

Shoulder belts in motor vehicle crashes: a statewide analysis of restraint efficacy

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FROM ABSTRACT:

The purpose of this study was to evaluate the impact of shoulder belt use on motor vehicle crash ejection, morbidity and mortality.

The authors analyzed motor vehicle crash records linked to hospital inpatient data for front seat occupants of passenger cars in Utah between 1994 and 1996 (n=103,035).

The adjusted odds of ejection for shoulder only belted occupants was higher compared to lap-shoulder belted and lap only belted occupants.

There was no difference in the odds of ejection for an occupant using a shoulder belt only and an occupant using no seatbelt.

[This is important: if the main reason to use a seatbelt is to prevent or reduce chances of ejection, this study indicates that a shoulder belt alone is no better for this purpose than is using a seatbelt.]

Occupants using a shoulder belt only were more likely to sustain a fatal or hospitalizing injury than lap-shoulder belted, and lap only belted occupants.

Occupants using only a shoulder belt had the same odds of a fatal or hospitalizing injury as unbelted occupants.

Average hospital inpatient length of stay, charges and injury severity scores were similar for all restraint types.

These results stress the need for the use of a lap belt in conjunction with the shoulder belt.

These authors also note:

INTRODUCTION

Vehicles from the late 1980s and early 1990s were often equipped with a two-point belt system composed of a motorized automatic shoulder belt with a manual lap belt.

Problems with the shoulder belt restraint system without using the manual lap belt have been identified.

The purpose of this study was to evaluate the effectiveness of a shoulder belt without a lap belt in reducing ejection, morbidity and mortality of front seat passengers involved in motor vehicle crashes.

The authors analyzed drivers and right front seat motor vehicle occupants older than 11 years of age who were involved in a crash that had at least one reported fatality or injury.

Seatbelt use status was categorized as:

No seatbelt

A shoulder belt without a lap belt

A lap belt without a shoulder belt

A lap-shoulder belt

If an airbag deployed, the occupant was excluded from the study.

Ejection was defined to be either partial or complete.

The odds ratios for ejection and for a fatal injury or hospitalizing injury were calculated for the use of a shoulder belt versus the other seatbelt categories.

In the hospitalizing injuries, inpatient hospital data were examined to determine types and seriousness of injuries sustained by occupants in the various seatbelt categories.

RESULTS:

There were 104,385 passenger car drivers and right front-seat passengers over the age of 11 years involved in injury or fatal motor vehicle crashes in Utah between 1994 and 1996. After eliminating airbag deployments, the final database consisted of 103,035 occupants.

The majority of the occupants (74.7%) used a lap-shoulder belt.

Unbelted occupants experienced the largest proportion of ejection (5.2%).

Shoulder belted only occupants sustained the largest proportion of fatal or hospitalizing injuries (6.5%).

The results showed that a lap-shoulder belt offered the best protection compared to the shoulder belt.

Shoulder belted only occupants were 3.8 times more likely to sustain a fatal or hospitalizing injury than a lap-shoulder belted occupant, and 2.8 times more likely to sustain a fatal or hospitalizing injury than lap belted only occupants.

“Not belted and shoulder belted occupants had the same odds of a fatal or hospitalizing injury.” **[IMPORTANT]**

“Injuries sustained and primary areas injured were comparable for all seatbelt categories. The leading injuries were fractures (64.3%), lacerations (37.1%), intracranial injuries (30.4%) and internal chest, abdomen or pelvis injuries (28%). The leading injured areas were head (24%) and lower extremity (22.3%).”

DISCUSSION:

In this study the authors “demonstrated that the use of a shoulder belt without a lap belt is not as effective as a lap-shoulder belt or a lap belt only in reducing motor vehicle crash ejection, hospitalizing injuries or fatalities.”

“In fact, occupants who only use their shoulder belt have the same odds as unbelted occupants of being ejected and of sustaining fatal or hospitalizing injuries. These results stress the importance of using the lap belt in a two-point restraint system.”

“One of the major risk factors for experiencing a fatal injury in motor vehicle crashes is ejection. The main deterrent to ejection is the proper use of seatbelts.”

Shoulder belts are 29% ($\pm 8\%$) effective in reducing ejection fatalities for drivers and front seat passengers.

Lap-shoulder belts offer more protection, with a 41% ($\pm 4\%$) effectiveness rate.

In this study, shoulder belted only occupants were more likely to sustain fatal or hospitalizing injuries than lap-shoulder and lap belted occupants.

This study “stresses the lack of protection the shoulder belt alone provides.”

Many motor vehicle crash studies use only fatal crash data to examine seatbelt effectiveness, but these authors also used injury and injury severity in examining seatbelt effectiveness.

Also, their analysis of injury severity was not dependent on assessment by law enforcement officers at the scene, which has been shown to be problematic, but rather on hospital records.

CONCLUSIONS:

“Using a shoulder belt without a lap belt is not as effective as the use of a shoulder and lap belt together, or only a lap belt in reducing motor vehicle crash ejection and fatal or hospitalizing injuries.”

“In fact, shoulder belted occupants are as likely as unbelted occupants to sustain a fatal or hospitalizing injury, and to be ejected from their vehicles during a motor vehicle crash.”

“These results stress the need for lap-shoulder restraint use to decrease the morbidity and mortality associated with motor vehicle crashes.”