FINAL REPORT

Nail Salon Hazards and Health Effects

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Abstract

This method development study of the nail salon work environment assessed hazards and health effects in two pilot studies; explored access and contextual issues relevant to community-based approaches to occupational health research in immigrant communities; and developed an investigatory framework and recommendations for further study. There have been few investigations of this work environment, despite a vulnerable worker population of reproductive-age Asian immigrant women, long hours of work, and extensive potential for exposure to toxic chemical ingredients in nail products. Barriers have included the difficulty in investigating multiple small businesses, language differences and other access challenges, and the perception of a lack of potential hazard due to the limited volumes of chemical present in cosmetics. However, community concerns about the impact of this work on the mostly Vietnamese immigrant population occasioned the opportunity to collaborate with a community organization to evaluate nail salon hazards and health effects in the Boston area.

As part of the work of this grant, a community-university collaborative partnership assessed self-reported work-related health effects and environmental factors in Boston's Vietnamese immigrant community via an interviewer-assisted survey. Seventy-one nail technicians responded. Musculoskeletal disorders, skin problems, respiratory irritation and headaches were commonly reported as work-related, as were poor air quality, dusts and offensive odors. The reporting of a work-related respiratory symptom was significantly associated with the reporting of exposure factors such as poorer air quality. Absence of skin disorders was associated with glove use and musculoskeletal symptoms were associated with years worked as a nail technician.

Concern about chemical exposure in salons was expressed by three-quarters of the respondents and use of a surgical mask was almost universal. Nail technicians most often cited a (false) belief that these masks were protective from chemical vapors as the reason for their use.

Additionally, twenty-two Boston area nail salons participated in a rapid assessment of basic air quality metrics. Sixteen of the 22 had no mechanical ventilation of any kind other than table fans and room air cleaners. Average carbon dioxide levels were 894 ppm, exceeding the reference level of 700 ppm (based upon the ASHRAE standard of 25 cfm fresh air per person in beauty salons). Temperatures and humidity levels were within reference guidelines. Potential offensive contaminants are plentiful in nail salons. These results suggest that a majority of nail salons may have inadequate fresh air and may not effectively exhaust contaminated air. Nail salon workers may be at risk of health effects such as headaches and respiratory irritation as a result of these conditions.

Important lessons were gleaned from this community-based study with regard to collaborative research approaches. The most important of these included 1) the mandate to tie assessments of hazards and health effects to education and outreach activities to help improve working conditions and 2) respect the voices and needs of the community representatives.

Further research in this area will benefit from community collaborative approaches. An indoor air quality assessment (rather than a chemical-by-chemical) approach is recommended for further exposure assessment work. Health effects should be clinically evaluated in this population.

Significant Findings

This study of community-based approaches to investigating hazards and health effects related to work in a nail salon produced results in three areas: 1) assessment of hazards and health effects; 2) community-based approaches to occupational health research in immigrant communities; and 3) an investigatory framework and recommendations for further study. The significant findings in each of these three areas are described below.

Health Effects and Exposures Pilot Studies

Vietnamese Community Occupational Health Survey

As part of the work of this grant, a community-university collaborative partnership assessed self-reported work-related health effects and environmental factors in Boston's Vietnamese immigrant community via an interviewer-assisted survey. Seventy-one nail technicians responded. Musculoskeletal disorders, skin problems, respiratory irritation and headaches were commonly reported as work-related, as were poor air quality, dusts and offensive odors. The reporting of a work-related respiratory symptom was significantly associated with the reporting of exposure factors such as poorer air quality. Absence of skin disorders was associated with glove use and musculoskeletal symptoms were associated with years worked as a nail technician.

Nail Salon Air Quality Audit

Twenty-two Boston area nail salons participated in a rapid assessment of basic air quality metrics. Sixteen of the 22 had no mechanical ventilation of any kind other than table fans and room air cleaners. Average carbon dioxide levels were 894 ppm, exceeding the reference level of 700 ppm (based upon the ASHRAE standard of 25 cfm fresh air per person in beauty salons). Temperatures and humidity levels were within reference guidelines. Potential offensive contaminants are plentiful in nail salons. These results suggest that a majority of nail salons may have inadequate fresh air and may not effectively exhaust contaminated air. Nail salon workers may be at risk of health effects such as headaches and respiratory irritation as a result of these conditions.

Community-based Occupational Health Research with Immigrant Communities

The following are lessons I have learned from my over three years of participant observation in this collaborative occupational health project with the Vietnamese community in Boston.

✓ Collaboration with a trusted community organization is essential. The research process should be collaborative and conducted by community members in the language of the community.

✓ Listening to what your community collaborators are saying is essential, even if it seems contradictory to your beliefs. For example, I was told that for various reasons having to do with Vietnamese culture and the process of adapting to life in the U.S., it would be better if "an English-speaking outsider" with qualifications rather than a community member provided information on health to the community.
✓ Your community collaborators (most likely) are not democratically elected representatives of the community. They may or may not be able to fully represent the views of the community. They may not have a complete understanding of issues in the community which may be one of their motivations for collaborative research. They, like you, will have community and office politics, personal biases and limitations, and wishes for professional fulfillment.
✓ It is very important to fully represent your own interests including requirements of grantors, your perception of the scientific community's expectations, the need for promotion of your institution, and your own wishes for professional advancement.
✓ Staff turnover in community organizations is inevitable.
✓ Data collection and investigations must be coupled with interventions and assistance.
✓ Feedback on findings must be provided as soon as possible and to appropriate outlets, especially the community's own newspapers and media.

Translation of Findings

Many of the findings of this study are applicable to public health programs. Indeed this work has already impacted the work of the Boston Public Health Commission and other public health agencies. Other public health workers may adapt the following recommendations for factsheets and outreach programs:

1. Population

Vietnamese immigrants have established the discount nail salon niche. Most beauty salons whose main business are nail services on the east and west coast and in other major centers of Vietnamese migration (Houston, Louisiana), will be owned and staffed by Vietnamese immigrants or refugees. In New York, salons are more likely to be owned and staffed by Korean immigrants. Chinese immigrants may work for other Asian owners. Employer/employee relations may not be formalized. Owners often also perform nail services. Employees may not work for salaries or hourly wages, but have other arrangements. Business operations may or may not be in conformity with regulations and other legal requirements, including taxes, required insurance, licensing, etc. Hours of work may vary, but average hours of work are likely to exceed 45. Vietnamese in this country often do have legal status as refugees. Legal status may distinguish their experience from other new immigrant populations. However, recent Vietnamese immigrants may not have legal status. English language skills are usually very limited for new immigrants. (Additional contextual issues can be understood from this article: M. Chang: Nonprofit reaches out to salon employees Inside Bay Area 2/16/07 http://www.insidebayarea.com/search/ci_5060479 and NYTs) Literacy in Vietnamese can be assumed and Vietnamese media and newspapers are well-used by the community,

especially radio. The legacy of intense chemical exposures in Vietnam due to the U.S.-Vietnam war may play a role in the current generation's health and fears.

2. Health Screening and Access

Vietnamese immigrants have one of the lowest rates of insurance. In Massachusetts, those Vietnamese nail salon workers with insurance are most likely to take advantage of the state-negotiated or provided health insurance plans through MassHealth and will not receive health insurance through their employer. We found that two community health centers in Boston with Vietnamese language interpreters and providers see a large number of Vietnamese patients. There are also independent Vietnamese doctors who see patients for cash and may have knowledge of common health problems in the community and alternative treatments. Health screenings for nail salon workers should include evaluation for reproductive problems, asthma and dermatitis. There is a "methacrylate" allergy battery to assess sensitization. Salon workers are also concerned about working while pregnant and health care providers should be prepared to address this concern.

3. Health Effects

There is a dizzying array of potential health effects that may result from exposures in nail salons. Some of the acute effects resemble "sick-building syndrome" or even a "painter's syndrome" and include headaches, discomfort, concentration problems, respiratory irritation, and general malaise. These symptoms may result from exposure to low levels of solvents in nail products, dust and/or from a lack of fresh air in salons (a build-up of carbon dioxide). Dust may also cause irritation to the eyes and throat. Methacrylate compounds in artificial nail products (including primer) may cause sensitization resulting in asthma and dermatitis. Skin problems are common and may be experienced on the face. Musculoskeletal problems are also very common. Chronic health problems and reproductive problems are possible given the toxicity of nail product ingredients, however, it is not clear if the exposures typical of nail salons could produce such outcomes.

4. Chemical Hazards

Nail products contain toxic ingredients some of which may represent a hazard to workers. Exposure levels are generally low by legal or recommended levels, but they are also typically mixed with other exposures, may occur via the skin as well as inhalation routes of exposure, and may be experienced without adequate general ventilation and over longer than standard hours of work. Acetone, isopropyl alcohol and methacrylate liquid are likely to be stored in bulk and decanted as needed, thus workers are at potential risk of splashes and short term, higher level exposures. Several of the chemicals stored in nail salons are flammable. Methacrylates all have low odor thresholds with strong irritating odors. It is this artificial nail liquid that most likely accounts for the very strong characteristic odor in salons. The strength of this odor does not necessarily correlate with a high concentration of vapor. However, the odor, in itself, may represent a hazard. Table

2 in the Scientific Report describes the main types of nail products and their potential hazards.

5. Physical, Biological, Ergonomic and Social Hazards

Ultraviolet light and vibrating tools are a part of the nail salon work environment. Due to the use of sharp instruments and close contact with customers, blood borne pathogens and other infections are possible. Awkward postures, forceful exertions and repetitive motions are common in nail salon work and may be experienced simultaneously. Giving massages, holding the mechanical filing tool, resting arms or wrists on the edge of the nail table and, most significantly, working with a bent head and neck, all may contribute to chronic pain in the neck, shoulders, hands and wrists. A University of California study found relief for sewing workers when they used a specially-designed chair with a curved seat pan.(1) Because salon workers work in a similar position, this chair may also provide them with relief. (Soma Ergonomics www.go4soma.com) The customized chairs sell for less than $200. Gel-filled wrist rests and stretching exercises may also help.

Figure 1: Stretching exercises from UCSF/Asian Law Caucus Training Project. Contact: Nan Lashuay lashuay@itsa.ucsf.edu

Because nail salons are retail establishments, they are at high risk for violence and examples of violent attacks have been reported. NIOSH's videos on preventing violence in the workplace may be useful to nail salons

http://www.cdc.gov/niosh/docs/video/violence.html.

6. Exposure Assessment

Exposure assessment of specific chemical concentrations in salons is likely to find low exposures when compared to occupational exposure limits or recommendations. Chemical by chemical exposure assessment is not likely to answer questions about the "relevance" of exposures, odors or potential health effects. This is especially the case since exposures are likely to be to mixed multiple chemicals and to chemicals without exposure limits. Occupational exposure limits do not generally address the effects of chemicals with the potential to be absorbed through the skin or cause skin problems, sensitization, reproductive health concerns, or irritation. Thus, an indoor air quality audit approach is recommended. This approach uses a check list and investigation approach to

determine sources of exposure and control and to assess the overall movement of air in and out of a salon. This approach should be augmented by a check list to identify chemicals in the salon that have the potential for serious effects such as adverse reproductive outcomes, cancer and sensitization.

7. Concern about Chemicals and Hazard Communication

The nail salon chemical exposure hazard and risk picture is extremely complex and difficult to understand even for occupational health specialists, thus it can be overwhelming to nail salon owners and workers. Salon owners and workers are concerned about exposure to chemicals in nail salons, however there are several factors that prevent that concern from turning into knowledge and action about potential hazards. In general, they are unlikely to have good information about hazards or to understand such information. MSDSs are not generally available in salons and are not available in Vietnamese. Compliance with the OSHA hazard communication standard is likely very limited. The high rate of mask use is in part in response to concern about chemical hazards, and most mask users assume that the infection control masks are helping to prevent chemical vapor exposure. Many salon workers and owners may be reluctant to better understand hazards if they feel that nothing can realistically be done about them. They also may worry that highlighting hazards and potential problems will scare customers or in other ways compromise business. Thus hazard information should be directly paired with "reality-tested" suggestions for improvements that incorporate these barriers and concerns.

8. Source Reduction

Prevention of hazards through reduction of those hazards at the source is a primary public health strategy. In the case of the nail salon work environment, where exposures are complex, the work environment and work practices difficult to modify and the potentially exposed population (including children) vulnerable, source reduction takes on a new priority. Unfortunately, many alternative safer processes and products that meet technical demands are not readily available. Some alternative products do exist, but have not been thoroughly evaluated (see http://www.honeybeegardens.com/ for one "water-based" nail polish). "Odor-free" acrylics are available and are less volatile than traditional ethyl methacrylate. A comparison of methacrylates is included in the Appendix. Consumer, health and environmental activists have persuaded some product makers, including OPI, a market leader in nail products, to reduce the hazards of their standard products through reformulation. The California Safe Cosmetics Act of 2005 which requires labeling of cosmetics if they contain carcinogens or reproductive toxins and the European chemicals policies restricting certain chemicals in cosmetics have also spurred reformulation by nail products makers. The latest on these efforts (or to join them) can be found at www.safecosmetics.org. Green chemistry initiatives have a role to play in creating safer alternative nail products.

9. Ventilation

The lack of appropriate ventilation in nail salons is widespread. Salons need both adequate general ventilation and local exhaust ventilation that can divert contaminants at the point of generation. General ventilation consists of two components: provision of fresh air and extraction of contaminated air. The professional consensus recommendation for fresh air in salons is 25 cubic feet per minute per person (of maximum occupancy) mechanically provided (ASHRAE).(2) A passive exhaust system may not be appropriate to salons because they are often located adjacent to other occupied spaces. Nail salons should not re-circulate air nor should they share systems with other building occupants. Many salons use common bathroom or kitchen exhaust fans to extract salon air. These may be helpful, but a system engineered by a professional ventilation expert is preferred. Systems should not be temperature-dependent but should operate year-round to consistently provide fresh conditioned air. Window air conditioners are common in salons as are fans and open doors and windows. Air conditioners may be run year-round on the fan setting in order to bring in fresh air to spaces without HVAC systems.

Many salons use room air cleaners – some ionic, some HEPA, some with HEPA and activated carbon. Their effectiveness is not clear. Ion generating air cleaners can produce ozone which is a potent respiratory irritant. The use of plants in salons, particularly spider plants with activated carbon in the soil, may contribute to healthier indoor air.

Specific local exhaust ventilation has been proposed for nail salons by NIOSH. (See Hazard Controls: Controlling Chemical Hazards During the Application of Artificial Fingernails http://www.cdc.gov/niosh/hc28.html). The design proposed by NIOSH gives owners directions how to build their own systems and to modify their existing nail tables. In the NIOSH design, a down-draft system is connected to a dedicated exhaust to the outside of the shop. Such systems are not common in nail salons, though some may use "off-the-shelf" down-draft tables with carbon filters that re-circulate to the shop. Because of maintenance challenges NIOSH does not recommend re-circulating air tables. Down-draft tables, regardless of exhaust location, may present a challenge to nail salon work. The Illinois Department of Public Health found that such tables were not used correctly or effectively. Additionally, the function of these tables may be compromised in spaces without make up air or with other air moving equipment such as window air conditioners.

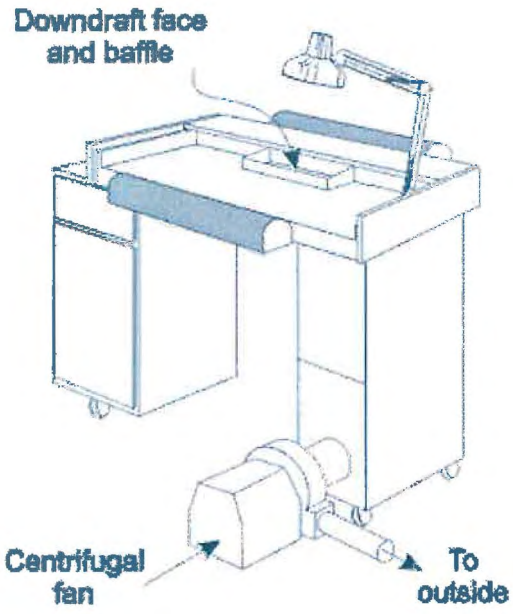

Figure 2: NIOSH Vented Nail Table

Nail dust can be extracted at the source with a vacuum shrouded mechanical nail file. The Jan L Inc. company builds and markets the Model 100 A Nail Dust Extractor with Sheath

to podiatrists. http://www.janlinc.com/ This is essentially a vacuum attachment for the standard Dremel file already in use in nail salons. When the drill is plugged into the vacuum it will automatically turn on when the drill is in use. It can also be used with battery-operated drills and, itself, comes in a battery-operated version. The printed cost is $500 per vacuum. This system would not address dust generated by the more common manual filing.

Figure 3a and 3b: Jan L Inc. Model 100A Sheathed Nail Drill

10. Personal Protective Equipment

Figure 4: N95 with Odor Control

Use of surgical masks is ubiquitous in nail salons. Nail techs wear them for two distinct reasons: 1) protection from chemicals, dust and bad odors and 2) to be polite or promote an image of hygiene. These masks are not appropriate for the prevention of exposure to chemicals, dusts, etc. If respiratory protection is perceived to be necessary, nail techs may use a NIOSH-approved N95 dust mask with odor control (Figure 4). These masks have a thin layer of activated carbon for a limited ability to prevent the inhalation of chemical vapors. However, the use of any mask may promote or antagonize skin irritation as many nail techs report persistent rashes on their faces. For that reason, mask use may not be recommended except for use during filing with an unvented mechanical file.

Latex gloves are also used in nail salons. While these may provide some protection from infectious agents, they do not offer protection from chemicals. Butyl rubber gloves should be used when decanting chemicals such as acetone, isopropyl alcohol or ethyl

methacrylate. Less expensive, disposable nitrile gloves may be used by those concerned about skin absorption or contact with chemicals during nail procedures. As with masks, gloves can promote or antagonize chronic skin problems, so gloves must be used with caution. Frequent hand washing can also promote or irritate skin problems. Alcohol-based rubs may be a better alternative and are accepted practice in health-care settings for infection control.

11. Work Practice Controls

Work practices should minimize the volatilization of chemicals into salon air and minimize skin contact with chemicals. Work practice and housekeeping strategies to minimize exposure include: keep covers, lids, and tops on nail products; use containers with very small openings and secure closures for decanted products; and dispose of solvent-soaked gauze in zip-lock bags or closed garbage cans.

Outcomes/Relevance/Impact

This study found that nail salons are potentially dangerous places to work. Workers face a complete lack of adequate and appropriate health and safety infrastructure in their workplaces and a multitude of health and safety hazards. Top among these are chemical hazards from exposure to sensitizers and solvent mixtures. Although these are experienced at low levels compared to industrial settings, in the context of an indoor environment with inadequate ventilation, the exposures are significant. This finding is supported by our survey of nail technicians reporting an array of symptoms related to these exposures including respiratory effects, headaches and skin problems. Additionally, musculoskeletal symptoms were widely reported as were exposures to awkward postures and other ergonomic risk factors. The assessment of the lack of appropriate ventilation is based upon the results of our community-based survey and our audit of 24 Boston-area nail salons.

Because of economic, cultural and linguistic challenges, significant improvements are unlikely to flow from salon-by-salon educational interventions. Our study of the work environment and socioeconomic context of nail salons points to the necessity for industry-wide interventions that reform the regulatory framework and the equipment and the materials used in salons. Regulatory interventions should create a level playing field of requirements and be aware of the socioeconomic context of salons: a largely non-English speaking immigrant workforce and ownership; informal and potentially "sweatshop-type" employment conditions; highly competitive and fragile economic environment; salons as tenants not building owners; salon supplies dictated by customer preferences and the beauty products industry; and a lack of access to traditional business support.

For the health of both salon workers and customers, nail products must be reformulated to reduce their toxicity, volatility, odor and other hazard potential. Because they are perceived as consumer beauty products there has been inadequate attention to the composition of nail products and their potential impact on workers using them day in and out. Green chemistry initiatives should be supported and pressure placed on

manufacturers to eliminate specific potentially hazardous chemicals from their products. These exposures can be prevented at the source and, in general, will only be prevented effectively at the source.

Salon equipment has been designed to appeal to the aesthetic preferences of customers and not the needs of salon workers. Since long hours and awkward postures are endemic, standard salon equipment including chairs should be redesigned to lessen musculoskeletal strain. Salons should be ventilated with an appropriate and efficient system that can exhaust contaminated air and bring in fresh air. This system could be complemented by a local exhaust system for dust collection such as a shrouded vented mechanical nail drill.

