



Misclassification of injury severity among road casualties in police reports

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ABSTRACT

This study aims to evaluate the discordance between police reports of injury severity among road casualties and the length of hospital stay and the Injury Severity Scale (ISS) by linking information from the crash records of the Hong Kong Police with the trauma records of a regional hospital. Sensitivity and specificity analyses suggest that police injury grading diverges noticeably from the definition of a 12-h hospital stay. Police reports overestimate injury severity remarkably. The results of logistic regression indicate that age, the ISS, and the position of the victim significantly determine the likelihood of police injury misclassification. Furthermore, an optimal demarcation point of the length of hospital stay for serious injury is estimated.

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1. Introduction

Police accident reports are often the main source of data for accident investigations and road safety analyses. These reports usually contain information on traffic conditions, vehicle performance, road environment, driver characteristics, casualty demographics, and injury severity level. Previous research has investigated the level of incompleteness of police accident surveillance systems. When comparing police reports with hospital records, the degree of the under-reporting of road casualties has been found to be quite significant. Some studies have focused specifically on the differences in reporting rates among subgroups and by road user characteristics and injury severity (Barancik and Fife, 1985; Rosman and Knuiman, 1994; Sciortino et al., 2005; Amoros et al., 2006; Loo and Tsui, 2007). Casualty demographics, time of injury, hospital admission, mode of transport, vehicle class, and car occupancy are all contributory factors to the reporting rate in police accident records. Fatal accidents are normally assumed to be reported in full. However, the degree of under-reporting is greater for less seriously injured casualties.

The quality of police accident reports has also been examined in relation to the accuracy of accident attributes, vehicle performance, driver characteristics, and accident causes. Police data on the number of casualties involved and the time and location of accidents have been found to be unreliable (Shinar et al., 1983). Study was conducted to examine the reporting rate of seat belt and

alcohol use in police report. The misclassification about seat belt and alcohol use was found affecting the estimates of injury and medical cost (Guo et al., 2007). Investigations involving in-depth vehicle inspections, interviews, and medical record assessments have also been carried out to determine the discordance between police records and accident characteristics (Schiff and Cummings, 2004). The results indicate that the police often over-estimate seat belt use among road casualties.

Injury severity is an important attribute in epidemiologic analyses of road casualties. Police definitions of the injury severity level of casualties are often based on hospital admissions, the length of the hospital stay, injury type, and the medical treatment required (Leung et al., 2005). The validity of police injury severity classifications has become the concern of epidemiologists (Aptel et al., 1999; Lopez et al., 2000; Sciortino et al., 2005; Amoros et al., 2007). Such studies have measured the level of discordance in injury severity between police reports and hospital records, and the contributory factors to these discrepancies have been identified. However, the results remain erratic, and the factors that lead to the discrepancies in police reports are not yet well-understood.

In Hong Kong, the police traffic accident database contains information on the accident environment, vehicle characteristics, and casualty attributes. For road casualties that result from traffic accidents, the degree of injury is also coded. All non-fatal road casualties in Hong Kong are classified as either serious or slight, in which a slight casualty means a person with non-severe or light injury. A 12-h hospital stay is used as the stratification point for serious injury in police reports (Leung et al., 2005). Although the actual injuries of road casualties are often available in hospital records, different countries adopt different definitions of injury

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grading according to different indicators: the presence of hospital admission, the length of hospital stay, capability of performing different activities (such as walking or driving), or the presence of evident injury (International Road Assessment Programme, 2008). However, there is no internationally accepted definition of injury grading.

A working group was established in 2003 to link road casualty data from a regional hospital with the police crash records, thus enabling us to examine the quality of that record in terms of the injury grading of road casualties and to explore the feasibility of devising a better definition of serious injury. The database of this hospital contains information on casualty demographics, injury characteristics, the length of hospital stays, and the Injury Severity Scale (ISS). To measure the quality of the police reports, the divergence between police injury classifications and the length of hospital stays was examined prior to a diagnosis of injury characteristics. However, the length of a hospital stay may not always be a good indicator of injury severity; other factors apart from the characteristics of the injury itself, such as age, the part of the body injured, medical care, and hospital admission policy, may also have an influence. The ISS is widely used in trauma records to indicate the degree of injury, which correlates with the mortality rate (Baker et al., 1974; Copes et al., 1988). In this study, therefore, the degree of agreement between police classifications and the ISS is also measured, which helps to ascertain whether police classification is able to reflect the actual degree of injury based on clinical diagnosis. This has an important implication of the resource allocation to improve road safety and rehabilitation service for the injured.

