COTTON HAS LONG BEEN BRANDED as “the fabric of our lives” because of its widespread use. It’s made it a ubiquitous presence in our everyday lives. But recent innovations in textiles have given fabrics an even more important role – helping to save lives by reducing the incidence of hospital-acquired infections (HAIs).

According to the Centers for Disease Control and Prevention, on any given day, about one in 25 hospital patients will have at least one health-care-associated infection. In 2002, there were approximately 1.7 million cases of HAIs, resulting in almost 100,000 deaths and costs of about $20 billion to the health-care industry, according to a 2007 report entitled “Estimating Healthcare-Associated Infections and Deaths in U.S. Hospitals, 2002.” The report was published in Public Health Reports, the official Journal of the Office of the U.S. Surgeon General and the U.S. Public Health Service.

Data show that the problem is getting better over time. The results of a project known as the HAI Prevalence Survey, published in the New England Journal of Medicine in 2014, showed that in 2011, there were an estimated 722,000 HAIs in U.S. acute-care hospitals. About 75,000 patients with HAIs died during their hospitalizations, and more than half of all HAIs occurred outside of the intensive-care unit.

Many innovations in fabric technology are helping to reduce the risk of HAIs.

**Microfiber Cleaning Products**

Though the usage of microfibers in apparel and bedding has not taken off to the degree that some in the industry initially expected, microfibers have become increasingly popular for use in mops and cleaning products. Examples include hard-surface cleaning cloths and surgical towels, according to Duane Houvenen, the national manager of value-added solutions for American Dawn Inc., a leading manufacturer and distributor of textiles.

According to an often-cited 2002 report from the Environmental Protection Agency, microfiber mops require 95 percent less water and cleaning chemicals than traditional wet-loop mops. Microfiber mops are also far more durable, with manufacturers typically guaranteeing microfiber mop heads for 500 washes, about 10 times as many as wet-loop mop heads.

The difference in durability largely accounts for the 60 percent lifetime cost savings of using microfiber mops instead of wet-loop mops, according to a case study from the University of California Davis Medical Center in Sacramento that was cited in the EPA report. The case study also found a 20 percent reduction in labor costs from using microfiber mops, which are less work intensive and allow cleaning to be done more quickly than traditional mops. Houvenen said those savings are even more pronounced now since the cost of microfiber products relative to their cotton counterparts has come down in recent years.

The case study found that microfibers are able to penetrate surface spores and remove dust particles that conventional mops leave behind. According to the study, using a conventional wet mop reduced the number of bacteria on a surface by only 30 percent, compared with 99 percent for microfiber mops. A microfiber is typically one-sixteenth as thick as a human hair in terms of diameter, giving it the ability to penetrate the microscopic surface pores of most flooring materials. In addition, the density of microfibers allows them to absorb about six times their weight in water, making them an ideal material for towels used in operating rooms, and positively charged microfibers attract dust, which has a negative charge.

“There still are too many facilities that don’t use microfiber, but over the last decade, we’ve seen a lot of conversions to microfiber cleaning products,” Houvenen said. “It’s been demonstrated in study after study that you can reduce – though not entirely eliminate – the risk of cross contamination by using microfiber. In the last decade, the cost has come down dramatically, and with proper care, we’re seeing hundreds of uses out of microfiber cleaning products, so the longevity of the product certainly makes up for the initial cost increase at purchase. It’s about value, not necessarily cost.”
For laundry professionals, microfibers must be treated with care because they are highly susceptible to heat damage from both washing and drying. However, said laundry professionals should follow the manufacturers’ guidelines, but generally speaking, temperatures of 140 degrees or above will permanently damage microfibers. Additionally, microfibers should be washed and dried solely with other synthetic products to ensure that the microfibers don’t collect lint, which is hard to remove and reduces the effectiveness of the fabric.

Copper-infused Fabrics
Copper isn’t just principally for pennies and electrical wiring anymore. Cupron licenses its proprietary copper-based antimicrobial technology to manufacturers of all kinds of products, from clothing to hard surfaces such as countertops and sinks, according to Jason Ellis, Cupron’s general manager of medical products. But as Ellis’s title suggests, the company has found great success in the health-care industry, with its technology being used in patient gowns, flat sheets, fitted sheets, draw sheets, pillowcases, bath blankets, thermal blankets, bath towels and washcloths.

