

Effects of Maine's 1981 and Massachusetts' 1982 Driving-Under-the-Influence Legislation

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Abstract: In 1981, Maine passed a drunk driving law with mandatory penalties and a new civil charge to increase the conviction rate. One year later, Massachusetts increased drunk driving penalties, particularly for repeat offenders and intoxicated drivers involved in fatal crashes.

In Maine, single-vehicle nighttime fatal crashes declined 22 per cent the year before passage of the law, and 33 per cent the year after. Maine's rates returned to pre-law levels by the third post-law year. Prior to Massachusetts' new law, single-vehicle nighttime and overall fatal crashes there also declined 20% and 22%, whereas after this law

fatal crash rates did not decline further compared with the pre-law year or other New England states.

Pre- and post-law surveys indicate that both laws were followed by some increases in public perceptions that drunk drivers stopped by police would be arrested, convicted, and receive automatic penalties. But, few believed it was very likely that drunk drivers would be stopped. For only two of three years studied after Maine's law did more people there report decisions not to drive because they had drunk too much. In Massachusetts, reported driving after heavy drinking declined as much the year before as the three years after its law. (*Am J Public Health* 1987; 77:593-597.)

Introduction

A 1981 National Academy of Sciences report estimated that if no one drove a motor vehicle after drinking, traffic deaths in the United States would decline 24 per cent, 11,000-13,000 annually.¹ Between 1980 and 1984, over 400 drunk driving laws passed in the United States.^{2,3} Projections from 15 states that consistently test 85 per cent or more of fatally injured drivers for blood alcohol indicate nationwide 3,400 fewer intoxicated drivers were killed in motor vehicle crashes in 1984 than in 1980, a 23.7 per cent reduction. In contrast, the number of non-intoxicated drivers who died annually has remained constant.⁴

However, the Insurance Institute for Highway Safety has cautioned "none of the countermeasure approaches devised and implemented to deter these drivers has been found by competent research to have a permanent influence on reducing deaths from crashes of alcohol impaired drivers."⁵ Reviews of drunk driving laws in the US and elsewhere^{6,7} indicate that without active enforcement increased legal penalties may not be followed by even short-term drunk driving and fatal crash declines. Any initial post-law crash declines typically decay as the public realizes police and court enforcement are not as intensive as initially anticipated.

Two drunk driving laws passed one year apart in New England provided an opportunity to study whether coupling judicial measures to increase convictions with stiffer penalties could increase public perceptions that drunk drivers will be apprehended, convicted, and punished, and thereby achieve sustained drunk driving and fatal crash declines.

Maine's Operating Under the Influence (OUI) Law

On September 17, 1981, Maine implemented what its governor, Joseph Brennan, called the "toughest drunk driving law in the nation." As recently recommended by the President's Commission on Drunk Driving,⁸ driving with a

blood-alcohol level (BAL) of 0.10 per cent or higher became evidence per se, instead of presumptive evidence, of operating under the influence (OUI). (A BAL of .10 results from a 150-pound person drinking approximately four to five drinks in one hour on an empty stomach.) Driver licenses were automatically suspended for 180 days for refusing a blood or breath test, and more stringent OUI penalties were made mandatory (details available on request).

A civil OUI charge was also introduced for first offenses with BALs under .20 so that preponderance of evidence, instead of guilt beyond a reasonable doubt, could obtain a conviction. The right of convicted offenders to a *de novo* or second jury trial was eliminated.

1982 Massachusetts Drunk Driving Law

Massachusetts, on September 1, 1982, introduced a new offense—vehicular homicide under the influence—with a mandatory 10-year license revocation, minimum one year imprisonment, and a \$500-\$5,000 fine. Heightened drunk driving penalties included a seven-day mandatory jail sentence or a 14-day inpatient alcoholism treatment for repeat offenders and, for first offenders, a one year mandatory license revocation, possible fines of \$100-\$1,000 and imprisonment of one week to two years. The common judicial practice of continuance without a finding of first offense cases until drivers complete a driver alcohol education program was no longer possible without a 30-day license suspension and subsequent charges being tried as repeat offenses.

