

with that tenet and contend that to follow the authors' suggestions could threaten the health of people who will not be able to afford health care or might not have access to chlorine-related products such as prescription and over-the-counter drugs; test kits and catheters; ophthalmic solutions and disinfectants; or oxygen tents and intravenous fluid bags. In the end, chlorine plays a major role in assisting the medical profession heal the sick.

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Hospital Waste Dissected

Health care practitioners should be educated about the by-products of quality health care, and the article was informative. Parts of the article, however, are not entirely accurate.

The headline implies that the issue is limited to hospitals. It is not. PVC is a component of the municipal solid waste stream as well, and is being burned in municipal incinerators daily. The headline also implies that the problem is with plastics in general, when in fact it is limited to chlorinated vinyl plastics, which are not the most common plastic in health care wastes; other plastics are more dominant in the health care waste stream.

After sorting thousands of pounds of hospital wastes, I can report that volumes of HDPE, PS, LDPE, and PP plastics exceed that of PVC. For example, the thousands of trash can liners are most likely made of LDPE and solution bottles of PP. PVC products are primarily items such as IV bags/tubing, respiratory therapy tubings, patient ID bracelets and cards, components of drainage bags, suction liners, surgical tubings, and some blister packaging. The American Plastics Council (800-2-HELP/-90) has published the *Hospital Plastics Characteristics and Recycling Feasibility Study* describing hospital waste by resin type.

The photo of "red bag" waste on

pages 298 and 299 and the corresponding description of items is potentially confusing. What is depicted in the photo was collected in a red biohazardous waste bag, perhaps reflecting the ignorance and poor performance of the hospital in question. Had the items shown in the photo been segregated properly, most should not have been a part of the hospital's regulated medical waste stream, destined for incineration, but a part of its solid waste stream, or recyclable waste. Further, the items are not "dioxin-releasing," other than the suction canister. The majority of gloves used in hospitals are latex, not PVC, but some of the non-latex gloves on the market use PVC or a chlorinated plastic hybrid. Bedpans, if they are disposable, are usually made from HDPE (high density polyethylene). Plastic reusable bedpans are often made from PVC, stainless steel, or a biodegradable paper material (Baxter Vernacare). Trays used in packaging tend to be made of a rigid thermoform polystyrene material (PS #6) or a polyethylene terephthalate material (PET #1). There are a few companies, such as DAVOL, that continue to package some of their products in PVC blisters. The red bags themselves are usually made from low density polyethylene (LDPE #4 plastic) or LLDPE (low linear density polyethylene).

Most of the waste from hospitals is actually solid waste, not unlike that from a hotel, restaurant, or office building, of which 50% or more can be recycled, if managed well. A small percentage, 15% or less, is actually considered "biohazardous," "regulated medical waste," or "infectious waste." It will be important to define these terms because there is little agreement among the states, and four define medical waste as hazardous waste.

The authors make several suggestions in their Program of Action. I would offer alternative guidance, including: First, I suggest that in place of a "waste audit," a purchasing-focused audit would be more useful,

keying in on supplies and products used. Often the vital information about the product, its composition, and manufacturer are on outer packaging and likely to be separated from the product in the waste stream. Moreover, sorting through waste materials is not a job for a rookie and can be a highly dangerous task. It takes much skill and experience to be able to identify the discarded health care products and their plastic resin composition.

Information on how to implement waste minimization programs in health care facilities is available in two publications of the American Hospital Association, (which I co-authored): *An Ounce of Prevention: Waste Reduction Strategies for Healthcare Facilities* and *Guidebook for Hospital Waste Minimization and Program Planning* (800-AHA-2626).

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Authors Respond

Mr. C.T. Howlett's letter continues a tradition of worry about the potential environmental toxicity of chlorinated compounds on the part of the trade association of chemical manufacturers who produce these substances. While we disagree with his characterization of our approach to the reduction of dioxin-generating compounds, we are happy to note his desire to promote a "scientific inquiry" into this issue.

Medical Waste Incinerators (MWIs) are a primary source of dioxin in the environment. Mr. Howlett is quite correct when he states, as did our article, that the EPA has said that its original estimate of MWI dioxin emissions may be too high. The evidence is clear nevertheless that medical waste incineration remains an important source of dioxin. The EPA's continuing analysis of the sources of dioxins is not the only recent estimate appearing in the scientific literature. Thomas and Spiro found that MWIs are the second