nia. An epidemiological investigation was undertaken to assess factors related to acquisition of DRSP in the nursing home. Because pneumococcal vaccination rates for all residents were determined to be low (2%), a formal program to vaccinate all residents of the nursing home was implemented.

The nursing home is a 240-bed residential facility that is divided into six 40-bed units; 25 beds are occupied by patients requiring ventilator-assisted breathing. None of the patients was known to be seropositive for the human immunodeficiency virus. Epidemiological information designed to identify risk factors for acquisition and transmission of DRSP was collected on standardized questionnaires. Information on the three DRSP isolates was obtained from the clinical microbiology laboratory of the hospital, but the isolates were not available for further characterization by molecular analysis or serotyping.

The three patients were in separate units in the nursing home. Two were ambulatory, and one was ventilator-dependent. They had no known social interaction with one another and did not share common healthcare providers. Two had been hospitalized within the previous 6 months. None had previous pneumococcal disease within the preceding 12 months, nor received visits from children <12 years of age during the preceding 6 months. All three had underlying chronic illnesses, two were receiving immunosuppressive medications, and all had received antibiotics within the previous 6 months. One patient had never been immunized with pneumococcal vaccine; the immunization status of the other two was unknown. Pneumococcal vaccination rates for all residents was found to be low (2%). This cluster of DRSP isolates was limited to these three residents; no additional cases have been detected among residents. No common exposures were identified.

The DRSP isolates did not have identical antibiotic susceptibility patterns. The minimum inhibitory concentrations (MICs) for penicillin for the three isolates were 2.0 µg/mL, 2.0 µg/mL, and 4.0 µg/mL (E-test). All were sensitive to trimethoprim-sulfamethoxazole and vancomycin. Susceptibility to erythromycin and ceftriaxone varied.

Certain changes were made in pneumococcal immunization practices to assure better immunization rates at the nursing home. First, after obtaining informed consent, the 23-valent polysaccharide pneumococcal vaccine was administered during a 6-week period to 207 (96%) of 215 residents not previously known to be immunized; 8 residents (4%) refused immunization. Residents were monitored actively by the nursing staff for side effects to immunization (fever >100ºF without other causes, myalgia, local erythema with pain, and anaphylaxis) and for illness compatible with DRSP. Two of the vaccinated patients (previously unimmunized) developed fever within 36 hours following vaccination. It was determined later that a vaccinated patient who did not develop side effects had been vaccinated more than 2 years previously.

Second, to ensure that pneumococcal immunization became a routine requirement for admission to the home, immunization policies were modified by the introduction of an immunization cover sheet to the front of each medical chart and by addition of a standing order for pneumococcal immunization within 7 days unless documentation of previous vaccination existed.

The NYCDOH mandated the reporting of antibiotic-resistant *S pneumoniae* in 1994. During the first 6 months of 1996, 16% of all blood isolates in New York City demonstrated intermediate penicillin susceptibility (2µg/mL>MIC≥0.1 µg/mL), and 6% showed high-level resistance (MIC≥2.0 µg/mL; NYCDOH, unpublished data, 1996). Over the past several years, nosocomial outbreaks of DRSP have been reported in New York City, including in a chronic-care facility for children[1] and a long-term–care facility for patients with acquired immunodeficiency syndrome (NYCDOH, unpublished data, 1996). Three outbreaks of pneumococcal pneumonia in chronic-care facilities have been reported recently from other states in which pneumococcal vaccination rates were low.[2]

Recommendations for prevention and control of infections in nursing homes include routine administration of 23-valent polysaccharide pneumococcal vaccine to all residents.[3] In spite of this, pneumococcal immunization rates for all US adults aged ≥65 years of age remain low.[4] Our experience at this nursing home highlights the missed opportunity that may occur in many long-term–care facilities to prevent invasive disease from *S pneumoniae* and, importantly, drug-resistant isolates. In our experience, pneumococcal vaccination was well tolerated by residents. The implementation of formalized pneumococcal immunization admission practices should provide improved vaccine coverage among residents of such facilities. However, more information is needed to assess the effectiveness of such policies, the occurrence of uncommon but serious side effects, and the effects of vaccination on the epidemiology of DRSP infections.