Methods

Effects of both laws were assessed. Initially the study was designed to compare pre-law and three years of post-law experience in Maine with Massachusetts where no legal changes had been anticipated. Prior to 1981, both states had similar drunk driving laws.

Connecticut, Rhode Island, New Hampshire, and Vermont were added for a separate pre- and three-year post-law comparison with Massachusetts when the 1982 Massachusetts law passed. Maine, Massachusetts, and the other New England states experience relatively similar weather and economic influences and had similar fatal crash patterns over the five years prior to Maine's law.

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Arrests and Convictions (law enforcement)

From official statistics,⁹⁻¹³ pre- and post-law rates of drunk driving arrests per 10,000 licensed drivers and the proportions convicted were compared in Maine and Massachusetts.

Citizen Surveys (public perceptions)

One month before Maine's 1981 law, anonymous telephone surveys of 1,000 randomly sampled¹⁴ adults 18 years and older in Maine and in Massachusetts queried respondents' personal characteristics, behaviors that might influence crash rates (e.g., mileage and types of vehicles driven), perceptions about police and court enforcement of drunk driving laws, respondents' drinking and driving behaviors, and nonfatal crash involvement. The surveys were repeated there annually and in the other New England states (N = 1,300 annually) from 1982, prior to Massachusetts' law, through 1985.* Response rates, similar in each area before and after the laws, ranged from 74 per cent to 76 per cent. Shifts in survey responses over time within and between states were tested respectively by chi square and log linear analyses. Data were weighted by age, sex, and number of adults in the household.

Fatal Crashes

Maine, Massachusetts, and other New England states annual and monthly fatal crash trends per hundred million

*One year after the Massachusetts law, New Hampshire amended its drunk driving legislation. New England comparisons were made with and without New Hampshire. Results reported were not altered.

vehicle miles (HMVM) driven were compared from September 1976 through December 1984. Single-vehicle nighttime (9pm-6am) fatal crash trends per HMVM traveled at night (HMNVN) were also compared as a surrogate for alcohol-involved crash trends. The US Department of Transportation provided these data. Alcohol is present in a majority of nighttime crashes, and study states did not consistently alcohol test all drivers in fatal crashes. The comparison ended early in 1985 when Maine's Supreme Court ruled the civil OUI charge unconstitutional (*Freeman vs Maine, 1985*) because it allowed police to handcuff and detain suspected offenders at police stations without due process. Massachusetts and the other New England states were compared from September 1976 through August 1985.

Separate Box Jenkins ARIMA time series¹⁵ models for each area were developed (BMDP-P2T statistical programs). An intervention component accounted for covariates such as a linear trend in crash rates over time and the number of weekend days per month. A series of dichotomous intervention variables which model annual post-law shifts in the expected level of crash rates described possible law effects. By comparing the coefficients of these intervention variables, we explored possible crash declines from the expected post-law level in the two new law states.

Results

Effects of Maine's Law

Arrests and Convictions—The three years before Maine's law, OUI arrests increased 29 per cent. They increased another 7 per cent the first two post-law years (to

