Victoria's Injury Surveillance System

Injuries cause death, disability and suffering in Victorian children. The cost can be measured in health care dollars, years of productive life lost, and tragic loss to families. These costs are a futile waste which can be avoided or minimized *because injuries can be prevented.*

HAZARD is the first report from the Injury Surveillance System based at the Royal Children's Hospital. The Injury Surveillance System uses injuries to identify hazards.

Information is collected from parents and doctors on all children who attend the Emergency Department because of injury or poisoning. In addition to first-hand information from parents of injured children, the Injury Surveillance System also records detailed information on all child and infant deaths in Victoria.

Hazards might be specific products (e.g. a skateboard, playground surface, a new type of toy, or ingested medications). They might be environmental situations (e.g. playground, or stormwater drain). Or they might be activities or behaviours (e.g. Australian Rules football, cooking, or graffiti writing on trains).

Identified hazards point to possible solutions - solutions which will prevent injuries occurring or reduce their severity if they do occur. Our job is:

- to bring these hazards to your attention,
- to take action or to stimulate others to do so where necessary,
- to encourage you to undertake further in-depth research, and
- to promote the design, implementation, and evaluation of potential solutions.

To achieve these ends, information must be disseminated to a wide range of people in the community, to organisations and government departments (such as the Child Accident Prevention Centre, National Safety Council, Health Department Victoria, Ministry of Consumer Affairs, Ministry of Education, municipal authorities), and others such as the Monash Accident Research Centre, consumer groups, specialist medical practitioners, manufacturers, insurers and so on.

The Injury Surveillance System was officially launched by the Minister for Health, Mr David White on March 9 this year, although data collection commenced on January 4. Since January, about 2,600 injuries have been recorded in the database.

Victoria's involvement in injury surveillance was stimulated by the National Injury Surveillance and Prevention Project (NISPP), a joint venture between the Commonwealth Department of Community Services and Health (through the Australian Institute of Health) and the Child Accident Prevention Foundation of Australia. NISPP is based in Adelaide and is responsible for providing assistance to the states (software and other technical advice), and drawing together data from all the states into a national database. NISPP will soon evolve into the Australian Injury Prevention Program, a cooperative venture involving the Commonwealth and all the states.

The Royal Children's Hospital is the first hospital to participate in Victoria and there are plans for two other metropolitan hospitals to take part by the end of the year. It will be known as the Victorian Injury Surveillance System. Eventually, the system may expand to cover non-hospital sources of data, such as community health centres, general practitioners, and private specialists.

NISPP was designed to evolve as an all-age, all-injury system and it is anticipated that following successful piloting in adult settings, Victoria will also move to extend surveillance to injuries in all ages.

Who Supports the Injury Surveillance System?

The impetus and structure of the Injury Surveillance System comes from NISPP, that is the Australian Institute of Health and the Child Accident Prevention Foundation of Australia. The Minister for Health and Health Department Victoria have acknowledged the critical importance of injury control as a major priority for Victoria, and initial funding for staff and maintenance has been provided by HDV.

Hewlett Packard (Australia) has generously donated sophisticated computing equipment to manage the Injury Surveillance System database, and to assist in the production of HAZARD. Similarly generous support has been provided by Alcatel Datakey Pty Ltd in the provision of software, staff training and equipment support. Rotary Club of Fawkner has also donated software through the Burns Unit at the Royal Children's Hospital.

Most importantly, the Royal Children's Hospital, as part of its commitment to injury prevention, has provided the facilities and support to make the whole venture possible through its Child Accident Prevention Centre and its Emergency Department. The cooperation and support of staff in the Emergency Department provide the foundation for the Injury Surveillance System.

How Does it Work?

A detailed step-by-step description of how information on injuries and hazards is collected is given in the section on pages 6 and 7, *HOW IT WORKS*. The main strength of the system is the way in which the injury event is broken down into a sequence that permits a much better understanding of how the injury came about. This leads to better clues about possible countermeasures.