REFERENCES

1. Manheimer SB, Riley LW, Roberts RB. Association of penicillin-resistant pneumococci with residence in a pediatric chronic care facility. *J Infect Dis* 1996;174:513-519.
2. Kludt P, Lett SM, DeMaria A Jr, Crutcher JM, Curtis NM, Garvey CW, et al. Outbreaks of pneumococcal pneumonia among unvaccinated residents in chronic-care facilities—Massachusetts, October 1995; Oklahoma, February 1996; and Maryland, May-June 1996. *MMWR* 1997;46:60-62.
3. Nicolle LE, Strausbaugh LJ, Garibaldi RA. Infections and antibiotic resistance in nursing homes. *Clin Microbiol Rev* 1996;9:1-17.
4. Durham K, Owens P, Bender B, Senner J, Davis B, Leff M, et al. Pneumococcal and influenza vaccination levels among adults aged ≥65 years—United States, 1995. *MMWR* 1997;46:913-919.

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The Stethoscope and Potential Nosocomial Infection

To the Editor:

In a recent letter, Dr. Brook noted the potential role the stethoscope may play in the nosocomial transmission of bacteria.[1] He referred to a study by Breathnach et al[2] that documented the isolation of bacteria (notably gram-positive cocci) from the majority of stethoscope diaphragms utilized in a pediatric population. They isolated gram-negative organisms from a minority of stethoscopes, with *Staphylococcus epidermidis* being the

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most frequent isolate.[2] We recently performed a study that evaluated for bacterial growth on stethoscope diagrams, as well as the peripheral rim that secures the diaphragm, and found that 100% of 40 stethoscopes were contaminated with coagulase-negative staphylococci, and 37.5% were contaminated with *Staphylococcus aureus.*[3] Of note, 87.5% of stethoscope diagrams harbored bacteria and 100% of stethoscopes had bacteria isolated from under the plastic rim that secures the diaphragm. No gram-negative organisms or *Clostridium difficile* were isolated using appropriate culture techniques. In addition, our study was unique in that it documented transfer of micrococcus species from an inoculated stethoscope to the clean skin of a study subject.[3] Although it is difficult to prove that pathogenic organisms can be transferred by the stethoscope in the clinical setting, our study showed that not only are most, if not all, stethoscopes used in the hospital contaminated but also that they have the potential to transfer an inoculum of bacteria to human skin. This has potential important clinical ramifications with the emergence of resistant enterococcal and staphylococcal species,[4,5] which need to be contained to the patient's room by use of isolation techniques (which should include a dedicated stethoscope or use of isopropyl alcohol on the stethoscope diaphragm). The application of isopropyl alcohol to the diaphragm is highly effective in eradicating bacteria from both the diaphragm and rim area.[3]

That inanimate objects can serve as a point source for nosocomial infection has been established in several reports. Outbreaks of nosocomial bacterial infections attributed to electronic thermometers,[6] blood pressure cuffs,[7] and latex gloves[8] have been reported recently. *C difficile* also has been transmitted nosocomially, usually from healthcare worker's hands.[9] Although no documented cases of nosocomial infection due to contaminated stethoscopes have been reported, it certainly seems a possibility, given the transmission of infection through inanimate objects as noted above. Certain patient groups, including burn patients, the immunosuppressed, and patients in the intensive-care unit, may be at higher risk for acquisition of bacterial colonization from the stethoscope, which could lead to infection. That handwashing decreases the risk of nosocomial infection[10] is well-accepted. In my opinion, all healthcare workers also should clean the surface of their stethoscopes regularly. This quick, simple, and inexpensive procedure may be another way to decrease the risk of transmitting infection to our patients.

