SENSOR Occupational Lung Disease Bulletin

A project of the Massachusetts Department of Public Health's Occupational Health Surveillance Program,
the Massachusetts Thoracic Society, and the Massachusetts Allergy Society

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Dear Health Care Provider,

The Occupational Health Surveillance Program (OHSP)is happy to announce that it has received an additional five years of funding for surveillance of work-related asthma under the NIOSH SENSOR program. We are looking forward to building on the strong surveillance system already in place by increasingly linking our surveillance findings to intervention efforts in the state. OHSP will continue to disseminate information about work-related asthma and surveillance findings to physicians and other health care providers in the state through the Bulletin. We plan to expand its distribution beyond the current mailing list of allergists and pulmonary specialists. Because expansion of the Bulletin will be more costly and more labor intensive, we have decided to publish it on a quarterly basis. The next issue will be in January 1998.

This month we call your attention to the health hazards associated with a growing industry- nail salons. This article appeared in the Connecticut Department of Public Health's newsletter in August of this year and is based, in part, on work being done in other SENSOR states.

Sincerely,
Catharine M. Tumpowsky, MPH, Project Director
Work-Related Asthma Surveillance Project

Worker Exposures to Dusts and Vapors in Nail Salons

Adapted from *Occupational Airways*, August 1997. *Occupational Airways* is a newsletter of the Occupational Health and Special Projects Program of the Connecticut Department of Public Health.

Nail Application

Artificial fingernails, also known as sculptured or acrylic nails have become increasingly popular since the 1970's. In the US, billions of dollars are spent on artificial nails, and approximately two thousand nail salons are opening each year. At the cost of enhancing customer appearances, nail technicians, cosmetologists, and manicurist could potentially be paying the price with their health. Toxic vapors from the chemicals used to construct the artificial nails and dusts from motorized and manual filing can cause health problems including occupational asthma.

Acrylic nails are created using a methacrylate monomer liquid and polymer powder. The nail surface is first roughened by sanding or filing. The nail technician then dips a small brush into liquid methacrylate monomer and then into powdered polymer. The powder contains a peroxide accelerator which catalyzes the liquid monomer into a polymer. The mixture is applied to the nail using an extender mold. After the resin dries, the mold is removed and the nail is ready for filing. The process takes 1 to 2 hours for initial application, and 30 minutes to 1 hour for "fill ins", which are done when the natural nail grows and the space between the artificial nail and the cuticle needs filling in. [1,3,4,5]

The first artificial fingernails were made by applying methyl methacrylate (MMA) dental acrylate to fingernails. In 1974, the Food and Drug Administration (FDA) banned the use of MMA from all artificial nail preparations because it caused nail deterioration and dislocation and allergic dermatitis in customers and nail technicians. MMA has been substituted with ethyl and other methacrylates. Despite the ban, studies have found that there are still some nail products that contain MMA.

Health Effects

MMA is a colorless, flammable liquid with a strong, bitter odor. It is an eye and mucous membrane irritant and can cause allergic and irritant dermatitis. It is also a known cause of occupational asthma. Other health effects reported include slowed peripheral nerve conduction, hand numbness and pain, headaches, nausea, fatigue and sleep disturbances. Once polymerized, it is relatively inert and nontoxic. When cut or sanded, however, the dusts can cause eye, skin, and mucous membrane irritation. [1,3,4,6,7,8]

MMA has been found to be irritating at air concentrations below 50 ppm (parts per million) measured as an 8 hr time weighted average (TWA). This is much lower than the OSHA permissible exposure limit (PEL) which is 100 ppm measured as an 8-hr TWA. Studies have found that nail technicians' exposures during artificial nail application are below OSHA PELs. Even so, there are reports of nail technicians adversely affected by chemical exposures while applying artificial nails. These include reports of cases of occupational asthma. [1,6]

Less is known about the toxicity of ethyl methacrylate but it is believed to have similar health effects as MMA. Currently, there is no OSHA standard for ethyl methacrylate. Industrial hygiene recommendations are the same for both MMA and ethyl methacrylate. [3,4]

REPORT AUGUST AND SEPTEMBER CASES NOW

By October 31st, report all occupational lung disease cases seen for the first time in August and September, 1997. If you have NOT seen any cases, it is not necessary to return the report form.

