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Comparison of Hospital Casualty Presentations with Police Road Injury Data

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Authors

L. R. Cercarelli, D.L. Rosman, G. A. Ryan, R. Hockey, M. Bulsara, A. H. Harris and T. Hamilton

Performing organisations

Road Accident Prevention Research Unit
Department of Public Health, University of Western Australia

Sponsor

Federal Office of Road Safety
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CANBERRA 2601

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Abstract

This report examines the consistency of police and hospital reporting of outcomes of road traffic crashes using a database linking police accident reports and hospital accident and emergency (A & E) department data. The database used consisted of linked records of road traffic crashes for the period 1 October 1987 to 31 December 1988 from police reported casualty crashes, the discharge records from all hospital admissions in Western Australia, the Registrar-General's death records, and records for each ambulance trip to a road crash in the Perth metropolitan area.

Keywords

Casualty crashes, road crashes, injury outcomes, database, data linkage, hospital admissions

Notes

(1) FORS research reports are disseminated in the interests of information exchange.
(2) The views expressed are those of the authors and do not necessarily represent those of the Commonwealth Government.

CONTENTS

EXECUTIVE SUMMARY

INTRODUCTION

The aim of this project was to examine the consistency of police and hospital reporting of outcomes of road traffic crashes using a database linking police accident reports and hospital accident and emergency (A&E) department data. Previous research has shown that there is considerable under-reporting when police records are compared with hospital records. The under-reporting is greatest in cases with less severe injuries and in crashes involving a single vehicle. This present work was intended to see if the same relationship held with A&E data, where the injuries sustained should be generally of a less severe nature than in cases requiring admission.

METHOD

Data on road traffic crashes from a hospital A&E department were compared with the Road Accident Prevention Research Unit's Road Injury Database. This consists of linked records of road traffic crashes for the period 1 October 1987 to 31 December 1988 from police reported casualty crashes, the discharge records from all hospital admissions in Western Australia, the Registrar-General's death records, and records for each ambulance trip to a road crash in the Perth metropolitan area.

RESULTS

Of the 2,504 A&E records, 1,276 (51%) had a matching police accident record while there was no police record for 1,228 (49%) attendances.

Admissions

The number of admissions from this group of A&E attendances, as recorded by police (474), was 15% lower than the number recorded by the Hospital Morbidity System (552). Of the cases reported by the police as being admitted, only 264 (55.7%) matched with a record of admission in the Hospital Morbidity System, that is, police records correctly identified only one half of the admissions.

Deaths

The total number of road traffic deaths recorded by the Registrar-General was 18, which compares with the 15 reported by the police, two of which were not recorded as traffic deaths by the Registrar-General. The discrepancy appears to be mainly due to differences in the definitions used in categorising a road traffic death, as well as differences in ascertainment.

Linkage of A&E attendances to police records by socio-demographic variables

The percentage of A&E attendances linking to police data varied to a small degree with place of residence, sex, age, country of birth and marital status.

Police reported cases linking to A&E reports

When examining the linkage in the other direction, that is, from police casualty reports to the A&E data, it was found that the linked group had a larger percentage of males, pedal cyclists and pedestrians, and twice the percentage of police-attended crashes. The

two groups had similar types of crashes, but presumably, the linked group had more severe injuries.

Factors associated with admission to hospital

Given that the police records identified only half of hospital admissions it was important to examine the differences between the hospital and police groups of cases where admission was recorded. Comparison of the frequency distributions and the logistic regression models associated with admission for the two groups showed that differences between them were rather small but the composition of the two groups was very different, making comparisons difficult to interpret.

DISCUSSION

Overall, police reports under-estimated the number of hospital admissions from this group of A&E attendances by about 15%, compared with the Hospital Morbidity System records. With regard to the accuracy of classification of outcome, where police recorded hospital admission, about 55% of cases were actually admitted, and where police recorded 'medical attention' about 85% attended the A&E department. However, it appears that about one half of attendances at the A&E department were due to crashes which were not reported to police for various reasons. This study was not designed to determine the reasons for the under-reporting of these cases.

