The impact of a 100% smoke-free law on the health of hospitality workers from the city of Neuquén, Argentina

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ABSTRACT

Objectives The objective of this study was to evaluate the impact of 100% smoke-free environment legislation on respiratory and sensory irritation symptoms and respiratory function among bar and restaurant workers from the city of Neuquén, Argentina.

Methods Pre-ban and post-ban studies without a comparison group in an Argentinean city were conducted. A baseline survey and spirometric measurements were performed with a total of 80 bar and restaurant workers 1 month before (October 2007) and 3 months after (March 2008) the implementation of the new 100% smoke-free legislation.

Results A significant reduction in secondhand smoke exposure was observed after the enactment and enforcement of the new legislation, and an important reduction in respiratory symptoms (from a pre-ban level of 57.5% to a post-ban level of only 28.8%). The reduction of sensory irritation symptoms was even higher. From 86.3% of workers who reported at least one sensory irritation symptom in October 2007, only 37.5% reported the same symptoms in March 2008. Also, data obtained by spirometry showed a significant forced vital capacity increase.

Conclusions Consistent with other studies, 100% smoke-free legislation improved short-term health outcomes in the sample and should be implemented nationwide. Furthermore, undertaking this study has been highly important in promoting 100% smoke-free environment legislation at the workplace as a legitimate right of hospitality workers, and in reducing social acceptance of designated smoking areas in bars and restaurants.

INTRODUCTION

Several Latin American countries, including Uruguay, Panama, Colombia and Guatemala, have passed 100% smoke-free legislation for bars and restaurants between 2006 and 2008. Argentina and Mexico have introduced subnational policies according to the World Health Organization (WHO) recommended standards, as is the case in Mexico City (2008) and several Argentine provinces and cities (2005–2009).

Argentina has not ratified the WHO Framework Convention on Tobacco Control (FCTC) as of 30 June 2009. However, six provinces (Santa Fe, Tucuman, Neuquén, Cordoba, Mendoza and Entre Ríos) have introduced comprehensive smoke-free laws for public places and workplaces with the inclusion of 100% smoke-free bars and restaurants, and over 17 cities enacted 100% smoke-free ordinances in local bars and restaurants between 2006 and 2009.

Exposure to secondhand smoke (SHS) has been associated with an increased risk of respiratory symptoms,[1–4] lung cancer,[5 6] acute coronary syndromes[7–10] and stroke.[11 12] Three recent reports have shown the causal relationship between SHS and the increase in disease and death among the people exposed to tobacco smoke.[13–15]

Restaurant and bar workers have a significantly increased risk as they are exposed daily to high doses of tobacco smoke as compared to other workers.[16]

Strong evidence links the implementation of 100% smoke-free legislation with a reduction of respiratory symptoms and hospital admissions due to myocardial infarction (MI).[17 18] At least six previous studies developed in different regions worldwide (Ireland, Scotland, Norway, and San Francisco, Kentucky and New York in USA) have evaluated respiratory symptoms (with or without functional respiratory tests) before and after the implementation of 100% smoke-free laws. All of these studies have shown a significant improvement in respiratory symptoms and spirometry measurements.[19–24]

To our knowledge, similar studies have not been conducted in Latin America. Our project has been developed by key organisations members of the Smoke-Free Alliance of Argentina (ALIAR).

The objective of this study was to evaluate the impact of 100% smoke-free environment legislation on respiratory and sensory irritation symptoms and respiratory function among non-smoking bar and restaurant workers from the city of Neuquén, Argentina.

METHODS

Overview

The city of Neuquén is the capital of the Province of Neuquén, Argentina, located in the Patagonian region. Neuquén has a population of 270 000 inhabitants. On 31 August 2007, the city enacted a 100% smoke-free ordinance, which banned cigarette smoking in all public venues and workplaces, including bars and restaurants. The ordinance entered into force on 15 November 2007.

The study was approved by the ethics committees of the Italian Hospital of Buenos Aires and of the Provincial Hospital of Neuquén 'Dr. E. Castro Rendón'.

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STUDY DESIGN

We conducted a pre-ban and post-ban study without a comparison group in the city of Neuquén, Argentina.

