



Occupational Health Issues in Dental Profession

Dr. Aneela Vaseem (BDS, FDS)

ABSTRACT: Dentists and other dental professionals face several unique risks on the job. These factors lead to the onset of career-specific illnesses that worsen over time. Many illnesses and disease clusters can be traced back to these factors, including some that are considered occupational ailments. This paper draws on the existing literature to discuss the risks associated with working in the dental field, including but not limited to stress, latex hypersensitivity, allergic reactions to various dental materials, exposure to radiation (both ionizing and non-ionizing), percutaneous exposure incidents (PEI), the dangers of nitrous oxide gas, and the causes of musculoskeletal and peripheral nervous system diseases. If dental workers are made aware of the risks they face on the job and given the means to avoid them, they can go about their day without incident. Likewise, dentists require access to continuing dental education courses in order to stay abreast of developments in the field.

Keywords: Dental personnel, hazards, stress, allergy.

I. INTRODUCTION

An occupational hazard is any threat to an employee's health that is directly or indirectly related to their job. It can also be used to describe a job, drug, method, or condition that makes workers more likely to get sick or injured on the job. This marked the beginning of the modern understanding of occupational hazards. There are many risks to workers' health on the job. Despite claims that modern dentistry is one of the safest jobs out there, there are still plenty of dangers associated with it. Dentists have a higher prevalence and severity of health issues compared to other high-risk medical occupations. Stress, allergies, increased noise, percutaneous exposure events, radiation, musculoskeletal diseases, legal risks, and more are just some of the hazards that dental workers face on the job. This is consistent with previous research showing a negative correlation between dental professionals' mental health and workplace factors such as patient contact, physical exertion, and financial stress. In addition, there is a substantial danger of exposure to numerous microorganisms in the dental environment. Systemic infections, such as bacteremia or viremia, can lead to the dissemination of infectious organisms into the bloodstream or the oral cavity. Blood, mouth, and respiratory secretions can be sources of infection for both patients and dental health care workers [DHCW]. Cuts on the doctor's hands, inadvertent biting by the patient during dental work, and needle wounds generated when administering anesthetic are all potential entry points for microorganisms.

II. METHODS

The topic of dental workplace dangers was the focus of a comprehensive literature study that included most publications previously published in scholarly journals. To begin the review, we first looked up terms related to dentistry and medicine, such as "occupational health," "occupational disease," "dental hazards," etc., in online databases like PubMed. Only articles originally published in English were considered for this analysis. Not only will dentists be under the spotlight of this assessment, but so will the other members of the dental team who face similar risks on the job. Stress-related and musculoskeletal illnesses, allergies, and increased noise levels were also included in the search. The current analysis also found that other, previously unseen risks, such as legal risks and dentists' suicidal tendencies, exist in the dental profession. The Worldwide Prevalence of Workplace Health Risks The dentistry profession faces a wide range of documented workplace dangers (Table 1). Dermatoses (40%) and ocular, respiratory, and systemic ailments (13%), among others, were found among public health dentists in a prior study. Back pain was the most common danger in 70.6% of the troops, followed by occasional anxiety and wrist pain. In India, an investigation among Navy dentists found that 47% of them sustained an injury with a sharp instrument within the last six months. Nine percent and twenty two percent of dental staff at an Australian dentistry school, respectively, experienced latex allergy and glove dermatitis. Researchers in Riyadh, Saudi Arabia asked dentists and dental assistants about their hearing health over the previous five years and found that 16.6% of them experienced tinnitus, 30% had trouble differentiating between speech and noise, and 30.8% had speech discrimination in a noisy environment. Five-point-one percent, eight-eight seven percent, and eighty-five percent, respectively, of dentists in a large study done in Lithuania, reported experiencing chronic back pain, headaches, and musculoskeletal complaints. Researchers in the southern part of

Iran found that 33% of dentists experienced back pain and 28% experienced neck pain. In another poll among dentists in Lithuania, 95.1% said they believe their choice of career affects their health, and 52.4% said they have frequent or very frequent health complaints.

