

Instructor Sheets

Dental Wastes Recycling and Disposal

Preventing Pollution by Putting Dental Wastes in Their Proper Place Part I

*A curriculum for use in Kansas dental schools
(For use with student notes pages and overheads, or electronic visual aid
provided as part of this curriculum)*

In preparation for presenting this information to your audience, it is recommended the instructor:

- 1. Review the script and accompanying visual aides.*
- 2. Prepare copies of the student sheets for student use during the presentation.*
- 3. Prepare copies of the four handouts provided in this curriculum and referenced at different points throughout the curriculum.*

Slide 1 Title Slide

This curriculum was designed for use in Kansas dental schools by the Kansas Small Business Environmental Assistance Program. It was developed and provided to all Kansas dental schools in the fall of 2001 with funding from the Kansas Department of Health and Environment and the Environmental Protection Agency. The purpose of this curriculum is to provide dental professionals with the information needed to ensure proper dental waste handling, prevent environmental health problems, and protect public health.

Slide 2 Introduction (engage)

It seems each day we hear the media report newly discovered problems associated with items we use on a regular basis. Within the past few decades, we have learned that a widely used fire retardant insulator, asbestos, has been linked with lung disease, and the durable lead paint used throughout the 1950's has now been identified as a childhood poison. Today we know that mercury and mercury-containing materials, including mercury-amalgam commonly used in dentistry, have been linked to health and environmental concerns. In fact, within the past decade, several cities across the United States and abroad have banned or encouraged the elimination of mercury and mercury-containing devices and compounds.

What Do You Think?

(explore)

Ask students to break into groups of two to four and come up with answers to the following situation. Give the students five minutes to come up with answers, then ask each group to share their responses.

Dr. Driller's dental clinic has five chairs, two of which are used exclusively for dental restoration, with the others used for hygiene work only. In the past, the clinic has simply removed the contents of the restoration chair chairside traps and rinsed the contents down the drain. The clinic has always collected the scrap amalgam in a container for a person who periodically picks it up.

1. You just heard that some wastes generated by dental clinics need to be handled in special ways. One of these wastes is mercury-amalgam. Why is it such a problem?

(Answer: When fillings are placed or restored and mercury-amalgam is disposed of through the drain, trash, or red bag, mercury is released to the environment where it can end up in the food chain and maybe on your family's dinner plate. This presentation will explain the potential health and environmental impacts that improper disposal of mercury-containing materials can have. It will then review recommended waste prevention and recycling methods.)

2. The clinic usually tosses the contents of the chairside traps and entire vacuum pump filter into the red bag waste. Is this a problem?

(Answer: Yes, this is a problem. Most red bag waste is incinerated which simply vaporizes the mercury, sending it out the stack and back into the environment. This presentation will detail how mercury circulates and persists in the environment, making proper handling of mercury-amalgam waste so very important.)

Slide 3 **Dental Waste Recycling and Disposal...What You Will Learn**

Although the ideal solution for addressing waste management is eliminating the pollutant at the source, a practice often referred to as pollution prevention, this method is not always feasible in practice. Best management practices or BMPs are economically achievable actions that can be used to reduce or control the entry of pollutants, such as mercury and silver, into the environment.

Like other cities and states, some regions in Kansas now regulate dental waste handling and disposal. (Dental offices are now asked to follow best management practices or BMPs at a minimum.) The regulations and/or

BMPs generally apply to mercury-amalgam scraps and particles, silver-rich wastes such as waste x-ray fixer and old film, and medical service wastes, commonly referred to as “red” bag wastes. Lead foils, shields and aprons, as well as some cleaners also need to be handled with care. This section on *Dental Waste Recycling and Disposal* is designed to help you identify the recommended, and in some cases required, waste handling methods that should be used in a clinical setting. Mercury-amalgam is generally considered the most toxic and problematic waste stream for dental clinics, so it will be the primary focus of this section, part I.

- ✓ This curriculum will cover proper waste handling for
 - mercury-amalgam
 - silver-bearing wastes
 - medical service wastes
 - lead foils, shields, and aprons
 - regulated or toxic cleaners
- ✓ and the environmental regulations that impact the dental community.

Slide 4 **Mercury-Amalgam: (explain)**
What Are the Mercury Facts?

- ✓ Mercury is liquid at room temperature.
- ✓ Mercury combines easily with other metals – amalgams.
- ✓ It was first used to treat syphilis in the 1500’s.
- ✓ It has been used in dentistry for more than 150 years.

Slide 5 **What Are the Mercury Environmental Concerns?**

- ✓ Mercury is very persistent in the environment; it never breaks down.
- ✓ Mercury evaporates easily and travels long distances in the atmosphere.
- ✓ Mercury pollution is a local, regional, and global problem.
- ✓ Mercury bioaccumulates in fish creating a poisoning problem for fish-eating animals such as humans.