Without wishing to detract from the enormous potential that the system offers, users of these data need to understand *both* the strengths and the limitations of the System in its present form. In particular, until other hospitals join the System, we cannot be sure that we will see all the "serious" injuries that might arise from a particular hazard. While the occurrence of a particular injury might be extremely helpful in identifying a possible solution, not all injuries will necessarily come to our attention. Therefore, the absence of injuries in the database associated with certain factors (or potential hazards) does not necessarily mean that those factors are *not* hazardous. The same applies to the monitoring of injury-reducing interventions.

Second, the quality of the information in our database is dependent on the detail provided by the parent. For example, if parents fail to specify what surface their child fell onto, we just don't know what contribution the surface might have made to the injury. At this time information on the severity of the injury is not collected. This is a complex and time consuming aspect of injury research, and not yet part of surveillance. Finally, experience in South Australia suggests that the system starts to become most useful after 7,000-8,000 injuries have been recorded in the database.

These caveats indicate that the prime purpose of the Injury Surveillance System is to provide clues to hazards, and to solutions. To raise a red flag where necessary. More detailed analysis may require a specific research study involving follow-up of subjects identified by the system, or perhaps a prospective study in certain circumstances. Part of our job is to assist you to carry out such studies where appropriate and where possible.

Injuries by Time of Day
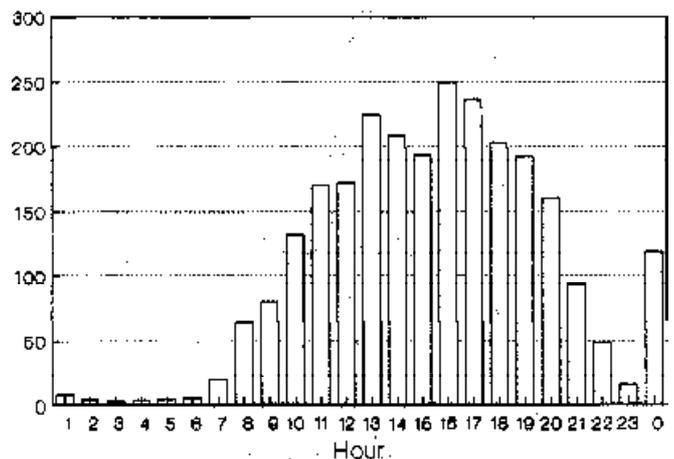
0 = midnight (includes unknown)

Early Experience with the Injury Surveillance System

To give you an idea of the range of problems that are encountered with injured children, and also how information is coded in the Injury Surveillance System, we will present some general information on the 2,600 cases identified so far . You may

need to refer to *HOW IT WORKS* at the end of this issue for a fuller explanation of some of the terms used.

Injury Attendances

By day of the Week
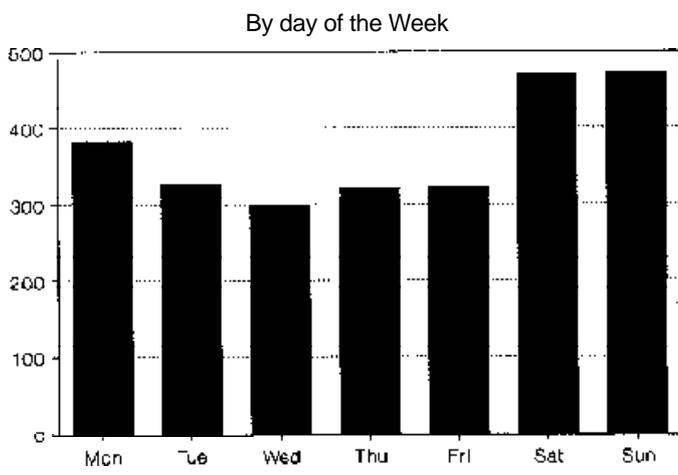
First, nearly twice as many boys are injured as girls (61 % versus 39%). Forty-two percent of injuries occur in the 0-4 year age group with a peak incidence in 1 and 2 year olds. Injuries occur most frequently between 4 and 7 pm. Most injuries occur on the weekend.

