MONASH University

Accident Research Centre

EVALUATION OF THE IMPLEMENTATION OF THE NATIONAL MINIMUM DATA SET FOR INJURY SURVEILLANCE

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EVALUATION OF THE IMPLEMENTATION OF THE NATIONAL MINIMUM DATA SET FOR INJURY SURVEILLANCE

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Evaluation of the implementation of the National Minimum Data Set for Injury Surveillance (NMDS-IS 0.3)

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Abstract:
The current moves to computerisation of hospital emergency departments in Victoria and other states are occurring at the same time as injury surveillance is moving towards implementation of the National Minimum Data Set for Injury Surveillance (NMDS-IS), as defined by the National Injury Surveillance Unit. Thus, this represents an opportunity for the NMDS-IS to be incorporated into the routine activities of hospital emergency departments.

This report details the findings of an evaluation of the implementation of the NMDS-IS, using Pickware software, at the Geelong Hospital Emergency Department. Data capture and quality is evaluated on initial implementation and following a series of interventions (notably software changes). Usefulness of the data, in terms of the level of detail provided, is assessed. The feasibility of centralisation of the collected data is also examined and recommendations are made for the facilitation of this. Issues arising during the evaluation, and future directions in injury surveillance, are also addressed.

Recommendations include: (i) encouraging co-operation by emergency department staff through promoting an understanding of their role in injury prevention; (ii) promoting data completeness and quality by - the collection of the full NMDS-IS items (Level 1) for baseline data, use of compulsory fields, staff training in data collection (particularly narrative collection & recording) and providing regular, timely analyses of data; (iii) continuing the fine tuning and customisation of software; (iv) continuing the monitoring of the various systems in use in emergency departments; (v) advising hospitals to take into consideration future needs for more detailed data collections (Level 2 data) when implementing systems; (vi) facilitating the centralisation of data through software changes, and through appropriate communication of summary details on data format etc; and (vii) improving the performance of computerised systems (e.g. rapid response, useful output) to provide assistance to staff in the management of their emergency department.

Key words:
injury surveillance
minimum data set
emergency departments
computerisation

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1. INTRODUCTION

As in other states, Emergency Departments in a number of Victorian hospitals have moved or are moving towards computerisation. Much of the impetus for this move relates to the need for case-mix identification. However, at the same time, injury surveillance is moving towards implementation of the National Minimum Data Set for Injury Surveillance (NMDS-IS), as defined by the National Injury Surveillance Unit.

The computerisation of emergency departments therefore represents an opportunity for the NMDS-IS to be incorporated into the routine activities of hospital emergency departments. The Victorian Department of Health and Community Services is committed to the collection of NMDS-IS data as part of its Emergency Department computerisation program. The Minister has recently announced the provision of funding to assist departments to introduce computerisation or to upgrade existing computerisation.

Monash University Accident Research Centre, in conjunction with Geelong Hospital and with funding from the National Injury Surveillance Unit, has undertaken an evaluation of the implementation of the Pickware software, and data capture and quality, in the Emergency Department of Geelong Hospital. This final report summarises the findings of the evaluation and outlines future plans for the ongoing evaluation of computerised injury data collection through hospital emergency departments.

Geelong Hospital Emergency Department initiated computerisation in August 1992 using Pickware software. The initial software incorporated injury surveillance components which were similar to NMDS-IS 0.3, which was at the time the nationally recommended data set for injury surveillance and had been designed by the National Injury Surveillance Unit. This data set has since been modified and is now called the National Minimum Data Set for Injury Surveillance (NMDS-IS).

The Pickware software as used by Geelong Hospital initially contained, in addition to demographic data, a number of the recommended NMDS-IS variables:

- location of injury event
- activity at the time of injury event
- external cause of injury
- nature of injury and body part

The purpose of this project was to evaluate the initial Pickware software for its effectiveness in capturing injury data and in meeting the recommended criteria of the NMDS-IS . During the course of this project the Pickware software as used at Geelong Hospital has undergone a number of changes which have been evaluated for their impact on injury data capture and quality.

2. AIMS

1. To facilitate the introduction of an injury minimum data set based on NMDS-IS 0.3 into the chosen software of a substantial proportion of Victoria's major emergency departments while a brief window of opportunity exists.

2. To determine the feasibility of centralisation of data based on a recommended national data set for injury surveillance.

3. OBJECTIVES

1. Evaluate data capture, quality and utility using the Pickware version of NMDS-IS 0.3

2. Evaluate data extraction capabilities of the software

3. Upgrade NMDS-IS 0.3 to final version in the Pickware software

4. Introduce software programming to require completion of NMDS-IS 0.3 items if acceptable to hospital emergency departments; program to allow the re-introduction of the NMDS-IS screen in the treatment area of the emergency department

5. Evaluate the up-graded NMDS-IS data set after one-two month trial to determine acceptability and utility of both data and software

6. Determine quality of output and potential for data stripping, centralising and aggregating in an SPSS-X or similar environment

