

# How to stop killing patients with healthcare-associated infections

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## Introduction

Healthcare-associated infections (HAIs) are infections acquired in a healthcare setting. *Staphylococcus aureus*, including *Methicillin-resistant Staphylococcus aureus* (MRSA), is the leading nosocomial infection in the world. *S. aureus* infections are followed by *Pseudomonas aeruginosa* and *Escherichia coli* infections in incidence. The most common HAI manifestations include (a) surgical wound infections, (b) respiratory infections, and (c) genitourinary infections.

## Prevention

Proper adherence to CDC's HAI prevention guidelines leads to a reduction of nosocomial infection acquisition rates. These guidelines cite the importance of limiting the usage of invasive medical equipment, correct utilization of prophylactic antibiotics, and following standard precautions.



"Standard Precautions include: (a) hand hygiene, (b) use of personal protective equipment (e.g., gloves, gowns, masks), (c) safe injection practices, (d) safe handling of potentially contaminated equipment, and (e) respiratory hygiene/cough etiquette." (Guide to Prevention, 2016). The single most important precaution to take is proper hand hygiene.

## Impact

**Patient Mortality.** HAIs are a significant cause of mortality amongst patients who have been admitted to hospitals. It is estimated that one in every twenty hospitalized patients will develop an HAI. HAIs are attributed to 99,000 patient deaths in the United States annually.

**Hospital Cost.** By drawing out the length of stay for hospitalized patients and simultaneously incurring additional treatment costs, HAIs rack up an estimated \$20 billion per year. The descending order of costs is as follows: (a) surgical site infections (33.7%), (b) ventilator-associated pneumonia (31.6%), (c) central line associated bloodstream infections, (18.9%), (d) *Clostridium difficile* infections (15.4%), and (e) catheter-associated urinary tract infections (<1%).

Standard precautions are the minimum infection prevention practices to be used at all times including:

- Hand hygiene
- Personal protective equipment
- Safe injection practices
- Safe handling of contaminated equipment
- Respiratory hygiene (cough etiquette)

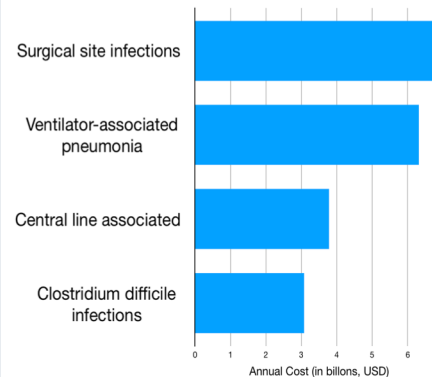
## Most Common HAIs in the US

1. *Staphylococcus aureus* (including MRSA)
2. *Pseudomonas aeruginosa*
3. *Escherichia coli*

## Transmission

HAIs are most commonly caused by (a) violation of infection control practices, (b) a non-sterile environment, and (c) ill employees. Consistent with these causes, the main sources of transmission are the hands of health care workers (20-40%) and the hospital environment (20%). The hospital environment refers to (a) surfaces, (b) medical equipment and (c) hospital air. MRSA is equally transmittable by health care workers whether contamination was acquired by infected patients or surfaces.

## Annual Cost of Healthcare Associated Infections by Type



## Risk Factors

Patient risk factors for HAIs include (a) age >70, (b) immuno-compromised states, (c) ICU stays >3 days, (d) surgical wounds, (e) mechanical ventilation, (f) indwelling catheters. Additionally, there are infection-specific risk factors for each HAI. Infections secondary to invasive medical equipment, such as catheters and ventilators, have duration of insertion as an important infection risk factor.

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