The expanded use of personal protective equipment, especially chemically-resistant gloves, could, in the short-term, mitigate some exposures. However, the widespread use of infection control masks should be discouraged since nail techs generally (falsely) perceive them as protective against chemical exposure and because they may be exacerbating skin problems. Until dust collection systems and hazard reduction has taken place, nail technicians may wish to use N95 dust masks with odor control carbon impregnation and abide by good work practices. Further assessment of health effects through clinical evaluations and biological assessment of exposure and effect will help to improve understanding of the impact of this work environment and will be responsive to nail technician's own concerns, particularly about the impact of their exposures on their reproductive health.

The complex context of the nail salon work environment represents a clear challenge to traditional approaches to the problems of worker health and safety. Working with immigrant community and economic development organizations may help in addressing some of these challenges, particularly those related to culturally and linguistically appropriate outreach efforts. However, the primary challenge of how to promote prevention at the source on an industry-wide level will require a coordinated national effort of many stakeholders.

Scientific Report

Background

The nail salon industry has experienced phenomenal growth in the past 15 years. As shown in Table 1, since 1991 the number of registered manicurists has increased by 234% in the U.S. as a whole, and by 428% in Massachusetts. Boards of Cosmetology report over 380,000 licensed manicurists in the U.S. and over 11,700 in Massachusetts. There are indications, however, that the industry growth has peaked and that changing fashions and spending priorities has lead to a recent contraction in the market for salon services.(3) Salon owners cite intense competition as a force behind lower prices and lower receipts.(4)

Table 1: Nail Salons and Technicians in Massachusetts and the United States

	Nail Salons			Nail Technicians		
State	**1991**	**2005**	**Growth**	**1991**	**2005**	**Growth**
Massachusetts	290	1,485	412%	2,219	11,708	428%
U.S. TOTAL	26,752	57.838	116%	113,934	380,635	234%

Source: Nails Factbook(5).

Asian immigrant women, particularly Vietnamese immigrants, are the force behind this tremendous growth. They have opened salons and made regular professional nail salon services an "affordable luxury," thereby building an economic niche.(6) While more formal figures are not available, the editor of *Nails Magazine*, the major trade journal associated with the nails industry, has estimated that 38% of the nation's manicurists are of Vietnamese decent.(5) Authors of an economic analysis of the industry estimate that almost 60% of manicurists in California are Vietnamese.(6) A search of the Massachusetts Board of Cosmetology's listing of licensed manicurists in Boston found that approximately 50% had probable Vietnamese surnames. Community networks, a common language, ease of entry into the profession and family connections are the likely reasons for the attraction of Vietnamese to this work. Nail salons are so much a part of the Vietnamese immigrant experience that a Vietnamese-American theater company has produced a play titled "Stories from a Nail Salon" (7). In New York City Korean and Chinese immigrants play a major role in owning and staffing salons.(8)

The industry has several active local, national, and international industry associations of salons, individual nail technicians, schools and product and equipment suppliers. The website of a major trade journal, *Nails Magazine*, lists 25 associations including the principal ones, i.e., the American Beauty Association and its subsidiary, the Nail Manufacturers Council (see www.nailsmag.com). The industry publishes the annual Nails Fact Book, sponsors conferences and contests, keeps members abreast of market and regulatory trends, and provides support to local networks, such as the New England Nail Technician Association (NENTA). There are many informative websites devoted to nails such as NENTA's at www.nenta.com and ones of national interest such as www.beautytech.com.

In 2007 Time Magazine named nail salon work one of the top three worst jobs in America—primarily due to the chronic exposure to chemicals used in nail products.(9) The case of nail salon workers provides a clear example of how special populations – in this case Vietnamese immigrants – may be disproportionately exposed to hazards. A *Los Angeles Times* article quoted a nail products manufacturer, herself Vietnamese-American, as saying "The Vietnamese technicians don't have that much technical knowledge. They use whatever product is available and, since they are in the lower-end salons, they try to get the cheapest product they can to accommodate the prices they charge."(10) Cheaper substitute products include methyl methacrylate (MMA) which has been restricted by the U.S. Food and Drug Administration and banned by several states because of reported health hazardous associated with its use.

Industry surveys have reported that 96% of salon technicians are women.(5) While the promise of good wages attracts women to this field, according to Bureau of Labor Statistics, the mean annual wage for manicurists is $21,280.(11) A *Nails Magazine* survey found an average weekly wage of $620 or $32,240. Nail technicians most often work in small businesses with fewer than five nail technicians per salon. Nail technicians are often not formal employees, but rather are hired as independent contractors and/or as booth renters. These factors tend to put these workers beyond the protective reach of labor regulations and union membership. Salon workers may feel they have relatively little power to affect change in their workplaces, and cultural values may prevent women and younger workers from challenging their employers to improve conditions.(12, 13) Additionally, immigrant workers often lack health insurance; the uninsurance rate is 27% among Vietnamese immigrants.(14)

Characteristics of the Nail Industry, the MMA Controversy and the Artificial Nail Process

In recent years, the nails industry at the national and local levels launched a major campaign against the use of methyl methacrylate (MMA) in artificial nails (see the extensive resources at http://www.beautytech.com/articles/#GMMA). MMA, a dental acrylic, was the chemical ingredient first used to make artificial nails. In the early 1970's MMA was linked to several serious health hazards including asthma, dermatitis, and more importantly for the industry, painful damage to clients' nails, dubbed "the ring of fire." The FDA won restrictions on the use of 100% MMA in consumer products but was not able to ban the chemical as a partial ingredient. Several states, including Massachusetts, have taken the step of including bans on the use of MMA in their salon regulations. The effectiveness of these bans is not known, nor is the extent of MMA use, although it is estimated by the industry to be considerable.

After the restrictions on MMA and growing public awareness of the hazards associated with artificial nails, the industry initiated an effort to protect the substitute for MMA – ethyl methacrylate (EMA). It has done this by attacking MMA as the bad actor, and promoting EMA as the safe alternative. However, as is discussed below, toxicologists believe that EMA is toxicologically similar to MMA. Additionally, MMA has been found in trace amounts in EMA-based products.(15) The campaign includes advertising against MMA, provision of "No MMA" graphics for salons, the availability

of MMA testing kits that clients may use to check the chemicals used in their salons, and calls for clients to report MMA-users to state Boards of Cosmetology. One such "consumer alert" on the BeautyTech website stated that "All of the traditional acrylic liquids that are available through main stream sources contain EMA Ethyl Methacrylate, which is free of the hazards associated with MMA." However, the Methacrylate Producers Association has published a statement on their website saying that no methacylates, including EMA and methacrylic acid, also widely used in nail primers, should be used in cosmetics due to their potentially hazardous effects. (See http://www.mpausa.org/mpapos.htm) Additionally, nail industry information on MMA consistently (falsely) reports that MMA is banned by the FDA. The motivation for this campaign is not completely health-related: MMA sells for as much 1/6th the price of EMA per gallon, and it has been suggested that the discount Asian salons undersell "legitimate" salons by using the restricted chemical.(10)

Many nail products manufacturers have added "odorless products" to their lines of artificial nail preparations. As seen in the Methacrylate Comparisons chart in the Appendix, odorless products are within the same methacrylate family, but contain higher-molecular weight compounds which makes them less volatile. The toxicity of these higher-molecular weight compounds appears to be greater than that of ethyl methacrylate, however their lower volatility would reduce the potential for inhalation. If the primary or a significant route of exposure is via the skin, including for sensitization, then these products might be of significant concern. "Gels" are also ethyl methacrylate.

While standard manicure services (cleaning, shaping and coloring finger and toe nails) are the staple of the nail salon business, artificial nail services have gained tremendous popularity. Artificial nails are applied in two principal ways. (See Figure 5).

Sculptured Nail Process Diagram

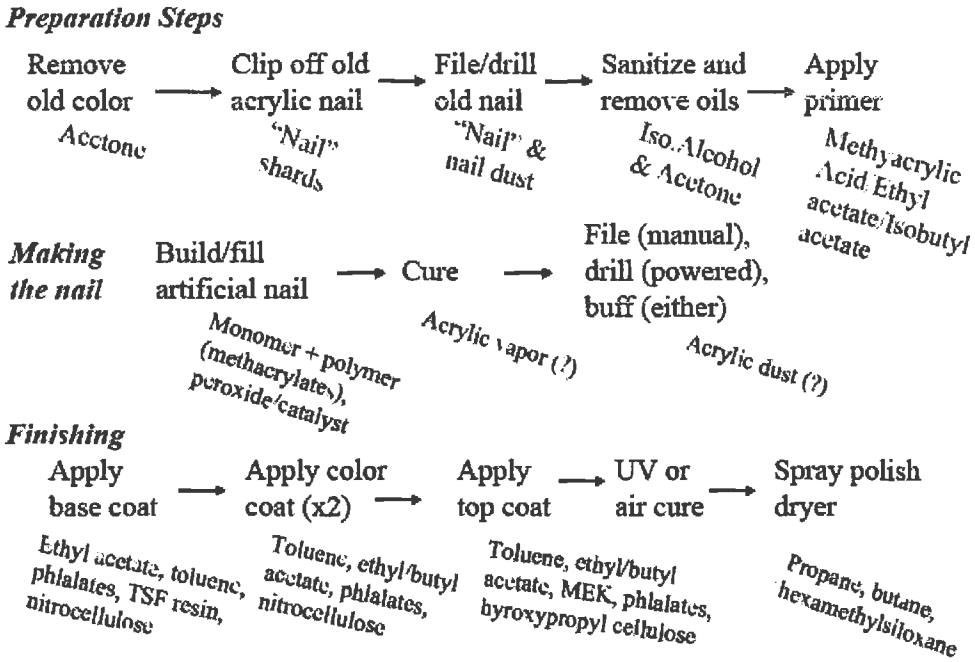

Figure 5: Sculptured Nail Process Diagram

In the first, an artificial or "sculptured" nail is built up by applying layers of acrylic polymer (principally EMA) over the client's natural nail. The artificial nail is formed as the nail technician dips her brush first in liquid monomer and then the powered polymer which contains a peroxide activator and applies this mix over a nail form. In the second method, a pre-formed nail tip is attached to the client's nail via an ethyl cyanoacrylate-based glue. In both cases, the nail is first prepared by removing nail polish, filing the nails, sanitizing, dehydrating with solvent (often methyl ethyl ketone) and then priming with methylacrylic acid to promote adhesion. After the artificial nails have hardened, they are filed and buffed into shape and nail color coats are applied. Following the initial application of the artificial nails, clients must return to the salon for bi-monthly maintenance or "fill-ins" where the EMA monomer-polymer mix is applied to the base of the nail and additional color is applied.

The Regulatory Environment

Nail salons and employees who are formal salon employees are covered by the Occupational Safety and Health Act. Given that salons frequently employ fewer than five workers, many of whom may be "self-employed," nail salons are unlikely to see OSHA inspectors as part of planned inspections. OSHA reports statistics by SIC Code and nail salons fall in SIC 7231 "Beauty Shops" which also covers hair salons. A detailed look at the inspections in this SIC revealed that there were 26 inspections by federal OSHA of salons with the word "nail" in the name in each of 2001 and 2000 (Integrated Management Information System data available at www.osha.gov). For 2001, all but two inspections were generated by complaint or referral (most likely the result of a complaint to another agency). In 2001 only 10 of the 26 salons were cited for any standard violation; in all but one case the salons were cited only for violation of the Hazard Communication standard (the other was also cited for Blood Borne Pathogens and Personal Protective Equipment). Only three Massachusetts nails salons saw an OSHA inspector from 1985-2002.

As shown in Table 2 several of the chemicals found in salon products have OSHA permissible exposure limits (PELs). There are no PELs for three of the most common hazardous chemicals used in salons: ethyl methacrylate, ethyl cyanoacrylate and methylacrylic acid.

Table 2: Nail Products: Chemical Ingredients, Exposure Standards and Potential Health Effects

Nail Products	Common Chemical Ingredients	OSHA PEL /[TLV if lower] (ppm)	Potential Health Effects
Nail Polish (Basecoat, Colors, and Topcoats) ***Includes: Pigments, Resins, Solvents, Plasticizers, Dispersants, and UV Stabilizers***	Ethyl acetate	400	Irritation eyes, skin, nose, throat; dermatitis
	Butyl acetate	150	Irritation eyes, skin, upper respiratory system; headache,
	Ethyl alcohol	1000	Irritation eyes, skin, nose; headache, CNS syndrome; cough; liver damage; anemia; reproductive effects
	Isopropyl alcohol	400	Irritation eyes, nose, throat; CNS syndrome, headache; dry, cracking skin
	Acetone	1000 [250]	Irritation eyes, nose, throat; headache; CNS syndrome; dermatitis
	Methyl ethyl ketone	200	Irritation eyes, nose, throat; headache; CNS syndrome; dermatitis
	Toluene	200 [50]	Irritation eyes, nose, throat; headache; CNS syndrome; dermatitis; dilated pupils, lacrimation; anxiety, muscle fatigue, insomnia; paresthesia; liver, kidney damage;
	Xylene	100	Irritation eyes, nose, throat; headache; CNS syndrome; corneal damage; dermatitis; reproductive effects
	Dibutyl phthalate	5 mg/m^3	Irritation eyes, upper respiratory system, stomach; reproductive effects (fetotoxic)
	Nitrocellulose	None [400]	Unknown
	Toluene Sulfonamide Formaldehyde Resin	None	Dermatitis
	Titanium dioxide	10 mg/m^3	Lung fibrosis; potential occupational carcinogen
Nail polish removers	Acetone	1000 [250]	see above
	Ethyl acetate	400	see above
	Butyl Acetate	150	see above
Artificial Nails ***Includes: acrylic polymers, hardeners, primers, dehydrators***	Ethyl methacrylate	None	Irritation eyes, skin, nose, throat; allergic contact dermatitis; asthma
	Methyl methacrylate	100 [50]	Irritation eyes, skin, nose, throat; allergic contact dermatitis; asthma
	Butyl methacrylate	None	Irritation eyes, skin, nose, throat; allergic contact dermatitis; asthma
	Methacrylic acid	None [20]	Irritation eyes, skin, mucous membrane; eye, skin burns
	Methyl ethyl ketone	200	see above
Nail Tips Adhesives	Ethyl cyanoacrylate	None [0.2]	Irritation eyes, skin, nose, throat; allergic contact dermatitis; asthma
Artificial Nail Removers	Acetone	1000 [250]	see above
	N-methyl pyrrolidone	None	Dermatitis, reproductive effects
	Acetonitrile	40 [20]	Irritation nose, throat; asphyxia; nausea, vomiting; chest pain; CNS syndrome; convulsions; in animals: liver, kidney damage
Disinfectants (regulated by EPA)	Formalin (formaldehyde)	0.75	Irritation eyes, nose, throat, respiratory system; lacrimation; cough; wheezing; dermatitis; potential occupational carcinogen
	Isopropyl alcohol	400	see above
	Bleach (sodium hypochlorite)	None	Irritation eyes, nose, throat, respiratory system; skin sensitizer
	Hospital grade disinfectants	n/a	Allergens

Source:(16) ACGIH, 2002 TLVs® and BEIs®; NIOSH Pocket Guide to Chemical Hazards; numerous nail products MSDS available at www.siri.org

In addition to the problem of no or out-dated PELs, OSHA chemical regulation appears potentially inadequate in its application to the nail salon environment for three reasons: 1) workers encounter simultaneous mixed chemical exposures with similar target organs, 2) many chemicals are absorbed through the skin or cause skin damage, and 3) several chemicals may cause respiratory and skin sensitization that results in health effects at low levels of exposure. Additionally, salon workers are potentially exposed to reactive chemicals and chemicals that are present in vapor and particle form. This complex exposure pattern is little understood, not easily measured, and difficult to consider in the setting of exposure limits.

The U.S. Food and Drug Administration has limited power to regulate cosmetics. They cannot require safety testing and may only intervene (by taking legal action) after products have been released to the market and found to be harmful. The FDA banned the use methylene chloride in consumer products, and has taken steps to severely restrict the use of MMA after receiving complaints about fingernail damage following its use.(17)

In Massachusetts there are few regulations to protect salon workers from health hazards. The Massachusetts Board of Cosmetology licenses nail technicians and salons and inspects nail salons (240 CMR 200-4.00: M.G.L.). In Massachusetts, a person may receive a license provided he or she has successfully completed a month-long, 100 hour course in manicuring in a school approved by the Board and achieves a passing score on a Board-approved exam. The Board-approved curriculum includes safety and hygiene as topics. Cosmetology schools and vocational high schools are the primary vehicles for nail technician training.

Nail salons must also be licensed. Licenses are granted following an inspection by the Board. In addition to having approved plumbing and electrical wiring, "Every salon shall be equipped with proper and adequate lighting and ventilation and kept in clean, orderly and sanitary condition." The regulations do not define "adequate ventilation." However, Massachusetts building codes require the ASHRAE recommendation of 25 cfm of mechanically-provided fresh air per person in beauty salons (780 CMR 1209.0).

Table 3: Selected States Board of Cosmetology Requirements

	MA	RI	CT	NH	VT	ME	NY
School Hrs	100	300	None[a]	300	400[b]	200[c]	250
CEU*	None	None	N/A	None	None	None	None
Salons/inspector	402[d]	167	N/A	94	10	60	85
Vent. Req in salon licensing	Yes	No[e]	N/A	Yes	Yes	Yes	Yes[f]
MMA restricted	Yes	No	No	Yes	Yes	Yes	Yes

a Manicuring is not regulated in Connecticut, though legislation is in legislative committees. No license required for manicure, but cosmetician license (1,500 hrs) for pedicures.
b or an 8 month apprenticeship
c or 400 apprenticeship hours.
d based on 3 inspectors, 1,206 salons
*Continuing education credits are required in Florida (16 hours/per renewal period), Georgia (5), Illinois (10), Indiana (16), Iowa (8), Kentucky (6), Nebraska (8), Ohio (8) and South Carolina (6)
e Rhode Island makes reference to state Building Code requirements which may require ventilation
f New York says that only chemical mixing areas and eating areas must have ventilation.

As in other states, most Massachusetts Cosmetology Board regulations relate to the protection of clients. For example, salon workers are required to wash their hands between clients and use sanitized containers, towels and tools. Explicit directions for

sanitization are included in the regulations and include the choice of placing tools in boiling water, under ultraviolet light, in hospital grade disinfectants, in alcohol, in bleach or 10% formalin. Salons are periodically inspected by Board of Cosmetology inspectors who are primarily looking for licenses and sanitary conditions. In Massachusetts, there are only three sanitary inspectors for the state and the rate of inspection is low. Recent news reports have alerted the public that licensee violations generally go un- or under punished due to the backlog of cases.(18) Massachusetts nail salons can also be inspected by local Boards of Health officers and by the Commonwealth's Division of Occupational Safety Indoor Air Division (MADOS). These inspections are triggered by complaint by customers or neighboring businesses or residents. The visits are largely investigatory and informational as there are no regulations that either agency has the power to enforce. Because nail salons store flammable and explosive chemicals, fire marshals may also inspect to assure compliance with fire safety and hazardous material storage regulations.

To summarize, despite the use of hazardous chemicals, nail salons may be flying under the regulatory radar screen due to a lack of relevant regulation, low enforcement of existing standards, prioritization of consumer health over worker health, and the structure of employment in these very small businesses. This regulatory environment may be inadequate to protect nail salon workers. Indeed, some Massachusetts health inspectors have called for increased regulation of salons at the state level.(19)

Exposures and Health Effects

From solvents to silica, the list of hazardous chemicals used in nail salon products in is daunting. Every day, salon workers potentially are exposed to a variety of solvents, acrylates, and disinfectants. Although these products are intended for beauty and health, many of them appear similar in composition to solvent-based paints and other coatings.(20) Salon workers face potential chemical hazards in dust, liquid and vapor form. For example, in the filing and shaping of nails, salon workers face exposure to nail dust and/or nail dust combined with nail products such as coatings, adhesives and EMA acrylics. A report of asthma in six nail salon workers in Colorado in 1990 prompted a NIOSH investigation of ways of controlling exposure to acrylics which have been identified as sensitizers by the Association of Occupational and Environmental Clinics.(15)

Exposure levels to salon chemicals have been characterized as low and below occupational exposure standards.(15, 20) However, these investigators also found health effects reported by salon technicians at levels below occupational exposure standards and, therefore, recommended exposure control strategies and further investigation. Additionally, a recent survey conducted by Vietnamese community health workers in Massachusetts of 55 nail salon employees found notable reporting of health effect symptoms (see Table 4).