This study evaluates the predictive power of police classifications on injury severity levels and identifies the influence of such possibly contributory factors as injury characteristics, casualty demographics, road user class, and hospital admission. Finally, it estimates an optimal demarcation point of hospital stay for serious injury, which implies that there is room for improvement in the coding of injury severity in police reports.

2. Method

2.1. Data

In 2003, a working group was formed among the representatives of Tuen Mun Hospital, the Transport Department, and the Hong Kong Police Force to explore the feasibility of developing a new accident surveillance system, known as the Road Casualty Information System (RoCIS). Accident records were matched with the records of each road casualty admitted to the Accident and Emergency Department of Tuen Mun Hospital. If a road casualty was present in the police report, then a sample point would be created in a RoCIS profile that incorporated accident information from the police report and injury characteristics from the hospital record.

Data of 3450 road casualties were captured between 2004 and 2005. Sixty-six of these cases were excluded because of fatalities or missing information, leaving information on 3384 injured (seriously injured or slightly injured) cases to be used to analyze the discordance between the injury severity classification in police reports and that in the trauma database. This study also collected information on the sex and age of the casualties, the part of the body with the major injury, the ISS (Baker et al., 1974), the length of the hospital stay, and the position of the victim.

2.2. Length of hospital stay

The study reported herein aimed to evaluate the quality of police accident reports on injury severity. In Hong Kong, police defini-

tions of serious injury and slight injury are based on the length of the hospital stay, with a cut-off point of 12 h. Data based on this classification of injury severity are commonly used for the statistical analysis of various road safety issues. The reliability of the injury severity grading in police reports is thus worth exploring epidemiologically.

Length of hospital stay is an efficient indicator of injury severity because of its simplicity and easy extraction. However, the ISS is a more definite measure of injury severity because it is derived from the information about severity of actual injuries. Also, the length of a hospital stay is often subject to the influence of the hospital admissions policy, the technology and methodology of trauma care, injury characteristics, and casualty attributes. Therefore, we further analyze the discordance between police injury severity classifications and the clinical measure of the ISS.

2.3. Injury Severity Scale

For a more credible analysis of police injury classifications, we evaluate the degree of discordance between injury severity as classified by the police and the actual injuries of the casualties. The ISS is the sum of squares of the Abbreviated Injury Scale (AIS) of the three most seriously injured regions of the body (Baker et al., 1974; Copes et al., 1988). In this study, a cut-off point of an ISS score of 16 for serious injury is applied. An ISS score of 16 refers to a condition with a single AIS = 4 injury or a multiple-injury condition with at least one AIS = 3 and two AIS = 2 injuries. The use of ISS = 16 as the stratification point is also in line with the analysis of the sampled casualties, as most of those who suffered residual permanent disabilities has an ISS above 16. In pathophysiological research, polytrauma is also defined by ISS = 16 (Copes et al., 1988; Keel and Trentz, 2005). In fact, the application of ISS = 16 as the demarcation point for serious injury is widely adopted by international trauma investigation bodies, including the American College of Surgeons (NTDB, 2004) and the Department of Human Services, Melbourne, Victoria, Australia (VSTORM, 1999; Gabbe et al., 2005).

Table 1 provides a summary of the corresponding road casualties. The results indicate that about one-fifth (20.7%) of the reported road casualties in the police record were classified as “seriously injured.” However, based on the ISS in the hospital records, 38 (1.1%) casualties had an Injury Severity Score of 16 or higher. It is therefore expected that a considerable proportion of the casualties classified as seriously injured by the police were not really seriously injured.

2.4. Statistical analyses

Prior to the multivariable analysis of the likelihood of police injury misclassifications, the factors are first screened through univariate analyses by non-parametric hypothesis testing at a 25% level of significance. Then, a multivariate binary logistic regression is applied to study the likelihood of police misclassification that is associated with the selected contributory factors from the univariate analyses, such as casualty demographics, injury characteristics and crash attributes (Hosmer and Lemeshow, 2000; Sze and Wong, 2007). Due to data limitation, the presence of co-morbidities and location of crash were not included in the analysis.

3. Results

3.1. Discrepancy in police injury classification

3.1.1. Length of hospital stay

Table 2 shows the distribution of road casualties by police classification and length of hospital stay. The consistency between police classifications and the prevailing definitions is also evaluated. The

Table 1
Summary of casualties in RoCIS.