There were similar discrepancies and overlaps between the police records of deaths and those of the Registrar-General. These were primarily due to the use of differing definitions of road traffic accident and to a lesser degree, to a lack of ascertainment.

A comparison of the two groups of cases in which hospital admission was defined by the police and by the A&E records showed that although the differences were small the composition of the two groups was different. Using police data on hospital admissions may be satisfactory for internal comparisons (that is, for examining the relationships between variables) but would not be appropriate for accurate estimation of rates of hospital admission or hospital attendance related to road traffic crashes. These results tend to confirm the finding of a study from the Netherlands (Harris, 1990) which suggested that, although police data under-estimated total casualties, they could still be used to monitor trends over time.

CONCLUSIONS

Although this study used data from only one hospital A&E department the results were consistent with those found in other studies, thus giving more weight to the findings. Based on comparison of police road traffic crash reports and A&E attendances, the following conclusions were drawn:

1. Police records of hospital admissions from this group of A&E attendances under-estimate the total by about 15%.
2. Only about one half of cases reported by police as being admitted are actually admitted.
3. About one half of attendances at an A&E department following a road traffic crash did not link to a police casualty accident report.
4. A comparison of police reported hospital admissions and A&E reported admissions suggested that although they were very similar on most variables examined, the composition of the two groups were very different, making the interpretation of these results difficult. It would be satisfactory to use police data

on admitted cases for the study of trends over time, but it would not be appropriate to use police data for purposes requiring more accurate data.

ACKNOWLEDGMENTS

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LIST OF CONTRIBUTORS

L. R. Cercarelli, D. L. Rosman, G. A. Ryan, Road Accident Prevention Research Unit, Department of Public Health, University of Western Australia

R. Hockey, Department of Public Health, University of Western Australia

M. Bulsara, Biostatistical Consulting Services, Department of Public Health, University of Western Australia

A. H. Harris, Formerly Department of Public Health, University of Western Australia. Currently at the National Centre for Health Programme Evaluation

T. Hamilton, Accident and Emergency, Sir Charles Gairdner Hospital

INTRODUCTION

The aim of this project was to examine the consistency of police and hospital reporting of outcomes of road traffic crashes using a database linking police accident reports and hospital accident and emergency (A&E) department data. This was an extension of previous work using linked police and hospital admission data (Ferrante, Rosman and Knuiman, 1993; Rosman and Knuiman, in press).

These, and other studies (Bull and Roberts, 1973; Barancik and Fife, 1985; Maas and Harris, 1984; Harris, 1990) have shown that there is considerable under-reporting of cases from road traffic crashes when police records are compared with hospital records. The under-reporting is greatest in cases with less severe injuries, in crashes involving a single vehicle, and in Western Australia, in persons of Asian or Aboriginal descent. This present work was intended to examine the results obtained by linking police road traffic accident reports with hospital A&E data, where the injuries presenting should include those of a less severe nature as well as those cases requiring admission.

METHOD

Data sources

This comparison was carried out by linking the Road Accident Prevention Research Unit's Road Injury Database with data from the A&E department of Sir Charles Gairdner Hospital (SCGH), a 900 bed teaching hospital in Perth, Western Australia. The Road Injury Database consists of records of road traffic crashes from four sources, for the period 1 October 1987 to 31 December 1988, linked together. These sources are:

a) reports of casualty accidents from the Western Australian Police Department;

b) the Hospital Morbidity System of the Health Department of Western Australia which contains discharge records from all hospitals in Western Australia;

c) the Registrar-General's death records; and

d) St John Ambulance records of ambulance trips.

The police accident records contain details of the crash, the site, the vehicles and the persons involved. Only records of casualty crashes were used in the Road Injury Database.

The Hospital Morbidity System contains details of all discharges from both public and private hospitals in Western Australia. Road crash casualties are identified in this system using the International Classification of Diseases Revision 9 - Clinical Modification (ICD9 CM, 1986) code for external cause of injury (also known as the E code). The categories included are: 810-819, motor vehicle traffic crash; 826.1, pedal cycle; 829.9, other road vehicle crash; and 929.0, late effects of motor vehicle crash.

The Registrar General's death records contain information for all deaths in Western Australia including deaths from road crashes.