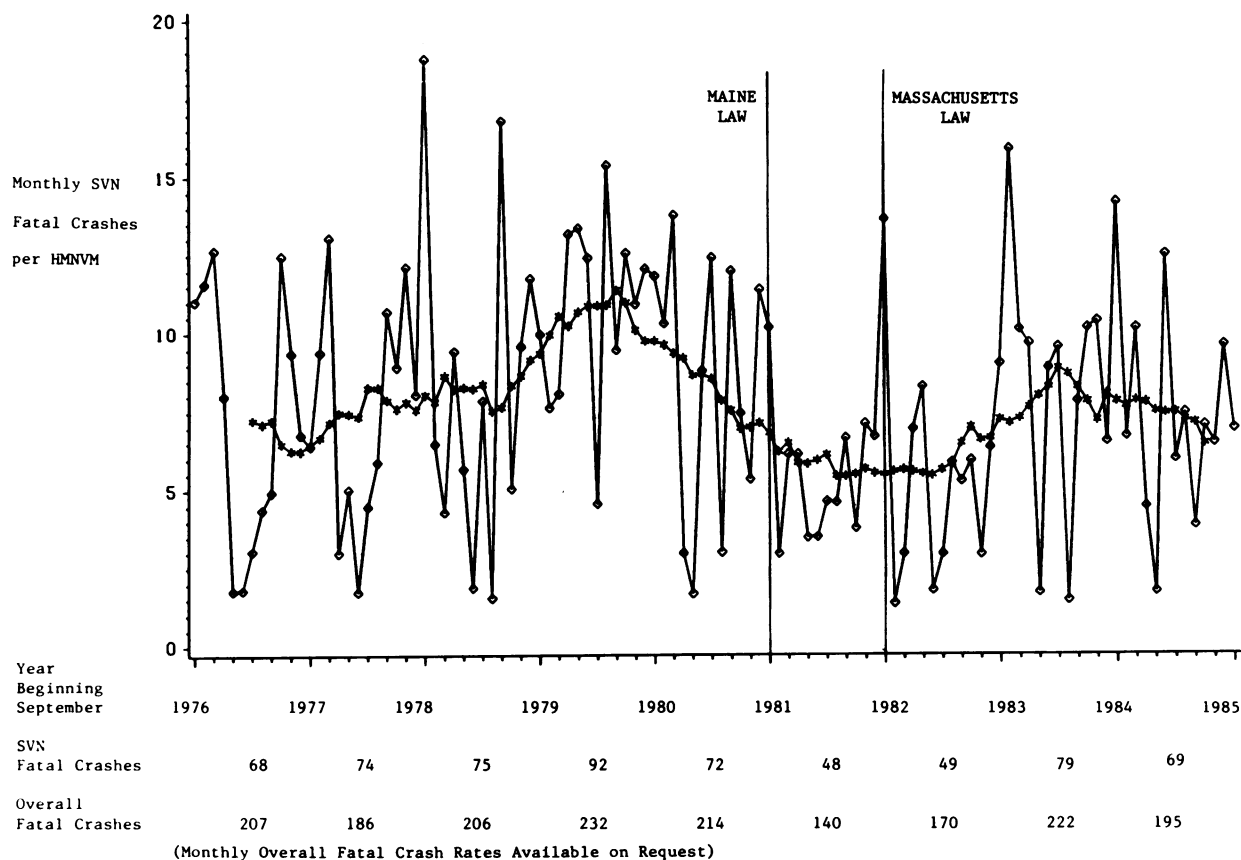


FIGURE 1—Maine Fatal Single-Vehicle Nighttime (SVN) Crashes per Nighttime Vehicle Miles Traveled, and Annual Fatal and SVN Fatal Crash Frequencies, 1976-85

Note: Smoothed curve is 12-month moving average.

