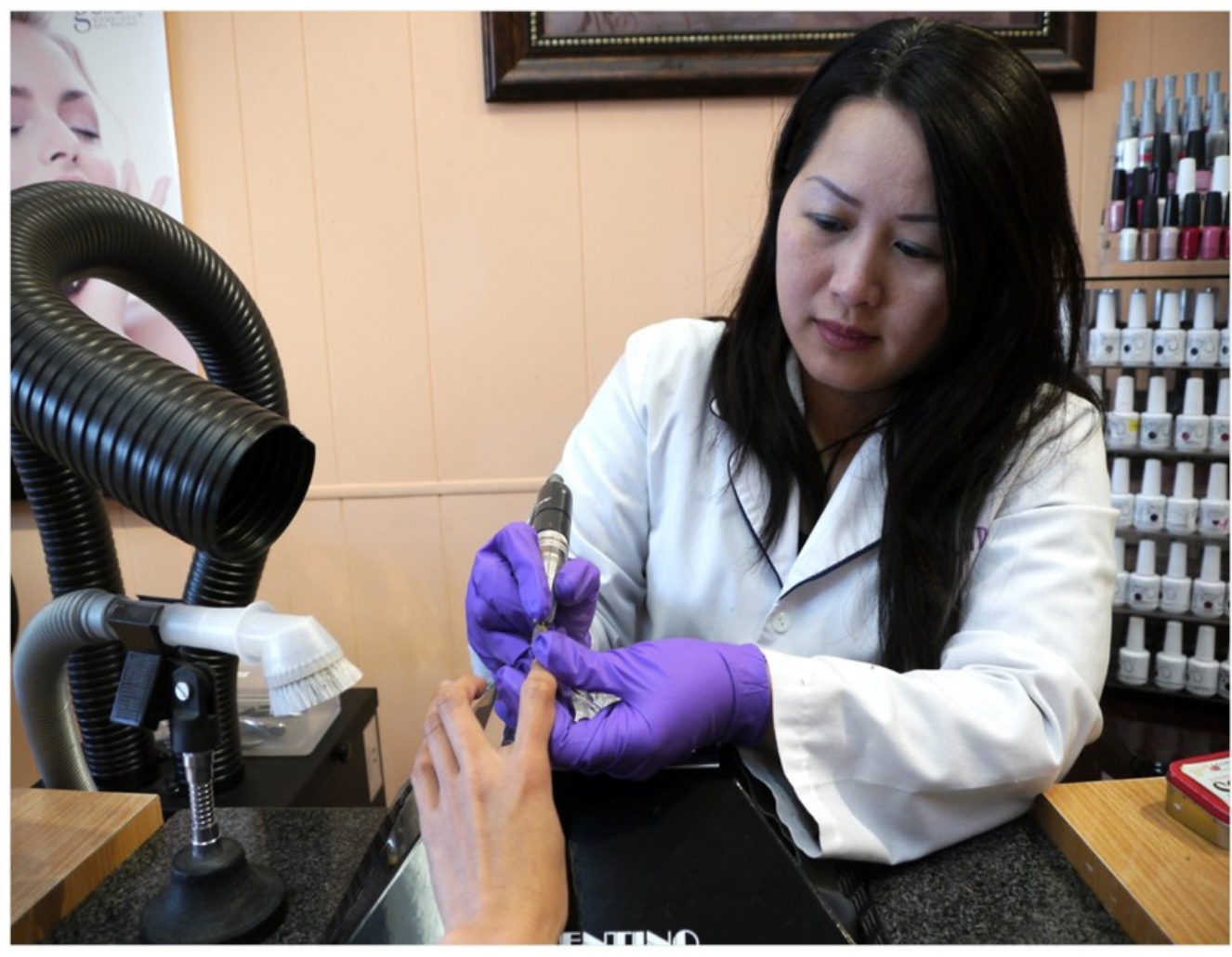


Evaluating a County-based Healthy Nail Salon Recognition Program

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BACKGROUND



Chemical exposures are of high concern for nail salon workers, who handle nail care products that contain many hazardous compounds, including some linked to cancer, reproductive harm, and respiratory problems. In response, San Francisco (SF), California passed a ground-breaking ordinance to establish a voluntary recognition program for salons that adhere to the program’s criteria. This program was one of the first of its kind, and other local

municipalities in California were interested in adopting a similar program. Thus, it was important to evaluate the program with respect to its impact on the salon environment and workers themselves. The recognition criteria for San Francisco’s *Healthy Nail Salon Recognition Program* include:

1. Choose nail polishes that do not contain the “toxic trio” (dibutyl phthalate, toluene, and formaldehyde).
2. Use safer nail polish removers, including but not limited to acetone.
3. Avoid using nail polish thinners, especially those containing toluene and methyl ethyl ketone.
4. Ensure that all nail salon staff wear nitrile gloves.
5. Ventilate the salon to improve air quality. Designate a specific area for artificial nail services and properly ventilate the area.
6. Install mechanical ventilation unit(s) within 1 year of entering program, if one does not already exist.
7. Train all nail salon staff onsite and owners on safer practices.
8. Allow SF program staff to monitor air quality within the salon.
9. Be committed to trying and adopting safer artificial nail products.
10. Do not allow customers to bring in products unless they meet program criteria.

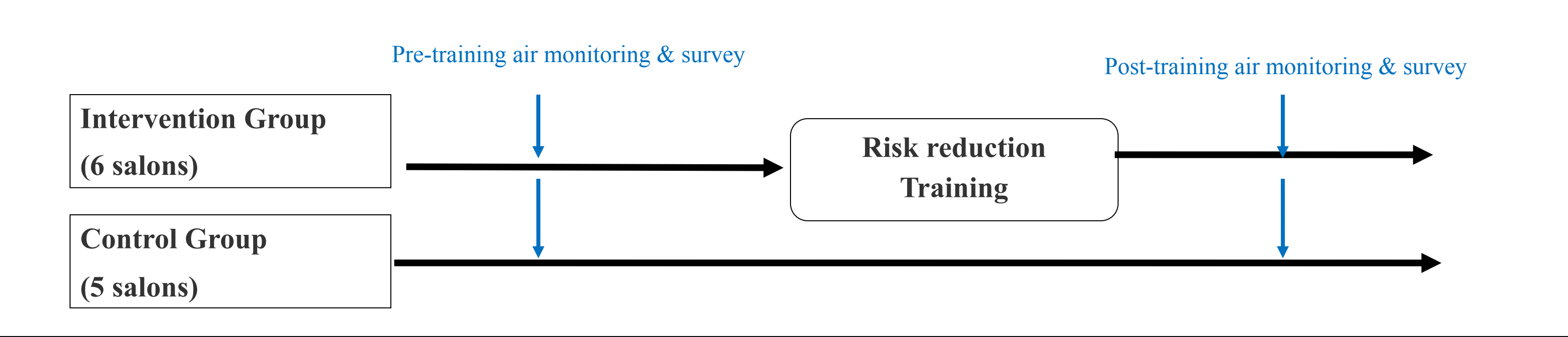


PILOT STUDY OBJECTIVES

- Determine whether nail salons that participate in the SF recognition program have reduced measured levels of toluene, methyl methacrylate (MMA), and total volatile organic (TVOC) compounds as compared to nail salons that do not participate; and
- Determine changes in worker knowledge/behaviors before & after the training.

METHODS

Figure 1. Study design diagram



Data collection: conducted with two workers per salon from each of six intervention group nail salons and five control group nail salons.

- Conducted personal air monitoring using passive organic vapor monitors.
- Administered surveys in Vietnamese to assess knowledge and behaviors.

Data analysis: conducted standard descriptive statistics.

- Air monitoring data:* used Wilcoxon signed rank test to compare differences between pre-and post-training results for each group and Wilcoxon rank-sum test to compare differences between intervention and control groups
- Survey data:* used McNemar’s test to evaluate differences between pre- and post-training results for each group and Fischer exact test to test differences between intervention and control groups.

RESULTS

- Two workers were lost to follow-up and replaced with two new workers.
- Survey results included 20 workers (those who completed pre- and post-training surveys).
- A majority of workers were female and had limited English proficiency.