The St John Ambulance Association provides road ambulance services for Western Australia. Information recorded for each trip to a road crash included the distance travelled.

SCGH is one of four major teaching hospitals in Perth with an A&E department. In 1988 SCGH had 40,560 (26.3%) of the total of 154,307 A&E attendances in the Perth metropolitan area. This compares with 52,149 attendances at Royal Perth Hospital, 54,578 at Fremantle Hospital and 7,020 at Princess Margaret Hospital for Children. At

each of the three larger hospitals, about 5% of attendances were due to road traffic crashes.

Linkage process

The methods used for the linkage were similar to those described in Ferrante, Rosman and Knuiman (1993). The A&E data were linked in turn to each of the four original datasets in the Road Injury Database using both exact and probabilistic record linkage techniques (Wadja & Roos, 1987). Exact record linkage is a procedure whereby records are linked using an identifier that is considered unique to a person (such as name). Probabilistic record linkage involves comparing all possible pairs of records in the two files being linked and giving a positive weight to those fields that match and a negative weight to those which disagree. It involves the calculation of the likelihood of a correct linkage and therefore, that the individual represented on the two records is the same. This calculation is similar to that of a clerical searcher who carries out a matching operation manually and forms an opinion on the degree of certainty that the records are correctly paired (Newcombe, 1988). The positive weights are derived by examining the relative frequencies and discriminating power of the individual values within fields (such as name or age). That is, less frequent values are given a higher weight than more common values, and whether the field agrees/disagrees for linked/unlinked pairs in already linked files. Negative weights, on the other hand, can only be derived iteratively, by examining whether a field agrees/disagrees in linked/unlinked pairs. In practice, all pairs are not compared but the files are pocketed (that is, grouped) on some field(s) that can be regarded as reliable and only pairs within the group compared. The final steps are to resolve conflicting links when one-to-one or one-to-many linkage is required and then to manually resolve uncertain links. More detailed descriptions of probabilistic record linkage can be found elsewhere in the literature (Baldwin, Acheson & Graham, 1987).

In the matching process, both exact and probabilistic methods were used to obtain the maximum number of possible links between records. There is a trade-off between the degree of certainty and the proportion of all possible pairs matched. The linkage process was performed using the Health Department of Western Australia's IBM mainframe computer to maintain the confidentiality of the hospital and police records.

The linkage was restricted to police reports of casualty crashes as, theoretically, all road crash casualties attending the A&E department should have been reported to police. However, some crashes involving people who later attended the A&E department may have been reported to police as property damage only. In order to determine the frequency of this occurrence, the records of the 159 A&E attendances due to road traffic crashes during the month of June, 1988 were examined and a manual linkage to property damage only crashes reported to police for the same month was performed. Thirteen cases linked to property damage only crashes, in addition to the 88 that had previously linked to a police reported casualty crash, making a total of 101 police and A&E links and an increase in the linkage rate from 55.3% to 63.5%. However, this increase of about 8% in the linkage rate was achieved at the expense of processing four times the number of records. It was felt that the considerable increase in complexity of the linkage process was not offset by the relatively small increase in the linkage rate.

RESULTS

The 2,504 records of attendance at the A&E department for the period 1 October 1987 to 31 December 1988, related to 2,376 people. That is, 128 persons attended more than once in that time. For the purpose of this project attendances were studied rather than people.

These 2,504 records included full identifying information, involving name, address, and date of birth, the Unit Medical Record Number (UMRN) from the Patient Master Index used by Government teaching hospitals in Western Australia, diagnostic and other demographic information. Two records in the original dataset were found to be duplicates and were deleted.

The file of A&E records was matched in turn with the hospital admission records, the police casualty crash records, the ambulance records and the death records. Considerable time was spent in manual checking of all links so that duplicates were eliminated and dates of accident, ambulance trip, A&E visit and hospital admission were in sequence. Any uncertain links were also checked manually. The results of the matching are shown in Table 1.

