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Identifying Health and Safety Concerns in Southeast Asian Immigrant Nail Salon Workers

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Nail salon workers are exposed to a variety of toxic chemicals at levels that remain unreported and have undetermined health consequences. The objective of the study was to gather information about the hazards in nail salons along with safety practices and health concerns of nail salon workers. A survey was conducted on 65 nail salon workers who were immigrants from Southeast Asia in Oregon, USA. More than 20% of the participants reported nose irritation and allergies as the most common health problems. Rare and no use of gloves and mask were reported among 72% and 32% of the participants, respectively. A significantly higher number of participants with "fair" or "poor" self-reported general health condition was found among the workers who applied acrylic nails compared with those who were not involved in this application. Findings of the study emphasize the need for more research to determine the relationship between chemical exposures in nail salons and health outcomes.

Keywords: acrylic nail, health concerns, nail salon workers, safety practices

Chemicals used by nail salon workers have the potential to cause long-term negative health consequences. Most nail products, including nail polish, solvents, acrylics, and gels, contain harmful chemicals such as formaldehyde, toluene, dibutyl phthalate (DBP), and methacrylates. The use of these chemicals is associated with health problems such as asthma, cancer, and neurological outcomes.[1–3] Typically, nail salon workers are exposed to these potentially harmful chemicals daily, and at levels that are difficult to measure. Assessing long-term exposures to these chemicals is a challenge for public health researchers.

It is estimated that 45% of nail salon workers in the United States are Vietnamese immigrants and refugees.[1,4] This population of workers may be more vulnerable to workplace exposures because the majority of workers are not fluent in English, and until recently, health and safety training materials have only been available in English. Additionally, informational materials regarding hazardous materials in the workplace are not easily accessible.[2,5] For instance, nearly 89% of the ingredients used in the cosmetics industry have not been evaluated for safety.[6]

Although professional manicure work has only been recognized as a profession since the 1980s, it has recently become one of the fastest growing industries in the United States.[1] Within the last 20 years there has been a 345% increase in the number of registered manicurists in the United States.[3] In 2011 there were over 350,000 licensed manicurists in the United States.[4] The nail salon industry is attractive to the Vietnamese population because the training is short, inexpensive, and workers do not need to be fluent in English to be successful.[5] Additionally, in some cases, immigrants received previous training in Vietnam. At the same time, the industry has been historically dominated by Vietnamese immigrants in states such as Oregon and California.[1] Traditional workplace hazard communication training is not consistently provided in most nail salons, reducing the opportunity for Vietnamese nail salon workers to get access to information about safe practices. In recent years, a number of more general guidance documents have been developed by the Labor Occupational Health Program (LOHP) and Occupational Safety and Health Administration (OSHA), in multiple languages including Vietnamese, which offer basic safety and health training, without knowing the specific chemical constituents of each Material Safety Data Sheets (MSDS).

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The "Toxic Trio," formaldehyde, toluene, and dibutyl phthalate (DBP), is perhaps the most well-known group of toxic chemicals used in nail products that have been extensively studied for their toxicological properties. Formaldehyde is used as a nail hardener, toluene forms a smooth finish over the nail, and DBP provides flexibility and a moisturizing sheen.[7] Formaldehyde is a human carcinogen, toluene is associated with nervous system and reproductive system toxicity, whereas DBP is a reproductive and developmental toxin.[7] Several studies have found associations between long-term occupational exposures to toxic chemicals and specific self-reported health problems, including respiratory effects, skin problems, neuropsychological problems, and even spontaneous abortion.[1–3,5] In addition, the application of acrylic nails includes toxic materials such as polymethyl methacrylate acrylics, a mixture of a polymer powder and a liquid monomer (eg, ethyl methacrylate). The mixture, used to harden the artificial layers on the nail, has been reported to be associated with rhinitis and contact dermatitis.[8,9] Exposure to acrylics can also lead to respiratory allergies in salon workers.[1] Overall, the nail salon environment is a mixture of toxic volatile chemicals that have the potential to cause adverse health symptoms.

