Proper laundering and handling are important in achieving and maintaining the hygienically-clean quality of healthcare fabrics and textiles delivered to the point of care, according to a recent review in Infection Control & Hospital Epidemiology that highlights evidence-based strategies to inhibit potentially serious contamination. The review is based on findings and recommendations from peer-reviewed studies, as well as current standards and guidelines.

“We asked the question if current industrial laundry processes are sufficient to interrupt patient-to-patient transmission via clean healthcare textiles (HCT). The evidence we examined suggests this is indeed the case; we found no evidence of microbial carry-over from one patient to the next for patient-care textiles when proper textile management and laundering specifications were used” says Lynne Sehulster, PhD, an infectious disease epidemiologist at the Centers for Disease Control and Prevention (CDC), and lead author.

Outbreaks of infectious disease associated with laundered HCT are fairly rare: only 12 such outbreaks have been reported worldwide in the past four decades. Analyses have identified inadvertent exposure of clean HCTs to environmental contamination, including exposure to dust in storage areas, or a process failure during laundering.

“Current infection prevention strategies for laundering and handling HCT appear to be adequate in preventing healthcare-associated infections, provided that every step is taken to maintain the hygienic quality of HCTs prior to use,” says Sehulster. “However, if an outbreak occurs linked to HCT, it is not enough to conduct microbial sampling of laundered textiles and declare the laundry process to be the source of the problem. Each of the distinct operations of the laundry-handling process needs to be evaluated in order to pinpoint the root of the problem. Our review was limited to clean HCT from laundries. We did not address contamination that occurs while the HCT are in use. That’s a topic for future study.”
We spoke with Sehulster for her additional perspectives on healthcare laundry-related infection prevention.

**Q:** What is your sense of IPs’ grasp on infection control-related HCT issues and guidance? Do they know where to look for the best sources of information and do they know how to synthesize that information?

**A:** The answer to this question depends on how involved the IPs are in the managerial oversight of the laundry functions for their hospital. These duties can be assigned in total to the IP or to the environmental services (EVS) director. An alternate approach is to delegate the laundry management duties to the IP and the EVS director in accordance with mutual agreement. Also, central sterilization department supervisors provide the oversight for the sterilization of reusable surgical textiles.

The greater the IP’s involvement in laundry oversight, the greater the impetus to become familiar with healthcare laundry issues. My sense is that IPs are aware of the basic information about healthcare laundry as presented in the full-text version of CDC’s “Guidelines for Environmental Infection Control in Health-Care Facilities” (see: http://www.cdc.gov/hicpac/pdf/guidelines/eic_in_HCF_03.pdf). IPs also are increasingly aware of professional association guidelines and standards for healthcare laundry as a result of major conference presentations by these associations.

For infection prevention, the two important concepts to consider are how germs are transmitted and what must happen for infection to occur as a result of that transmission (also discussed as the “chain of infection” in the CDC guideline). If you analyze an infection prevention problem in the context of the Chain of Infection, this will guide your development of an appropriate solution to that problem. This will

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**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.

also help IPs and EVS directors when preparing policies and procedures that are evidence-based. Simply stated, a Chain of Infection assessment is basically doing an “Infection Control Risk Assessment” (ICRA).

**Q:** What steps can be taken to foster improved communication and collaboration between IPs and their institutions’ laundry managers and personnel to help address potential knowledge gaps that go both ways?

**A:** Take the initiative! If healthcare laundry is part of the IP’s oversight responsibilities, set up a meeting with the laundry manager or contractor to discuss the issues and learn about the process. When planning the agenda for a hospital infection prevention committee meeting, make it a point to add healthcare laundry to the discussion at least once a year or more if needed. Foster the spirit of the multi-disciplinary team in these meetings. Ask your hospital’s EVS director for his/her expertise as appropriate.

You may also find it very helpful to visit periodically the websites of professional laundry and textile associations. Over the last 20 years there has been the trend to out-source the healthcare laundry service to contractor laundry operations. The laundry and textile associations are very aware of the need to foster improved communications with the healthcare sector, and some of these associations are working to educate both the IPs and the laundry managers on issues such as CMS surveys, updates on technology, etc. Good resources are the Healthcare Laundry Accreditation Council (see: http://www.hlacnet.org), the Association for Linen Management (see: http://www.almnet.org), and the Textile Rental Service Association (see: http://www.trsa.org).

