Impact of a Comprehensive Smoke Free Law on Incidence of Heart Attacks at a Rural Community Hospital

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Background

Secondhand smoking (passive smoking) is associated with many negative health effects, primarily respiratory and cardiovascular diseases. Approximately 46,000 deaths from cardiovascular disease are associated with secondhand smoke exposure annually in the U.S.. This corresponds to roughly 150 deaths annually in North Dakota. Secondhand smoke, even in brief exposure, can increase risk of heart attack.

There have been several studies show that passage of comprehensive smoke-free laws at the community level can reduce the incidence of heart attack admissions to hospitals. Other surveys have not demonstrated a significant change in heart attack rates following the implementation of smoke free laws at the state level, although recently, Rhode Island published data to show a drop in heart attack rates following a state-wide comprehensive smoke-free law.

Our study, as a community level study, used methodologies similar to those used in the well-known and previously published Helena, MT, and Pueblo, CO studies, which showed significant drops in rates of heart attack following implementation of community level smoke-free laws. Recently, Olmstead County, MN published similar data, which was not available at the time of our study.

Methodology

As noted above, our study design was similar to other previously published community-level studies such as Helena, MT and Pueblo, CO. For a four-month period (April 15, 2010-August 14, 2010) prior to the implementation of the comprehensive smoke-free law, all hospital admissions to Altru Health System were calculated, and the number of admissions for Acute Coronary Syndrome (ACS) and Myocardial Infarction (MI) were also calculated. ACS and MI are the appropriate medical terminologies for "heart attack". The comprehensive law was implemented on August 15, 2010. Likewise following the implementation on the date, four months (August 15, 2010-December 14, 2010) of data collecting total number of hospital admissions and number of admissions for ACS and MI ("heart attack") were obtained. Data was limited to those 18 years of age and over and to those who had a Grand Forks city address (Zip Codes 58201, 58202, 58203, and 58206), as these persons resided in the area of direct enforcement of the smoke free law. Those admitted from surrounding communities were not

considered. Only those admitted to the hospital alive were considered, similar to other previously published studies. As the city of Grand Forks has a single community hospital with an electronic health record, data extraction errors were unlikely, and were undertaken with Altru Information Technology personnel assistance.

Results

Overall, there were 146 heart attack admissions (MI and ACS) during the study, with 25 deaths. The average age for heart attack admissions was 65.3±14.0 and 61.0% (n=89) were men. Following the implementation of a comprehensive smoke free law, the number of heart attack admissions decreased 24.1%, from 83 to 63. There were no significant differences in gender, age, or deaths between the heart attack admissions before and after the implementation of a comprehensive smoke free law.

During the study period there were a total of 35,215 total admissions. The average age for total admission was 48.3±19.6 and 40.4% (n=14,212) were men. There were no significant differences in gender or age between the total admissions before and after the implementation of a comprehensive smoke free law. The rate of deaths did decrease significantly after implementation of a comprehensive smoke free law compared to before, 1.8% (n=338) vs 2.5% (n=421), $p<.001$.

Heart attack admissions fell by 30.61% as a percentage of total admissions after implementation of a comprehensive smoke free law, from 0.49% (83/16,702) to 0.34% (63/18,513).

Summary

We found the rate of heart attacks (MI and ACS) decreased by 24.1% after implementation of a comprehensive smoke free law comparing 4 months prior to implementation to 4 months after implementation.

This data is comparable to other results of other similar community studies following the implementation of a smoke free law. Grand Forks was somewhat different compared to other studies in the respect that a partial smoke-free law, exempting bars, was already in place prior to the comprehensive law. Given that the community already had a partial smoke free workplace law prior to the study dates, the effect is of particular interest.

There are a number of limitations to our study. Our study was a before and after ecological study design and thus case and effect cannot be determined, only association. This does not have the benefit of a study comparing to test subjects and control subjects in a prospective design and therefore may not account for all potential risk factors (personal smoking history or other heart

disease risk factors) or seasonal changes. Gender and age of the subject in the before- and after-implementation study periods were similar.

However, the data are consistent with other community level studies suggesting that comprehensive smoke-free laws may be associated with reduction in heart attack admissions (MI and ACS). Future directions should include assessment of any persistent effect of decreased heart attack incidence over longer periods of time and controlling for other risk factors.

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