Instructor should explain bioaccumulation; this is very important.

Mercury bound in amalgam in our teeth is generally very stable. But when waste or scrap amalgam is discarded in the trash, added to red bag wastes, or put down the drain, it enters the environment. When mercury enters the environment it never really breaks down or degrades naturally. It is especially toxic in aquatic environments where bacteria convert it to a form that is toxic and bio-available to fish. In an aquatic environment, such as a lake, impurities such as mercury are concentrated in lower forms of life and are reconcentrated substantially during the movement of the impurity up the food chain. For example, mercury is bioaccumulated

or bioconcentrated in a lake environment, when large fish consume smaller mercury- contaminated fish. The mercury concentration bioaccumulates or increases as it moves up the food chain, eventually impacting animals such as humans and eagles when they consume the mercury-contaminated fish.

Slide 6 What Are the Mercury Health Concerns?

- ✓ It only takes about one teaspoon of elemental mercury to contaminate a 22-acre lake to the point that a fish-consumption warning must be posted. These warnings caution people about the possible health implications of eating these fish. Pregnant women, people considering having children, nursing mothers, and children under 12 should all avoid consuming fish from these contaminated bodies of water.
- ✓ In July of 2001, Massachusetts issued a statewide fish-consumption warning when 64% of the 121 bodies of water sampled contained mercury-tainted fish.

Slide 7 Mercury Health Concerns (continued)

- ✓ Mercury poisoning is often referred to as the “mad hatter syndrome.” This is a term that was derived from an early industrial occupation disease which affected American hat makers. The hat making industry used mercury compounds to enhance the process of making hat felt from animal fur. During the process, the mercury was heated exposing workers to mercury vapors in workspaces that were poorly ventilated. When hat makers exhibited lack of coordination, slurred speech, and personality changes due to brain damage, mercury poisoning was often referred to as “mad hatters’ syndrome.”
- ✓ Mercury is a known neurotoxin.
- ✓ It slows fetal and child development.
- ✓ It causes irreversible brain deficits.
- ✓ It causes lack of coordination.

Slide 8 Where Is It Coming From?

- ✓ About 75% of mercury in the environment is from pollution.
- ✓ Coal-fired power plants and garbage incinerators emit mercury to the air.
- ✓ Wastewater treatment plants cannot treat mercury, so they end up discharging the mercury they get into the plant from homes and businesses either directly to the receiving waters, like the river, or via their wastewater sludge. The sludges are usually land applied

or incinerated, causing the mercury to reenter the environment.
(This is how most dental mercury waste enters the environment.)

Slide 9 Mercury Circulation in the Environment

- ✓ Mercury circulates in the environment and never really goes away.
- ✓ It enters the air through pollution sources or evaporation where it can travel long distances in the environment and reenter the environment when it rains, entering lakes and streams.
- ✓ Mercury bioaccumulates in the food chain. As previously mentioned, when mercury enters the environment, it never really breaks down. When it is consumed by lower forms of life, it bioaccumulates as it moves up the food chain, eventually impacting animals that consume these mercury-tainted fish.
- ✓ Mercury poisoning is not treatable...it must be prevented.

Slide 10 Mercury Trends in Kansas

- ✓ Mercury levels in the environment appear to be on the increase, as state trends fall in line with national trends.
- ✓ On this chart, the triangle icons represent actual mercury levels in fish tissue from Kansas waters. Note the upward trend. (FYI: The square icons represent the decline of levels from a banned pesticide, chlordane.)

Slide 11 So Why Is Dental Amalgam a Problem? (elaborate/extend)

Composition of common dental amalgam:

- ✓ Dental amalgam is approximately 50% mercury.
- ✓ Mercury is generally considered “stable” in the amalgam form.
- ✓ Mercury is released when the fillings are removed or when excess scrap is improperly handled. If the clinic allows amalgam particles to go down the drain, the mercury then goes to the wastewater treatment plant. If the clinic puts the waste in the trash or “red” bag, it then reenters the environment when these contents are land filled or incinerated.

Slide 12 Putting Mercury-Amalgam in Its Place

Comply with these BMPs or best management practices (at a minimum):

- ✓ Always use encapsulated forms of amalgam; never use bulk amalgam.
- ✓ Use composites or non-mercury containing alternatives whenever possible.

- ✓ Keep excess or waste amalgam particles out of the drains, trash, and “red” bag or medical service wastes.
- ✓ Collect it for simple recycling.
- ✓ Use improved removal technologies such as modified traps, amalgam separators, or sedimentation units when possible. These technologies remove mercury-amalgam particles that the basic chairside trap does not catch. Use of an improved technology is required in Wichita, Kan.

