

## Italian Public Smoking Ban Increases Efficacy of Smoking Cessation Interventions

Grassi MC, Enea D, Ferketich AK, et al. A smoking ban in public places increases the efficacy of bupropion and counseling on cessation outcomes at 1 year. *Nicotine Tob Res* 2009;11:1114–21.

### Study Overview

**Objective.** To evaluate the impact of the 2005 Italian indoor smoking ban on the efficacy of counseling alone or combined with bupropion for smoking cessation.

**Design.** Prospective cohort study with propensity score matching for retrospective analysis.

**Setting and participants.** Between January 2001 and December 2006, 674 patients completed a smoking cessation treatment program at an outpatient clinic within a major teaching hospital in Rome. Patients had to be older than 18 years and pay a fee to enter the 6-week program consisting of group counseling sessions, the option to use bupropion, and 1-year follow-up. Approximately 40% of patients chose to use bupropion in addition to group counseling. For this study, patients enrolled in the year prior to the introduction of the smoking ban in 2005 were excluded from the analysis because they completed the course before the ban but follow-up occurred after the ban. Thus, a total of 550 subjects were included, of which 336 enrolled before the ban and 214 after the ban.

**Main outcome measures.** The key outcome measures were continuous abstinence from smoking at 12, 26, and 52 weeks after the quit day. At 52 weeks, smokers were invited to the clinic to confirm abstinence with exhaled CO monitoring (< 10 parts per million considered abstinence verification); 31.8% of participants did this, and all had verified abstinence by the CO monitor. However, if a patient reported on the phone complete abstinence (no verification), this was considered abstinence. If a patient was lost to follow-up, they were considered smokers. Because participants enrolled at different time points and chose whether or not to take medications, the investigators used a propensity score matching analysis to minimize selection bias. They created matched pairs of pre- and post-ban participants within each treatment group based on a propensity score that balanced all of the measured covariates in the study sample. All covariates were equally matched except for coffee consumption in the counseling alone treatment group. Thus, this covariate was

adjusted for separately in the final models. Motivation to quit smoking was analyzed in a mediating analysis after the matching algorithm was completed.

**Main results.** The investigators identified a total of 69 matched pairs of subjects in the bupropion and counseling group, as well as 145 matched pairs in the counseling alone group. More subjects selected counseling and bupropion in the pre-ban versus post-ban period (43.2% vs. 32.2%;  $P < 0.01$ ) for unclear reasons. Bupropion with counseling was more effective than counseling alone in both the pre- and post-ban groups ( $P < 0.05$ ). The efficacy of all treatment options improved after the implementation of the smoking ban. Specifically, 52-week abstinence rates for bupropion and counseling versus counseling alone were 68.1% and 46.9% respectively during the post-ban period, compared with 50.7% and 35.2% respectively pre-ban ( $P < 0.05$  in all groups). Patients unable to quit smoking at 12-month follow-up still showed reductions in the number of cigarettes smoked per day (from  $24.6 \pm 10.0$  to  $20.3 \pm 10.7$ ;  $P < 0.01$ ). Logistic regression models comparing post-ban to pre-ban treatment groups showed significant adjusted odds ratios for smoking of 0.49 (95% confidence interval [CI], 0.30 to 0.79) for counseling alone at 3 months and 0.59 (95% CI, 0.37 to 0.96) at 12 months. For the bupropion and counseling group, the adjusted odds ratio for smoking at 12 months was 0.48 (95% CI, 0.24 to 0.96) in the post-ban compared to pre-ban group. The mediation analysis using motivation to quit at the start of the program as a potential mediator showed that the effect of the smoking ban on continuous abstinence rates at 52 weeks was reduced after controlling for motivation, confirming this variable as a partial mediator.

**Conclusion.** The implementation of an indoor smoking ban in Italy improved the efficacy of group counseling and medication smoking cessation interventions, probably by increasing motivation to quit smoking at the outset of the treatment program. Counseling plus medication after the ban introduction was the most efficacious form of treatment, achieving a 1-year abstinence rate of nearly 70%.

### Commentary

Smoking is a major cause of preventable disease and premature death both in the United States and worldwide. Public health strategies such as indoor smoking bans are proven ways to reduce dramatically both smoking prevalence and consumption [1]. However, even in the midst of aggressive public health policies aimed at smoking reductions, most smokers continue to smoke, though nearly 70% say they want to quit [2]. Currently, an important debate rages in the tobacco control and public health communities about how to promote increases in smoking cessation at a population level. Some commentators have argued that smoking cessation programs should be abandoned because they are not cost-effective and shift attention and resources away from public health strategies [3]. Others have argued that clinicians and health system planners have a moral and clinical imperative to provide cessation services given the powerfully addictive nature of tobacco [4]. In fact, smoking cessation using nicotine replacement therapy is extremely cost-effective (\$385–\$1917/QALY gained) when considered from a clinical perspective but less so when compared with other measures such as tax increases [5]. Thus, it remains unclear how and whether to prioritize various tobacco control interventions, and what is the relationship between various interventions.

This study sought to evaluate the impact of the 2005 Italian smoking ban on the efficacy of smoking cessation interventions in an outpatient clinic. Using a sophisticated propensity score analysis to adjust for selection bias and the longitudinal nature of the data, the investigators found that the introduction of the smoking ban resulted in a 52% reduced odds of smoking at 52 weeks among the counseling and bupropion group, and a 41% reduced odds of smoking at 52 weeks in the counseling group alone. Motivation to quit smoking appeared to be improved by the ban and mediated the reduced odds of smoking. The study was adequately powered to detect differences, and the propensity

analysis was appropriately done. The use of an integrated model that assessed both policy-level and individual-level impacts in a longitudinal manner was novel.

A few key limitations deserve mention. First, propensity scores cannot fully remove bias introduced through unmeasured confounders. The authors could have used sensitivity analyses to address the robustness of the treatment effects seen. Second, overall generalizability remains an important issue. This study was conducted among participants in 1 clinic at a major teaching hospital in Rome. How these results might be translated to other settings outside of academic settings or in different policy environments remains to be seen.

### Applications for Clinical Practice

Indoor smoking bans appear to improve overall smoking cessation treatment rates by changing the public environment for smoking and thus increasing smoker motivation to quit. Supporting both public and clinical approaches may yield the highest quit rates. Future research needs to address how to continue to measure and promote these potential synergies rather than argue about zero-sum policy approaches.

—Review by Asaf Bitton, MD

### References

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