Table 1

Percentage of 2,504 A&E records linking to each source.

	n	%
Hospital Morbidity System	568	22.7
Police	1279	51.0
St John Ambulance	1116	44.6
Deaths	28	1.1

Just over 20% of the A&E records matched to a hospital admission record, about 50% linked to a police accident record, and about 45% to an ambulance record. For about 1% there was a matching record in the death register. There is considerable overlap within these figures because, for example, some of those who died may have been carried in an ambulance, and some of those who were admitted may have also died, as well as being carried in an ambulance and being recorded in a police report. That is, a single case can be counted in one or more of the data sources, with the result that the totals of the tables presented can vary considerably, depending on which sets of data are under examination. Exclusion of cases with missing data is another reason why totals vary from table to table. The linked data, without identifying information, is held in a SAS dataset on a SUN (Unix) computer at the Department of Public Health, University of Western Australia.

Comparison of police and other records

In Table 2 and Figure 1, which show a comparison of police with hospital and other records, the categories used are mutually exclusive; there is no double counting, each case being recorded in the category with the maximum injury severity applicable.

Of 2,504 A&E records, 1,276 (51%) had a matching police accident record. The police reports recorded outcome as follows:

death within 30 days	15	(0.6%)
hospital admission	474	(18.9%)
received medical attention	709	(28.3%)
other injury	78	(3.1%)

There was no police record for 1,228 (49%) attendances. This group was found to be very similar in terms of age, sex, place of residence, country of birth and marital status to the group that linked to a police record, except that about 30% of those linking to police records were admitted to hospital, compared with about 15% of those not linking (Table 3). No other data relating to the crash or the injury was available for comparison. The police-linked attendances have suffered generally more severe injuries as shown in Table 4.

