



Many people acquire infections, often fatal ones, during hospital stays. In fact, hospitals lack appropriate incentives to take infection-control measures. Partly, this is because third parties bear most of the cost of treating such infections. However, another problem when hospitals share patients is that several hospitals can be put at risk as a result of a patient becoming infected in one hospital.

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## Avoiding the Unnecessary Costs of Hospital-Acquired Infections

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Although going to the hospital may be the correct option if you are very sick, simply going to the hospital could make you sick. Roughly 1 in 20 patients admitted to a hospital for routine surgery or other treatments pick up serious infections that they did not have at the time of admission. These infections can lengthen their stays and may even kill them. How serious is the problem of hospital-acquired infections, what are the causes, and what might be done?

### SCALE OF THE PROBLEM

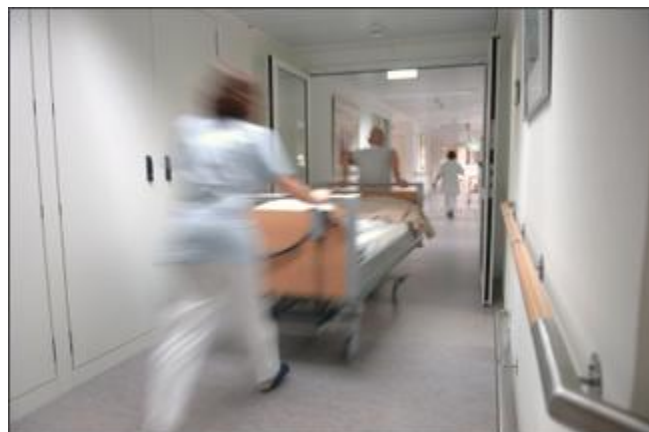
In 2006 alone, some 290,000 people contracted bloodstream infections (sepsis) and another 200,000 caught pneumonia while in U.S. hospitals. Their hospital stays were extended by 2.3 million patient-days. The cost: \$8.1 billion and 48,000 deaths, all preventable.

Those figures come from the first large-scale study of a recognized problem in U.S. health care, hospital-acquired infections. Sepsis is a systemic response to infection that can be introduced during surgery and other invasive procedures, and health care-associated pneumonia is an all-too-common lung infection picked up during hospitalization.

To identify infections associated with health care, we looked for diagnoses of sepsis and pneumonia in the 1998–2006 discharge records for representative hospitals in 40 states. We excluded cases in which patients entered the hospital with preexisting infections. From the remaining 58.7 million hospitalization records, we then estimated the length of stay, costs, and mortality associated with the hospital-acquired sepsis and pneumonia. We controlled for patient diagnoses, demographics (including age), other health conditions, and hospital treatment. We also used approximate controls for preinfection hospital exposure.

For patients who entered the hospital for invasive surgery and then contracted sepsis, the mean length of stay attributable to the infection was 11 days, and the extra hospital cost was \$33,000 per patient; 20 percent of these patients died before leaving the hospital. For those who came down with pneumonia, the additional length of stay was 14 days, and the attributable cost was \$46,000; the in-hospital mortality rate was 11 percent. The highest costs attributable to hospital-acquired infections were for surgery patients who had sepsis associated with pneumonia: their attributable hospital stays averaged 24 days and cost an additional \$80,000 each; these infections resulted in 28 percent in-hospital mortality.

Despite the substantial costs in dollars and lives, however, the United States devotes very few resources to studying the delivery of health care, and hospital records are not detailed enough to allow precise accounting. Our figures are likely underestimates because they focus on infections acquired and diagnosed during the same hospitalization; in fact, most surgical site infections are not diagnosed until after the patient has been discharged. Moreover, we looked at only two of the most common and serious conditions caused by these infections and calculated deaths actually caused by, rather than just associated with, infections patients got in the hospital.



## CAUSES

One reason for the high mortality rate is that common infections have become resistant to some antibiotics. *Staphylococcus aureus*, especially methicillin-resistant *S. aureus* (MRSA), is the primary cause of lower respiratory tract infections and surgical site infections. MRSA is now endemic, and even epidemic, in many U.S. hospitals, but it is not the only problematic pathogen. Increasingly, resistant strains of enterococci and gram-negative bacteria such as *Pseudomonas aeruginosa* and *Klebsiella pneumoniae* are infecting hospital patients. Resistant pathogens persist in hospitals because of excessive antibiotic use, high susceptibility of patients, and colonization of hospital staff or the hospital environment. They are then carried to other facilities by colonized patients who show no visible signs of infection.

The root cause of the problem, however, is the lack of infection control, which in turn is caused by the lack of incentives to do something about it. Hospitals don't pay the full costs of treating cases of infection because they can charge third-party payers for infections regardless of their origin.

Even if hospitals were to bear the costs of infection, there is the problem of free riding in infection control among institutions. A hospital or long-term-care facility can actually cut its costs by reducing infection control efforts and letting other institutions bear the economic burden of dealing with the problem. From the lax hospitals' perspective, minimal investment in controlling infections is the optimal response, even if it is not socially desirable, since they benefit from free riding and lowering their own resource allocations to control efforts.

Anecdotal evidence confirms this trend: single hospitals in rural settings often have lower infection rates and are more likely to invest in control than a large hospital that is one of many institutions sharing a pool of patients in an urban area. Because the benefit of ensuring that patients are not colonized accrues not just to the hospital undertaking the measures but also to other facilities where those patients may go, each hospital does less than would be socially optimal.

## WHAT CAN BE DONE?

Take the example of handwashing, a basic intervention for limiting the spread of infections within hospitals. Although we have known for at least 150 years that handwashing can prevent infections, compliance with this simple practice remains inadequate in most U.S. hospitals. But even a perfect record of handwashing may not be sufficient. Containing infections requires that hospitals devote valuable financial and human resources and use protective equipment. Even if physicians and nurses fully recognize the value of infection control, hospital management may not see its value in the immediate term relative to other priorities.

One option is to deny reimbursement to hospitals for charges related to infections acquired within the hospital, but this has two potential problems. First, hospitals could knowingly misclassify these infections to avoid financial penalties. And second, the penalties may not be large enough to sufficiently change behavior. Nevertheless, it makes no sense to pay hospitals for consequences that were a result of their neglecting to protect patients.

That infections cannot be entirely controlled at the scale of a hospital but involve multiple facilities that share colonized patients is another challenge to hospital-level measures. Third-party verification of the efforts of each hospital is a possible solution. Because a coordinated strategy would be in the interest of all hospitals, a transparent system that permits hospitals to observe transmission levels and control expenditures in other facilities might help. Organizing regional committees that share information on infection prevalence and act in a coordinated manner to manage the problem within the region may be a useful first step. Making public the data on resistance and infection levels would give hospitals reason to invest in addressing this preventable problem.

More broadly, treating antibiotics as a shared resource whose effectiveness must be conserved—through judicious use of existing drugs, investment in new ones, and careful management of narrow-spectrum antibiotics—would help slow the emergence of resistant pathogens.

There are many calls for new methods of measuring infections, interventions to prevent them, and evaluations of the effects. But more evidence on the magnitude of the problem could point the way to better allocations of resources and adjustments in health care policy. Right now, we know a lot about how to prevent hospital infections, but without adequate incentives for hospitals to do better, the situation may not change dramatically in the near future.

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### Further Readings:

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