4. INJURY EVENT DATA: EVALUATION OF DATA CAPTURE IN THREE NUMERIC FIELDS

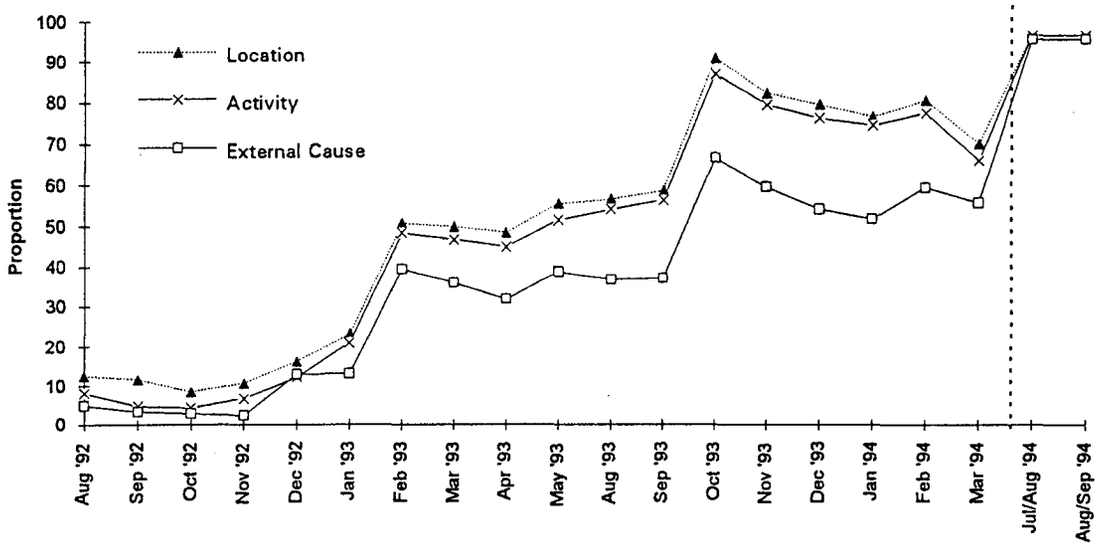
4.1 Interventions made to improve data capture for injury

Interventions made to improve data capture for each of three injury specific variables (location of injury event, activity at the time of injury event, external cause of injury) were undertaken in January 93, October 93 and July 94. The resulting completion rates are shown in Figure 1. The software characteristics and the interventions undertaken are as follows:

Aug 92 - Jan 93	Completion of variables was not a prerequisite for closing the patient's file and exiting from the database (thus termed non-compulsory)
Jan 93	Completion of variables was still non-compulsory but staff were instructed that the variables were to be completed
Oct 93	Completion of variables was still non-compulsory but the software was modified: a reminder pop-up screen was introduced Non-compulsory narratives were also introduced into the software and one training session on narrative recording was provided
July 94	Variable completion was made compulsory Recording of narratives ceased

4.2 Evaluation of data capture following interventions

Figure 1: Completion rates for individual injury variables, Geelong Hospital. Average number of injury cases per month = 834.



4.2.1 January 93 to September 93

As previously noted, the software at this stage had not made completion of these screens a prerequisite to logging out of the patient's file. However, even though the software allowed completion of the variables to be optional, staff were instructed that the variables were to be completed.

The completion rate for each of the three variables rose dramatically following this instruction to staff in January 1993. The increase was maintained over the period to September 93.

The proportion of cases with all three variables completed also rose demonstrably in February 1993 and was maintained at this level to September 93 (Figure 2).

4.2.2 October 93 to March 94

The software still allowed non-compulsory completion of variables but a modification was made: a reminder pop-up screen, activated on non-completion of the variables, was introduced.

Completion rates for each of the three variables increased after the October 1993 software changes (though of smaller magnitude compared with the change in February 93). However, this increase was not sustained over the subsequent five months. Although completion rates were still somewhat better than those for May 1993, by March 94, the rates remained below the desirable level of a good quality surveillance system.

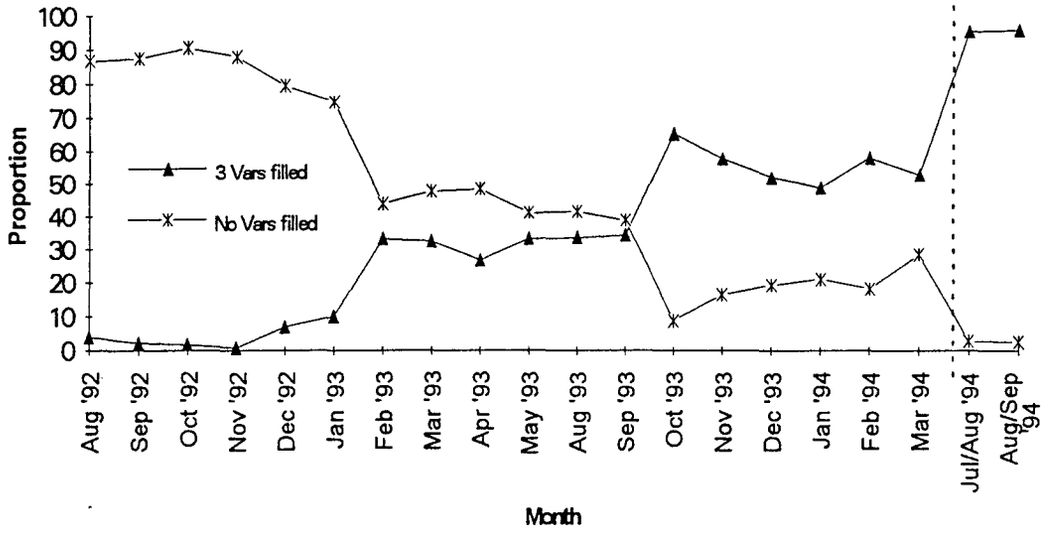
The proportion of cases with all three variables completed rose by a similar amount as occurred in Feb 93. However, this also showed some decline over the ensuing months to March 94 (Figure 2).