Location

Half of the injury events occur in the child's own home, while 13% occur at school and about 12% on a road, footpath or driveway.

Location	%
Own home: living or sleeping area	22
Own home: garden, garage or yard	17
School playground	10
Public road	7
Own home: kitchen	6
Sports - arena, oval, court	5
Footpath	3
Other home: garage, garden or yard	3
School (not playground)	3
Park- National or other public	3
Own home: bathroom, laundry, toilet	3
Private road, driveway	2
Public playground	2

Context

The context of the injury refers to what the child was doing at the time of the injury. It may give clues to behavioural or environmental hazards.

Most are described as *playing (general activity).* Another 30 percent are walking/running, bicycling or playing sport.

Context	%
Playing (general activity)	46
Walking/running	13
Sport: organised, informal or unspecified	10
Bicyclist	7
Sitting	3
Eating or drinking	2
Sleeping resting	2
Passenger car	2
Standing	1
Washing, showering, bathing	1
Motor cycle, scooter	1

Breakdown Event

The breakdown event is the occurrence that led to the injury. It is most often a fall- from different heights, or as a result of slipping or tripping (36%). Other major contributing events include losing control of an object, moving person or thing into a dangerous position, or overreaching.

Breakdown Event	%
Lost control of object or article	16
Moved person/thing into dangerous pos'n	11
Fell from other level up to 1 metre	10
Fell on same level	10
Described by injury event	9
Other-exerted, over-reached	9
Tripped on (something)	6
Slipped on (something)	5
Fell from other level >1 metre	5
Practical joke, horseplay	5
Collision between	5
Aggression, fight, quarrel	2
Knocked over, spilt	2

Mechanism of Injury

The mechanism of injury describes how the injury itself actually occurred. It is most frequently the impact of the victim hitting against an immovable object such as the ground, road, furniture and so on (56%). Ingestions and burns account for 3.9% and 3.7% respectively - not a large number, but these often result in admission to hospital and can have severe long-term consequences.

Factors

As described in *HOW IT WORKS*, factors are the types of products that are associated with either or both of the breakdown events and mechanism of injury. There is a factor code for over 1500 types of things that may be associated with injury.

This is a key element for hazard identification. The database also contains text fields which allow brand names to be stored when that information is known and provided by the parent. This table lists the commonest factors identified so far (apart from the injured child himself) in relation to either the breakdown event or the mechanism of injury.

| Factors	N
Concrete, other artificial outdoor surfaces	335
Ground, other natural surfaces	277
Child other than victim	277
Floors or flooring materials	166
Bicycles or accessories	145
Adult	121
Passenger car or station wagon	75
Football	69
Stairs or steps	68
Tables	59
Fences or fence posts	46
Monkey bars, other climbing equip.	45
Chairs	45
Tree, branch, stick	45
Beds	44
Dog	41
Door	38
Door sills or frames	36
Ceilings or walls	35
Skateboards	33
Trampolines	29
Slides or sliding boards	29
Swings or swing sets	25
Glass parts or pieces	24
Hot water	22
Ball sports (not specified)	21
Toy	21
Carpet	20
Tea, coffee, other hot beverage	20

Safety Precautions

Only about 3 percent of people reported the use of any form of safety precaution such as an approved motor vehicle restraint or seat belt, helmet (etc). Of those safety precautions that are named, bicycle helmets are reported most often.

What Happened to the Victims?

Of all those registered in the database so far, 80% have required treatment for their injury. Of these, 20% required hospitalisation, while 50% needed more than emergency treatment and were followed up either in an outpatient department clinic (OPD) or by some other health professional.

