have been surprisingly slow to respond to this problem. New methods for the reduction of bacterial accumulation are needed, especially in old dental units, whereas state-of-the-art units have sterilizable water lines and flushing devices to obtain better water quality. In biomedical laboratories, cyclic acid-based washes are used to remove biofilms from plastic tubing.

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Report on a Packaged Handwashing Antiseptic Contaminated With *Pseudomonas aeruginosa*

To the Editor:

The occurrence of bacterial contamination of disinfectants and antiseptics during their use and inside their original packaging may result in pseudobacteremias or the circulation of resistant strains within the hospital.[1-3] We report the serendipitous discovery of the contamination of a packaged handwashing antiseptic at Umberto I Hospital in Ancona, Italy.

A study aimed at evaluating the antimicrobial activity of a new procedure in antiseptic hand washing was conducted in the blood transfusion service. The routine handwashing procedure involved the use of a packaged antiseptic containing triclosan (5-Chloro-2- [2,4-dichlorophenoxy] phenol), used in our hospital since mid-1997.

The blank test of the antiseptic in use revealed contamination by *Pseudomonas aeruginosa.* After this discovery, we tested four sealed samples present in the transfusion unit; *Pseudomonas aeruginosa* was isolated from three.

Following these observations, all of the antiseptics coming from the same company still present in the hospital were identified and removed from use. Only two different lots were still present, and 13 bottles could be analyzed: 5 from different wards and 8 present in the pharmacy service. Thirteen of 17 samples analyzed belonged to lot A and 4 to lot B. *P aeruginosa* was isolated in 7 cultures (41%), all belonging to lot A (54% of samples from this lot). The Department of Health was informed.

The cause of antiseptic contamination in the original packaging often remains unknown,[1,3,4] as in this case; the minimal nutritional requirements of *Pseudomonas* species, as evidenced by their ability to grow in distilled water and their tolerance of a wide variety of physical conditions, contribute to their ecological success. Moreover, the ubiquity of this bacterium would increase the possibility of contact with antimicrobials and therefore the possibility of selecting, in the hospital environment, strains resistant to disinfectants. The mechanisms of resistance have been made clear, and Levy et al recently published the results concerning the acquisition by *Escherichia coli* K 12 strains of resistance to triclosan.[5]

As already observed by Oie, "At present, the necessity of measures to prevent contamination does not seem to be fully appreciated."[4] The publication of reports of epidemics, or the accidental discovery of the spread of microorganisms, coming from antibacterial solutions represents the lack of increased hospital prevention measures by infection control committees. We believe that checking sterility of disinfectant or antiseptic products must be assured at two levels: during the production cycle and during hospital use. In our opinion, the microbiological control of samples of antiseptic products in use should become a routine procedure as far as infection control committees are concerned, taking feasibility and cost into account.

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Tuberculin Skin Testing in the Era of Multidrug-Resistant Tuberculosis

To the Editor:

The tuberculin skin test using purified protein derivative (PPD), first introduced in 1910, has been the standard and the only validated screening procedure for identifying asymptomatic tuberculosis (TB) infections in the United States since the early 1930s. PPD skin test interpretation may be problematic due to cross-reactivity, booster effect, anergy, variability in the performance or reading of the test, lot-to-lot variation of PPD, and a variety of other causes.[1] False-positive reactions may occur because antigens present in the PPD are shared with environmental mycobacteria, an overlap known to be considerable in some areas of the world.[1] We report the consequences of a PPD skin test conversion in a healthcare worker (HCW 1) who worked on an inpatient unit providing clinical care to patients with multidrug-resistant (MDR) TB, as well as to patients with *Mycobacterium avium* complex (MAC) infection.

Our 250-bed tertiary-care research hospital has a TB control plan that is congruent with Centers for Disease Control and Prevention (CDC) "Guidelines for Preventing

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the Transmission of *Mycobacterium tuberculosis* in Health-Care Facilities, 1994."[2] Using CDC criteria to define PPD skin-test conversion,[2] the apparent PPD conversion was detected during routine PPD skin testing in September 1996. This finding prompted an investigation that included immediate and 3-month follow-up for 106 HCWs who provided direct clinical care to our patients with MDR TB during the interval in which the skin test conversion was presumed to have occurred. Our investigation identified no other PPD skin test conversions and no deficiencies in our TB control plan.