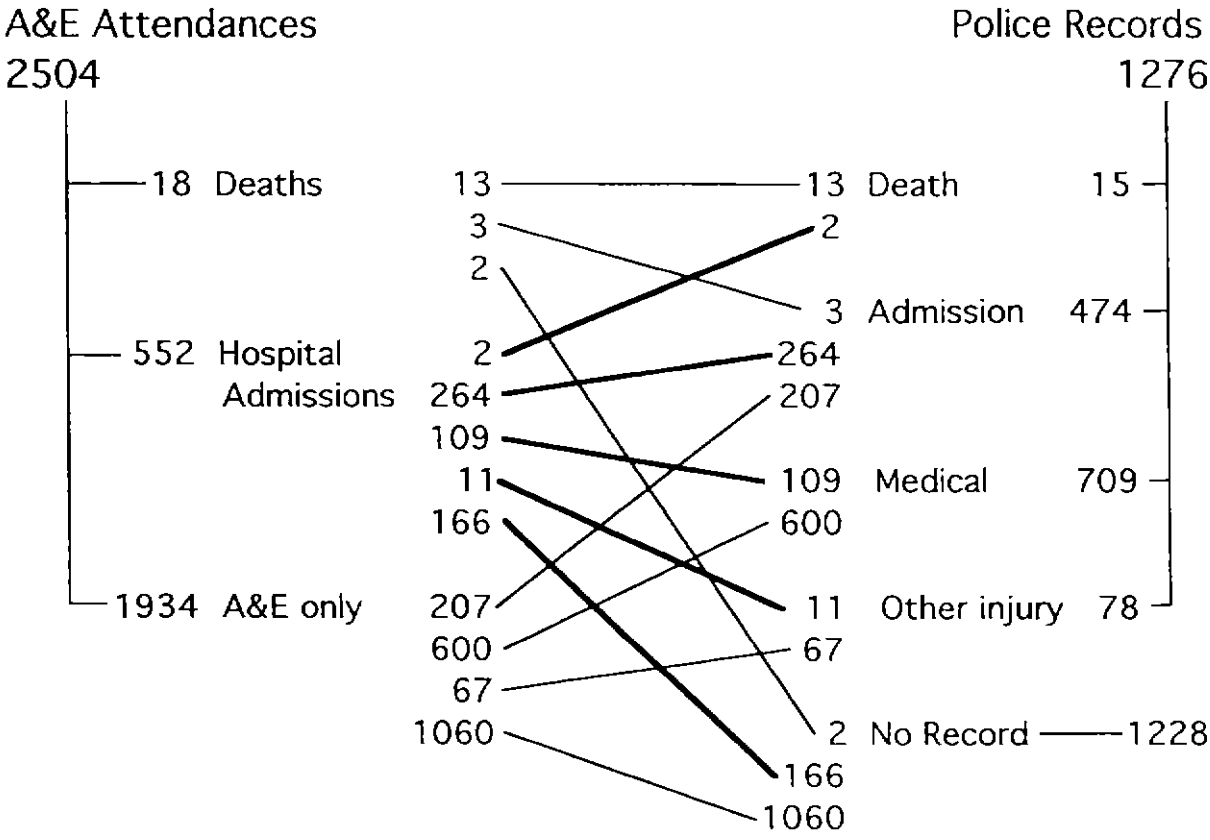

Figure 1

This shows the links between the outcomes of A&E attendances and the police records for the same cases. It is the same information as shown in Table 2.

Table 2

Comparison of police, hospital and other records of injury outcome from road traffic crashes.

A&E attendance plus record of:		Police records											
		Death (30 days)		Hospital admission		Medical attention		Other injury		No record		Total	
		n	%	n	%	n	%	n	%	n	%	n	%
Death (R-G)[1]		13	*86.7*	3	*0.6*	0	*0*	0	*0*	2	*0.2*	18	*0.7*
Hospital admission (HMS)[2]		2	*13.3*	264	*55.7*	109	*15.4*	11	*14.1*	166	*13.5*	552	*22.0*
A&E attendance only		0	*0*	207	*43.7*	600	*84.6*	67	*85.9*	1060	*86.3*	1934	*77.2*
Total	n	15	*100.0*	474	*100.0*	709	*100.0*	78	*100.0*	1228	*100.0*	2504	*100.0*
	%	*0.6*		*18.9*		*28.3*		*3.1*		*49.0*		*100.0*	

[1] Registrar-General's death register

[2] Hospital Morbidity System

Table 3

Characteristics of A&E attendances by linkage to police records.

Variable	Value	Link to police records	
		Yes	No
		%	%
Sex	Male	57.3	56.1
	Female	42.7	43.9
Age	<15	2.6	3.4
	15 - 24	49.3	49.4
	25 - 44	29.1	30.9
	45 - 64	11.1	10.5
	65+	7.9	5.7
Residence	Perth Metro	95.1	96.2
	Rural	4.9	3.8
Country of Birth	Australia	64.1	67.9
	Europe	24.2	16.4
	Asia	4.7	5.7
	Other	7.0	9.9
Marital Status	Single	62.1	58.6
	Married	27.1	31.3
	Other	10.8	10.1
Admitted	Yes	30.3	15.7
	No	69.7	84.3
Total		1276	1228

Table 4

Linkage to police report and injury outcome.

Police Report	Death		Outcome/Admission		A&E only		Total
	n	%	n	%	n	%	
Yes	16	*1.3*	386	*30.2*	874	*68.5*	1276
No	2	*0.2*	166	*13.5*	1060	*86.3*	1228
Total	18	*0.7*	552	*22.0*	1934	*77.2*	2504

Admissions

Table 2 shows that for attendances at the A&E department, the number of admissions to hospital, as recorded by police (474), was fewer than the number recorded by the Hospital Morbidity System (552). However, of the 474 cases reported by the police as being admitted, only 264 (55.7%) matched with a record of admission in the Hospital Morbidity System. Where police reports recorded other outcomes such as medical attention, or other injury, or where there was no police record, about 15% of cases were recorded as admitted.

Differences in coding and classification may be responsible for some of this under-reporting. For example, of 579 A&E records with a code that indicated that the patient had been admitted, only 499 (86%) could be linked to a Hospital Morbidity System record of admission. A sample of 10 of the unlinked cases was examined. Nine were found to have a matching Hospital Morbidity record, but with an E code indicating a "non-traffic accident", hence, no link would have occurred as the linkage process only included cases with E codes for "traffic accidents". In the other case, the Hospital Morbidity record did not contain an E code at all. The discrepancy in numbers of

admissions was therefore due to differences in coding between the A&E department and the medical records department at the hospital.