Treatment for Injuries

percentages of the 80% treated
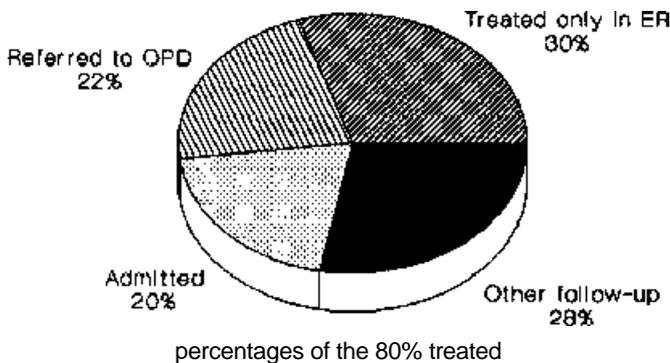
Agreement to be Followed Up

The Injury & Poisons Form also asks parents whether they have objection to being contacted at a later time about the injury that brought their child to the hospital. Over 95% of parents have given their consent to be contacted for follow-up interview.

Some Examples of Specific Injuries and Hazards

1. Burns

The vast majority of children presenting with burns are four years old or younger (almost 80%). There are approximately equal numbers of girls and boys. Burn injuries occur throughout the day, but peak noticeably at meal times, especially in the evening.

Location	%
Own home kitchen	40
Own home living/sleeping area	25
Own home yard	8
Other home living/sleeping area	6
Own home bathroom	5
Elsewhere	16

The principal mechanisms of injury are scalds from hot liquids, hot fat and soup (60%), and contact with dry heat, such as an iron, heater, car or motor bike muffler or an oven (21%).

Thirty-four percent were admitted immediately and an additional 54% required treatment beyond that provided in the Emergency Department. It is sobering to note that 20% of burns involved the face or neck.

Burn Injuries
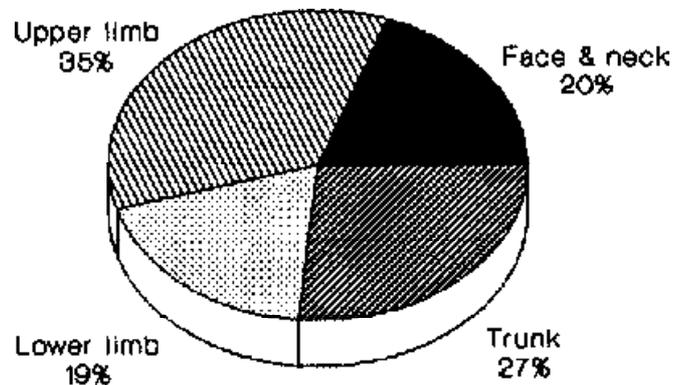
Hot fluids in the kitchen environment clearly represent an important hazard which requires targeting for action in both the behavioural and design domains.

2. Fractures

Almost a quarter of the children in the Injury Surveillance System database have presented to Emergency with fractures. Several have more than one injury, such as another fracture, concussion, cuts or abrasions. Nearly three-quarters of all fractures involve the upper limb.

Fractures

Upper limb 70%

Trunk 1%

Head & neck 11%

Lower limb 18%
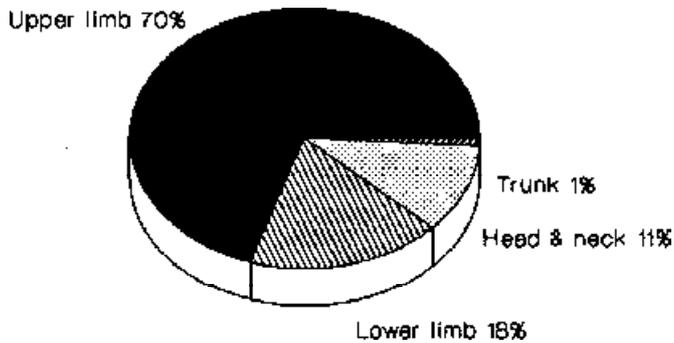
A third of the injury events occurred at the child's home, a quarter at school and 15% on a road, footpath or driveway. Playing is given as the activity at the time of the accident in half the cases, and sport, bicycling and walking/running account for 11% each.