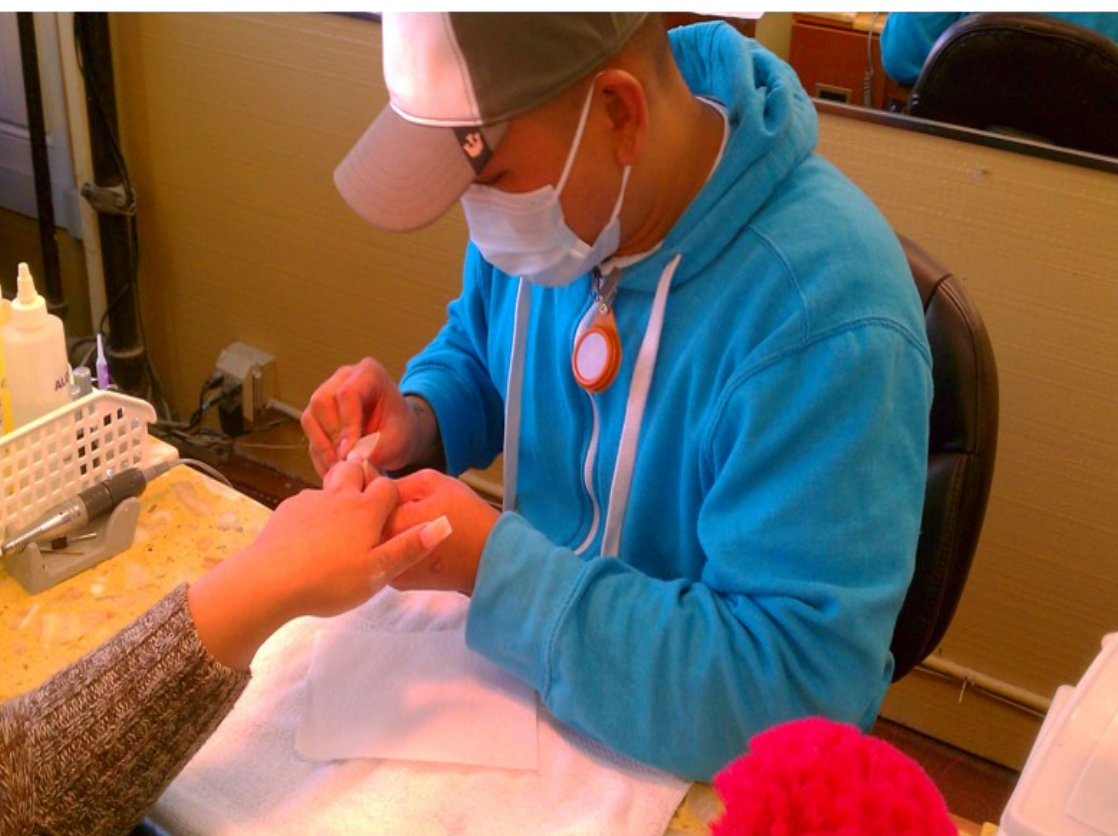


Table 1. Characteristics of worker participants (n=24)			
Participant characteristics	Intervention	Control	
Gender			
Female	10 (77%)	11 (100%)	
Male	3 (23%)	0 (0%)	
Age: mean years (range)	42.2 (27-59)	46.4 (30-62)	
Birthplace: Vietnam	13 (100%)	11 (100%)	
English Proficiency			
Fluent/pretty well	4 (31%)	1 (9%)	
Not very well/not at all	9 (69%)	10 (91%)	
Yrs in nail business: mean (range)	10.5 (0.1-24)	10 (0.4-22)	
Yrs in this salon: mean (range)	7.4 (0.1-24)	5.7 (0.1-15)	

Table 2: Arithmetic Mean of Personal Air Monitoring for Workers at the Salon-Level for Methyl Methacrylate (MMA), Toluene, and Total Volatile Organic Compounds (TVOC) in Parts per Million by volume (ppmV) for Pre-training (A1) and Percentage Change (% Δ) between Pre-training and Post-training (A2)*