Conversely, there were also 69 A&E attendances that were recorded as not being admitted to hospital but which linked to a Hospital Morbidity record. This suggests that they were later admitted to another hospital. In these cases it was not possible to identify the individual hospitals involved.

This comparison indicates that police reports from this group of A&E attendances under-estimate the number of hospital admissions by about 15%, and correctly identify about half of those admitted. This under-reporting may be due to differences in classification of individual cases by each agency, as well as being due to coding errors and to incorrect information being obtained by the police.

Deaths

Eighteen deaths were classified by the Registrar-General as being due to a road traffic crash. A further ten cases were certified as dying from other medical conditions, even though they had been involved in a crash and had attended the A&E department during the period under study. These deaths presumably were not connected to the crash event.

The 18 road traffic deaths recorded by the Registrar-General compares with 15 reported by the police, of which two were not among the traffic deaths by the Registrar-General. Three deaths recorded as due to road traffic crashes by the Registrar-General were recorded as hospital admissions by the police and for two deaths reported as road traffic deaths by the Registrar-General there was no matching police record. Both of the latter were admitted to hospital, one died more than 30 days after the crash, and the other, an 87 year old male, died after 9 days from a heart attack. In each case, the cause of death

on the register was "traffic accident". The discrepancies appear to be mainly due to differences in the definitions used in categorising a road traffic death, as well as differences in ascertainment. The total number of deaths recorded by the police was very similar to that found in the Registrar-General's records, but there was some differences due to mis-classification of particular cases.

Other outcomes

The police records indicate that about 780 persons sought medical attention, apart from admissions, compared with records of 1,934 A&E attendances not admitted. Only half of the A&E attendances linked to police reports, indicating that the relevant crashes had not been reported to police, or that they had not been specified as participants of reported crashes.

Linkage of A&E attendances to police records by socio-demographic variables

The percentage of A&E attendances linking to police data varies to a small degree with place of residence, sex, age, country of birth and marital status (Table 5). The lowest linking rates were found in those with a place of residence in Perth (51.1%), females (50.4%), those under 15 years (44.0%), those born in Asia (43.9%) and in other countries (40.3%), and those married (48.3%).

Table 5

Characteristics of A&E records by linkage to police records.

Variable	Category	No. of A&E records	Linkage rate (%)
Residence	Perth metro	2357	51.1
	rural	108	57.4
Sex	male	1420	51.6
	female	1084	50.4
Age	<15	75	44.0
	15-24	1236	51.1
	25-34	505	49.9
	35-44	246	49.6
	45-54	161	49.7
	55-64	110	56.4
	65+	171	59.1
Country of birth	Australia	520	47.5
	Europe	159	58.5
	Asia	41	43.9
	other	67	40.3
Marital status	single	1484	53.4
	married	716	48.3
	other	257	53.7

Police reported cases linking to A&E reports

When examining the linkage in the other direction, that is, from police casualty reports to the A&E data, the comparison of those that did and did not link shows that there are differences in the distributions of age, sex, police attendance, road user type and not surprisingly, urban-rural distribution of the crash (Table 6). The distributions of road feature, alignment and type of crash are very similar. With regard to age, the linked group had fewer in the under 17 year group because children under 15 years will be taken to the nearby Princess Margaret Hospital for Children. The linked group also had

more cases aged 17-29 and 70+ years than the non-linked group. The linked group had a larger percentage of males, pedal cyclists and pedestrians, and twice the percentage of police-attended crashes. The two groups have similar types of crashes, but, presumably, the linked group has more severe injuries.

Table 6

Characteristics of police cases by linkage to A&E records.