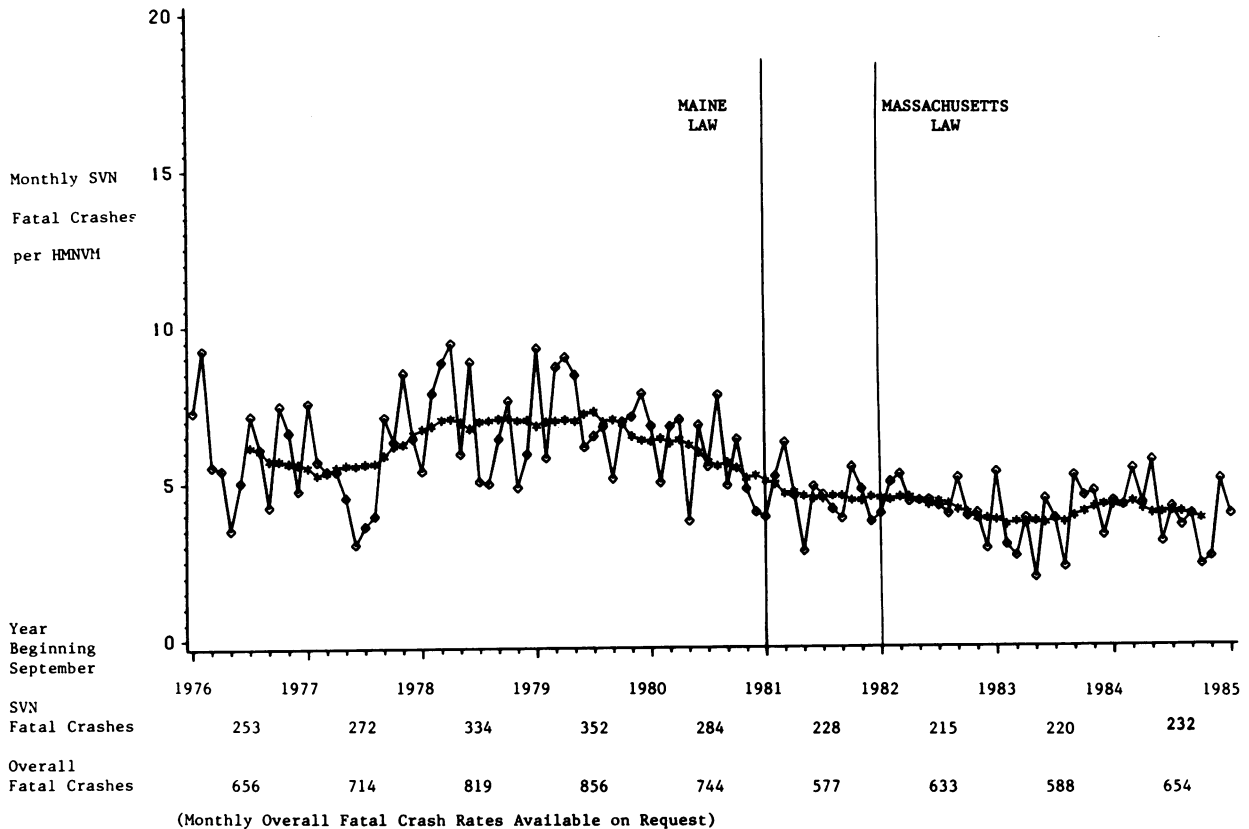


FIGURE 2—Massachusetts Fatal Single-Vehicle Nighttime (SVN) Crashes per Nighttime Vehicle Miles Traveled, and Annual Fatal and SVN Fatal Crash Frequencies, 1976–85

Note: Smoothed curve is a 12-month moving average.

14/100,000 drivers), but returned to the pre-law level the next year. Convictions increased from 66 per cent to 90 per cent of those arrested from 1978 to 1984.

Citizen Surveys—After passage of the law there was some increase in the proportion of respondents who felt the law was adequately enforced, but half of them remained skeptical. Only a fourth of them thought it very likely that a drunk driver would be stopped by the police, and the law had no effect on this perception. If stopped, somewhat more thought they would be charged (59 to 74 per cent), taken to court (72 to 80 per cent), and convicted (54 to 68 per cent). Most respondents seemed aware that the new law increased penalties (specific data available on request).

Although there was some initial increase in Maine drivers, especially young males, deciding not to drive because they drank too much (from 14 to 20 per cent), this declined to 16 per cent by 1984. Frequency of driving after consuming 5+ drinks did not decline significantly in Maine relative to Massachusetts, nor did reported frequency of non-fatal crashes.

Fatal Crashes (Figures 1–3)—Relative to the five-year pre-law trend, three-year post-law fatal crash declines in Maine were not significantly greater than in Massachusetts or other New England states. Single-vehicle nighttime fatal crashes which had been increasing for several years declined 22 per cent the year prior to Maine's law and 33 per cent the year after. In the comparable Massachusetts years, they declined 19 per cent and 20 per cent; in the rest of New England, they declined 0.3 per cent and 22 per cent. All fatal crashes followed a parallel pattern. Relative to the five-year

pre-law trend, the first year overall fatal crash decline in Maine was steeper than in Massachusetts (one-sided $p < .08$) or the other New England states (one-sided $p < .05$). But, unlike those other areas, Maine's single-vehicle nighttime and overall fatal crash rates returned to the pre-law level by the third post-law year.

