

More Crashes, Pedestrian Injuries

Right-Turn-On-Red Laws Raise Intersection Toll

Adoption of right-turn-on-red laws throughout the United States as a fuel-saving measure has cost the nation a 20 percent increase in the number of crashes involving right turns at traffic lights and a 57 percent increase in the number of pedestrians struck during right-turn maneuvers, a new research study has concluded. In real numbers, that means an additional 20,000 crashes each year, 1,400 of them involving pedestrians.

Researchers analyzed data involving crashes at intersections in six states, before and after adoption of laws permitting a right turn on red (RTOR) between 1974 and 1977, contrasting that experience with three states whose laws did not change during that period. The study was conducted jointly by the Insurance Institute for Highway Safety and Moshman Associates, Inc.

The researchers concluded: "The results of this study show that, whatever the savings in gasoline resulting from RTOR, they are being paid for in increases in pedestrian and other intersection crashes. In fact, the adoption of RTOR leads to an increase of over 20 percent in all crashes involving a right turn at signalized intersections, with substantially larger percentage increases in urban areas.

The report explained: "Pedestrian crashes also increase substantially as a result of RTOR: among children, the increase is more than 30 percent; among adults, about 100 percent; and among the elderly, more than 110 percent."

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Motor Vehicle Injury Costs Found Second Only To Cancer

A study of four major causes of death in the country has determined that the societal costs of motor vehicle injuries are exceeded only by those of cancer. Following, in order, are coronary heart disease and stroke.

"In terms of total individuals affected, motor vehicle injuries dominate, with an incidence five times that of any of the other three impairments," authors of the study noted. "Moreover, the age at incidence is younger — by three decades — for motor vehicle injuries."

Results of the study, conducted by Charles N. Smart, Nelson S. Hartunian, and Mark S. Thompson and supported by the Insurance Institute for Highway Safety, have been published in the December 1980 *American Journal of Public Health*. An expanded report of the three-year research project will be published in book form by Lexington Books, Boston.

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Right-Turn-On-Red Laws Raise Intersection Toll (Cont'd from page 1)

The effect of the laws was most pronounced in urban areas, where the increased number of pedestrians struck by single vehicles was 79 percent. The aggregate increase in right-turn crashes following RTOR was 25 percent, compared to a 16.5 percent increase in rural areas, the study reported.

Twenty-five states had adopted laws permitting RTOR by 1974, but not until 1975 did Congress make it a national policy to encourage the laws. Following passage of the Energy Policy and Conservation Act that year, the states were required to develop energy conservation under the threat of losing federal aid. Among the regulations stipulated by the act was the adoption by states of "a traffic law or regulation which to the maximum extent practicable consistent with safety" permits drivers to turn right at a red light after stopping.

The Federal Highway Administration commissioned a 1976 survey which concluded that RTOR would reduce fuel consumption and auto emissions, as well as result in "a relatively insignificant number of accidents," predicted to be 11,200 annually.

By 1976, some 43 states had adopted RTOR and all states and the District of Columbia now permit RTOR unless specifically prohibited by a sign at the intersection.

Problems Found With Earlier Study

"The need to assess the consequences of the right-turn-on-red rule became particularly acute," the researchers said, "after a number of methodological problems were discovered in the (1976) FHWA study cited earlier." The 1976 study based its conclusions on police-reported data as to whether the crashes had occurred during the green or red cycle at signalized intersections. The reliance on the data was faulty, the researchers reasoned, since that information was usually obtained from the involved parties, resulting in the strong possibility that the information could have been wrong.

"On the other hand," said the authors, "a police officer commonly has less difficulty observing the final positions of the involved vehicles just after a crash and can ascertain the pre-crash turning movements of the vehicles with much greater certainty than the status of the signal phase at the time of movement.

"With that in mind, the crash data cited in the FHWA study were re-analyzed by one of the authors of the present paper with conclusions that were markedly different from those of the FHWA study. In fact, the later analyses showed that the introduction of generally permissive RTOR rules was always followed by increases in the relative frequencies of crashes involving right turns as compared to the relative frequencies of crashes not involving right turns."

Later analysis of a 1972 RTOR experiment in Chicago not only showed an increase in the total frequency of right-turn crashes, the researchers found, but the number of pedestrians struck by right-turning vehicles increased by 100 percent compared to a 57 percent increase in pedestrian impacts not involving right turns.

