COST SAVING ANALYSIS OF REDUCED HOSPITAL ADMISSIONS FOR ACUTE MYOCARDIAL INFARCTION AND STROKE AFTER "NEVADA CLEAN INDOOR AIR ACT"

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BACKGROUND

- SHS (ETS) has been shown to cause premature death and disease in children and adults who do not smoke
- Recent studies have provided evidence that comprehensive smoking bans have a positive effect in reducing acute myocardial infarction, stroke and asthma related hospital admissions

ETS Status In USA

Cotinine levels in nonsmokers who were exposed to ETS fell since 1980s. However,
- >126 million nonsmokers in the US continue to be exposed to ETS
- Children, 60% of U.S. children are exposed
- 7% of adult nonsmokers live with at least one smoker,
- 25% of U.S. children live with at least one smoker.

BACKGROUND

Two most common objections to legislating smoking bans:
- 1) Personal freedoms and
- 2) Negative economic consequences.
- Nevada Clean Air Act: Jan. 2007
- legislative challenge in 2009 (SB 372): Economics

OBJECTIVES

- Analyzing the effects of three years of a partial state-wide smoking ban on MI and stroke hospital admissions
- Providing a cost savings and payer source analyses.
- Evaluating health consequences of smoking bans and the economic impact on the communities.

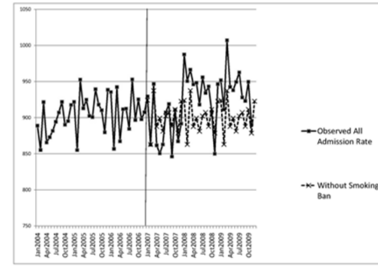
METHOD

- Data Sources: Hospital admissions for AMI and stroke from Center for Health Information Analysis, UNLV (State Division of Healthcare Finance and Policy); Population data obtained from State Demographer's Office
- 1991-2009
- ICD9-CM, 410.00-410.99 and 430.00-438.99
- Primary or multiple diagnosis

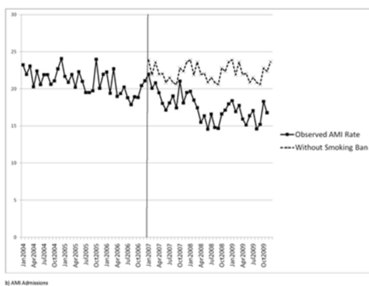
METHOD: DATA ANALYSIS

- Multiple linear regression and interrupted time-series analysis
- Monthly rates of admission for AMI, stroke and all diagnosis
- Linear time-trend variable (month) to quantify changes in treatment, population risk factors and other seasonality trends.
- A dichotomous variable accounted for the laws (Jan. 2007) was tested after controlling seasonal variations

RESULTS – TOTAL ADMISSIONS



RESULTS – AMI ADMISSIONS



RESULTS – STROKE ADMISSIONS

RESULTS

Note:

1) When using smoking ban as the predicting variable in the Interrupted Time-Series analysis, results for all diagnosis admissions as a responding variable are β = 21.933, P<0.001; AMI admissions β = -5.617, P<0.001; and Stroke β = -6.312, P<0.001.

2) Regression models include indicator variables for month of admission (11 variables).

3) Regression models and predicted values included data from 1991-2009, while presented figures are three years before and three year after the smoking ban (January, 2007) for easier illustration.

RESULTS

Year			2007	2008	2009	Annual Average
All	Hospital Admissions	Observed	289,637	308,235	302,593	300,155
		Projected	293,630	295,833	267,810	285,758
		Median Staying (day)	2.0	3.0	3.0	2.7
		Median Charges	$19,874	$22,002	$23,770	$21,882
	Difference between Observed and Projected	Admissions	-3,993	12,402	34,783	14,397
		Staying (day)	-7,986.3	37,205.1	104,348.8	44,522.5
		Charges	-$79,359,858	$272,862,401	$826,790,249	$340,097,597
AMI	Hospital Admissions	Observed	6,270	5,471	5,342	5,694
		Projected	7,228	7,283	6,562	7,024
		Median Staying (day)	4.0	4.0	4.0	4.0
		Median Charges	$64,898	$68,270	$74,049	$69,072
	Difference between Observed and Projected	Admissions	-958	-1,812	-1,220	-1,330
		Staying (day)	-3,833.4	-7,246.3	-4,880.2	-5,319.9
		Charges	-$62,194,401	-$123,676,285	-$90,342,587	-$92,071,091
Stroke	Hospital Admissions	Observed	13,586	11,499	11,078	12,054
		Projected	13,769	13,873	12,553	13,399
		Median Staying (day)	4.0	4.0	4.0	4.0
		Median Charges	$32,699	$35,418	$37,392	$35,170
	Difference between Observed and Projected	Admissions	-183	-2,374	-1,475	-1,344
		Staying (day)	-733.8	-9,495.0	-5,901.5	-5,376.8
		Charges	-$5,998,475	-$84,073,795	-$55,167,436	-$48,413,235