4.2.3 July 94 to September 94

Given the disappointing results in the October 93 to March 94 period, further changes were made in early July 94 to the Pickware software in Geelong Hospital. The three injury variables, (activity, location and external cause) were made compulsory, meaning that these fields had to be completed before the patient's file could be closed and stored in the database.

As can be seen in Figures 1 and 2, completion rates rose dramatically, approaching 100%. Figure 1 demonstrates the dramatic rise in the completion rate for the three variables individually; Figure 2 shows the rise in the proportion of cases with all three variables completed. This also rose dramatically, approaching 100%. However, no narrative data were collected during this period.

Figure 2: Data capture on all 3 injury variables, Geelong Hospital. Average number of cases per month = 834.



5. INJURY EVENT DATA: EVALUATION OF DATA CAPTURE IN NARRATIVE FORM

In October 93, it was decided to introduce a text description (narrative) of the injury event to be recorded. The software was changed to include 2 additional text fields (non-compulsory): What went wrong? and What actually happened? A written protocol was prepared and distributed among the staff. A training session was also provided for staff.

Narrative completion was found to be poor. An analysis of a random selection of 50 cases presenting in November 1993 revealed completion rates of 56% for 'What went wrong?' and 40% for 'What actually happened?' In only 19% of the cases were both fields completed. In addition, the narratives were of variable quality: of the 226 cases of motor-vehicle occupant

injury analysed (see section 7.4.1), only 22% of narratives provided information on the circumstances leading to injury and only 23% gave information on the mechanism of injury.

Examples of well completed narratives are as follows:

- 'fell off trampoline, bruised ribs on clothesline'
- 'football injury, player ran into him'
- 'playing football, stepped into hole, twisted ankle'
- 'motorbike accident, lost control while trying to avoid animal'
- 'car accident, low speed, hit head on windscreen'
- 'MCA, other car failed to stop at T-intersection'
- 'MCA, brakes failed on car, hit truck at 70km/hr'.

Examples of poorly completed narratives are as follows:
'fell off trampoline'
'fell off trampoline, wry neck'
'fell on wrist at footy'
'hit football, injured hand'
'MCA'
'MCA, cut face'
'MCA, head injury'.

In July 94, the narrative fields were removed. Anecdotal evidence suggested that the time taken to type in the narrative and the perception that it was duplication of the written medical record were barriers to high completion rates for the narratives.

An alternative may be the scanning of the written medical record into the database for later retrieval. Including an injury narrative box in the medical record has been proposed as a prompt for medical staff to collect and record this information. However, this is unlikely to achieve high capture rates without continuing support and encouragement. Furthermore, since the information would not be converted to typed text in the data base, there would be no mechanism for conducting computer-based text searches on the injury narratives with the current technology.

Further attention to the collection of narrative data is required since the NMDS-IS is incomplete without it and loses much of its utility for injury prevention purposes. The usefulness of the data in the narrative is illustrated in section 7, where analyses are undertaken on data collected by both the ISIS* (with narrative) and NMDS-IS 0.3 (both with and without narratives) systems.

*ISIS was the original system developed for paper-based, detailed injury surveillance in Australia.

6. INJURY DIAGNOSIS DATA: QUALITY OF CODING

6.1 Validation of injury diagnosis coding

Assessment of the validity of diagnosis coding was performed by comparing the doctor's diagnosis code (Wkdiag) with the doctor's text description of injury (Diagtxt). Random samples of all cases in the data set were selected for 2 time periods: (i) August 1992 - May 1993; and (ii) 11th July - 11th September 1994.

(i) August 1992 - May 1993

A random sample of 5% (N=462) was selected from every second month in the data file and the diagnosis code was validated against the diagnosis text. For each case in the 5% sample, cases where there was a clear error were recorded as coding errors and cases where there was a slight discrepancy were recorded as requiring refinement. The overall level of coding errors was 5.0% and a further 3.7% of cases required coding refinement (Table 1).

Coding errors included medical cases coded as injury cases, miscoding of body parts (e.g. fingers instead of toes) and miscoding of injury type (e.g. oedema/tenderness instead of strain). Refinement of coding generally referred to coding of body parts: radius was coded as wrist, eyelid as eye, and ocular adnexae as face. The only nature of injury requiring coding refinement was 'bite' which was at times coded as a puncture. As is evident from Table 1, there was no obvious trend with time.

(ii) 11th July - 11th September 1994

A random sample of 10% was selected from the data set of 1601 cases. For the 163 cases selected, the diagnosis code was again validated against the diagnosis text. Coding errors were found in only 1.8% of cases. Of the 3 cases miscoded, 2 were strains coded as oedema/tenderness. Only 1.8% of cases required coding refinement and, as in the previous period, this referred mainly to body parts: radius was coded as wrist and ocular adnexae as face.