Variable	Value	Link to A&E record	
		Yes	No
		%	%
Age (years)	<17	7.3	12.7
	17-29	57.2	45.6
	30-49	19.7	28.4
	50-69	9.8	10.1
	70+	6.1	3.1
Sex	male	57.0	51.4
	female	43.0	48.6
Police attendance	yes	50.5	27.0
	no	11.0	34.1
	not known	38.5	38.8
Road user type	vehicle occupant	60.5	58.3
	motorcycle	25.0	31.5
	pedal cycle	7.4	5.3
	pedestrian	7.1	4.9
Road feature	present	61.4	60.2
	absent	38.6	39.7
Road alignment	straight	81.7	81.4
	curved	18.1	18.4
Place of crash	Perth	93.4	76.0
	rural	6.6	24.0
Nature of crash	multiple vehicle	70.0	71.3
	single vehicle	30.0	28.7
Number of cases		1276	17320

Factors associated with admission to hospital

Given that the police records identified only half of hospital admissions it was important to examine the differences between the hospital and police groups of cases. These were defined either by a code for admission in the A&E record ('A&E' group), or by a record of admission in the police report ('police' group). For this comparison frequency distributions of the variables describing the two groups were compared. For 1,232 of the 1,276 A&E attendances that linked to police reports, the data was sufficiently complete for this analysis (Table 7). There was a record of admission for 374 of the 'A&E' group, and for 474 of the 'police' group. It can be seen from Table 7 that the distributions of each variable were very similar with none of the observed differences being statistically significant.

Table 7

Frequency distribution of variables for the two groups defined by police and A&E records of hospital admission.

Variable	Value	'Police' (n=474)	'A&E' (n=374)
		%	%
Age (grouped)	< 17	8.9	9.3
	17-29	58.3	56.4
	30-49	17.8	15.0
	50-69	8.4	9.3
	70+	6.6	9.9
Sex	male	64.7	66.6
	female	35.3	33.4
Transport	self	12.9	8.6
	ambulance	73.8	75.9
	other	12.3	14.2
	not known	1.1	1.3
Police present	yes	57.3	59.4
	no	3.6	2.4
	not known	39.1	38.2
Road user type	driver	65.5	59.4
	passenger	23.7	26.7
	pedal cyclist/ pedestrian	10.8	13.9
Distance from hospital to home (km)	< 2	6.1	5.1
	2-5	9.5	9.9
	6-10	27.1	26.2
	11-80	47.6	47.3
Road feature present (eg, traffic signal)	yes	45.7	44.1
	no	54.3	55.9
	not known	0.0	0.0
Road alignment	straight	74.2	73.3
	curved	25.6	26.4
	not known	0.2	0.3
Place	urban	86.3	84.8
	rural	13.7	15.2
Nature of crash	single vehicle	45.7	48.4
	multiple vehicle	51.8	48.9
	not known	2.5	2.7

Table 8

Logistic regression models for admissions defined by police and A&E records.

	Admission defined by:	
	Police record	A&E record
	Variable list	Variable list
Main effects	age	age
	sex (female)	sex (female)
	transport (ambulance)	transport (ambulance)
	police present	police present
	road feature (none)	road feature (none)
	road alignment (straight)	road alignment (straight)
	rural	road user type (pc/ped[1])
		hospital-residence distance (>2 km)
Interaction effects	sex / road alignment	sex / road user type
	road feature / road alignment	road feature/road user type
		transport / police present

[1] pedal cyclist/pedestrian

Stepwise logistic regression was then used to determine if there were differences between the two groups in the variables associated with a record of admission. Main effects were tested at the univariate level. Any significant variables were then entered into a multivariate model where a forward selection procedure was used. This produced the final main effects model. Significant interactions were then tested and a final model determined. Cases with missing data in the variables examined were excluded leaving 750 in the 'police' group and 704 in the 'A&E' group.

The variables in the logistic regression model for each group are presented in Table 8 where it can be seen that the two models are very similar. The common variables were age, sex, method of transport to the hospital, whether police attended the crash, whether road features like traffic signals were present, and the nature of the road alignment, curved or straight. For the 'police' group, an additional variable was included indicating whether the crash took place in a rural area. For the 'A&E' group, two additional variables were included, road user type (such as driver, passenger, or pedestrian/pedal cyclist) and distance between hospital and place of residence. For the 'police' group there was one interaction between sex and road alignment and another between road feature and road alignment. For the 'A&E' group there were three interactions, one between sex and road user type, one between road feature and road user type, and one between transport method and police attendance. More details of this analysis can be obtained from the authors.

