



HEALTH EFFECTS OF SMOKE-FREE BARS IN WISCONSIN

Karen Palmersheim PhD, Mark Wegner MD MPH, Patrick Remington MD MPH

INTRODUCTION

Exposure to secondhand smoke has increasingly become an issue of concern to the public health community. Indeed, a heightened awareness has followed the release of the 2006 report of the US Surgeon General,¹ which reviewed and critiqued numerous studies investigating the relationship of passive smoking with various disease processes. The report concluded that children and infants exposed to secondhand smoke are at increased risk of lower respiratory illnesses, middle ear disease, and sudden infant death syndrome (SIDS).¹ Exposure to secondhand smoke has also been associated with an increased risk for coronary heart disease among both men and women, and an increase in lung cancer risk among lifetime non-smokers.¹ Further, the Surgeon General concluded that nasal irritation is causally related to secondhand smoke exposure, and evidence is suggestive of a causal relationship between secondhand smoke and other acute respiratory symptoms including cough, wheeze, chest tightness, and difficulty breathing --- among both healthy persons and persons with asthma.¹

The number of workplaces that are smoke-free has been steadily increasing --- via the enactment of smoke-free laws and by the voluntary implementation of smoke-free policies by employers and businesses. However, individuals working in the restaurant and hospitality industry (e.g., wait staff, bartenders) are among those least likely to work in smoke-free environments,^{1,2} and previous research has found mean serum cotinine levels (a measure of secondhand smoke exposure) highest among people working in these settings.² These findings suggest that individuals employed in these types of occupations would be at an increased risk of developing conditions associated with secondhand smoke, and accordingly, would benefit most from the elimination of such exposure.

The purpose of this research was to assess change in mean level of exposure to secondhand smoke among bartenders affected by the establishment of smoke-free ordinances in two Wisconsin cities. In addition, upper respiratory tract symptoms were assessed prior to, and approximately one year after, the implementation of the smoke-free ordinances. These findings were then used to estimate the potential impact of smoke-free policies on bartenders statewide.

METHODS

The University of Wisconsin Tobacco Surveillance and Evaluation Program, in collaboration with the Wisconsin Tobacco Prevention and Control Program, conducted two cross-sectional studies to assess secondhand smoke exposure and upper respiratory symptoms among bartenders working in two Wisconsin cities that implemented smoke-free workplace ordinances on July 1, 2005. The first study was conducted two months prior to the ordinance, and the second study was conducted approximately one year after its establishment, during May through July of 2006.

Details of data collection, inclusion criteria, and analytic methods for the full study can be found at <http://www.medsch.wisc.edu/mep/>.

Overall, 1,528 bartenders were included in the current study, 793 in the pre-ordinance group, and 735 in the post-ordinance group. However, the samples were stratified by bartender smoking status to control for the effects of active smoking. In the current report, findings presented for upper respiratory health symptoms were limited to bartenders that reported being non-smokers, because exposure at work is

likely to be their main source of inhaled cigarette smoke. Independent-samples t-tests were employed to compare pre-ordinance scores to post-ordinance scores on measures

Summary

Objective – To assess the impact of a smoke-free workplace ordinance on bartenders' exposure to secondhand smoke and upper respiratory tract symptoms.

Methods – Data were collected from bartenders working in Appleton and Madison, Wisconsin employing a cross-sectional research design. Pre-ordinance data were collected 2 months before the July 1, 2005 ordinance; post-ordinance data were collected approximately one year later. Findings were extrapolated to the statewide population of bartenders.

Findings – Bartenders' mean level of exposure to secondhand smoke at work decreased from 20.7 hours during pre-ordinance to 1.6 hours during post-ordinance; exposure in other places decreased from 8.2 hours to 4.1 hours; home exposure decreased from 3.9 hours to 2.8 hours. The prevalence of eight upper respiratory symptoms was significantly lower during the post-ordinance period among non-smoking bartenders. Smokers reported a significant reduction of two symptoms.

Implications – A smoke-free workplace ordinance was associated with reduced exposure to secondhand smoke and fewer related upper respiratory symptoms among bartenders. Statewide, smoke-free establishments could lead to similar health improvements among many more employees and bar patrons.

of secondhand smoke exposure. Pearson Chi-square analyses were used to test levels of upper respiratory symptoms. These findings were then extrapolated to the estimated number of non-smoking bartenders working in Wisconsin as follows. According to the Wisconsin Department of Workforce Development, approximately 23,000 individuals are employed as bartenders in the state of Wisconsin.³ Calculating an average across the two study samples suggests that approximately 45% of bartenders currently smoke. Thus, an estimated 12,650 bartenders would be non-smokers (55% of 23,000). The estimated number of non-smoking bartenders was then applied to the absolute percent difference in each symptom, pre- to post-ordinance, to predict the number whose physical symptoms might be improved if all bars in the state were smoke-free.

