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In virtually all areas of the U.S., hospitals are lowering their waste streams by increasing recycling rates, for both economic and environmental reasons, and in some cases because of state or local laws. Many hospitals have hired consultants to undertake audits of their waste streams, in order to lower their medical and general solid waste disposal costs. Some medical waste technology vendors tout systems that can recover recyclable materials, mostly plastics, from treated medical wastes.

Experts in the field of hospital waste management agree on at least one conclusion: the makeup of hospital waste streams varies tremendously from region to region, and even from hospital to hospital. The factors involved are many, including recycling mandates, the method of medical waste treatment used by the facility, rural vs. urban issues, and, as in municipal recycling, the strength of local recycling markets, or lack thereof.

**Special wastes, special handling**

In most states, the term of choice for hospitals' medical/infectious waste stream is regulated medical waste (RMW). Both New York and New Jersey—which, after the notorious beach washups of the late 1980s, catapulted the issue of medical waste into the national arena—use the term, as does the U.S. EPA.

EPA is working on implementing medwaste incinerator standards outlined in the 1990 Clean Air Act, and on preparing its *Final Report to Congress on Medical Waste*, which will include the agency's analysis of the federal Medical Waste Tracking Act, which ran from 1989-1991. Behind schedule by almost two years, most recently because of delays in Clinton administration appointments, the agency is aiming to release the final report by the end of this year. The document is likely to be a cornerstone of any future federal regulation of RMW, but
for now, medwaste regulation remains a states issue. Other main federal agencies involved in the medical waste regulation include the U.S. Department of Transportation and the Occupational Safety and Health Administration.

RMW—better known to health care workers as ‘red bag’ wastes, since they are placed in red bags to distinguish them from other wastes—are disposed of either by incineration, steam sterilization (autoclaving), or a handful of other methods including chemical or microwave treatment. Incineration and autoclaving have been accepted as viable treatment methods longer than other methods and account for the bulk of medwaste disposal. They are used both on-site and at off-site commercial facilities. Other technologies, as a group, are generally referred to as alternate technologies.

Some states, such as New York, have also required medical wastes to be rendered “unrecognizable” before ultimate disposal, which requires shredding with treatments other than burning. In late May, though, the state was considering allowing the landfilling of treated, but still recognizable, medical waste, most commonly associated with autoclaving. Other states, such as Virginia, report they may be requiring shredding for systems other than incinerators in the near future.

In addition to red bag wastes, hospitals also produce small amounts of hazardous, chemotherapeutic, and low-level nuclear wastes—the latter a byproduct of nuclear medicine. In most cases, depending on the treatment used, hazardous and chemotherapeutic wastes cannot be commingled with red bag wastes. Hazardous wastes must be treated as such, while “chemo” wastes must be burned in permitted RMW incinerators or treated by technologies approved to handle them.

Low-level nuclear wastes from hospitals, while overall a tiny fraction of the waste stream, are becoming more of a problem because of the nation’s inability to get nuclear waste storage sites permitted. In California, for example, a Mojave Desert site approved for low-level radioactive waste storage has been held up by opponents who have leaned on political leaders; generators, in turn, have sued the state to get the permit process moving.

The dilemma could be costly, as the few permitted storage sites operated by regional state compacts (in Washington and Nevada) are, as of the first of this year, accepting waste only from the members of their regional compacts. California facilities either must hold their wastes on site until their radioactivity “cools,” or ship them across the country to South Carolina, a costly proposition with potential liability concerns.

### Numbers tough to crunch

Jose “Wally” Jordan knows hospital waste. Jordan, president of Waste Energy Technologies (Waste-Tech, Houston), undertook a study of 75 hospitals in the New York and Los Angeles metropolitan areas from 1990 through 1992. After sorting through wastes the hard way, bag by bag, he emphasizes the fact that hospital waste streams, due to their diverse nature, are difficult to categorize definitively.

“There is a great deal of variability in the type and amount of waste generated by hospitals,” Jordan says. “How huge the variability is, is hard to define.”