The above comparison suggests that the 'A&E' group and the 'police' group are very similar over the variables examined, with only very minor differences between the two groups even though they were defined with different selection criteria. This reassuring result is largely due to the common group of 264 cases and the exclusion of the 166 cases not reported to police.

DISCUSSION

Linking records from five sources produces a very complex web of possible links, which can be very difficult to comprehend if all possible links are examined. This report has concentrated as far as possible on the links between the police, the hospital A&E and admission data.

It was found that about 50% of the A&E attendances linked to a police casualty accident report, rather less than the 64% found for linkage between hospital admissions and police casualty accident reports (Rosman and Knuiman, in press). This is consistent with the findings of other comparisons of hospital and police data (Bull and Roberts, 1973; Barancik and Fife, 1985; Maas and Harris, 1984; Harris, 1990) which generally found that the frequency of linkage decreases with decreasing severity of injury. The characteristics of the group that linked to police records were very similar to that for which there was no link, except that 30%, rather than 15% were admitted, suggesting that the general level of injury was more severe in the linked group. When the links in the opposite direction were examined, that is, from police to A&E records, it was found that the cases linking tended to be younger, more were male, and presumably, the injuries more severe although the patterns of crashes were similar to those not linking.

Overall, in this sample of A&E attendances, police reports under-estimate the number of hospital admissions by about 15%, compared with the Hospital Morbidity System records. The magnitude of this difference depends to some extent on the set of E-codes used in defining the hospital admissions. With regard to the accuracy of classification of outcome where police recorded hospital admission, about 55% of cases were actually admitted, and where police recorded 'medical attention', about 85% attended the A&E department. However, it appears that about one half of attendances at the A&E department were due to crashes which were not reported to police for various reasons.

This study was not designed to determine the reasons for the under-reporting of these cases.

There were similar discrepancies and overlaps between the police records of deaths and those of the Registrar-General. These were primarily due to the use of differing definitions of road traffic accident and to a lesser degree, to a lack of ascertainment.

A comparison of the two groups of cases in which hospital admission was defined by the police and by the A&E records showed that the frequency distributions of the same variables for each group were very similar, and that variables included in a logistic regression model were very similar for each group. The overlap of at least 50% of cases between the two groups plays an important part in producing this outcome, as does the exclusion of those cases not reported to the police. Although the differences between the groups were not large, the composition of each group was very different, rendering comparisons difficult to interpret. Police data may be used for crude comparisons, or the evaluation of trends over time, but not for purposes requiring more accuracy. A study from the Netherlands suggested that although police data under-estimated total casualties by about 20%, it could still be used to monitor trends over time (Maas and Harris, 1984). These results would tend to confirm that finding.

Police reported cases linking to A&E records were found to be different from those not linking in the distribution of age, sex, police attendance, road user type and urban-rural distribution, but were similar in crash-related variables. The difference in age distribution was partly due to the presence nearby of a children's hospital to which younger cases would be taken. The differences between the cases linking and not linking to the A&E records of SCGH were not great, suggesting that the population attending this hospital was not very different from police reported casualties for the whole state. The differences appear to be mainly those associated with a higher level of injury in those attending hospital. SCGH takes about one quarter of total casualty

attendances in Perth and has about the same percentage of cases from road traffic crashes as the other major hospitals. It is therefore reasonable to extrapolate the results obtained at SCGH to the whole of Perth. Whether these results represent the experience of other parts of Australia is rather more questionable.

CONCLUSIONS

Although this study used data from only one hospital A&E department, the results were consistent with those found in other studies, thus giving more weight to the findings. Based on the comparison of police road traffic crash reports and A&E attendances, the following conclusions were drawn:

1. Police records of hospital admissions from this group of A&E attendances under-estimate the total by about 15%.
2. Only about one half of cases reported by police as being admitted are actually admitted.
3. About one half of attendances at an A&E department following a road traffic crash did not link to a police casualty accident report.

4. A comparison of police reported hospital admissions and A&E reported admissions suggested that although they were very similar on most variables examined, the composition of the two groups were very different, making the interpretation of these results difficult. It would be satisfactory to use police data on admitted cases for the study of trends over time, but it would not be appropriate to use police data for purposes requiring more accurate data.

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