Falls are the main breakdown event (45%). Factors that contributed to this include bicycles, skateboards, trampolines (17%), playground equipment (14%), or furniture (7%). Another 19% of children lost control of an object or article, such as a bicycle or skateboard.

Not surprisingly, the most common mechanism of injury is the *victim hitting against something*, usually the ground, man-made outdoor surface (e.g. concrete), or the floor.

A quarter of these children required admission to hospital and 60% were treated and then referred to the Outpatient Department (OPD).

In South Australia, the Injury Control Unit of the South Australian Health Commission has focussed on playground surfaces as a target for intervention to reduce fractures and other injuries due to falls from play equipment onto unacceptably hard surfaces (see below). In Victoria, further study is needed to identify the scope of the problem in our home, school, and municipal playgrounds.

3. Child-resistant bottle caps/closures

Four toddlers (aged one and a half to three years) opened child-resistant caps on medication containers resulting in serious ingestions. Three were admitted to hospital and the fourth was treated in Emergency. In all cases, the parents felt sure that the lid was done up securely.

The point to stress is that even under the best circumstances, these lids are child-*resistant*, not child-*proof*, and that every precaution should be taken to keep them out of reach of children. Nevertheless, vigilance is required to ensure that approved caps still perform to an acceptable level. Increased effort may be needed to create more effective child resistant containers for medications and a whole range of other potentially harmful substances.

Details of these cases - brand of medication, circumstances of the injury event and its consequences - have been sent to the Standards Association, Ministry of Consumer Affairs, the Child Accident Prevention Centre, and the Poisons Information Centre. We will keep you informed of any future developments.

4. Skateboard Injuries

We have seen 34 skateboard injuries so far, only 4 of which occurred in girls. Two-thirds were aged between 10 and 14 years. Nine were injured on the road, 7 on a footpath, 7 in their own back yard, and 2 in a driveway. Nearly all lost control of the skateboard, and there was one instance of a fatal collision with a vehicle in a 5 year old girl. Fractures or dislocations occurred in 19 children, while 3 received head injuries. Only 2 children were wearing safety equipment at the time of injury (knee pads or helmet).

As skateboards become increasingly popular, we can expect to see more injuries related to their use. We need more information to develop guidelines for safe environments for skateboard use, to decide what sort of safety devices are necessary and effective, and what rider characteristics increase the risk of injury, such as lack of skill and experience.

Experience in Other States

The use of injury surveillance in other Australian states has already led to decisive action in preventing injuries. In South Australia, NISPP data revealed that falls onto hard surfaces in playgrounds was a frequent and important cause of severe injury in children. This led to the development of a cooperative venture between the Injury Control Unit of the South Australian Health Commission and the Department of Mechanical Engineering at the University of Adelaide. A laboratory was established to test and evaluate various playground surface materials. In South Australia, the ideal impact absorbing surface (in terms of cost and efficacy) seemed to be tan bark laid at an appropriate depth.

Already, several hundred playgrounds have had concrete or sand removed and replaced with tan bark. Other surfaces may also be suitable, and the laboratory now offers a service to all Australian states to test local materials that might be available cheaply. The NISPP data in South Australia will be used to evaluate the impact of this intervention on the incidence of playground injuries.

The Early Childhood Injury Prevention Project (ECIPP) which was designed and implemented throughout Victoria in Maternal and Child Health Centres is now being introduced in South Australia where a controlled evaluation will be based on their injury surveillance system data.

In Western Australia, a community-based intervention called NIPPER (Neighbourhood Injury Prevention Program) is being launched to tackle a range of common injuries. This intervention is based on a similar Swedish exercise which reduced injury rates by 10 to 30%. The Western Australian injury surveillance system will be used to evaluate the outcome of NIPPER.

