

## Health Care–Associated Infections

# A Meta-analysis of Costs and Financial Impact on the US Health Care System

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### ABSTRACT

**Importance:** Health care–associated infections (HAIs) account for a large proportion of the harms caused by health care and are associated with high costs. Better evaluation of the costs of these infections could help providers and payers to justify investing in prevention.

**Objective:** To estimate costs associated with the most significant and targetable HAIs.

**Data Sources:** For estimation of attributable costs, we conducted a systematic review of the literature using PubMed for the years 1986 through April 2013. For HAI incidence estimates, we used the National Healthcare Safety Network of the Centers for Disease Control and Prevention (CDC).

**Study Selection:** Studies performed outside the United States were excluded. Inclusion criteria included a robust method of comparison using a matched control group or an appropriate regression strategy, generalizable populations typical of inpatient wards and critical care units, methodologic consistency with CDC definitions, and soundness of handling economic outcomes.

**Data Extraction and Synthesis** Three review cycles were completed, with the final iteration carried out from July 2011 to April 2013. Selected publications underwent a secondary review by the research team.

**Main Outcomes and Measures:** Costs, inflated to 2012 US dollars.

**Results:** Using Monte Carlo simulation, we generated point estimates and 95% CIs for attributable costs and length of hospital stay. On a per-case basis, central line–associated bloodstream infections were found to be the most costly HAIs at \$45,814 (95% CI, \$30,919–\$65,245), followed by ventilator-associated pneumonia at \$40,144 (95% CI, \$36,286–\$44,220), **surgical site infections at \$20,785** (95% CI, \$18,902–\$22,667), *Clostridium difficile* infection at \$11,285 (95% CI, \$9,118–\$13,574), and catheter-associated urinary tract infections at \$896 (95% CI, \$603–\$1,189). **The total annual costs for the 5 major infections were \$9.8 billion (95% CI, \$8.3–\$11.5 billion), with surgical site infections contributing the most to overall costs (33.7% of the total)**, followed by ventilator-associated pneumonia (31.6%), central line–associated bloodstream infections (18.9%), *C difficile* infections (15.4%), and catheter-associated urinary tract infections (<1%).

**Conclusions and Relevance:** While quality improvement initiatives have decreased HAI incidence and costs, much more remains to be done. As hospitals realize savings from prevention of these complications under payment reforms, they may be more likely to invest in such strategies.