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Infection Control and Flooring

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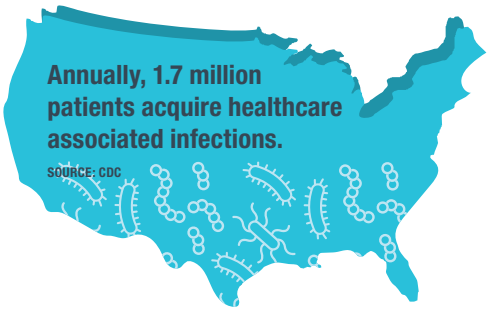
Each year in the United States, approximately 1.7 million patients are affected by healthcare-associated infections (HAIs) which are acquired while receiving treatment for medical or surgical conditions in a healthcare setting, while in Canada 1 in 16 patients admitted to hospitals develop an infection from a multidrug-resistant organism[i]. Antimicrobial-resistant infections are becoming more frequent and increasingly difficult to treat, and as a result, antimicrobial resistance (AMR) is now recognized as a growing health threat around the world[ii]. Left unchecked, AMR could cause a return to a pre-antibiotic era in which common infections could once again become incurable, with grave consequences to the health of populations worldwide.



Approximately one-third of all HAIs can be prevented by adherence to infection prevention guidelines, which address the sources associated with the transmission of HAIs — including people, interior finishes, equipment, and surfaces. These sources can potentially harbor harmful infectious organisms, introducing new risks of transmitting microorganisms throughout facilities. To control or stop infections, you must break the chain of infection — meaning you must stop germs from being transmitted. This is simple in concept, but harder in practice because germs are everywhere and not all of them are bad.

There is a lot of research on the benefits of good germs, such as bacteria in our intestines that help digest food. It's the bad germs that we need to stop. Eliminating HAIs saves lives, reduces patient stays, and reduces cost. The Center of Disease Control estimates that annual direct medical costs ofHAIs to U.S. hospitals ranges from $28.4 to $33.8 billion.[iii]

This white paper provides basic information about infection control and reviews key considerations for flooring selection, maintenance, and cleaning that can impact infection control.

The Basics

An infection is the invasion of bodily tissues by pathogenic organisms (aka: disease-causing germs) that proliferate or grow, resulting in tissue injury that can progress to disease, human health issues, and even death. Pathogenic organisms include bacteria, viruses, protozoa, or fungi. Any natural or synthetic substance that kills or inhibits the growth of microorganisms is known as an antimicrobial, while antibiotics are medicines used to prevent and treat bacterial infections. Antibiotic resistance occurs when bacteria change in response to the use of antibiotic medicines, therefore bacteria, and not humans, become antibiotic resistant. Resistant bacteria may then infect humans and are harder to treat than non-resistant bacteria, and overusing antimicrobials contributes to antimicrobial resistance.

To Treat or To Disinfect

As a society, we have become accustomed to seeing products that claim antimicrobial

properties, yet in a world of antimicrobial-resistant bacteria, adding antimicrobials to everything is not a beneficial solution. The more antimicrobials we use, the more resistant bacteria will become. According to the Healthy Building Network, "no evidence yet exists to demonstrate that products intended for use in interior spaces that incorporate antimicrobial additives actually result in healthier populations", and antimicrobials may have negative impacts on both people and the environment. For this reason, flooring products with added antimicrobials should be avoided.

This recommendation is often made, because flooring, like walls and ceilings, is considered a low or infrequently touched surface. Low-touch surfaces have minimal contact with hands, where high-touch surfaces such as doorknobs, light switches, and handrails are frequently touched by hands. Hand hygiene is the simplest and most effective measure for preventing HAIs. Despite the simplicity of this procedure and advances made in infection control, hospital healthcare workers' compliance to hand hygiene recommendations is generally low. A study found an overall median compliance rate of only 40 percent among healthcare workers[v].

While the U.S. Center for Disease Control has not issued guidance as to the efficacy of adding antimicrobials to low-touch surfaces such as flooring, they state that "cleaning and disinfecting environmental surfaces as appropriate is fundamental in reducing their potential contribution to the incidence of healthcare-associated infections"[vi]. In the U.S. and Canada, both "treated articles" and "surface disinfectants" are regulated.

Health Canada's Pest Management Regulatory Agency (PMRA) and the United States Environmental Protection Agency (USEPA) regulate pesticides added to products designed to manage, destroy, attract, or repel pests. The term "treated article" generally refers to product that has been intentionally treated with a pesticide, such as an antimicrobial. The pesticide registration in both the U.S. and Canada involves the scientific evaluation of ingredients, extensive testing to determine the potential risks posed to human health, and to the environment.

Additionally, both Canada and the U.S. regulate chemical products used as disinfectants on environmental surfaces and inanimate objects. These products are commonly referred to as "surface disinfectants", and their label claims may represent the product as being effective against bacteria, fungi, viruses, mycobacteria, or bacterial spores.[vii] Before surface disinfectants can be sold in Canada or the U.S., Health Canada or the USEPA respectively require that they undergo a pre-market assessment to determine the safety, efficacy, and quality evidence that the product performs as indicated by the label. USEPA provides List N, an approved list of surface disinfectants for specific microbes. If a product claims "antimicrobial", the antimicrobial must be registered with the USEPA.