RESULTS

Sample characteristics of bartenders who participated in the pre-ordinance and post-ordinance studies are presented in Table 1. Table 2 displays the mean estimates of exposure to secondhand smoke in the home, at work, and other places, during pre-ordinance and at post-ordinance. Exposure was self-reported as the number of hours exposed during the past 7 days. Mean exposure to secondhand smoke in the home decreased from 3.9 hours at pre-ordinance to 2.8 hours at post-ordinance. Exposure to secondhand smoke at work decreased from 20.7 hours at pre-ordinance to 1.6 hours at post-ordinance, and mean exposure in other places decreased from 8.2 hours to 4.1 hours. T-test analyses revealed the mean reported decreases in exposure were statistically significant for all three areas assessed.

Study participants were also asked to report how often they experienced a number of upper respiratory symptoms over the past 4 weeks. Data were dichotomized (collapsed into yes/no categories) for the current analyses. Table 3 presents the percentage of non-smoking bartenders that reported experiencing the eight upper respiratory symptoms before and after the establishment of the smoke-free ordinance. The second column designates the percentage of bartenders

that reported having experienced each of the eight symptoms during the pre-ordinance study, and the third column shows the prevalence at post-ordinance. For example, 31% of non-smoking bartenders reported ‘wheezing or whistling in chest’ during the pre-ordinance study, whereas 16% reported this symptom at post-ordinance. This represents an absolute percent decrease of 15%. The fourth column, presenting the results from the Chi-square analysis which compares the sample proportions, shows that the change was statistically significant. The final column shows the estimated number of non-smoking bartenders statewide who could see improvement in the reported symptom were a smoke-free policy extended to all Wisconsin bars. For example, we could expect approximately 1,900 fewer non-smoking bartenders to experience wheezing or whistling in the chest.

COMMENTS

The findings from this study reveal that the establishment of a smoke-free workplace ordinance can reduce exposure to secondhand smoke among bartenders – both at work and in other places. These latter findings suggest that when bartenders are not at work, they may be spending more of their time in establishments that have also become smoke-free. The lower level of exposure to secondhand smoke in the home reported in the post-ordinance study may reflect, in part, the lower percentage of smokers in the post-ordinance sample, as smokers are more likely to live with other smokers. Or, the impact of the smoke-free workplace ordinances may have carried over into the home environment.

Analyses suggest that the reduced level of exposure to secondhand smoke corresponds with a reduction in the prevalence of upper respiratory symptoms among these workers. In particular, among non-smoking bartenders, the prevalence of all eight symptoms was significantly lower after the establishment of the smoke-free ordinances compared to that reported prior to the ordinances. These findings suggest that an improvement in upper respiratory health symptoms could be experienced by a significant number of non-smoking bartenders in Wisconsin if all bar work environments in the

state were smoke-free. In addition, even bartenders that were current smokers reported a significantly lower prevalence of two symptoms one year post-ordinance (data not shown), and thus could be expected to see a tangible improvement in health. Finally, although this study examined only the health effects of these policies on bartenders, others who work or recreate in bars might also see similar improvements in health.

These findings are similar to those reported by Eisner et al.⁴ in a cohort study of bartenders in San Francisco, and a second study conducted by Menzies et al.⁵ in Scotland. However, due to relatively smaller sample sizes, results in the previous two studies were reported as groups of symptoms. In addition, the Menzies study only included non-smokers. The current study had ample power by which to analyze each symptom independently, in addition to stratifying the sample by smoking status.

Moreover, the current study extends the findings from a previously reported longitudinal study of bartenders in Madison and Appleton.⁶ That study involved comparing baseline data, collected 2 months before the July 1, 2005 ordinance, to follow-up data collected only 3-5 months post-ordinance. Within the cohort of 403 bartenders studied, mean level of exposure to secondhand smoke decreased significantly at work and in other places. In addition, the prevalence of all eight upper respiratory symptoms decreased significantly from baseline to follow-up among non-smoking bartenders, and smokers reported a significant reduction of two symptoms. The strength of the current study is that similar findings have now been found in two much larger cross-sectional samples.

PROGRAM/POLICY IMPLICATIONS

This study revealed a significant reduction in exposure to secondhand smoke in the workplace, as well as in other places, one year after the implementation of a smoke-free workplace ordinance in two Wisconsin cities. In addition, bartenders working in establishments impacted by the ordinances reported significantly fewer upper respiratory tract symptoms. Thus,

it appears the elimination of smoking in workplaces such as bars and restaurants can have beneficial effects on the acute respiratory health of those who work in such settings. These acute symptoms may serve as the warning signs of impending, more serious chronic conditions such as emphysema, lung cancer, and heart disease. Hence, in addition to reducing the immediate, short-term consequences associated with exposure to the chemicals present in secondhand smoke, smoke-free environments should contribute to a reduced risk of more serious long-term conditions.