Although nail salon technicians are required to complete training to become licensed, the laws regarding this issue in the United States vary by state. Alabama requires 750 training hours for a nail technician license, yet Colorado requires only 20 hours for a license. Oregon requires 350 hours to become licensed in nail technology, in addition to completing a certain number of hours in safety and infection control for initial certification,[10] whereas California requires 400 hours of training for taking the state board examination to become a manicurist.[11] The variation of length of training by state leads to workers with different levels of skills and knowledge regarding workplace safety and health.

Recently, a number of advocacy groups have been formed in the United States that focus on creating healthier and safer working conditions for nail salon workers (Table 1). Most of these organizations promote and provide health and safety training materials and classes, in addition to offering other services. Trainings typically focus on ventilation, using less toxic products, and using appropriate personal protective equipment.

The Occupational Safety and Health Administration (OSHA) and its state counterparts help employers and employees reduce work-related job injuries, illnesses, and deaths through information sharing on OSHA regulations, trainings, and voluntary partnership programs. However, it remains questionable whether nail salon employers are providing appropriate training as required by OSHA, even though agencies over the past few years have supported the creation of training materials in several languages.[5] Oregon OSHA is available to provide consultation services to the nail salon industry in Oregon. Although a few beauty schools have asked for this free service to improve their salon health and safety and to provide training, our personal communication with Oregon OSHA indicates that none of the employers so far has requested this service.

The primary goal of the current study was to identify health and safety concerns of a current working population in the nail salon industry in Oregon through a survey. Initially our intention with this survey was to recruit interested employers for focus groups to assist in the development of training for their employees. Our survey results illustrated there to be little interest in attending focus groups at an outside location. Therefore, the goal of this survey was to collect information to share within the nail salon and public health communities to further the development of understandable education and training materials for this immigrant Southeast Asian population.

Methods

Study Population and Recruitment

Partnering with the Asian Health and Services Center (AHSC), researchers at Oregon Health and Science University (OHSU) applied a community-based participatory approach to recruit workers from nail salons in Portland, Oregon. Health outreach workers from AHSC, who were bilingual in English and Vietnamese, used their experience working with immigrants from Southeast Asia to establish contacts with the target population. Initial recruitment effort involved visiting Vietnamese nail salon workers and inviting the workers to participate in the survey assessing health status and workplace practices. A snowball approach to recruitment was utilized—recruiting one participant often led to participants encouraging their coworkers to join the study.

Survey

The survey items were adapted from a questionnaire created by the California Healthy Nail Salon Collaborative, which was available both in English and Vietnamese,[12] and was administered by Vietnamese speaking AHSC health outreach workers. Prior to the start of the study, the Vietnamese survey items were reviewed and modified by AHSC for cultural appropriateness. The survey questionnaire was divided into 5 sections. The first section contained 15 items addressing demographic and basic salon characteristics, including an item addressing the application of acrylic nails by the salon workers. The second part had 7 items addressing health problems experienced by the salon workers and coworkers and accessibility to health insurance. The third contained 11 items focused on workplace safety issues such as specific tools used for safer practices, use of personal protective equipment (PPE), access to information on chemicals, and the participants' knowledge of the properties of the chemicals used in the salon. The final section contained 8 items regarding general concerns of the workers (such as working enough hours), Internet use, and preference for the mode of future dissemination of information on occupational health and safety information.

After initial contact, participants were given the option to complete the survey either in person, over the phone, or to complete it at home and mail it to AHSC. Participants received the best practices brochure (available both in English and Vietnamese), "How to be Safe at Work,"[13] created by the Oregon Collaborative for Healthy Nail Salons. In addition to the brochure, participants received a $5 gift card to a local store as an incentive for completing the survey. The data from the current participants in Oregon was then compared with

Table 1. Active Groups Working on Creating Healthy and Safe Environment for the Nail Salon Workers