Table 1: Basic Routine Injury Surveillance
Validity of Diagnosis Code
(i) August 1992-May 1993 and (ii) July-September 1994

Month	Cases sampled	Cases with coding errors		Cases requiring coding refinement	
	N	N	%	N	%
PERIOD 1					
August 1992	102	4	3.9	1	1.0
October 1992	96	6	6.3	7	7.3
December 1992	90	5	5.6	4	4.4
February 1992	86	9	10.5	0	0
April 1992	88	4	4.5	5	5.7
Sub-Total	**462**	**23**	**5.0**	**17**	**3.7**
PERIOD 2					
July - Sept. 1994	**163**	**3**	**1.8**	**3**	**1.8**

6.2 Exclusion of non-injury cases

A separate analysis was undertaken to examine whether any of the cases which had been coded as injury cases would not normally be collected in an injury surveillance system. Such cases would include chronic conditions arising from injury (e.g. back pain due to an old injury), conditions with no specific injury cause (unspecified muscular pain), and medical conditions miscoded as injury.

(i) August 1992 - May 1993

Cases (N=508) were selected from the unintentional injury file on the basis of presenting complaint. They were reviewed using the diagnosis text, working diagnosis and diagnosis code. Seventy-seven percent of the cases were identified as injury cases and 5% were identified as cases which would not normally be collected in a surveillance system. There was insufficient information to make a judgement on the remaining 18% of cases.

Analysis was undertaken to attempt to quantify and describe any cases which were coded as injury but which were in fact non-injury cases. A random selection of 25% of all cases was first undertaken and subsequently, for codes with less than 50 cases, a listing of all cases was done.

Twenty-six cases (5% of the total sample), which would not have been usually collected, were identified. They were found to fall into two groups: cases with a full injury code (1% of the total sample); and cases with a mixed code (4% of the total sample), the first digit of which relates to injury with the remaining digits relating to non-injury codes. From the first group, three cases were clearly coding errors. The remaining two were cases which would not usually be collected by an injury surveillance system. The second group seems to be non-injury cases which were mistakenly given an injury code as the first digit in the diagnosis code.

This analysis would seem to indicate that in this earlier period: there was some uncertainty over the definition of injury; and that a clear distinction between injury and non-injury cases was not being made at the point of selection for the diagnosis codes.

(ii) 11th July - 11th September 1994.

This result compares favourably with the results of the August 92 - May 93 analysis, where 21 (5%) of the 508 cases selected from the injury data set were non-injury cases (mainly coded as shortness of breath, abdominal pain, chest pain[cardiac], febrile). Of the 514 cases examined in the later period, only 5 (1%) cases appeared to be non-injury cases (coded as back pain{chronic}, abdominal pain. head injury, convulsion and nausea/vomiting). There were 3 (0.6%) further cases (coded as back pain - oedema/tenderness) on which there was insufficient information to make an assessment of whether the case was an injury case.

It was a little more difficult in this data set to determine whether it included many cases not normally picked up by a surveillance system (eg. chronic). This results from the 'Working diagnosis' variable (previously completed by the triage nurse) being completed in this data set by the doctor. Less elaboration on the injury was found.

7. UTILITY OF THE DATA

7.1 Method of assessing data utility

Injury surveillance data is a vital element in injury control. Data is essential for the identification of injury problems, the determination of appropriate interventions and the evaluation of those interventions.

Central to the identification of injury problems (and for generating hypotheses for further study) is an understanding of the sequence of events leading to injury. An assessment of the utility of the data, collected by the NMDS-IS 0.3 system, for injury prevention purposes was therefore undertaken.

This assessment was undertaken through an analysis of three areas. The areas selected were sport, consumer product and traffic injuries. One specific topic was selected from each area:

- football-related injuries
- trampoline-related injuries
- motor vehicle-related injuries (excluding pedestrians)

Analysis was performed on data from the NMDS-IS 0.3 system and, for comparison, on data from the Victorian Injury Surveillance System (VISS). VISS utilises the ISIS data system (Injury Surveillance Information System).

Variables for which an equivalent level of detail is available in both systems were not analysed. These include: age, sex, injury diagnosis, patient disposition and intent (eg. intentional unintentional).

7.2 Summary of NMDS-IS 0.3 injury data items selected for comparison

The variables selected for analysis of injury data of interest and the number of coding options per variable (in brackets) are listed as follows:

- Date of presentation (day, month, year)
- Time of presentation
- Working diagnosis (triage nurse's one-line text field)
- Location (12)
- Activity (10)
- External cause (26)

The data set analysed was for the time period October 1993 - March 1994. In this data set, data from the 3 numeric codes (location, activity and external cause) was available. In addition, 2 text fields had been introduced: they detailed 'what went wrong?'(what led to the injury) and 'what actually happened?' (mechanism). As outlined earlier, recording of narratives was ceased in June 1994 due to poor completion rates (56% and 40% respectively) and variable quality.

Cases were selected using one of the 3 numeric codes and the cases selected were then analysed for detail of data. The text fields for the selected cases were then examined to assess

whether further detail could be extracted. In the analyses undertaken on football- and trampoline-related injuries, it was not possible to select on any of the 3 numeric codes.

