

LETTERS TO THE EDITOR

Outbreak of *Escherichia coli* Infections Associated with a Contaminated Transesophageal Echocardiography Probe

To the Editor—More than 1 million people in the United States have cardiac surgery each year, of whom at least 8% develop a postsurgical infection.¹ Odds of mortality are higher in patients with major postoperative infections than in those who remain uninfected.²

On May 30, 2006, Hospital A, a 350-bed community hospital, reported to the Los Angeles County Department of Public Health (LACDPH) a cluster of patients who had had cultures positive for *Escherichia coli* from blood or sputum samples obtained 1–4 days after cardiac surgery. We initiated an investigation to determine the cause of the outbreak and to develop control recommendations.

We performed a retrospective cohort study of all patients who had cardiac surgery during May 2006 at Hospital A. Cases were defined as patients with a culture positive for *E. coli* from a sputum or blood sample obtained within 7 days of their surgery.

Individual patient medical records were reviewed, and data were abstracted with a standardized chart abstraction tool. The data included demographic information, procedures during hospitalization, operating room (OR) personnel, medications, clinical status, duration under anesthesia, total time intubated, and intensive care unit staff involved in patient care until time the first positive *E. coli* culture sample was obtained (for cases) or for 4 days after surgery (noncases).

The policies and procedures for cardiovascular intensive care unit (CVICU) and OR infection control were reviewed. The use, cleaning, and disinfection of the cardiac surgery transesophageal echocardiography device (TEE) were reviewed and observed.

Samples for environmental surveillance cultures were obtained from surfaces in the OR and the cardiac catheterization laboratory and from the TEE by hospital staff; additional culture samples from the TEE and the lubrication gel were obtained by LACDPH staff. Culture samples were obtained from the TEE after the equipment had been cleaned and disinfected by usual practices at the hospital.

Available *E. coli* isolates from the case patients, from others admitted to the hospital during May 2006 who had *E. coli* in sputum or blood but did not have cardiac surgery, and from environmental surveillance were submitted to the LACDPH Public Health Laboratory for analysis by pulsed-field gel electrophoresis (PFGE). PFGE was performed with the standardized methods of the PulseNet USA protocol using *Xba*I and *Bln*I restriction enzymes. PFGE pattern comparisons were performed visually and with BioNumerics software, ver-

sion 4.0 (Applied Maths), and were interpreted as recommended by Tenover et al.³

A total of 20 patients had cardiac surgery operations in May 2006, of whom 8 (40%) had clinical cultures positive for *E. coli*. Of the 8 case patients, 6 had positive sputum cultures, 1 had a positive blood culture, and 1 had positive cultures of both sputum and blood; patient specimens were cultured because of postoperative fever, and all case patients received antibiotics for presumed infection. All the culture samples were obtained 1–4 days after surgery. The procedures included valve replacement ($N = 1$), coronary artery bypass graft (CABG; $N = 4$), both valve replacement and CABG ($N = 2$), and ascending aortic dissection repair ($N = 1$). None of the analyzed exposures were statistically associated with infection. There were no deaths.

Cultures of samples from the TEE conducted by both hospital and LACDPH staff were positive for *E. coli*. All other environmental cultures ($N = 27$) were negative.

E. coli isolates from 5 cardiac surgery patients (including multiple isolates from 2 patients), from 5 non-cardiac surgery patients, and from the TEE were analyzed by PFGE. The *E. coli* isolates from 3 cardiac surgery patients had a pattern indistinguishable from that for the TEE isolate; 1 cardiac surgery patient had an *E. coli* isolate with only a 1-band difference, and 1 cardiac surgery patient had an *E. coli* isolate with differences of more than 7 bands (Figure 1). All 5 non-cardiac surgery patients had *E. coli* isolates with more than 7 bands of difference from the TEE isolate, and none matched any other.

