WOHRC FACT SHEET

WOMEN"S OCCUPATIONAL HEALTH RESOURCE CENTER

THE HEALTH RISKS OF DENTISTRY

Dentists, dental assistants and dental hygienists constitute a sizable occupational group at risk to multiple exposure to harmful agents—chemical, physical and biological. Job stress also is part of the picture. While the risk factor in the dental professions is not usually life-threatening, health can be damaged. In general, dental education has not adquately prepared dentists and dental personnel to recognize and avoid many of the hazards in their work environment. Fortunately, in the past decade, attention has been called to the problem both in scientific circles and in media reports. This raised level of awareness plus strategies for limiting exposure can make a difference.

There are some 125,000 dentists practicing in the U.S. and over 93% of these employ at least one other person, with one third employing four or more auxiliary persons. Reports concerning the health and safety of dentists have appeared in the scientific literature since the 1920's. While mortality studies have shown that dentists have a better mortality experience than the general population and a lower mortality rate than their professional peers, it would be a mistake to dismiss the health risks in dentistry. The reality is that dental personnel are at risk for exposure to infectious diseases, chemical and radiation hazards and the design of the dental workplace can promote physical strain. The stress of being in a service profession also can have a harmful impact.

IDENTIFYING THE RISKS

Infections

During high speed operative procedures dental personnel can be exposed to microbial aerosols consisting of infected dental pulp and water droplets contaminated with organisms from the patient's saliva. Even in procedures removed from the patient, there can be risk. For example after an outbreak of Mycoplasma pneumoniae infection among prosthodontic laboratory personnel an investigation revealed that the organism was transmitted by fine-particle aerosol generation from abrasive grinding of contaminated dentures.

Dental personnel are at particular risk from primary herpes infection because of frequent exposure. Herpes simplex virus (HSV) is responsible for a variety of clinical syndromes affecting the skin, mucous membranes and nervous system. Dental personnel are at risk of herpetic lesions particularly of the eye and finger. Transmission can occur by contact with the saliva or an active lesion. Furthermore, a study done at the University of Michigan has shown that dentists and dental students who had no evidence of HSV disease were more vulnerable to the Herpes virus than the general adult population when they were treating patients with active lesions.

Hepatitis, an acute illness that can mean a four-to-six week absence from work, is a particular risk for dental personnel because the disease is so common that it is not unusual for a patient to be a silent carrier. According to one expert, thirteen percent of practicing general dentists contract Hepatitis B compared with four percent of the general population. When dentists become infected they become carriers themselves, an additional danger to the public.

Chemical Exposure

There are a myriad of potentially hazardous chemicals in the dental environment several of which are worth specific mention:

Waste Anesthetic Gases

NIOSH estimates that each year some 100,000 dentists and dental assistants are exposed to waste anesthetic gases that include nitrous oxide, halothane, enflurane and others. Exposure to these gases occurs primarily from leakage of gases from the anesthetic system, poor fit of masks on patients and such sloppy work practices as turning on the equipment before the patient is properly masked. Reported risks from waste gas exposure include: impaired perceptual cognitive and motor skills; liver disease and cancer. Wives of dentists exposed to these gases have a higher rate of spontaneous abortion and, there have been reports of a slightly higher rate of birth defects.

Airborne Particulates (Mineral Dusts)

High speed grinding of silica-containing composite restoratives, the contouring of fused porcelain and other such procedures create airborne mineral dust, a situation

similar to the risk of dust disease linked to asbestos exposure. Additionally asbestos itself has been used as a binder in periodontal dressing and as a lining material for casting rings and crucibles. The Council on Dental Therapeutics no longer considers such products acceptable.

Methyl Methacrylate

Methyl methacrylate is widely used in dentistry as an adhesive. While there is limited data on the effects of prolonged exposure in humans, the monomer component of this chemical is known to be an irritant to the eyes, mucous membranes and skin.

Ethylene Oxide

Ethylene oxide is becoming more common as a component of the sterilization processes that are a must in a dental office. Excess quantities of the chemical can be released during routine use of ethylene oxide, a potent cancer-causing agent. In addition, ethylene oxide can cause gastric, skin and eye effects. And, animal studies and preliminary human studies have shown an adverse effect on reproduction.