Flooring and Infection Control

A decision-making process and policy to guide selection and procurement of finishes, such as flooring, should be developed collaboratively with key stakeholders like purchasing managers, occupational health and safety, infection prevention personnel, building services (maintenance), and environmental services (cleaning staff). This process and policy should be reviewed regularly and amended, as needed, and quality improvement elements should be incorporated into the process, including monitoring, audits, and feedback. To minimize the risk of microbial contamination, the Center for Disease Control[viii] (CDC), as well as the Provincial Infectious Diseases Advisory Committee[ix] (PIDAC, Ontario, Canada), recommends the following characteristics for finishes, furniture, and other surfaces.

CHARACTERISTICS TO MINIMIZE THE RISK OF MICROBIAL CONTAMINATION	
> Cleanable	Surfaces must be easy to clean and disinfect. A comprehensive cleaning regimen should be developed.
> Easy to Maintain and Repair	Regularly evaluate flooring and repair immediately if needed.
> Seamless	Easiest type of floor to clean and disinfect.
> Nonporous	Microorganisms can survive more easily on porous surfaces.

Cleanable

It's important to ensure that all finishes, furniture, and surfaces can be effectively cleaned and are compatible with facility disinfectant(s). It is especially important in areas where blood and bodily fluids such as vomit, urine, or spit-up may contaminate a surface. Cleanability must be a central consideration when facilities are designed or renovated,or when new finishes are obtained. Surfaces that are difficult or impossible to clean and disinfect should not be purchased, installed, or used. Surfaces that are difficult to clean present a danger to building occupants — especially to patients who are at risk for healthcare-acquired infections.

No matter what flooring type is in place, it's necessary to devise a comprehensive maintenance plan and to clean flooring regularly and thoroughly with effective cleaning solutions to eliminate infection risk. The maintenance plan, along with the cleaning policy and purchasing criterial, should be developed collaboratively with key stakeholders (e.g. facility management,

environmental services, infection prevention, and occupational health and safety) at the planning stage of construction and renovation, and prior to the purchase of new flooring.

Easy to Maintain & Repair

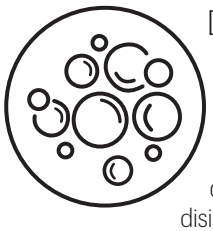
To minimize the risk of microbial contamination, avoid materials that are prone to cracks, scratches, or chips, and quickly patch or repair if they occur. Materials selected for interior finishes, furniture, and surfaces should be durable or easy to repair. Staff should regularly check flooring for damage, such as cracks or peels and fix promptly. These routine checks will help keep building occupants safe and extend the durability of the floor.

Seamless

Seams may harbor microorganisms and are difficult to clean. Items with seams, such as flooring or upholstered furniture, should be avoided especially in areas such as healthcare patient rooms or operating rooms.

Nonporous

Microorganisms can survive more easily on porous surfaces and have been shown to survive on porous fabrics such as cotton, nylon, and polyester. For this reason, porous surfaces and porous plastics should be avoided, especially for in-patient areas.



Disinfecting Flooring

While both the PICAC and the CDC recommend that under normal circumstances infrequently touched surfaces like flooring do not require disinfectant, developing a cleaning and disinfecting strategy is important. Surfaces cannot be disinfected if they are not clean. For hard surface flooring, cleaning consists of dry dust mopping to remove dust and debris, followed by wet mopping with a detergent to clean; under normal circumstances, the use of a disinfectant is not required.

In their joint Guidance for Cleaning and Disinfecting, the USEPA and the CDC recommend removing soft and porous materials in high traffic areas and considering if and how soft and porous materials like carpet or fabric in seating can be disinfected.

If Environmental Services chooses to use a registered surface disinfectant for cleaning low-touch surfaces (e.g., floors), then they should confirm prior to use that the flooring is chemical resistant to the disinfectant. Most flooring manufacturers test and provide guidance as to what types of disinfectants are safe to use on flooring. It is important that spills are cleaned up immediately for occupant safety to prevent slipping and to prevent the spill from tracking throughout the building. If a spill is thought to contain blood or body fluids, or when a multi-drug resistant organism is likely to be in the environment, surface disinfectants should be considered. Finally, the cleaning strategy should minimize contamination of cleaning solutions and cleaning tools. Buckets quickly become contaminated, and soiled cloths and mop heads should be replaced with clean items each time a bucket of detergent/disinfectant replaced with fresh, clean solution.

WELL Building Standard

The WELL Building Standard is the world's first architectural building standard focused exclusively on human health and wellness. Unlike LEED or Green Globes, it focuses only on the health and wellness of the building occupants. The WELL Building Standard is broken down into categories. Each category includes features which are like "credits" in LEED. Some of the WELL features related to infection control, design, and flooring, such as Feature X09 for Cleaning Product and Protocols found in WELL Building Standard v2. This feature is in the Materials Category — a new category in WELL v2. This feature takes a slightly different approach. Part 1 encourages project teams to select cleaners that do not contain certain ingredients. These ingredients include restrictions on carcinogens, mutagens, reproductive toxins, skin and respiratory irritants, and chemicals. Whereas Part 2 of Feature X09 encourages acceptable cleaning practices, such as providing training, establishing cleaning protocols, and chemical storage requirements.

Conclusion

Selecting, cleaning, and maintaining your flooring is important for the health and safety of the building occupants. Always choose flooring products that are easy to clean, maintain, and repair, and select non-porous and seamless flooring products to minimize the risk of microbial contamination. Challenge requests to specify flooring products with added antimicrobials as this may contribute to antimicrobial resistant organisms, and use disinfectants conservatively according to manufacturer recommendations. Remember that in most cases that the use of disinfectants is not required and that water and detergent are effective cleaning solutions.

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