Table 4: Springfield, MA Area Salon Workers and Owners Health Concerns
(n=55, multiple reports for each condition for each individual are possible)

Skin	Rash	Dry	Itchy	Flaking/ Scaly
	10	1	6	4
Eyes	Red	Watery		
	10	5		
Breathing	Heavy	Asthma		
	10	7		
Nose	Bleeding	Runny	Itchy	
	10	5	8	

Source: Vietnamese Health Project 2002

The presence of sensitizing agents in salon chemicals that can stimulate an immunological response – dermatitis or asthma – at low doses is of clear concern. The principal ingredients of artificial nails, EMA and MMA, have been determined to be a sensitizing agents.(21) Once sensitized, workers (or clients) are likely to experience cross-reactions with other acrylics.(22)(23) In addition to chemical hazards, nail salon workers face occupational health and injury risks related to blood borne pathogens and other infections, musculoskeletal injury, fire and explosion, unguarded machinery, UV light exposure, and violence.

Table 2 shows some of the main health effects associated with common ingredients in nail salon products. Almost cvery major organ system potentially is affected by these chemicals following acute or chronic exposures. Although the medical literature clearly identifies occupational exposure to acrylic compounds with allergic contact dermatitis and asthma, the link with nail salon workers is based primarily on case reports.(24) The epidemiology finding these occupational illnesses and symptoms in nail technicians is limited: Hiipakka and Samimi's symptom survey of 20 nail technicians and controls found greater prevalence of respiratory irritation in nail technicians(20); LoSasso et al. found neurological deficits in a study of 150 nail technicians versus controls(25, 26); and John et al. found that manicurists and nail sculptors were at increased risk of spontaneous abortion.(27)

Health effects have been documented in other workers, such as dental technicians, who work with the same chemicals that are used in nail products. Skin and respiratory sensitization has been documented in dental personnel exposed to EMA.(28-31)

Case reports linking dermatological problems to salon client's non-occupational exposure to salon chemicals are present in the literature and these reports are what led to the restrictions on MMA.(17, 32)

The main classes of potential occupational health effects related to nail salon exposures are dermatological, respiratory, neurological and reproductive. The epidemiological and toxicological studies in each of these classes are summarized below:

Dermatological: Several ingredients found in salon products have been linked to allergic contact dermatitis including formaldehyde, toluenesulfonamide formaldehyde resin, methyl and ethyl methacrylate, ethyl cyanoacrylate, and dibutyl phthalate.(33-36) Other skin hazards include methacrylic acid burns(37, 38) and acrylate-related nail dystrophy and eczema(39); onycholysis (separation of the nail from the nail bed)(40); and

eye injury.(41, 42) Skin and eye irritation are also health effects of EMA, MMA, and several solvents used in nail products.

Artificial fingernails harbor more bacteria and are more difficult to clean than natural nails and hospital infection control personnel have called for restrictions on their use in healthcare settings.(43-45)

Respiratory: Numerous case reports have identified acrylic compounds, including EMA, MMA and ethyl cyanocrylate, as sensitizers capable of initiating occupational asthma and other respiratory effects.(29, 46-48) Finnish investigators found increased prevalence of respiratory hypersensivity in dental personnel exposed to methacrylates.(30) An epidemiologic study did not find a higher proportion of workers with reduced pulmonary function in those exposed to cyanoacrylic adhesives at "low" levels (less than 0.5 ppm on average) than in unexposed controls.(49) Several nail product chemicals can cause irritation to the respiratory tract (see Table 2). Exposure to human nail dust may cause irritation and even allergy.(50, 51) Salon technicians may use disinfectants and latex gloves to protect against transmission of infection; these products are recognized to be potential allergens.(24)

Neurological: LoSasso and colleagues investigated cognitive and neurological symptoms in nail technicians.(25, 26) In the first study, 150 nail technicians' self-reported neuropsychological and psychological symptoms were compared to those of controls. Nail technicians statistically were more likely to report more severe symptoms and a greater frequency of symptoms (cognitive efficiency, memory and learning) than controls. In the second study, investigators administered batteries of psychologic, neuropsychological and neurosensory tests to approximately 35 nail technicians and controls. They found that nail technicians performed at lower levels than controls on tests of attention and processing speed and that olfaction was below normal levels. In both studies, the investigators regressed individual scores against self reports of exposure factors including length of time worked as a nail technician, workplace size and ventilation and found that severity of symptoms was associated with "occupational exposure." The authors concluded that "exposure to low-level neurotoxicants common to nail studios may result in mild cognitive and neurosensory changes similar to those observed among solvent-exposed workers in other settings."

A rat study found neurological impairments in animals exposed to ethyl methacrylate.(52)

Reproductive: In a study of spontaneous abortions in cosmetologists, John and Savitz found that work in salons providing manicuring was associated with increased risk, (OR = 1.5, 95% CI 0.8-2.4) as was "nail sculpturing" (OR = 1.9, 95% CI 1.0-3.9).(27) A study in rats found that ethyl methacrylate (EMA), the principal ingredient of artificial nails, was embryotoxic and teratongeic, although a more recent study did not find developmental toxicity in rats exposed to four methyacrylates.(53)

Dibutyl phthalate (DBP), a common plasticizer in nail polishes, has been found to be a reproductive and developmental toxicant in laboratory animals, particularly affecting the male offspring of exposed females (see for example Schultz 2001(54)) An environmental group's search of nail products available from an on-line drug store found DBP in 37 nail products from 22 companies.(55) While the routes of human exposure to DBP are not clear, National Center for Environmental Health researchers have found that not only are DBP metabolites common in human urine, women of reproductive age (20-

40 years) have significantly higher levels of the metabolite than men and other age groups.(56) A NIOSH-sponsored consensus workshop has prioritized study of DBP.(57) Limited epidemiological and toxicological studies have suggested that several of the individual solvents and mixed solvents used in nail products may pose reproductive hazards in both men and women,(58) particularly toluene and xylene.(59, 60)

Exposure Assessment

There are few studies of the occupational chemical exposures of nail salon technicians. None of these is comprehensive and extensive. There are three articles in the peer-reviewed literature;(20, 61, 62) four NIOSH Hazard Evaluation and Technical Assistance report summaries;(63-66) and an unpublished report by the Illinois Department of Public Health.(67) Of the non-HETA studies, EMA in vapor form was sampled for in two studies, solvents in one, and respirable and total dusts in two. In all cases, the investigators concluded that exposure concentrations were well below standards, but that due to the potential irritating properties of nail salon chemicals, ventilation by mechanical or natural means should be improved. The four main studies are discussed below.

Froines and Garabrant measured manicurists' breathing zone exposure to mixed methacrylates in eight nail salons in southern California via three methods: passive dosimeter, charcoal tubes, and an infrared real-time monitor. The results are reproduced below:

Table 5: MMA and EMA Exposures of Manicurists in Eight Salons

	# of Samples	Mean Exposure: Period of Application (ppm)	# of Samples	Mean Exposure 8-hrTWA (ppm)
MMA	25	20.3	59	5.3
EMA	15	13.4	32	7.3

Source: Froines 1986(61)

While they found low exposures relative to occupational exposure standards, the authors noted that the literature contains reports of symptoms associated with these levels of exposure and they recommended further study.

Hiipakka and Samimi collected personal air samples of both polymethacrylate total and respirable dusts and organic vapors in six salons. At total of 17 samples were taken (one day of sampling; 17 technicians) for each of toluene, isopropyl alcohol, butyl acetate and EMA. 16 samples of respirable and total dust were collected. All samples were far below exposure standards. Table 6 summarizes their findings:

Table 6: Exposure Assessment for Vapors and Dusts in 6 Salons

Chemical	Mean TWA Concentration
Toluene	0.8 ppm
Isopropyl Alcohol	15.6 ppm
Butyl Acetate	0.4 ppm
Ethyl Methacrylate	4.5 ppm
Dusts	
Respirable	0.9 mg/m^3
Total	1.4 mg/m^3

Source: Hiipakka 1987(20)

In 1990 three asthma cases reported in manicurists lead to an in-depth investigation of nail salon exposures and controls by NIOSH.(15) At a Cincinnati cosmetology school, investigators collected EMA and MMA vapors in personal breathing zone samples of nail technicians working at vented downdraft and unvented tables. The NIOSH investigators modified the commercially-available downdraft tables by increasing the fan size and air volume (from 62 to 235 cfm), enlarging the plenum to improve air flow consistency, removing the charcoal filters and exhausting the system out of doors, and moving the work surface closer to the inlet area. Over three full days of sampling each configuration, a total of 18 samples were collected. The geometric mean of the acrylate samples from a day of manicuring on the unvented tables was 9.4 ppm versus 0.7 ppm for the vented tables.

In Illinois, a customer referral to the Department of Public Health led to the discovery that the acrylic polymer powder used to make artificial nails contained between 1-10% amorphous and crystalline silica.(67) Because of concerns about possible silica exposure, the Department staff conducted a study of dust exposures in five nail salons. The sanding of artificial nails to shape the cured acrylic is performed in three major ways: with dental tools using metal bits (burrs); in motorized sanding drums; and hand filing. Both mechanical methods appeared to propel dust into the technician's breathing zone. The dust was suspected to be a mix of acrylics, fiberglass and silica flour (both amorphous and crystalline). The investigators observed visible dust on customer, technician and table. The results of sampling via NIOSH Analytical Method 7500 for crystalline silica are reported below in Table 7. (There was no measurable silica in these samples.)

Table 7: Illinois Nail Technicians' TWA Mixed Acrylic Dust Exposure

Table	Filing Method	# OF SAMPLES (n=10)	Avg Total Dust µ/m^3
Unvented	Hand	1	150
Unvented	Motorized sanding drum	3	280
Down Draft	Dental tool with burrs	6	243

Source: Maxfield 1997(67)

In summary, the exposure assessment data that are available suggest that workers are generally not exposed to chemicals at levels above exposure standards where they exist. However, these studies do document exposure, including to sensitizing chemicals. Generally, these studies reported only a few exposure measures of only a few chemicals. They used a variety of sampling methods and none reported comprehensive findings that include assessment of mixed exposures and exposures in mixed dust and vapor form. In most cases, the authors concluded that protective measures and further study were necessary.

A study of formaldehyde emission rates by the California Air Resources Board found that nail hardener and nail polish both emitted formaldehyde in chamber tests. The maximal formaldehyde concentrations for nail hardener was 295 µg/m^3 and for nail polish it was 24.5 µg/m^3 leading the authors to conclude that these products had "relatively high emission rates" compared to other consumer products.(68)

Prevention and Control

In their study of a Cincinnati cosmetology school, NIOSH investigators noted the ineffectiveness of commercially available re-circulating downdraft salon tables. Leaks, maintenance requirements, and inadequate and uneven airflow led to the modifications to the table as described above. A description of the modified table was published in the industrial hygiene literature, in nail industry journals and in a NIOSH Hazard Controls factsheet.(69-72).

Other investigators also described inadequacies in control and prevention strategies in nail salons. The Illinois Department of Public Health found that the principal method of mechanical ventilation was ceiling mounted exhaust fans that tended to keep the dust airborne.(67) Two salons in their study had downdraft tables with fans capable of moving 144 cfm. These tables had a three-stage filter system (two dust, one charcoal), however the charcoal filter was found to be missing. Additionally, the fan was not always used by the technician, and those that did use it would cover the inlet with a towel (which they would later shake out to release the dust). System maintenance, including changing filters, was not done.

Hiipakki and Samimi's study found that the vented down draft table "had no effect in terms of reducing ethyl methacrylate vapor levels," perhaps because the capture velocities were inadequate and the filters had not been changed.(20)

An unpublished survey of 20 nail salons by the Vietnamese Health Project in Springfield, MA found a low prevalence of use of vented nail tables: two workers out of 55 reported using them.(73) This survey also found relatively high use of "masks" – 32 salon workers reported mask use. The use of surgical/isolation masks appears to be common among nail technicians. The purpose of these masks is to prevent the spread of airborne infectious diseases from the worker to the client, although salon workers may be using them to protect themselves from dust. These masks provide no protection against vapor exposures and little protection from dusts.

Commercially-available downdraft tables may not provide protection from hazardous dust and vapor exposures, and salon practices may void what protection they offer. While the extent of use of commercially-available or the NIOSH-modified table is unknown, it is suspected to be minimal. Several brochures aimed at nail salon technicians are designed to educate them about hazards and safe work practices, but we have no information about salon workers' knowledge of hazards or practices.(74) Nor is there information about the use of other protective devices such as vented nail drills(75) or choices for less-toxic nail products.

Specific Aims and Project Summary

The specific aims of this project were to develop and pilot methods of assessing exposures and health effects in nail salon workers and salons. Additionally, the project sought to implement a community-based occupational research strategy that would uncover relevant social contextual issues including how to access to the work environment and population. Because this project was a "career development" grant, it also aimed to facilitate the professional development and accomplishments of the principal investigator. The project successfully accomplished all of these aims. This section will briefly review the project activities and results while the body of the report will describe these in detail.

Aim 1 (and 3): Design (and pilot) an exposure assessment strategy appropriate to the evaluation of nail salon work environments

The nail salon work environment and exposure profile are extremely complex. Nail salons are characterized by low exposures to a chemical mixture whose components have known toxic effects, including sensitization. Exposures are well below PELs and RELs for individual chemicals. However, the nail salon context of chemical mixtures, multiple routes of exposures and reported health effects similar to those report by workers in "sick buildings" as well as skin problems point to exposure assessment strategy that is closer to an indoor air quality assessment than a standard industrial hygiene approach. This simplified but comprehensive strategy was developed and piloted in 22 Boston-area salons. Findings included an average carbon dioxide level of 893 ppm, well above the reference level of 700 ppm which would correspond to ASHRAE recommendations for ventilation in beauty salons.

Aim 2 (and 3): Design (and pilot) a survey to assess occupationally-related health effects in nail salon workers

Working with a Boston Vietnamese community organization, Viet-AID, we designed and conducted a comprehensive survey of work, work environment and health effects in the Vietnamese community. Seventy-one of 141 surveys collected were from nail technicians. The 93-item interviewer-assisted survey contained both standard and open-ended questions and was conducted in Vietnamese and translated. Subjects were recruited directly by interviewers from their contacts of family and friends. Notable findings included a high prevalence of headaches, respiratory symptoms, skin problems and musculoskeletal problems.

Aim 3: Pilot the exposure assessment strategy and health effects survey (see above)

Aim 4: Assess the social context of occupational health issues as they relate to nail salon work

Information about social context related to nail salon occupational health issues was gathered from several sources. The investigator's close collaboration with Viet-AID, involvement in a statewide Healthy Cosmetology Committee and connection to investigators and advocates across the country were fruitful sources of information about population and business characteristics and perspectives and policy and regulatory issues. Economic pressures, language and culture, and the international movement to reduce toxics in cosmetics were some of the most important social contextual issues framing exposure and health effects assessment.

Aim 5: Determine access strategies and build relationships to facilitate this project and a larger-scale study

This aim was accomplish through close attention to Aim 4 and through consistent effort to build a collaborative partnership with Viet-AID and other organizations. Indeed, access to nail salons and salon workers was only made possible through the principal investigator's relationship with Viet-AID staff and through what they taught about opportunities and barriers to access. Salon access strategies that were successful included recruiting from a small business technical assistance program, providing a promotional opportunity for business owners, and on-the-spot recruitment for a quick assessment by a native Vietnamese research assistant. Two strategies that were not successful were distributing bilingual brochures with contact information about the project and utilizing youth to recruit salons. Survey respondents were readily recruited by interviewers who knew them or had regular contact with them. Recruiting survey participants from grocery stores or in their places of work were strategies deemed infeasible.

The overall project of developing and assessing methods for evaluating the hazards and health effects of nail salon work was investigated in three sub-projects. In the first project—Community-Based Occupational Health Survey of Nail Salon Hazards and Health Effects—a survey instrument and protocol were collaboratively developed and implemented by the investigator, university colleagues and a Vietnamese community organization (Viet-AID). In the second—Nail Salon Exposure Assessment—an audit tool and strategy were developed and tested. The third project was Community-Based Approaches to Occupational Health Research with an Immigrant Population. These are discussed in turn below.

Community-Based Occupational Health Survey of Nail Salon Hazards and Health Effects

This study was conducted to better understand nail technicians' work environment and potential health effects related to their work. Specifically, we sought quantitative and qualitative data on workplace hazards and health effects self-reported by Vietnamese immigrants and refugees engaged in this industry in the Boston area. We also

investigated potential associations between aspects of the work environment and symptoms reported by this population.

Methods

The study was designed and implemented through a collaborative partnership of university researchers, the Vietnamese economic development and community organization the Vietnamese-American Initiative for Development, Inc. (Viet-AID), and the environmental advocacy and research group New Ecology, Inc. (NEI), all of the Boston, Massachusetts area. The university researchers wanted to better understand the potential for hazardous exposures in small, immigrant businesses. The economic and health impacts of the concentration of Vietnamese community members in this industry were of particular interest to Viet-AID. A mission to promote "Green" grassroots economic development drove NEI's involvement. Together we developed a work, occupational health and work environment questionnaire consisting of open and closed-ended questions. The project was conceived and undertaken as a community-based participatory research project, although we did not involve research subjects themselves in the research design or analysis of the results.

We incorporated standardized and validated health questions where possible. For respiratory health we drew from the American Thoracic Society questionnaire and its updated and expanded version, the Protocol for the European Community Respiratory Health Survey (http://www.ecrhs.org/quests.htm). Our general health question came from the SF-36® (http://www.sf36.com/demos/SF-8.html). Skin questions were based on the Nordic Occupational Skin Questionnaire - NOSQ 2002 (http://www.ami.dk/english/redskaber/2.html).(76) We obtained expert advice for designing questions related to occupational asthma, musculoskeletal and reproductive health outcomes and the work environment. Work-relatedness of a health symptom was assessed by asking if a reported symptom improved after a period of time away from work.(77) In order to capture the experience of these immigrant workers and to compensate for our lack of direct knowledge of this work environment, we offered many opportunities in the questionnaire for respondents to give answers in their own words. The questionnaire was piloted with 10 subjects and revised to shorten it and for clarity. The result was a 45-minute, 93-item interviewer-assisted questionnaire in both English and Vietnamese.

Our sampling strategy considered that immigrant workers in small businesses would be very difficult to access and enroll by traditional workplace-based approaches. We utilized a community-based rather than workplace-based approach for identifying and enrolling participants in a convenience sample of the population. The core of this strategy was to reach out to the community through ethnic networks, personal contacts and a "snowball" effect where participants identified other potential participants. This method was also designed to capture the experience of workers who had left a job due to work-related health problems. Eligible participants self-identified as Vietnamese, were at least 17 years old, had worked for money in the past year and lived in the Boston area (broadly defined by the interviewer).

Ten bilingual interviewers were recruited by Viet-AID staff and trained in conducting surveys and research ethics by both the university researchers and Viet-AID staff. The

interviewers ranged in age from 18 to 60, were mostly women, and included students, medical interpreters and health workers. These interviewers recruited family, friends, and others from their own networks as participants. For completing the survey, participants were offered a $20 grocery gift certificate. Interviewers worked on their own time and were paid per interview conducted. All questionnaires and the Informed Consent process were conducted in Vietnamese with written materials translated by project staff and back translated by professionals external to the project. Following the eight-month survey period, we held a debriefing meeting with the interviewers on factors affecting participation, quality and utility of the questionnaire, the interview process and potential biases affecting the results. Interviewers did not feel that respondents were less forthcoming for being interviewed by someone they knew. Additionally, they felt that they had succeeded in interviewing even very busy people—a potential selection bias of concern to the research team.

Prevalence rates of self-reported health effects and work environment characteristics are reported with 95% binomial confidence intervals. Prevalence rate ratios were calculated for exposure-response relationships between binary symptom outcomes and binary or continuous exposures using a log-binomial model (SAS Proc Genmod) and are reported with a 95% confidence interval.(78) Two-way variable tests of association, either Chi-square or Fisher's exact tests (SAS Proc Freq), were also used to examine exposure-response relationships between binary/categorical variables. Fisher's exact test is appropriate when 25% of the expected cell counts are less than 5 and results are described by a two-sided p-value.

For statistical analysis of the relationship between health symptoms and exposure factors, composite variables were created that grouped related symptoms. The composite variable for work-related respiratory symptoms was coded as "yes" if there was a "yes" response to any of the four respiratory symptoms that got better away from work; "don't know" responses were grouped with "no" responses. Other work-related symptom variables were similarly defined. Years since immigration was examined as a predictor of some health effects, such as skin problems.