Factor	Attributes	Count	Proportion
Sex	Male	2183	64.5%
	Female	1201	35.5%
Age	15 or below	332	9.8%
	16–64	2883	85.2%
	65 or above	169	5.0%
Body part with major injury	Head	621	18.4%
	Face	269	7.9%
	Neck	14	0.4%
	Thorax	287	8.5%
	Abdomen and pelvic	49	1.4%
	Spine	906	26.8%
	Upper extremity	542	16.0%
	Lower extremity	696	20.6%
Injury Severity Score	1–3	2878	85.0%
	4–8	314	9.3%
	9–15	154	4.6%
	16–75	38	1.1%
Length of hospital stay	Less than 12 h	2862	84.6%
	12 h or above	522	15.4%
Position of victim	Driver	932	27.5%
	Passenger	1043	30.8%
	Motorcyclist	295	8.7%
	Bicyclist	461	13.6%
	Pedestrian or others ^a	653	19.3%
Police classification	Slight	2685	79.3%
	Serious	699	20.7%
Year	2004	1717	50.7%
	2005	1667	49.3%

Total number of observations = 3384.

^a Number of victims at other or unknown positions equal to 17.

sensitivity of police reports is estimated to be 80.7%; in other words, most casualties with more than 12 h of hospital stay are classified as seriously injured by the police. Conversely, the positive predictive value is estimated at 60.2%; that is, of the casualties classified as seriously injured by the police, more than half are admitted to the hospital for more than 12 h. Specificity is estimated at 90.3%; that is, most casualties admitted for less than 12 h are classified as slightly injured by the police. Conversely, the negative predictive value is estimated at 96.2%; that is, of those classified as slightly injured by the police, almost all were admitted to the hospital for less than 12 h. The discordance in injury classification between the police report and the length of hospital stay is quite noticeable: 19.3% of the casualties with a hospital stay of more than 12 h were under-classified as slightly injured by the police, whereas 9.7% of those with a hospital stay of less than 12 h were over-classified as seriously injured. Therefore, the reliability of police reports in injury severity grading, with respect to their definition of a 12-h hospital stay, may be questionable. A significant percentage of the road casualties classified as seriously injured by the police was found to have stayed in the hospital for less than 12 h (39.8%).

Table 2
Distributions of casualties by police classification, length of hospital stay and Injury Severity Score.

	Total	Length of hospital stay		Injury Severity Score	
		Less than 12 h	More than 12 h	ISS = 1–15	ISS = 16–75
Police injury classification					
Slight	2685	2584	101	2683	2
Serious	699	278	421	663	36
Total	3384	2862	522	3346	38

3.1.2. Injury Severity Scale

Table 2 also shows the distribution of casualties, with respect to the police classifications and the ISS. The sensitivity is estimated at 94.7%; in other words, almost all of the ISS = 16–75 casualties were classified as seriously injured by the police. However, the positive predictive value is estimated at only 5.2%; that is, of those classified as seriously injured by the police, very few were ISS = 16–75. Specificity is estimated at 80.2%; that is, most of the ISS = 1–15 casualties were classified as slightly injured by the police. Conversely, the negative predictive value is estimated at 99.9%; that is, of those classified as slightly injured by the police, almost all were ISS = 1–15 casualties. Five percent of the road casualties who were classified as seriously injured by the police had an ISS score of 16 or higher, thus implying a significant overestimate of injury severity in the police records.

The results indicate a remarkable over-classification of injury severity (19.8%) in police reports, with only one-twentieth of the casualties classified as seriously injured actually being so. This implies that there is a possible association between the discordance of the police injury classifications and such factors as casualty demographics, injury characteristics, and crash attributes.

3.2. Factors contributing to police misclassification

3.2.1. Length of hospital stay

Table 3 shows that the factors selected from the individual univariate analyses are sex, age, ISS, part of the body with the major injury, and position of the victims, all at the 25% level of significance. Based on these selected variables, the multivariate logistic regression shows that casualty age, ISS, and the position of the victim are strongly associated with police injury misclassification at a 1% level of significance. The injuries of the elderly (those aged 65 or above) are less likely to be misclassified by the police, with an odds ratio of 0.38, than are those of younger adults (aged between 15 and 64). Casualties with ISS scores of 4–8 and 9–15 are much more likely to be misclassified by the police, with odds ratios of 2.01 and 2.72, respectively. Passengers are also more likely to be misclassified than drivers, with an odds ratio of 2.30. However, sex and the part of the body with the major injury are not found to be significantly associated with the divergence of police reports from the length of hospital stays. The proposed logit model fits adequately well with the observed scores at the 1% significance level, with a likelihood ratio test statistic of 87.12. For temporal consistency, the test statistic of 11.9 confirms the validity of the proposed models at the 95% confidence level (Sze et al., 2008). The results indicate that there was no evidence of variation in the likelihood of discordance over the years.

