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REVIEW ARTICLE

Bio Medical Waste And Dentistry

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ABSTRACT

This article provides dentists with the information they need to properly dispose of mercury and amalgam waste, and provides suggestions for managing the other wastes that result from the day-to-day activities of a dental office such as: used X-ray fixers and developers; cleaners for X-ray developer systems; lead foils, shields and aprons; chemiclave/chemical sterilant solutions; disinfectants, cleaners, and other chemicals; and, general office waste.

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INTRODUCTION

The essences of cleanliness was captured by the Dravidians , who in 5000 B.C gave due emphasis to safe and effective sewerage systems, to get rid of all solid and liquid waste generated by the population. They were indeed the pioneers as far scientific waste management is considered.

BIO-MEDICAL WASTE

According to the Bio-medical waste rules 1998 of India, Bio – Medical Waste is defined as "Any solid, fluid or liquid waste, including its container and any intermediate product, which is generated during the diagnosis, treatment or immunization of human beings or animals, in research pertaining thereto, or in the production or testing of biological and the animal waste from slaughter houses or any other like establishments." There are a number of hazardous dental wastes that, when disposed improperly, could cause harm to the environment (1). Examples include chemical solutions, lead foil film backing, mercury, scrap dental amalgam, fluorescent tubes and batteries. If liquid hazardous wastes are discharged into a sewer system, they potentially impact the wastewater treatment plant, and/or pass through the treatment plant into the bay, ocean, river, or other receiving waters. Alternatively, if materials are disposed of in the trash, they may eventually contaminate the soil, ground water, or create a public health problem. Most chemical waste streams generated in the dental office can be managed as non-hazardous waste, if proper disposal guidelines are followed (2).

MERCURY CONTAINING WASTES

Dental Amalgam particles are a source of mercury, which is known to be neurotoxic and nephrotoxic. Fetuses and newborn babies are more sensitive to mercury than adults and there seems to be a great difference in sensitivity among individuals (3). Mercury is particularly threatening because it "bioaccumulates" in the food chain, collecting and building up in the tissues of small fish and other species and then accumulating in ever-increasing amounts as those creatures are consumed by others higher up the chain. There are several ways that mercury from dental amalgam can get into the environment:

- **Wastewater:** Amalgam that is rinsed down drains or escapes from poorly maintained chairside traps and vacuum pump filters enters the wastewater stream.
- **Medical Waste:** Scrap amalgam, both contact and non-contact, should not be treated as medical waste. If amalgam is present in waste that is autoclaved, the volatilized mercury will escape from the autoclave when the door is opened, presenting an immediate health hazard to dental office staff. The volatilized mercury then precipitates to the ground or a water body.
- **Garbage:** If amalgam scrap is discarded into ordinary trash, it may

eventually be incinerated or placed in a landfill. Since amalgam decomposes on heating; amalgam scrap should not be disposed in the waste that could eventually be incinerated (4). To minimize the amount of mercury vapour emitted from waste amalgam, ADA recommends that it be stored under a small amount of photographic fixer in a closed container(5).

Elemental Mercury Waste Management

It can be done by Storing unused elemental mercury in a tightly sealed container, By contact a certified waste carrier for recycling or disposal, By using a "mercury spill kit" if you have a spill of elemental mercury, By reacting unused elemental mercury with silver alloy to form scrap amalgam, By not placing elemental mercury in the garbage and also by not washing elemental mercury down the drain (3,4).

Scrap Amalgam Waste Management

It is performed by using a Sponge type Mercontainer TM to store the scrap amalgam, empty amalgam capsules are non-hazardous and can be disposed in the garbage, use an amalgam separator on the suction lines to remove over 95% of the contact amalgam prior to entering the sewer system, use disposable suction traps on your dental units and change them weekly, use gloves, mask, and glasses when cleaning the suction traps, mix only as much amalgam as is immediately required using premeasured amalgam capsules, manually remove large pieces of amalgam produced when removing old fillings and place them in a contact amalgam container, Do not dispose scrap amalgam in the garbage, Do not wash scrap amalgam down the drain, Do not rinse the traps and filters in the sink as amalgam particles will discharge into the sewer, Do not throw disposable traps that contain amalgam particles into the garbage, Do not place extracted teeth with amalgam fillings in the regular garbage (It should be disposed of in the "Scrap Amalgam" container to avoid incineration), Do not suction up unused particles of amalgam, instead place them in a mercury vapor suppressant container(3,4).

AMALGAM SEPARATION

The basic types of amalgam separation technologies are: Sedimentation units reduce the speed of the down flow of water with baffles or tanks to allow amalgam particles to settle, Centrifuge units spin the water out to the sides of the unit (These units offer good amalgam removal but cause some foaming with American vacuum systems), Ion Exchange units use polymers to capture small particles; these are often used in series with sedimentation units and other wastewater treatment technologies such as electrolysis and chemical additions have been adapted for dental applications (6).

