TOPIC 5:
HAZARDS IN THE
DENTAL LABORATORY

Types of Workplace Hazards

So far we have discussed aspects of risk identification, assessment and control. Now it is time for us to apply this knowledge to actual hazards that are present in our work environment, this is dental laboratories and clinics.

There are 6 major types of hazards in the workplace – all of them are present in a dental laboratory or clinic in one form or another.

As part of determining Hazard Identification, hazards are divided into 6 categories:

1. Physical Hazards
   Noise, vibration, lighting, electrical, heat and cold, nuisance dust, fire, machinery and working space.

2. Chemical Hazards
   Gases, fumes, vapours and liquids.

3. Radiation
   Microwave, infra-red, ultraviolet, and x-ray.

4. Ergonomic
   Tool design, equipment design, job design, workstation design and manual handling.

5. Psychological
   Shift work, workload, dealing with the public, harassment, discrimination and low-level constant noise.

6. Biological
   Infection, bacteria and viruses.
Before we identify specific examples of each category, make a list yourself of examples you can think of in a laboratory. An example could be:

Physical Hazard
- Noise of grinding and polishing operations
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Chemical Hazard
- Vapours from monomer liquid
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And so on.

After you have made your list, compare it with the following section.
Hazards in a Dental Laboratory

The following is a list of some materials that can be hazardous in a dental laboratory:

- Silica
- Cristobalite
- Hydrofluoric Acid
- Phosphoric Acid
- Hydrochloric Acid
- Alcohol
- Borate
- Chromium
- Formaldehyde
- Cobalt
- Methyl Methacrylate
- Ammonia
- Gluteraldehyde
- Nickel
- Alginate
- Asbestos

Dust Hazards

Things which generate dust in a dental environment are:

- polishing and grinding
- sandblasting
- mixing and investing

Polishing and Grinding

It has been established that particles of less than 5 microns in size are hazardous to the health. Dust extraction units and dust masks are a good solution to this problem.

Sandblasting

Many sandblasting procedures cause substances including silica, to be spread into the air. Free silica is classified as carcinogenic (cancer causing). If wet blasting cannot be carried out, then good dust extraction is necessary.
Mixing and Investing
Crystobalite and silica are the hazardous substances we are exposed to. Mixing and handling should be carried out under ventilation and wearing a mask when the ingredients are dry.

Summary of Dust Control

1. Identify the Hazard
   The hazards here are:
   • airborne particles of less than 5 microns
   • released crystobalite and silica which are hazardous to health and known carcinogens.
   • Considerable nuisance value – sneezing etc.

2. Assess the Risk
   Obviously the risk is highest when a person is exposed to these materials when used and distributed in a dry form.

3. Control the Risk
   This can be done by:
   • good ventilation/suction
   • dust mask and/or breathing equipment
   • use wet if possible – this keeps down dust exposure

Vibration
Grinding and polishing with vibrating tools is a time consuming job for dental technicians. The grinding tools used in dental work are of a higher frequency (i.e. shorter, sharper and faster vibration) than those often found industrially. The effects of local vibration on dental workers can be:
• numbness
• fumbling

Health Effects
Vibration disease can develop after several years of exposure, for example, a technician whose main job might be grinding, polishing metal work or acrylic dentures. The main effects are a narrowing of arteries in the fingers and hands and damage to nerve endings. Poor circulation can make the condition worse.

Early symptoms of vibration disease are reduced blood circulation in the fingers, reduced sensitivity of the fingers to pain, touch, vibration and temperature.
What jobs in a Dental Laboratory can you think of that can cause vibration?

**Summary of Vibration Hazards**

1. **Identify the Hazard**
   The hazards here are vibrations caused by operating certain types of machinery.

2. **Assess the Risk**
   The risk is present when a worker operates this equipment. The risk increases depending upon the frequency of the vibration and the length of time of exposure.

