

Reducing PVC through a Statewide Pollution Prevention Agreement

by Michael Belliveau, Executive Director, Environmental Health Strategy Center
P.O. Box 2217, Bangor, Maine 04402, email: mbelliveau@preventharm.org

Abstract. All thirty-nine hospitals in the State of Maine have undertaken the most comprehensive statewide pollution prevention program for hospitals in the United States. This program flows from a Pollution Prevention Agreement negotiated and signed in March 2001 by the Maine Hospital Association, the Maine Department of Environmental Protection and the Natural Resources Council of Maine, the state's leading environmental advocacy group, with major support provided by Health Care Without Harm. In addition to focusing on achieving mercury elimination and waste reduction goals, the Maine hospitals have committed to steadily reduce the use and disposal of PVC (vinyl) plastic. The commitment to reduce PVC, a first among statewide hospital associations, was made to prevent formation of dioxin, a highly persistent, bioaccumulative and toxic byproduct of incineration of PVC-containing biohazardous and solid waste from hospitals. In the first year of the program, most Maine hospitals have made excellent progress in eliminating mercury use and have advanced from baseline assessments to the active development of pollution prevention plans. Initiatives to reduce PVC use and incineration have been fewer so far with progress at a beginning stage, reflecting the inherent complexity of the task, competing priorities and slowness in addressing the concern for patient safety from the use of PVC in medical procedures.

Introduction

Maine, a northern New England state large in area and small in population, is known for its natural beauty and political independence. The sign at the state border reading "Maine: The Way Life Should Be" welcomes visitors to its scenic coastline, plentiful lakes and rural pace of life. The official state motto, *Dirigo* ("I Lead" in Latin), belies its national reputation for public policy leadership on the environment, health care, campaign finance and other issues.

The strong environmental ethic in Maine has translated into a number of innovative state policy actions to reduce waste, eliminate mercury and slash dioxin releases among many others. Important initiatives have also been undertaken by the private sector,

including health care, which formed Maine Hospitals for a Healthy Environment in 2001.

Thirty-nine general purpose and specialty care hospitals, plus three federal and state facilities, provide health services to Maine's 1.3 million residents. While two larger institutions (with more than 400 beds each) provide comprehensive medical services, and another 2 to 3 facilities are mid-sized, most of Maine's hospitals are small and serve rural populations.

Waste Incineration, Dioxin and PVC

Solid waste management in Maine has presented a study in contrasts. With the most comprehensive bottle bill in the United States, Maine has achieved a 40% recycling rate for municipal solid waste. Yet in

response to the threat of leaking landfills in the 1980's, Maine embraced incineration, despite ongoing concerns about mercury, dioxin and other toxic releases in air emissions and incinerator ash sent to landfills.

About 70% of Maine's solid waste, including non-infectious hospital waste is incinerated, ranking Maine third among all states in percent of solid waste disposed of by incineration. Waste imported from other states accounts for about half of the input to one of the larger Maine incinerators. To stem the further flow of waste imports, the Maine legislature enacted a ban on new commercial waste management facilities.

Incinerators and other combustors remain an important source of dioxin formation. Some of the dioxin from incineration is released directly to the air while most of is released to the land as a contaminant of incinerator ash, which is commonly landfilled.

Hospital waste is particularly rich in PVC, the only chlorine-based plastic resin. Dioxin forms when chlorine reacts with organic matter in a high temperature environment.

Although PVC makes up only about 0.5% of the municipal solid waste stream by weight, it accounts for more than 80% of the organically bound chlorine and 50% to 67% of the total chlorine (organic plus inorganic) in trash. In medical waste, the amount of PVC in the waste stream is much greater than in municipal waste and the chlorine contribution by PVC is higher.

PVC is the dominant source of chlorine in the majority of dioxin releases to air, water and land. For example, in Maine, the state's dioxin inventory is dominated by incinerator ash disposal, air emissions from backyard trash burning and air emissions from incineration. (See Table 1). PVC is the major source of chlorine for each of these sources as well as for uncontrolled burning

of PVC in building and automobile fires and in construction job site burn barrels or burn piles.

Table 1		
Dioxin Formation and PVC in Maine		
Dioxin Release to Air, Water & Land	Amount, grams TEQ	1° Chlorine Source
Municipal Waste Incineration	36.1	PVC
Fuel Combustion	6.5	?
Other Sources	4.2	?
Backyard Trash Burning	4.1	PVC
Building/Car Fires; Open Burning	?	PVC
Medical Waste	Incinerated out-of-state	PVC
Source: Maine Department of Environmental Protection, Dioxin Inventory 2000		

Biohazardous waste from Maine hospitals (i.e. infectious medical waste) was historically burned on-site or shipped out-of-state to Lawrence, Massachusetts for disposal at a commercial medical waste incinerator. Tightening regulations and public protests led to the closure of all medical waste incinerators in Maine leaving hospitals dependent on a single out-of-state commercial vendor for disposal services.

Medical Waste as Policy Driver

In 1999, concerned about rising waste transportation costs and the threat of monopolistic disposal price increases, especially for Maine's geographically far flung rural hospitals, the Maine Hospital Association (MHA) sought legislative relief from the statutory ban on commercial waste management facilities.

