



Biosafety Tips

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Biosafety Tips brings you practical approaches to biosafety or “news you can use.” If you are looking for a useful and sensible solution to a biocontainment problem or perhaps a reference to help convince a skeptical researcher of the need for caution, this is the place to look. In this column I will share some biosafety insights for managing a variety of workplace situations. I welcome feedback or suggestions for future topics. Please e-mail any comments or suggestions to karen_byers@dfci.harvard.edu or to the Chief Editor, Barbara Johnson, at barbara_johnson@verizon.net.

All it takes is one person to be noncompliant!

The enforcement of good laboratory practices on a daily basis is essential when handling pathogenic cultures. The actions of one noncompliant staff member can jeopardize the health of his or her colleagues. A paper in the *Journal of Clinical Microbiology* illustrating this fact is available online at <http://jcm.asm.org/content/vol35/issue12/index.shtml> (Mermel, 1997). A summary follows.

The microbiology laboratory in a 719-bed university-affiliated hospital was staffed with 19 medical technologists and 3 medical technology students. In 1996, six technologists developed symptoms associated with infection by an enteric pathogen. Stool cultures from all six of the technologists yielded *Shigella sonnei*; all isolates had identical antibiograms. The isolates and a laboratory control strain were further characterized by preparing total genomic DNA and running it on pulsed field gel electrophoresis. The gel results are available in the paper and the isolates from infected staff were identical to the *S. son-*

nei control strain given to a student as an unknown to identify. All of the infected technologists were on duty when that student manipulated the *Shigella* culture.

This laboratory had established procedures for the use of a “prep” or “dirty” sink for laboratory procedures, and the use of a “clean” sink for hand-washing. A year before the outbreak, the hand-washing sink had been moved and the foot-pedal controls were removed. There was one laboratory hand-washing sink and it was adjacent to the bench where the student worked for several days with the *Shigella* culture. During the outbreak investigation, the student “admitted that heavy glove contamination had occurred when he placed his gloved finger in a titer well containing a high concentration of *S. sonnei* during the typing process.” The bench where the student worked was remote from the prep sink, where such plates were to be disinfected with Lysol prior to discard of the *Shigella* suspension. A thorough analysis of the risk factors which could have contributed to the outbreak is reprinted in Table 1 (Mermel, 1997). The author assumed that the sink faucet and fixtures became contaminated when “the student broke laboratory protocol and used the hand-washing sink, rather than the sink that he had been instructed to use for processing, to discard the concentrated *Shigella* suspension in the titer wells.”

This outbreak investigation is very instructive. The student handling the *Shigella* did not become infected; the student was the only laboratory member who wore gloves (even in 1997). One staff member followed the recommended practice of using a dry paper towel to turn off the faucet (Vesley, 1995) and did not become infected. After a phenolic disinfectant was used on all work surfaces, environmental

samples did not yield *Shigella*. The infected staff members were given a mandatory leave of absence until diarrheal symptoms resolved; the total time lost from work was 73 days (with a range from 1 to 54 days).

It should be noted that this *Shigella* outbreak occurred in a laboratory which had trained medical technology students for 20 years without a suspected laboratory-associated infection. The author states: "As with so many areas of infection control, written protocols and appropriate training in sterile technique may not insure good practice. This report emphasizes the fact that despite the rigorous training of students and new personnel, close supervision of these individuals is of paramount importance."

References

- Mermel, L. A., Josephson, S. L., Dempsey, J., Parenteau, S., Perry, C., & Magill, N. (1997). Outbreak of *Shigella sonnei* in a clinical microbiology laboratory. *Journal of Clinical Microbiology*, 35(12), 3163-3165.
- Vesley, D. & Lauer, J. (1995). Decontamination, sterilization, disinfection, and antisepsis. In D. O. Fleming, J. H. Richardson, J. J. Tullis, & D. Vesley (Eds.). *Laboratory safety: Principles and practices* (2nd ed.) (p. 236). Washington, DC: ASM Press.

TABLE 1. Risk factors for acquisition of shigellosis by medical technologists

Risk factor or lab bench ^a	No. of culture-positive cases (n = 6)	No. of asymptomatic controls (n = 15) ^b	P
Bench			
1	2	5	0.68
2	1	3	0.68
3	1	3	0.68
4	1	2	0.66
5	1	1	0.50
6 ^c	2	1	0.20
7	0	1	0.71
8	0	1	0.71
9	1	0	0.28
10	0	2	0.50
11	0	1	0.71
12 ^d	1	0	0.28
Worked evening shift	1	2	0.66
Assisted a student with identification of unknown isolate	1	0	0.28
Shared equipment with a student	2	1	0.20
On duty with a student	6	11	0.22
Routinely washed hands before leaving lab	5	15	0.28
Washed hands before eating	5	15	0.28
Shared food with a student	0	0	1.0
Went on break with a student	0	0	1.0
Used a hand washing sink in work area ^e	6	11	0.22
Used a paper towel to turn off faucet	1	11	0.03 ^f
Used processing sink 1	0	2	0.50
Used processing sink 2	0	2	0.50
Used processing sink 3	0	1	0.71

^a Represents the location of each medical technologist's workbench in the lab.

^b Excludes index student.

^c The workbench used most often by the medical technology student who handled the *S. sonnei* unknown isolate.

^d The workbench occasionally used by the medical technology student who handled the *S. sonnei* unknown isolate.

^e Four of the 15 asymptomatic technologists and students used a sink outside of the work area for hand washing.

^f Odds ratio, 0.07; 95% confidence interval, 0 to 1.07.