Name of group	Location	Actions
California Healthy Nail Salon Collaborative www.cahealthynailsalons.org/	Oakland, California	• Active since 2005, the California Collaborative Active since 2005, the California Healthy Nail Salon Collaborative is a statewide coalition that seeks to improve the health, safety, and rights of the nail and beauty care workforce • In Partnership with San Francisco Board Supervisor David Chiu, the collaborative passed the San Francisco Healthy Nail Salon Ordinance, which recognizes nail salons that meet a rigorous checklist of healthy and safe workplace requirements including ventilation and nail products that do not contain the "Toxic Trio"
Local Hazardous Waste Management in King County www.lhwmp.org/home/Health/nail-salons.aspx	Seattle, Washington	• King County offers financial assistance to nail salons to improve ventilation and use less toxic products • Offers local trainings, provide free health and safety brochures and videos online
The Safe Nail Salon Project www.bphc.org/safenails	Boston, Massachusetts	• Funded by the Boston Public Health Commission, provides free local training, health screenings, and health materials to nail salon workers • Emphasize using proper ventilation and personal protective equipment
Occupational Safety and Health Administration www.osha.gov/SLTC/nailsalons/index.html	Washington, D.C.	• Provides information about ergonomics, chemicals, diseases, workers' rights, and nail salon standards
Oregon Healthy Nail Salon Collaboration www.oregonhealthynailsalons.org	Portland, Oregon	• Loosely structured nonfunded organization comprised of organizational sharing a common interest in worker health and environmental protection
National Healthy Nail & Beauty Salon Alliance http://nailsalonalliance.org/	National	• Proposes research agenda to advocate health and safety • Advocates removing the "toxic trio" from nail products
The National Institute for Occupational Safety and Health (NIOSH) http://www.cdc.gov/niosh/topics/manicure/	National	• Evaluates exhaust ventilation systems • Assesses exposures to different chemicals and their potential health effects

the survey data obtained by the California Healthy Nail Salon Collaborative.[12] The study was approved by Oregon Health and Science University Institutional Review Board (IRB) and participation of human subjects occurred in this study only after informed consent had been obtained.

Data Analysis

We used SPSS version 18.0 (SPSS, Chicago, IL) for the statistical analysis. Sociodemographic variables were summarized and described using percentages for discrete outcomes. Simple comparisons between subgroups of participants with respect to a variable were completed using chi-square tests (discrete outcomes). All p values are 2-sided, with significance judged relative to a .05 level.

Results

A total of 65 surveys were collected from nail salon workers. A total of 49% of the participants completed the survey in person, 40% responded by mail, and 11% completed them over the phone. A comparison of participants of this study with the participants from the previous California study[12] from which the survey was adapted is summarized in Table 2. The response rate of the survey was 70.7%.

Demographic Characteristics

The majority of nail salon workers surveyed in the present study were female (94%), whose primary language spoken at home is Vietnamese (100%), and are workers or station renters (self-employed workers) (88%) (Table 2). The participants in the current study were similar to those in the California study in terms of English fluency, primary language spoken at home, gender distribution, and work status. However, nail salon workers in Oregon were more experienced—more than 50% of the workers report more than 5 years of experience compared with only 27% of the California workers with similar experience. Over 30% of participants reported that they work on average 40 or more hours per week.

Every participant reported that their primary language spoken at home is Vietnamese, and only 8% reported they are "very fluent" in English. The majority of the nail salon workers (90.8%) reported having less than 10 employees in their salon. Less than 50% reported having access to health insurance.

Table 2. Sociodemographic Characteristics of the Participants of the Current Study and a Previous California Study

Sociodemographic	Present study in Oregon ($n = 65$)		Past study in California ($n = 73$)
	%	*n*	%
English fluency			
Not very fluent	40.3	25	49
Somewhat fluent	51.6	32	44
Very fluent	8.1	5	7
Primary language spoken at home	Vietnamese		Vietnamese
Gender			
Female	93.8	61	93
Male	6.2	4	7
Position at salon			
Worker/station renter	87.6	57	93
Owner/manager	12.3	8	8
Years worked in nail salon industry			
Less than 12 months	4.6	3	14
Between 1 and 4 years	40	26	46
Between 5 and 9 years	33.8	22	20
Between 10 and 20 years	21.5	14	7
Racial background			
Vietnamese	98.4	64	—
Chinese	1.5	1	—
Number of workers in the salon*			
1–5 workers	52.3	34	—
6–10 workers	38.5	25	—
11–15 workers	7.7	5	—
Access to health insurance			
Yes	47.7	31	—
No	52.3	34	—
Average hours working per week**			
10–20	14.3	9	—
20–30	15.9	10	—
30–40	39.7	25	—
40–50	22.2	14	—
50+	7.9	5	—
Customer characteristics			
White	92.3	60	—
Asian	10.8	7	—
African	7.7	5	—
Latino	10.8	7	—

*One person did not respond to this question.
**Two persons did not respond to this question.