A baseline survey and spirometric measurements were performed 1 month before (October 2007) and 3 months after (March 2008) the implementation of the new legislation in bar and restaurant workers. We also evaluated non-workplace exposure to SHS in the home and in other public places.

Recruitment of bars and restaurants

We obtained a list of the total number and locations of all 101 bars and restaurants in the city (52 restaurants and 49 bars) and invited all of them to participate. Each bar and restaurant owner was contacted by invitation letter, describing the study and assuring confidentiality and anonymity. Once the owner agreed to participate, we requested their permission to visit the venue and recruit workers for the study. A total of 83 venues agreed to participate; 5 refused participation, 5 had voluntary 100% smoke-free policies at the beginning of the study, 3 were about to finish their commercial activity and 5 small bars were excluded because they did not meet the inclusion criteria (all workers were smokers). From the 83 venues that agreed to participate in our study, 12 were not finally included due to operative problems with complete evaluation of workers (they were not available to complete the survey on at least 3 visits to the venue). Finally, 71 venues (73.1% of all) were included and completed the study.

Participant selection

All workers from 71 bars and restaurants were invited to participate in the study. Smoking and non-smoking workers completed the baseline survey. After the first interview smokers were excluded from the study and did not undergo any further testing (sensory and respiratory symptoms and spirometry). Participants were requested to provide written informed consent before inclusion and were assured about the confidentiality and anonymity of their answers. Inclusion criteria were: non-smoking waiters working for 25 h or more per week for at least 3 months before the beginning of the study, and non-smokers who had quit smoking at least 6 months before the study. Current smokers only completed the baseline survey. Asthmatic workers were also included for a specific subgroup evaluation and were requested to complete the same questionnaire. Temporary workers were excluded from the study.

Interviews

All participants were invited to complete two interviews, conducted by a single study investigator. A baseline interview and a spirometry test (both performed at the workplace) were conducted in October 2007 and a second one in March 2008, 1 month before and 3 months after the implementation of the new legislation.

We developed and adapted the Spanish version of the International Union Against Tuberculosis and Lung Disease (IUATLD) Bronchial Symptoms Questionnaire used by Eisner *et al* in a study conducted at the University of San Francisco.[21] This instrument has also been used in several other studies.[25] We assessed face validity of the Spanish version of the questionnaire.[26] We then developed a pilot evaluation in 20 waiters to define the Argentinean version of the questionnaire.

Questions regarding respiratory symptoms included cough, phlegm production, wheezing and dyspnoea. Sensory irritation symptoms included red, teary, or irritated eyes; sore and scratchy throat, sneezing and running nose. Questions regarding asthma and asthma-like symptoms included history of asthma, asthma episodes during the last 4 weeks and any current asthma medication.[26]

At both interviews, participants were also asked about their attitudes towards SHS and about the implementation of the new smoke-free legislation. In addition, we evaluated whether they were aware of the harm caused by SHS, and the amount of SHS exposure at work and at home.

Lung function was measured with a portable spirometer. As stated in internationally accepted protocols, each participant underwent at least three forced expiratory manoeuvers.[27 28] We also measured the forced expiratory volume in 1 s (FEV_1) and forced vital capacity (FVC). Results were expressed as percentages of the predicted values.

Statistical analysis

Categorical data were described as frequencies and percentages. Continuous data were described as mean (SD) or median (IQR).

We used the Wilcoxon signed rank test and the Student t test for normally distributed and non-normally distributed continuous paired variables respectively. Categorical variables were compared between groups using a McNemar χ^2 test. Estimation of the sample size revealed that a minimum of 75 workers with some kind of respiratory or sensory irritation symptom after prohibition should be included to obtain an 80% power (α error 5%, 2-tailed). We considered a potential 30% drop-out rate at follow-up.[24] Therefore the number of participants necessary to be recruited for this study was 98.

In the analysis we only included those participants who completed the survey and underwent spirometry before and after smoking prohibition. We assessed normality with data distribution.

Primary endpoints included the percentage of workers with pre-ban and post-ban respiratory and sensory irritation symptoms, and the FEV_1/FVC ratio change per spirometry reading of all participants before and after the implementation of the new legislation. A p value of less than 0.05 was considered significant for all analyses. Data were analysed using STATA V.10.0 (College Station, Texas, USA) and SPSS V.13.0 (SPSS, Chicago, Illinois, USA).