Open-ended qualitative data were noted in Vietnamese on the instrument in the form of words, phrases or one or two sentences per question. These data were translated by H. Nguyen, a native speaker. In some cases, responses were consistent enough in form to allow us to quantify these results, as in the cases of our questions regarding the sources of irritating smells and allergies. In most cases, open-ended responses were subject-coded only. The qualitative data we chose to report below represented to the investigators samples of the diversity of responses to a given question or exemplary responses.

Results

One hundred and forty surveys were collected over the eight-month survey period; 71 of these were from nail technicians. (The others were from floor finishers, factory workers, dry cleaning workers and other professions). These nail technicians were predominately female (65 female, 6 male), young (mean age 34; age range: 17 to 55 years) and relatively recent arrivals to the U.S. (median of 6 years since arrival with 42% having arrived in the prior 5 years). All spoke Vietnamese as their first language. The average hours worked per week was 46 and the range was 12 to 80. Sixty-five percent

rated their general health good or better; 31% fair; with only 4% rating their health as poor. Only one person was a smoker, although 26 (37%) reported living with a smoker.

Health Effects

Tables 8 and 9 show frequencies and confidence intervals for nail technician survey respondents' self-reported health effects. More than three-quarters of the sample reported being very or somewhat concerned about the health effects of chemicals at work (n=55, 77%). Questions regarding respiratory symptoms included "In the past 6 months, have you had..." "difficulty breathing? (Khó thở?)," "regular cough? (Ho thường xuyên?)," "sinus pressure or inflammation [*point to sinuses*] or nasal congestion? (Viêm, xưng hay đau rát xoang?)" "irritation in your throat, nose, or chest?" (Khó chịu ở mũi, họng hay ngực?) If the respondent answered "yes" to any of these questions, it was followed with "Does [*name symptom*] get better when you are away from work for more than one day?"

Table 8: Self-Reported Health Effects and Work Relatedness Among Vietnamese-American Nail Technicians (n=71)

Health Effect	Frequency (%) (95% CI)	Better when away from work: Frequency (%) (95% CI)
Respiratory irritation	22 (31%) (21%, 43%)	16 (23%) (13%, 34%)
Difficulty breathing	13 (18%) (10%, 29%)	8 (11%) (5%, 21%)
Doctor-diagnosed asthma	2 (3%) (0.3%, 10%)	1 (1%) (0.0%, 7.6%)
Any respiratory symptom (difficulty breathing, regular cough, sinus/nasal, irritation)	31 (44%) (32%, 56%)	21 (30%) (19%, 42%)
Skin problems	22 (31%) (21%, 43%)	12 (17%) (9%, 28%)
Musculoskeletal problems	33 (46%) (35%, 59%)	20 (28%) (18%, 40%)

Table 9: Self-Reported Health Effects Among Vietnamese-American Nail Technicians (n=71)

Health Effect	Frequency (%) (95% CI)
Concerned about the health effects of chemicals at work	55 (77%) (66%, 87%)
Allergic to something at work	17 (25%) (15%, 36%)
Seen a doctor for work-related health problem	15 (21%) (12%, 32%)
Asthma	4 (6%) (2%, 14%)
Doctor-diagnosed asthma	2 (3%) (0.3%, 10%)
Know others with work-related health problem	24 (34%) (23%, 46%)
Headaches that get better away from work	31 (44%) (32%, 56%)
Difficulty concentrating at work, better away	20 (28%) (18%, 40%)
Difficulty conceiving	1 (1%) (0.04%, 8%)

As shown in Table 9, almost one-third of the nail technicians surveyed reported a respiratory symptom that got better when they were away from work, with 43% of these reporting irritation only and not other respiratory symptoms. Thirteen (18%) reported difficulty breathing; eight of these said this symptom got better away from work (four others weren't sure).

Additionally, four technicians responded "yes" to the question "do you have asthma?" of whom two also replied "yes" when asked "has a doctor told you that you have asthma?" These two also reported difficulty breathing, and one reported work-related difficulty breathing. Almost one-quarter (17) answered "yes" to "Do you feel that you are allergic to anything at work?" of whom 12 identified "nail liquid" (primarily EMA) as the allergen; the remaining five identified other nail product chemicals as the allergen, e.g., acetone or the "primer," methacrylic acid. Fifteen (21%) nail technicians reported that they had seen a doctor for job-related health problem and 24 (34%) knew others with work-related health problems.

Skin problems are prevalent with 22 (31%) answering "yes" when asked "In the past six months, have you had redness, itching, rashes, burning, dryness, or scaliness on any part of your skin?" Twelve of these said that their skin gets better when away from work for 2 days. Eleven mentioned skin problems on their face or cheeks and nine mentioned skin problems on their hands.

To assess musculoskeletal problems in this population, we asked if they had experienced pain, numbness, or tingling that occurred more than three times or lasted more than one week in the past six months and in what part of their body. Forty-six percent noted such pain with 60% of these reporting relief when away from work for one

week. Hands and wrists, back, shoulders and the neck were the most common site of such pain. They observed the causes as sitting, bending, holding the filing machine, giving massages, and non-work activities.

Potential reproductive health effects are of great concern to nail technicians (personal communication A. Bracker June 2004), but difficult to assess through symptom surveys. We asked if they had tried to conceive for 12 months without success: one said yes, while 18 (25%) said they didn't know. Thirty-one participants (44%) reported work-related headaches and 20 (28%) reported difficulty concentrating, or feeling spacey, lightheaded or faint at work that got better away from work.

Work Environment Characteristics

Summaries of responses to questions related to work environment factors, exposures and protection are presented in Table 10. When asked, "How would you rate the quality of the air you breathe in your workplace on an average day during an average level of business? Would you rate the air quality 'Terrible,' 'Poor/Needs improvement,' Good/Acceptable,' or 'Excellent'?" Twelve (17%) rated the air as "terrible" or "poor/needs improvement." Fourteen (20%) answered "yes" when asked whether there was not enough fresh air in their workplace on an average day, and 12 (17%) replied "no" to the question "Does your work area have fresh air brought in from the outside?"

When asked which products they work with have a strong or irritating smell, 56 (79%) identified at least one product, mostly artificial nail liquid or paste. Forty-one (58%) reported chemicals in the air and 45 (63%) said there were odors at work that made them feel bad. The following are some characteristic responses:

"When making the paste, I have to use the primer; this liquid has a really bad smell that makes me very uncomfortable."

"No, I'm used to the smell of the chemicals but the customers are not used to it."

"Acetone to remove nail polish, liquid and powder to make paste to put on the nail, soap used during pedicure, toxic and smelly."

"Besides the bad smell, the process of filing the toe nails is uncomfortable because sometimes I have to hold my breath so my body gets tired."

Most had no response or said "None" to our question "What has your employer told you about the hazards of the chemicals in your work?" Some nail technicians expressed these views on the subject of hazard communication:

"We know chemicals are dangerous, the owner tells us to wear mask."

"Owner said you should wear mask so you will not inhale liquid smell."

"Says that the chemicals are harmful so always need to keep the ventilator on and close lids, covers of chemicals surely."

"Owner doesn't address issue because the employee doesn't bring it up."

Cloth and paper masks of the medical or surgical type are used almost universally by nail technicians (64 or 90% reported wearing a mask.) Such masks are designed for infection control and do not prevent the inhalation of chemical vapors. When asked "Why

do you wear a mask?" 35 mentioned protection from dust, 36 mentioned bad smell, odor or chemicals. Others said they wear a mask "To protect my health" or mentioned smelly feet. Other responses were:

"Because I am young and pregnant and I don't want to breathe in the dust and chemicals; I'm afraid that it might affect my child later on."

"Keep hygiene for self and others."

"Polite way to protect health, avoid chemicals."

"Prevent coughing, itching of neck, redness of skin, itching of face, tearing."

"Prevent dust, bad odors when sanding and filing acrylic nails, I have to bend very close."

Table 10: Work Environment Characteristics as Reported by Vietnamese-American Nail Technicians (n=71)

Characteristic	Frequency	% (95% CI)
Average air quality terrible or needs improvement	12	17% (9%, 28%)
Chemicals in air	41	58% (45%, 69%)
Dust in air	65	92% (83%, 97%)
Not enough fresh air	14	20% (11%, 31%)
No fresh air brought in from outside	12	17% (9%, 28%)
Absence of ventilation devices	19	27% (17%, 39%)
Named product with strong or irritating odor	56	79% (68%, 88%)
Odors at work that make you feel bad	45	63% (51%, 75%)
Wear a mask at work	64	90% (81%, 96%)
Wear gloves at work	50	70% (58%, 81%)

Exposure-Response Relationships

Exposure-response relationships were described by prevalence ratios (PR) and significance is reported as either a 95% confidence interval (CI) or a Fisher's exact test p-value if cell counts were small (see Table 11). Reporting of a work-related respiratory symptom was significantly associated with poorer air quality (PR=3.2; exact $p<0.01$), not enough fresh air (PR=3.1; exact $p<0.01$), absence of ventilation devices (No devices vs. Yes/Don't Know; PR=4.3; CI=2.1, 9.0) and concern about the health effects of chemicals (PR=5.5; exact $p=0.03$). Reporting of "chemicals in the air" at work was not significantly associated with the reporting of a respiratory symptom, nor was a report that the subject lived with a smoker. Confounding due to exposure to smoking in the home was examined for the four exposure-response models that were significant. For all of the considered models, there was no evidence of confounding due to smoking in the home.

Table 11: Variable Associations Tested for the Study Results
P-values are specified as either from a chi-square test (Chisq) or a Fisher's exact test for small numbers (Exact).

Exposure Variable	Count	Prevalence of work-related respiratory symptoms	Prevalence rate ratio (PR) & P-value
Air quality			
Bad	12	67%	PR = 3.2; Exact = 0.003*
Good	58	21%	---
Fresh air			
Not enough	14	64%	PR = 3.1; Exact = 0.003*
Enough	57	21%	---
Chemicals in air			
Yes	41	27%	PR = 0.8; Chisq = 0.5
No	30	33%	---
Air Brought in From Outside			
Yes	59	25%	PR = 2.0; Exact= 0.16
No	12	50%	---
Ventilation Devices in Salon			
Yes	38	18%	Chisq= 0.016*
No	31	45%	---
Concerned about Chemicals			
Very/Somewhat	55	36%	PR = 5.5; Exact= 0.03*
Not concerned	15	7%	---
Anyone Smoke at Work			
Yes	4	50%	PR =1.8; Exact= 0.03*
No	67	28%	---
Exposure Variable	**Count**	**Prevalence of skin itch**	**Prevalence rate ratio (PR) & P-value**
Glove Use			
Yes	50	24%	PR=0.5; Chisq= 0.05*
No	21	48%	
Concerned about Chemicals			
Very/Somewhat	55	36%	PR=5.5; Exact= 0.03*
Not concerned	15	7%	

--- denotes the reference category.
* significant p-value < 0.05.

The prevalence of skin symptoms was significantly lower for those who ever used gloves compared to those who never used gloves (PR=0.5; CI=0.26, 0.98). When glove use was categorized into frequency of use, skin symptom prevalence went in the expected direction—fewer symptoms with more frequent glove use—but the association was not significant. The prevalence of skin symptoms was 5.5 times higher among those who were concerned about the health effects of chemicals compared to those who were not concerned (exact p=0.03). Skin symptoms were associated with glove use only and not with age, years as a nail technician, or years since immigration.

The reporting of any musculoskeletal disorder in the past 6 months was significantly associated with years worked as a nail technician (PR=1.08; CI=1.01, 1.14; p=0.02). Work-related headache was marginally associated with years as a nail technician (PR=1.05; CI=0.99, 1.11; p=0.09).

Discussion

These results suggest a prevalence of self-reported work-related health effects, including musculoskeletal disorders, respiratory symptoms, skin problems and headaches among Vietnamese-American technicians who generally work long hours in nail salons. In comparison to available general population data, this population of nail technicians' symptom prevalence is elevated. For example, data from National Health and Nutrition Examination Study for 2004 shows a raw prevalence of 14% wheezing, 7% regular cough and 12% dermatitis or rashes in the general adult population (not adjusted for age, race, or smoking status).(79) In this survey population of almost all non-smoking Asian women, we found that 18% experienced difficulty breathing, 14% had a regular cough, and 31% reported skin problems.

Working populations are generally healthier than the general population that includes elderly people and those too infirm to work.(80) However, only 65% of our sample rated their overall health good or better. This compares with 85% of U.S. residents included in the 2003 Behavioral Risk Factor Surveillance Data who rated their physical health as good or better.(81) Adjusting these figures for age would strengthen the interpretation that the generally younger population of nail technicians is rating their health status lower than the general population. Still, this working population may discount health problems if they are able to work. Of those who reported their overall health as excellent or good, 31% also reported one or more respiratory symptoms.

The common reporting of respiratory irritation and headaches may be due to a lack of adequate general ventilation and combined with exposure to low concentrations of mixed volatile chemicals and to strong odors over extended work days and weeks. The National Institute for Occupational Safety and Health (NIOSH) has developed guidance for local exhaust ventilation for artificial nail applications, however these systems are not in widespread use in salons.(70)

There may be multiple causes of the skin irritation reported by almost 1/3 of the respondents. Nail technicians are required to wash their hands after each customer and this, in itself, can damage the skin. Many nail product ingredients' Material Safety Data Sheets note that skin contact should be avoided and local exhaust ventilation used.(82) One of the most common chemicals in salons, isopropyl alcohol, is well known to cause skin irritation. The frequency of reports of skin irritation on the cheeks and face is similar to that reported by dental nurses who also work with methacrylates and who wear similar masks.(28)

The type of mask used by nail technicians is not appropriate for protection from chemical vapors—only respirators with organic carbon chemical cartridges (or supplied air respirators) can prevent inhalation of vapors from solvents and the acrylics. And while the masks in use may provide some protection from dusts, they were not designed for dust protection. The N95 NIOSH-approved dust mask with organic vapor/odor control may be a reasonable alternative although anecdotal feedback from nail technicians who have evaluated these masks is that the size and shape of these masks may not fit the predominantly female Asian population of nail technicians.

Study limitations include a non-random and potentially non-representative sample, and a relatively small sample in comparison to the size of the population. Because the study was cross-sectional, results cannot be used to infer causality. While we used many

questions that had been validated in English and other languages, the survey as a whole has not been validated in English or Vietnamese or with a Vietnamese immigrant population. Self-reported symptoms have not been corroborated with physical evidence of effect. Our survey strategy of interviewers surveying people known to them may have influenced responses. Finally, error may have been introduced by the process of translation.

Nail Salon Exposure Assessment

Exposure assessments in nail salons, while limited in number, have found consistent results: nail salon workers are exposed to multiple potentially hazardous chemicals, but at low levels when individual chemicals levels are compared to OSHA Permissible Exposure Limits.(15, 20) While the relatively low exposure levels pass under the radar in traditional industrial workplace exposure assessment, the presence of volatile compounds, disagreeable odors, inadequate ventilation and health complaints are suggestive of an indoor air quality problem.(83) We had MSDS's to tell us of the presence of volatile compounds, our noses to tell us of disagreeable odors and our survey which had found that nail technicians in the Boston area commonly reported symptoms such as respiratory irritation and headaches.(84) We hypothesized that these health effects might be related to salon workers exposure to chemicals in salons and/or to the effects of limited building ventilation. Exposures to the types of chemicals in nail products—organic solvents, formaldehyde and acrylic compounds—and low ventilation rates have both been associated with such symptoms.(85, 86) In this exposure assessment study we sought to better understand indicators of indoor air quality—specifically the adequacy of salon ventilation strategies.

Figure 5: Nail Salon Work

The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) recommends that beauty salons maintain 25 cubic feet per minute (cfm) of fresh air per person via mechanical ventilation.(2) This guideline would correspond to a measured level of 700 parts per million (ppm) of carbon dioxide in an indoor environment. (Carbon dioxide levels range from 300-600 ppm in outside uncontaminated air). There are no requirements or guidelines for the exhausting of salon air, although the National Institute for Occupational Safety and Health has developed guidance for local exhaust ventilation via downdraft ventilation in nail tables.(62)

As we had found in a previous study that nail salon owners and staff were often not able to describe the air handling devices in their salons, we attempted to assess ventilation and other exposure metrics through a salon audit conducted by a trained researcher. There are many challenges to the recruitment of participants and to conducting research in salon settings including language and other social and economic barriers. In the Boston area and in many parts of the country the majority of nail salons are owned and staffed by Vietnamese refugees/immigrants, many of whom have limited English language ability. Even when language issues are overcome, salon owners may fear that the presence of researchers will disrupt or discourage business or attract unwanted regulatory attention.(87) Environmental or occupational health researcher have

rarely conducted large studies with very small businesses such as these due to the massive effort required to recruitment a sufficient number of potential subjects. In order to overcome these barriers, we relied on a collaborative process with a Vietnamese community and economic development organization, the Vietnamese-American Initiative for Development, Inc. (Viet-AID) and a University, the University of Massachusetts Lowell to develop and carry out our research.

Methods

We conducted short air quality audits in 22 salons over three months in early summer 2006 in the Greater Boston Area. The field researcher Tuan Do is occupational health ScD student and a native Vietnamese speaker. Though a convenience sample, several geographic areas were designated to represent the distribution of salons throughout the area. Two of the 22 salons that participated were primarily hair salons. Five salons were recruited to participate by Thu Truong, the small business program coordinator for Viet-AID. Of these five, four had participated in our marketing, outreach, and education project: the "Healthy Nail Salon Work Environment" bilingual calendar. In addition to recruiting from Viet-AID's network, we recruited salons "on-the-spot." The field researcher approached salons during non-busy periods and requested participation in the audit. Of the 47 that were approached, 17 agreed to participate and signed Informed Consent Forms. Participating salons received a copy of the calendar, a $20 grocery store certificate and a full report in English and Vietnamese on the findings of the audit and recommendations for air quality improvement.

The audit recorded basic business information as provided by a salon owner or worker, the researcher's observations of air movement equipment and natural ventilation, and measured temperature, humidity and carbon dioxide level. Carbon dioxide level was used as a surrogate for the salon's ventilation rate. In an occupied space, carbon dioxide levels can be compared to natural outside levels (300-600 ppm) to evaluate the adequacy of fresh air (people are the principal source of carbon dioxide indoors). Temperature, humidity and carbon dioxide were measured with a TSI Q-Trak monitor. The monitor was placed in the work area and allowed to equilibrate without any person within three feet of the monitor. Each salon was provided with an audit report in English and Vietnamese with findings of the audit. Audit data was transferred to an Excel® spreadsheet and basic analysis was conducted within Excel®.

Results

The salons in the sample had been in business an average of 4.5 years and none had operated more than 10 years. A couple of salons that were primarily hair salons had only one manicure table and one manicurist, but most had 5 or more tables and 3 or more pedicure stations. Three or four nail technicians usually worked in each salon with one salon having as many as 10 workers. Additional nail technicians are usually called in on a Saturday, the busiest day, when these salons averaged 32 manicures and as many as 100. Seventeen out of the 22 salons generally perform artificial or "sculpted" nail services and the average amount of "nail liquid," the intensely odorous ethyl methacrylate monomer,

used by these shops in a month was 24 ounces. Almost all of the shops visited were storefronts; two others were in malls and another was in the upper floor of a building.

Of the 22 salons in our survey, eight had some form of mechanical ventilation. Although we were not able to verify that these systems delivered fresh air, or that these systems were appropriately designed and operated, the field researcher did verify that these systems were functional. As shown in Table 12, the salons in the sample rely on a variety of strategies to move and condition air, including room air conditioning units, room and table fans, open doors and windows, stand-alone air cleaners units and wall or ceiling mounted exhaust fans. One salon had built a "local exhaust" system whereby commercial vacuum cleaners in the basement were connected to a work area by a hose extended through the ceiling to the tables above.

Table 12: Ventilation Characteristics of 22 Boston-area Nail Salons

Mechanical Ventilation	Yes	8	36%
	No	14	64%
Ventilation Working	Verified	9	41%
	Don't know	13	59%
Local Exhaust	Yes	1	5%
	No	21	95%
Other Ventilation (Salons using)	Room a/c	20	91%
	Open doors/windows	13	59%
	Air purifyers	5	23%
	Room fan	4	18%
	Exhaust fan	5	23%
	Table fan	12	55%
Shop Volume	Average	5,674	
	Low	1,639	
	High	15,561	

Early summer salon temperatures averaged 78° F with a range of 58 to 90° F. Relative humidity averaged 48% with a range of 24-73%. Carbon dioxide levels had a mean of 893 ppm with a range of 470 to 1550 ppm. The number of occupants ranged from 2 to 14 with an average of 7. Shops were generally small: the average area was 551 ft^2 and they ranged in size from 216 to 1365 ft^2.