Effects of Massachusetts' Law

Arrests and Convictions—From 1978 through 1981, prior to Massachusetts' law, arrests increased 20 per cent but convictions declined from 24 to 17 per cent. After the law, arrests increased 29 per cent (to 10/10,000 drivers in 1985). Convictions rose to 31 per cent, and 63 per cent were given continued sentences that required 30-day license suspensions.

Citizen Surveys—After the Massachusetts law passed, the proportion of respondents who believed the law was adequately enforced increased somewhat, but more than half were skeptical. Less than one-fifth thought it very likely a drunk driver would be stopped by the police and this was unaffected by the law. If stopped, more thought they would be charged (41 to 61 per cent), convicted (30 to 47 per cent), subject to license suspension (38 to 54 per cent), and if a repeat offender fined (84 to 90 per cent) and jailed (24 to 38 per cent). Reported driving after heavy drinking declined from 14 per cent to 11 per cent the year before the law, then to 7 per cent over the three post-law years. Reported non-fatal crash frequency remained constant.

Fatal Crashes—Single-vehicle nighttime and overall fatal crashes declined the two years prior to the law, but did not

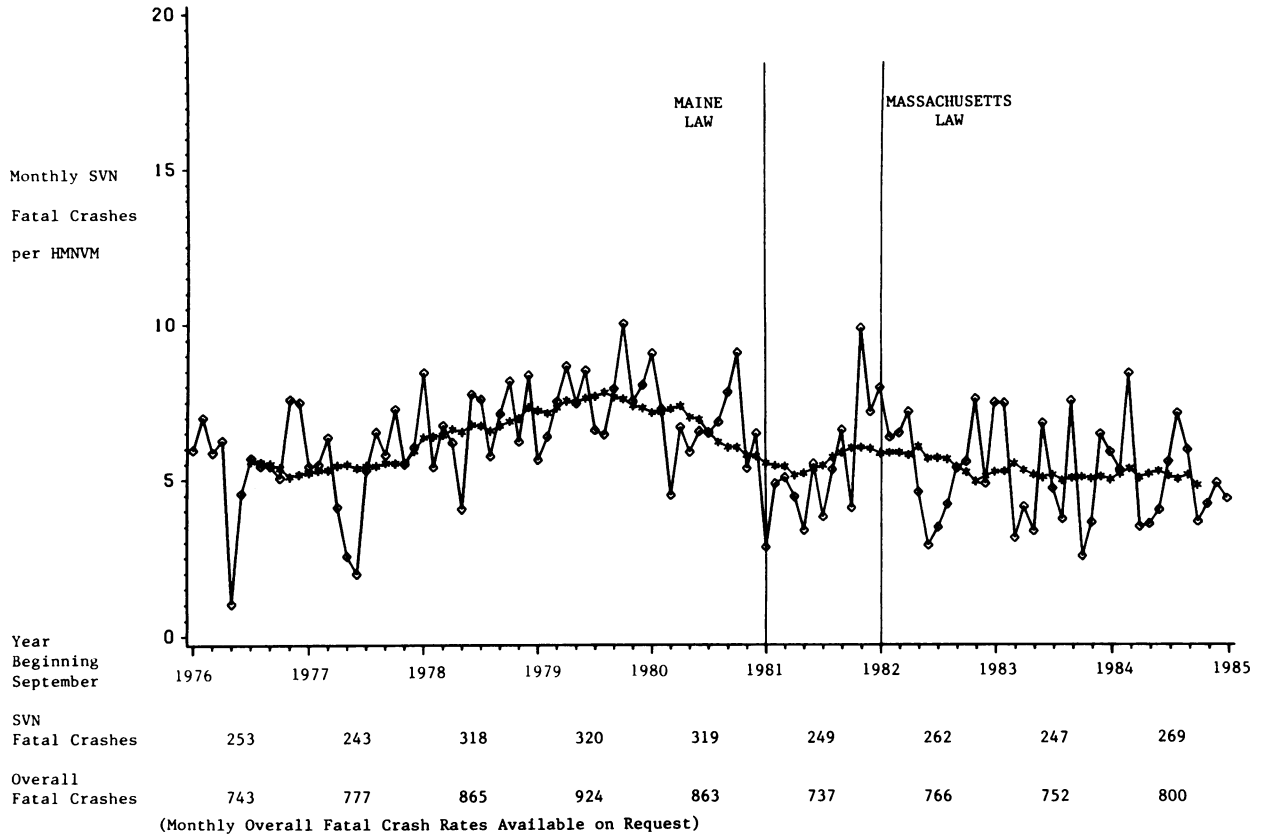


FIGURE 3—Other New England States Fatal Single-Vehicle Nighttime (SVN) Crashes per Nighttime Vehicle Miles Traveled, and Annual Fatal and SVN Fatal Crash Frequencies, 1976–85
 Note: Smoothed curve is 12-month moving average.

decline further the three years thereafter. These fatal crash rates did not decline significantly in Massachusetts after its law relative to the New England comparison area (one sided $p = .25$) (Figures 2, 3).

Time Series Analyses

In each of the three regions under study, fatal rates were found to follow an AR(1)(12) model. After accounting for the autocorrelation structure, neither a linear time trend nor the number of weekend days was significant. In Massachusetts and the New England control region, single-vehicle nighttime fatal crash rates were found to follow an AR(1) model, suggesting such crashes do not follow strong seasonal patterns. In Maine, single-vehicle nighttime crash rates followed a random pattern; no autoregressive parameters were found to be significant (data available on request).