**Q:** If there are relatively few HCT-related outbreaks, does that indicate that the potential is low overall? Or that it’s a perfect storm waiting to happen but we aren’t certain of the triggers? What’s your perspective in looking at the literature?

**A:** We don’t know the actual scope of adverse events potentially associated with healthcare laundry because published reports are few in number. Most of the medical literature on healthcare laundry and textiles is scientific information from researchers conducting laboratory studies to evaluate microbial burden on garments, healthcare textiles, uniforms, bed linens, privacy curtains, etc. As for a “perfect storm waiting to happen,” I can’t make a prediction on this. I am satisfied that the current healthcare laundering process is adequate, WHEN all recommended infection prevention aspects of the process are achieved and the laundry processing is carried out in accordance with current industry standards. One observation I made while conducting the literature review of laundry-associated outbreaks was that local climate conditions and water quality must be considered for environmental
Infection control in order to maintain the quality of the clean textile product. My review article describes actions that can be taken to correct process inadequacies that may enhance environmental contaminant proliferation and also highlights some of the local environmental conditions that played a role in several of the outbreaks.

Q: You seem to be satisfied that the current laundering process is adequate. Could there be ways to further enhance it as an added layer of protection against contamination or transmission?

Annually, several billion pounds of healthcare textiles are laundered in the US, and yet cases of infection related to laundry are rarely reported.

There is always innovation in technology and chemistry. One development is the use of antimicrobial treatments of fabrics, garments, and textiles. For example, while silver-impregnated garments have been used for many years as part of the treatment of atopic dermatitis, antimicrobial treatment of textiles is an emerging technology for infection prevention. In my review of the medical literature, I found only one article describing the use of antimicrobial-treated textiles as part of infection prevention. Current healthcare laundry processes and practices produce a hygienically clean textile product such that we see a very low incidence of infection linked to the use of those textiles. Introduction of new technologies or practices should be supported by evidence of effectiveness in lowering the risk of infection for patients. A cost-benefit analysis is needed as well.

Q: Do you have additional concerns depending upon whether a laundry is onsite at a healthcare institution vs. an offsite contracted laundry facility?

A: The issue of transport is the major difference between the onsite services vs. those of the offsite contractor. The responsibility to maintain the hygienic quality of the laundered healthcare textiles during transit belongs to the laundry contractor. They also need to evaluate their onsite storage/holding areas to ensure proper conditions for storage in preparation for transport.

Q: What do you believe represents the greatest opportunity for breaches in infection control related to HCT? Are there specific points in the HCT pick-up, processing and/or delivery/storage aspects that concern you most?

A: I reviewed these breaches in infection control in my article. The main concerns are the moisture content of bundled textiles, storage conditions (e.g., dust, inadequate climate control), inadvertent exposure to environmental contamination, and problems in the...
When the laundry equipment is properly maintained and operated and the appropriate laundry detergents and additives are used according to specifications, the laundry process is very effective in producing a hygienically clean product. What happens after the washing and drying is critical to maintaining that quality, and both the healthcare facility staff and the laundry staff are both involved with the task of ensuring a hygienically clean textile comes to the patient.

**Q:** Since publication of your review article, have you received any interesting rebuttals or suggestions that you can share? How was the article received overall? What did you hope to achieve in terms of raising awareness, settling some issues, and advancing the dialogue?

**A:** No rebuttals received as yet. In general, I’ve heard from representatives from a few laundry and textile professional associations and they have highlighted the article’s major points on their websites. I’ve heard from several laundry professionals and a few IPs and EVS directors who were very enthusiastic about the article’s message and its scientific information.

My main goals in writing this review article were: 1) to provide IPs and EVS directors with information about the log reduction capability of modern laundry chemistries and laundry processes; 2) to make the case of the effectiveness of the laundry processing to healthcare epidemiologists by using an epidemiologic review of reported outbreaks and root cause analysis of the reported problems; 3) to provide an infection prevention perspective to laundry professionals so they can enhance their communications with healthcare professionals; and 4) to provide some perspective on some of the recent developments in the field.