Self-Reported Health Issues

The most common personal health problems identified by the participants and health problems often reported by their coworkers are presented in Table 3. Nose irritation was reported most frequently, followed by allergies, skin irritations, and stress. Some participants also reported other health problems such as coughing, pain, and nausea.

When participants were asked to define their general health, 33.8% ($n = 22$) identified themselves as having "good" or "very good" health, whereas the remaining 66.2% ($n = 43$) reported their health condition as "fair" or "poor." When we compared health condition between workers ($n = 57$) and owners ($n = 8$) who also worked in the shops, we observed that the workers reported significantly higher "poor/fair" health condition (73.7% vs 12.5%) than the owner ($p = .001$). However, when we compared these 2 groups by individual symptoms, we did not observe any significant differences (data not shown). Since acrylic nail applications usually involve the use of chemicals that are more toxic and irritating than those

Table 3. Health Problems of the Study Participants and Their Coworkers

	Self-reported problems		Problems of coworkers reported by participant	
Health Problem	%	*n*	%	*n*
Nose irritation	23	15	23.1	15
Allergies	21.5	14	40	26
Skin irritation	11	7	26.2	17
Stress	11	7	6.2	4
Pain	9	6	3.1	2
Cough	9	6	10.8	7
Nausea	5	3	6.2	4
Difficulty breathing	3	2	4.6	3
Asthma	1.5	1	1.5	1
Miscarriages	0	0	4.6	3

Table 4. Ventilation and PPE Use by the Study Participants

Workplace environment and personal protective equipment	Always use		Sometimes use		Rarely/ never use	
	%	*n*	%	*n*	%	*n*
Ventilation type						
General shop ventilation system	49	32	21.5	14	29	19
Table ventilation system	63	41	10.8	7	26.1	17
Keep window/door open	20	13	9.2	6	70.7	46
Ceiling fan	38.4	25	29.2	19	32.3	21
Glove use:						
During manicure/pedicure	92	60	3	2	5	3
During acrylic nail application	20	10	8	4	72	35
Mask use:						
During manicure/pedicure	30	19	16	10	54	34
During acrylic nail application	66	33	2	1	32	16

used in standard manicures and pedicures, the relationship between the acrylic nail exposure and self-reported general health condition of the salon workers was examined. A significantly higher number of participants with "fair" or "poor" health condition was found among the workers exposed to acrylic nails compared with those who did not have any acrylic nail exposure (83.3% vs 48.5%; $p = .004$) (Figure 1).

Workplace Environment and Safety

Two major concerns regarding the workplace health and safety of the nail salon workers have been proper ventilation systems at the salons and the use of appropriate personal protective equipment (such as gloves and masks). Ventilation practices and personal protective equipment use reported by the study participants are presented in Table 4. The most common forms of ventilation reported by the study participants included table ventilation system and a general shop ventilation system. However, probing by interviewers indicated that a table ventilator was more likely interpreted by the respondents as a table fan. The least frequent method was keeping a window/door open.

Access to Health and Safety Information

Material Safety Data Sheets (MSDS) for different nail salon products offer important health and safety information, including first aid procedures, specific to the harmful chemicals present in the products. Although it is a requirement for nail salon employers to have MSDS available for employees for the products they use for services, almost half (45.3%) of the participants reported that they were not familiar with MSDS (Table 5). Participants reported that they received MSDS most often when they bought disinfectants (49.2%) and polish removers (35.4%), but not as often for nail polishes (12.3%) and base coats (12.3%). Less than half of participants reported that they were able to access health and safety information at work. Most participants reported receiving most of their health and safety information from newspapers (73.8%), friends (64.6%), and the Internet (47.7%).