3.2.2. Injury Severity Scale

This study presents a quality assessment of police reports on injury severity. The term misclassification can be used instead of discordance and further stratified into under-classification and over-classification. Under-classification refers to casualties with

Table 3

Analyses for the factors associated with the discordance between police classification and length of hospital stay.

Factor	Attributes	Misclassified	Correct	Univariate analysis – odds ratio	Multivariate analysis – odds ratio (95% CIs)
Sex [†]	Male	230	1953	0.83	1.07 (0.83–1.37)
	Female	149	1052	1	1
Age [†]	15 or below	31	301	0.78	0.68 (0.45–1.02)
	16–64	337	2546	1	1
	65 or above	11	158	0.53	0.38 (0.20–0.75)**
ISS [†]	1–3	294	2584	1	1
	4–8	52	262	1.74	2.01 (1.43–2.82)**
	9–15	31	123	2.22	2.72 (1.76–4.19)**
	16–75	2	36	0.49	0.55 (0.13–2.33)
Body part with major injury [†]	Spine	92	814	0.86	0.86 (0.66–1.13)
	Others	287	2191	1	1
Position of victim [†]	Driver	78	854	1	1
	Passenger	170	873	2.13	2.30 (1.68–3.14)**
	Motorcyclist	21	274	0.84	0.69 (0.41–1.16)
	Bicyclist	56	405	1.51	1.36 (0.92–2.01)
	Pedestrian	54	599	0.99	0.97 (0.65–1.45)
<i>Goodness-of-fit test</i>					
Number of observations					3384
Unrestricted log likelihood					–1141.04
Restricted log likelihood					–1184.60
Likelihood ratio statistic					87.12***
<i>Internal consistency test</i>					
Log likelihood at convergence for	2004				–616.81
	2005				–512.33
Likelihood ratio statistic					11.90***

** Statistically significant at the 1% level.

*** Passed the internal consistency test at the 95% confidence level.

† Statistically significant at the 25% level in the univariate analysis.

ISS = 16–75 being classified as slightly injured by the police, and over-classification to casualties with ISS = 1–15 being classified as seriously injured. To ensure efficient and effective analysis, under-classification was not diagnosed due to the small sample size ($n = 38$). Binary logistic regression was applied to identify the factors that were associated with the police over-classification of injury severity. Of the 3346 casualties with ISS = 1–15, 663 (19.8%) were classified by the police as seriously injured (as shown in Table 2).

Table 4 shows that the factors selected from individual univariate analyses are age, ISS, length of hospital stay, part of the body with the major injury, and the position of the victims, all at the 25% level of significance. Based on these selected variables, the multivariate logistic regression shows that the ISS and the position of the victim are both strongly associated with such over-classification at a 1% level of significance. Casualties with ISS scores of 4–8 and 9–15 are much more likely to be over-classified by the police, with odds ratios of 3.89 and 9.35, respectively. The length of hospital stays has a similar association, that is, a longer hospital stay is associated with a greater likelihood of police over-classification, with an odds ratio of 28.02. Passengers are more likely to be over-classified, with an odds ratio of 2.03, whereas cyclists are less likely to be over-classified, with an odds ratio of 0.15. However, age and the part of the body with the major injury are not found to be significantly associated with the police over-classification of injury severity.

The proposed logit model fits adequately well with the observed police over-classification at a 1% significance level, with a likelihood ratio test statistic of 1212.1. For temporal consistency, the test statistic of 12.2 confirms the validity of the proposed models at the 95% confidence level (Sze et al., 2008). The results indicate that there was no evidence of variation in the likelihood of police injury over-classification over the years.