Stress

The dental profession is rife with stressful situations. Considering the risks inherent to the field, it's important to talk about them. Dentists are older and more likely to become unwell as they progress through their careers, even though they have a reputation for being in good health and missing few days of work.

Sources of Stress

Dentists experience stress in a variety of clinical settings. Some of them include procedures involving anaesthetizing patients, helping them overcome pain and fear, responding to emergency situations in which a patient's life is in risk, and performing operations with uncertain outcomes. A prominent source of tension in this field is the delivery of anesthesia to patients, as found in a recent study. Both the doctor and the patient may experience the sadness and hurt that comes with failure if the treatment was not carefully planned. Many dentists may experience distressing thoughts, emotions, or concerns due to the constant presence of stressful situations. Instantaneous effects to stress can include elevated tension, hypertension, tiredness, insomnia, irritability, and sadness. Cooperation between dentist and patient, from a psychological standpoint, is crucial. A dentist's approach to a patient in the clinic must be tailored to that person's unique mental health and character traits. If the patient is unhappy with the dentist's services, it might lead to a stressful scenario.

If doctor and patient are able to communicate well, the patient is more likely to follow the doctor's orders. Doctor-patient interactions have a major impact on health behavior and treatment outcomes. When it comes to dentists and substance addiction, chemical dependency is by far the most common documented source of impairment most contemporary dentists admits to using drugs or alcohol, while a prior study found that male dentists were more likely to drink than their female colleagues. Dentists' prevalence of alcohol use varies widely across regions and countries. Dentists continue to have one of the highest smoking rates of any profession.

Table 1. Categorization of Potential Hazards Encountered in Dentistry

1	Stress and professional burnout [21-33]
2	Allergies from various materials [34-37] Latex hypersensitivity [38-43] Acrylate and its compounds [44-47] Allergic asthma [48,49]
3	Hazards from physical agents Noise generated by dental equipments [50-53] Radiation [54-60]
4	Ergonomics Musculoskeletal disorders and diseases of the peripheral nervous system [61-71]
5	Percutaneous Exposure Incidents (PEI) [72-80]
6	Dental Materials Mercury [81,82] Developing and fixing solutions [83]
7	Hazards due to nitrous oxide gas [84,85]
8	Legal hazards [1]
9	Overhead expenses of a dentist [86]

Allergic Reactions

Dental workers frequently experience an occupational allergic reaction, most often affecting the hands. Contact dermatitis and atopic dermatitis are the two most common forms of this skin condition. One study found

that 20% of dentists in Thailand had contact dermatitis. Only a small percentage of dentists and dental hygienists have reported having hand dermatomes.

Latex Hypersensitivity

The gloves and mask worn by dentists are essential pieces of safety gear. For almost two decades, dental professionals have relied on latex gloves as the foundation of effective infection control practices. Some dental professionals and patients may be put at risk by the integral or persistent chemical components. Most commonly, corn flour powder is sprinkled onto latex gloves. In addition to providing a natural defense against bacteria and other infections, a properly functioning set of gloves and mask can also protect against viruses. However, they are most likely to cause allergic responses in dentists and other people who routinely handle rubber.

Exposure to latex products frequently is the most important risk factor for acute reactions. One's skin or lungs can get sensitized to a powder in the air. Although type 1 hypersensitivity reactions can be triggered by inhaling glove powder, delayed hypersensitivity reactions, often known as allergic contact dermatitis, are far more common. The prevalence of atop is also a major reason for the rise in reported allergic reactions. Health care workers who were allergic to latex were shown to be 2.2-4.5 times more likely to be atopic than those who were not. It is estimated that 2.8%-17% of healthcare workers have latex allergies. Some 8.8 percent of dentists were found to have allergies.

Despite popular belief, this powder has some biological properties. It causes allergic reactions in susceptible people right away.

