Applied Biosafety, 6(2) pp. 68-71 © ABSA 2001

Positive Benefits Arise from Hospital Pollution Prevention Programs

Jack S. McGurk

California Department of Health Services, Sacramento, California

Introduction

In response to the memorandum of understanding between the American Hospital Association (AHA) and the United States Environmental Protection Agency (EPA), hospitals are beginning to initiate pollution prevention (P-2) programs. At the heart of this agreement is the goal to reduce solid and medical wastes generated by hospitals and eliminate all mercury from these facilities. Implementation of P-2 programs provides hospitals opportunities to realize positive benefits through system improvements. The infection control nurse must play a major role in the P-2 activities if the program is to be successful.

California Pilot Project

Through an EPA grant and funding from an interagency agreement with the California Department of Toxic Substances Control, the California Department of Health Services (DHS) has been able to implement a pilot P-2 project with six Bay Area hospitals. Many of the experiences and early lessons learned are included in this article. The six California hospitals participating in the P-2 project are:

- Eden Medical Center, Castro Valley
- Children's Hospital, Oakland
- Kaiser Foundation Hospital, Walnut Creek
- John Muir Medical Center, Walnut Creek
- Sutter Delta Medical Center, Antioch
- University of California, San Francisco

The P-2 project includes a safe harbor provision under which regulators working on these activities will not cite the participating facility for violations observed while at the hospital, but do point them out for immediate corrective action. This provision has proven valuable in reducing the anxiety level of hospital staff while working with regulators and allowing candid conversations as to how best to separate the medical and solid waste streams.

Common to all participating hospitals is support from top administration for the project and designation by the administrator of a contact person to lead P-2 efforts for the facility. Managers of either environmental services or health and safety were most often tasked with overseeing implementation of the P-2 project. However, activities in the P-2 project not only took place within these units, but also cut across organizational boundaries and staffing hierarchy within hospitals. One incidental benefit of implementing P-2 activities is the team-building that takes place as participants from different disciplines within the hospital undertake project tasks together and work to design improved systems.

It is essential that the status of the systems operating within the hospital be documented during the initial implementation of P-2 activities. This baseline data can then be used to measure the outcomes from P-2 interventions. The documentation of solid and medical waste generation for a hospital is based on the amounts being produced over a specific period of time. In contrast, the baseline documentation for mercury is obtained through an inventory of bulk mercury and mercury-containing devices within the facility.

The Mercury Mission

The University of California, Los Angeles, is also working with DHS to build its new medical school hospital as a mercury-free facility. The decision to develop a mercury-free hospital was an outgrowth resulting from several costly mercury spills at the current medical school on the UCLA campus.

A small team conducted the mercury audit of the facility. A team of two or three persons, including a representative from environmental services/health and safety and the infection control nurse, was found to be the most effective and efficient. A team of that size and composition was not disruptive to ongoing operations, had familiarity with the layout of the facility, and was able to engage in dialogue with staff from the different areas surveyed. This approach often results in the discovery of mercury-containing devices that might have otherwise gone undetected.

Elimination of mercury as recognized by the EPA/AHA memorandum of understanding calls for the replacement of mercury-containing devices where nonmercury equivalents are available. However, where nonmercury replacements are not available or when mercury-containing devices or medicines are required for patient care, their use should continue. The P-2 project found that nonmercury alternatives are available for the types of equipment containing the highest quantities of mercury.

The P-2 project worked with participating facilities to inventory mercury-containing devices such as sphygmomanometers, thermometers, bougies, barometers, barostats, and thermostats could be replaced. They then developed a business plan with cost estimates for replacement. Calculations were also made for the amount of mercury contained in fluorescent tubes. The fluorescent tube calculations, as well as those for thimerosal used in pharmaceuticals, were included in the inventories although no substitutes are currently available. A new California regulation requires fluorescent tubes to be recycled when replaced.

A compound widely used in hospital laboratories is B-5 fixative. This mercury-containing fixative is used in histology to aid in identifying certain cell types. The tissue being examined is placed into a container with B-5 fixative, which penetrates the tissue. The tissue is next stained and placed on a slide for microscopic examination. During the rinse process, mercury may be discharged into the sewer system. However, several brands of B-5 fixative have been developed that use zinc chloride instead of mercury. Laboratory suppliers should be able to provide listings of these substitute brands.

Potentially overlooked sources of mercury in hospitals are cleaning products. Although many cleaning products contain low levels of mercury in parts per million or billion, the large amount of cleaners used in hospitals can result in mercury being placed in wastewater systems. Hospital purchasing departments should be aware of this situation and request mercury-free product verification from their suppliers.