3.3. Demarcation point of serious injury

Under the current definition of a 12-h hospital stay, the likelihood of slightly injured casualties being overstated is notable. The optimal demarcation point for serious injury is an ISS score greater than or equal to 16. The sensitivity and specificity of setting the demarcation point for serious injury at different lengths of hospital stays are estimated and shown in Table 5. The results indicate that the optimal demarcation point for serious injury is a 3-day stay, which has the lowest misclassification rate of 8.4%.

4. Discussion

This study aims to examine the accuracy of police reports on the degree of injury among road casualties based on an analysis of information about crash characteristics, injury characteristics, hospital admission, and the length of hospital stays obtained from the linked database of an accident surveillance system and hospital records. The results indicate that police classifications of injury diverge remarkably from the definition of a 12-h hospital stay. The discordance between police reports and the ISS, which is related to the actual injuries that casualties have suffered, is also notable. This deficiency in police classifications is attributed to the customs of the police reporting system, as the police do not always enquire about the actual length of hospital stays. Police officers in Hong Kong may not wait until casualties are retained in the hospital for more than 12 h before they code the data in the accident surveillance system. Instead, they would normally classify a casualty as seriously injured once he or she had been admitted to hospital on the expectation that this hospital stay would be for more than 12 h even if only for observation purposes. This casualty may then be re-classified as slightly injured if he or she is found – either through direct contact or by checking the hospi-

Table 4

Analyses for the factors associated with the discordance between police classification and Injury Severity Scale.

Factors	Attributes	Over-classified	Correct	Univariate analysis – odds ratio	Multivariate analysis – odds ratio (95% CIs)
Sex	Male	416	1741	0.91	Not applicable
	Female	247	942	1	Not applicable
Age [†]	15 or below	53	275	0.79	0.74 (0.48–1.13)
	16–64	559	2293	1	1
	65 or above	51	115	1.82	0.68 (0.39–1.18)
ISS [†]	1–3	354	2524	1	1
	4–8	179	135	9.45	3.89 (2.71–5.59)**
	9–15	130	24	38.62	9.35 (5.12–17.08)**
Length of hospital stay [†]	12 h or above	385	99	36.15	28.02 (20.20–38.87)**
	Less than 12 h	278	2584	1	1
Body part with major injury [†]	Spine	130	774	0.60	0.88 (0.67–1.15)
	Others	533	1909	1	1
Position of victim [†]	Driver	147	776	1	1
	Passenger	226	813	1.47	2.03 (1.52–2.72)**
	Motorcyclist	62	233	1.41	0.78 (0.48–1.26)
	Cyclist	61	389	0.83	0.15 (0.09–0.25)**
	Pedestrian	167	472	1.87	0.92 (0.63–1.35)
<i>Goodness-of-fit test</i>					
Number of observations					3346
Unrestricted log likelihood					–1059.66
Restricted log likelihood					–1665.72
Likelihood ratio statistic					1212.11**
<i>Internal consistency test</i>					
Log likelihood at convergence for	2004				–563.60
	2005				–483.88
Likelihood ratio statistic					12.18***

** Statistically significant at the 1% level.

*** Passed the internal consistency test at the 95% confidence level.

[†] Statistically significant at the 25% level in the univariate analysis.

tal records at a later stage – to have been discharged less than 12 h after admission. Hence, it is possible for the police to overstate the severity of an injury. The results consistently indicate that the influence on the deficiency in injury grading that can be attributed to the discordance between police reports and the 12-h definition overweighs that that can be attributed to the application of an inappropriate demarcation point with respect to the ISS. In some countries, police explicitly evaluate injury severity based on the number of days of temporary total incapacity (ITT) (Amoros et al., 2007). Therefore, interpretations of studies in which injury severity is based on police accident reports must be treated very cautiously.

In this study, one-fifth of road casualties with ISS = 1–15 were classified as seriously injured in police reports (20%). This deficit is lower than that of a French study (39%) in which a 6-day hospital stay was used as the demarcation point for serious injury (Aptel et al., 1999). It is also lower than that found in San Francisco (24%) (Sciortino et al., 2005). Many studies indicate that a more precise measure of injury severity derived from the severity and number of injured body regions noted in the trauma record is preferable (Rosman et al., 1996). The relative risk among different subgroups of injury severity could be more easily determined with more precise and complete information on actual injury characteristics.