From January through September 1996, HCW 1 provided care to three patients with MDR TB for 20 8-hour duty tours and to seven patients with MAC infection for 17 8-hour duty tours. No additional exposures or risk factors for TB infection were identified. The possibility of cross-reactive mycobacterial hypersensitivity was raised by the infectious diseases consultant. This possibility was examined by simultaneous intradermal skin testing with the following preparations: 0.1 mL of *M avium* serovar 2 sensitin ([MAS] *M avium* sensitin PPD RS 10, 0.1 µg/0.1 mL; master batch RS 10/2, lot number 63; Statens Seruminstitut, Copenhagen, Denmark), 0.1 mL of Aplisol (5 TU, 0.1 µg/0.1 mL; Parkdale Pharmaceuticals, Rochester, MI), and 0.1 mL of Tubersol (5 TU, 0.1 µg/0.1 mL, lot number 2432-11; Pasteur Merieux Connaught USA, Swiftwater, PA). Informed consent was obtained prior to MAS testing.

Three experienced occupational medicine staff independently evaluated each skin test as mm of induration transverse to the long axis of the forearm, using the ballpoint pen technique, at 48 hours. Induration was averaged from the three readings. MAS dominance was defined as MAS reaction ≥5 mm larger than a simultaneously applied PPD at either 48 or 72 hours after skin test placement.[3] At 48 hours, the induration response to the MAS injection was 5 mm larger than the reaction to PPD (Figure). Dominance of MAS skin test reactivity suggested a cross-reaction due to MAC exposure, not exposure to MDR TB. Much of our time-consuming and anxiety-provoking investigation could have been avoided, or at least greatly reduced, if TB diagnostics were more accurate.

Skin testing with mycobacterial antigens (sensitins) other than tuberculin is not new.[4] Nontuberculous mycobacteria skin testing is a routine diagnostic tool used in the assessment of pediatric cervical adenitis in Finland. Despite routine use of nontuberculous sensitins outside the United States, a major obstacle for their widespread acceptance in the United States is concern that they do not have sufficient species specificity. Nonetheless, dual skin testing has been proposed in the United States to help distinguish TB and nontuberculous mycobacteria in childhood and adolescent cervical adenopathy and in patients with cystic fibrosis. The use of dual skin testing with MAS and PPD to distinguish MAC infection from TB is a safe, sensitive, and highly specific method that has been developed through animal and human studies.[5]

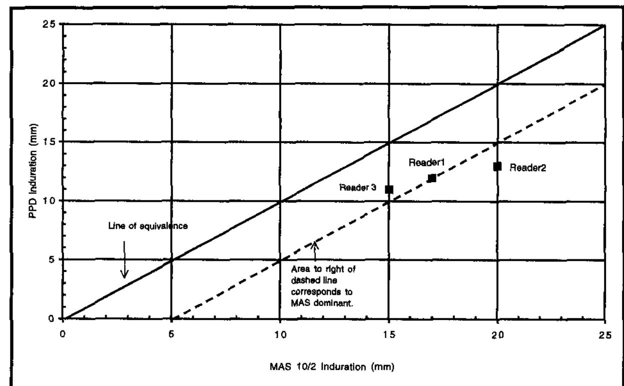

FIGURE. Dual skin test reactions (mm of induration) to purified protein derivative (PPD) and 0.1 mL of *Mycobacterium avium* serovar 2 sensitin ([MAS] 10/2) in healthcare worker 1. Solid line is line of equivalence. Area to right of dashed line indicates MAS reactions 5 mm larger than corresponding PPD reaction (ie, MAS dominant).

Our experience suggests that HCW PPD conversions should be carefully evaluated for cross-reactivity with other mycobacterial antigens to which HCWs are known or likely to have been exposed. Further, the diagnostic accuracy of PPD skin testing could be improved if MAS were commercially available in the United States to assist interpretation of PPD conversions. Distinction between nontuberculous mycobacteria exposure and TB exposure is critical to decisions involving chemotherapeutic regimens, clinical care, infection control, and management policies, particularly in the MDR TB era.

Occupational exposure and infection with MDR TB are not trivial events. Wide-scale PPD skin testing of populations in which TB infection is not highly prevalent, such as HCWs who may have occupational exposure to TB, will result in substantial numbers of false-positive PPD skin tests. Each false-positive test will have attendant costs. Continued reliance upon the PPD skin test using the Mantoux method as the single available biological screening test for infection with TB is no longer adequate. Randomized, blinded, prospective studies of dual testing with PPD and MAS among HCWs who meet criteria for PPD conversion are warranted.

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