SPECIFIC HAZARDS

MERCURY

Dental mercury is one of the most commonly used metals in dentistry and it is highly toxic (poisonous). It is the only metal that is liquid and vaporizes (particles of matter scatter and freely float in the air) at a relatively low room temperature. Mercury vapor has no color, odor, or taste and cannot be readily detected. Mercury may be absorbed into the body through inhalation or through the pores of the skin. Mercury vapor inhalation may occur during triturating, dispensing the amalgam mass from the capsule, and when polishing new amalgam restorations. Also during the cutting and removal of amalgam restorations, mercury vapor and amalgam dust are created. The frictional heat created by grinding the amalgam causes the surface mercury to separate from the alloy, resulting in mercury vapor and amalgam dust (minute particles of alloy and mercury).

Mercury will penetrate the pores of the skin when touched with bare hands. Therefore, squeezing of the amalgam mass to express excess mercury should be avoided and is no longer an accepted technique.

The American Dental Association (ADA) recommends that a program of mercury hygiene be established within each dental practice. The dentist has a dual responsibility to the dental staff and him or herself to control mercury vapor in the dental office.

In 1984 the Occupational Safety and Health Act (OSHA) mandated that the dentist provide a workplace that is free from any occupational hazards.

Potential office hazards involving mercury can be eliminated by practicing appropriate mercury hygiene. A great deal of concern has been directed toward the biological effects of mercury. To inform the dental profession of the potential dangers of mercury, the Council on Dental Materials, Instruments and Equipment of the American Dental Association has established the following guidelines:

PERSONNEL RESPONSIBILITIES

1. Wear disposable gloves, face mask and glasses or shield when working with dental amalgam.
2. A no-touch technique should be used when handling mercury. Skin that is exposed to mercury should be cleansed with soap and water. Rinse thoroughly under running water.
3. The use of premeasured capsules allow for exact ratio of alloy and mercury. This type of capsule eliminates the use of the mercury dispensers and any possibility of mercury spillage. The ideal premeasured capsule that is electronically welded presents no hazard.
4. Use an amalgamator that has a protective hood to reduce the chance of any mercury vapor being released into the atmosphere and to confine mercury that might be sprayed from a traditional capsule with an ill-fitting cap. Screw-type or fictional-fit capsules that must be pressed together may also leak during triturination. Both can be checked for leakage by wrapping adhesive tape around the point where the two parts of the capsule join. Leakage will show up as small drops of mercury on the adhesive tape. Leaking capsules should be discarded.
5. All used capsules should be reassembled immediately after dispensing the amalgam. The used dental amalgam capsule is highly contaminated with mercury vapor.
DENTAL OPERATORY

1. Unwanted mercury and amalgam scraps should be stored in a tightly sealed, unbreakable jar containing used x-ray fixer, glycerin, or mineral oil. Storing scrap amalgam under water is not an effective means of controlling mercury vapor.

2. Carpeted floors in dental operatories is not recommended. Mercury in carpeting is impossible to retrieve and significantly increases mercury hazard. Never use a household vacuum to clean up mercury spills, as it tends to vaporize the mercury rather than collect it.

3. Water spray and high-volume evacuate should be used when cutting old amalgams or finishing new restorations, because the heat created will release some mercury vapor. A face mask should be worn to reduce mercury vapor and amalgam dust inhalation.

4. Avoid working with mercury or amalgam near a heat source.

5. Perform all operations involving mercury over areas that have an impervious and suitable lipped surface. This will allow easier recovery of unwanted mercury or amalgam scraps.

6. Treatment rooms should have proper ventilation to reduce the possibility of mercury vapor inhalation. Frequent changes in the office air-filter system is of utmost importance.

7. Dispose of mercury-contaminated items such as gloves, mask, used capsules, squeeze cloths, and the like, by placing and sealing in a labeled polyethylene bag.

SUGGESTIONS FOR CONTROLLING MERCURY SPILLS

1. Clean up mercury spills immediately regardless of amount. Small droplets may be recovered by using a fresh mix of amalgam or picked up with a narrow-bore tubing connected (via a wash bottle trap) to the low-volume aspirator of the dental unit. Spills of mercury should be cleaned up, because small droplets of mercury have a high vapor potential as atmospheric temperature increases. That is to say, the higher the room temperature, the more likely it is that mercury will vaporize.

2. Dental offices that use large quantities of mercury should be equipped with a mercury-spill kit. The kit should include disposable rubber gloves, a mercury-vapor respirator, a hypodermic needle with a large lumen, a syringe, adhesive tape for picking up droplets, polyethylene bags for disposal, and a sulfur solution for coating droplets prior to retrieval and disposal.

