

Feasibility study for injury surveillance
at
Dr. Ram Manohar Lohia Hospital,
New Delhi

GOI- WHO collaborative program
2006-2007

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(2)

AIMS & OBJECTIVE

To develop & implement injury surveillance system with particular reference to Road Traffic accident in Dr Ram Manohar Lohia Hospital, New Delhi, as per WHO guidelines”

(3)

Methodology:

- **Point of data collection**
 - Retrospective study by collecting data from medical record department.
- **Who collected the data?**
 - Doctors.
- **Method of collection**
 - By reviewing case sheet.

- **Current status of medical record keeping**
 - Manual.
- **ICD coding.**
 - Yes.
- **Retrieval of injury case record-from code set/from ICD coded set.**
 - From code set.
- **Time taken for retrieval.**
 - 6 months.
- **Usefulness of the format.**
 - Useful, however certain modifications are suggested.
- **Information in the case sheet appropriate for the format.**
 - No.
- **Time for filling the format**
 - 15 to 20 mts.
- **Data entry process.**
 - Manual (hard copy)
 - Computer (excel format)
- **Staff required for various steps**
 - MRD – MRD clerk, attendant for retrieval of case sheets.
 - Doctor-For retrieval of info from case sheet & recording in data capture form.
 - Data entry operator
 - For data entry in computer.

Review of literature

Introduction

Injury: a major health problem worldwide

Injuries, unintentional or intentional, constitute a major public health problem, killing more than 5 million people worldwide each year and causing many more cases of disability. People from all economic groups suffer fatal injuries, but death rates due to injury tend to be higher in those in the lower income groups. The poor are also less likely to make a full recovery following an injury.

Historically, the injury problem has been neglected, largely because injuries were viewed as accidents or random events. Today, however, injuries are known to be preventable. The use of seat belts, car seats for children, designated drivers, together with early childhood education and family counseling to prevent violence have all proved to be effective measures for preventing injuries.

To date, injury prevention has tended to be an issue only in wealthier countries. The highest rates of death and permanent disability due to injury are, however, currently found in the poorer nations; it is these countries therefore that have the most urgent need for prevention strategies that are appropriate, cost-efficient and effective.

Global estimates

The road traffic injury problem began before the introduction of the car. However, it was with the car – and subsequently buses, trucks and other vehicles – that the problem escalated rapidly. By various accounts, the first injury crash was supposedly suffered by a cyclist in New York City on 30 May 1896, followed a few months later by the first fatality, a pedestrian in London. According to WHO data for 2002, road traffic injuries accounted for 2.1% of all global deaths and ranked as the 11th leading cause of death. Furthermore, these road traffic deaths accounted for 23% of all injury deaths worldwide

Magnitude of problem in India

Road traffic accidents have become a major public health problem in the last few years. India is passing through a major epidemiological transition, social-demographic changes and technological revolution due to rapid Industrialization, urbanization, economic liberalization and changing social, cultural and political situation. This has brought about a combination of communicable and non-communicable diseases to the forefront of the healthcare delivery system. With these changes, a number of other factors like increasing migration, large scale housing and construction activities, economic reforms and technology import have resulted in an increase in changing lifestyles of the people and there has been an alarming rise in number of injuries due to accident, crime and violence.

India is undergoing major economic and demographic transition coupled with increasing urbanization and motorization. Among the top ten causes of mortality in the country, Road traffic accident was the tenth cause two decades back. But with the increasing urban expanse and lifestyle changes, it is projected that road traffic accidents will occupy the fifth position in the list of major killers and third position among causes of disease burden in 2020. Every death is accompanied by several more that are injured and require hospitalization. Nearly 3% of our GDP is spent on the hospitalization of the accident victims. In India, 11% of deaths due to non-communicable diseases are due to injuries and 78% of injury deaths are due to road traffic accidents. India accounts for only 1% of the world vehicle population but accounts for 6% of accidents and 10% of fatalities due to road traffic injuries. Approximately, 80,000-100,000 fatalities occur per year (a fatality every 6 minutes)

The aim of this project study is to help Medical Professionals to design, establish and maintain good injury surveillance systems. Such systems are intended to record information on individual cases of injury and produce statistical overviews of an injury problem, with all the relevant data being classified and coded according to agreed international standards.

1. Terms & Analytical Tools.

i) Injury: An injury is the physical damage that results when a human body is suddenly or briefly subjected to intolerable levels of energy. It can be a bodily lesion resulting from acute exposure to energy in amounts that exceed the threshold of physiological tolerance, or it can be an impairment of function resulting from a lack of one or more vital elements (i.e. air, water, warmth), as in drowning, strangulation or freezing. The time between exposure to the energy and the appearance of an injury is short.

The energy causing an injury may be:

Mechanical□ (e.g. an impact with a moving or stationary object, such as a surface, knife or vehicle)

Radiant□ (e.g. a blinding light or a shock wave from an explosion)

Thermal□ (e.g. air or water that is too hot or too cold)

Electrical□

Chemical□ (e.g. a poison or an intoxicating or mind-altering substance such as

Alcohol or a drug).

