monoclonal antibodies of nosocomial pneumonia caused by *Legionella pneumophila* serogroup 10. *J Clin Microbiol* 1994;32:2692-2697.
28. Broderick A, Mori M, Nettleman MD, Streed SA, Wenzel RP. Nosocomial infections: validation of surveillance and computer modeling to identify patients at risk. *Am J Epidemiol* 1990;131:734-742.
29. Rodgers FG, Pasculle W. *Legionella.* In: Balows A, Hausler WJ Jr, Herrmann KL, Isenberg HD, Shadomy HJ, eds. *Manual of Clinical Microbiology.* 5th ed. Washington, DC: American Society for Microbiology; 1991:442-453.
30. Helms CM, Massanari RM, Wenzel RP, Pfaller MA, Moyer NP, Hall N. Legionnaires' disease associated with a hospital water system. A five-year progress report on continuous hyperchlorination. *JAMA* 1988;259:2423-2427.
31. Rowbotham TJ. Isolation of *Legionella pneumophila* from clinical specimens via amoebae, and the interaction of those and other isolates with amoebae. *J Clin Pathol* 1983;36:978-986.
32. Stout JE, YU VL, Best MG. Ecology of *Legionella pneumophila* within water distribution systems. *Appl Environ Microbiol* 1985;49:221-228.
33. Marrie TJ, Haldane D, Bezanson G, Peppard R. Each water outlet is a unique ecological niche for *Legionella pneumophila. Epidemiol Infect* 1992;108:261-270.
34. Dournon E, Rajagolapan P. Correlation between monoclonal antibody pattern, serum sensitivity and intracellular growth of *Legionella.* Presented at the Annual Meeting of the American Society for Microbiology. Atlanta, GA; March 1-6, 1987:71. Abstract B-279.
35. Edelstein PH, Edelstein MA. Intracellular growth of *Legionella pneumophila* serogroup 1 monoclonal antibody type 2 positive and negative bacteria. *Epidemiol Infect* 1993;111:499-502.
36. Fields BS, Barbaree JM, Sanden GN, Morrill WE. Virulence of a *Legionella anisa* strain associated with Pontiac fever: an evaluation using protozoan, cell culture, and guinea pig models. *Infect Immun* 1990;58:3139-3142.

Handwashing Compliance During Isolation

Gina Pugliese, RN, MS
Martin S. Favero, PhD

Researchers at Duke University Medical Center reported the results of a study that measured the effect of an isolation policy requiring the use of gowns and gloves on the frequency and duration of encounters between healthcare workers and patients, and on handwashing compliance.

Handwashing compliance was significantly higher among healthcare workers who cared for patients in contact isolation than among those who cared for controls. However, almost all hand washing by healthcare workers caring for patients in contact isolation occurred after the encounter; hand washing occurred before care of a patient in contact isolation only twice.

Compliance with the use of gowns and gloves in the care of patients in contact isolation was 90%. In addition, healthcare workers wore gloves during 38 (43%) of 88 encounters with controls. These workers were twice as likely to wash their hands as those who did not wear gloves. Healthcare workers who treated patients in contact isolation entered their rooms less frequently and had significantly less direct contact with them than those caring for controls. The mean length of time spent in a patient's room did not differ significantly between the groups.

The researchers note that these observations suggest that policies requiring the use of gowns and gloves in caring for patients in contact isolation increase the frequency of hand washing by healthcare workers, but decrease the likelihood of contact between healthcare workers and patients. The costs of using gowns and gloves as a way of prompting healthcare workers to wash their hands are high. In this study, the average length of hospital stay for patients in contact isolation was 46 days. Assuming 90% compliance with contact-isolation policies, they estimated that 2,070 disposable gowns and 4,140 latex gloves are used during the average hospital stay for a patient in contact isolation; the estimated cost is $1,627 per patient.

Moreover, the timing of the extra hand washing associated with contact isolation (after care of the patient) is not ideal. Hand washing before contact with patients is clearly beneficial in preventing the nosocomial spread of organisms to the patient. In this study, however, hand washing occurred before contact with patients only 15 times in 117 encounters. The observed tendency of healthcare workers to wash after rather than before contact with patients suggests that they may perceive hand washing more as an act of personal protection than as a way to prevent spread of nosocomial pathogens to patients.

The authors conclude that contact isolation should not be accepted as a substitute for hand washing. Moreover, until there is convincing evidence that the routine use of contact isolation adds to the efficacy of hand washing alone in controlling the spread of endemic resistant organisms, its routine use (outside an outbreak setting) should be reconsidered.

FROM: Kirkland KB, Weinstein JM. Adverse effects of contact isolation. *Lancet* 1999;354:1177-1178.