Beryllium

Beryllium is a highly toxic metal which is used in dental alloys. Melting, grinding, buffing and general lathing operations in the preparation of dentures can result in significant exposure. Acute chemical pneumonitis, pulmonary granulomatosis, dermatitis and skin ulcers have been linked to occupational exposure.

Mercury

There is a vast literature on mercury contamination in the dental office through contact or handling of mercury and mercury-containing compounds as well as inhalation of vapors and respirable dusts. Mercury can cause nerve and liver damage among other effects and can be stored in body tissues for many years.

Physical Agents

Exposure to ionizing radiation is one of the best-known occupational hazards. Nonetheless, a study done as late as 1969 in England found more than one-third of the dentists studied still holding x-ray films in their patients mouths fairly regularly. Concern for radiation exposure requires constant vigilance of the operating procedures and equipment (see guidelines below) and a healthy respect for the cumulative effect of low-level exposure over time.

The use of devises for curing resins and sealants, plaque lights and molten metal used in casting can result in eye irritation, erhytema of skin and/or mucous membranes and malignant transformation of cells and viruses.

Miscellaneous Hazards

In addition to the above chemical and physical agents of harm, those in dentistry are subject to high noise levels from drills, contact dermatitis from the constant use of soaps and detergent—office personnel usually wash their hands some fifteen times a day—and disorders of the musculoskeletal system from poor working position. Moreover, dental practice means dealing with patient anxiety, high case loads, physical confinement during the working day and such intangibles as frustrations in reaching treatment goals because patient cost objections. These intangibles can add up to job stress overload.

LOOKING FOR SOLUTIONS

Although there are a myriad of potential hazards in dentistry, they can be controlled. The following suggestions and questions a dental professional should ask were compiled by Dr. Jacqueline Messite, NIOSH Regional Program Consultant and WOHRC Director, Dr. Jeanne Stellman as a guide to controlling unnecessary hazardous exposure in necessary work.

Chemical Control

For each of the chemical processes or products used, the following should be considered:

- Do you know the generic name and potential toxic effects of each chemical ingredient?
- Have you obtained material safety data sheets from the manufacturer?
- Are all employees aware of proper handling practices and precautions?
- Are in-service training sessions carried out at least annually?
- Are you and your employees aware of signs and symptoms of inadvertent exposure?
- Are records kept of the dates, quantities, and names of all chemicals used?

Infection Control

- Do you take a complete health history of your patients, with an update each visit?
- Do you use a rubber dam to limit the spread of aerosolized saliva?
- Do you use surgical gloves to stop infections from entering abraded or nicked skin?
- Do you wear a face mask while working on the patient?
- Do you buy handpieces and air-water syringes that can be heat sterilized?
- Are all dental instruments routinely and regularly sterilized?
- Are disposable syringes and needles used and disposed of in closed containers?
- Do you routinely have your patient rinse his/her mouth prior to beginning the session?
- Are all uniforms and work clothes removed at work and laundered professionally to avoid contaminating home environments?

Radiation

- Are you fully aware of the latest techniques and requirements for the safe use of radiation?
- Are only films rated Speed Group "D" or faster used?
- Is the x-ray beam filtered to eliminate unneccessary wavelengths and to meet state and federal requirements? Do you mimimize both the time and amperage needed to achieve effective results?
- Do you provide patients with a leaded apron?
- Do you always avoid holding the film in place for a patient and use x-ray holders or other methods instead?
- Is your examination area arranged to permit you to stand at least 6 feet from the patient and outside the path of the beam when the equipment is operating?
- If your workload is greater than 30 mamp per week, do you have an adequately screened and shielded area?
- Do you have your office inspected periodically by state officials or other qualified experts to ensure that all equipment and shielding are effectively maintained? (Have you considered personal dosimeter measurements for you and your staff to assure control?) □

The information in this fact sheet was excerpted from "Occupational Hazards in Dentistry," Harriet S. Goldman, Kenton S. Hartman, Jacqueline Messite, Year Book Publishers, 1984 Chicago, 1984. Available from WOHRC for $ 29.95 plus $2 postage.

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