Important Role for Standalone Indoor Air Purification Systems in a Dental Laboratory

Most people do not know how harmful their indoor air can be. The US. EPA states that 68% of human disease is spread through indoor air. [1] When it comes to the air in a dental laboratory these concerns become even greater. According to the US Department of Labor’s statistics, working as dental professional is one of the most damaging jobs to peoples’ health. [2] Why is this the case?

This is due largely to the fact that many dental laboratories do not pay enough attention to their indoor air quality. Laboratory owners believe that they are well protected through the source control devices on their equipment, and their building’s heating, ventilation, and air conditioning (HVAC) systems. Unfortunately for the technicians working in a dental laboratory, the source control devices do not capture all of the contaminant that is created, and HVAC systems are primarily designed to maintain the indoor air temperature at comfortable levels.

HVAC systems have filtration components that are designed to filter out large particulate to protect the components of the HVAC system, and not to filter out the small indoor airborne particulate that can be harmful to the occupants. This is why more and more dental laboratories have taken proactive steps to properly clean their indoor air with standalone indoor air purification systems.

The #1 Most Unhealthy Job is Working in the Dental Profession

Based on analysis of the US Department of Labor database of 974 occupations, 10 million Employers and 125 million Employees - the Most Unhealthy Job [#1] is that of a Dental Worker, a category that combines the related detailed jobs of general dentists, dental hygienists, dental laboratory technicians, dental assistants, and prosthodontists. Noticeably, Dental occupations ranked ahead of jobs such as Oil/Gas Derrick Operators [#11], Mining Machine Operators [#17], and Chemical Plant Operators [#19]. The Dental profession ranked #1 based on high scores for: exposure to contaminants, exposure to disease/infections and time spent sitting. [2]

Sources of Indoor Air Contaminant in Dental Laboratories

There are many sources of harmful airborne contaminant in a Dental Laboratory.

Dust - The dental lab worker may be potentially exposed to various dusts many of which can cause occupational asthma. The Asthma Society of Canada states that 20% [1 in 5] people working in clinics and laboratories will contract occupational asthma due to exposure to chemicals and dust. [3] Of particular concern is the silica content of the dust generated during the grinding and sandblasting processes involved in dental laboratory work. The United States Center for Disease Control’s publication, Morbidity and Mortality Weekly Reports (MMWR), have highlighted documented many cases of silicosis, a well-known and very serious occupational lung disease that is caused by inhaling respirable crystalline silica dust. [4] Traditionally, silicosis was associated with mining and the ceramics industry, but now it appears the materials and processes in the dental laboratory put workers at risk of silicosis. Another lung condition known as pneumoconiosis can be contracted due to the significant exposure to dust from heavy metals like cobalt-chromium-molybdenum alloy.

Gases & Chemicals – Metal casting and porcelain baking can release dangerous airborne gases and vapours. In the creation of crowns, bridges and dental prostheses, airborne contaminant comes from metal alloys such as vironite, vitallium, wisil, and duralium. Of particular concern is Methyl Methacrylate monomer used to generate polymer PMMA which is used in making dentures, other dental prostheses, and as a filler and cement. Workers exposed to methyl methacrylate can suffer from acute symptoms (headaches, skin, eye and mucus membrane irritation, allergies, and respiratory problems), chronic symptoms (reduced lung function), and most concerning is the exposure to potential carcinogens. [5]
Infectious Diseases - Humans are a key source of unhealthy airborne agents which infect people. Measles, influenza viruses and the tuberculosis bacteria are diseases known to be transmitted by means of shared air between infected and susceptible persons. In the act of talking, sneezing and coughing, germs can spread up to 160 ft through the air, and in regular office buildings up to 10 stories through the buildings HVAC system. In a Dental Laboratory, the close proximity of dental workers increases, and the types of HVAC systems that are present all increase the likelihood that infectious disease can spread from person to person.

The Role for Standalone Air Purification Systems in Dental Laboratories

Even though the equipment in a dental laboratory has source control devices attached to them, they do not capture all of the contaminant that is created, especially the very fine particulate that can remain suspended in the air for hours. In a house or condo there is a source control device over the stove, the range hood, which is designed to capture odors and contaminants from cooking to protect the occupants of the house. How well does a range hood work? Range hoods can capture as little as 15% of the contaminants being created when cooking – that is why you can still smell the things you cook (like bacon or fish) all through your house.

Just like your range hood, the source control devices in the dental laboratory help with machine created contaminate, but not sufficiently enough, and they do nothing to protect people from the airborne particulate that is transmitted through the HVAC system from other rooms and tenants, and they do nothing to remove airborne disease and chemicals that originate away from the dental equipment (like cleaning chemicals). That is why standalone air purification systems have been used by many dental laboratories today as an effective first level control solution to protect the health and safety of dental laboratory employees.

Choosing an Efficacious Stand Alone Air Purification Solution

Standalone purifier effectiveness is dependent on the: i) filtration system, ii) air handling capacity, and iii) operating sound level. The U.S. Department of Health & Human Services Centers for Disease Control & Prevention states ‘if portable units are used, they should recirculate all the room air through medical grade filters.’ These systems should be capable of operating at noise levels that do not inhibit occupants from performing their necessary tasks, otherwise they will be ‘turned down’ which can negate their efficacy at cleaning the air.

Summary

Today, more and more well-known hospitals, dental offices and dental labs have taken proactive steps to take care of their indoor air quality. Worldwide leading dental authorities, like the American Dental Association (ADA), British Dental Journal, University of Athens, University of Detroit Mercy School of Dentistry, are recommending a new school of thought on the use of standalone medical grade air purifiers in managing the dangers of indoor airborne particulate in the dental environment.

REFERENCES