REFERENCES

1. Brook I. The stethoscope as a potential source of transmission of bacteria. *Infect Control Hosp Epidemiol* 1997;18:608.
2. Breathnach AS, Jenkins DR, Pedler SJ. Stethoscopes as possible vectors of infection by staphylococci. *BMJ* 1993;305:1573-1574.
3. Marinella MA, Pierson C, Chenoweth C. The stethoscope: a potential source of nosocomial infection? *Arch Intern Med* 1997;157:786-790.
4. Archer GL, Climo MW. Antimicrobial susceptibility of coagulase-negative staphylococci. *Antimicrob Agents Chemother* 1994;38:2231-2237.
5. Flores PA, Gordon SM. Vancomycin-resistant *Staphylococcus aureus:* an emerging public health threat. *Cleve Clin J Med* 1997;64:527-532.
6. Livornese LL, Dias S, Samel C, Romanowski B, Taylor S, May P, et al. Hospital-acquired infection with vancomycin-resistant *Enterococcus faecium* transmitted by electronic thermometers. *Ann Intern Med* 1992;117:112-116.
7. Layton MC, Perez M, Heald P, et al. An outbreak of mupirocin-resistant *Staphylococcus aureus* on a dermatology ward with an environmental reservoir. *Infect Control Hosp Epidemiol* 1993;14:369-375.
8. Patterson JE, Vecchio J, Patelick EL, Farrel P, Mazon D, Zervos MJ, et al. Association of contaminated gloves with transmission of *Acinetobacter calcoaceticus* var. *anitratus* in an intensive care unit. *Am J Med* 1991;91:479-483.
9. McFarland LV, Mulligan ME, Kwok RYY, Stamm WE. Nosocomial acquisition of *Clostridium difficile* infection. *N Engl J Med* 1989;320:204-210.
10. Steere A, Mallison GF. Handwashing practices for the prevention of nosocomial infections. *Ann Intern Med* 1975;83:683-690.

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The author replies.

I am grateful to Dr. Marinella for presenting his recent data on the potential transmission of organisms by stethoscopes.[1] Unfortunately, his groups' study appeared after my letter was submitted to *Infection Control and Hospital Epidemiology.*

I agree with his advice that all healthcare workers should clean their stethoscopes regularly, so that potential sources of bacterial transmission could be avoided. This is of even greater importance in an era when antimicrobial resistance is increasing.

REFERENCE

1. Marinella MA, Pierson C, Chenoweth C. The stethoscope: a potential source of nosocomial infection? *Arch Intern Med* 1997;157:786-790.

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Prevention of Nosocomial Cross-Infections

To the Editor:

Complicated technology, the pandemic spread of bloodborne viral infections, and evolution of common bacterial resistance to antibiotics[1] have created situations in healthcare facilities wherein healthcare workers (HCWs) and patients are at high mutual risk for cross-infections. Universal Precautions issued in 1987 for protecting HCWs and patients from bloodborne pathogens led to burgeoning use of unsterile protective latex gloves, at the expense of handwashing.[2] Handwashing declined to 25% of rates before gloving, and examination glove use increased to >9.15 billion per annum in the United States.[3] Side effects include increasing problems with glove allergy in HCWs and increased risk for nosocomial spread of skin-borne pathogens via gloves to patients, especially during the handling of equipment used in veins.[3-5] Because protective latex, vinyl, or nitrile gloves do not protect HCWs from accidental penetrative injuries from hollow-bore steel needles and other sharp instruments contaminated with blood or body fluids, in 1992 it was suggested that blunt instruments should be used, instead of sharp ones, whenever possible in the care of patients.[5] Side effects include a threefold to 10-fold increase in staphylococcal and vancomycin-resistant enterococcal bloodstream infections,[5] partly owing to hidden recesses capable of bacteriologic colonization in needleless intravenous access ports,[4] partly owing to use of unsterile gloves when handling blunt cannulae (as well as needles),[3] and partly owing to the complicated technology involved.[2,5] Therefore, to shield patients from some 2 million