Ellis said copper-infused fabrics pose no special challenges for laundry professionals, although for efficient sorting, copper products are typically processed together. Since the copper is embedded into the fibers, it does not rub or wash off onto other garments. He said the copper-infused products are lasting just as long or longer than traditional fabrics, so laundry professionals are using the same rag-out procedures for these products, removing them from circulation only due to wear and tear or stains. The copper does not lose its antimicrobial properties over time.

Charles Berge, the president and general manager of Shared Hospital Services, which processes laundry for a group of Sentara Healthcare hospitals, said his company has had success with Cupron’s linens.

“There is a reduction in the HAIs that offsets the higher cost of the linens,” Berge said. “The average person would be amazed at the costs to the health-care industry that stem from HAIs, and hospitals cannot submit those costs to insurance companies, so the hospital has to eat that cost, and it amounts to many millions of dollars each year.”

Berge said laundry professionals should be aware that some people are allergic to copper, which is also a concern for hospitals. Hospitals must be sure to make white linens available for patients who are allergic to copper. He said the beige color of copper-infused fabrics can change over time, similar to how a copper penny eventually loses its luster, but the color is good for concealing stains. Berge said laundry professionals should not use fabric softeners when processing copper-infused fabrics because fabric softeners over time can limit the fabric’s ability to absorb water, which is needed to activate copper’s antimicrobial properties. Although copper from fabrics will not transfer onto white linens during processing, some copper will be present in the wastewater generated by laundry facilities, which is the main environmental concern associated with copper-infused fabrics. The EPA’s maximum contaminant level for copper in drinking water is 1.3 milligrams per liter, and long-term exposure at higher levels can result in health problems such as liver and kidney damage. To ensure that a laundry facility’s wastewater doesn’t contain excessive amounts of copper, a laundry facility should consult with its local wastewater authority to ensure that samples are pulled and analysis performed on an ongoing basis, Berge said.

“Any laundry facility should be on a first-name basis with its wastewater representative,” Berge said. “We pull samples every quarter.”

Zinc-infused Fabrics
Giancarlo Beevis is bullish on the long-term prospects of zinc-infused fabrics. “I think in time, it will replace copper and silver,” said Beevis, the president and chief executive of Intelligent Fabric Technologies North America Inc.

According to Beevis, zinc-infused fabric has many things going for it, including the fact that it typically does not cost more than traditional fabrics. That’s because zinc isn’t a precious metal like silver and is less valuable than copper. Additionally, his company’s proprietary fabric additive, which uses zinc as a main ingredient, typically accounts for only 0.85 percent of the weight of a typical fabric product, less than one-third of the typical dosage found in copper- or silver-infused fabrics.

Citing its own research, Intelligent Fabric Technologies also claims that its zinc-based additive provides stronger antimicrobial properties than copper. The “kill rate” for zinc-infused products – the length of time needed to kill bacteria or fungus – can be less than half an hour, compared to three to five hours for some copper-infused fabrics, Beevis said.

Intelligent Fabric Technologies has used its additive to produce scrubs, bedding and even underwear because the zinc’s antimicrobial properties make it ideal for killing odor-causing bacteria and the fungus that causes jock itch. The bulk of the company’s business, however, comes from selling the additive to clothing manufacturers that use it to produce scrubs, lab coats, bed sheets, pillow cases, underwears, shorts, socks and even the lining of winter coats, which typically aren’t washed often.

Beevis said zinc-infused fabrics are preferable to silver-infused fabrics because they use the ambient air to become antimicrobial, whereas silver doesn’t take on antimicrobial properties unless it is fully hydrated, meaning the fabric is wet or very moist. He said zinc-infused products are durable, with some able to endure more than 100 washes, and the fabrics do not require any special handling by laundry professionals. In addition, there are not the same environmental or discoloration issues inherent with copper-infused products.

“Zinc gets lumped into the environmental concerns because it’s a heavy metal,” Beevis said. “But if you actually do the research, zinc is in products such as Head & Shoulders dandruff shampoo. It’s washed down the drain by the hundreds of thousands of gallons every day in North America, and there isn’t any issue. It’s used in diaper rash cream for babies, sunscreen, and you’d be shocked at how many cosmetics it’s used in, just as a preservative.”