

agement of respiratory equipment can reduce the spread of Gram-negative bacteria.¹ Meta-analyses have found that many non-pharmacologic interventions can significantly reduce the rate of ventilator-associated pneumonia; these include kinetic bed therapy, subglottic secretion drainage, heat-and-moisture exchangers (rather than heated humidifiers), and oral decontamination with chlorhexidine.⁶

Environmental controls can prevent a large percentage of hospital-acquired bacterial infections. Fewer nosocomial infections will reduce overall antibiotic use, which should reduce the risk of creating bacterial antibiotic resistance and improve the efficacy of antibiotics given to patients who do acquire infections. Much more research is needed on the prevention and antibiotic treatment of Gram-negative infections.

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The author responds:

Dr Curtis emphasizes some very important environmental issues that are frequently overlooked and some measures that can decrease the incidence of nosocomial infections. Organisms, such as *Acinetobacter*, that can persist for long periods on surfaces easily spread from patient to patient via hospital personnel (eg, radiology technicians and respiratory therapists) and equipment (eg, electrocardiographs, ultrasound machines, thermometers).

Improvements in intensive care unit design may reduce the risk from environmental surfaces that become colonized with pathogenic organisms. Curtains used for patient privacy may harbor organisms such as *Clostridium difficile* spores, and should be replaced with alternatives, such as E-glass or double glass plates with embedded shades

or blinds. Those surfaces are easy to clean and might help prevent infections by preventing colonization. Seamless intensive care unit floors and fabrication of environmental surfaces from materials that inhibit bacterial growth, such as copper, might also be effective. Research on those subjects is underway and may lead to new concepts and designs that provide a hospital milieu hostile to bacteria (personal communication, Neil A Halpern MD, Memorial Sloan-Kettering Cancer Center, New York, New York, April 28, 2008).

As Dr Curtis pointed out, subglottic suctioning decreases ventilator-associated pneumonia. Another strategy is silver-coated endotracheal tubes, which get less bacterial colonization.¹ We clearly need to look at innovations that can prevent infections, because they are not only cost-effective but will reduce the development of resistant microorganisms, decrease the need for antibiotics, and save lives.

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