The most common events causing injuries are:

- 1) Interpersonal violence and sexual abuse;
- 2) Collective violence including wars, civil insurrections and riots;
- 3) Traffic collisions and
- 4) Incidents at home, at work and while participating in sports and other recreational activities.

The standard definition of an “injury” as used by WHO is: “Injuries are caused by acute exposure to physical agents such as mechanical energy, heat, electricity, chemicals, and ionizing radiation interacting with the body in amounts or at rates that exceed the threshold of human tolerance. In some cases (for example, drowning and frostbite), injuries result from the sudden lack of essential agents such as oxygen or heat.”

ii). Types of injury.

Injuries may be categorized in a number of ways. However, for most analysis purposes and for identifying intervention opportunities, it is especially useful to categorize injuries according to whether or not they were deliberately inflicted and by whom. Commonly used categories are:

unintentional (i.e. accidental);
 intentional (i.e. deliberate):
 interpersonal (e.g. assault and homicide)
 self-harm (e.g. abuse of drugs and alcohol, self-mutilation, suicide)
 Legal intervention (e.g. action by police or other law enforcement personnel)
 war, civil insurrection and disturbances (e.g. demonstrations and riots);
 undetermined intent.

iii.) Epidemiology of injuries.

Epidemiology is a specialized field of medical research with its own vocabulary. Generally speaking, however, the term refers to the study all the factors that interact with each other to account for the presence or absence of disease or injury. In the epidemiology of injury, as in the epidemiology of disease, these factors can be categorized as:

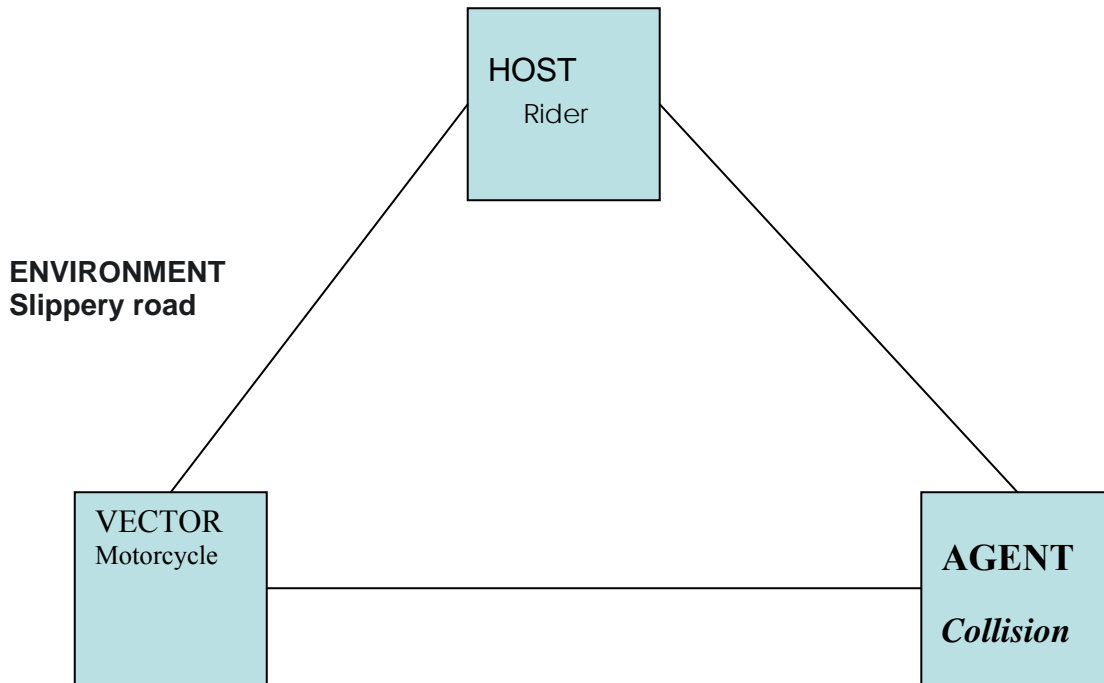
the host (i.e. the person injured)
 the agent (i.e. the force or energy)
 the vector (i.e. the person or thing that applies the force, transfers the energy
 or prohibits its transfer)
 the environment (i.e. the situation or conditions under which the injury happens).

Using models to analyze the epidemiology of injuries

The four factors that are involved in injury, and the relationships between them, are illustrated in the diagram below (see Figure 1). The example given is based on an incident in which a man is injured when his motorcycle slides and crashes on a slippery roadway.

The standard definition of the term “epidemiology” as used by WHO is:
 “Epidemiology is the study of the distribution and determinants of health-related events in a defined population and its application to the control of events”

Figure 1:
Epidemiological model of an injury caused by a motorcycle Collision.



Using a model of this type can help to identify all the factors involved in an injury. It also helps people to think about where they might intervene to prevent such injuries from happening in the future or to reduce the harm done when they do happen. For instance, in the motorcycle collision model, there may be things about the rider, the motorcycle or the road that contributed to the crash. Perhaps there are things about motorcycle riders, motorcycles and/or road conditions that could be changed in order to prevent similar incidents in the future. In sum, models of the type described above can be effectively used to analyze a given situation and thus identify interventions that may prevent future incidents and injury.