Slide 13 Recycling Amalgam, Keep It Simple

- ✓ Identify a vendor who will take the mercury-amalgam. Mercury-amalgam waste and scraps should be collected and sent to a facility that can extract or recover the mercury and other metals for recycling. So, the first step in recycling mercury-amalgam is to identify a licensed mercury still or vendor that will take the waste. Some vendors will provide special collection containers or have specific collection instructions, so it is important that you first identify the still or vendor you’ll be working with. The handouts that will be reviewed later contain names of these mercury stills and vendors.
- ✓ Wear utility gloves, glasses, and masks.
- ✓ Flush vacuum lines with disinfecting solution at the end of the day before trap changeout; the next morning, clean or change the disinfected traps.

Slide 14 Recycling Amalgam, Keep It Simple (continued)

- ✓ Place trap in a wide-mouth, covered plastic container.
- ✓ Label: “Amalgam for Recycling.”
- ✓ Vacuum pump traps or contents should also be recycled.
- ✓ There is no need to service hygiene-only chairs.

Slide 15 Simple Recycling Results

- ✓ In regions of Minnesota, these tips reduced amalgam wastes and potential environmental mercury from dental offices by 60% to 75% over a 14-year period that data was collected.
- ✓ The chart show a dramatic decreases in the amount of mercury entering a Minnesota wastewater treatment plant after the region implemented a dental amalgam recycling and education program.

Slide 16 What Kansas Communities Regulate Mercury-Amalgam Disposal?

- ✓ As of 2001, the city of Wichita is the only Kansas region that regulates mercury-amalgam wastewater discharges. However, other cities in Kansas are likely to adopt similar regulations. Many regions around the country and the world currently regulate dental wastes in some form. In Wichita, clinics need to register with the city program, utilize an “improved mercury recovery technology,” and monitor their waste stream through annual testing.
- ✓ Improved technologies are technologies that have been added to the basic chairside traps or drains to capture additional amalgam. These are devices such as modified traps, membrane filters, or sedimentation units.
- ✓ Other regions around Kansas encourage dental waste BMPs.
- ✓ Nationally, many regions regulate mercury discharges, and some are attempting to eliminate the use of mercury all together.

Slide 17 Other Regulatory Questions

- ✓ Manage regulated wastes (mercury-amalgam wastes and silver-rich wastes) in total quantities less than 55 lbs and make it easy! Note: Mercury and some of the other wastes generated by dental clinics, such as silver-bearing wastes, are considered hazardous wastes and are regulated by the state in certain quantities. Clinics that generate at one time or accumulate these wastes in quantities greater than 55 pounds total are impacted by hazardous waste regulations. For this reason, it is important that the clinic properly dispose of or recycle these mercury and silver wastes on a regular basis (in total quantities of less than 55 pounds) to avoid further regulatory burden.
- ✓ Label containers: “Amalgam for Recycling.” If the waste is not going to be recycled and is to be disposed of as hazardous waste (such as mercury-contaminated wastes from a spill that can no longer be recycled), then label it “Hazardous Waste.” If total wastes at the clinic, generated at one time or accumulated in quantities, are greater than 55 pounds, then the waste should be labeled as hazardous as well. This situation can usually be avoided by recycling or disposing of these wastes on a regular, timely basis.
- ✓ If the clinic is using a vendor that requires recyclable materials be sent through the mail, ask the vendor for a copy of its mailing permit, which states this type of material/container approved for transport via the mail.
- ✓ Always use a licensed vendor when the waste is transported off site.
- ✓ Using a legitimate company and keeping records of the company used, amount sent with or mailed to the company, as well as the date are all important record-keeping tips. In cities that regulate

(Answer: BMP is short for best management practice. These are usually the recommended practices, not necessarily always the required practices.)

4. What are the BMPs for handling mercury-amalgam?

(Answer: Use mercury alternatives whenever possible, and use encapsulated amalgams instead of bulk amalgams. (Refer to the handout (#2) which reviews the four steps to recycling amalgam waste.)

5. Some Kansas regions regulate dental wastes. True or false?

(Answer: True. As of 2001, the city of Wichita regulates wastewaters containing mercury-amalgam and requires that clinics use an improved technology on their systems for the removal of mercury-amalgam. Best management practices are recommended but not required in other Kansas communities as of 2001. (For further information, see the contact information previously provided.)

Note: Mercury and some of the other wastes generated by dental clinics, such as silver-bearing wastes, are considered hazardous wastes and are regulated by the state in certain quantities. Clinics that generate at one time or accumulate these wastes in quantities greater than 55 pounds total are impacted by the hazardous waste regulations. For this reason, it is important that the clinic properly dispose of or recycle these mercury and silver wastes on a regular basis (in total quantities of less than 55 pounds) to avoid further regulatory burden. Mercury spills and mercury-contaminated materials usually need to be handled as hazardous wastes as well. Mercury spills should be report to the numbers listed on handout number three.