Removing Mercury

When mercury-containing devices are changed-out at hospitals, they should have secondary containment to avoid spills, be transported to the hazardous waste storage area, and held there for recycling or disposal as a hazardous waste. Mercury devices must never be placed into red medical waste bags or sharps containers. It is important to have individuals at the facility who are trained and familiar with handling mercury spills available to respond.

Once mercury sources have been removed from the hospital, the next challenge is to prevent new sources of mercury from entering the facility. Personnel tasked with purchasing supplies and equipment serve as the first line of defense against mercury sources entering the hospital. They must continually update their familiarity with mercury-free alternatives. It should become common practice for departments that order materials or equipment that contain mercury, to provide justification that mercury-free alternatives are not available or applicable.

The California Department of Health Services has recently published a 79-page publication entitled, *A Guide to Mercury Assessment and Elimination in Health Care Facilities.* This document is available at the department's web site at: www.dhs.ca.gov.

Table 1 provides a composite of the P-2 project's findings for mercury at the six participating facilities. The P-2 project developed an assessment "toolkit" that summarizes findings for mercury and presents them on a Pareto chart. The assessment toolkit is also available at the department's web site.

Solid and Medical Wastes

Solid and medical waste audits have been performed at the six hospitals that had agreed to participate in this portion of the project. Most have initiated cardboard recycling and several are bailing substantial amounts of cardboard. This process requires expenditure of personnel resources to break down the cardboard containers and transport them to an area where bailing takes place. One hospital receives supplies and pharmaceuticals from its regional distribution center in reusable plastic containers and totes. This reduces the amount of cardboard waste at the hospital.

The cardboard recycling process provides an excellent example of how a system can be analyzed and improved. As a result, the P-2 project is encouraging other suppliers to send their supplies to the hospitals in reusable plastic containers and totes.

The hospitals have also initiated other strategies to reduce the amounts of solid waste being sent to their community landfills. Several are working with their solid waste authorities to implement recycling programs that allow all recyclable materials to be placed into a single container. This is possible when these materials are sent to a central materials recovery facility in the community for sorting. One strategy being implemented is to utilize a small solid waste receptacle for wet garbage and large, conveniently located receptacles for recyclable materials.

Efforts to reduce the medical waste stream most frequently focus on eliminating solid wastes that are being incorrectly placed into medical waste containers. This must be an ongoing effort and include training of the health care practitioners who generate this waste stream. The location of medical waste containers can determine whether nonmedical wastes are placed within them. A medical waste container located next to a hand-washing sink, for example, increases the likelihood that soiled paper towels will be errantly placed into the medical waste stream.

The P-2 project has been working on several interventions that hold promise for significantly reducing the medical waste stream. Several hospitals are in the process of converting to reusable sharps containers. These containers are more durably constructed than traditional sharps containers and are expected to last 5 years or longer. After being dumped by mechanical means, the empty sharps containers are washed and disinfected before being returned to the hospital for reuse. A 250-bed hospital participating in the P-2 project re-

Table 1

Device Inventory and Weight of Mercury Found at Six Hospitals

Device	Inventory	Weight (Kg)	Note
Bougies	8	43.3	
Other GI	6	0.1	Blakemore, Cantor tubes
Barometers	5	5.1	
Sphygmomanometers	475	39.1	
Bulk mercury	4.3		
Flourescent tubes	39,843	0.9	Calculated as 4-foot tubes, based on lighted floor area
Switches	90	0.3	Switches from thermostats, barostats, boilers, X-ray tubes, and safety tip-over devices
Thermometers	254	0.6	Laboratory, fever, refrigerator, boiler
Total (Kg)		93.7	Sum of device totals

Source: Pollution Prevention Project, California Department of Health Services

viewed its 1999 purchase records and determined that approximately 18,000 sharps containers were used. The weight of each type of empty sharps container was recorded and calculations were completed that documented the hospital could divert 13 tons of medical waste annually by switching to reusable sharps containers. The department also recently approved a safety needle device as a single use sharps container that allows the device to be placed directly into the red bag waste stream. This device also eliminates the need for sharps containers.

Conclusion

Hospitals benefit in many ways by introducing pollution prevention programs. They reduce wastes, free their facilities from mercury, improve the environment, save money, and increase employee morale by demonstrating that the hospital is a responsible neighbor in the community. Additionally, as employees from across the spectrum of professions working within the hospital participate jointly on teams to study pollution prevention strategies, new ideas often surface for systems improvements that can strengthen the fiscal condition of the hospital while also improving working conditions.

Article reprinted with permission of Virgo Publishing, Publishers of *Infection Control Today.*