Table 13: Air Quality Metrics in Boston-area Nail Salons (n=22)

Temperature F	Average	78
	Low	57
	High	90
Relative Humidity %	Average	48
	Low	24
	High	73
Carbon Dioxide	Average	893
	GM	845
	Low	470
	High	1550
	700 ppm or more	16
	1000 or more	6
Number of Occupants (incl survey staff)	Average	7
	Low	2
	High	14

Discussion

In 27% of the salons, spot carbon dioxide readings exceeded 1000 ppm, the level determined by NIOSH and EPA to indicate inadequate ventilation of occupied spaces.(88) Seventy-three percent of the salons in the sample had measured spot carbon dioxide readings greater than 700 ppm. Seven hundred ppm is the carbon dioxide level corresponding to ASHRAE's beauty salon guideline of 25 cfm of fresh air per person. In half of the salons that had this elevated carbon dioxide reading, there were fewer than seven people, the average number of occupants for this sample. In all but one of the salons with mechanical ventilation carbon dioxide levels exceeded 700 ppm, suggesting that systems were either not designed to introduce fresh air or were not operating at the time of the measurement. In response to our audit report, one owner upgraded her ventilation system to provide fresh air to the salon. The small business coordinator of Viet-AID was able to assist her in gaining a small business loan in order to do so.

This is the first study of its kind to evaluate basic business, indoor air quality and exposure metrics in nail salons. Although this study collected data from a small non-random sample of salons and took a limited number of measurements per salon, we were able to obtain some basic information that will serve the public health and consumer community in their efforts to understand and address the potential hazards in this popular business. In keeping with the public health mandate to reduce hazards at the source, consumer advocates have pressured some manufacturers to reduce the odor, volatility, toxicity and hazard potential of nail products and some have done so.(89) However, adequate general ventilation in public and work places is important regardless of the potential contaminants in those spaces.

The majority of nail salons may not have adequate general ventilation, despite the presence of ventilation systems in some, and a combination of other air moving equipment, such as room air conditioners in others. The lack of adequate ventilation is of significant concern because of the presence of potentially hazardous chemicals in salon products and the common self-report of symptoms among nail technicians.

Special Note on Exposure Assessment

The exposure assessment approach taken in this project was one of an indoor air quality assessment strategy. Since this was a methods development study, it did not seem worthwhile to repeat traditional exposure assessment approaches that been reported on in the literature and there were several barriers to doing so in any case. However, while I feel that the indoor air quality approach is the correct one for the salon environment, it misses two related realms of exposure assessment: skin exposures and biological monitoring, both of which are of special importance for this occupational group. Further work is necessary to design exposure assessments that might be comprehensive of the potential skin contact and skin absorption issues, especially with regard to the methacrylate exposures. Additionally, my colleague Dr. Susan Duty of Simmons College has conducted a small study of the pre- and post-shift phthalate body burden in nail salon workers and found a suggestion of significant exposure. The publication of that work is forthcoming and should inform future exposure assessment studies in nail salon workers.

Community-Based Approaches to Occupational Health Research with an Immigrant Population: Recruitment and Access Issues

The overall goal of this project was to develop methods, broadly speaking, for evaluating nail salon related hazards and health effects. The overall approach was as a community-based research project and notes on this experience are included in the section above: "Community-Based Approaches to Occupational Health Research on Nail Salon Hazards and Health Effects." Here is specifically addressed the recruitment and access issues that were the main focus of the community-based strategy. For the population survey and exposure assessment audit described above, specific alternative strategies than those that were pursued were considered and, in some cases, attempted. This section reports on this iterative research process to "get it right" – a true benefit of community-based research.

In the case of the population survey, other methods to reach subjects that were considered included mailing surveys to registered nail technicians, workplace surveys, cosmetology school surveys, grocery store (public place) surveys, focus groups, individual interviews, and a web-based survey. All of these methods were discussed with the collaborating partners in the Vietnamese community and rejected. For the survey approach, we determined that in a population unfamiliar with scientific surveys, non-interviewer assisted surveys were not expected to generate good results. The interviewers also provided two other important functions in locating potential participants and in helping them to trust the research process. Because we were interested in a comprehensive 45 minute survey, we did not think that "on-the-spot" recruitment at grocery stores or in nail salons would be successful. Because we were hoping to recruit nail technicians who had a range of experience in the field, we rejected recruiting from cosmetology schools. Focus groups and interviews were not conducted because of recruitment and language challenges, although we held one focus group/feedback session with our survey interviewers. A web-based version of the survey was developed, but was not piloted due to time constraints.

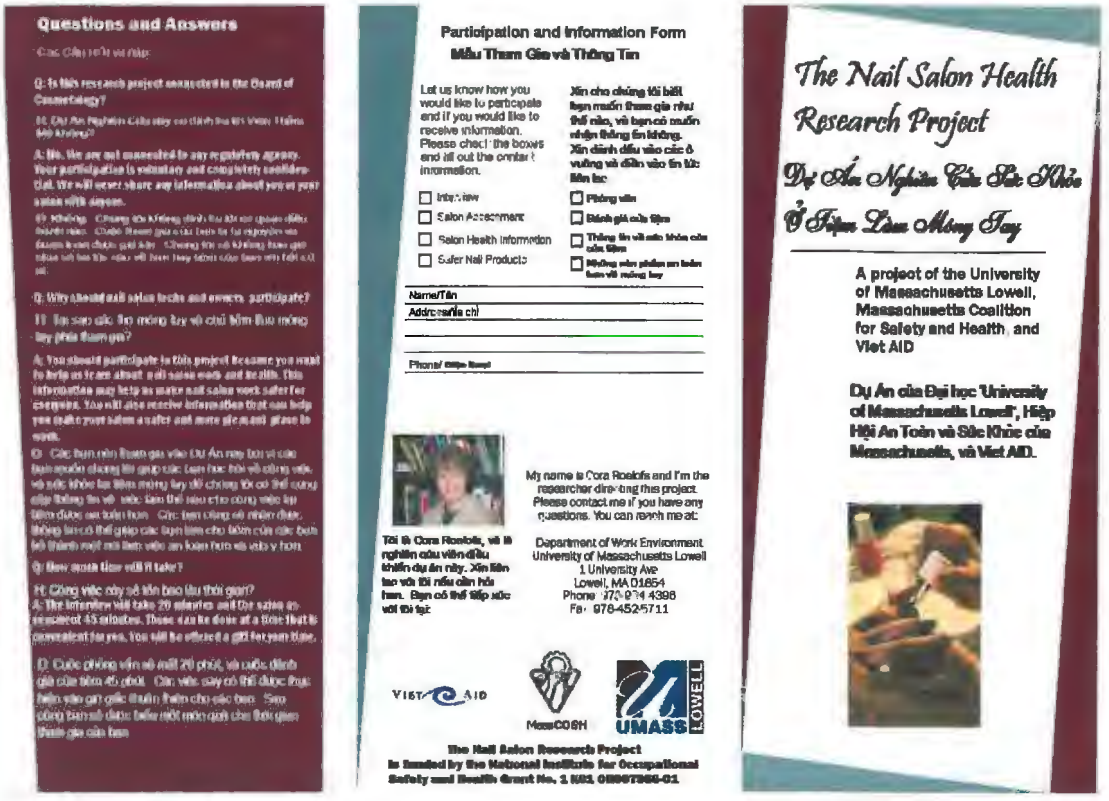

Figure 6: Study Recruitment Brochure

For the nail salon audit, five access strategies were piloted. The first involved the distribution of project brochures (Figure 6). While it was useful to have a bilingual brochure, it did not result in the recruitment of salons to participate. The second strategy involved the assistance of the young people of the MassCOSH Teens Lead at Work project. Following a three-part training with seven teens on research ethics, health and safety basics and the research protocol, the teens attempted to recruit salons to participate in the air quality assessment, but were not successful. (Figures 7a and 7b)

Although one of the teens was Vietnamese, it was thought that young people were not having success because Vietnamese culture associates respect with age.

Three additional strategies were successful in recruiting salons to participate. Working with the business outreach coordinator for Viet-AID (Thu Truong), salons known to him through his outreach and technical assistance activities were recruited to participate. Some of these were also recruited to participate in a bilingual marketing and educational calendar that we then used as a gift and outreach tool (See Figure 8 and Appendix). Of the six that participated in the calendar project, four agreed to participate in the audit. With the calendar in hand, a Vietnamese doctoral student in the Department of Work Environment (Tuan Do), set out to recruit and perform audits on the spot. He generally visited salons in the morning early in the week so as to hit salons during non-busy periods. He was very successful and recruited 16 salons by this method. Each of the salons was provided with a full report on the audit and a calendar.

Figure 8: Nail Salon Work Environment Calendar

In summary, this project found that personal contacts are very important for recruiting participants to research projects. The research instruments and materials should be in Vietnamese rather than bilingual and the protocol should be executed by native Vietnamese speakers in a culturally appropriate format. Gifts and business cards are important to recruitment. Given Vietnamese cultural associations of respect with age, youth may not be good agents of recruitment. Protocols that are very sensitive to subjects' time and work pressures will have more success. Recruitment that depends upon appointments may be less successful than on-the-spot recruitment and research process. However, it may be necessary to make appointments to assure that owners are present.

Conclusion and Recommendations

An indoor air quality consultant, a NIOSH Health Hazard Evaluation investigator, a city health inspector and a breast cancer activist walk into a nail salon……..In what sounds like the beginning of a joke is the question: Are nail salons an indoor environment, a traditional workplace, or a public and consumer health concern? A nail salon can be each and all of these, depending upon the perspective of the concerned

party. Each of these perspectives offers a particular set of concerns that frame how problems and solutions are characterized. Some of these concerns overlap and some are in conflict. What varies between these perspectives is what is of potential concern, what makes it warrant concern and who is affected. Taking them each in turn, we can see through the lens of each.

If one adopts the perspective of an **indoor air quality investigator**, one would be looking to see if how the nail salon conforms to the expectations of work or occupancy of offices or other "building" environments. Their checklist would include items such as "Are there concentrations of mixed volatile organic compounds reaching the parts per billion range?" Are there noticeable odors and complaints about odors including from non-occupants?" "Is there adequate general ventilation, including adequate provision of fresh air?" "Are occupants reporting health symptoms related to their time in the building, especially respiratory irritation, headaches, and other subjective symptoms of being unwell?" The investigator would recognize that there is a range of susceptibilities and would take seriously concerns voiced by even a few people and begin to search out the potential sources of "sick building syndrome."

In a more traditional work environment context, the **industrial hygienist** would have a different checklist, exposure assessment approach and response. The industrial hygienist would be primarily concerned about employees rather than "occupants" and would be focused on their exposures during eight hour shifts and 40 hour work week. She or he would assess which individual contaminants might potentially reach legal or recommended exposure limits (in the hundreds of ppm range) and plan to conduct integrated personal air sampling for those individual contaminants. If there were other relevant OSHA regulations such as the hazard communication standard or chemicals requiring medical monitoring, that would also be of interest. For chemicals reaching significant exposure levels, the industrial hygienist would look for appropriate local exhaust ventilation and personal protective equipment.

The **public and or consumer health advocate** has still another set of concerns. Their number one concern might be the presence of toxic chemicals, especially carcinogens, reproductive hazards, or chemicals that might cause asthma or other chronic conditions. They would be most concerned about involuntary exposure to vulnerable populations, such as children and the general public, and may be somewhat less concerned about the risks borne by workers and owners. In addition to chemical exposures, the public health advocates may also be concerned about potential exposures to infectious agents and will want to know if the salon is clean, hygienic and adequately ventilated.

Regardless of orientation of the investigator, some questions are universal: what are the potential exposures?, what do we know about such exposures? and what factors in the salon would promote or prevent hazardous exposures? As shown in Table 2, there is a range of potential hazards and hazardous effects of chemical ingredients in nail products. These chemicals and others are always present in the salon. Acetone, isopropyl alcohol, methacrylic acid (primer) and ethyl methacrylate liquid and powdered polymer are purchased in bulk and decanted into containers that sit, often exposed to the air, on each nail tech's station. Gauze and cotton soaked in acetone or isopropyl alcohol are often exposed to the air in open storage or disposal containers. Dust is a common contaminant that is visible in the air and on many surfaces in a nail salon. This dust is created from hand filing of natural nails, but more so from machine filing of artificial nails.

Another question of interest to all relates to the literature of **exposure assessment**. This literature, although limited in quantity, shows consistency in results. When workers' exposures have been evaluated, the exposures have been well below TLVs and PELs for individual contaminants. Generally, measured personal exposures have been less than 20 ppm for volatile contaminants such as toluene, ethyl methacrylate and isopropryl alcohol, whereas the PELs and TLVs are generally 100 ppm for eight hour exposures. It is important to note that there are not PELs for all substances, (most notably, there is no PEL for ethyl methacrylate) and the PELs should not be considered a "no effect" level. However, airborne exposures have been considered "low" because they are generally below these recommended and required levels. Biological monitoring and other evaluations of biologically relevant "doses" that would be comprehensive of skin absorption have not been published. Additionally, there are no published reports of exposures to the general public, to room occupants other than workers or to neighboring businesses. These would be expected to be below those reported as representing the workers' exposures.

Only our study has reported on nail technicians' self-reported exposure factors. Our study asked nail technicians in the Boston-area to rate air quality and to report the presence or absence of exposures. Table 10 shows their perceptions.

Additionally, we measured carbon dioxide levels in twenty-two Boston area salons and assessed exposure parameters related to the rate of work in salons. Carbon dioxide is not a hazardous contaminant in salons (it is produced by human respiration), however high levels are associated with health effects because they signify the absence of sufficient fresh air. Carbon dioxide levels had a mean of 893 ppm with a range of 470 to 1550 ppm. The 17 salons that performed artificial nail services used on average 24 ounces of "nail liquid" per month. On busy days, the salons averaged 32 manicures per day.

A third area of concern to these investigators would be reports of health effects in people exposed to the potential contaminants in the nail salon environment. Numerous cases nail damage from the use of methyl methacrylate in artificial nail preparations in customers have been reported by physicians. Cases of asthma and contact dermatitis in nail salon workers have also been reported. As noted above, some small studies of nail salon workers have found higher prevalence of respiratory symptoms, negative reproductive outcomes and neuropsychological symptoms. Our survey of self-reported health effects among Vietnamese-American nail technicians is described above and summarized in Tables 8 and 9. In our study, nail technicians reported a variety of symptoms including headaches, respiratory symptoms, musculoskeletal problems and skin irritation. Almost one-quarter perceived themselves as being "allergic to something at work" and 77% expressed concern about exposure to chemicals.

Finally, most of the "perspectives" would be interested in how potential contaminants are handled. Are they vented to the outside? Do occupants wear personal protective equipment? What are the usual practices to control exposure? Our two investigations, the survey and the worksite audit, provide information in this area. Of the 71 nail technicians who were interviewed for our survey, 59 (83%) said that there was fresh air from the outside; 44 (62%) reported a ventilation system and 38 (54%) said that there was some "other" ventilation device such as air conditioners or fans. Ninety percent reported wearing a mask, almost all a paper or cloth mask like a medical or surgical mask. We

also asked them why they wore this mask – an important question considering that the masks are not effective protection from vapors or dusts. Most believe that the masks are protective and that is why they wear them, however, they also wear them for reasons of "hygiene."

We also asked them to describe any devices used in the salon to bring in or remove air other than an HVAC system. There were many diverse responses to this question including:

> "One large fan located by the back door and each nail table has a ventilating machine, under the table with a bag that filters dust."
> "Six small fans to suck up. I bought a ventilator that filters toxic chemicals and dust and install it close to the entrance door. Pump in clean air."
> "Don't have ventilation system, when weather warm, open windows. Stores with air vent machines are better."
> "There is a ventilator on the ceiling that sucks dirty air outside."
> "Two fans filtering the air placed by front and back door, bad air goes in and is filtered into good air."

Our audit of Boston-area nail salons found that 14 of 22 (64%) had no form of mechanical ventilation. We confirmed that the systems that were in salons were operable, but we did not assess if the systems were appropriately designed, operated, or maintained or if they re-circulated air or brought in fresh air. Anecdotally, we learned that even those with systems do not use them regularly in order to save money on utilities.

Given their concerns, perspectives, and this background, how would each of our investigators respond to the nail salon "problem"? Certainly the indoor air quality investigator would be concerned about the odors and mixed solvent exposure and would most likely recommend improvements in general exhaust ventilation and elimination or reduction in the use of volatile substances. If we take NIOSH to represent the industrial hygiene perspective we can look to a report from 1992, when in response to a complaint from a neighboring business, NIOSH conducted a Health Hazard Evaluation in an Ohio nail salon.(65) They conducted some sampling and interviewed the workers and concluded that there was no health hazard present in the salon, but that the salon might do a better job of controlling odors if they had mechanical ventilation that conformed to ASHRAE's recommendation of 25 cfm per person of fresh air. NIOSH personnel also designed and publicized a modified nail table down draft local exhaust system to exhaust both dust and solvent vapors. (See Figure 2)

The public and consumer health advocate would most likely recommend that the toxicity, volatility, odor and hazard potential of nail salon products be reduced through reformulation and that general ventilation be improved. Some U.S. cosmetics makers, including OPI, Revlon, Proctor and Gamble and Estee Lauder, have begun to reformulate their nail products in response to new European restrictions on toxic cosmetics ingredients. (see: http://www.cosmeticsdesign.com/news/ng.asp?id=57387-cosmetic-giants-remove) (www.safecosmetics.org) These product changes, and those that reduce allergenic potential and irritating properties of cosmetics, may help prevent health effects in nail salon workers and customers alike.

United these perspectives into one, we find a mandate to respond with a set of comprehensive recommendations that are noted above in the section on "Translation of Findings." Following the hierarchy of controls and public health directive to prevent hazards at the source, we encourage and support the reformulation of products to reduce their toxicity, volatility, odor and other hazard potential. Salon equipment including chairs could be redesigned to lessen musculoskeletal strain. Salons should be ventilated with an appropriate and efficient system that can exhaust contaminated air and bring in fresh air. This system could be complemented by a local exhaust system for dust collection such as a shrouded nail file. Generally, the use of infection control masks might be discouraged since nail techs generally (falsely) perceive them as protective against chemical exposure and because they may be exacerbating skin problems. Until dust collection systems and hazard reduction has taken place, nail technicians may wish to use N95 dust masks with odor control carbon impregnation and abide by good work practices. Compliance with the Hazard Communication Standard should be encouraged as a way of educating and training both salon owners and workers. Outreach to salons will have to be culturally and linguistically appropriate and may need to be linked to community and economic development organizations in order to be effective. Finally, further assessment of health effects through clinical evaluations and biological assessment of exposure and effect will help to improve understanding of the impact of this work environment and will be responsive to nail technician's own concerns.

Publications

Roelofs C, Azaroff L, Holcroft C, Nguyen H, Doan T: Results from a Community-based Occupational Health Survey of Vietnamese-American Nail Salon Workers. Journal of Immigrant and Minority Health (published online October 18, 2007)

This publication describes our community-based occupational health survey and results. It provides the most comprehensive and significant report on the self-reported health effects and exposures in this population to date and will be the only peer-reviewed report in this area. Seventy-one Vietnamese nail technicians participated in the survey. In addition to the results, the article describes the methods used to reach and access the population and describes the instrument and its pilot testing. These methods and results directly flow from work related to the specific aims of the study. The manuscript is largely reproduced above under the heading Community-Based Occupational Health Survey of Nail Salon Hazards and Health Effects.

A summary of this research was published in Thang Long, a Massachusetts Vietnamese American newspaper. It is included in English and Vietnamese in the Appendix.

Human Subjects Issues

Inclusion of Gender and Minority Study Subjects

The table below describes our subject by race and gender. For the salon audit, the "subject" was the salon more than the owner, so we did not collect race, ethnicity or gender information. (We nonetheless provided an informed consent process.) However, almost all participants were female and all were Asian.

PART A. TOTAL ENROLLMENT REPORT: Number of Subjects Enrolled to Date (Cumulative) by Ethnicity and Race				
	Sex/Gender			
Ethnic Category	**Females**	**Males**	**Unknown or Not Reported**	**Total**
Hispanic or Latino	0	0	0	0
Not Hispanic or Latino	65	6	0	71
Unknown (individuals not reporting ethnicity)	0	0	22	22
Ethnic Category: Total of All Subjects*	65	6	22	93
Racial Categories				
American Indian/Alaska Native				
Asian	65	6	0	71
Native Hawaiian or Other Pacific Islander				
Black or African American				
White				
More Than One Race				
Unknown or Not Reported			22	22
Racial Categories: Total of All Subjects*	65	6	22	93

Inclusion of Children

Although the study was open to workers aged 17 and older, there were no minor participants.