Other News from the Injury Surveillance System

Three separate incidents causing severe multiple injuries to 10 - 14 year old boys as a result of being hit by trains were recorded earlier this year. Two were at level crossings, and involved an unexpected second train. One of these was at an unprotected crossing. We notified the Railways Investigation Unit, and the Loss Assessor of the Met. The investigation of more effective barriers is apparently being carried out although results were not available to us at this time. We will keep you posted.

Surgeons from the Burns Centre at the Royal Children's Hospital plan to study in some detail the treatment required for burn injuries and the long term outcomes of burn injuries. The facilities of the Injury Surveillance System will assist them to carry out these studies.

A major study of the consequences of head trauma in children will also use the Injury Surveillance System database to identify subjects and controls for detailed follow-up.

Where is the injury surveillance system?

The Injury Surveillance System is located in the Child Accident Prevention Centre, 1st floor, Royal Children's Hospital in the main building on Flemington Road. If you have any questions about the Injury Surveillance System, please call Dr. Terry Nolan on 345-5522, or call Marga Penny or Lilly Nikolic on 345-5087. In *HOW IT WORKS* (on the next page), we give details about how to request specific information from the database.

If you know of someone who should be on our mailing list and has not received a copy of HAZARD, please let us know.
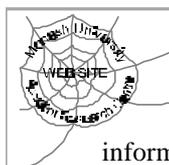
Issues of *Hazard*, along with other information and publications of the Monash University Accident Research Centre, can be found on our internet home page:

http://www.general.monash.edu.au/muarc

VISS is located at:

Accident Research Centre
Monash University
PO Box 70A
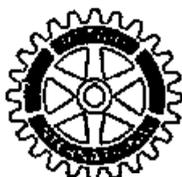Monash University, Victoria, 3800 Australia

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Reception	(03) 9905 1808
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How it Works

Getting Information into and out of the Database

What's so special about the database?

The system of injury coding developed by the National Injury Surveillance and Prevention Project (NISPP) is comprehensive and sophisticated. What is special and unique is its ability to break the injury sequence down into its component parts. This allows great scope for use in developing possible preventive interventions. To do this the NISPP coding system splits the injury event into two phases:

* the **BREAKDOWN**, or circumstances that led to the injury event (what went wrong),

* the **MECHANISM**, namely the object or action that injured the child.

In addition, it labels as a **FACTOR** the object, person or activity associated with the breakdown and the mechanism of the injury. This results in **BREAKDOWN FACTOR**S and **MECHANISM FACTORS**. There are over 1500 factor codes in the NISPP manual.

What You Get from the Database

We can ask many things of the database. It can be "queried" about all sorts of possible combinations of relevant details. An anonymous potted summary of each individual injury case can also be obtained. This tells you the sex of the child and age in months, what happened where, the nature of the injury, body part affected and the disposition (what treatment the patient received).

In addition to the numeric codes shown in the example opposite, detailed and specific information may be stored in the database in three text fields:

1. *Place injury occurred:* the exact location in a given street, the name of the school, shop or park (etc) can be noted.

2. *What happened:* a brief one-line description of the injury event. This enables the reader to picture the relationship between the coded elements and the actual injury event. It may provide a clearer picture of the causes involved.

3. *Product or Motor Vehicle Description:* Model, year & make of car; brand name & model of products (such as bicycles, electrical appliances, etc). This space is also used to record additional relevant information provided by the parents, such as first aid provided (particularly for burns and choking episodes), other safety devices used such as gym mats or tan bark, or even the breed of dog in the case of dog bites.

It will soon be possible to provide researchers with a subset of the database (but without individual patient identification) as an ASCII file which will permit more detailed analysis to be carried out on their own computer .