3. The Council on Dental Materials, Instruments and Equipments, specifically advises against the use of ultrasonic condensers when condensing amalgam, because mercury vapor is released from the amalgam.
SAFETY PRECAUTIONS

Although mercury can be absorbed through the skin, poisoning commonly results from aspiration of mercury vapors in the lungs. Mercury poisoning results in a wide variety of signs and symptoms depending on the total accumulation of mercury in the body. Hazards include nausea, loss of appetite, diarrhea, fine tremors, depression, fatigue, increased irritability, headache, insomnia, allergic manifestations, such as contact dermatitis, pneumonitis, and nephritis, dark pigmentation of marginal gingiva and loosening of teeth, etc. Read Material Safety Data Sheet for complete details.

The safe mercury level is 0.05 mg in the breathing zone for an 8 hours work day at 40 hours a week. Urinalysis may be done to measure your level. The normal is about 0.015 mg or mercury per liter of urine. OSHA maximum is 0.15 mg of mercury per liter.

SUMMARY

The vulnerability of dental personnel in general practice is significant because the amalgam restorative procedure is the predominate service (approximately 70%) provided by the general practitioner.
NITROUS OXIDE ANALGESIA

Nitrous oxide analgesia, or “tranquilizing air” or “gas” as it is sometimes called, can be used as a convenient preoperative sedative. Nitrous oxide is actually a general anesthetic that has been available since around 1844. Although early use of nitrous oxide gas was relatively crude by today's standards, it was the most popular anesthetic used by dentists until local anesthesia was developed around 1905. Local anesthesia rapidly, gained popularity and virtually eliminated the use of nitrous oxide as an anesthetic in dental practice.

For many years nitrous oxide has slowly returned to popularity in dental practice, not as an anesthetic but rather as a means of sedating a patient and raising the pain reaction threshold while the patient remains conscious. The general idea of nitrous oxide analgesia is to provide sedation for the patient just before the dental procedure beings. Other means of achieving sedation by the use of oral agents require that the patient take the medication well in advance of the dental appointment. Although intravenous sedatives eliminate this problem, they require an injection procedure that is often objectionable to an apprehensive patient. Nitrous oxide can be continually administered to maintain sedation throughout the dental procedure. After completion of the dental treatment the nitrous oxide is discontinued, and the patient returns to a normal alert status and can usually drive home safely. This is not possible with oral sedatives. In short, sedating with nitrous oxide can be initiated immediately before a dental procedure, maintained throughout the procedure at a constant level, and terminated quickly at the end of the appointment. This is convenient for both the dentist and the patient.

Since nitrous oxide is a gaseous substance, it is administered with a gas machine that mixes it with oxygen and delivers it to the patient through a nose-piece. The patient inhales this mixture, and sedation results. The mixture commonly used is approximately 40% nitrous oxide and 60% oxygen. The mixture is almost odorless and not unpleasant for the patient.

After the nitrous oxide enters the lungs, it is absorbed into the bloodstream and depresses the central nervous system. The degree of central nervous system depression is controlled by the mixture of gasses delivered to the patient. Patients in the analgetic state created by nitrous oxide have the following characteristics:

1. Patients are still conscious, communicative, and cooperative.
2. They are relaxed, breathe normally and can hold their mouth open voluntarily.
3. They have an elevated pain reaction threshold and do not react to a minor pain stimulus such as the injection of a local anesthetic.

This state is very safe because the patient remains conscious, whereas protective reflex mechanisms such as the cough reflex and eye blinking remain. The patient may have a feeling of profound relaxation, tingling in fingers, toes and the tongue and a general feeling of well-being. It is recommended that all dentists and auxiliary personnel experience nitrous oxide analgesia if it is to be used in the office. This experience will help them reassure patients about the effects of nitrous oxide.

After completion of treatment the flow of nitrous oxide is discontinued and only oxygen is delivered through the nosepiece for approximately 5 minutes. Some patients may require more time to “clear” or completely recover. Recovery should be assessed by the following methods:

1. The patient claims to feel normal.
2. Blood pressure, pulse rate, and respiratory rate are similar to the values recorded before nitrous oxide is administered.
3. The patient successfully completes a Trieger test.

The Trieger test is designed to assess the psychomotor ability of the patient. The test is administered before nitrous oxide is administered and again after the patient has been cleared to provide comparative results. Both tests are conducted with the patient positioned in an upright position to standardize the test conditions. The patient is given a clipboard with a test sheet contain a pattern of dots as shown and is asked to connect the dots with a pencil as shown. When the before and after tests are comparable, recovery is complete. If tests are not comparable, the clearing time should be extended until they are.