Data Used From Six States

In order to get a broad statistical base, the researchers used police reports of crashes occurring at signalized intersections in New Jersey, Oklahoma, South Carolina, Tennessee, Virginia, and Wisconsin between 1974 and 1977, when RTOR was introduced in those states. The researchers then contrasted that data with that obtained from three comparison states, where laws did not change during that time span. They were Maryland, which had signs at some intersections permitting motorists to turn right on red, and Texas and Washington, both of which had RTOR laws in effect.

By using statistical procedures the authors were able to compare the data from jurisdictions which changed their RTOR laws with those that did not and estimate the magnitude of the laws' effect on right-turn crashes, taking into account fluctuations in the overall crash rate.

“There were 20.7 percent more crashes involving right-turn maneuvers at signalized intersections following the introduction of RTOR than there would have been had RTOR not been introduced,” they reported. “The probability that such a change would occur due to chance fluctuations is negligible.”

Details Extracted From Reports

Using the police reports, the analysts were able to determine the types of crashes, their locations, severity of injury, age and sex of drivers and pedestrians, the day of the week, time of day, and whether the weather was good or bad.

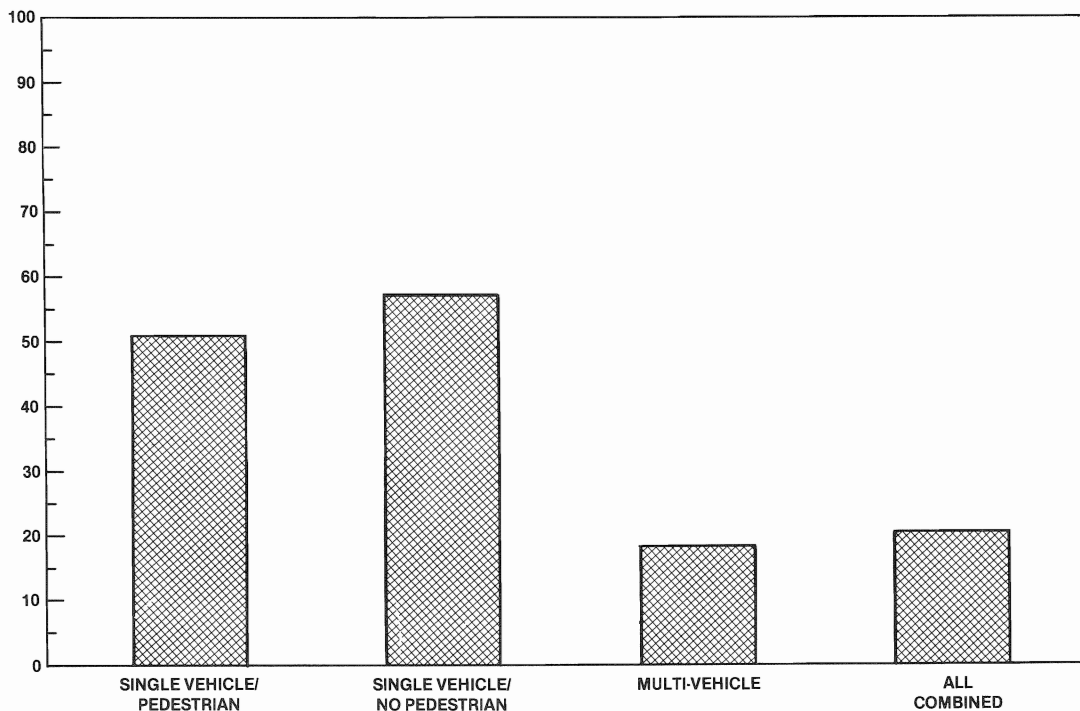
They found that the greatest adverse effect of the laws upon drivers was among females, particularly those over 55 years of age, for whom the increased crash-involvement was 28 percent. Among males, the greatest increase was for those under 24 years. Drivers under 24 doubled their involvement in pedestrian impacts, with the rate nearly tripling for female drivers 24 and under. Overall, there were more crashes in bad weather than good.

Extrapolating from the results of the study, the researchers were able to estimate that if similar law changes had taken place during the same period in each of the 50 states, a toll of about 20,000 additional crashes would have resulted each year, 1,400 of them involving pedestrians.

