

# **Correlating crash severity with injury risk, injury severity, and long-term symptoms in low velocity motor vehicle collisions**

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FROM ABSTRACT:

Background:

Auto insurers use a variety of techniques to control their losses, and one that has been widely employed since the mid-1990's is the Minor Impact Soft Tissue (MIST) segmentation strategy.

MIST protocol dictates that all injury claims resulting from collisions producing US \$1000 or less in damage be "segmented," or adjusted for minimal compensation.

Material/Methods:

Multiple databases were searched for studies comparing any of three dependent variables (injury risk, injury severity, or duration of symptoms) with structural damage in motor vehicle crashes of under 40 km/h (25 mph).

Results:

A limited correlation between crash severity and injury claims was found.

Other studies provided conflicting results with regard to acute injury risk, but both found no statistically significant correlation between crash severity and long-term outcome.

Conclusions:

A substantial number of injuries are reported in crashes of little or no property damage.

Property damage is an unreliable predictor of injury risk or outcome in low velocity crashes.

The MIST protocol for prediction of injury does not appear to be valid.

THESE AUTHORS ALSO NOTE:

In the mid-1990s, a set of guidelines was published by a leading U.S. auto insurer instructing claims adjustors that injury claims resulting from motor vehicle crashes with less than \$1000 US in claimant's vehicle property are "unlikely to-or cannot-cause significant or permanent injury" and should "be handled as a fraudulent claim," regardless of medical evidence of injury. The "claim goal was to close without payment."

The MIST protocol uses vehicle property damage as a construct for injury, and all injury claims less than \$1000 US of vehicle property damage are considered to be false.

These authors “conducted a comprehensive best evidence synthesis of the existing medical and engineering literature to investigate the relationship between vehicular structural damage and occupant injury in motor vehicle crashes.”

They conducted literature searches of MEDLINE, CINAHL, WebDex, Road Safety Library, and the Transportation Library literature databases for years 1970 to 2005.

95% of rear impact injury crashes occur below 25 mph.

Rear-impact collision impacts have an estimated annual comprehensive cost in the U.S. of \$42.9 billion.

The studies accepted for review in this article defined:

- 1) Minor damage as damage to the bumper, bumper cover, rear body panel, or tail lamp.
- 2) Moderate damage as damage that required repairing the bumper reinforcement, bumper energy absorber (isolator), deck lid, or quarter panels.
- 3) Severe damage was if either the trunk floorpan or frame were repaired, or if the car was declared a total loss.

These authors found that the risk of injury increased with increasing severity of vehicle damage.

“However, injuries were common even in the minor category.” **[Important]**

20% of those with minor property damage vehicles were injured.

27% of those with moderate property damage vehicles were injured.

41% of those with severe property damage vehicles were injured.

“On the basis of repair cost, the reported proportion of claims with neck injury increased incrementally with increasing repair cost.”

In a good quality 1990 rear-impact study, reviewed by these authors, it was found:

- 1) 88% of vehicle occupants were initially injured.
- 2) 39% continued to be symptomatic at 12 weeks.
- 3) 36% continued to have symptoms at 12 months.

- 4) Symptoms were significantly prolonged when backseat distance exceeded 10 cm from the back of the head.
- 5) No correlation was found between crash characteristic and the duration of neck symptoms or type of neck symptoms.
- 6) 12% of the vehicle subjects who were not injured, all had damage to their cars.
- 7) Of the crashes described as having less property damage, 60% of the subjects had symptoms exceeding 12 months.
- 8) Of the crashes described as having more property damage, 32% of those subjects had symptoms exceeding 12 months.
- 9) This suggests a "paradoxical relationship between crash severity and injury severity." **[IMPORTANT, meaning the greater the crash severity, the less prolonged the symptoms.]**

Other studies documented cases of injury with "almost no vehicle damage."

These same authors noted at six months post injury that there is "no statistically significant associations between crash severity and the 6-month injury status."

These authors did note:

"Persons who were unaware of the impending crash were significantly more likely to have persistent symptoms."

"No statistically significant relationships existed between measures of crash severity in terms of calculated velocity change or maximum deformation and long-term symptoms."

## DISCUSSION

In the two longitudinal studies reviewed by these authors, "no significant correlations were found between crash severity and long-term symptoms."

### **[Important]**

These authors note that passenger cars can collide with one another at low speeds without sustaining appreciable damage and that at or below these crash speeds, "epidemiological studies demonstrate that a substantial injury risk exists in frontal and rear impact crashes."

"It seems clear that property damage in low velocity motor vehicle crashes does not provide a reliable means of assessing the validity of injury claims and, provides no reliable means of prognosticating long-term outcome." **[Important]**

"It is likely that other factors, such as being aware of an impending impact and relative head restraint rating or geometry are competing, and perhaps stronger, determinants of injury risk than property damage in low velocity crashes of this type."

## CONCLUSIONS

"A substantial number of injuries are reported in crashes of severities that are unlikely to result in significant property damage."

"Property damage is neither a valid predictor of acute injury risk nor of symptom duration."

"Other factors, such as head restraint geometry, awareness of the impending crash, sex, and prior injury are likely to impose competitive or stronger outcome effects, particularly as regards long-term outcome."

"Based upon our best evidence synthesis, the level of vehicle property damage appears to be an invalid construct for injury presence, severity, or duration. The MIST protocol for prediction of injury does not appear to be valid."

## KEY POINTS FROM DAN MURPHY:

- 1) Since the mid-1990's auto insurers have used the Minor Impact Soft Tissue (MIST) strategy to control their losses. The MIST strategy dictates that all injury claims resulting from collisions producing less than \$1000 US in vehicle damage are "unlikely to-or cannot-cause significant or permanent injury" and should "be handled as a fraudulent claim," regardless of medical evidence of injury."
- 2) A substantial number of injuries are reported in crashes of little or no property damage.
- 3) Property damage is an unreliable predictor of injury risk or outcome in low velocity crashes.
- 4) 95% of rear impact injury crashes occur below 25 mph.
- 5) Rear-end collision injury severity and duration can be reduced with a head restraint closer to the occupant's head.
- 6) Well-done studies documented cases of injury with "almost no vehicle damage."
- 7) There is "no statistically significant associations between crash severity and the 6-month injury status."

- 8) "Persons who were unaware of the impending crash were significantly more likely to have persistent symptoms."
- 9) "No statistically significant relationships existed between measures of crash severity in terms of calculated velocity change or maximum deformation and long-term symptoms."
- 10) There are no significant correlations between crash severity and long-term symptoms.
- 11) There is a substantial injury risk in frontal and rear impact low speed crashes without sustaining appreciable vehicle damage.
- 12) "It seems clear that property damage in low velocity motor vehicle crashes does not provide a reliable means of assessing the validity of injury claims and, provides no reliable means of prognosticating long-term outcome."
- 13) "A substantial number of injuries are reported in crashes of severities that are unlikely to result in significant property damage."
- 14) "Property damage is neither a valid predictor of acute injury risk nor of symptom duration."
- 15) "Based upon our best evidence synthesis, the level of vehicle property damage appears to be an invalid construct for injury presence, severity, or duration."
- 16) "The MIST protocol for prediction of injury does not appear to be valid."