MHA proposed that a commercial medical waste treatment facility (based on a microwave disinfection technology) be sited within the state.

Diverse political opposition ultimately defeated this proposed exemption from the state’s commercial disposal facility ban. Browning Ferris Industries, which at the time operated the Lawrence, Massachusetts incinerator, opposed the measure out of self-interest. Concerned legislators feared that Maine would become a magnet for imported medical waste. And Maine residents concerned about the impacts of the existing solid waste incinerators objected to the increase in solid waste incineration that would result from in-state disposal of the disinfected residual waste from the proposed new treatment facility.

In the end, the Legislature instructed the Maine Department of Environmental Protection (DEP) to work with MHA and other stakeholders to develop a better proposal for in-state management of Maine’s medical waste, including a serious effort to reduce the volume and toxicity of the waste stream.

The Pollution Prevention Agreement

In January 2000 the Maine DEP convened the first meeting of the Bio-Hazardous Waste Working Group to address these concerns. Through more than a year of meetings and negotiations, a two-pronged strategic solution was arrived at:

1. Maine hospitals would commit to a comprehensive pollution prevention program to reduce waste and eliminate toxic chemical hazards; and
2. A non-commercial, non-incineration treatment facility would be sited to disinfect medical waste in Maine with a commitment to dispose of the residual waste after treatment in a landfill rather than an incinerator.

(By developing a non-commercial treatment facility with majority ownership by Maine hospitals, the need for a legislative

exemption from the commercial waste facility ban would be avoided and importing of medical waste from out of state could be legally prevented).

The crafting of the pollution prevention agreement was informed by long standing concerns about mercury and dioxin pollution in Maine and by the framework provided by the Memorandum of Understanding (MOU) previously developed between the American Hospital Association and the U.S. Environmental Protection Agency.

The pollution prevention agreement was announced on March 5, 2001 with a signing ceremony featuring Maine governor Angus King. Table 2 lists the major elements of the agreement. Maine hospitals agreed to eliminate all mercury uses by 2005 and, for the first time ever by a statewide hospital association, to steadily reduce the use and disposal of PVC plastic (also known as vinyl).

Table 2 Major Elements of Pollution Prevention Agreement
<ul style="list-style-type: none"> • Eliminate mercury by 2005 • Steadily reduce the use of PVC • Purchase more environmentally preferable products • Reduce waste by 50% by 2010 • Technical assistance to hospitals

The hospital commitment to eliminate mercury was non-controversial. Most mercury uses in hospitals were well defined with readily available and effective alternatives. Moreover, considerable momentum existed in Maine to phase out this developmental neurotoxicant, which has rendered most freshwater and some ocean fish in Maine unsafe to eat for women of childbearing age and young children.

Maine had already led a three-year old regional effort in the Northeast to virtually

eliminate human-caused sources of mercury releases to the environment. In 2000, Maine became the second state in the country to ban the disposal of mercury products in municipal waste, require product labeling and ensure that manufacturers notify the DEP of the mercury content of products sold in the state. Maine also imposed mercury air emission limits on incinerators more stringent than federal requirements.

The hospital commitment to reduce the use of PVC plastic was driven by a concern with preventing the formation of dioxin during the incineration of hospital solid waste and medical waste. The national MOU called on hospitals to address persistent, bioaccumulative and toxic chemicals (PBTs). Dioxin compounds are high priority PBTs because of their extreme toxicity in small amounts and the high body burden of dioxin in the average population relative to levels known to cause adverse health effects in animals. Average daily exposures to dioxin in fatty foods equal or exceed various health advisory levels developed by government agencies.

The emergent concern about DEHP exposure from the medical use of PVC products was also discussed. Diethylhexyl phthalate (DEHP) is a male infant reproductive tract toxicant identified at the time as a serious concern by the National Toxicology Program’s Center for the Evaluation of Human Reproductive Risk due to exposure of neonates and pregnant women during medical procedures involving PVC products. However, it was agreed during the negotiations to defer the DEHP issue for later review by a patient safety committee process to be led by MHA.

The pollution prevention agreement calls for actions to reduce all sources of chlorinated compounds in hospital waste, since a source of chlorine is necessary to produce dioxin during waste combustion.

PVC plastic is singled out for priority reduction action because it is the major source of chlorine in hospital waste. The agreement establishes a goal “to continuously reduce the use and disposal of PVC plastic in hospitals.” Table 3 lists the “[S]teps to be taken toward achievement of this goal.”

Table 3
Summary of PVC Reduction Steps
<ol style="list-style-type: none"> 1. Establish a written hospital-wide PVC reduction policy. 2. Assess the current use of PVC-containing products. Request that vendors disclose the PVC content. 3. Reduce PVC use in disposable healthcare & office products. 4. Replace PVC use in durable medical products, construction materials and furniture when opportunities allow. 5. Ask GPOs and manufacturers to help evaluate the efficacy and availability of PVC-free alternative products. 6. Renegotiate GPO contracts for reduced purchase of PVC products. 7. Report annually on progress achieved in reducing the use of PVC. <p>Source: Maine Hospitals for a Healthy Environment, Pollution Prevention Agreement, March 5, 2001</p>

The overall pollution prevention agreement was signed by the statewide Maine Hospital Association in consultation with an Environmental Services Committee made up of hospital staff from around the state and with the action participation of the safety director and a vice president of the Maine Medical Center, the state’s largest hospital.