Discussion

Increased drunk driving penalties, even when coupled with judicial measures to increase conviction, did not initiate sustained drunk driving and fatal crash reductions in Maine or Massachusetts. Although both laws somewhat increased the public's perception that arrested drunk drivers would be convicted and receive stiffer penalties, in neither state did more than one-fourth of respondents come to believe drunk drivers were very likely to be stopped by the police. Despite increased police arrests for drunk driving, during the post-law period in Massachusetts only one arrest, compared to 2.5 crashes, occurred per 1,000 drunk driving trips reported by

survey respondents. Maine's arrest rate was only slightly higher and declined the third post-law year.

Also, in Maine after passage of the drunk driving law, the increased focus on drunk driving coincided with a decline in state police speeding enforcement. Citations dropped from 31,045 in 1980 to 19,693 in 1984, and fewer Maine drivers perceived that police would stop speeders (49 per cent vs 59 per cent). US Department of Transportation automatic monitoring equipment revealed that during the post-law period (1982–1984) the proportion of traffic traveling 65 mph on 55 mph posted roads increased from 7 per cent to 12.3 per cent. This may have contributed to the return of fatal crashes to pre-law levels. Drunk drivers may be particularly vulnerable to crashing at higher speeds because of slower reaction time and reduced sensory motor coordination. In response, Maine police increased speeding arrests by one-third and warnings by 100 per cent in 1985 compared to 1984, and fatal crashes declined 16 per cent. Because speeding, drunk driving, and other traffic safety violations disproportionately cluster in the same drivers, it is important not to neglect one area of traffic enforcement to increase attention to another.

Finally, in both Maine and Massachusetts, fatal crashes began to decline prior to the laws. Correlations of unemployment with fatal crash rates of .38 in Massachusetts and .34 in Maine over the study period suggest this was partly attributable to the economic recession.