“The inevitable conclusion of the present study,” they reported, “is that the widespread adoption of RTOR laws that took place in the U.S. during the 1970's was not ‘consistent with safety’ and was therefore contrary to the intent of the congressional requirement that such turns be permitted to ‘the maximum extent practicable consistent with safety.’ ”

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Percentage of increases in police-reported right-turn crashes after adoption of right-turn-on-red laws—by crash type



In an attempt to contrast the estimated economic benefits of the laws in terms of time and fuel savings, the investigators noted that estimates vary widely, but “allowing for the crudeness of annual estimates, the following summarize the wide range of estimated economic benefits of RTOR:

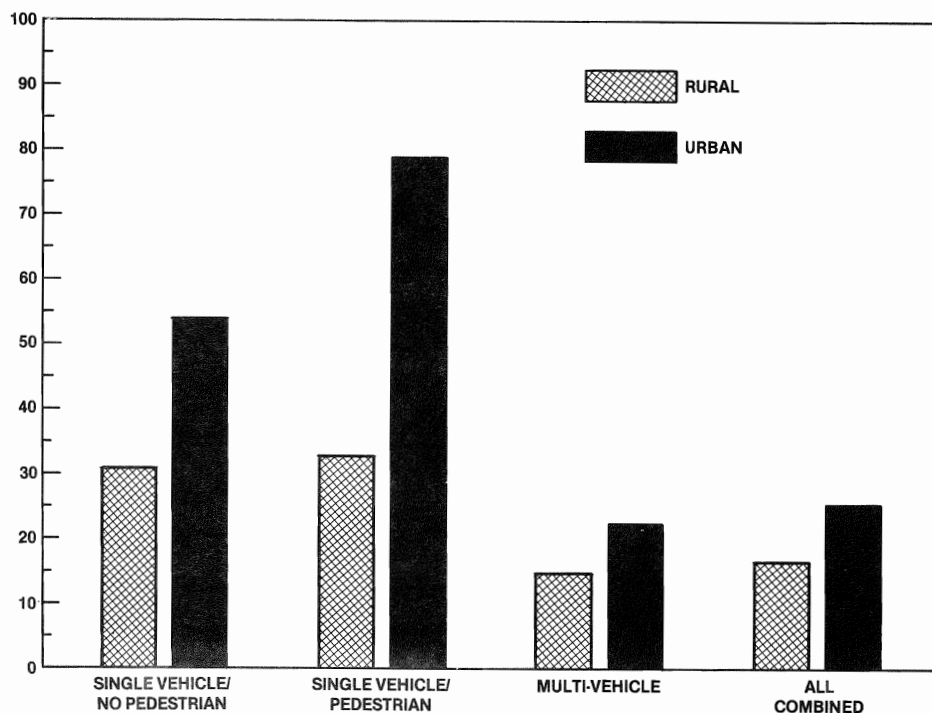
- “25-190 million gallons of fuel per year,
- “0.2-1.3 gallons of fuel per registered vehicle per year,
- “\$0.25-\$1.70 per vehicle per year (at \$1.30/gallon),
- “0.3-1.7 hours per driver per year,
- “3-17 seconds per driver per day.

“These benefits,” the authors reported, “can be contrasted with the following costs: 20,000 excess police-reported crashes per year and 1,400 excess injuries to pedestrians per year.”

The adverse effects of RTOR could be reduced, the researchers suggested, by outlawing RTOR in urban centers with large traffic volumes, especially those with high numbers of pedestrians.

Copies of the study, “Adoption of Right Turn on Red: Effects on Crashes at Signalized Intersections,” by Paul Zador, of the Insurance Institute for Highway Safety, and Jack Moshman and Leo Marcus of Moshman Associates, Inc., may be obtained by writing the Insurance Institute for Highway Safety, Watergate 600, Washington, D.C. 20037.

Percentage of increases in police-reported right-turn crashes after adoption of right-turn-on-red laws— by crash type and location



Motor Vehicle Injury Costs Found Second Only To Cancer (Cont'd from page 1)

Cancer led the list of major health impairments with estimated total societal costs in 1975 of \$23.1 billion, and motor vehicle injuries were second with estimated costs of \$14.4 billion. Coronary heart disease costs ranked next at \$13.7 billion, and stroke costs were estimated at \$6.5 billion. These estimates included direct costs — actual health care expenditures — and indirect costs — the lost economic productivity caused.

Lost Earnings Far Higher

Because of the youthful age of so many of those suffering motor vehicle injuries (the toll peaks between 15 and 24), the indirect costs reflecting lost earnings are far higher than for any of the other three major impairments.