REFERENCES

1. U.S. Department of Health and Human Services. The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Coordinating Center for Health Promotion, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2006.
2. Wortley PM, Caraballo RS, Pederson LL, Pechacek TF. Exposure to secondhand smoke in the workplace: serum cotinine by occupation. *Journal of Occupational & Environmental Medicine*. 2002; 44(6):503-509.
3. http://worknet.wisconsin.gov/worknet/jsocsrch_results.aspx?menuselection=js&occc=353011&ocname=Bartenders&area=SW
4. Eisner MD, Smith AK, Blanc PD. Bartenders' respiratory health after establishment of smoke-free bars and taverns. *JAMA*. 1998; 280:1909-1914.
5. Menzies D, Nair A, Williamson P, et al. Respiratory symptoms, pulmonary function, and markers of inflammation among bar workers before and after a legislative ban on smoking in public places. *JAMA*. 2006; 296:1742-1748.
6. Palmersheim KA, Remington PL, Gundersen DF. The impact of a smoke-free ordinance on the health and attitudes of bartenders. Tobacco Surveillance and Evaluation Program, University of Wisconsin Comprehensive Center, Madison, WI: February, 2006. Available at: <http://www.medsch.wisc.edu/mep/>.

Suggested Citation: Palmersheim, et al. Health Effects of Smoke-Free Bars in Wisconsin. Surveillance Brief. UW Paul P. Carbone Comprehensive Cancer Center. 2007; 3-1.

TABLE 1. Sample Characteristics – Pre-Ordinance and Post-Ordinance

	Pre-Ordinance (n=793)	Post-Ordinance (n=735)
City (n)		
Madison	621	510
Appleton	172	225
Age (years)		
Range	19-80	19-76
Mean	35	35
Median	32	31
Gender (%)		
Female	52	54
Race/Ethnicity (%)*		
White	95	96
Other	6	5
Hispanic	2	3
Education (%)		
Less than high school	2	1
High school diploma	18	16
Some college (no degree yet)	38	39
Associate's degree	12	12
Bachelor's degree	24	26
Graduate or Professional degree	5	5
Months bartending at current bar (#)		
Mean	64	61
Median	36	35
Hours working in current bar per week (#)		
Mean	24	23
Median	22	20
Current smoker (%)		
Cigarettes smoked per day (#)	48	41
Mean	13	11
Median	10	10

* Because respondents could check more than one race, totals may not add to 100.

TABLE 2. Level of Exposure to Secondhand Smoke at Home, Work and Other Places – Pre-Ordinance and Post-Ordinance

Place of Exposure	Pre-Ordinance (mean hours/past 7 days)	Post-Ordinance (mean hours/past 7 days)
Home*	3.9	2.8
Work***	20.7	1.6
Other***	8.2	4.1

Independent-samples t-test, 2-tailed; *p<.05, **p<.01, ***p<.001.

TABLE 3. Percent Reporting Upper Respiratory Symptoms – Pre-Ordinance and Post-Ordinance (Non-Smokers)

Upper Respiratory Symptoms (past 4 weeks)	Percent Reporting Symptom			Number of Non-Smoking Bartenders Potentially Affected by Statewide Smoke-Free Policy ^b
	Pre-Ordinance (n=409)	Post-Ordinance (N=433)	p-value ^a	
Wheezing or whistling in chest	31	16	.000	1,900
Shortness of breath	40	27	.000	1,600
Cough first thing in the morning	44	24	.000	2,500
Cough during the rest of the day/night	50	29	.000	2,700
Cough up any phlegm	50	32	.000	2,300
Red or irritated eyes	72	41	.000	3,900
Runny nose/irritation, sneezing	76	53	.000	2,900
Sore or scratchy throat	62	38	.000	3,000

a Comparison of Pre-Ordinance to Post-Ordinance; Pearson Chi-square Analyses, 2-tailed

b Calculated as (percent with symptom pre-ordinance – percent with symptom post-ordinance) x 12,650 (rounded to the nearest hundred)

University of Wisconsin
Cancer Control and Outreach
370 WARF Building
610 Walnut Street
Madison, WI 53726

Nonprofit Org.
U.S. Postage
PAID
Permit No. 658
Madison, WI



Surveillance Brief

Wisconsin's Comprehensive Cancer Control Program

Prevention • Screening & Detection • Treatment • Quality of Life • Palliative Care

April 2007

Volume 3 Number 1

In This Issue:
**HEALTH EFFECTS OF SMOKE-FREE BARS
IN WISCONSIN**

Editor: Mark V. Wegner, MD, MPH
Deputy Editor: Stephanie K. Kaufman, MS
Consulting Editor: Mary Foote, MS
Assistant to Editors: Namratha Turlapati
Layout and Design: Media Solutions

Published through a partnership of the Wisconsin Division of Public Health and the University of Wisconsin Paul P. Carbone Comprehensive Cancer Center. This study was supported by the Wisconsin Tobacco Prevention and Control Program, Bureau of Community Health Promotion, Division of Public Health, Wisconsin Department of Health and Family Services.

Funded by a grant through the Wisconsin Partnership Fund for a Healthy Future.

For more information contact:
Stephanie Kaufman
(608) 262-4380
kaufman@uwccc.wisc.edu
<http://wicancer.org/>