

3. Jensen PA, Lambert LA, Iademarco MF, Ridzon R. Guidelines for preventing the transmission of *Mycobacterium tuberculosis* in health-care settings, 2005. MMWR Recomm Rep 2005;54:1-141.
4. Salazar-Schicchi J, Jedlovsky V, Ajayi A, Colson PW, Hirsch-Moverman Y, El-Sadr W. Physician attitudes regarding bacille Calmette-Guerin vaccination and treatment of latent tuberculosis infection. Int J Tuberc Lung Dis 2004;8:1443-7.
5. Mazurek GH, Jereb J, Lobue P, Iademarco MF, Metchock B, Vernon A. Guidelines for using the QuantiFERON-TB Gold test for detecting *Mycobacterium tuberculosis* infection, United States. MMWR Recomm Rep 2005;54(RR-15):49-55. [Erratum, MMWR Morb Mortal Wkly Rep 2005;54:1288.]

## System Failure versus Personal Accountability — The Case for Clean Hands

Donald Goldmann, M.D.

A new mother sits by her tiny, premature baby in a neonatal intensive care unit. She watches as a physician touches the baby without first washing his hands or using the waterless, alcohol-based hand antiseptic just a couple of feet away. A few minutes later, a nurse and then another doctor also fail to perform these basic procedures. When her baby was admitted to the unit, the mother was told to remind caregivers to wash their hands, but only after witnessing repeated failures does she muster the courage to speak up about the practice she thought would be routine. By then, her baby has acquired methicillin-resistant *Staphylococcus aureus* (MRSA) — probably transported on the hands of a caregiver who had been examining other babies who are colonized with MRSA. A few days later, MRSA invades the baby's bloodstream; it eventually proves fatal. Such preventable infections, caused by the failure to practice hand hygiene, are far from rare, and they occur in many of the finest neonatal intensive care units in the United States.

MRSA and other health care-associated infections have been prime targets of hospital infec-

tion-control and patient-safety programs for years, yet the prevalence of antibiotic-resistant bacteria continues to increase, and the rate of infections caused by these pathogens remains unacceptable. What can be done about these seemingly intractable problems?

Patient-safety experts stress that complex, error-prone systems are at the root of most mistakes in health care. Archaic, poorly designed systems often undermine the best efforts of well-intentioned, highly motivated clinicians and health care personnel to provide safe care. A major goal of contemporary patient-safety programs is to encourage a culture of safety and create a blame-free environment in which errors are seen as a by-product of bad systems, not as caused by bad or incompetent people. This orientation toward improving systems rather than blaming people who make mistakes is critical, since it encourages caregivers to report adverse events and near misses that might be preventable in the future. Improvement is impossible without such reports, which permit hospitals to gain an understanding of the factors that lead to mistakes and create systems that support safer

practices. Although reports tend to focus on major, dangerous errors that occur relatively infrequently, lower-profile mistakes that many caregivers make virtually every day, such as not washing their hands, also need to be documented and understood if the systems are to be improved.

But if we really are serious about making care safer, I would argue that we need to find the right balance between blaming mistakes on systems and holding individual providers accountable for their everyday practices. Curbing the alarming increase in the rate of antibiotic-resistant infections surely requires both systemic improvements and increased personal accountability.

Infections with antibiotic-resistant bacteria such as MRSA, which are difficult to treat, are transmitted primarily by the contaminated hands of health care providers who have touched a colonized patient or something in the patient's environment. Patients who are colonized or infected with resistant pathogens often have billions of colony-forming units of bacteria per milliliter of sputum or per gram of stool. Their skin and immediate environment may also be heavily contaminat-

ed. Caregivers who leave the bed-sides of such patients without performing hand hygiene may carry thousands or even hundreds of thousands of colony-forming units of antibiotic-resistant bacteria on their hands. Even if the caregivers wear gloves while caring for patients who they know are colonized with resistant bacteria, they frequently contaminate their hands when they remove their gloves.