“The major surprise for most readers will probably be the astounding costs of motor vehicle injuries,” William Haddon, Jr., M.D., IIHS president, said of the study. “Yet unlike society’s response to coronary heart disease, stroke, and cancer, there is no great scientific effort to reduce damage to people sustained on the highway. Moreover, lifesaving motor vehicle crash packaging and other technology and important scientific knowledge to reduce motor vehicle crash injuries remain unused many years after their development.”

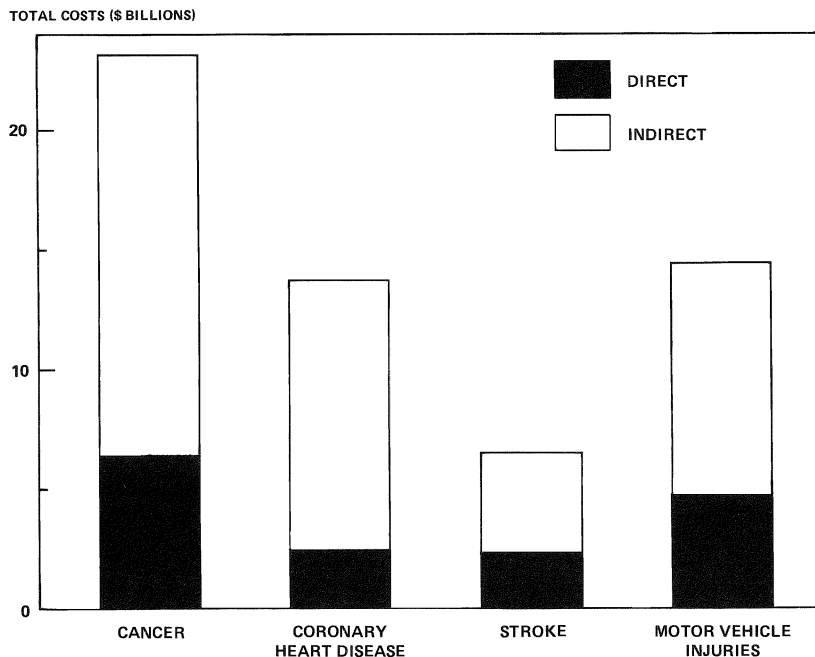
Costs Charged to Year of Incidence

While economic costs of disease and injury have usually been calculated by the *prevalence* of the impairments in a given year, the researchers used an alternative method, assigning all costs properly discounted, to the year of *incidence*.

“The underlying rationale of the prevalence approach is that disease or injury costs should be assigned to the years in which they are borne or are directly associated,” the authors said. “In this approach, direct and morbidity costs are assigned to the years in which they occur and mortality costs are assigned to the year of death.”

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Total economic costs associated with the incidence of cancer, coronary heart disease, stroke, and motor vehicle injuries: United States, 1975



NOTE: All costs in 1975 dollars, discounted at 6 percent.

In contrast, the incidence approach is based on the principle that the stream of costs associated with a health condition should be assigned to the year in which the stream starts. The incidence approach thus assigns all direct, morbidity, and mortality costs to the year in which the condition first appears.”

The latter approach, the authors contended, “is more appropriate for gauging the economic gains achievable through prevention, immediate rehabilitation, and arresting progression.”

Implications for Policymakers

Both Haddon and the researchers pointed to the implications for policymakers in the study results.

“Surely it is rational and sensible for private and public decision-makers to pay attention to both the absolute and relative economic losses that result from the occurrence of different kinds of damage to the bodies of Americans,” Haddon said. “In this light, and aside from its considerable contribution to the methodology of economic analysis, one of the most important contributions of this work is its finding that motor vehicle injuries are one of the leading causes of health-related expenditures by the people of the United States. It is tragic and illogical that they are not receiving commensurate attention in government and private research and control activities.”

At present, Haddon said, “some health problems are more equal than others, and motor vehicle injuries are not among them.”

Reprints of the American Journal of Public Health article will be available from the Insurance Institute for Highway Safety, Watergate 600, Washington, D.C. 20037. Ask for copies of “The Incidence and Economic Costs of Cancer, Motor Vehicle Injuries, Coronary Heart Disease, and Stroke: A Comparative Analysis.”

Claybrook Urges Voluntary Safety Action By Auto Makers

“Approximately 140 Americans die on the highways each day, the equivalent of a major airline crash 365 days a year. Every 10 minutes, another person is killed and every nine seconds another is injured — every day of the year.”