Acryl ate and its Compounds

Contact dermatitis is common among dental professionals, and it appears to be caused mostly by methacrylate, its polymer, and polyelectrolyte's. Many different types of polymers are used in the field of dentistry. Restorative materials and adhesives set chemically when two components are mixed or when exposed to light. Both scenarios result in the release of unreacted monomers due to incomplete polymerization. Changes in blood parameters, as well as neurological symptoms such as headaches, limb pain, nausea, lack of appetite, tiredness, trouble sleeping, irritability, amnesia, and memory loss, may be observed.

Asthma Due to Acryl ate Compounds

A serious health risk in the dental field is an allergy to dental products. Previous research has shown that dental technicians who work with acryl ate chemicals may develop asthma, conjunctivitis, and allergic contact dermatitis.

Hazards from Physical Agents

Dental instruments make a lot of noise. When working in an office or laboratory for the dental industry, employees may be subjected to a range of decibel levels. The noise created by dental laboratory equipment, such as dental hand pieces, ultrasonic scalers, amalgamators, and highspeed evacuation tools, is both necessary and pleasant.

However, the danger increases when outdated or broken machinery is used. Because of the heightened noise produced by some of these devices and the use of dental equipment by numerous users at the same time, the acoustic environment in dentistry practical sessions is typically characterized by increased noise levels in comparison to other teaching locations. Most classrooms have hard surfaces that act as noise reflectors, exacerbating the problem. Therefore, it is important to ensure that noise levels in such classrooms do not disrupt instruction. Long-term exposure to louder environments has a negative impact on both pupils and teachers. Its common knowledge that prolonged exposure to loud noise can cause physiological effects like increased heart rate and blood pressure as well as psychological effects like anxiety, exhaustion, and emotional distress that can lead to decreased productivity. These side effects are most noticeable at decibel levels above 80 and vary with factors such as how close one is to the noise source, how long one is exposed to it, how old one is, how healthy one is, and how sensitive one is. It's also general knowledge that prolonged exposure to loud noise might damage one's hearing. Controlling noise in classrooms is, thus, crucial; nevertheless, acoustic comfort is dependent on both the management of emitted sound levels and the acoustic properties of the actual classrooms themselves. Both doctors and patients could be at risk of hearing loss when using ultrasonic scalers. The ultrasonic scaler's airborne subharmonics can cause permanent hearing loss in the operator. Ultrasound transmitted by tooth contact to the inner ear via the skull bones can be harmful to the patient. Molar teeth scaling carries the risk of this subsequent complication. Some people have tinnitus after undergoing ultrasonic scaling, which is an early indicator of hearing loss.

Radiation

Both ionizing and non-ionizing radiations are present in the workplaces of dentists. Exposure to ionizing radiation is known to increase the likelihood of developing cancer. Despite the widespread availability of x-ray equipment in dental practices, only a small number of studies have evaluated the potential cancer risk linked with dental workers' exposure to ionizing radiation. The dental team should shield themselves from radiation by standing behind barriers and wearing badges that measure exposure. The use of blue light and ultra-violet light to cure different dental materials has raised serious concerns about exposure to non-ionizing radiation. Damage to the retina and cornea, among other parts of the eye, can result from exposure to the radiations released by these. Protection from these radiations is possible through the use of safety goggles and shields.

Dentists and dental hygienists in Canada have seen a significant drop in their exposure to ionising radiation at work during the 1950s, according to a recent study. Except for melanoma of the skin, the cancer rate among Canadian dentists was lower than the national average. Due to advancements in radiologic technology and procedures as well as radioprotection protocols, direct radiation harm is now extremely rare. **Ergonomics**