Fortunately, the remedy for this situation is simple. If every caregiver would reliably practice simple hand hygiene when leaving the bedside of every patient and before touching the next patient, there would be an immediate and profound reduction in the spread of resistant bacteria. The recent widespread deployment of waterless, alcohol-based hand antiseptics has made this task easier even for harried caregivers. Performing hand hygiene with these products kills bacteria (with the exception of *Clostridium difficile*) very rapidly, takes much less time than traditional hand washing, and is gentler on the hands than the repeated use of soap and water. Yet compliance with hand hygiene remains poor in most institutions — often in the range of 40 to 50 percent.<sup>1,2</sup>

The system is partly to blame. First, staff members must not be so seriously overworked that they do not have time to perform important standard procedures. Second, many hospitals do not have programs to ensure that caregivers are adequately educated — that they know ex-

actly how much alcohol to apply, how long to rub their hands together, and which skin surfaces are most important to cover. Once educated, caregivers should also have their hand-hygiene competency assessed and certified. And then they must have reliable access to alcohol-based antiseptics at the point of care, which requires a foolproof system for refilling dispensers before they have run dry. Dispensers must be functional and must reliably deliver the appropriate amount of alcohol. Although the alcohol-based rubs in current use are gentle on the hands, lotions should also be easily accessible, in case of irritation. Clearly, the resolution of such system issues is not terribly complicated; in the realm of hand hygiene, near-perfect reliability should be achievable.<sup>3-5</sup>

Imagine, then, a hospital that has perfected its hand-hygiene system and monitors it regularly to detect failures. If a caregiver in such an institution neglects to perform hand hygiene when leaving the bedside in any case except a life-threatening emergency, it is no longer logical to blame the system. Experts in human error have a word for the failure to follow clear rules in the face of well-functioning systems: “violation.” Repeated violations in health care, as in any industry, should have consequences.

Another industry in which cleanliness is paramount — computer-chip manufacturing — may be able to teach us something about this issue. When a worker enters a “clean room” where com-

puter chips are being made, he or she must don a special suit, gloves, and mask to prevent the chips from becoming contaminated. These required materials are always available, and the clean-room system is highly reliable. A single failure to follow the rules results in a warning. Employees who violate the rules twice risk disciplinary action — for, after all, millions of dollars are at stake if contamination occurs. The performance expectations, in my view, should be at least as high when the stakes are lives rather than profits.

When a doctor or nurse can reduce the spread of antibiotic-resistant bacteria by practicing simple hand hygiene, accountability should matter. True, the hospital and its leaders are accountable for establishing a system in which caregivers have the knowledge, competence, time, and tools to practice perfect hygiene. But each caregiver has the duty to perform hand hygiene — perfectly and every time. When this widely accepted, straightforward standard of care is violated, we cannot continue to blame the system.

Dr. Goldmann reports having received research-grant support from Clorox and having served as a consultant to the Cosmetic Toiletry and Fragrance Association and to Warner-Lambert.

Dr. Goldmann is senior vice president of the Institute for Healthcare Improvement, Cambridge, Mass., and a professor in the Department of Pediatrics at Harvard Medical School, Boston.

1. Pittet D, Mourouga P, Perneger TV. Compliance with handwashing in a teaching hospital. *Ann Intern Med* 1999;130:126-30.

2. Lankford MG, Zembower TR, Trick WE, Hacek DM, Noskin GA, Peterson LR. Influence of role models and hospital design on hand hygiene of healthcare workers. *Emerg Infect Dis* 2003;9:217-23.

3. How-to guide: improving hand hygiene. Cambridge, Mass.: Institute for Healthcare Improvement, March 2006. (Accessed June 22, 2006, at <http://www.ihl.org/IHI/Topics/CriticalCare/IntensiveCare/Tools/HowtoGuideImprovingHandHygiene.htm>.)
4. Guideline for hand hygiene in health-care settings: recommendations of the Health-care Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. *MMWR Recomm Rep* 2002;51(RR-16):1-45.
5. WHO guidelines on hand hygiene in health care (advanced draft): a summary. Geneva: World Health Organization, 2005. (Accessed June 22, 2006, at [http://www.who.int/patientsafety/events/05/HH\\_en.pdf](http://www.who.int/patientsafety/events/05/HH_en.pdf).)