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SENSOR: *Sentinel Event Notification System for Occupational Risk. Massachusetts SENSOR is funded by the National Institute for Occupational Safety and Health.*

MMA has a wide variety of uses besides artificial fingernails. It is used in the production of acrylic plastics, adhesives, and surface coatings. In medicine, it is contained in bone cement, spray adhesives and bandage solvents and in dental technology, it is used as a ceramic filler or cement. Medical and dental personnel working with any of these materials are at risk of developing symptoms and/or disease consistent with MMA exposure. [6,7,9]

Investigations

Occupational Asthma. In Colorado in 1990, occupational asthma was diagnosed in six cosmetologists working with artificial fingernails. The Colorado Department of Public Health requested assistance of NIOSH for evaluation and control of exposures. The primary ingredient of the liquid and powder components was ethyl methacrylate. However, NIOSH found trace amounts of MMA in 15 of 25 random bulk samples of both components. It was believed that trace amounts of MMA were most likely impurities in the ethyl methacrylate and was not an added ingredient. When air sampling was conducted, the levels of MMA were nondetectable. Nail technician's exposures to ethyl methacrylate were measured by having them wear personal air sampling devices while working at a modified vented manicure table and an unvented manicure table. The modified vented table reduced ethyl methacrylate exposure by tenfold compared to the unvented table. Therefore, it was suggested that salons use a modified vented or downdraft manicure table to alleviate vapor and dust exposure. [3]

For nail applications, **silica** aids the ethyl methacrylate in flowing, therefore, making the monomer less likely to clump. Silica exposure can lead to silicosis, a fibrotic lung disease. There may be some risk for silica exposure from the dust caused by motorized and manual filing of the artificial nails, although it is unlikely that harmful quantities of silica dust would be generated during nail applications. In a recent investigation conducted by the Illinois Department of Public Health, of five salons sampled, all had silica exposures below the NIOSH exposure limit of 0.05 mg/m^3. However, the use of silica in nail applications raises concern for the workers who produce and package silica for use in nail salons.

Most salons have little or no controls for hazardous substances used during artificial nail applications. Besides the components in the artificial nails, technicians are exposed to other chemicals such as those found in nail polish, fingernail glues and nail polish remover. Appropriate ventilation such as that provided by a modified downdraft manicure table, would reduce the need for technicians to wear personal protective equipment. To minimize skin and dust contact, additional recommendations include hand washing, wearing long sleeved clothing, and not permitting food, drink, and smoking at the manicure table. [1,3,10]

Even though studies found exposure levels of vapors and dust were lower than guidelines and standards, nail technicians may be at risk for occupational asthma and other health effects associated with methacrylates. In order to decrease exposures, effective engineering controls and good work practices should be implemented. It is clear from the literature that ethyl methacrylate needs to be researched further and perhaps a standard needs to be set. Nail technicians need to be educated about the chemical hazards and about the controls available. [3]

References

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3. Spencer AB, Estill CF, McCammon JB, Mickelsen RL, Johnston OW (1997): Control of Ethyl Methacrylate Exposures During the Application of Artificial Fingernails. AIHA Journal 58:214-218.
4. Froines JR, Garabrant DH (1986): Quantitative Evaluation of Manicurists Exposure to Methyl, Ethyl, and Isobutyl Methacrylate During Production of Synthetic Fingernails. Appl. Ind. Hyg 2:70-74.
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For additional information on exposures in nail salons:

Artificial Fingernail Products: A Guide to Chemical Exposures in the Nail Salon. State of California, Hazard Evaluation and Information Service. Call 415-540-3138.

Health Hazard Manual for Cosmetologists, Hairdressers, Beauticians, and Barbers. By Nellie J. Brown, M.S. Cornell University, Chemical Hazard Information Program. Call 718-842-1124.

Number of Lung Disease Cases Reported to MA SENSOR, March 1992-July 1997

	June 1997	July 1997	Total to Date (3/92-3/96)
Asthma	3	43*	521
Silicosis	0	0	12
Asbestosis	0	0	122
Chemical Pneumonitis	0	0	15
Total Number of Lung Disease Reports	3	43	670

*****includes 40 cases from quarterly computerized reporting from a single occupational health clinic.