Disabilities of the musculoskeletal and nervous systems (MSD and PND) Dentists frequently have muscle pain, particularly in the areas of the spine, neck, shoulders, and hands, beginning at the commencement of their professional education and continuing throughout their professional practice. Degenerative alterations in the lumbar spine and associated lower back pain have been linked to several risk factors, including postures that may place more pressure on intervertebral discs and persistent spinal hypo mobility. Back discomfort has been identified as a significant risk factor for ill health among dentists. Thirty percent of dentists in Finland experience back and neck pain, according to recent research. 57% of 960 dentists in an American Dental Society reported experiencing occasional back pain. It's not uncommon for a dentist's back and legs to get sore from all the bending and twisting they do on the job, whether they're standing or sitting close to a patient. 37% of working time is being referred to here. Overstress has a deleterious effect on the musculoskeletal and peripheral neurological systems, especially the nerves of the upper extremities and the nerve roots in the neck. Dental workers typically suffer back pain syndromes due to spinal degeneration. Cervical or cervico-acromial pains are a common symptom of neck discopathy. Dentists are especially susceptible to these types of symptoms. Pain in the shoulders and arms is common in dentists because of the hunched and twisted neck position they adopt when working, as well as the constant, precise movements of their hands. Pain in the lower back and pelvis that spreads to the legs is a symptom of lumbar and lumbosacral discopathy; this pain is usually felt on the right side of the body. As the doctor works with a seated patient, more strain is placed on the right side of the body. Dentists' repetitive motions are hard on their wrists and elbows. Some dental tools, like as ultrasonic scalers and hand pieces, generate mechanical vibrations that can be felt in the hands and arms. Furthermore, digital nerve entrapment can be brought on by the chronic extrinsic compression of the nerves in the hand that is common in dentistry due to the use of hand instruments. In a profession where precise hand movements are required, neurological abnormalities, regardless of their cause, can have devastating effects. Many dentists have problems with their median or cubital nerves. Acroparadesthesia is an early manifestation of the condition with a defective median nerve.

Chronic exposure to potentially harmful conditions while practicing dentistry may result in illnesses known as cumulative trauma disorders. Incidents of Percutaneous Exposure [PEI] Dentists have a higher risk of percutaneous injuries than any other healthcare profession, especially from needle sticks and other sharp instruments. Dentists are vulnerable because to the nature of their employment in a low-visibility, low-access environment where they often handle sharp instruments. A recent survey found that 19.2% of dentists experienced needle stick or sharp tool injuries within the preceding six months. In this research, burs were shown to be the most frequently used method to bring about an exposure. According to the findings of a separate study conducted in the state of Washington, dentists account for 66.7% of the people who experience percutaneous injuries, with many of these wounds happening when dentists are administering local anesthesia, recapping a needle, or carrying out surgical procedures. Two percent of latex gloves and five percent of nitrile gloves are damaged after typical Clinical dentistry operations, according to a study conducted in the United Kingdom. Needles and drilling equipment like burs continue to be the leading cause of "sharps" injuries in the dental profession, as has been previously mentioned.

Needle stick injuries are concerning because they frequently occur during injections, when some residual body fluid from the puncture site remains in the needle. The danger of blood borne pathogen exposure for health care workers, particularly those in dentistry settings, has been reduced thanks to national and international recommendations like the Needle stick Safety Act of 2001. The likelihood of infection following an accident in which tainted blood was handled is contingent on a few variables, including the nature of the exposure, the size of the inoculum, the host's immune response, the nature of the infectious agent, and the volume of blood involved. In theory, all accidents should be handled in the same way, regardless of the patient's or the scene's unique characteristics. Determining whether post-exposure chemoprophylaxis is warranted

requires a thorough assessment. In addition, learning from the incidents' causes can help avoid such occurrences in the future.