Materials Available for Other Investigators

The survey and workplace audit instruments are included in the Appendix and are available in electronic form to interested investigators by emailing the PI at Cora_Roelofs@uml.edu. A .pdf of the calendar may also be requested.

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APPENDIX

Index of Materials

A-1 Methacrylate Comparison
A-2 Vietnamese Community Occupational Health Survey (English and Vietnamese)
A-3 Nail Salon Exposure Assessment Checklist
A-4 Thang Long article (Vietnamese and English)
A-5 Calendar for a Healthy Nail Salon Work Environment (health and safety tips pages only)

Methacrylate Comparisons

Methacrylate	CAS	VP	Tox	Health Effects
Methyl Source: Fischer MDSD	80-62-6	28 mm Hg @ 20C	Draize test, rabbit, eye: 150 mg; Inhalation, mouse: LC50 = 18500 mg/m3/2H; Inhalation, rat: LC50 = 78000 mg/m3/4H; **Oral, mouse: LD50 = 3625 mg/kg;** Oral, rabbit: LD50 = 8700 mg/kg; Oral, rat: LD50 = 7872 mg/kg; Skin, rabbit: LD50 = >5 gm/kg	Eye: Contact with eyes may cause severe irritation, and possible eye burns. May cause eye injury. Skin: May cause severe skin irritation. May cause skin **sensitization**, an allergic reaction, which becomes evident upon re-exposure to this material. Ingestion: May cause central nervous system depression, kidney damage, and liver damage. May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause allergic reaction. Exposure may cause headache, anorexia, and irritability. Inhalation: Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. May cause allergic respiratory reaction. May cause respiratory tract irritation. May cause effects similar to those described for ingestion. Chronic: Prolonged or repeated skin contact may cause sensitization dermatitis and possible destruction and/or ulceration. May cause **reproductive** and fetal effects. Repeated exposure may cause tingling in the extremities and other nervous system abnormalities.
Ethyl Source: Fischer MSDS	97-63-2	16 mm Hg @ 20C	Inhalation, rat: LC50 = 8300 ppm/4H; **Oral, mouse: LD50 = 7836 mg/kg;** Oral, rat: LD50 = 14800 mg/kg;	Eye: Causes eye irritation. Lachrymator (substance which increases the flow of tears). Skin: Causes skin irritation. May cause skin **sensitization**, an allergic reaction, which becomes evident upon re-exposure to this material. Ingestion: Causes gastrointestinal irritation with nausea, vomiting and diarrhea. Inhalation: Causes respiratory tract irritation. Vapors may cause dizziness or suffocation. Central nervous system effects, which appear to predominate in acute cases are characterized by abnormal fatigue, memory difficulties and dizziness. Chronic: Repeated exposure may cause sensitization dermatitis.
2-Hydroxyethyl Source: Fischer MSDS	868-77-9	0.01 mm Hg @ 25C	**Oral, mouse: LD50 = 3275 mg/kg;** Oral, rat: LD50 = 5050 mg/kg; Same tox effects as EMA listed	Eye: Causes severe eye irritation. Skin: May cause severe skin irritation. May be absorbed through the skin in harmful amounts. May cause skin **sensitization**, an allergic reaction, which becomes evident upon re-exposure to this material. Ingestion: Causes gastrointestinal irritation with nausea, vomiting and diarrhea. Inhalation: Causes respiratory tract irritation. The toxicological properties of this substance have not been fully investigated. Chronic: May cause **reproductive** and fetal effects.
Triethylene Glycol Di- Source: HSDB	109-16-0		No LD50s available; one contact derm, one metabolic inhibition	**Sensitization**

Occupational Health Survey (Vietnamese Version)

(To display Vietnamese Fonts, download free software from www.vps.org)

Phần I. Thông tin tổng quát

1. Đánh dấu cho biết giới tính của bạn
   Nữ.....1
   Nam.....2

2. Tiếng mẹ đẻ của bạn là gì?
   Tiếng Việt.....1
   Tiếng Anh.....2
   Một thứ tiếng khác:_____.....3

3. Bạn bao nhiêu tuổi? _____

4. Bạn đến Mỹ vào năm nào? _____

5. Trong một tuần bạn hút bao nhiêu điếu thuốc?
   Số lượng_____ (lưu ý có 20 điếu/bao).....chuyển qua câu số 6.....1
   Không hút..... 2

6. Trong nhà bạn có bao nhiêu người (kể cả trẻ em) đang ở? _____

7. Có ai trong số những người sống chung với bạn hút thuốc trong nhà không?
   Có.....1
   Không.....2

Phần 2. Tình trạng sức khỏe

Prompt: Bây giờ chúng ta sẽ nói tới sức khỏe của bạn (quí vị cảm thấy như thế nào trong 4 tuần vừa qua).

8. Nhìn chung, bạn cảm thấy như thế nào về sức khỏe của mình trong 4 tuần vừa qua? (*đọc và chọn một câu trả lời thích hợp*)
   Tuyệt vời.....1
   Rất tốt.....2
   Tốt 3
   Trung Bình.....4
   Yếu.....5
   Rất tệ.....6

9. Bạn có bị dị ứng với thứ gì không?
   Có.....*chuyển sang câu 9A, B*.....1
   Không.....2
   Không biết.....3

Nếu có dị ứng

9.A. Bạn bị dị ứng với thứ gì?

_____

_____

9.B. Khi bạn tiếp xúc với những thứ này, bạn có những triệu chứng hay những dấu hiệu gì?

_____

_____

10. Bạn có bị hen suyễn không?

Có .....*chuyển sang câu 10A*.....1

Không .....2.

Không biết.....3

Nếu có

10.A. Có phải bác sĩ thông báo cho bạn?

Phải..... 1

Không phải.....2

Phần 3. Nghề nghiệp

Prompt: Bây giờ chúng ta sẽ nói về công việc mà bạn đang làm hay đã làm.

11. Bạn có đang làm việc không?

Có .....*chuyển sang các câu 11A, B, C, D* 1

Không.....chuyển sang câu 12.....2

Việc Làm Hiền Tại

11.A. Bạn đang làm nghề gì?	11.B. Xin vui lòng cho biết những nơi làm việc của bạn. Bạn làm công việc này trong một tuần bao nhiêu giờ?	11.C. Nhiệm vụ chính của bạn trong công việc này là gì?	11.D. Bạn đã làm công việc này được bao nhiêu năm ?

12. Ngoài công việc hiện tại, bạn có làm công việc gì khác trong vòng 5 năm qua, kể từ năm 1998 đến nay không?

Có .....*chuyển sang câu 12A, B, C, D, E*.....1

Không..... *chuyển sang câu 13*.....2

Việc Làm Trước Đây

12.A. Bạn đã làm những công việc gì khác trong vòng 5 năm qua, kể từ năm 1998 đến nay?	12.B. Xin vui lòng cho biết những nơi bạn đã làm việc đó. Bạn làm công việc này mỗi tuần bao nhiêu giờ?	12.C. Nhiệm vụ chính của bạn trong công việc đó là gì?	12.D. Bạn đã làm công việc đó được bao nhiêu năm ?	12.E. Lý do gì làm bạn ngưng công việc đó?

13. ***Prompt: Nhớ lại về những người quen của bạn đã từng làm công việc bạn làm.*** Trong những người cùng làm công việc giống bạn, có ai gặp những vấn đề sức khỏe (ví dụ bị bệnh, triệu chứng, khó chịu, v.v.) mà họ nghĩ là do công việc đó gây ra?

Có .....*chuyển sang câu 13A, B*.....1
Không ..... *chuyển sang câu 14*.....2
Không biết 3

Nếu có

13.A. Những vấn đề sức khỏe của họ hoặc những lo lắng cuả họ như thế nào? Xin kể ra.

_____

_____

13.B. Những nguyên nhân nào họ cho là do việc làm đã gây ra những vấn đề sức khỏe trên? Xin kể ra.

_____

_____

_____

14. Bạn có bao giờ phải thay đổi công việc vì lý do sức khỏe không?
Có .....*chuyển sang câu 14A, B, C, D*.....1
Không ..... *chuyển sang câu 15*.....2

Nếu có
14.A. Bạn đã phải nghĩ (những) công việc nào?

_____

_____

14.B. Sức khỏe của bạn đã bị ảnh hưởng như thế nào vì những công việc đó, hoặc bạn có những lo ngại gì?

_____

_____

14.C. Bạn nghĩ tại sao sức khoẻ của bạn bị ảnh hưởng hoặc điều gì đã làm bạn lo lắng cho sức khỏe của mình?

_____

14.D. Khi bạn ngưng công việc đó, những vấn đề sức khoẻ của bạn có trở nên tốt hơn không?
Có.....1
Không.....2
Không biết.....3

15. Bạn có bị dị ứng với bất cứ thứ gì ở chỗ làm không?
Có .....*chuyển sang câu 15A*.....1
Không ..... *chuyển sang câu 16*.....2
Không biết 3

Nếu có dị ứng
15.A. Bạn nghĩ là bạn dị ứng với thứ gì nơi sở làm?

_____

16. Bạn có bao giờ đi đến bác sĩ vì những vấn đề sức khỏe do công việc gây ra?
Có 1
Không..... 2

Phần 4. Hô hấp

Prompt: Bây giờ chúng ta sẽ nói về những triệu chứng hô hấp bạn đã bị trong 6 tháng qua.

Trong 6 tháng qua, bạn có bao giờ bị...?	*Nếu có với 17A, B, C, hoặc D,* Triệu chứng đó có giảm đi không nếu bạn nghỉ làm hơn một ngày?
17A. Khó thở? Có...*chuyển sang câu A(i)*.. .....1 Không..... 2	17 A(i) Có.....1 Không.....2 Không biết 3
17 B. Ho thường xuyên? Có...*chuyển sang câu B(i)*.. .....1 Không..... 2	17 B(i) Có.....1 Không.....2 Không biết.....3
17 C. Viêm, xưng hay đau rát xoang? ***(point to sinuses)*** Có...*chuyển sang câu C(i)*.. .....1 Không..... 2	17 C(i) Có.....1 Không.....2 Không biết.....3
17 D. Khó chịu ở mũi, họng hay ngực? Có...*chuyển sang câu D(i)*.. .....1 Không..... 2	17 D(i) Có.....1 Không.. .....2 Không biết.....3

Note to Interviewer: If No to all of #17 in the table, go to #19 (skip #18 A-B below). If Yes to <u>any</u> of #17 in the table, answer #18 A-B below.

18 A. Bạn có uống thuốc để chữa những triệu chứng này không?
Có ....*chuyển sang câu 18A (i)* 1
Không.....2

Nếu có .
18.A.i. Xin vui lòng kể tên các loại thuốc mà bạn uống?

_____

_____

18 B. Có điều gì trong công việc của bạn đã gây ra cho bạn những triệu chứng về đường hô hấp không?
Có....*chuyển sang câu 18B (i)*.....1
Không.....2

Nếu trả lời có.(If response if yes)
18 B.i Điều gì trong công việc của bạn đã gây ra cho bạn những triệu chứng đó?

Phần 5. Cơ bắp

Prompt: Bây giờ chúng ta sẽ nói về xương, khớp, và cơ bắp.

19. Trong 6 tháng qua, bạn có bị đau, nhức mỏi, rát hoặc tê buốt xảy ra nhiều hơn 3 lần hoặc kéo dài hơn 1 tuần?

Có....*chuyển sang câu 19A, B, C*.....1

Không .....*chuyển sang câu 20*.....2

Nếu có

Prompt: Sơ đồ cơ thể người: Đay là phía trước. Đay là phía sau. Dán vào những điểm trên cơ thể nơi bạn bị đau, nhức mỏi, rát hoặc tê buốt xảy ra nhiều hơn 3 lần hoặc kéo dài hơn 1 tuần.

Đối với từng vùng cơ thể bị đau

19.A. *Kể tên chỗ đau* (***If the respondent corrects the identification of the body area, note his/her word below***)	19.B. Bạn nghĩ triệu chứng này do đâu mà có?	19.C. Triệu chứng này có giảm bớt nếu bạn nghỉ làm hơn một tuần không?
		Có.... .....1 Không.....2 Không biết....3
		Có.... .....1 Không.....2 Không biết....3
		Có... .....1 Không.....2 Không biết....3
		Có... .....1 Không.....2 Không biết....3
		Có.. .....1 Không.....2 Không biết....3
		Có... .....1 Không.....2 Không biết....3

Phần 6. Bệnh về da

20. Trong 6 tháng qua, da bạn có chỗ nào bị tấy đỏ, ngứa, rát, nóng, khô bong không?

Có....*chuyển sang câu 20A,B (table)*.....1

Không .... *chuyển sang câu 21*.....2

Nếu có bị những triệu chứng kể trong câu 20

Đánh dấu trên sơ đồ cơ thể người.

20.A. Kể tên vùng da bị triệu chứng	20. B. Có phải triệu chứng này là do một thứ gì đó trong công việc của bạn gây ra?	*Nếu trả lời có cho câu 20. B* 20. C. Thứ gì hay quá trình nào trong công việc gây ra những triệu chứng đó?	*Nếu trả lời có cho câu 20. B.* 20. D. Những triệu chứng này có giảm bớt nếu bạn nghỉ làm hơn 2 ngày không?
	Phải...*chuyển sang câu C, D*.....1 Không phải 2		Có... .....1 Không.....2
	Phải...*chuyển sang câu C, D*.....1 Không phải 2		Có.....1 Không.....2
	Phải...*chuyển sang câu C, D*.....1 Không phải 2		Có.. .....1 Không.....2
	Phải...*chuyển sang câu C, D*.....1 Không phải 2		Có... .....1 Không.....2

Phần 7. Những triệu chứng mà bạn cảm thấy

21. Bạn có bao giờ cảm thấy nhức đầu trong khi làm việc và cảm thấy thuyên giảm hơn sau khi bạn rời khỏi chỗ làm không?

Có.....1

Không.....2

Không biết.....3

22. Bạn có bao giờ cảm thấy buồn nôn trong khi làm việc và cảm thấy thuyên giảm hơn sau khi bạn rời khỏi chỗ làm không?

Có.....1

Không.....2
Không biết.....3

23. Bạn có bao giờ cảm thấy ngột ngạt, khó tập trung, cảm thấy đầu óc bị choáng váng hay ngất xỉu trong khi làm việc và cảm thấy thuyên giảm hơn sau khi bạn rời khỏi chỗ làm không?
Có.....1
Không.....2
Không biết.....3

24. Ở nơi bạn làm việc có mùi nào làm cho bạn khó chịu không?
Có.....1
Không.....2
Không biết. 3

Phần 8. Sinh sản

25. Có bao giờ bạn hoặc người bạn tình/ vợ /chồng của bạn có chủ định/cố gắng sinh con trong thời gian 12 tháng hoặc lâu hơn mà không thành công không?
Có.....1
Không.....2
Không biết.....3

Phần 9. Môi trường làm việc
Prompt: Bây giờ chúng ta sẽ nói đến môi trường nơi bạn làm nhiều giờ nhất trong một tuần hoặc đã làm trong quá khứ.

26. Xin vui lòng kể tên các sản phẩm hoạc chất bột, chất lỏng hay hóa chất mà bạn sử dụng nơi làm việc. Nếu có thế, kể tên các sản phẩm và công ty sản xuất.

_____

_____

27. Xin kể ra những vật liệu và quá trình trong công việc của bạn mà có bất cứ mùi hôi, muì hắt hoặc làm bạn khó chịu nơi bạn làm việc.

_____

_____

28. Xin miêu tả/kể ra những loại bụi trong chỗ làm việc của bạn.

_____

_____

28.A. Sản phẩm/vật liệu nào hay quá trình nào trong công việc gây ra bụi bặm?

#29, Note: Nếu trả lời ''Có'' câu #26 hoặc #28 (liên quan tới hóa chất và bụi) và bạn không làm chủ cơ sở. (If ''Yes'' to 26 or 28 [chemicals or dusts], and not self-employed.)

29. Người chủ của bạn đã nói gì với bạn về nguy cơ độc hại của hóa chất nơi bạn làm việc?

30. Bây giờ tôi sẽ hỏi bạn thêm về chất lượng không khí nơi bạn làm việc. Trong một ngày bình thường với lượng khách trung bình, bạn đánh giá độ sạch của không khí nơi bạn làm việc như thế nào?

Tồi tệ 1
Không tốt / Cần được cải thiện 2
Tốt / Chấp nhận được 3
Tuyệt vời 4

31. Có phải những phần liệt kê sau đây_____ (read each answer one at a time, circle the answer) là vấn đề nơi chổ bạn làm trong một ngày trung bình không?

31A. Ngột ngạt / Không đủ không khí
Đúng..... 1
Không đúng.....2

31B. Hóa chất trong không khí
Đúng..... 1
Không đúng.....2

31C. Những lý do nào khác_____
Đúng.....1
Không đúng.....2

32. Nơi làm việc của bạn có không khí trong sạch từ bên ngoài thổi vào không?

Có.....*chuyển sang câu 32A, B*.....1
Không có..... *chuyển sang câu 33*.....2

Nếu có,

32.A. Những hệ thống nào sau đây đem lại không khí sạch vào nơi bạn làm việc? (*đọc và chọn tất cả các câu trả lời đúng*)

Hệ thống thông gió 1

Cửa ra vào và cửa sổ mở..... 2
Máy điều hòa không khí (máy lạnh) 3
Quạt treo tường.....4
Những loại Quạt khác 5

33. Nơi bạn làm việc có thêm hệ thống thông gió nào khác nữa không, ví dụ như bàn làm móng tay có hệ thống thông khí, hoặc hệ thống hút hơi độc, mùi hôi hay bụi ra ngoài?

Có...*chuyển sang câu 33A*.....1
Không.... *chuyển sang câu 34*.....2
Không biết.....3

Nếu có thêm hệ thống thông gió
33.A. Vui lòng miêu tả hệ thống hoạc dụng cụ hút hơi độc ra ngoài

_____

_____

34. Có bao giờ bạn hoặc một người bạn chung sở thay đổi vật liệu đang sử dụng nơi làm việc hoặc thay đổi cách làm việc để bảo vệ sức khỏe cho nhân viên không?

Có...*chuyển sang câu 34A*.....1
Không..... *chuyển sang câu 35*.....2
Không biết.....3

Nếu có thay đổi
34.A. Những thay đổi nào đã được thực hiện để bảo vệ sức khỏe của nhân viên?

_____

_____

35. Câu hỏi sau đây hướng đến sức khỏe của khách hàng thay vì của nhân viên. Có bao giờ bạn hoặc một người bạn chung sở thay đổi vật liệu đang sử dụng nơi làm việc hoặc thay đổi cách làm việc để bảo vệ sức khỏe cho khách hàng?

Có...*chuyển sang câu 35A*.....1
Không..... *chuyển sang câu 36*.....2
Không biết.....3

Nếu có thay đổi
35.A. Những thay đổi nào đã được thực hiện để bảo vệ sức khỏe của khách hàng?

_____

_____

36. Có ai hút thuốc gần nơi bạn ngồi hay hút ở bất kỳ chỗ nào ở nơi bạn làm việc không?

Có.....1

Không.....2

37. Bạn có sử dụng khẩu trang/ mặt nạ ở nơi làm việc không?
Có....*chuyển tới câu 37B, C, D, E* 1
Không..... *chuyển tới câu 37A*.....2

Nếu không có mang khẩu trang/ mặt nạ
37. A. Những lý do gì bạn không mang khẩu trang/ mặt nạ?

_____

_____

Nếu có câu 37,
37.B. Bạn sử dụng loại khẩu trang/ mặt nạ nào? (*nhìn mẫu và chọn tất cả các loại đã sử dụng*)
Khẩu trang/ mặt nạ giấy hoặc vải như loại dung trong y khoa hay phẫu thuật.....1
Khẩu trang/ mặt nạ che bụi có băng kim loại để cố định vào mũi và có in chữ.....2
Loại khẩu trang/ mặt nạ có màn lọc phòng hơi độc..... 3
Loại khác:_____..... 4

37.C. Bạn có thường xuyên sử dụng khẩu trang/ mặt nạ không? (*chọn một câu trả lời*)
Không bao giờ.....1
Một vài lúc trong khi làm việc.....2
Hầu hết thời gian làm việc.....3
Trong suốt thời gian làm việc.....4
Chỉ mang khi làm những việc sau (*điền vào*): _____...5

37.D. Tại sao bạn mang khẩu trang nơi bạn làm việc?

