

## Letters to the Editor

### Radiographic Films: Potential Source of Nosocomial Infections?

#### To the Editor:

Approximately 5% of patients acquire an infection while hospitalized, accounting for an estimated 2 million cases per year.<sup>1</sup> Sputum from patients with pneumonia can be a potential source of infection.

We sought to determine if respiratory isolates from hospitalized patients with pneumonia could be isolated from radiographic films of these patients. If this were the case, contact with the films might be a potential source of nosocomial spread of infection. Although healthcare workers are encouraged to wash their hands after patient contact, it is not usual practice to do so after handling radiographic films.

Data from Gram stain and culture of sputum specimens were evaluated daily. Patients with organisms isolated from cultures were selected, and only those with <10 epithelial cells and >10 to 25 polymorphonuclear leucocytes on sputum Gram stain had cultures obtained. These patients then were examined and their records reviewed for clinical evidence of pneumonia, including the presence of fever, cough, sputum production, shortness of breath, physical examination for signs of consolidation, and leukocytosis. The most recent radiographic films then were reviewed for radiologic evidence of pneumonia. Cultures of these films were obtained by swabbing all four corners and streaking onto a trypticase soy agar culture plate. Plates were incubated at 35°C and observed for growth at 24 to 48 hours. Organisms isolated were compared with those found in the respective patient's respiratory culture.

To determine whether the radiographic film itself inhibits bacterial growth, isolates of organisms grown in the laboratory were obtained, including *Pseudomonas*, *Acinetobacter*, *Staphylococcus*, and *Klebsiella*. Each of these isolates were swabbed onto developed films that had been cut into pieces of 2×2 cm. The films then were

placed face down on the trypticase soy agar blood agar (streaked side onto agar surface), incubated at 35°C, and observed for growth after 24 to 48 hours of incubation.

A total of 40 patients were entered, including 38 adult patients aged 32 to 92 (mean, 78) years and 2 pediatric patients aged 8 and 14 years; 23 (57.5%) were female, and 17 (42.5%) were male. Pathogens isolated included *Pseudomonas aeruginosa* in 12 patients (30%); *Staphylococcus aureus* in 9 (22.5%), including 2 methicillin-resistant isolates; *Klebsiella pneumoniae* in 7 (17.7%); *Acinetobacter anitratus* in 5 (12.5%); *Escherichia coli* in 4 (10%); *Citrobacter freundii* in 1 (2.5%); *Morganella* in 1 (2.5%); and *Serratia marcescens* in 1 (2.5%). Of these, 17 patients (42.5%) had both clinical and radiological evidence of pneumonia, 11 (27.5%) had clinical but no radiological finding of pneumonia, 6 (15%) had no evidence of pneumonia clinically or radiologically, and 6 (15%) had radiographs that showed infiltrates but no clinical signs of pneumonia.

The films from these 40 patients were processed as described above. None of the 40 plates grew the organisms that were isolated and identified in the sputum of the respective patients. Of the 40, 23 (57.5%) grew coagulase-negative *Staphylococcus*, and 16 (40%) showed no growth. One grew *P. aeruginosa*, which was different from the organism from the corresponding patient's sputum culture (*Klebsiella*).

Since none of the organisms grown from the sputum actually were isolated from the films, the possibility that the radiographic film itself may inhibit the growth of microorganisms has been raised. To test this postulate, the organisms commonly isolated from the sputum (*Acinetobacter*, *Klebsiella*, *Staphylococcus*, and *Pseudomonas*) were swabbed onto the cut films as previously detailed. After 24 hours of incubation, all the organisms grew on and around the cut radiographic films in the culture plates.

This prospective study shows that radiographic films do not appear to participate in the transmission of pathogenic microorganisms in patients with pneumonia. This may be due to better

compliance with hand washing by healthcare workers than has been reported previously.<sup>2</sup> Our data also show that the film is not inhibitory to the growth of respiratory pathogens. It is possible that the organisms may not persist for long enough to be recovered. In this study, 57.5% of the swabs from the radiographic films of patients with pneumonia grew coagulase-negative *Staphylococcus*, organisms that generally are nonpathogenic and are found on the skin, and 40% showed no growth.

The composition of the radiographic film includes an emulsion consisting of gelatin made from bone and silver halide, a light-sensitive material in the emulsion (90%-99% of which is silver bromide and 1%-10% silver iodide).<sup>3</sup> The film base provides support for the emulsion. The fact that the organisms commonly isolated from patients' sputum, including *Acinetobacter*, *Pseudomonas*, *Staphylococcus*, and *Klebsiella*, all were grown from swabbed films shows that radiological films do not inhibit the growth of these organisms.

Therefore, it appears that radiological films are not a source of pathogenic organisms that could transmit nosocomial infections. This may be due to compliance with hand washing or because the organisms may not persist long enough to be recovered.

#### REFERENCES

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