No infection control deficiencies were noted in the ORs or in the postoperative care in the CVICU. Hospital A had one TEE dedicated for cardiac surgery. Patients had the TEE inserted at the beginning of cardiac surgery, and it remained inserted for the duration of the procedure. The TEE was cleaned by OR staff technicians between patients. Deficiencies noted during the cleaning process included not visually inspecting the TEE before cleaning the probe, cleaning the TEE in close proximity to a hopper (waste) sink, and storing the TEE in a closed case on top of a refrigerator, where temperatures were routinely elevated. Visual inspection revealed cracks in the ring of the TEE and a small white fiber hanging loose from the edge.

This outbreak of *E. coli* infections after cardiac surgery was perhaps due to a contaminated TEE probe used during cardiac surgery. TEEs have rarely been implicated as the cause of nosocomial infections,^{4–6} and this is the first TEE-associated outbreak of *E. coli* that we know of. Once the damaged TEE was removed from use, no additional instances of *E. coli* in sputum were identified in cardiac surgery patients.

There were two issues related to contamination of the TEE: a physical defect in the TEE, which allowed safe harbor for bacteria during the disinfection process, and improper dis-

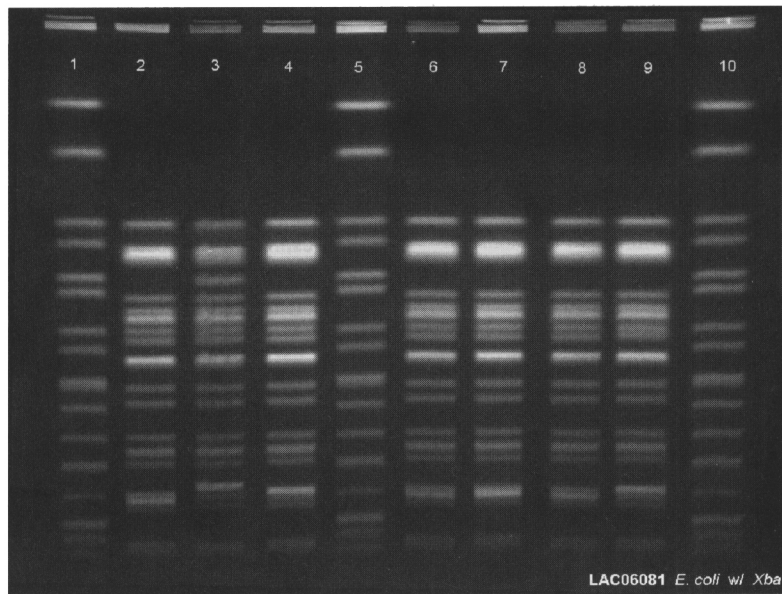


FIGURE 1. Pulsed-field gel electrophoresis analysis of strains of *Escherichia coli*. Lanes 1, 5, and 10, reference strain. Lane 2, strain from implicated transesophageal echocardiography probe. Lane 3, strain from cardiac surgery patient with more than 7 bands of difference from the probe strain. Lanes 4 and 6–9, strains from cardiac surgery patients with no or a 1-band difference from the probe strain.

infection and storage procedures. Other outbreaks have been associated with poor cleaning and disinfection of semicritical equipment, such as endoscopy scopes.^{7,8} In addition to ensuring proper disinfection, facilities should examine their patient equipment for deterioration, per manufacturers' recommendations. Once the damage was identified in the cardiac surgery TEE, the hospital found evidence of deterioration in the 2 other TEEs used in the hospital, and they were also removed from use.

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Annual Fluctuation in the Rate of Resistant Bacteria Isolated as an Indicator in the Control of Hospital-Acquired Infections

To the Editor—The presence of drug-resistant organisms and their variability between hospitals and even within different areas of the same hospital requires a good knowledge of local microbiological epidemiology. The development of antimicrobial stewardship programs (ASPs) in the hospital setting has been encouraged by scientific societies worldwide,^{1–3} and they have proved to be an essential measure in controlling bacterial resistance and antibiotic expenditures.⁴ ASPs establish mechanisms for monitoring and control by the microbiology laboratory by measuring the frequency of isolation of microorganisms with greater importance in the context of nosocomial infection. The aim of this study is to assess the effectiveness of measuring the frequency of isolations per year

and the annual fluctuation in the rate of isolation as a working tool in the control of nosocomial infection.