_____

_____

37.E. Bạn nghĩ khẩu trang/ mặt nạ có thể bảo vệ bạn hay không (chọn một câu trả lời)?
Không hề.....1
Một ít 2
Tương đối.....3
Rất tốt 4

38. Bạn có bao giờ sử dụng bao tay (găng tay) khi làm việc không?
Có....*chuyển sang câu 38A, B*.....1
Không .... *chuyển sang câu 39*.....2

Nếu có đeo găng tay
38.A. Bạn sử dụng loại găng tay nào? (*nhìn mẫu và chọn tất cả các loại đã sử dụng*) Latex, loại không có bột 1
Latex loại có bột 2

Non-latex chống lây nhiễm 3
Cao su 4
Vải bông 5
Găng tay làm việc 6
Loại khác_____..7

38.B. Bạn có thường xuyên sử dụng găng tay không? (*chọn một câu trả lời*)
Không bao giờ 1
Một vài lúc trong khi làm việc.....2
Hầu hết thời gian làm việc.....3
Trong suốt thời gian làm việc.....4
Chỉ mang khi làm những việc sau (*điền vào*) _____ 5

39 Bạn có lo lắng và quan tâm về vấn đề hóa chất có thể ảnh hưởng đến sức khoẻ của bạn không?
Rất lo lắng 1
Có phần hơi lo lắng 2
Không lo lắng chút nào 3

40. Ước lượng thời gian mà bạn phải nói lớn để người khác mới nghe được do sự ồn ào ở nơi việc làm?
Hầu hết thời gian làm việc. 1
Phần lớn thời gian làm việc 2
Đôi khi 3
Ít khi 4
Không khi nào.....5

Phần 10. Kỹ năng

Văn phòng Viet-AID đang có kế hoạch phát triển chương trình huấn nghệ cho cộng đồng Việt Nam. Chúng tôi muốn chắc rằng những chương trình này sẽ đáp ứng nhu cầu và lợi ích cho cộng đồng. Một số câu hỏi sau đây sẽ giúp Văn Phòng chúng tôi hiểu rỏ thêm về kỹ năng, kinh nghiệm nghề nghiệp, và các kế hoạch của bạn để chúng tôi có thể phát thảo những chương trình tốt hơn sau này.

41. Trình độ văn hóa cao nhất của bạn là lớp mấy? _____

42. Bạn còn có những kỹ năng hoạc năng khiếu? Xin kể ra.

_____

_____

43. Những kỹ năng nghề nghiệp nào bạn thích được học?

_____

_____

44. Nếu bạn quan tâm đến việc học hỏi thêm về một nghề mới, bạn có muốn tham gia vào chương trình huấn nghệ để có thể giúp bạn có được một việc làm mới hay không?

Có..... 1
Không.....2

45. Bạn đánh giá khả năng đọc tiếng Anh của mình như thế nào? (*chọn một câu trả lời*)
Xuất sắc 1
Tốt 2
Hạn chế 3
Rất hạn chế.....4

46 Bạn đánh giá khả năng nói tiếng Anh của mình như thế nào? (*chọn một câu trả lời*)
Xuất sắc 1
Tốt 2
Hạn chế 3
Rất hạn chế 4

47. Nếu Viet-AID có tổ chức chương trình tập huấn về sức khỏe và sự an toàn trong môi trường làm việc, bạn có muốn tham gia không?
Có..... 1
Không.....2

Questionnaire for Viet Aid worker survey

Incorporating changes from HN, TH, LA, and CR based on need to shrink following reactions from interviewers that instrument was too long

Demographic

1. **Mark gender**
   F.....1
   M.....2

2. What is your native language?
   Vietnamese.....1
   English.....2
   Other:_____.....3

3. How old are you? _____

4. In what year did you come to the United States? _____

5. How many cigarettes do you smoke per week?
   Number _____ (note 20 cig/pack).....1
   None.....2

6. How many people including children live in your home? _____

7. Do any of the people you live with smoke in the home?
   Y.....1
   N.....2

Overall Health

Now we're going to talk about your health.

8. Overall, how would you rate your health in the past 4 weeks? Would you rate your health (***read list, circle 1 answer***)
   Excellent.....1
   Very good.....2
   Good 3
   Fair.....4
   Poor.....5
   Very poor.....6

9. Are you allergic to anything?
   Y.....***Go to A, B***.....1
   N.....2
   Don't know.....3
   If yes to 9
   9.A. What are you allergic to? _____

   9.B. What kinds of symptoms or reactions do you have when you are exposed to (*materials mentioned*)?

10. Do you have asthma?
Y .....*Go to A*.....1
N .....2.
Don't know 3
If yes to 10
10.A. Has a doctor told you that you have asthma?
Y.....1
N.....2

Employment

Now we're going to talk about the types of work or occupations you are doing or have done.

11. Do you do any work for money now?
Y 1
N.....2

If yes to 11, go to 11A-D Current Employment Chart

Current Employment Chart

11.A. What types of work/occupations do you do now?	11.B. This question is about all the places where you do this kind of work. Including all the workplaces where you do this type of work, about how many total hours do you do this type of work each week?	11.C. What are the primary tasks you do for this work?	11.D. For about how many years have you been doing this type of work?

12. Besides the type of work you do now, have you done any other types of work/occupations in the past five years, since 1998?
Y 1
N.....2

If yes to 12, Go to 12A-E

Prior Employment Chart

12.A. What other types of work/occupations have you done in the past five years, since 1998?	12.B. Including all the places where you did this type of work, about how many hours did you do this type of work each week?	12.C. What were the primary tasks you did for this work?	12.D. For about how many years did you do this type of work?	12.E. What were the reasons for your leaving this job?

13. Think about people in the different types of work or occupations you have done. Do you know anyone who has health problems or health concerns that they feel might be caused by this type of work?

Y .....***Go to A, B***.....1
N .....2.
Don't know 3

If yes to 13

13.A. What types of health problems or concerns do they have? _____

_____

13.B. What about their job do they say causes their health problems? _____

_____

14. Have you ever changed jobs because of a health problem or concern about your health?

Y .....***Go to A, B, C, D***.....1
N 2

If yes to 14

14.A. What job or jobs did you leave? _____

14.B. How was your health affected by that job or jobs, or what were your health concerns?

_____

14.C.What do you believe caused your health problem or gave you concerns about your health at that job?

_____

_____

14.D. When you left the job, did the health problems that made you leave get better?
Y.....1
N.....2
Don't know.....3

15. Do you feel that you are allergic to anything at work?
Y .....*Go to A*.....1
N .....2.
Don't know 3

If yes to 15

15.A. What at your work do you feel you are allergic to?_____

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16. Have you ever seen a doctor because of health problems related to your work?
Y 1
N.....2

Respiratory
Now we're going to talk about any breathing and respiratory problems you have had during the past six months.

In the past 6 months, have you had...?	*If yes to 17A,B,C,or D* Does (*name symptom*) get better when you are away from work for more than one day?
17 A. difficulty breathing? Y...***Go to A (i)***...1 N.....2	17 A. (i) Y....1 N.....2 Don't know....3
17 B. regular cough? Y...***Go to A***...1 N.....2	17 B (i) Y....1 N.....2 Don't know....3
17 C. sinus pressure or inflammation (***point to sinuses***) or nasal congestion? Y...***Go to A***...1 N.....2	17 C. (i) Y....1 N.....2 Don't know....3
17 D. irritation in your throat, nose, or chest? Y...***Go to A***...1 N.....2	17 D. (i) Y....1 N.....2 Don't know....3

If yes to any of 17

18.A. Do you take any medicines for any of these respiratory problems you mentioned?
Y 1
N.....2
If yes to 18.A(i).
18.A.i. What are all the medicines you take for your breathing problems? _____

_____

18.B. Is there anything about your job that triggers your respiratory problems?
Y....***Go to i***.....1
N.....2
If yes to18.B(i).
18.B.i What at work triggers your respiratory symptoms? _____

_____

Musculoskeletal
Now we're going to talk about your bones, joints, and muscles.

19.In the past 6 months, have you felt pain, aching, stiffness, burning, numbness, or tingling ("pins and needles") that occurred more than three times OR lasted more than one week?
Y....***Go to A, B, C***.....1
N 2
If yes to 19

Body map: This is a picture of the front of your body. This is a picture of the back of your body. Stick these dots where you have felt pain, aching, stiffness, burning, numbness, or tingling -- "pins and needles" -- that occurred more than 3 times OR lasted more than 1 week.

For each body area marked

19.A. This is the (*Name body area*)? (***If the respondent corrects the identification of the body area, note his/her word below***)	19.B. What do you think causes this problem?	19.C. Does this problem get better if you are away from work for more than one week?
		Y....1 N.....2 Don't know....3
		Y....1 N.....2 Don't know....3
		Y....1 N.....2 Don't know....3
		Y....1 N.....2 Don't know....3
		Y....1 N.....2 Don't know....3
		Y....1 N.....2 Don't know....3
		Y....1 N.....2 Don't know....3
		Y....1 N.....2 Don't know....3

Skin

20. In the past six months, have you had redness, itching, rashes, burning, dryness, or scaliness on any part of your skin?

Y....***Go to A,B***....1
N 2

If yes to 20
Mark this on the body map.

20A. This is the (*Name body area*)? (***If the respondent corrects the***	20B. Is/was there something at your work that triggers	***If yes to 20B*** 20C. What products or processes at your work trigger this skin	***If yes to 20B*** 20 D. Does this problem

identification of the body area, note his/her word below)	this skin problem?	problem?	improve if you are away from work for more than 2 days?
	Y...*Go to C, D* ...1 N.....2		Y....1 N.....2
	Y...*Go to C, D* ...1 N.....2		Y....1 N.....2
	Y...*Go to C, D* ...1 N.....2		Y....1 N.....2
	Y...*Go to C, D* ...1 N.....2		Y....1 N.....2
	Y...*Go to C, D* ...1 N.....2		Y....1 N.....2

Subjective Symptoms

21. Do you ever feel headaches at work that get better when you go away from work?
    Y.....1
    N.....2
    Don't know....3

22. Do you ever feel nausea at work that gets better when you go away from work?
    Y.....1
    N.....2
    Don't know....3

23. Do you ever have difficulty concentrating or feel spaciness, lightheaded or faint at work that gets better when you go away from work?
    Y.....1
    N.....2
    Don't know....3

24. Are there odors at work that make you feel bad?
    Y.....1
    N.....2
    Don't know....3

Reproductive

25. Have (*if a woman*) you/(*if a man*) your partner/wife ever tried to conceive a baby for 12 months or more without success?
    Y.....1
    N.....2

Don't know.....3

Work Environment

Now we're going to talk about the work environment where you spend most of your time in each week or (*if not employed*) a previous job that you have spent much time in the past.

26. Please name the different materials, powders, liquids, or chemicals you use at your job. If you can, please tell me the specific names of the products as they are listed on the labels and the names of the manufacturers.

_____

_____

27. Which products or processes have a strong or irritating smell?_____

_____

28. Please describe any dusts that are in the air at your job. _____

_____

28.A. What products or processes are the dusts associated with? _____

_____

If yes to 26 or 28 (chemicals or dusts) and not self-employed

29. What has your employer told you about the hazards of the chemicals in your work?

_____

_____

_____

30. How would you rate the quality of the air you breath in your workplace on an average day during an average level of business? Would you rate the air quality (***read all the following choices***)

Terrible 1
Poor/Needs improvement.....2
Good/Acceptable 3
Excellent 4

31. Are any of the following (***read each answer one at a time, circle the answer***) a problem at your workplace on an average day?

31.A. Not enough fresh air/stuffiness
Y.....1
N.....2

31.B. Chemicals in the air
Y.....1
N.....2

31.C. Other problems with the air that we haven't mentioned?

Y:_____.....1

N.....2

32. Does your work area have fresh air brought in from the outside?

Y.....***Go to A, B***.....1

N.....2

If yes to 32

32.A. Which of the following systems helps fresh air get to your work area? (***read list, circle all that apply***)

Ventilation system, like ducts and vents 1

Open doors or windows.....2

Window air conditioner 3

Wall fan.....4

Other types of fans that are not wall fans 5

33. Are there other ventilation devices at work, such as vented nail tables, or air vacuum devices that remove bad air, smells or dust?

Y...***Go to A***.....1

N.....2

Don't know.....3

If yes to 37

33.A. Please describe the devices that remove the bad air._____

_____

34. Have you or anyone else at your work ever changed the materials used at work or changed the way work is done to protect the health of workers?

Y...***Go to A***.....1

N.....2

Don't know.....3

If yes to 34

34.A.What changes were made to protect the health of workers? _____

---

35. This question refers to the health of customers, not workers. Have you or anyone else at your work ever changed the materials used at work or changed the way work is done to protect the health of customers?

Y...***Go to A***.....1

N.....2

Don't know.....3

If yes to 35

35.A What changes were made to protect the health of customers? _____

_____

36. Does anyone smoke around you in any of the places where you currently work?

Y.....1

N.....2

37. Do you ever use a mask at work?
Y....***Go to B, C, D, E***.....1
N.....***Go to A***.....2

If no to 37

37. A. What are your reasons for not wearing a mask? _____

_____

if yes to 37

37.B. Which of these types of masks do you use? (***show example/pictures, circle all that apply***)
A paper or cloth mask like a medical or surgical mask.....1
A dust mask with a metal bar to fit around your nose and printing on it...2
A respirator with a rubber face piece and changeable cartridges.....3
Other:_____.....4

37.C. Do you use the mask _____? (***read list, circle 1 answer***)
None of the time you are doing your job.....1
Some of the time you are doing your job.....2
Most of the time you are doing your job.....3
All the time you are doing your job..... 4
Only when you do a certain kind of task (*fill in task*)_____...5

37.D. Why do you wear a mask at work? _____

_____

37.E. Do you think that the mask protects you _____? (***read list, circle 1 answer***)
Not at all.....1
A little.....2
Adequately.....3
Very well 4

38. Do you ever use gloves at work?
Y....***Go to A, B, C***...1
N 2

If yes to 41

38.A. Which of these types of gloves do you use at work? (***show pictures, circle all that apply***)
Latex powder-free.....1
Latex with powder 2
Vinyl or other clear (polypropylene, etc.) 3
Nitrile, blue or purple.....4
Cotton 5
Work gloves 6
Other_____.....7

38.B. How much of the time do you wear gloves at work? (***read list, circle 1 answer***)

None of the time you are doing your job 1
Some of the time you are doing your job.....2
Most of the time you are doing your job.....3
All the time you are doing your job.....4
Only when you are doing a particular kind of task (*fill in task*)_____.....5

39. How concerned are you about chemicals at work affecting your health? (***read list, circle 1 answer***)
Very concerned.....1
Somewhat concerned.....2
Not at all concerned.....3

40. How much of the time do you have to shout to be heard because of noise at work? (***read list, circle 1 answer***)
All the time you are working.....1
Most of the time you are working.....2
Some of the time you are working.....3
Rarely.....4
Never.....5

Skills

Viet-AID is planning to develop job-training programs for our community. We want to make sure that these programs meet people's needs and interests. The next few questions are to help Viet-AID learn about your work background, skills and plans so that we can design good programs.

41. What is the highest level of school you completed? _____

42. What job skills do you possess? _____

_____

43. What kinds of job skills would you be interested in learning? _____

---

44. If you were interested in developing new skills to enter a new sector, would you be willing to attend a training program to help you develop those skills in order for you to enter that sector?
Y.....1
N 2

45. How would you rate your skills at reading English? (*read list, circle 1 answer*)
Excellent 1
Good 2
Limited 3
Very limited.....4

46. How would you rate your skills at speaking English? (*read list, circle 1 answer*)
Excellent.....1

Good 2
Limited 3
Very limited.....4

47. If Viet-AID offered training on health and safety in the workplace, would you be interested in participating?

Y.....1
N 2

Nail Salon Walkthrough Audit v.4P 5/25/06

Q1 Salon ID Q2 Auditors Initials Q3 Audit Date and Time

Basic Info

Q4 How many years has this shop been in business (even if different owner)

Q5 How many nail techs work here when you are least busy?

Q6 How many nail techs work here when you are most busy?

Q7 How many manicures were done here last Saturday?

Q8 How many fake nails were done here last Saturday, including new sets and fills?

Q9 How much nail liquid do you use in a typical month?

Q10 Shop length

Q11 Shop width

Q12 Shop height

Q13 Number of manicure tables

Q14 Number of pedicure stations

Q15 Salon Location: free standing store front upper floor mall

Air Quality

Q16 Mechanical Ventilation yes no

Q17 Operation Verified for General Ventilation working not working don't know

Q18 Local Exhaust System yes no

If yes, Describe:

Q19 Operation Verified for LEV working not working don't know

Q20 Other Ventilation devices? table fans room fans room a/c exhaust fan
open doors/windows air purifiers

Q21 Air Movement From Source 5 (Rapid) 4 3 2 1 (Static)

Q22 Ventilation Notes

Q23 Temperature

Q24 Relative Humidity

Q25 Carbon Dioxide

Q26 Number of Occupants Now

Q27 Describe Odors

Q28 Mold/Mildew yes no

Q29 Airborne Dust Seen yes no

Q30 Settled Dust Seen yes no

Q31 Other AQ Issues

Những khám phá về các áp lực khó khăn đối với thợ làm móng tay người Việt

Tác giả: Cora Roelofs
Giáo sư Phụ Trách Nghiên Cứu Đại Học Massachusetts Lowell

Người dịch: *Lê Văn Lập*
VIET-AID

Ngày 11 tháng 8, 2008

Trước đây bốn tháng khi cô Bui Trần mở tiệm nòng cốt kinh doanh làm móng tay, cô cảm thấy không có gì đáng tự hào hơn. Cô ta đã cố làm cho tiệm thật sạch sẽ và vui mắt tối đa. Có rất nhiều cây xanh, tường được sơn các màu tươi mát, và cô đã bắt đầu có được những khách hàng quen thuộc, họ đến làm móng vì cảm mến sự chăm sóc đặc biệt tại đây và rằng vì sự sáng sủa đẹp đẽ của tiệm. Nhưng có một điều làm cô buồn phiền, lo ngại, mặc dù khách hàng không phàn nàn. Cô nghĩ rằng hơi hóa chất tỏa ra trong phòng làm móng đã làm cô hằng ngày bị nhức đầu. Có gì được cô khuê làm việc, và cô vào ngày thứ bảy cũng chẳng phàn nàn gì, nhưng vào cuối ngày cô và chị của cô này cũng gặp trở ngại khó chịu. Về sau thì cô Trần bắt đầu bị những vết ngứa đỏ trên mặt. Cô có ăn phải thứ gì không hợp thể gây ra tình trạng này hay trong phòng làm móng tay có điều gì không ổn? Có phải chiếc mặt nạ có mang để bảo vệ tránh hóa chất đã gây nên tình trạng này chăng? Cô Trần phân vân không hiểu các nhân viên làm móng tại các tiệm khác có bị cùng tình trạng này không, và phải làm gì với chứng đây . .

Bui Trần là người chủ giàu nhưng tương của một tiệm làm móng tay trong khu vực Greater Boston. Nhưng sự quan tâm của cô ta và các nhà tới thân là có thật và trường hợp của cô không phải là đơn độc. Một cuộc nghiên cứu mới đây của Viet-AID, một tổ chức phát triển cộng đồng Việt Mỹ tại vùng Dorchester và các nhà nghiên cứu thuộc Đại học Massachusetts Lowell đã cho thấy rằng có khá nhiều các kỹ thuật viên làm móng tay ở khu vực Boston đã báo cáo nhiều vấn đề sức rối về sức khỏe liên quan đến nghề nghiệp như bị nhức đầu, đã gặp nhiều vấn đề, bị nhức và đau cơ. Nhiều người làm việc hàng tuần nhiều giờ cũng bị như vậy. Thêm đó 71 kỹ thuật viên làm móng tay thì thấy giờ làm việc trung bình của họ là 46 giờ một tuần, một số làm việc đến 60 giờ. Làm việc quá nhiều giờ như vậy thì không lạ gì khi căng thẳng đã đã gây ra những tác hại cho họ. Một số hóa chất trong các sản phẩm làm móng tay có thể gây tổn các rắc rối về da và hô hấp nếu đã tiếp xúc với chúng trong một thời gian dài.