Group	Salon	MMA		Toluene		TVOC	
		A1 mean	%Δ(A2-A1)	A1 mean	%Δ(A2-A1)	A1 mean	%Δ(A2-A1)
Intervention	1	6.80	+151	0.07	+171	4.00	-39
	2	0.21	-76	0.11	-82	0.74	-47
	3	0.05	+20	0.15	-80	0.65	+43
	4	0.04	+50	0.16	-81	0.52	-6
	5	0.02	+50	0.17	-82	0.50	-38
	6	2.40	+27	0.11	+9	1.75	+17
Overall†		1.59	+113	0.13	-46	1.36	-19
Control	7	2.32	+100	0.07	0	1.59	+79
	8	0.04	-50	0.04	-50	0.33	-21
	9	0.02	+450	0.05	+240	0.36	+233
	10	0.42	-93	0.11	-82	0.71	-63
	11	0.08	+150	0.11	-9	0.62	+19
Overall†		0.58	+72	0.08	0	0.72	+47

* Results presented are means of workers' (n=2) air monitoring results at each salon. Lab results below the minimum reporting limit (MRL) (n=8 for MMA; n=12 for toluene; and n=0 for TVOCs out of 44 total samples) were set to MRL/√2. Collocated samples were averaged for a participant prior to averaging for a salon.

† Results presented for each of the intervention and control group are the overall average of salon-level means for A1, and the % Δ between the overall averages for A2 and A1.

No statistically significant differences between A1 and A2 in either group using the Wilcoxon signed-rank test, nor between changes from A1 to A2 comparing the two groups using the Wilcoxon rank-sum test.

Survey questions	Intervention (N=11)		Control (N=9)	
	Baseline (A1)%	Δ(A2-A1)	Baseline (A1)%	Δ(A2-A1)
Knowledge questions (% correct answers)				
Toluene in nail products	63.6	+36.4	11.1	+11.1
Dibutyl phthalates (DBP) in nail products	9.1	+54.6*	0.0	+11.1
Formaldehyde in nail products	18.2	+27.3	0.0	0
Methyl methacrylate (MMA) in nail products	36.4	+45.5	44.4	-11.1
MSDS sheets and product labels	81.8	+18.2	66.7	-11.1
Ventilation (open doors and windows)	100.0	0	100.0	0
When to use nitrile gloves	54.6	+27.3	33.3	-33.3
When to use latex gloves	18.2	+54.6	33.3	+11.1
Proper handling and storage of chemicals	90.9	0	88.9	0
Behavior questions (% with positive behavior)				
"Toxic trio"-free nail polish at salon	54.6	0	11.1	-11.1
Ventilation (open doors and windows)	90.9	+9.1	100.0	0
Salon provides gloves	100.0	0	77.8	+11.1
Worker wears gloves	100.0	-9.1	77.8	+11.1

* Statistically significant based on McNemar's test for agreement (Exact P<0.05)

No statistically significant difference in Δ(A2-A1) between intervention and control groups using Fisher's exact test

Summary of Results:

- Reduction in toluene (-46% vs. 0%), TVOC (-19% vs. +47%) levels in the intervention group as compared to the control group, respectively. An increase in MMA (+113% vs. +72%) in the intervention as compared the control group, respectively. None of the differences were statistically significant.
- Statistically significant increase in knowledge of DBP in nail products (+55%) for intervention group between pre- and post-training surveys.
- Some knowledge increased for intervention group but not statistically significant.

CONCLUSIONS

- The study results suggest that the Program may have helped to reduce levels of toluene and TVOCs measured in the salon (not statistically significant) and increased knowledge regarding healthy workplace practices.
- All air monitoring results were much lower than the Permissible Exposure Limits (PEL) set by California’s Division of Occupational Safety and Health (Cal/OSHA) for toluene and MMA. Cal/OSHA PEL for toluene is 10 ppm TWA, and for MMA is 50 ppm TWA.
- The SF Healthy Nail Salon Recognition Program was one of the firsts of its kind to use an incentive-based approach to encourage salons to apply source reduction strategies to reduce chemical exposures. Other counties in California are following suit. More research is needed to fully evaluate the impacts of the program on the salon environment and worker knowledge.

Study Considerations:

- Sample size was modest—this pilot study did not have the power to detect significant differences, especially given the low and variable chemical concentration levels.
- The post-training assessment was conducted only two months after the SF training, which may have been an insufficient amount of time for salon owners to switch out products. Information from training may have been easier to recall in this shorter period.
- The participating nail salons were not chosen at random, and were instead selected from a list of salons planning to participate in the SF program (intervention) and salons contacted by SFE but declining to participate in the program (control). This affects generalizability of our findings.



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