis

**I**t takes just one breakdown for an infection to happen. Imagine the following scenario: A healthcare facility removes soiled linen from laundry carts but does not clean and disinfect the carts consistently. Clean linen is placed in the carts and sent back to the hospital. Hospital patients come in contact with a deadly pathogen—and some end up dying as a result. The exposure is ultimately traced back to contaminated linens.

This example — while rare — illustrates what can happen when part of a system designed to protect patients falters.

A similar situation played out at Children's Hospital in New Orleans, where five pediatric patients died after they were exposed to a fungus on contaminated bed linens, according to a 2014 article in *The Times-Picayune*. Between 2008 and 2009, the article notes, the children contracted mucormycosis, an infection that is caused by fungi typically found in decaying organic matter like leaves, compost piles or rotten wood. A study led by a Centers for Disease Control and Prevention (CDC) medical officer determined that the linens were contaminated by fungal spores; the researchers noted that textiles were “exposed to the outdoors at a laundry facility and the loading dock,” *The Times-Picayune* article notes.

Over the last four decades, 12 similar outbreaks were reported, according to the CDC. The clean textiles were inadvertently exposed to environmental contaminants such as dust in storage areas, or there was a breakdown in the laundering process.

“Washing is critical, but protecting linen on the journey from the washer to the patient's skin is a journey fraught with danger at every turn,” says consultant Gregory Gicewicz, president of the Healthcare Laundry Accreditation Council (HLAC) and the Tumwater, Wash.-based Sterile Surgical Systems.

“The biggest challenges are the countless opportunities for contamination after the laundering of healthcare textiles. Some of these aren't always apparent, but it takes only one breach for an infection to happen. Functional separation at all phases of the laundering process is critical.”

Below, Gicewicz outlines some of the areas where contamination can happen.



THE BIGGEST CHALLENGES ARE THE COUNTLESS OPPORTUNITIES FOR CONTAMINATION AFTER THE LAUNDERING OF HEALTHCARE TEXTILES.

### Out of the Washer

Removing textiles from the washer on the “clean” side of the laundry facility—when not done correctly—can expose clean textiles to pathogens. For instance, if the outside of the washer has not been properly cleaned after a load of dirty laundry was placed inside, Gicewicz says, there is the risk of contaminating the clean linens once they are removed from the machine. Those textiles are also at risk if the worker has not removed dirty personal protective equipment (PPE)—or if his or her hands are contaminated—and then touches the laundered linens.

“That’s only the first step,” Gicewicz says. “If clean textiles are near dirty ones, there is also the risk of exposure.”

Perhaps the laundry worker has just removed a clean load of linen and a dirty load sits right next to the washer. “There might be dirty lint or other contaminants in the air that can be deposited on the clean textiles,” Gicewicz explains. “In some hospital laundry facilities, there are overhead slings to help workers load dirty linen into the washer. But that means there is an opportunity for dirty textiles to fall on top of the clean ones.”

### Into the Dryer

In the drying area, mistakes can also happen. For example, a laundry worker might put freshly washed linens into a cart that just held a dirty load—and the cart wasn’t cleaned properly, or at all. “That cart might not have been cleaned with the right disinfectant—or the chemical was not mixed properly and used according to the label instructions,” Gicewicz says. There also is the risk of contamination of the worker is wearing contaminated PPE (gloves and gowns) or has dirty hands when he or she pulls the clean load out of the dryer.

He adds, “If the textiles have not dried completely, moist materials are a great environment for fungal or bacterial growth. Occasionally, what people will do is stage the dried textiles for a long time before they’re completely done with the laundering process.” The staging and storage area must have a clean environment and the proper temperature and humidity—or else the environment will contribute to fungal or bacterial growth.

## Protecting Health & Hygiene in the Laundry

It’s obvious that clean linen needs to be protected from contaminants to keep patients safe from harm. But what about the workers in the laundry plant itself?

They face constant exposure to bodily fluids, harmful pathogens and sharps tangled in the laundry—to name just a few. That’s why it’s important to ensure they’re wearing the right personal protective equipment when they’re handling dirty loads.

“Employers must ensure that employees who have contact with contaminated laundry wear appropriate PPE.” That includes gloves, gowns, face shields and masks when sorting dirty laundry, OSHA states.