With that as the setting, Joan Claybrook, National Highway Traffic Safety Administration (NHTSA) head who presumably will be leaving office soon, has issued a plea to both domestic and foreign auto makers that they build in known safety features — without government regulatory pressure they make the transition to energy-efficient small cars. Failure to do so, she told them, will result in even more numbing statistics.

“With the introduction of large numbers of small cars on American highways, we can anticipate an increase of 10,000 to 15,000 lives lost per year by 1990,” said Claybrook, in letters to the chief executives of 10 major auto makers. “You should consider that in the years ahead, the auto makers’ view that safety has no market value could prove to be just as wrong as their attitude of a year or two ago toward fuel efficiency. . . . Now, as cars must get lighter to achieve greater efficiency, safety looms larger in the purchase decision. And with good reason. In large/small car crashes 85 percent of the fatalities occur to the small car occupant.”

The experimental safety vehicles built here and abroad provide examples of designs and materials that could be readily incorporated into production cars, Claybrook said. Adding that Congress had intended that federal safety standards serve as a floor for safety performance, Claybrook said, “The tragedy is that many manufacturers have treated the standards more like ceilings on safety performance. . . .”

Noting the historical reluctance of the manufacturers to accept safety regulation, Claybrook said that “over 60,000 Americans owe their lives to the safety advances made in the last 12 years” under the pressure of federal standards.

Claybrook listed five key design areas manufacturers need to concentrate on in order to reduce crash injuries. They are:

- Occupant restraints – to prevent or soften contact with vehicle interiors during crashes.
- Crash energy management – designs for managing crash energy in a way that absorbs, controls, and reduces the forces exerted on people during impacts.
- Structural integrity – design goals to prevent car occupants from being ejected, trapped, burned, or crushed in impacts.
- Crash avoidance characteristics -- better handling, braking, visibility, signalling, and diagnostic systems.
- Pedestrian protection – exterior designs to lessen the severity of injuries to pedestrians during collisions.

Critical Areas Listed

Claybrook suggested some specific areas requiring attention:

- *Air bags* – Not available to consumers since 1976, if offered they could provide “unobtrusive and potentially superior” protection to occupants in frontal crashes, which account for about 20,000 deaths each year.
- *Seat belts* – Recently, the agency conducted 35 mph crash tests under its new car assessment program and found that many seat belts failed to provide adequate protection at speeds above the current 30 mph crash standard. (See *Status Report*, Vol. 15, No. 14, Sept. 17, 1980.) Claybrook singled out for special praise General Motors’ Chevy Citation, Chrysler’s Omni/Horizon, Ford’s Mustang/Capri, and the Fiat Strada for providing an extra margin of safety.

Seat belt accessibility, comfort, and convenience should also be improved, said Claybrook, along with the addition of three-point seat belts for rear-seat passengers. (Companies like Volvo, Mercedes-Benz, and other foreign producers have made them standard equipment.) Manufacturers need to insure that their seat belts will accommodate child restraints and follow General Motors’ lead in providing tether attachment points, she added.

- *Steering columns and wheels* – Current NHTSA rules permit inadequate performance by steering columns and hubs in certain common crash situations. Claybrook asked manufacturers to use superior designs available for years, that will provide greater energy absorption and reduce injuries in greater numbers of crashes. (Both the Center for Auto Safety and the Insurance Institute for Highway Safety have petitioned NHTSA for an upgraded standard. See *Status Report*, Vol. 15, No. 1, Jan. 25, 1980.)
- *Safer interiors* – Additional padding on the lower part of dashboards and the elimination of hard points and edges would reduce injuries in crashes, especially for unrestrained children.
- *Side-impact protection* – doors, door frames, hinges, and latches need to be strengthened to provide greater protection, along with additional padding on door frames and improved seat designs to help cushion shocks.
- *Fuel systems* – Fuel systems can and should exceed the current 30 mph crash test standard. Claybrook said, and improved firewalls need to be installed behind the rear passenger seat to help prevent fuel vapors from penetrating the passenger compartment and carrying flames inside.
- *High-mounted brake lights* – Innovations that could lower the number of rear-end crashes.
- *Pedestrian safety* – Manufacturers are urged to eliminate hood ornaments. Even the spring-loaded variety can exacerbate injuries in the inevitable impacts that take place. And soft-face bumpers would provide added energy-absorption in such impacts, Claybrook said, lessening pedestrian injuries.

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Watergate 600 • Washington, D.C. 20037 • 202/333-0770

Editor: Paul C. Hood

Writers in this issue: Rea Tyler

Production: Avis Harris