We wanted to know if the Vietnamese nail salon workers could get access to various information resources such as

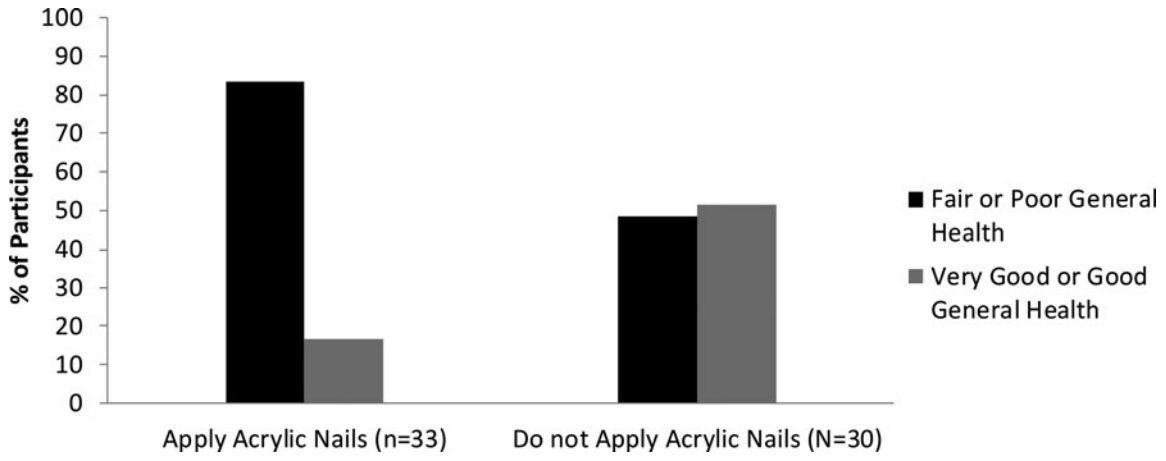

Fig. 1. Application of acrylic nail and its association with general health.

Table 5. Access to Material Safety Data Sheets (MSDS) and Other Information Materials for the Study Participants

Topics of health and safety information	%	*n*
Do you know what a Material Safety Data Sheet (MSDS) is?		
Yes	54.7	35
No	45.3	29
Products participants received an MSDS For		
Nail polish	12.3	8
Base coat	12.3	8
Polish remover	35.4	23
Disinfectant	49.2	32
Can you access health and safety information at work?		
Yes	44.6	29
No	55.4	36
Type of health and safety information available at work		
MSDS	26.1	17
Brochures	20	13
Posters	15.4	10
How much do you know about the chemicals you work with and their potential health effects?		
A lot	10.9	7
Some	48.4	31
A little	35.9	23
None	4.7	3
Would you like to learn more about the chemicals you work with and their potential health effects?*		
Yes	87.7	57
No	12.3	8
Where do you get most of your health information from?		
Family	15.4	10
Friends	64.6	42
Doctor	23.1	15
Newspaper	73.8	48
Television	21.5	14
Radio	26.1	17
Internet	47.7	31
Church	1.5	1

*34 participants did not answer this specific question.

Material Safety Data Sheets (MSDS), health brochures, and posters at the salon, and if access to these resources at job site determined their knowledge on harmful chemicals used in the salons in the study area. It was observed that a significantly higher percentage of participants who got access to information about chemicals at their workplace had reported to have excellent or good levels of knowledge on the chemicals compared with those who had no access to these resources ($p = .001$) (Figure 2). No differences in knowledge, access to health and safety information, and interest in learning were observed between the workers and owners who worked in the salons (data not shown).

Comment

This is the first study of nail salon workers in Oregon that has demonstrated health and safety concerns within the workforce, including occupational health. The current study partnered with Asian Health and Services Center (AHSC) to survey nail salon workers in Oregon. AHSC is a local community organization, providing mental and physical health services and community-based classes to immigrants from Southeast Asian countries, including Korea, China, and Vietnam. Previous research conducted in other states has described difficulty accessing this population. Therefore, we took a community-based participatory research approach, partnering with AHSC to reach a reasonable number of participants. We observed a fairly high response rate of the survey indicating that the participatory approach was successful.