RESULTS

Bar and restaurant worker characteristics

Of the 198 workers included in the study from 88 bars, 64 were smokers (32.6%) and 134 non-smokers (67.4%). Smoking workers completed the baseline interview but did not undergo any further measurement. From the 134 non-smoking workers, 114 completed the spirometry; 20 participants were not available at their workplace the second time we visited the venues to perform the follow-up test. A total of 26 workers were lost at follow-up due to the fact that their workplaces had closed or because they had quit their jobs at the time of the post-ban visit. Eight participants did not undergo spirometry due to operative problems. Post-ban interview and spirometry were completed in 80 participants.

Of the total number of participants, 31 (38.7%) were women and 5 (6.2%) had a history of asthma (self-reported). The mean age of participants was 34.3±12.5 years with an average of 11.0±2.3 years of education. Study participants worked an average of 50.7±13.4 h per week and 47.5% had at least one evening shift. The mean duration of employment at the current workplace was 4 (1–6) years (table 1).

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Table 1 Baseline characteristics of non-smoking participants (n=80)

Parameter	Value
Mean age, years	34.3±12.5
No. (%) of women, n (%)	31 (38.7)
Education, years	11.0±2.3
History of asthma*, n (%)	5 (6.2%)
Hours worked in current job/week	50.7±13.4
At least one evening shift/week, n (%)	38 (47.5%)
Time working in current job, years	4 (1–6)

Values are mean ±SD or median (IQR).
*Self-reported and those on asthma medication.[26]

The age (median 25, IQR 20 to 32, p=0.04) and duration of employment (median 1.5, IQR 0.25 to 3, p=0.001) of those workers who did not complete the follow-up were lower as compared to those who completed the second spirometry.

Smoke exposure and associated respiratory and sensory irritation symptoms

Non-workplace (exposure in the home and in public places) and workplace exposure are reported separately.

We found a median of 1 h (range 0–2 h) of non-workplace exposure/day before the enforcement of the new legislation. This figure decreased to a median of 0 h/day (range 0–2 h/day) post ban. We observed a small but statistically significant difference using a non-parametric test (Wilcoxon signed rank test).

We observed a significant reduction in SHS exposure post ban. A month before the implementation of the law, hospitality workers reported a median of 8 h/day (IQR 8 to 9 h) smoke exposure at their workplaces. This figure dropped to 0 h (IQR 0 to 0) 3 months after smoking prohibition (p<0.001) (table 2). Participants worked an average of 51.4±13.0 h/week. This figure remained the same after smoking prohibition.

We observed an important reduction in respiratory symptoms (from a pre-ban level of 57.5% to a post-ban level of only 28.7% (p<0.001)). Table 2 shows the respiratory symptoms that declined after prohibition, such as cough, cough at night, dyspnoea on exertion and at rest, and tightness in the chest.

The reduction of sensory irritation symptoms was even greater. From 86.3% of workers who reported at least one sensory irritation symptom in October 2007, only 37.5% (p<0.001) reported the same symptoms in March 2008 (table 2).

Table 2 Pre-ban and post-ban workplace and non-workplace exposure and respiratory and sensory irritation symptoms in bar and restaurant workers

	Pre-ban exposure	Post-ban exposure	p Value
Workplace tobacco smoke exposure, h/day (IQR)	8 (8–9) h/day	0 (0–0) h/day	<0.001
Non-workplace tobacco smoke exposure, h/day (IQR)	1 (0–2) h/day	0 (0–2) h/day	0.0008
Respiratory symptoms			
At least one symptom, % (n)	57.5% (46)	28.7% (23)	<0.001
Cough, % (n)	20.2% (16)	7.1% (5)	0.039
Wakes during sleep due to cough, % (n)	31.6% (25)	8.8% (7)	<0.001
Phlegm production, % (n)	19.4% (15)	15% (12)	0.454
Wheezing, % (n)	7.5% (6)	3.7% (3)	0.453
Tightness in chest, % (n)	17.5% (14)	7.5% (6)	0.039
Dyspnoea on exertion, % (n)	41.2% (33)	16.2% (13)	<0.001
Dyspnoea at rest, % (n)	21.2% (17)	5% (4)	0.001
Sensory irritation symptoms			
At least one symptom, % (n)	86.3% (69)	37.5% (30)	<0.001
Red eyes, % (n)	58% (46)	20% (16)	<0.001
Sneezing, % (n)	58.2% (46)	26.2% (21)	<0.001
Scratchy throat, % (n)	53.1% (42)	17.7% (14)	<0.001

Pulmonary function

Prohibition of smoking was associated with an improved pulmonary function. We found a significant improvement in FVC (mean 96, SD 12 to 88). We did not find any significant differences in FEV_1 measurements (mean 90, SD 17 to 70) (table 3).

