

Colonization of Yankauer suction catheters with pathogenic organisms

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Oral suction devices may be fomites for nosocomial infections. This study was designed to evaluate the rate of contamination of Yankauer suction catheters. Among the 20 catheters tested, 16 (80%) yielded cultures for pathogens. Seven (35%) were colonized with multiple pathogens. Among the organisms encountered included methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant Enterococci (VRE). These devices should be handled and stored with appropriate care. (Am J Infect Control 2005;33:483-5.)

Transmission of pathogenic organisms (viruses, bacteria, and fungi) within hospital units has been shown to play a major role in the development of serious nosocomial infections. The rising incidence of antibiotic-resistant bacteria has amplified the risk to patients and staff. Health care workers are at risk of becoming colonized with such pathogens and transferring them to patients, families, and other health care workers. Such person-to-person transfer may be facilitated by contaminated fomites in the environment. For example, studies have shown a high prevalence of contamination of stethoscope diaphragms, gowns, gloves,¹⁻³ health care personnel's pagers,⁴ and curtains in clinical areas.⁵ We studied the prevalence of contamination of Yankauer suction catheters obtained from the bedside of patients in 3 intensive care units (ICUs).

METHODS

The Yankauer suction device is a disposable, clear, tapered, plastic suction handle with a bulbous tip. It is utilized in the intensive care environment to withdraw oral fluids and is stored at the bedside, preferably in a designated holder. The timing of disposal and replacement of these suction devices may be set by each individual hospital policy or even individual unit policy. In this institution, at the commencement of this study, each unit had its own policy in place ranging from routine daily changes to replacement when visibly soiled. There was no standard infection control procedure in place that adequately addressed the storage of grossly contaminated suction devices. Bed-side Yankauer catheter holders were brought to the bedside and utilized solely at the caregiver's discretion. A convenience sample of 20 Yankauer catheters present at the bedside of critically ill patients in any of 3 ICUs was collected. Each subject catheter came from a different patient. Upon collection, the location at which the Yankauer catheter was collected was recorded without identifying the patient. The Yankauer catheter

locations included a medical intensive care unit (MICU), a coronary care unit (CCU), and a surgical intensive care unit (SICU). Also recorded was the location in the patient's bed space at which the Yankauer catheter was currently being stored, such as on the bed, on a medical equipment top, or in a designated holder. The catheter tips were immediately submerged 3 cm in 8 mL thioglycollate broth (BBL, Cockeysville, MD) and agitated for 10 to 15 seconds. The resulting solution was then transported to the laboratory and centrifuged, and the sediments were planted on blood agar (BA), chocolate agar (CA), colistin-nalidixic acid blood agar (CNA), and MacConkey agar (MAC) plates, which were then incubated in CO₂ for 72 hours at 35°C to 37°C and examined daily for growth. The sediment was also inoculated into a VRE broth (Hardy Diagnostics, Santa Maria, CA). The broth tubes were incubated along with the plates at 35°C to 37°C. If the broth tubes turned black at any time during the 3 days they were held, they were subcultured onto a CNA plate. The broth-subcultured plates were incubated in CO₂ at 35°C to 37°C and examined for colonies at 24, 48, and 72 hours. If suspect colonies were identified, they were subcultured, 1 to a BA plate and 1 to a bile esculin azide agar (BEA) plate with 6 µg/mL vancomycin. Subcultures were incubated in the CO₂ incubator at 35°C to 37°C and examined for colonies at 24, 48, and 72 hours. Bacteria were identified using standard microbiology technique.⁶ Only *Staphylococcus aureus* and Enterococci were subjected to susceptibility testing to identify methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant Enterococci (VRE). Enterococcus faecalis and Enterococcus faecium that were resistant to vancomycin were considered VRE. Results of cultures are presented as a percentage of the total number of Yankauers submitted.

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0196-6553/\$30.00

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doi:10.1016/j.ajic.2005.03.015

Table 1. The location of the Yankauer suction catheters when collected in the intensive care unit

Location of Yankauer catheter	N	%
Designated holder	11	55
Equipment top	6	30
Bed	2	10
Floor	1	5

Table 2. Frequencies of pathogenic organisms cultured from 20 individual Yankauer catheters

Organism cultured	N	%*
Candida species	6	30
Enteric gram-negative rods	5	25
Coagulase-negative Staphylococcus	4	20
MRSA	3	15
Methicillin-sensitive Staphylococcus	2	10
Viridans Streptococci	2	10
Enterococci, vancomycin-sensitive	2	10
VRE	1	5

MRSA, Methicillin-resistant Staphylococcus aureus; VRE, vancomycin-resistant Enterococcus.

*Total is greater than 100% because several catheters contained multiple pathogens.

RESULTS

A total of 20 Yankauer catheters from 3 ICUs were collected and cultured over the course of 3 months. Ten catheters were collected in the surgical ICU and 5 each in the medical and cardiac ICUs. Nine (45%) of the collected catheters were found lying on top of medical equipment, in a patient's bed, or on the floor. Eleven (55%) of the collected catheters were found in a designated bedside holder (Table 1).

Sixteen (80%) of the catheters yielded cultures for 1 or multiple pathogens. Seven (35%) of catheters were colonized with multiple pathogens. Mixed oropharyngeal flora was cultured from each of the remaining catheters. Organisms encountered included *Staphylococcus aureus* (25% of the Yankauers), of which 60% were methicillin-resistant. Enteric gram-negative rods, including *Pseudomonas aeruginosa* and *Escherichia coli* were seen, as were viridans Streptococci, coagulase-negative Staphylococci, Enterococcus species (1 of 3 isolates vancomycin resistant), and Candida species (Table 2). Semiquantitative estimation of plate growth showed "moderate" or "abundant" growth of organisms from 15 (75%) catheters and for 20 of 25 (80%) pathogens.

DISCUSSION

There is a very high prevalence of contamination of Yankauer catheters with highly pathogenic bacteria and fungi. This is not surprising given their use in suctioning the oropharynx, nasal drainage, and other draining sites, all frequently colonized with pathogens. A significant concern is

that, given the usual treatment of such catheters (lying in the bed sheets, on the floor, on ventilator surfaces, and others), gross contamination of the care environment can occur. Furthermore, health care workers such as nurses and therapists who utilize the catheter may themselves become colonized and transmit infection. VRE may remain viable on inanimate surfaces for 7 days to 2 months,⁷ and patient-to-patient transmission of infection has been documented to arise from environmental contamination.⁸ Not only are patients and health care employees at risk, but colonization of health care workers' households has also been reported.⁸

These and all such suction catheters should only be handled with gloved hands; adequate handwashing must be practiced before and after use, and appropriate receptacles to contain and isolate the Yankauer suction catheter are mandatory. The commonly observed practice of placing uncovered Yankauer catheters on beds, medical equipment, or other hospital surfaces is below the standard of care and must no longer be tolerated. We are aware of 2 devices specifically designed to contain the Yankauer type suction catheters (The Suction Tip Holster; Medical Device Group, Poway, CA, and The Secretion Trapper Suction Tube Holder; RZV Medical Specialties, Inc., Pittsburgh, PA). Since the completion of this study at our institution, our suctioning policy and procedure has been modified requiring the routine setup of designated Yankauer catheter holders at the bedside of every patient.

The authors thank Jeanine Palmer in the Sharp Memorial Laboratory for her assistance.

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