Findings of the current study are somewhat consistent with studies of comparable nail salon workers in Alameda County, California, and Boston, Massachusetts.[3,5] Similar to the 2 previous studies, the majority of participants of the current study were Vietnamese, female, speak Vietnamese as their primary language, and were working as a station renter or worker. Consistent with the findings from the California survey, our study demonstrated prevalence of self-reported nose and throat irritations, skin irritations, and allergies as the top 3 health problems among the participants. Other notable self-reported health problems included stress, cough, and nausea (over 5% in both participants and their coworkers). At the same time, the majority of participants were concerned that working in the nail salon could be associated with neurological problems, reproductive problems, and general long-term health consequences. A previous California study[5] reported prevalence of nose, throat, lung, skin, or eye irritation among 25% of the participants, whereas participants of the Boston study[3] reported experiencing musculoskeletal problems (46%), followed by at least 1 respiratory symptom (including difficulty breathing, regular cough, or sinus/nasal irritation) (44%) and skin problems (31%). Among our study participants, self-reported prevalence of nose and skin irritations were slightly lower than the 2 other studies. Since the Vietnamese population in California is much larger and denser than in Oregon, there may be greater turnover in California. Our assumption is supported by the data from the 2 study samples (Table 2) where we observed that the number of years working in nail salon was higher in our sample. This may explain some of the differences in health effects between these 2 groups and could reflect a healthy worker effect.

We also asked the participants about the health problems that they had observed in their coworkers. Through this question we wanted to know if similar symptoms were manifested in other workers who work with the participants in the salons. We observed reporting of the same top 3 symptoms among

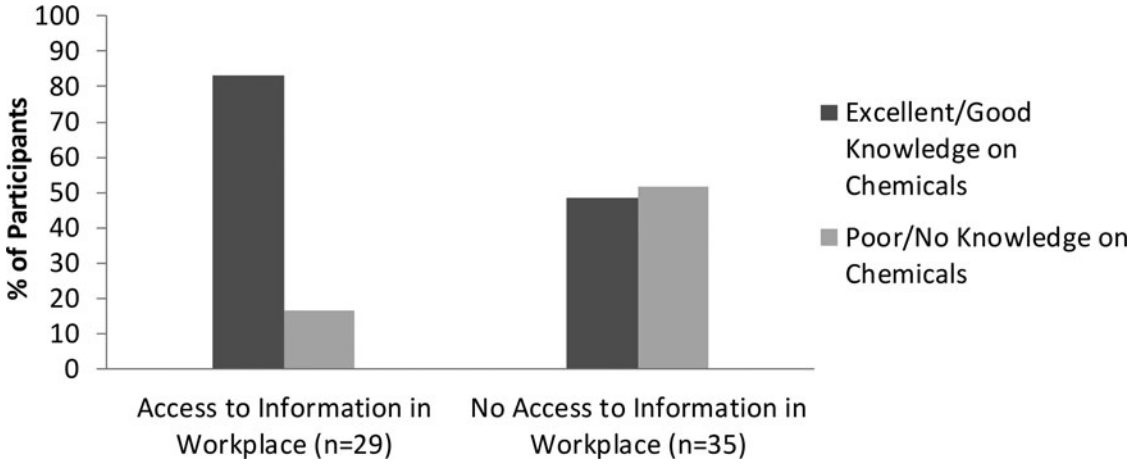

Fig. 2. Access to information about chemicals and self-reported knowledge levels of the participants.

their coworkers. The data from the current and previous studies indicate specific health concerns are prevalent among the Asian nail salon workers across the United States.

In this study, the nail salon workers predominantly reported skin and respiratory problems, potentially due to their exposures to various volatile solvents and other chemical reagents that are present in nail polish, nail polish removers, artificial nails including acrylic polymers, dehydrators and hardeners, nail tips adhesives, and disinfectants.[3] Exposures to these toxic chemicals can be exacerbated by inadequate ventilation, which is known to affect salon indoor air quality.[14] The most common types of ventilation reported by the participants was the table ventilation system (63%) and the shop ventilation system (49%). However, the participants reported a table fan as this ventilation system, which lacks the effectiveness of a downdraft table, which has the potential to reduce exposure to hazardous chemicals by 50% to 60%.[15] The salon workers are unable to purchase downdraft ventilation systems without the shop owners initiating such an action.