3. **Control the Risk**
   Risk can be controlled by:
   - modifying or changing the equipment
   - reducing length of time of exposure

**Noise**

Various types of dental equipment emit noise which, under certain circumstances, can be harmful to hearing.

Equipment that causes noise:
- Dental lathes
- Polishing and grinding machines
- Air compressors
- Suspended motors
- Micromotors

Health effects of noise can be:
- Ringing in the ears
- Dizziness and sense of loss of balance
- Temporary hearing loss after work
- Noise induced stress

**Summarising Noise Hazard**

1. **Identify the Hazard**
   Some Dental equipment causes noise that can be hazardous.

2. **Assess the Risk**
Long term exposure to loud noises can have a detrimental effect on hearing.

3. **Control the Risk**
   Simple solutions would be:
   - Move the air compressor to another room or enclose it.
   - Replace suspended motors with newer micromotors.
   - Use of earmuffs.
   - Replace old equipment with newer equipment, as it is usually quieter.

**Electrical Safety**
There are 2 main factors contributing to electrical accidents. These are:
- Lack of maintenance
- Unsafe work practices

**Addressing the Problems**

**Equipment Maintenance**
Air compressors and steam cleaning pressure vessels should be tested by qualified persons. The owners should carry out visual inspections of the equipment. This should be on a regular basis. Things that should be checked are:
- that there is no obvious external damage, or damage to the connecting lead and plug
- that the inner cores of leads are not exposed
- that sockets are not cracked or broken
- that control knobs are functional
- that wheels or casters turn freely

Also, electrical equipment should be regularly tested by qualified electrical contractors, fitters or mechanics.

**Summary of Electrical Hazards**

**Identify the Hazard**
The hazard identified is **electrocution**.

**Identify the Risk**
The risk identified is the potential for a worker to suffer electrocution caused by improper handling or maintenance of electrical equipment.

**Control the Risk**
The risk of electrocution can be controlled or minimised by:
- Regular inspection and testing of equipment.
• Proper employee instruction in regard to how to follow manufacturers’
directions and how to properly handle appliances.

**Chemical Hazards**

**Fumes in the Dental Laboratory.**
Information and fumes given off by chemicals can be found in Material
Safety Data Sheets (MSDS) supplied by manufacturers. In general,
materials and procedures that we use that give off fumes are:

- acrylic monomers
- burn-out furnaces
- casting procedures
- cleaning chemicals

Mechanical ventilation is to be supplied when using hazardous substances.

**Biological Hazards (other than infection control)**

Air conditioning units. These are to be well maintained and free of micro-
organisms – viruses and bacteria can be spread via unmaintained air
conditioning units.

**Radiation Hazards**

Hazards in a dental laboratory that fall under the heading of radiation
hazards would be:

- computer screens
- photocopiers

**Screen-based Equipment**

Whilst dental technicians do not often spend large amounts of time in front
of computer screens, it is nevertheless important to be aware of the hazards
presented by this equipment. The adverse health effects of screen-based
equipment are essentially related to ergonomic or posture problems,
eyestrain, backache and discomfort.

Eye strain can be associated with poor lighting which may lead to symptoms
of eye fatigue, ache and pain.

Poor posture as a result of poorly designed workstations or bad habits may
lead to backache and increased fatigue.

**Prevention and Control of the Hazards**

The high lighting levels required for normal reading are not necessarily good
for computer use. Computers require lower levels of surrounding light.
It does not matter whether it is a case of eye-strain, backache, discomfort or fatigue, the longer the period of time doing repetitive tasks, the more likely the operator will suffer from these problems.

Variation of work and frequent rest breaks can all assist in the elimination of health problems in this area.

**Photocopiers**

It is advisable that the protective light cover be lowered and in place to avoid exposure to the strong light associated with photocopier use.

**Ergonomic Hazards**

**Workstations**

What do you think would be some factors considered important in good workstation design?

The basic requirements of a satisfactory workstation would be that it is of adequate height for the task required – sitting or standing and roomy enough to allow free movement of the worker.