Using the Database

We are anxious to have people use the Injury Surveillance System to ensure that its potential is fully exploited. But it is most important that you first explain what you are trying to achieve with the data. What basic question are you asking? This helps us to select the most appropriate and comprehensive information available for your particular request.

Requests may include specification of:

age; sex; time period(s) in the day, day(s) of the week, or a calendar time period; *location* (eg. public park, backyard or swimming pool etc.); *activity* (e.g. a specific sport or sports, road traffic accident, playing etc.);*products, or factors* (eg. bicycle, dog, car, fire etc) for breakdown and/or mechanism.

Depending on the question you want to ask, access to Victorian or perhaps national data might be appropriate. If you need to obtain national data, direct contact with the NISPP Secretariat in Adelaide is encouraged.

Requests should be sent to:

> National Secretariat,
> NISPP,
> Public & Environmental Health Division,
> P.O. Box 1313c, Adelaide, SA., 5002.
> Phone: (08) 218-3455 or Fax: (08) 223-6683

Provision of data from the national database involves a service charge in some cases.

Requests for Victorian data should be addressed to:

> Injury Surveillance System,
> Royal Children's Hospital,
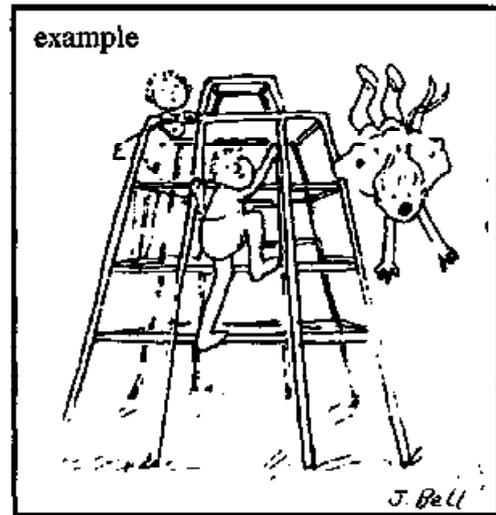> Parkville 3052.
> Phone: (03) 345-5087 or Fax: (03) 345-5789.

Step 1: Injury occurs

Step 2: Child arrives at RCH Emergency

Step 3: Assessment by triage nurse who then gives the parent or guardian an *Injury & Poisons Form.* A copy of the actual form is attached.

Step 4: The *Injury & Poisons Form* is completed by the parent or guardian (front), and the attending doctor (back).

The parent or guardian fills out this page for the first presentation of a particular injury, as this example shows:

example

J. Bell

1. When did the **injury** occur?

Date 12·4·88   Time 4·15   am ☐ pm ☑

2. Where did the injury occur?

Smith St. playground

3. What was the child doing at the time the injury occurred?

Playing on climbing frame

4. What went wrong?

Fell 2 metres

5. What actually caused the injury?

Landed on hard ground

7. What safety precautions were in use at the time the injury occurred?

None

Step 5: Injury Surveillance staff code (convert text into a numbers) the information from the Form. These are the corresponding NISPP categories and specific codes, given in [brackets], which describe this example.

LOCATION
Public playground .... [81]

CONTEXT
Playing, general activity .... [401]

BREAKDOWN
Fell from other level over 1 metre .... [05]
BREAKDOWN FACTOR(S)
Monkey bars or playground climbing equipment .... [1244]

MECHANISM(S)
Hit against victim moving (contact with immovable object) .... [11]
MECHANISM FACTOR(S)
Ground & other natural surfaces .... [6327]

SAFETY USE
None .... [0]

From the reverse side of the page the doctor selects numeric codes which correspond to:

1. The nature of the injury ————————— Fracture .... [20]

2. Body part affected ——————————— Radius, ulna .... [206]

3. Intent of the injury ——————————— Accidental (unintentional) .... [0]

4. What the doctor did with the patient —————— Treated, referred to OPD .... [03]

Note that the doctor can code up to three separate injuries in order of severity (if child has more than one injury).