The study was performed in a 790-bed tertiary care academic institution in which microbiology laboratory data about relevant nosocomial isolates are updated monthly. We measure the indicators established by the ASP proposed by the Spanish Society for Infectious Diseases and Clinical Microbiology,³ which are expressed in terms not only of absolute and relative frequencies but also of levels of antibiotic resistance and impact on health care units, with special reference to critical patient units. All data are provided to the infection control committee and serve as a tool in updating the local empirical therapy guidelines in the hospital. The indicators that measure the annual frequency levels are methicillin-resistant *Staphylococcus aureus* (MRSA), extended-spectrum β -lactamase-producing *Enterobacteriaceae* (ESBL), and multidrug-resistant *Acinetobacter baumannii* (MDRA). The data are expressed as number of patients, eliminating recurrent strains isolated from the same patient over a period of 4 months.

The first 12-month period began in July 2009. Data were collected monthly, and annual data were obtained until December 2012, which represent 31 points of measurement, which allows observation of trends in the indicator. The most relevant finding was a decrease in patients infected with *A. baumannii*, from 246 MDRA isolates during the first 12-month period to 70 MDRA isolates in the most recent 12-month period, in agreement with the emergence and control

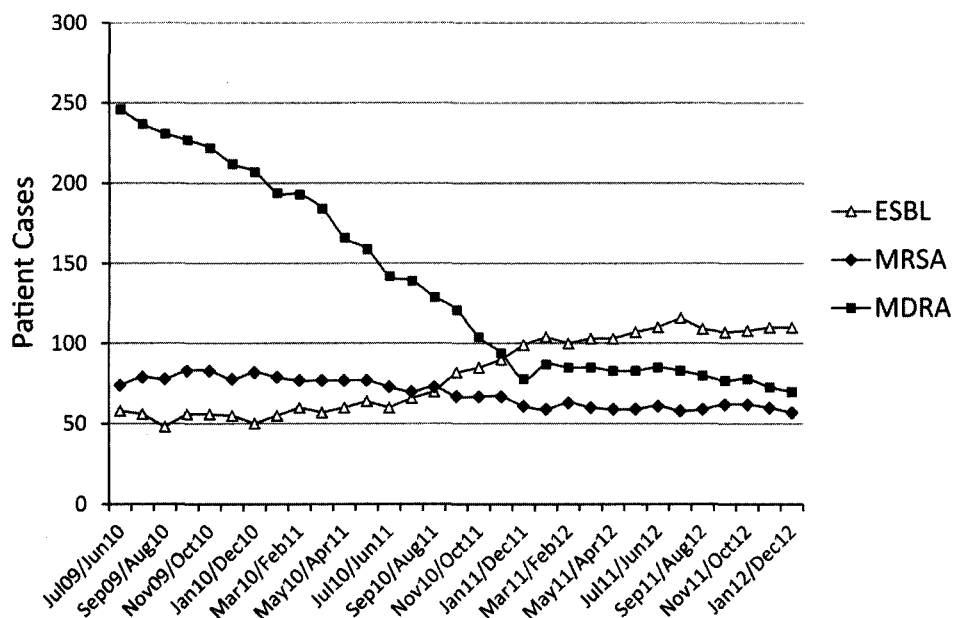


FIGURE 1. Distribution of annual fluctuation in the rate of extended-spectrum β -lactamase-producing *Enterobacteriaceae* (ESBL), methicillin-resistant *Staphylococcus aureus* (MRSA), and multidrug-resistant *Acinetobacter baumannii* (MDRA) in nosocomial patients (June 2009–December 2012).