Sporting/leisure activities as a group can be identified under the 'Activity' code but individual sports/leisure activities cannot be identified. They can be identified only via a text search. Thus, text searches for 'football' and 'trampoline' were undertaken and the selected cases were analysed for the 3 numeric variables and any additional text.

7.3 Summary of ISIS injury data items selected for comparison

ISIS reports can provide up to 22 standard tables, one line narratives and caselists (case summaries). Any combination of variables and codes can be provided by selecting subsets of subsets of subsets etc. Additionally text searches can be undertaken of terms in the narratives to provide information for which there is not a code eg 'rollerblades'. The variables and the number of coding options per variable (in brackets) are listed as follows:

- Time of injury(hourly intervals), day of the week and month of injury
- Major injury type groupings (10)
- Location (43)
- Activity being undertaken at time of injury (59)
- 'Breakdown' event (events which led to the injury occurring) (24)
- Mechanism of injury (35)
- Factors associated with - the events leading to injury ('breakdown') or the direct cause of injury ('mechanism') (1500)
- Use of safety devices/precautions (9)
- For vehicle-related injuries - seating position in vehicle (10) .
- For occupational-related injuries - occupation (250) and type of business/industry (50)

ISIS also provides a one line text description (summary) of the injury event, the 'narrative'. This allows the recording of brand names for products and also specific place names for locations. Further, it allows for the storage of data that is not elsewhere codeable. Extraction of this data is done by reading through manually or by a computerised text search.

Cases were selected from data collected at the Latrobe Regional Hospital over the period 1991-1994.

7.4 Results of data analyses

7.4.1 Motor vehicle-related injury (excluding pedestrians)

Data extracted from NMDS-IS 0.3

Cases were selected using the external cause code variable, with the value '1' selected . This thus selects for MVA driver/passenger and excludes bicyclists, motorcyclists, pedestrians and other transport-related cases.

Of the selected cases, the following information was extracted from the numeric variables:

- all occurred on the street/highway, as expected for most motor-vehicle accidents
- activity in 43% of cases was 'unspecified activity' and in another 24% of cases, it was 'other activity specified'.

This was the only data available for the 3 numeric injury fields analysed. Further data could only be extracted through analysis of the narratives. At least 1 of the 2 narrative fields had been completed in 73% of the 226 cases. When information was extracted from these narratives, the following data was found:

- 22% provided information on the circumstances leading to injury with 14% involved in a collision and 8% having lost control of the vehicle - 11% gave reasons for the event (most commonly a car pulling out in front or less commonly another car failing to give way at stop sign)
- the mechanism of injury was stated in 23% of cases with collisions representing 14%, and the victim's car hitting a stationary object another 7%.
- 11% stated where the impact on the car had been (mainly front and back)
- 7% stated which part of the car had impacted on the victim's body
- 8% mentioned that a seatbelt had been worn.

Data extracted from ISIS

Data was extracted on cases of road traffic-related injuries (excluding pedestrians).
This includes motorcyclists, bicyclists etc. Data extracted from numeric codes is as follows:

- the most common time was the afternoon peak period between 4pm and 7pm, and injuries increased throughout the working week, peaking on Saturdays and Sundays (36%)
- the victim's seating position may be specified for all motor vehicle accidents and was specified in 82% of cases - most common were driver (42%) and front passenger (18%)
- the use of safety devices was recorded in 56% of cases and included seat belts (36%), bicycle safety helmets (13%) and motorcycle helmets (4%)
- factor codes allow identification of various types of vehicles - most common were passenger car/ stationwagon (62%) motorcycle - power not specified (7%), <250cc (1%) and >250cc (1%) and light truck utility van < 3 tonnes (3%)
- the events most often leading to injury were collisions (47%) and loss of control (35%)
- the most common mechanisms of injury were the victim hitting against a stationary object (eg. car part, tree) (63%), collisions (21%) and the victim being hit by another moving object (8%).

Data extracted from the narrative is as follows:

- make and model of the vehicle
- approximate speed at the time of incident
- names of streets and intersections
- blood alcohol readings are often recorded
- details on the impact are often recorded (eg. *'passenger stationary Cortina sedan hit in rear by car, victim hit drivers seat'; 'backseat passenger in car hit on side by truck, victim hit head on top of door, seat belt worn.'*)
- detail on vehicle parts at fault can be found (eg. *'riding BMX bike, brakes locked, landed on roadway'; 'passenger involved in MCA, tyre blew out, lost control, hit parked vehicle'*)

Conclusion of section

It is clear from the comparative analyses of the NMDS-IS 0.3 and ISIS data that the amount of data provided by each of the systems varies substantially. From NMDS-IS 0.3, general information only can be extracted. The ISIS system provides a greater level of detail in its many numeric-coded injury fields (at least 10 fields) and in text form (3 text fields)

Both systems provided data on the following important items: circumstances of the injury event; seatbelt usage; and mechanism of injury. However, the quality of information differed due to the lower frequency of recording of these items in the NMDS-IS 0.3 system. The following important items were available only from the ISIS system: approximate speed at the time of the incident; names of streets and intersections (for hazard identification); day and time of the incident; make and model of the vehicle; and detail on vehicle faults.