Workers' attitudes towards the new legislation

A month before prohibition, 91.2% of participants reported knowledge of the legislation. After the implementation of the law, knowledge increased to 98.7% (p=0.07).

Support for the new legislation was high and did not change before and after the enforcement of the law (93.8% and 96.4%, respectively).

Data collected from the baseline interview showed that 89.8 % of workers were in favour of the smoke-free legislation. Support to 100% smoke-free legislation was 93.1% in non-smoking and 82.8% in smoking workers.

DISCUSSION

The main finding of our study is that the implementation of the new legislation was associated with a substantial and rapid reduction of respiratory and sensory irritation symptoms. Furthermore, there was a significant improvement in the respiratory function of participants as stated in other studies.[19–24 29 30]

Most of our sample included healthy participants with normal spirometric results at baseline; however, symptom reduction and improvement in spirometry measurements were associated with a dramatic reduction in secondhand smoke exposure at work reported by workers.

Although we observed a statistically significant reduction in non-workplace exposure to SHS, clinically, it represents a very small reduction as compared to the drastic workplace reduction. Thus, clinical and spirometric changes in non-smoking workers are mainly attributable to the reduction of workplace exposure to SHS.

Also, our study shows a statistically and clinically significant increase in FVC after the removal of SHS exposure like several other studies published elsewhere. Furthermore, this change was observed in a very short period of time.

Another important finding of this study is the high level of support for the new 100% smoke-free law observed among smoking and non-smoking workers. We obtained similar results in a national survey conducted in 13 Argentine cities, where there was a 96% support to 100% smoke-free legislation in the general (smoking and non-smoking) population.[31]

To our knowledge, this is the first study to show the positive impact of the implementation of 100% smoke-free legislation in the workplace on the health of hospitality workers in Latin America.

Table 3 Pulmonary function in bar and restaurant workers

Measurement	Baseline media (SD)	Post-law media (SD)	p Value
FEV_1	90% (11% to 63%)	90% (17% to 70%)	0.8372
FVC	88% (11% to 55%)	96% (12% to 88%)	<0.001

FEV_1, forced expiratory volume in 1 s; FVC, forced vital capacity.

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What this paper adds

- This study confirms that 100% smoke-free environments have a positive effect on hospitality workers' respiratory health in Latin America, and in many other countries worldwide as it has been shown in previous studies.
- The study also provides local data helpful to raise awareness among decision makers regarding the need for 100% smoke-free environment legislation without designated smoking areas to protect the health of hospitality workers and to counteract the tobacco industry's attempts to implement Courtesy of Choice and Accommodation programmes.

LIMITATIONS

The use of self-reporting without a biological marker could contribute to potential bias of the results. However, this is not likely to be related to the lack of support for the new legislation, as most workers were in favour of 100% smoke-free workplaces. The non-response rate and significantly high follow-up dropout rate could also produce a selection bias. This was an expected result also observed in other studies, and may be caused by the constant changes among workers in the hospitality business as compared to other variables.

CONCLUSIONS

Consistent with other studies, 100% smoke-free legislation improved short-term health outcomes in our sample and should be implemented nationwide in Argentina. Furthermore, the undertaking of this study has been greatly important in promoting 100% smoke-free environment legislation in the workplace as a legitimate right of hospitality workers, and to reduce social acceptance of designated smoking areas in bars and restaurants. Media coverage of the study results has also had a great impact countrywide and several legislators have used this evidence as the basis of bills.

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Competing interests None.

Ethics approval This study was conducted with the approval of the Hospital Italiano de Buenos Aires and Hospital Provincial de Neuquén's ethical committees.

Patient consent Obtained.

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