or lesser exposure to the disinfectant agent. For instance, the extracellular matrix in bacterial biofilms may hinder diffusion of disinfectants and reduce exposure of the embedded cells (Sanchez-Vizuete et al. 2015). Similarly, organic and inorganic solids can interfere with the antimicrobial activity of disinfectants or sterilization systems by protecting the microorganisms or inactivating the antimicrobial agent.

It is well known that the efficacy of a given method for disinfection or sterilization depends on the procedure design, the potency to kill microorganisms, concentration (for chemical treatments), and exposure time. In relation with the procedure design, standard cleaning and disinfection practices are also influenced by the personnel, and notable differences can be observed depending on individual performance (Boyce et al. 2010). The type of surface, contact time, inappropriate concentration, or contamination of the disinfectant may also contribute to reducing the effectiveness of the treatment (Boyce et al. 2016). Additionally, physical and chemical factors (temperature, pH, relative humidity, and ionic strength) may have an effect on the activity of most disinfectants.

There are several methods to assess the efficacy of disinfection procedures such as ATP bioluminescence assays (Boyce et al. 2009) or microbiological screening (White et al. 2008). In fact, these techniques have been incorporated into the disinfection routine of some hospitals (Dancer et al. 2008; Lewis et al. 2008). Data obtained from these screenings can then be compared with data from hospital-acquired infections to determine the success of different cleaning procedures. However, these monitoring systems require the use of microbiological standards. Dancer (2004) proposed two different possible standards to evaluate hospital cleaning. The first standard is the presence of some microorganisms such as *S. aureus*, including MRSA, *C. difficile*, VRE, and various Gram-negative bacilli. The second alternative is a quantitative evaluation of aerobic colony counts on frequent-hand-touch surfaces (<5 cfu cm^2). Regarding the ATP bioluminescence assays, standard levels range from 25 to 500 relative light units (RLU) for surfaces of 10–100 cm^2 (Mulvey et al. 2011). However, it should be taken into account that, independently of the results obtained in these assessment techniques, the risk of infection also depends on the probability that a patient comes in contact with the contaminated surface.

22.3 Resistance to Disinfectants

22.3.1 Molecular Mechanisms of Biocide Resistance

A major setback for successful surface decontamination is the presence of disinfectant-resistant microorganisms. Resistance mechanisms may be inherent to a given microbe (intrinsic), acquired through horizontal transfer or