



# Injury severity codes: A comparison of police injury codes and medical outcomes as determined by NASS CDS Investigators

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## 1. Problem

The severity of a highway crash can be described in terms of the severity of injuries to crash victims. Police-assigned severity is the most commonly used measure, but the accuracy of the severity assignments has been questioned.

Police crash reports commonly employ the KABCO injury scale to describe injury as it presents at the roadside. The KABCO injury scale was introduced by the [National Safety Council \(1966\)](#) in the late 1960s as a suggested standard for injury severity classification. In this scale, K injuries are “fatal,” A injuries are “incapacitating,” B injuries are “non-incapacitating,” C injuries are “possible injuries or complaint of pain” and the O injury severity is “not injured.” The KABCO score has been evaluated in the past. [Popkin, Campbell, Hansen, and Stewart \(1991\)](#) found in a study of 796 persons in North Carolina that approximately 51% of A-injury assignments were “correct” in their evaluation. Bias was found in injury severity assignment for gender and crash severity. Additionally, profuse bleeding of minor injuries was found to lead to over-evaluation of severity while hidden or “occult” injuries resulted in underassessment. Popkin also reported that police officers most often judge the injury severity of victims by observation alone.

A second severity measure, the Abbreviated Injury Scale (AIS) was introduced by the [Association for the Advancement of Automotive Medicine \(1990\)](#) and codes individual injuries on a scale of “threat-to-life,” from 1 to 6 or greatest threat.

The National Automotive Sampling System (NASS) Crashworthiness Data System (CDS) samples tow-away

crashes of passenger vehicles at 24 sites in the United States. These sites are selected to represent all U.S. crashes and contain both urban and rural locations. Cases are investigated after the crash with the occupant’s medical outcome information being one part of the investigation. Both the officer’s KABCO score and the AIS of the injuries, including a maximum AIS, are recorded for each occupant of a case vehicle. These scores were compared and this presentation discusses the results of that comparison with particular emphasis on the type of injuries under- and over-rated.

[Farmer \(2003\)](#), in a comparison of 11,000 drivers in NASS CDS from 1995–2001, found that 51% of the A-injured occupants had an MAIS of 2 or greater. He also found bias in injury-severity assignment when crash severity was high as well as unexplained bias by gender, vehicle model year, time of day, and crash type. He concluded the KABCO scale was unusable as a crash-severity indicator for detailed analyses.

## 2. Method

In this study, the police-assigned KABCO scores for 101,580 motor-vehicle occupants of case vehicles with

Table 1  
KABCO Score distribution by percentage in MAIS category

	KABCO SCORE			
	O	C	B	A
Maximum AIS 0	80.5%	20.7%	5.6%	2.6%
Maximum AIS 1	18.9	70.5	75.5	41.1
Maximum AIS 2	0.5	7.2	13.9	25.3
Maximum AIS 3	0.1	1.6	4.9	31.1

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Table 2

Underrated B-injured occupants-AIS 2+injuries by body region and injury type

	KABCO SCORE			
	Head/Face	Extremities	Neck/Spine	Other
Concussion	62.0%	0%	0%	0%
Fracture	22.7	31.0	90.1	46.5
Strain/sprain	0	9.6	0	0
Other	15.3	59.4	9.9	54.5

Table 3

A-injured occupants-AIS 1 non-skin injuries by body region and injury type

	KABCO SCORE			
	Head/Face	Extremities	Neck/Spine	Other
Concussion	42.20%	0%	0%	0%
Fracture	21.6	13.7	0	37.8
Strain/sprain	0	63.8	99.1	7.3
Other	32.2	22.5	0.9	54.9

288,286 injuries in the 1994–2003 NASS CDS database were examined to determine the accuracy with which the officers have identified injury severity. Distributions of the unweighted data are shown. Weighting the data did not change the distributions, as was also found by Farmer (2003). The uninjured and fatally-injured occupants are not discussed because those assessments are generally correct. Those cases in which the officer over-coded or under-coded the injury severity are further examined.

### 3. Results

Table 1 shows the KABCO score and maximum AIS injury score for these occupants. The no-injury group (O) and the possible-injury group (C) contain mostly minor injuries; 0.6% of O and 8.8% of C are AIS 2+. The nonincapacitating injury group (B) has 18.8% AIS 2+, while the incapacitating (A) group has 57.4% AIS 2+.

Table 2 shows the injured body regions of the B-injured, AIS 2+group. There are far more injuries than people, any one person may have multiple injuries. Of these injuries, 65% are skeletal and nearly 20% are to the brain. These may well be injuries that did not show themselves at the crash scene (occult injuries) and were only later found during medical examination.

The body systems of the non-skin injuries to A-injured occupants with only an AIS 1 injury are shown in Table 3.

The skin, with 82% of these injuries, predominates, but 44.6% of these occupants also had a non-skin injury. Extensive bleeding from these injuries may have resulted in an overrated score. The other systems involved, which represent injuries to nearly one-third of the overrated A group, have the potential to harbor very serious injuries. Seventy six percent of these were sprains or strains, 11% were fractures, and 12% were concussions. All these were rated an AIS 1 injury after medical examination.

### 4. Discussion

This overview of a comparison of police coding with medical findings suggests that the police officers at the scene of the crash do a good job of identifying the injury severity of the victims. The A-injury category contains over 65% of the AIS 2+injured nonfatal occupants in this study. Errors result from obvious injuries that appear worse than they are, or from injuries that are not evident.

### 5. Conclusion

The police injury scale appears to be an appropriate tool for planners to use to discriminate the more serious crashes from the multitude of minor crashes.

### References

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**Charles P. Compton** is a Senior Research Associate at UMTRI and has been involved in crash data analysis for over 30 years. As manager of the Transportation Data Center he is involved in collecting and documenting crash data and datasets from and for government and industry. The TDC has created the official Michigan crash report, Michigan Traffic Crash Facts, since 1993. Mr. Compton holds a B.S. in Biology from Michigan State University and an M.S. in Biology from Eastern Michigan University.