Based on the data gleaned from the Waste-Tech study, multiplying the approximately 1.2 million hospital beds nationwide by 20 pounds per day, per bed, hospitals produce about 4.43 million tons per year (tpy) of total waste. Jordan cautions that this figure contains a plus-or-minus variability rate of 20%. For RMW, which generally runs about 5 pounds per bed, per day, that would be about 1 million tpy total; given a 2.5-pounds-
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operating room for planned surgeries, the packaging is removed—Shaner calls it "Christmas wrap"—from the surgical instruments, and tossed into bins lined with blue bags. Once the patient enters, medical waste goes into red-bag lined bins. Changing the bags "takes about 30 seconds," Shaner says.

MCHV uses 32- and 64-gallon Otto Industries (Charlotte, N.C.) recycling carts and utilizes an on-site Marathon (Vernon, Ala.) cardboard compactor, along with a Trashmaster computer program (also by Marathon) that notifies staff when the compactor is getting full. Shaner says the program has cut the number of pulls necessary to cart the cardboard away. The center uses its own trucks to bring wrapped and sealed recyclables to a nearby storage center. "The hospital trucks are used twice daily," Shaner says, "to transport recyclables to the off-site recycling center. The morning run delivering recyclables to the warehouse is accompanied by a return run to the hospital laden with fresh supplies." An afternoon run is a "discreet roundtrip to deliver recyclable materials to the recycling center and to pick up empty gondolas and totes" to collect the next day’s recyclable wastes.

Intravenous (IV) bags have often been among the most difficult items for hospitals to recycle, because of both health and safety concerns and the lack of markets for the plastic. However, Shaner says that in her 20 years as a nurse, she’s seen perhaps one IV bag with blood in it.

Baxter Healthcare (Chicago) has, for the past year, sponsored a pilot IV bag recycling program. The health care supplier has financially aided (though the company won’t specify how much) five hospitals in five states in setting up IV recycling programs, paying for transportation and reprocessing of the polyvinyl chloride (PVC) bags into reusable items. The plastics have been shipped to Cleveland Reclaim (Cleveland), where they are made into "fatigue mats" most commonly used in restaurant kitchens.

Putting ‘someone in charge’

Larry Chadzynski, a medical waste specialist in the Michigan Department of Public Health, says that under that state’s law, hospitals must have a single person in charge of all aspects of environmental health and safety controls. "Hospitals should identify one person responsible [for those areas] and that person then becomes the responsible party," he says.

When one person is in charge of a hospital’s waste stream—with the corresponding responsibility—"they can identify breakdowns before they occur," Chadzynski says.

Two Michigan hospitals with individuals in charge have developed successful recycling and innovative waste management schemes for their facilities. Genesys Health System, a Flint-area conglomeration of a medical center, laboratory, and physician services, burns its medical wastes on site in a heat-recovery system, and uses a computer tracking program to keep track of its wastes on a monthly basis.

The center developed the tracking program itself, says Scott Cruzen, the system’s director of environmental controls. He said that a typical monthly solid waste stream output for the facility was about 133 tons, with 56% of that being general solid waste, 17.5% medical, and lesser amounts for various recyclables and special wastes. Over the past four years, waste-to-energy has overtaken landfilling as the most used method of disposal on the main hospital’s site, while recycling has increased from 1.4% to 15% in the same period (see figures).

Butterworth Hospital, a 529-bed facility in Grand Rapids, Mich., is implementing an innovative scheme to deal with its medical waste. The hospital, which is planning to install a new medical waste incinerator, will build a conveyor system to mechanically truck Rubbermaid (Winchester, Va.) carts the half-block to the site of the new incinerator, not yet installed.

Dan Stickles, Butterworth’s director of environmental services, says the hospital prefers to keep its medical waste treatment on site because hospitals are responsible for their medical wastes, even after they leave the site. Currently, Butterworth ships its waste syringes and scalpels, called "sharps" wastes, off site for incineration, because its seven-year-old incinerator cannot effectively burn the plastics in the sharps collection containers.

The hospital will lower its sharps disposal costs from about 3 cents/lb. to about 10 cents/15 cents/lb., Stickles estimates, and is saving about $10,000 per year through an overall recycling program, though recycling markets in the area are fairly weak. Like other hospitals, Butterworth has increased its reusables, including everything from sterilized bedpans to laundry items.