“Bloodborne pathogens are a huge issue. Employees are most at risk in the soil sort area,” says Gregory Gicewicz, president of the Healthcare Laundry Accreditation Council and Tumwater, Wash.-based Sterile Surgical Systems. “If laundry workers aren’t practicing proper universal precautions, they could definitely be exposed. For instance, a blood splash may hit an open wound,” Gicewicz notes. Or a contaminated sharp might be tangled in the dirty linens.

“In my plants, that happens about every two weeks,” says Gicewicz. “It might not sound like a lot” but when you consider the volume of laundry that plants must process, the number of sharps can add up quickly.

“Employee training is crucial to their safety, Gicewicz notes. “They need to be trained on hand hygiene, cleanliness and PPE—and that needs to be documented, dated and initialed.”

OSHA recommends that hospital laundry facilities maintain “a safety and health program

### Preparing for Transport

In the finishing area, where the goods are packaged or ironed, “all kinds of potential” for contamination exists, Gicewicz says. “Surfaces have to be cleaned and disinfected rigorously all the time. All of the handlers have to practice good hand hygiene. If one of those finishers goes to lunch, the restroom or the soiled laundry room and doesn’t clean his or her hands or him or herself, there is the potential for contamination right there.”

Once the laundry is inspected and folded, it is put onto an exchange cart or on a truck to the hospital.

### A Risky and Overlooked Area

The loading docks are a particular risky and often overlooked area. “Clean textiles are typically unloaded—and in many cases—left on the loading dock,” Gicewicz says. “If the dock has poor environmental conditions, soiled linens sharing the same dock or the clean textiles aren’t prevented, there is a huge potential for contamination.”

He continues, “This is why it’s very important that the cart is properly protected while in transit. If the carts are not covered up, there are all kinds of nasty (things) in the air that can contaminate the clean textiles.” And if the truck isn’t cleaned properly, the risk of infection increases. The same can occur if clean and soiled textiles are transported next to each other on the same truck.

Additionally, truck drivers typically handle loading and unloading the linen carts, and they need to be sure to wear PPE—including gloves and gowns—when they’re handling soiled textiles, Gicewicz says. But that PPE needs to come off before the clean laundry, he cautions: “The drivers need to ensure that they’re not exposing the clean linens to any contaminations.”

### In the Hospital

Similarly, handling clean and dirty textiles in the hospital linens room may expose clean linens to contamination. “The workers in the linen room handling clean and soiled textiles have to wear proper PPE,” Gicewicz says. That means gloves and gowns when they’re handling dirty linens, and then removing that PPE when they’re handling clean linen.

that includes handling of sharps and follows required practices outlined in the Bloodborne Pathogens Standard.”

Gicewicz also notes that keeping the laundry plant itself clean is critical. For instance, lint can be one of the worst contaminants. “Laundry facilities need to ensure they’re doing a blowdown of lint at least once a day,” he says. An example might be a cart that is not cleaned properly. He recommends a checklist that the laundry worker follows as he or she inspects the cart.

“Another example is lint contamination in the finish area. There needs to be a scheduled blowdown program that needs to be checked off and verified,” Gicewicz says. “There should also be a documented validation of temperatures, times, pH levels and wash chemical concentrations. Ironers should be checked daily—again with a physical checklist—to ensure temperature parameters are within the required settings.”

He concludes, “The most important thing to have a holistic end-to-end program where you’re verifying standards and regular reviews—whether you’re building 747s or doing healthcare laundry. The concepts are the same.” □



He also notes the importance of ensuring storage closets are properly disinfected and healthcare workers practice “good hand hygiene” when taking clean linens to patient room. “You want to make sure the clean linens are protected when they’re going up to the unit. There are all sorts of nasty things on hospital floors. You also need to avoid mixing dirty and soiled linens in the patient rooms,” Gicewicz says

### **The Infection Prevention Perspective**

“From the infection preventionist’s perspective, you want to ensure that your hospital textiles are cleaned in the safest manner possible,” Gicewicz says. “We encourage infection preventionists—and environmental services leaders—to establish a close relationship with staff from hospital laundries.”

That means visiting the laundry facilities at least annually. “As far as infection preventionists visiting the laundry, they should make sure the infrastructure supports functional separation of clean and soiled linen. Make sure they watch—actually watch—the workers and make sure they’re following best practices and standards. Interview the employees of the laundry. Ask them to show you how they clean a cart, or what they do if a piece of linen falls on the floor,” Gicewicz says.