Within six months of MHA’s signing of the master agreement, the Chief Executive Officers of each of Maine’s 39 hospitals signed facility-specific agreements that incorporated the pollution prevention agreement in its entirety and included

additional actions. Within six months the hospitals agreed to complete a pollution prevention assessment and within six additional months to develop a pollution prevention plan. The Maine hospitals also agreed to organize mercury thermometer exchanges to inspire removal of mercury from the communities they serve.

The major parties to the pollution prevention agreement also developed a technical assistance program to assist the Maine hospitals in achieving its goals. Through joint funding provided by Health Care Without Harm, Maine Department of Environmental Protection and Maine Hospital Association, the consulting firm of CGH Environmental Strategies from Burlington, Vermont was contracted to work with the Maine hospitals on pollution prevention.

The technical assistance effort has included an annual Maine Hospitals for a Healthy Environment conference, training workshops on conducting baseline surveys to assess pollution prevention opportunities and on developing individual pollution prevention plans. Individual consultations tailored to specific hospital needs have also been offered.

Discussion of First Year Results

A little more than one year has passed since each of the Maine hospitals reiterated their commitment to the pollution prevention goals negotiated by the Maine Hospital Association.

A progress-tracking matrix allows for an evaluation of results for those completed activities that are actually measured and documented. Table 4 summarizes the major outcomes after year one.

Table 4 Maine Hospitals' First Year Progress	
Activity Completed	Percent Completed (# of hospitals)
Mercury Elimination	
Thermometer exchange	95 % (37)
Thermometer phase-out	74 % (29)
B.p. monitor phase-out	64 % (25)
Other product phase-out	28 % (11)
PVC Reduction	
Product inventory	18 % (7)
Patient safety review	5 % (2)
Minimize incineration	3 % (1)
Product phase-out	not quantified
Pollution Prevention	
Baseline survey done	74 % (29)
P2 Planning wkshps	67 % (26)
Source: Maine Hospital Association, www.themha.org/pages/resource_pages /scorecard.htm, revised September 2000	

In the first year of the program, most Maine hospitals have made excellent progress in eliminating mercury use well ahead of the 2005 phase out goal. Almost every Maine hospital participated in a statewide thermometer exchange in April 2002 that collected about 5,000 mercury thermometers from hospital employees and state government workers.

A super majority of Maine hospitals have completed baseline assessments and participated in workshops aimed at the development of pollution prevention plans. While this represents good progress it falls short of the objective to complete all of the pollution prevention assessments within six months of each hospitals signing of the facility-specific agreement.

Initiatives to reduce PVC use and divert PVC away from incineration have been fewer so far with progress still at a beginning stage. This reflects the inherent complexity of the task since PVC use is pervasive; few products are labeled for PVC

content and purchasing practices need to be altered. Additional factors include competing priorities, included heightened emergency preparedness planning, and slowness in addressing the growing concern about patient exposure to DEHP from the use of PVC in medical procedures.

Although actual PVC reduction has not been quantified in Maine, anecdotal reports indicate that some progress is being made in replacing PVC in patient ID bracelets, office supplies and body bags. One Maine hospital leading on PVC reduction has been using PVC-free IV bags for twenty years (see Table 5). Awareness of PVC as a priority issue among Maine hospital staff has increased markedly in the more than two years of dialog around this project.

Table 5 - PVC Reduction at Southern Maine Medical Center
Licensed 150 beds, 1100 employees Located in Biddeford, Maine Uses 200,000 PVC-free IV bags per year through contract outside of GPO Benefits cited: price, quality, medication compatibility and environmental Contract for IV bags with B. Braun McGaw less expensive than Abbott Recent switch to non-PVC body bags Source: Holly Shaner, CGH Environmental Strategies, Inc., Case Study, 2002

In conclusion, the statewide hospital pollution prevention agreement has been an important organizing vehicle for accelerating the phase out of mercury and elevating PVC reduction on the environmental agenda of hospitals throughout the state of Maine.

Recommendations

To improve hospital performance toward steadily reducing the use and disposal of PVC in Maine, several steps should be taken, including:

1. Clinicians and risk managers should be educated about the patient safety concerns with DEHP exposure from the use of PVC in medical procedures;
2. All products containing PVC and/or DEHP should be labeled and their content disclosed in purchasing catalogs;
3. Institutional arrangements should be made to enable PVC in waste to be segregated for diversion away from incineration to landfill disposal;
4. Information on the availability, cost and efficacy of PVC-free alternatives should be more widely disseminated;
5. Progress tracking should be expanded to document the phase-out of several specific PVC product categories, e.g. IV bags

Literature Cited

(to be added in final version)