Modern technologies for improving cleaning and disinfection of environmental surfaces in hospitals
(Boyce, J. Antimicrobial Resistance and Infection Control. 2016.)

Abstract
Experts agree that careful cleaning and disinfection of environmental surfaces are essential elements of effective infection prevention programs. However, traditional manual cleaning and disinfection practices in hospitals are often suboptimal. This is often due in part to a variety of personnel issues that many Environmental Services departments encounter. Failure to follow manufacturer’s recommendations for disinfectant use and lack of antimicrobial activity of some disinfectants against healthcare-associated pathogens may also affect the efficacy of disinfection practices. Modern disinfectant technologies, such as Improved Hydrogen Peroxide, are effective alternatives to disinfectants currently in widespread use.

Background
In recent years, there is an increasing consensus that improved cleaning and disinfection of environmental surfaces is needed in healthcare facilities. Experts generally agree on a number of areas, including the fact that careful cleaning and/or disinfection of environmental surfaces, daily and at time of patient discharge, are essential elements of effective infection prevention programs. Moreover, when disinfectants are used, they must be used appropriately to achieve the desired effects. The purpose of this article is to summarize the many factors that affect standard cleaning and disinfection practices and to discuss modern liquid chemical disinfectant technologies that can supplement traditional cleaning and disinfection methods.

Personnel-related issues
Multiple studies have shown that manual cleaning and disinfection of surfaces in hospitals is suboptimal. In many facilities, only 40-50% of surfaces that should be cleaned are wiped by housekeepers. Some contributing personnel issues include employee turnover among Environmental Services departments which poses a significant problem. Furthermore, among housekeepers and nursing personnel, when there is insufficient training, there is often confusion about who is responsible for cleaning various surfaces and equipment, leading to surfaces being missed during the cleaning process.

Issues related to disinfection protocols and practices
In addition to the above personnel-related issues, there are many other factors that can potentially have adverse effects on the efficacy of traditional cleaning and disinfection practices. The type of surface being cleaned or disinfected can affect the completeness with which bacteria are removed. Disinfectants may be applied using inadequate contact times. Failure of housekeepers to use an adequate number of wipes per room can result in poor cleaning of surfaces. Use of wipes without sufficient antimicrobial activity against target pathogens can result in poor disinfection of surfaces and can lead to spread of pathogens from one surface to another. Binding of quaternary ammonium disinfectants to cloths made of cotton or wipes containing substantial amounts of cellulose may reduce the antimicrobial efficacy of the disinfectant. Inappropriate over-dilution of disinfectant solutions by housekeepers or by malfunctioning automated dilution systems may result in applying disinfectants using inappropriately low concentrations. Furthermore, contamination of disinfectant solutions can occur, particularly if recommendations for their use are not followed. Lastly, numerous studies have found that standard manual cleaning or disinfection of surfaces can reduce, but often does not eliminate, important pathogens such as staphylococci including methicillin resistant *Staphylococcus aureus* (MRSA), vancomycin resistant *Enterococcus* (VRE), and multidrug resistant *Acinetobacter*. Failure to adequately disinfect patient rooms at the time of hospital discharge contributes to the increased risk of acquisition of resistant pathogens among patients admitted to a room where the prior room occupant was colonized or infected with a multidrug resistant pathogen.

Monitoring housekeeping practices
In order to improve standard cleaning and disinfection practices, it is recommended that the practices of housekeepers be monitored and that they receive feedback regarding their performance. However, monitoring of housekeeper performance is often not performed as frequently as needed, if at all. Monitoring activities can be time-consuming and must be conducted on an ongoing basis in order to be effective.

Given the multitude of challenges to achieving and maintaining adequate cleaning and disinfection in health care facilities, there is a need to consider the use of modern technologies designed to improve disinfection of surfaces in hospitals. New technologies fall into several categories, including: new liquid surface disinfectants, improved methods for applying disinfectants, self-disinfecting surfaces, light-activated photosensitizers, and no-touch technologies.

Improved Hydrogen Peroxide
Several Improved Hydrogen Peroxide disinfectants, including Accelerated Hydrogen Peroxide®, have been shown to be effective one-step cleaner/disinfectant agents that significantly reduce
bacterial levels on surfaces. In one study, use of a product containing 0.5% Accelerated Hydrogen Peroxide® was associated with fewer healthcare-associated infections when compared to an existing cleaning product. Improved hydrogen peroxide liquid disinfectants can also be used to reduce contamination by multidrug-resistant pathogens on soft surfaces such as bedside curtains. Several of the improved hydrogen peroxide disinfectants also have activity against Norovirus surrogate viruses. These newer disinfectants have the highest Environmental Protection Agency (EPA) safety rating meaning that housekeepers do not need to wear any personal protective equipment while using these products.

Conclusions
In conclusion, manual cleaning and disinfection of environmental surfaces in healthcare facilities (daily and at patient discharge) are essential elements of infection prevention programs. Because many factors make it difficult to achieve high rates of effective disinfection on a routine and sustained basis, continued efforts to improve the quality and consistency of traditional cleaning and disinfection practices are needed. Given the many challenges in achieving desired levels of surface disinfection, adoption of modern technologies is indicated to supplement traditional methods. As additional data becomes available, it is likely that newer liquid disinfectants will be more widely adopted to supplement traditional cleaning and disinfection practices.

Implications for AHP®

AHP® Disinfectants are One-Step Disinfectant Cleaners
• AHP® has proven cleaning efficiency resulting in lower costs and faster results as well as added confidence that disinfection can occur
• AHP® is proven to reduce HAIs by 20%1

AHP® Disinfectants have realistic contact times
• Short contact times ensure surfaces remain wet for the required contact time, providing comfort and confidence that disinfection has occurred

AHP® Disinfectants provide the perfect balance between safety and efficacy
• AHP® is designed to be easier on employees and occupants resulting in protocol compliance
• The ingredients found in AHP are all listed on the EPA and Health Canada Inerts lists and the FDA Generally Regarded as Safe List

• AHP® provides a HMIS rating of "0", meaning it has been proven to be non-toxic, non-irritating to eyes and skin and non-skin sensitizing and does not require the use of personal protective equipment to handle

AHP® Disinfectants are compatible
• AHP formulations are tested to ensure compatibility that preserves your investments in equipment, furniture, and building surfaces

AHP® Disinfectants are environmentally sustainable
• AHP’s® active ingredient, hydrogen peroxide, breaks down into water and oxygen leaving no active residues
• AHP® is formulated to ensure that it will not negatively impact indoor air quality

1 Use of a daily disinfectant cleaner instead of a daily cleaner reduced hospital-acquired infection rate. AJIC 43 (2015) 141-6