7.4.2 Football-related injury

Data extracted from NMDS-IS 0.3

Sporting activity can be identified under the 'Activity' code but individual sports can only be identified via a text search. Thus, if there is no text variable and where a search is not possible, injuries relating to individual sports cannot be identified.

When a text search was undertaken on the word 'football', 10 cases were found (total no. of 'sports' cases = 246). Data extracted from the numeric codes was as follows:

- external cause was mostly 'falls < 1m'
- activity was (not surprisingly) mostly 'sports'
- location was mostly 'sports/athletic area'.

Data extracted from the 2 text fields was

- detail on how the type of injury occurred. For example, a foot/ankle injury occurred when the player *'stepped into hole and twisted ankle'* or a wrist injury resulted when the player *'fell on wrist at Footy'*.
- detail on the circumstances of the event. (eg. collision with another player, or hit by another player)

Data extracted from ISIS

Data is available on the different codes of football (rugby, soccer and Australian football), but data was selected on Australian football only.

Data extracted from numeric codes is as follows:

- the most frequent time for football injury was 2pm - 4pm on Saturday and Sunday
- May was the most frequent month for injury (23% cases)
- the sports oval represented 62% cases, the school playground 17%
- at least 63% of cases were in organised competition or practice
- 4% used safety devices, most frequently mouth guards.
- the event most often leading to injury occurrence was over-exertion/over-reaching (57%), falls on the same level (13%), moving a person into a dangerous position (10%) and collisions (10%)
- the most common mechanisms of injury were a victim being hit by a moving object/person (45%), and a moving victim hitting against a stationary object/person (32%).

Data extracted from the narrative is as follows:

- detail on how a particular type of injury occurred. For example, most ankle injuries occurred when the player *'went for the ball and landed awkwardly on ankle'* or *'fell over and twisted ankle'*. Head injuries usually occurred when the player' *collided with another player'*.
- detection of cases where, for example, modified rules were in use or where the victim's injury resulted from hitting against the goal post.

Conclusion of section

As individual sports can only be identified in NMDS-IS 0.3 through a text search (and not through a numeric field), their identification is likely to be poor if completion of the text fields is poor. Further, when cases were identified, the information did not provide the level of information extracted from ISIS such as: whether the sport was organised/practice; detail on how a particular type of injury occurred; use of safety devices (including modified rules); and time of injury.

7.4.3 Trampoline-related injury

Data extracted from NMDS-IS 0.3

'Leisure activity' can be identified under the 'Activity' code but individual leisure activities cannot be identified. Individual leisure activities can be identified only via a text search. Thus, if there is no text variable and a search is not possible, leisure activity-related injuries cannot be identified.

When a text search was undertaken, 5 cases were found and data was extracted as follows:

- in 4 cases the victim fell off the trampoline and in 1 case the victim hit his/her head
- for most cases the location was home
- the activity specified was play/leisure.

Data extracted from ISIS

Data extracted from numeric codes is as follows:

- the most frequent time for injury to occur was between 4pm and 6pm, with Saturday being the most common day of the week (22%)
- most common locations were the victims own home (51%) residential backyard (8%) (2% of cases occurred in school playgrounds)
- 5% used some form of safety device (usually specified in the narratives)
- the event most often leading to injury occurrence was over-exertion/over-reaching (38%), falls from up to one metre (22%), falls from over one metre (12%) and falls on the same level (10%)
- the most common mechanisms of injury were a moving victim hitting against a stationary object/person (75%), straining/over-exerting (11%) and the victim being hit by another person/object (9%).

Data extracted from the narrative is as follows:

- detail on how a particular type of injury occurred (eg. *'jumping on trampoline -fell onto concrete path'*) and whether the victim was injured by a specific part of the trampoline (eg. *'head caught in springs when bouncing on back'; 'jumped too high - fell off - landed on bar as fell'; 'trying to get off trampoline-landed between springs').*
- detail on how injury involving another person occurs (eg. *'jumping with a friend - collided, bumped heads'; 'bouncing on trampoline - bounced off by another boy - landed on ground'*).
- detail on trampoline-related injury even when the trampoline was not in use at the time of injury (eg. *'trampoline leaning on side of fence - brother leaned on it - fell onto victim'*).

Conclusion of section

As individual leisure activities can be identified only through a text search, and not through a numeric field, their identification is likely to be poorer given the low rates of text field completion already referred to. When identified, the information did not provide the level of information extracted from ISIS, such as: mechanisms of injury; day and time of injury; detail on how a particular type of injury occurred; detail on how injury involving another person occurs; detail on trampoline-related injury even when the trampoline was not in use at the time of injury.

7.5 Conclusion

It is clear from the comparative analyses of the NMDS-IS 0.3 and ISIS data that the amount of data provided by each of the systems varies substantially. Detailed information is needed for the identification of problems and for the development of interventions to prevent injury.

The ISIS system provides a greater level of detail in its many numeric-coded injury fields (at least 10 fields) and in text form (3 text fields). The NMDS-IS 0.3 system provides 3 numeric-coded injury fields (detailing location, activity and external cause). Given this small number of numeric-coded fields, it would appear even more vital to include a text field in the NMDS-IS 0.3 system than in the ISIS system where greater detail can be extracted in coded form.