The two years of pre-law survey data available in Massachusetts also reveal declines in reported driving after drinking and heavy drinking even before the drunk driving law passed there. Prior to Massachusetts' law, media atten-

tion focused on drunk driving. Maine passed its laws, and Congress passed new federal legislation. A national commission appointed by President Ronald Reagan, and a Massachusetts commission appointed by then-Governor Edward F. King held widely publicized hearings about the drunk driving problem.

Debate preceding the laws in both states as well as national media attention may have increased public disapproval of drunk driving, thereby reducing its occurrence. Increased drunk driving penalties may have been the symbolic outcome rather than the catalyst of such change. This study, which focused on the effect of specific features of laws to deter drunk driving, did not systematically evaluate the effects of changes from media attention and informal social pressure. Such changes may be as important as government regulations in reducing drunk driving and fatal crashes.

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REFERENCES

1. Reed D: Reducing the costs of drinking and driving. *In*: Moore M, Gerstein D (eds): Alcohol and Public Policy: Beyond the Shadow of Prohibition. Washington, DC: National Academy Press, 1981, 341.
2. US Department of Transportation: A Digest of Alcohol—Highway Safety Legislation. Washington, DC: National Highway Traffic Safety Administration, DOT, HS 806 745, 1985.
3. National Commission against Drunk Driving: Progress Report on the Implementation of Recommendations by the Presidential Committee on Drunk Driving. Washington, DC: DOT, HS 806-885, 1985.
4. US Department of Transportation: Fatal Accident Reporting System, 1984. Washington, DC: DOT, HS 806 919, 1986.
5. Insurance Institute for Highway Safety: Drinking Driving Laws: What Works? Highway Loss Reduction Status Report 1981; 16:1.
6. Ross H: Detering the Drinking Driver: Legal Policy and Social Control. An Insurance Institute for Highway Safety Book. Lexington, MA: Lexington Books, 1982; 103.
7. National Highway Traffic Safety Administration: Alcohol and Highway Safety, 1984: A Review of the State of Knowledge. Washington, DC: DOT, HS 806 569, 1985.
8. Report to the Nation from the Presidential Commission on Drunk Driving. John Volpe, Chairman, November 1983.
9. Foley J, Brown M, Driving under the Influence of Liquor: Dispositions and Placements in Driver's Education Programs 1977-1982. Boston: Office of the Commissioner of Probation, Commonwealth of Massachusetts, July 21, 1983.
10. Cochran D, Brown M: Driving under the Influence of Liquor: Arraignments, Dispositions and Collections 1985. Boston: Office of the Commissioner of Probation, 1985.
11. Robinson T, Clark R: Drinking and Driving in Maine: How Well Is the Law Working? Augusta: Office of Alcoholism and Drug Abuse Prevention, Maine Department of Human Service, 1980.
12. McDonnell P, Frank T: A Report on an Act to Reform the Statutes Relating to Driving under the Influence of Intoxicating Liquor or Drugs. Chapter 469 of the Public Laws of Maine. Portland: Human Services Development Institute, University of Southern Maine, 1983.
13. Maine Department of Human Services: Drinking and Driving in Maine 1983 (6 months) March 1984.
14. Waksberg J: Sampling Methods for Random Digit Dialing. *J Stat Assoc* 1978; 73:40-46.
15. Box G, Jenkins G: Time Series Analysis: Forecasting and Control. San Francisco: Holden-Day, 1976.

Guarding the Guardians: Research on Peer Review

The First International Congress on Peer Review in Biomedical Publication, to be held in Chicago in May of 1989, will present original research on critical issues in the publication of scientific research. These will include:

- the relationships between authors, editors, and reviewers, and how each is educated, selected, and evaluated;
- analysis of editorial decision making;
- cost-benefit issues;
- allocation of responsibility for published material;
- appropriate editorial safeguards;
- breakdowns in the system, for example, plagiarism.

The subject of the congress is *biomedical* publication but scholars in other disciplines such as social scientists and historians of science are urged to participate. Thereby, *biomedical* peer review can be examined in the context of the overall scientific enterprise. Research protocols should be developed now; future mailing and journal announcements will call for abstracts and announce the exact date of the congress.

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