Dental Materials

In the absence of proper safety measures, many of the materials used in dentistry can be harmful to patients' health. Before and after being used, most dental supplies are put through a battery of rigorous examinations. Nonetheless, dental professionals risk breathing in aerosolized dental materials produced by high velocity cutting and polishing. Other dental materials can be irritating to the skin and lungs because they are flammable. Chronic mercury exposure has been linked to a variety of health problems. Chemicals found in developing solutions are what are needed to reduce silver bromide ions. These also have a hardening agent, a preservative, and compounds that regulate the processing time. Neutralizers, clearing agents for removing immature silver bromide ions, preservatives, and hardening agents are all part of fixing solutions. A variety of ingredients, including acetic acid, diethyl glycol, glutaraldehyde, hydroquinone, potassium hydroxide, and others, have been linked to adverse health effects. Glutaraldehyde is most employed as a hardening agent in medical imaging to stop films from clinging to one another. Glutaraldehyde has been linked to sensitization and allergic contact dermatitis in cases of infrequent exposure. Sulfur-dioxide is released from the decomposition of sulphite when the chemical components of a processor are mixed together. Exposure over time may cause bronchospasm. Another possible by-product emitted from manufacturing chemicals is ammonia, a highly soluble respiratory irritant. The silver recovery system is another potential source of vapor emissions. The container must be closed securely and opened only in a well-ventilated location. The anesthetic nitrogen monoxide (N₂O), also known as laughing gas, has serious medical applications. As the anesthetic gas is being administered to patients, workers are being exposed to N₂O. Scavenging systems are commonly used in operating rooms to remove unneeded and exhaled N₂O from the working environment, hence protecting the health of the staff. Female dental assistants who are exposed to N₂O can greatly benefit from these systems, according to recent studies. Workplace exposure to N₂O has been linked to a variety of negative health outcomes in humans, including decreased fertility, spontaneous miscarriages, and neurologic, renal, and liver disease. There is also evidence that workers exposed to N₂O have declines in cognitive performance, including worse hearing and vision.

Legal Hazards

The practice of dentistry is governed by a variety of laws and regulations on a global scale. Any of these violations could lead to legal action being taken against a dentist, especially in more developed countries where people appear to be more conscious of their rights. All clinical staff at the dental hospital should be made aware of the hazards and precautions needed to ensure a safe working environment in dental care.

Overhead Expenses of a Dentist

Providing dental care for all patients and meeting the practice's financial obligations are sometimes at odds with one another. Dental care can be out of reach for some people because of the hefty cost. Whether or not customers show up or pay up, you still have to cover these costs. In addition, the dentist has earned the right to a comfortable salary because of his or her extensive education and experience in the field. The high expense of dentistry school means that many new dentists have significant debt when they graduate, making an immediate return on investment imperative. Dentists experience mental stress when they have trouble covering their overhead costs and the obligations. The causes of suicidal ideation are often observed. Dentists' families also feel the strain of the profession's pay gap. As a result, having a steady income is crucial to maintaining a comfortable lifestyle and satisfying personal relationships.

III. CONCLUSION

The above explanation makes it abundantly evident that many occupational health concerns are still prevalent in today's dental industry, despite major developments. Many careers entail inherent risks to one's health. Being in good health is crucial to having a successful career. The health of workers will be negatively impacted by high production demands and stressful working circumstances. The fact remains, however, that even the most helpful technologies have the potential to negatively affect some people. In public health, the goal is always to maximize benefit while minimizing risk to the population. Immunization against HIV, HBV, and other infectious illnesses is a must for everyone working in the dental healthcare industry. In order to prevent repetitive stress injuries (RSIs) and other muscular skeletal disorders (MSDs), dentists must observe proper ergonomics, including keeping a healthy working posture and using tools and furniture that are comfortable and well-suited for the task at hand. Dentists need to keep tabs on their own mental health, work at their own speed, and limit their exposure to potentially harmful workplace conditions. To ensure the well-being of dentists, it is

necessary to create and execute strategies to improve mental health and reduce the consequences of professional hazards.

Percutaneous exposure events (PEI) can cause serious infections, but they can be prevented with the right barrier tactics and thorough sterilization. In the event of an allergic emergency during a consultation, dental staff should be conversant with the major signs and symptoms of allergic reactions, including anaphylaxis. It's important to provide opportunities for dentists to learn about new research and techniques through continuing education programmes.

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