8 UTILITY OF THE DATA AND THE SYSTEM

8.1 Downloading data for importing

Part of assessing the utility of the data and the system utility lies in assessing the ease with which the data can be downloaded into a suitable format and then imported into the desired software package. This assessment examined the ease with which the data could be downloaded into an ASCII file and imported into the statistical package SPSS-X.

The downloading and importing procedure has not been smooth and some of the problems encountered are outlined below.

8.1.2 Problems encountered

Difficulty in determining the variable format

One of the main problems in converting the given ASCII file into SPSS has been difficulty in determining the format in which it has been provided: the column positions for each variable were not specified. Details such as column position, field type, length and format (for dates) need to be supplied, together with each new ASCII dataset in fixed format.

There are two suggested methods for overcoming this problem:

(i) A standard summary sheet containing the following data variable details can reduce the time spent determining the information required:

- Variable name and description
- Column position (for fixed-format only)
- Variable length, type and format (for dates)

(ii) The other alternative is to generate the dataset in free-format, containing delimiters (often commas or spaces) which separates each variable (text enclosed in inverted commas for text fields). This will overcome the need to provide column positions for each dataset requested.

Recommendation:

1 Details such as column position, field type, length and format (for dates) need to be supplied, together with each new ASCII dataset in fixed format.

Presence of duplicate records

The text fields are in text-wrapped format and sometimes more than one line is required for the text. The second line of text unfortunately results in a duplicate record being made. A dataset containing duplicated records provides a false impression on the true number of cases collected within a period. Thus, duplicate records have had to be tagged in SPSS before proceeding with any analysis. This is clearly not desirable, especially if large data sets are to be used.

Recommendation:

1. *The problem of duplicate records needs to be addressed by software changes at the data source.*

8.2 Acceptability of the system

The following notes follow a discussion with Dr. Peter Cameron on his views on the acceptability of the system to the emergency department staff.

Coding and entry of data

The number of codes is manageable, but staff found some difficulty in allocating the codes. The emergency department at Geelong Hospital will be trialling the entering of key words rather than diagnosis codes, and would like to extend this to other codes.

At the time of entry, there are inbuilt entry checks so that unrecognised codes cannot be entered. However, the wrong code can be entered as there are no internal consistency checks. It is planned to develop the entry system into a pathway so that once a patient complaint is entered, the appropriate screens will appear: protocol for management, pathology test forms, standard letter to LMO etc. This is some way off yet.

Access/retrieval of data

Standard reports (waiting times etc) are performed by the Emergency Department doctors. Subsets can be selected on one variable and output of a case listing can be obtained; 2x2 tables cannot be done. Running of the standard reports is slow and it is planned to introduce an Executive Information System, which will update particular reports automatically (on management issues such as waiting times, patients seen, etc.).

More complex reporting is undertaken by downloading a data subset to an ASCII file and importing it to a statistical package (usually done by the computer services department) as it is considered inefficient to do this on a large database in the Emergency Department.

Staff adjustment

The extra time required to use the NMDS-IS 0.3 system has not been monitored, but Dr. Peter Cameron suggests that, at about 2 minutes per case, it is a substantial cost. The doctors have recognised the usefulness of the system and although the nurses had initial reservations, they see the system as valuable because of the good documentation it provides.

9. ISSUES FOR COMPUTERISED SURVEILLANCE IN EMERGENCY DEPARTMENTS

A number of issues relevant to the routine computerised collection of injury data in emergency departments have been identified during the course of this project. Some of these issues may be addressed by software developments and others may need to be resolved through discussion with emergency department directors. The issues include:

- emergency departments of hospitals around Victoria and Australia are structured differently and may therefore require some degree of flexibility in software.

- variables recommended in the NMDS-IS for routine collection (includes case narratives) have been endorsed by NISU and the Department of Health and Community Services as the ***minimum*** required for good quality injury data, not only for the purposes of surveillance, but also for basic research.

- in order to make the system workable for injury prevention research, it is essential that a text field be included, either in the form of free text or as 2 one line narratives - "What went wrong?" and "What actually happened?". Given the poor rates of non-compulsory completion outlined earlier in this report, it is also essential that text fields be compulsory.

- to facilitate conversion of the downloaded data into a statistical package, details such as column position, field type, length and format (for dates) need to be supplied together with each new ASCII dataset in fixed format.

- to prevent duplicate records being recorded (through text wrapping of text fields), software changes need to be made at the data source.

- job descriptions, and the perception of roles, for emergency department clerks, nurses and doctors do not clearly allocate roles for collection of routine injury data.

- time is a significant issue for emergency department staff, particularly during peak periods such as weekends.

- levels of computer literacy and keyboard skills differ considerably among emergency department staff.

- there may be some duplication of data recording, while hospitals use computer and paper based records in parallel.

- injury prevention is not a priority for emergency department staff at the time of patient management.

10. FUTURE DIRECTIONS AND RECOMMENDATIONS

10.1 Fine tuning and customisation of software

During the process of computerisation of hospital emergency departments in Victoria, the potential exists to secure high quality routinely collected basic injury surveillance data, as recommended in the NMDS-IS . This may require some degree of fine tuning the Pickware software specifications, and some tailoring of these specifications to individual hospitals.

Recommendation:
1. Continue the fine tuning and customisation of software.