Inadequate use of personal protective equipment (PPE) may also be related to chemical exposure and subsequent health effects in the salon industry. PPE such as nitrile gloves, masks, and respirators are recommended to minimize direct exposures to hazardous chemicals. Dust masks and surgical masks protect nail salon workers from exposure to dust and nail filings and germs, respectively, but do not protect them from the inhalation of chemical vapors. Although 30% and 66% of the participants reported use of masks during manicure/pedicure and acrylic nail, respectively, the survey did not collect specific information about the type of masks used. Only air-purifying respirators designed for gases and vapors offer protection against chemical vapors, although effective ventilation systems minimize the use of respirators.[16] In our study, the majority of participants reported use of gloves during a standard manicure/pedicure but they refrained from using gloves during acrylic nail applications. Occupational exposure to acrylates in dental clinics was reported to be associated with allergic contact dermatitis[17,18] asthma and respiratory hypersensitivity.[19] Since more than 30% of Vietnamese salon workers in the study samples worked 40 or more hours per week, it is important to emphasize proper PPE use and ventilation system operation to reduce chronic exposures to these hazardous nail salon chemicals. In addition, specific intervention training materials should be developed to teach practices to reduce exposure during the application of acrylic nails.

Inability to access health insurance by the salon workers is another important finding of the current study. The unique characteristics of the nail salon workers in Oregon may have played a role for this poor accessibility. Many workplaces offer health insurance to their employees, but often this benefit is not typically provided to salon employees and would not be available to independent contractors through the salon. Employees are employed by the owner of the salons and are subject to laws regulating employee's rights. There have been recent concerns expressed in Oregon that not all nail salon technicians who believe they are independent contractors meet the technical definition of an independent contractor. A recent survey of nail salon workers in Alameda County, California, reported that only 18% of participants did not have health insurance, but that only 2% of participants had work-based health insurance.[20] The rate was over twice as much in the current study, with over 45% of the participants reporting that they did not have access to health insurance.

We also observed that lack of access to information regarding chemicals used in the nail salons in Oregon affected the level of knowledge of the survey participants. A recent pilot study has demonstrated that education on workplace chemical exposure through salon owners to their employees can significantly increase work-related knowledge, safety behavior, health symptoms, and exposures to toxic chemicals in Vietnamese salon workers.[21] In our study, nearly 90% of the participants indicated interest to learn more about safe work practices. Both hardcopy materials (eg, brochures) and electronic materials (eg, Internet sites) were preferred by 57% and 51% of the respondents as sources of information. Understanding the material format preferences may prove beneficial to those assisting employers who recognize their responsibility in providing safe and healthful workplaces for their employees.

There are several limitations in our study. Our survey was unable to fully discern between true contractors and those who were renting space but reported themselves as contractors. Our

sample size is fairly limited and gathered information from a specific area, based on convenience. Measuring exposures in the workplace was beyond the scope of the current project, as was objective evaluation of ventilation systems. We did not ask the participants if they got better when they left the workplace after their shifts, nor did we include an unexposed control group. These potential limitations limit our ability to directly relate symptoms with workplace exposure.

In addition, it is possible that some of the workers who had experienced health problems might have left the workforce, resulting in a healthy worker effect. Due to the cross-sectional design of the study, this effect was more likely to underestimate the self-reported health problems among the study participants. The objective of the study was not to examine specific risk factors for health problems, but to conduct a survey of the local nail technician population and hence identify potential outcomes to be more specifically addressed in future exposure-outcome assessments.

Another limitation of the study was the use of different methods survey administration, including in-person interview, phone interview, and response by mail. The low level of literacy in our sample may have impacted the way participants answered questions. However, we did not observe any significant differences in self-reported health problems, knowledge about chemicals used in the salon, general health conditions, and access to health information between the participants who participated in the interview and those who filled out the questionnaire and sent it by mail (data not shown).

The nail salon industry is important because it involves a large population who is at risk for long-term health effects and commonly does not have access to health services. It includes many immigrants who are not fluent in English and many women continuing to work during pregnancy. It is also evident in a recent study that to reduce chemical exposure in nail salons interventions should target both owners, who are also the decision-makers, and workers to promote positive health behavior.[21] The present study will provide useful information to salon owners, and their advocates, to develop training strategies and improve practices within their workplaces.

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