The discordances between police classifications and the ISS differ among different groups of road users. Casualties with higher ISS scores are more likely to be over-classified in police reports. The likelihood of overestimation becomes even greater when the severity of the actual injury is further increased. This is not surprising, because police classifications are likely to be influenced by certain explicit crash characteristics, such as collision type, collision speed, and injury type, all of which are closely related to the ISS (Amoros

et al., 2007). The discrepancies in police classifications, however, are also associated with the road user group. For example, passengers are more likely to be over-classified, whereas cyclists are less likely to be. This cannot simply be attributed to differences in the matches made between police reports and trauma records among different road user groups, because it can be seen from the same RoCIS dataset for 2004 that cyclists and back seat passengers were among the least likely groups to report their injuries to the police (Loo and Tsui, 2007). One possible explanation could lie in differences in the likelihood of multiple injuries among different road user groups. Unfortunately, however, this was not examined in the current study.

The results indicate that police reports generally tend to overstate the injury severity of road casualties. However, this conclusion is imprecise, because the influence of the under-reporting of road

Table 5

Relationship between sensitivity and demarcation point of length of hospital stay for serious injury.

Demarcation point (length of hospital stay)	Sensitivity	Specificity	Misclassification
12 h	100.0%	85.5%	14.5%
1 day	100.0%	86.5%	13.5%
2 days	100.0%	89.9%	10.1%
3 days ^a	100.0%	91.6%	8.4%
4 days	92.1%	93.2%	14.7%
5 days	89.5%	94.2%	16.4%
6 days	84.2%	95.0%	20.8%
7 days	79.0%	95.5%	25.6%
8 days	73.7%	96.0%	30.3%

^a Optimal demarcation point for serious injury.

casualties to the police has been neglected. As casualties with more serious injuries are more likely to be reported to the police, the number of those with ISS scores below 16 should be multiplied by a larger correction factor than those with scores above 16 (Amoros et al., 2007; Loo and Tsui, 2007). Based on the same dataset, the odds ratio of police reports of casualties with ISS scores above 16 is 1.72 (Loo and Tsui, 2007), whereas the crude ratio of the over-classification rate to the under-classification rate is almost 4. Therefore, we can be certain that the adjusted degree of over-classification should be higher than that of under-classification. Such a conservative result may raise public awareness of road safety, and a more reliable and precise diagnosis of police misclassification could still be carried out by adopting a consistent demarcation point for serious injury.

However, the length of a hospital stay is still a suitable proxy for injury severity if insufficient injury information is available, although the results suggest that the use of a 12-h hospital stay as the stratification point could lead to the overestimation of injury severity among some road user groups. Therefore, based on the information on actual injury and hospital admission from hospital records, an optimal demarcation point of a 3-day hospital stay for serious injury is estimated. Last but not least, the reader should take great care in interpreting injury grading among different indicators. The role of the ISS is to measure the threat to life and to influence in-hospital trauma management, whereas the injury grading in police reports may be designed to determine the cost of the loss in productivity of the casualties or of post-hospital medical care. Therefore, the degree of injury should be characterized by parameters other than the length of a hospital stay. The comprehensive review of the RoCIS provided in the current study should give insight into injury grading and associated advances in trauma management and road safety engineering.

5. Conclusion

A working group was established among representatives of a regional hospital, the police, and the Hong Kong Transport Department in 2003 to develop a Road Casualty Information System (RoCIS) that comprises accident records from the police and trauma information from a hospital database on road casualties. Taking advantage of the linked information on crash and injury characteristics for road casualties, this study has attempted to measure the degree of discordance between police reports and hospital records on injury severity, and the factors associated with that discordance have also been identified.

The results indicate that the police tend to overestimate injury severity. A remarkable proportion of road casualties with an ISS score below 16 have been classified as seriously injured in police reports. The ISS and the position of the victim have also been found to be significant in determining the degree of discordance. Therefore, the reader should be aware that the injury grading of certain road user groups may be misleading. Although the trauma record is more reliable in determining the actual injury severity of road casualties, the length of a hospital stay is a simple indicator of injury severity in accident investigation. Also, the more conservative estimate of injury severity that results, although sometimes misleading, may to a certain extent favor the mobilization of resources for safety measures. However, for a more reliable estimate that achieves the lowest misclassification rate, the results suggest that the optimum demarcation point for serious injury – that with an ISS score of 16 or above – should be prolonged to a 3-day hospital stay.

It is recommended that the more precise and complete information on injury characteristics that is available in trauma records be applied for the identification and quantification of biases in injury

severity grading. Moreover, the results of studies based on police accident surveillance systems should be reinterpreted for a more accurate quantification of the effectiveness of road safety and injury prevention measures.

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