Hầu hết một phần ba những kỹ thuật viên làm móng được chúng vấn trong cuộc khảo sát trên báo cáo rằng ít nhất một trong các triệu chứng về hô hấp đã được cải thiện tốt hơn khi họ ngưng không làm việc trong một thời gian. Điều đó chỉ ra rằng làm việc trong tiệm làm móng có thể gây ra các triệu chứng như kích ứng mũi, họng và khó thở. May mắn là không có nhiều trường hợp bị bệnh suyễn, mặc dù các bác sĩ về sức khỏe nghề nghiệp nhận định rằng các hóa chất lỏng để làm móng tay giả có gây ra "sự nhạy cảm" dẫn đến bệnh suyễn. Các vấn đề về da cũng thường được báo cáo với hơn 30% thợ làm móng được khảo sát nói rằng họ bị ngứa và có vết đỏ trên tay và mặt. Các chất lỏng có mùi nồng nặc này có thể gây ra các vấn đề về da, nhưng các hóa chất khác làm khô da như cồn và acetone cũng góp phần vào đó. Ngay cả yêu cầu phải rửa tay thường xuyên tại tiệm làm móng cũng dẫn đến tình trạng về da nói trên.

Phàn nàn thông thường nhất của thợ làm móng là bị nhức và đau cơ. Sử dụng máy làm móng, làm việc với tư thế nghiêng cổ và lưng, và kể cả công việc xoa bóp là một số nguyên nhân gây ra đau nhức và tỉ lệ mới ở 46% công nhân làm móng. Như hầu hết các đau đớn liên quan đến nghề nghiệp được báo cáo, 28 % nói rằng họ nghỉ do công việc buộc họ phải lập đứng nhiều và đã làm cho họ cảm thấy yếu ớt đi.

Một số trong các nguyên nhân dẫn đến các bệnh tật trên là do thiết không khí trong tình trong phòng làm việc. Hầu hết một phần ba thợ làm móng nói rằng không có không khí trong lành được đưa vào trong phòng làm việc, và hai mươi phần trăm thì nghĩ rằng không đủ không khí này lưu thông. Khiến thợ làm móng bị khó chịu với mới hơi hóa chất tại chỗ làm (63%), nhưng những người khác thì bảo rằng họ đã quen với chúng.

Không có nhiều thợ móng tay được thông báo và hiểu được những nguy hại có thể có từ các hóa chất họ dùng, chúng các người khác thì đã được chú họ nhắc nhở. Một người nói "Người chủ nói rằng hóa chất có hại, vì vậy chúng ta nên giữ cho luôn luôn được thông gió và phải đậy kỹ các nắp và các vật bao phía ngoài các hóa chất lại." Những người khác được bảo rằng đeo một nạ hoặc lự chọn một nạ nếng để đeo. Thực ra hầu hết tất cả các thợ làm móng tay đều có đeo một nạ- một số để "giữ vẻ sạch" và những người khác thì để bảo vệ sức khỏe. Một như nữ nói "Tôi trẻ và đang có thai và tôi không muốn hít phải bụi và hóa chất. Tôi sợ nó sẽ ảnh hưởng xấu đến con tôi sau này."

Về các mặt nạ đó thì thế nào? Người chủ tiệm móng tay có nhiều tường tượng của chúng ta là cô Bùi Trần phân vân không biết các mặt nạ đó có lợi hay có hại. Chúng có thể có hại. Cần một ra giữ vệ sinh bằng giấy hay vải mà thợ móng tay đeo khi làm việc không bảo vệ được họ tránh hít phải hơi hóa chất. Hơi hóa chất rất nhỏ đến mức chúng có thể đi xuyên qua lớp mặt nạ. Những chiếc mặt nạ này có thể giúp thợ làm móng tay tránh không hít phải bụi bẩm, nhưng chúng cũng có thể giữ bụi và hóa chất lại đã gây nên các kích ứng nơi da mặt.

Vậy cô Bui Trần và những người khác phải làm gì nhằm ngừa tránh không để cho công việc họ yêu thích thay mang lại cuộc sống tốt đẹp cho hội cô thể gây nguy hại đến cơ thể của họ? Có nhiều giải pháp thông dụng rất hữu hiệu. Trước hết là giữ cho hóa chất không trần vào không khí bằng cách đậy kín các lọ đựng hóa chất bất cứ khi nào có thể. (Bạn cũng không muốn hóa chất bay vào da và mang găng bảo vệ có thể giúp được bạn). Thứ hai phải để không khí tươi mát bên ngoài trần vào phòng làm việc bằng cách mở các cửa lớn và cửa sổ hay cho khởi động hệ thống thông gió và điều hòa không khí. Thiết bị làm sạch không khí và các quạt trần không thể dụng trong việc loại bỏ hóa chất ra khỏi không khí. Hệ thống thông gió mang không khí mát và ấm vào phòng là một trong điểm trong năm là cách tốt nhất để làm không khí lưu chuyển tốt. Nhức và đau thì khó ngừa tránh hơn nếu bạn phải làm việc nhiều giờ trong những tư thế khó khăn, nhưng thực hiện các đợt nghỉ ngắn giữa các khách hàng, dùng gối đỡ đệm bằng ở khủy tay và vương dậy nhẹ nhàng lưng và cổ có thể giúp ích cho bạn.

Một tháng sau khi cô Bùi Trần gọi đến Viet-AID để yêu cầu có các lời khuyên nhằm cải thiện sức khỏe khi làm việc, cô cảm thấy rằng các đề nghị của cơ quan này thật sự đã giúp cô cải thiện được sức khỏe của mình. Cô đã vứt bỏ các thùng chứa " Stan-Dry" đựng các hóa chất chỉ gây kích thích da và không cần thiết gì cả. Cô chỉ cho một nạ khi giữa móng tay bằng máy và cô đã cho vận hành hệ thống không khí nhiều hơn. Mọi người trong tiệm có các đợt nghỉ ngắn hơn để vươn tay vươn mình và đã nghỉ ngơi giữa các khách hàng. Họ đã bắt đầu mang găng tay để chuyển các sản phẩm từ thùng chứa lớn sang các đồ đựng nhỏ hơn mà họ sử dụng tại chỗ. Một trong những khách hàng mới của cô Trần nói với cô rằng họ ta sẽ tiếp tục đến làm móng tay tại đây bởi vì tiệm trước đây bị lạ thường đến làm có mùi hóa chất quá nặng. Nhân viên Viet-AID cũng đã giúp cô ta vay được tiền để mua ghế làm chân mới và việc này đã thu hút thêm nhiều khách hàng mới cho tiệm của cô. Cô Trần đã tự cảm thấy sức khỏe tốt hơn, công như cô cảm thấy rằng việc kinh doanh hành nghề cải tốt đẹp khi nó bảo vệ được sức khỏe cho cô và cho những người thợ.

Để có thêm thông tin về cuộc khảo sát này về các lời khuyên về sức khỏe và công việc tại tiệm làm móng tay, các bạn có thể gọi cho cơ quan Viet-AID ở số điện thoại (617) 822-3717 hoặc email *health@viet-aid.org*

Số 600 Thứ Ba, Oct 17, 2006 - Ấn phí $2.00

New Discoveries about Difficulties for Vietnamese Manicurists
Thang Long Oct. 17th, 2006

Cora Roelofs, 2006

When Tran Bui opened her very own nail salon four months ago, she couldn't have been more proud. She had taken care to make the salon as neat and cheerful as possible. There were lots of plants and fresh paint on the walls, and she was starting to get loyal customers who appreciated her attention to their nails and her bright salon. But something was bothering her. Her customers didn't complain, but she thought that the chemicals in the air in the salon gave her headaches everyday. The girl she hired to work with her on Saturdays didn't complain either, but at the end of the day, her neck and back bothered her. And then Tran was starting to get itchy red patches on her face. Was it something she ate or something in the salon? Was it the mask she wore to protect herself from the chemicals? Tran wondered if other nail salon techs had the same problems and what could be done about them.....

Tran Bui is the fictional owner of a nail salon in the Greater Boston area. But her concerns are real and she is not alone. A new study conducted by the Dorchester-based Vietnamese American Initiative for Development, Inc (Viet-AID) and researchers at the University of Massachusetts Lowell has found that many nail techs in the Boston area report work-related health problems, such as headaches, skin problems and muscle aches and pains. Many work long hours, too. The average hours worked per week by the 71 nail techs surveyed was 46, with some working as many as 80 hours per week. Working so many hours, it is not surprising that the work can take a toll. And some of the chemicals in the nail products can cause skin and breathing problems if people are exposed to them for long periods of time.

Almost one-third of the nail techs who were interviewed for the survey reported at least one respiratory symptom that got better when they were away from work for a period of time – an indication that work in the nail salon can cause such things as irritation in the nose and throat and difficulty breathing. Fortunately, not many nail techs reported having asthma, even though the nail liquid chemical used to make fake nails has been recognized by occupational health doctors to cause "sensitization" that can lead to asthma. Skin problems were also commonly reported with more than 30% of the surveyed nail techs saying that they had itches or redness on their hands or face. That strong smelling liquid can also cause skin problems, but other chemicals that dry the skin such as alcohol or acetone might also contribute. Even the frequent hand washing required in a salon can lead to skin problems.

The nail tech's most common complaint was muscle aches and pains. Holding the nail filing machine, working with a bend neck and back, and even giving massages were some of the things that caused problems for the 46% of nail techs who said they experienced pain or numbness. Almost as many reported work-related headaches and 28% said that they thought that work affected their concentration or made them feel faint.

Some of the reason for these complaints may be a lack of fresh air in salons. Almost a third of the respondents said that there is no fresh air brought in and twenty percent thought that there wasn't enough fresh air in their salons. Many were bothered by the odors at work (63%), but others said that they were used to it.

Not many salon workers had been told or knew about the potential hazards of the chemicals that they worked with, but others had been given advice by their employer. One said "The owner says that the chemicals are harmful, so we should always keep the ventilator on and close the lids and covers of the chemicals." Others had been told to wear masks or chose to wear them themselves. In fact, almost all of the nail techs said that they wore masks – some to "keep hygiene" and others to protect their health. As one woman said "I'm young and pregnant and I don't want the breathe in the dust and chemicals. I'm afraid it may affect my child later on."

What about those masks? Our fictional salon owner, Tran Bui wondered if they were helping or hurting. They may be hurting. The paper or cloth hygiene masks worn by nail techs do not protect them from breathing in chemicals. Chemicals in the air are so small that they can go right through the mask. The masks may help prevent nail techs from breathing in dust, but they may also collect dust and chemicals that can irritate the skin of the face.

What can Tran Bui and others do to prevent the work they love (or the good living it provides) from hurting their bodies? There are many commonsense solutions. The first is to keep the chemicals from getting in the air by keeping all containers closed when possible. (You also want to keep the chemicals from getting on your skin and wearing protective gloves can help.) The second is to get fresh air into the salon by keeping doors and windows open or turning on ventilation systems and air conditioners. Air cleaners and ceiling exhaust fans will not be effective in removing chemicals from the air. Ventilation systems that bring in fresh cool or warm air at all times of the year are the best way to keep the air moving. Aches and pains are harder to prevent if you work long hours in awkward positions, but taking mini-breaks between customers, using padded wrist rests and gently stretching the back and neck may help.

One month after Tran Bui had called Viet-AID to get some advise about improving her health at work, she felt that their suggestions had already made an improvement. She had thrown away the "Steri-Dry" containers that contained an irritating chemical and weren't necessary anyway. She only wore the mask when filing with the machine and she turned on her air system more. Everyone in the salon took little breaks to stretch and rest between customers and started wearing gloves to transfer the nail products from the big to the little containers they used at their stations. One of her new customers told her that she started coming to Tran because her usual salon smelled too strong. The staff at Viet-AID had also helped her get a loan to buy a new pedicure chair and it was drawing new customers. As well as feeling better herself, Tran started to feel that protecting her and her employees' health was good business.

For more information about this survey and advice about health and work in a nail salon, you can call Viet-AID at (617) 822-3717 or email health@vietaid.org.


THY'S NAILS & SKIN CARE
EYE-BROW WAX
VICTORIA'S NAILS SALON
PROFESSIONAL NAIL CARE
Tokyo Hair & Nail
Lynn's Spa
Lịch
2006-2007
Calendar
For a Healthy
Nail Salon
Work Environment
Cho Môi Trường
Làm Móng Tay
Trong Lành

Clean Air

Fresh air is the key!
Chemicals can build up in the air.
The chemicals can make the air unhealthy.
Ventilation systems can keep your salon pleasant.
A ventilation system takes out bad air and brings in fresh air.
You can also get fresh air by opening the doors and windows.
You can turn on the fan in the air conditioner several times a day.
An air cleaner machine can help.
Air cleaners must have "activated carbon" to clean the air.
Stay away from air filters with "ion generators", these can make harmful ozone gas.

Làm sạch không khí

Không khí trong lành là giải pháp chính!
Các hoá chất có thể hòa lẫn vào không khí nơi làm việc.
Các hóa chất này có thể làm cho không khí có hại đến sức khỏe.
Hệ thống làm thông gió có thể giữ cho căn phòng của bạn có không khí dễ chịu.
Hệ thống thông gió sẽ làm mất không khí xấu và đưa vào không khí tươi mát.
Bạn cũng có thể có được không khí tươi mát bằng cách mở các cửa chính và cửa sổ.
Bạn cũng có thể mở quạt trong máy điều hòa không khí năm sáu lần một ngày.
Máy làm sạch không khí có thể giúp bạn.
Máy làm sạch không khí phải có "chất carbon hoạt hoá" để làm sạch không khí.
Phải tránh xa những bộ lọc không khí "phát sinh các ion", chúng có thể tạo ra khí ozone độc hại.

Preventing Aches and Pains

Many nail techs have sore backs, shoulders, necks, wrists, and hands. These problems may be caused by sitting for a long time, bending, using tools, and doing the same motions over and over.

Sore wrists may come from resting wrists on the edge of the table. Gel wrist rests available in office supply stores may help this problem. Try this stretching exercise.

Nhiều nhân viên làm móng tay bị đau lưng, đau vai, đau cổ, đau cổ tay và bàn tay.

Các vấn đề này có thể phát sinh là do ngồi lâu, thường cúi người xuống, sử dụng dụng cụ, và làm cùng một động tác lặp đi lặp lại nhiều lần.

Đau cổ tay có thể do phải chống cổ tay nơi rìa bàn làm việc.

Gel chống đau cổ tay nơi các cửa hàng cung cấp dụng cụ văn phòng có thể giúp giải quyết việc này.

Hãy thử tập động tác co duỗi tay thường xuyên.

Masks

Nail techs wear face masks for many reasons.

They wear masks to be sanitary. Techs also want masks to keep out dust and chemicals.

Most nail techs use paper or cloth masks. Paper and cloth masks do NOT protect you from chemicals! Nail chemicals and odors go right through paper and cloth masks.

Paper and cloth masks can also irritate your skin.

Some masks do keep out chemicals. Masks with charcoal filters help keep out chemicals. Masks with charcoal filters work like water filters.

One filter mask is the "N95 with Nuisance Organic Vapor Protection." You can buy these masks from safety products companies such as www.labsafety.com

Đeo mặt nạ phòng độc

Những người làm móng tay phải đeo mặt nạ vì nhiều lý do.

Họ đeo mặt nạ để giữ vệ sinh. Họ cũng muốn đeo mặt nạ để tránh bụi và hóa chất.

Phần lớn những người làm móng thường dùng mặt nạ bằng giấy hay vải. Những mặt nạ bằng giấy hay vải không bảo vệ được bạn tránh khỏi hóa chất có hại! Các hóa chất làm móng và mùi của chúng đi thẳng xuyên qua mặt nạ bằng giấy và vải.

Mặt nạ bằng giấy và vải cũng có thể gây kích thích làm khó chịu da bạn.

Có một số mặt nạ có thể tránh được hóa chất có hại. Các mặt nạ với bộ phận lọc bằng than giúp tránh được hóa chất.

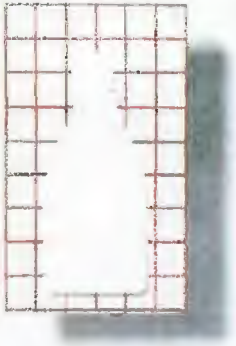
Mặt nạ với bộ phận lọc bằng than hoạt động giống như các bộ phận lọc bằng nước.

Một mặt nạ lọc có tên là "N95 Bảo vệ tránh các chất hơi hữu cơ độc hại." Bạn có thể mua các mặt nạ này tại các công ty bán sản phẩm an toàn như www.labsafety.com

GETTING INFORMATION

You can find health information about nail products.
Each product has a "Material Safety Data Sheet" or MSDS.
An MSDS tells you what is in the product. The MSDS also tells you about effects on your health.
An MSDS tells you how to use and store products safely.
You can get the MSDS for any nail product. Call the company that makes the product. They will fax or send you the MSDS.
Many MSDS for nail products are available at:
http://www.eznails.com/msds.htm

Bạn có thể tìm thấy các tin tức liên quan đến sức khỏe của các sản phẩm dùng trong việc làm móng tay.
Mỗi sản phẩm đều có một "tấm giấy báo các thông tin an toàn nguyên liệu" hay gọi tắt là MSDS.
Một MSDS báo cho bạn biết bên trong sản phẩm có chứa hoá chất gì. MSDS cũng báo cho bạn biết chất đó có những ảnh hưởng gì đến sức khỏe.
Một MSDS cũng báo cho bạn biết cách sử dụng và cất giữ sản phẩm một cách an toàn.
Bạn có thể có được những tấm MSDS này cho bất cứ sản phẩm làm móng nào. Hãy gọi cho công ty làm ra sản phẩm đó. Họ sẽ fax hay gởi nó đến cho các bạn.



Keep it Covered

Keep chemicals from getting into the salon air in the first place! These tips can help:

1. Place chemical-soaked gauze pads in a zip lock bag before throwing them in the trash can.
2. Change trash can liners daily and use a trash can with a lid.
3. Pour only the amount of fingernail liquid needed into the bottle.
4. Use bottles that have small openings -- only large enough for a brush to enter.
5. Keep containers closed when not in use.

Hãy giữ cho các hóa chất không thoát ra không khí ngay trong phòng. Biện pháp này có thể giúp:

1. Đặt các miếng gạc thấm hóa chất trong túi đựng có dây kéo khóa lại trước khi vứt chúng vào thùng rác.
2. Thay bao lót thùng rác hàng ngày và nên dùng thùng rác có nắp đậy.
3. Chỉ đổ vào chai đựng một số lượng hóa chất dùng làm móng tay cần thiết.
4. Sử dụng các chai có nắp mở nhỏ -- chỉ đủ rộng để đưa bàn chải vào được.
5. Đậy kỹ các vật dụng đựng hóa chất khi không sử dụng.

Cần sự giúp đỡ ở đâu

Để có thêm tin tức về bảo vệ sức khỏe và sự an toàn, hãy gọi đến Liên Hiệp Massachusetts về An toàn và Sức khỏe Nghề nghiệp (MassCOSH). MassCOSH hiện ở tại Trung Tâm Cộng Đồng Việt Nam tại Dorchester và số điện thoại là (617) 825-7233. Họ cũng có thể đưa ra lời khuyên cho bạn là bạn nên làm gì khi bạn gặp tổn thương trong lúc làm việc. Viet-AID có thể giúp bạn bằng tiếng Việt, số điện thoại là (617) 822-3717.

Thông tin cũng còn có trên các mạng điện toán :
Các sản phẩm nhân tạo để làm móng tay: Hướng dẫn sự sắp đặt các hóa chất trong phòng làm móng tay
http://www.dhs.ca.gov/ohb/HESIS/artnails.htm
Móng Tay Nhân Tạo và Chất Lượng Không Khí Trong Nhà
http:www.mass.gov/dos/iaqdocs/iaq-400.htm
Giúp đỡ Một Tay Cho Những Người Làm Móng
http://www.ahealthyme.com/topic/manicurists

WHERE TO GET HELP

To get more information about health and safety, you can call the Massachusetts Coalition for Occupational Safety and Health.
MassCOSH is located in the Vietnamese Community Center in Dorchester and their telephone number is (617) 825-7233.
They can also give you advice about what to do if you are injured at work.
Viet AID can give you help in Vietnamese; their number is (617) 822-3717.

Information is also on the web:
Artificial Fingernail Products: A Guide to Chemical Exposures in the Nail Salon
http://www.dhs.ca.gov/ohb/HESIS/artnails.htm
Artificial Fingernails and Indoor Air Quality
http://www.mass.gov/dos/iaqdocs/iaq-400.htm
Giving Manicurists a Hand
http://www.ahealthyme.com/topic/manicurists