**Lighting**

The basic requirement for adequate lighting is that the work must be made easy to see, the light must be comfortable to the eyes and lighting must be maintained.

**Hazards associated with lighting**

- Fluoro lights sometimes flicker, which can annoy people.
- Light levels may be too high or too low.

**Hazard assessment**

- Too little or badly designed lighting can cause discomfort, reduce productivity and lead to accidents.
- Poor lighting can lead to eye strain, loss of clarity, headache, nausea and fatigue.
- Excess lighting or glare can cause problems

**Controlling the hazard**

The hazards associated with poor lighting, as discussed above, can be controlled or reduced by:

- Variation in lighting levels.
- Correct positioning of light sources – this is particularly important in a dental laboratory or clinic.
- Adequate quantity of light.
- Replacement of flickering tubes.
There are Australian Standards in relation to the levels of light required for various tasks.

**Manual Handling**
Manual handling related accidents account for a majority of all injuries requiring workers’ compensation in Australia.

Back pain is the greatest single cause of time loss in the workplace.

**Hazards associated with Manual Handling**
Manual Handling injuries vary from short-term aches and pains to severe disabling injuries such as dislocation and hernias. (Watch those bags of plaster!!). The lower back is the most commonly affected area.

Activities which may lead to back injury are:
- lifting and lowering loads
- carrying, stacking, pushing, pulling
- operating levers and other mechanical devices
- maintaining an unbalanced posture.

**Hazard Assessment**
The majority of back injuries occur from lifting and carrying. Over exertion can lead to hernia, fractures or spinal injury. Minor injuries such as muscle tension can be caused by repetitive action or poor posture.

**Hazard Control**
Simple and straightforward questions about work practices can give clues as to the best way to minimise risk. For example:
- Can you lift all loads in a balanced way without twisting or bending sideways?
- Is the working layout or working height matched to your size and height?
- Can you vary your posture?
- Can you vary the length of time at a particular task?
- It is comfortable or easy to push, pull or lift?
- Are the floors slippery or uneven?
- Are there sufficient people for the task?
- Have you been shown the correct way to lift?
Occupational Overuse Syndrome
Occupational Overuse Syndrome was first described in the 18th century. Since then, the level of O.O.S. has increased greatly due to changing technology, more people reporting the condition and doctors diagnosing the symptoms. Repetitive strain injury, (R.S.I.) is another name for this condition.

Hazards associated with O.O.S.
These include:
- tenosynovitis (inflammation of wrists and hand tendon coverings)
- synovitis
- tendonitis
- tension neck syndrome
- bursitis
- carpal tunnel syndrome (tingling and loss of sensation in fingers due to nerve damage).

Hazard assessment
O.O.S. is usually caused or aggravated by work and is associated with repetitive movement, sustained or constrained postures and /or forceful movements.

When a person’s work requires the repetition of the same movement over a prolonged period, they may be susceptible to O.O.S. or R.S.I. Often the movement is undertaken in a hurried fashion or in an uncomfortable position.

The amount of force required can be important, as can emotional stress or work pressure from co-workers and employers.

Control of Hazard
A typical strategy to control O.O.S. would be:
- Setting of work rates – they should be realistic and set to the capacity of the individual.
- Provide a variety of work.
- Fixed posture and repetitive movements should be avoided.
- Increase the number of work breaks rather than the length of work breaks.
- Consider the ergonomics of the situation.
- Select the correct equipment.
**Personal Allergies**
Employers and employees should always be aware that many materials used in a dental laboratory or Denture Clinic could cause an allergic reaction in the user.

Can you think of any materials that might cause an allergic reaction?
- Polishing pastes and dust.
- Zinc Oxide / Eugenol (ZOE) impression paste.
- Cleaning solutions and solvents.
- Acrylic liquids.

**Controlling Allergies**
If allergies become obvious, then steps should be taken to avoid (if possible) the problem. Alternatively, the wearing of dust masks, protective barrier creams and gloves can be utilised.