“Have the laundry workers show you how they clean a table or the surface linens are placed on. Visually inspect the plant with a special emphasis on the finishing area. If there’s a lot of lint or dirt around, that’s a sign of poor hygiene practices.”

Next, he continues, “Infection preventionists should look at the carts—are they clean and protected? Ask to see the truck cleaning log and talk to the drivers. Ask how they operate and ensure the textiles are remaining clean. Visually inspect the carts—are they soiled? Are there bad hygiene practices?”

At the hospital, the infection preventionist should check the environmental conditions of the linen room, Gicewicz says. “Talk to the staff and ask them about their practices. How do they clean carts? How do they handle soiled linen? What if something falls on the floor?”

“If they really want to get in depth, infection preventionists can use ATP testing. There’s also a dust that will show in UV light. Apply some of that and if it’s still there a day or two later when the infection preventionist inspects the cart, then the cart wasn’t cleaned properly.”

The infection preventionist will obviously ensure that linens are being washed at the proper temperatures and with the appropriate products—that includes asking for the laundry facility’s logs and records.

“In all phases of the journey, that linen should be treated as if it will ultimately touch one of your loved ones,” Gicewicz says, “because it will touch someone’s loved ones.” ▣

## Textile-Transmitted HAIs Rare

In June 2015, Lynne Schulster, PhD, a scientist at the Centers for Disease Control and Prevention (CDC), and colleagues, published a literature review of peer-reviewed studies and current standards and guidelines. The researchers wanted to determine whether current laundry practices “are sufficient to interrupt patient-to-patient transmission via clean healthcare textiles (HCT). The evidence we examined suggest that this is indeed the case,” Schulster said in a statement published by the Society for Healthcare Epidemiology of America.

“Outbreaks of infectious diseases associated with laundered HCTs are extremely rare; only 12 such outbreaks have been reported worldwide in the past 43 years,” Schulster and colleagues wrote.

“Root cause analyses have identified inadvertent exposure of clean HCTs to environmental contamination (including but not limited to exposure to dust in storage areas) or a process failure during laundering. To date, patient-to-patient transmission of infection has not been associated with hygienically clean HCTs laundered in accordance with industry process standards. Occupationally acquired infection involved mishandling of soiled HCTs and failure to use personal protective equipment properly.”

If an outbreak is linked to a healthcare textile, however, testing needs to go beyond microbial sampling of clean linens and subsequently declaring the laundry process to be the source of the problem, Schulster notes, adding that the topic is one for future study.

Recommendations on optimal infection-prevention strategies used during the laundering process of HCT include:

- Adherence to Standard Precautions (gown and gloves) and minimal textile agitation when handling contaminated laundry in isolation rooms are considered sufficient to prevent the dispersal of potentially infectious aerosols.
- Offsite laundries should carefully package or cover clean textile bundles prior to transport to prevent inadvertent contamination from dust and dirt during loading and unloading.
- Laundered HCT must be stored in a manner to keep them dry and free from soil contamination.
- If alterations occur in water temperature, agitation, chemical type and concentration, and duration of laundering cycle, the addition of a disinfecting laundry chemical can compensate for the anticipated loss of antimicrobial effectiveness of the overall process.
- Laundry additives, such as hydrogen peroxide, peracetic acid and acetic acid, can provide extra disinfection options for short wash cycles of HCT or for those laundry situations in which chlorine bleach is not indicated.
- Industrial laundering offers more control of the process and can be tailored to adequately disinfect HCT with more choices of detergent and laundry additives compared to home laundering.
- The importance of temperature, relative humidity, and moisture control in storage areas is central to preventing microbial proliferation in and on materials that have some organic components. As new technology and treatments (such as antimicrobial treatments of healthcare textiles) emerge, Schulster recommends further research on the development of laundry processing in addition to current operations. ■

## Resources:

Centers for Disease Control and Prevention, [http://www.cdc.gov/HAI/prevent/prevent\\_pubs.html](http://www.cdc.gov/HAI/prevent/prevent_pubs.html)

Healthcare Laundry Accreditation Council, <http://www.hlacnet.org/>

Society for Healthcare Epidemiology of American, <http://www.shea-online.org/View/smid/428/ArticleID/370.aspx> <http://www.shea-online.org/View/smid/428/ArticleID/370.aspx>

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