



## [Chlorine Chemistry](#)

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# The Disinfecting Power of an Old Stand-by: Chlorine Bleach

*By these members of the Nurses Leadership Council, a group of nurse educators who advised the American Chemistry Council's Chlorine Chemistry Council for several years in the early 2000's: Nettie Birnbach, RN, EdD, FAAN; Ann W. Burgess, RN, DNSc, CS, FAAN; Willa M. Doswell, RN, PhD, FAAN; Lucie S. Kelly, RN, PhD, FAAN; Donna A. Peters, RN, PhD, FAAN; and Marlene R. Ventura, RN, EdD, FAAN*

Viewed through a microscope, a nurse's working environment can be risky. Although microorganisms live naturally on surfaces everywhere—and are even vital to life as we know it—hospitals and other healthcare facilities often play host to a variety of dangerous viruses and bacteria. The unfortunate outcome is that many patients, particularly the immunocompromised, acquire infections in healthcare settings, the very environments they enter to regain health. As surgical and specialty care is relegated to outpatient centers, the sickest and most vulnerable patients are left in hospitals, which are becoming more and more like large ICUs.<sup>1</sup>

It's estimated that one in 10 hospital patients acquires an infection as a direct result of being hospitalized.<sup>1</sup> Nurses are at risk in their workplaces because of their direct contact with the sick and the sheer number of hours they spend in healthcare settings. Patients and nurses deserve the benefits of the most stringent hospital infection control programs possible. Besides attention to handwashing, [chlorine bleach](#), one of the most powerful weapons in the ongoing campaign against infection in healthcare facilities, is a reliable disinfecting agent.

### **Beyond the Laundry**

Sodium hypochlorite (the active ingredient in chlorine bleach) is one of the chlorine disinfectants routinely added to municipal drinking water to control waterborne disease. Since the introduction of water chlorination to the US in 1908, death rates due to [typhoid fever](#), cholera, and hepatitis A have declined dramatically. In addition to water disinfection, chlorine bleach solutions are approved by the [Environmental Protection Agency](#) (EPA) and the [Department of Agriculture](#) (USDA) for use in safe food production, including food preparation and service in healthcare facility kitchens and cafeterias. Chlorine bleach is used routinely to kill common food pathogens like *Campylobacter*, *Salmonella*, and *Escherichia coli* (*E.coli*) 0157:H7. At critical junctures all the way from the farm to the fork, chlorine disinfectants kill microbes that cause foodborne disease.

Chlorine bleach is registered by the EPA for use as a hospital disinfectant. The Centers for Disease Control and Prevention (CDC) has established guidelines for chlorine bleach use in healthcare facilities.<sup>2</sup> The CDC specifies concentrations of chlorine bleach required to disinfect countertops, floors, tonometer heads, needles, syringes, laundry, dental appliances, hydrotherapy tanks, water distribution systems in hemodialysis instruments, and regulated medical waste prior to disposal. Visiting nurses and home healthcare providers should be aware of the broad disinfection capabilities of this readily available, inexpensive disinfectant.

Failure to comply with scientifically based guidelines on disinfection and sterilization leads to numerous cases of illness in healthcare environments. The [National Nosocomial Infections Surveillance System](#) (NNIS) agency monitors infections acquired by patients in more than 270 US hospitals. This agency found that the rate of hospital infections per 1,000 patient-days increased by 36% between 1975 and 1995. In 1995, hospital infections cost \$4.5 billion and contributed to more than 88,000 deaths. The infection rate and costs increase every year.<sup>3</sup>

### **A Trusty Ally**

*Clostridium difficile* is an example of a common hospital pathogen, and antibiotic therapy is a major risk factor in the development of hospital infections with *C. difficile*. Antibiotics suppress normal intestinal flora, allowing the organism to proliferate and produce toxins that may cause diarrhea and colitis. Individuals with *C. difficile*-associated disease shed spores in the stool that can be spread from person to person. These spores can survive up to 70 days on inanimate surfaces.<sup>4</sup>

Unlike many other disinfectants, bleach kills *C. difficile* spores and can be used to control the spread of this bacterium. Overuse of antibiotics has led to the evolution of hospital "super-bugs," resistant to the most aggressive drugs given to patients; but on inanimate surfaces, they're no match for the trusted ally, chlorine bleach.

Despite the remarkable disinfecting properties of chlorine bleach, there are those who discourage its use in healthcare environments, citing concerns about its human health and environmental effects. But used correctly, the product that is tough on germs can be handled safely and released without harming the environment. For example, to avoid user contact with undiluted liquid chlorine bleach, which may lead to skin or respiratory irritation, the Nurses Leadership Council (NLC) suggests that nurses use prediluted solutions or premoistened cloths. As for the environment, in the process of chemically disinfecting, chlorine bleach decomposes, mainly to saline (sodium chloride) water. Any excess bleach that flows into waste drains reacts with wastewater components until it's completely deactivated, long before being released into waterways.

Hospital infections are a dreaded possibility for patients entering healthcare facilities. Such infections increase the period and decrease the quality of patient confinement and may even contribute to death. For nurses, the risk of infection acquired in the workplace is a constant occupational hazard.

The good news is that about one-third of all hospital infections are preventable using a simultaneous strategy that includes identifying patients at risk, handwashing, and attention to sterilization and disinfection procedures.<sup>1</sup> While exposure to harmful pathogens in healthcare settings will always present a risk for patients and nurses, all proven measures to minimize these risks should be taken, including the prescribed use of chlorine bleach disinfectants.

## References

<sup>1</sup> Tilton D. *Nosocomial infections: diseases from within our doors*. Accessed June 30, 2003.

<sup>2</sup> Rutala WA, Weber D.J, and the Healthcare Infection Control Practices Advisory Committee. *Draft Guideline for Disinfection and Sterilization in Healthcare Facilities*. 2002:92-93.

<sup>3</sup> Weinstein R. *Nosocomial infection update*. CDC website. Available at: [www.cdc.gov/hcidod/eid/vol4no3/weinstein.htm](http://www.cdc.gov/hcidod/eid/vol4no3/weinstein.htm). Accessed June 30, 2003.

<sup>4</sup> *Clostridium difficile fact sheet*. Wisconsin Department of Health & Family Services website. Accessed June 30, 2003.

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