RESULTS

	Payer	Admissions			Charges		
		All	AMI	Stroke	All	AMI	Stroke
Obseved Payer Source Distributions (2007-09 Average)	Medcaid	32,109	210	584	$1,109,047,796	$31,306,707	$66,126,988
	%	10.7%	3.7%	4.8%	9.3%	5.5%	8.7%
	Medicare	74,023	2,142	5,885	$3,940,002,975	$204,684,290	$337,163,508
	%	24.7%	37.6%	48.8%	32.9%	36.1%	44.3%
	PPO/HMO	113,959	1,836	3,143	$4,057,518,459	$186,257,148	$195,855,631
	%	38.0%	32.3%	26.1%	33.9%	32.8%	25.7%
	Self Pay	24,835	315	455	$668,543,266	$29,275,802	$31,467,202
	%	8.3%	5.5%	3.8%	5.6%	5.2%	4.1%
	Others	30,926	672	860	$1,257,604,294	$61,544,432	$56,571,216
	%	18.4%	20.9%	16.5%	18.3%	20.5%	17.1%
	Total	300,150	5,694	12,054	$11,970,078,092	$567,682,160	$760,762,276
	%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Annual Difference between Observed and Projected	Medcaid	620	-55	-80	$31,510,612	-$5,077,564	-$4,208,176
	%	10.7%	3.7%	4.8%	9.3%	5.5%	8.7%
	Medicare	1,429	-563	-804	$111,944,595	-$33,197,284	-$21,456,343
	%	24.7%	37.6%	48.8%	32.9%	36.1%	44.3%
	PPO/HMO	2,200	-483	-430	$115,283,482	-$30,208,627	-$12,463,821
	%	38.0%	32.3%	26.1%	33.9%	32.8%	25.7%
	Self Pay	480	-83	-62	$18,994,860	-$4,748,176	-$2,002,503
	%	8.3%	5.5%	3.8%	5.6%	5.2%	4.1%
	Others	1,066	-313	-271	$24,871,710	-$21,359,686	-$10,220,657
	%	18.4%	20.9%	16.5%	18.3%	20.5%	17.1%
	Total	5,795	-1,496	-1,647	$340,097,597	-$92,071,091	-$48,413,235
	%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

RESULTS

After smoking ban (Jan. 2007):

- AMI admissions decreased 1,330 cases annually;
- Stroke admissions decreased 1,344 cases annually;
- While "Overall" admissions increased 14,397 annually at the same period of time;

RESULTS

After smoking ban (Jan. 2007):

An annual decrease in hospital charges of

- $92.1 million for AMI including 5.1 million Medicaid and 33.2 million Medicare as payers)
- $48.4 million charges for stroke (including 4.2 million Medicaid and 21.5 million Medicare as payers).

DISCUSSION

- This study contends that the reduction in admissions for both AMI and stroke, two diagnoses with a well-established direct relationship with exposure to secondhand smoke
- The results are consistent with an accumulating body of research on the impact partial and comprehensive smoking bans on health outcomes in other states and western region of the United States.

DISCUSSION

- Nevada provides a compelling opportunity to assess the health impact of a partial statewide smoking ban since there were no local or county-level smoking bans in place when the statewide ban was implemented.
- No other factors have been found the reduction in AMI and stroke admissions during the period 2007 to 2009.

DISCUSSION

- Overall hospital admissions in the post-ban period continued to increase despite the severe economic downturn in Nevada and have actually exceeded what was predicted by the same regression model.
- Unlike asthma and other conditions affected by exposure to ETS, emergent conditions like AMI and stroke cannot be deferred or take place in an outpatient setting.

CONCLUSIONS

- Nevada's partial statewide smoking ban decreased hospital admissions for AMI and stroke;
- Not only reduced severe impacts on individual quality of life (life threatening diseases) , but also significantly reduced costs on the community level.

Thank you and Questions?