SILVER CONTAINING WASTES

Spent X-ray Fixer Management

The fixer that Dental offices use to develop x-rays is a hazardous material that should not be simply rinsed down the drain. Spent fixer solution contains approximately 4000 mg of silver per litre. Use a Silver recovery unit to recapture the silver from the fixer and once the container is full, contact a Certified Waste Carrier for recycling or disposal. The de-silvered fixer solution can be mixed with developer and water and disposed of down the sewer or septic system, Spent developer is permitted to be discharged into the sewer or septic systems provided it is diluted with water, Utilize a digital X-ray unit to minimize the need for fixer solutions, Many cleaners for x-ray developer systems contain chromium, a toxic substance so ask the supplier for a cleaner that doesn't use chromium, Do not pour fixer down the drain, Do not place silver recovery unit cartridge in the garbage, Don't discharge chromium- containing cleaners into a sewer or septic system (5-8).

Undeveloped Film Management

Undeveloped film contains a high level of silver and must be treated as a hazardous waste. Silver can contaminate the soil and groundwater if it is sent to a landfill. Unused film should be recycled rather than being placed into the waste.

Collect any unused film that you will be disposing and place it in a container recommended by the disposal company (Plastic alginate container sufficient), once the container is full, contact a certified waste carrier for recycling or disposal, use a digital x-ray unit to minimize purchase of new x-ray film and developed film has little residual silver and can be placed in the regular solid waste stream.

LEAD CONTAINING WASTES

Lead Foil Packets

The lead foil inside each xray packet is a leachable toxin and can contaminate the soil and groundwater in landfill sites. The management can be done by collecting lead foil packets in a marked container, once container is full, contact a certified waste carrier for recycling and do not throw lead foil packets into the regular garbage (4,7).

Lead Aprons

Lead aprons should not be thrown into the regular garbage since the lead can contaminate soil and groundwater via the landfills. Contact a certified waste carrier to recycle or dispose of unwanted lead aprons (5,8).

BLOOD SOAKED MATERIALS

Non-dripping gauze and extracted teeth are not considered biomedical waste and can be put directly into the garbage. When gauze is blood soaked and dripping blood, it does become a biomedical hazardous waste. Its management can be completed by using a yellow biomedical waste bag to collect the non-anatomical wastes, by applying double bag for the waste, by labeling the bag with a biohazard symbol, keep refrigerated if onsite for more than 4 days, Once accumulated, contact a certified biomedical waste carrier for disposal and do not throw blood soaked materials into the regular garbage (9).

Sharps (Needles, Scalpels, Glass Carpules, Burs, Acid Etch Tips, Files, Blades & Other Sharp Objects):

All sharps must be disposed using the appropriate guidelines. Proper disposal will minimize possible puncture wounds on

other workers handling these wastes such as cleaners and waste carriers. Its management can be done by collecting sharps in a red or yellow puncture resistant container with a lid that cannot be removed, the sharps container should be properly labeled with biohazard symbol, once container is full, contact a certified biomedical waste carrier for disposal, do not throw sharps in a regular garbage bag, do not place other biomedical wastes materials in this container (2)

CHEMICALS, DISINFECTANTS, AND STERILIZING AGENTS

The dental office utilizes many chemicals, disinfectants, and sterilizing agents that may be hazardous to the environment if they are not properly disposed. Management can be done by ensuring that staff handling these materials are trained in Workplace Hazardous Materials Information System (WHMIS), Avoid the use of chemical sterilants whenever possible, Use steam or dry heat to sterilize your dental instruments, If using disposable plastic components, use non-chlorinated plastic (i.e. not PVC) to minimize environmental impacts, Rinse empty sterilant containers with water and place the empty containers in your solid waste stream, Avoid halogenated products (i.e. those with chlorine or iodine) since these can have detrimental effects on the environment, Do not pour ignitable substances (straight alcohols, ether, acetone, xylol, chloroform) or other solvents down the drain, Do not pour x-ray cleaning solutions containing chromium down the drain, Do not pour any used or unused chemicals down the drain that contain high concentrations of formaldehyde without contacting your municipality first, Do not pour sterilant solutions into a septic system. This may significantly disrupt the functioning of the system by killing the bacteria, which normally breakdown wastes, Don't pour concentrated alcohols, ethers or peroxides down the drain. These materials are flammable and could start a fire or explode (5,10).

NONHAZARDOUS WASTES

Paper, Cardboard, Aluminum, Plastics, etc.

It should be minimized by using responsible suppliers, Office paper should have a high-recycled content, Minimize plastic waste by using refillable bottles for disinfecting or cleaning products and reusable devices for dental procedures where feasible, Avoid containers or packaging made of PVC plastic where feasible. This material is difficult to recycle and can produce acid gases if incinerated as part of your municipal waste treatment, Paper waste, cardboard and plastic containers (clean or rinsed) should be recycled where this service exists (9).

CONCLUSION

Waste management is considered as a undignified unquestionably menial job , no wonder it was relegated to the group "D" staff who are headed by a sanitary supervisor. Thus the crying need of the day is to sensitize the top level managers making them aware of the various types of waste there generation, segregation, collection, transport, and final disposal. In a nut shell, waste management has two vital parts management of hazardous waste generated from different sources which involve careful segregation, collection, transport, and final disposal of various types of waste on one hand and on the other hand effective training and supervision of various categories of personnel involved in whole waste management system.

With the advent of diseases like AIDS, Hepatitis B and their increasing prevalence in health care workers and other personnel working in health care institutes it become important to have proper waste management (1,2).

In addition to health risks improper hospital waste management also has an impact on the environment causing pollution of water air and soil.

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