10.2 Continue the monitoring of implemented software systems

It will be important to continue monitoring of the running of the Pickware software at Geelong Hospital, and of its implementation at other hospitals adopting this software.

It will also be important to conduct a similar evaluation of the HAS system, which has recently been implemented in over 60 hospitals in a number of states. Not all hospitals are currently using the injury data module, but all have the potential to commence the collection of injury data. Further evaluations may be required as new systems emerge.

It is evident that the NMDS standard is becoming much more widely disseminated.

Recommendation:
1. Continue the monitoring of the systems in use in emergency departments.

10.3 Collection of complete and good quality data

Completeness and quality of injury data requires the routine collection and entry, at all computerised Emergency Departments, of numerically coded data and of text descriptions (the narrative).

Compulsory completion of all core items listed in the NMDS-IS (this includes the narrative) is vital for the collection of complete and quality baseline-level data. Failure to collect narrative data, particularly good quality data, has the potential to significantly reduce the utility of the surveillance data to the extent that the data becomes of limited value for injury prevention.

The evaluation of the Level 1 data collection at Geelong Hospital, using the Pickware system, has demonstrated that more work needs to be done with the staff at that hospital to ensure collection of good quality narratives. This finding should not be generalised to all hospitals and all systems; evaluation is required of collections in different hospitals and using different software packages.

Important components of the process of ensuring good quality data collections include:
- promoting the belief by staff that injury prevention is part of their role
- educating staff on the importance of the data (particularly narratives) in injury prevention
- training staff in the recording of good quality narratives
- continuously monitoring collections and providing on-going feedback on findings
- providing timely, regular analyses of the data enabling staff to see the utility of the collection.

More detailed data than that provided by NMDS-IS core items will, however, be necessary in some locations at some times. Thus, development has begun on a second, more detailed level of data items (Level 2) for NMDS-IS, and this will more closely reflect the detail present in the ISIS system. It is advisable that future needs for Level 2 data be taken into account before implementing computerised systems.

Finally, in recognition of the additional time required for the collection and input of data, additional benefits of computerisation need to be made available to staff. Improved performance of the computerised system (e.g. rapid response, useful output) would provide assistance to staff in the management of their emergency department. The computerised system must thus be improved.

Recommendations:

1. That the co-operation by emergency department staff be encouraged by promoting an understanding of their role in injury prevention through:
- *education sessions*
- *regular, timely analyses of their data.*

2. That data completeness and quality be promoted by -
- *collection of the **full NMDS-IS items (Level 1) through the use of compulsory fields;***
- *training staff in data collection (particularly narrative collection & recording);*
- *undertaking continued monitoring of the data quality of individual departments and feed back of this information;*
- *providing regular, timely analyses of data.*

N.B. These functions could be facilitated by a centralised agency.
Additional funding would be required for this function.

3. That future needs for more detailed data collections (Level 2 data) be taken into consideration by users prior to implementation of systems.

4. That the performance of computerised systems be improved (e.g. rapid response, useful output) to provide assistance to staff in the management of their emergency department.

APPENDIX 1

1. VALIDITY OF ALLOCATION OF TRAUMA CODE AUGUST 92 - MAY 93

Nature of complaint	Total Cases n =	Definite Cases n =	Cases - not enough information n=	Definite non-Cases n =
Back pain	61	33	28	0
Chest pain-other	62	47	12	3
Eye problem	197	193	4	0
Abdominal pain	63	50	9	4
Arrest	1	1	0	0
Cardiac arrythmia	1	1	0	0
Chest pain -cardiac	10	3	5	2
C.V.A.	2	1	0	1
Convulsion	3	2	0	1
G.I. Bleed	2	1	1	0
Gynaecol.	5	3	1	1
Headache	23	20	3	0
Infection	13	5	7	1
Psychiatric	1	1	0	0
Shortness of breath	31	18	6	7
Febrile	9	6	0	3
Urological	11	5	5	1
Vascular	10	3	6	1
Gastro.(not bleeding)	3	2	0	1
TOTAL	508	395	87	26

1. *VALIDITY OF ALLOCATION OF TRAUMA CODE JULY 11th TO SEPTEMBER 11th 1994*

Nature of complaint	Total Cases n =	Non-Cases n =	Cases with insufficient information n =	Definite Cases n =
Abdominal pain	11	1	-	10
Back pain	37	1	3	33
Bite	9	-	-	9
Burn	34	-	-	34
Collapse	7	-	-	7
Chest pain - other	18	-	-	18
Ear/Nose/Throat	26	-	-	26
Eye injury*	50	-	-	50
Fracture/Dislocation*	50	-	-	50
Head Injury*	50	1	-	49
Multi-trauma	6	-	-	6
Overdose*	50	-	-	50
Review (injury)*	24	-	-	24
Skin wound -Lac'n*	50	-	-	50
Soft tissue injury*	50	-	-	50
Shortness of breath	8	-	-	8
Altered consciousness	14	-	-	14
Other ** (see below)	20	2	-	18
Total	514	5	3	508

* more than 50 cases in data set thus only first 50 examined

Listing of 'other':

Chest pain (cardiac)	2	GI	1 (not inj)
Convulsion	1 (not inj)	CVA	1
GI bleed	1	DOA	1
Gynaecological	1	Psychiatric	1
Headache	3	Urological	2
Infection	3	Vascular	3