Using the injury spectrum

The so-called “injury spectrum” is another useful device for analyzing injuries. The injury spectrum, which is illustrated in Figure 2, maps an injury over time, starting with the host’s exposure to a hazard, followed by the event, through to the occurrence of the injury and finally the possible resultant disability and/or death.

Figure 2:
The injury spectrum



Like the injury model described previously, the injury spectrum helps people to think about what happened in a particular case and how interventions might have prevented the injury from happening or reduced the damage done.

Three levels of prevention are suggested by the injury spectrum:

- **Primary prevention** involves either preventing the event from occurring or preventing it from leading to injuries (primary prevention measures might include putting protective barriers around fires, discouraging people from smoking in bed, and wearing protective gear while working or participating in sports).
- **Secondary intervention** involves early diagnosis and appropriate management of an injury (e.g. applying basic first aid at the scene of an incident to stop an injury from having more serious consequences).
- **Tertiary intervention**, and improving the final outcome e.g. rehabilitation, involves preventing further complications in the form of more

severe injury, disability or death e.g. giving an injured person crutches or a cane).

2. Risks

In road traffic, risk is a function of four elements:

The first is the exposure – the amount of movement or travel within the system by different users or a given population density. The second is the underlying probability of a crash, given a particular re-exposure.

The third is the probability of injury, given a crash. The fourth element is the outcome of injury.

Factors influencing exposure to risk

- Economic factors like rapid motorization.
- Demographic factors
- Land use planning practices which influence the length of a trip or travel mode choice
- Mixture of high-speed motorized traffic with vulnerable road users
- Insufficient attention to integration of road with decisionsfunction about speed limits, road Layout and design.

Risk factors influencing crash involvement

- Inappropriate or excessive speed
- Presence of alcohol, medicinal or recreational drugs
- Fatigue
- Being a young male
- Being a vulnerable road user in urban and residential Areas
- Traveling in darkness
- Vehicle factors – such as braking, handling and maintenance
- Defects in road design, layout and maintenance which can also lead to unsafe road user behavior
- Inadequate visibility due to environmental factors (making it hard to detect vehicles and other road users)
- Poor road user eyesight

Risk factors influencing crash severity

- Human tolerance factors
- Inappropriate or excessive speed
- Seat-belts and child restraints not used
- Crash helmets not worn by users of two-wheeled Vehicles
- Roadside objects not crash protective
- Insufficient vehicle crash protection for occupants and for those hit by vehicles
- Presence of alcohol and other drugs

Risk factors influencing severity of post-crash injuries

- Delay in detecting crash
- Presence of fire resulting from collision
- Leakage of hazardous materials
- Presence of alcohol and other drugs
- Difficulty rescuing and extracting people from vehicles
- Difficulty evacuating people from buses and coaches involved in crash
- Lack of appropriate pre-hospital care
- Lack of appropriate care in the hospital emergency rooms.

3. Interventions:

Three levels of interventions are suggested:

- **Primary intervention:**
- **Secondary intervention**
- **Tertiary intervention.**

Primary intervention

i.) A road traffic system designed for safe, sustainable use.

Road traffic deaths and serious injuries are to a great extent preventable, since the risk of incurring injury in a crash is largely predictable and many countermeasures, proven to be effective, exist. Road traffic injury needs to

be considered alongside heart disease, cancer and stroke as a preventable public health problem that responds well to targeted interventions.

The provision of safe, sustainable and affordable means of travel is a key objective in the planning and design of road traffic systems. To achieve it requires firm political will, and an integrated approach involving close collaboration of many sectors, in which the health sector plays a full and active role. In such a systems-based approach, it is possible at the same time to tackle other major problems associated with road traffic, such as congestion, noise emission, air pollution and lack of physical exercise.

ii. Managing exposure to risk through transport and land-use policies.

Perhaps the least used of all road safety intervention strategies are those that aim to reduce exposure to risk. Yet the underlying factors determining exposure to risk can have important effects.

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While further research is required to fully explore intervention strategies, it is known that exposure to road injury risk can be decreased by strategies that include:

- reducing the volume of motor vehicle traffic by means of better land use;
- providing efficient networks where the shortest or quickest routes coincide with the safest routes;
- encouraging people to switch from higher risk to lower-risk modes of transport;
- placing restrictions on motor vehicle users, on vehicles, or on the road infrastructure.

iii. Reducing motor vehicle traffic Efficient land use.

The organization of land use affects the number of trips people make, by what means they choose to travel, the length of trips and the route taken . Different land use creates different sets of traffic patterns. The main aspects of land use that influence road safety are :

- the spatial distribution of origins and destinations of road journeys;
- urban population density and patterns of urban growth;
- the configuration of the road network;
- the size of residential areas;
- alternatives to private motorized transport.

iv.) Providing shorter, safer routes.

—In an efficient road network, exposure to crash risk can be minimized by ensuring that trips are short and routes direct, and that the quickest routes are also the safest routes.

—Safe crossing facilities for pedestrians and cyclists are likely not to be used if many steps need to be climbed, if long detours are involved, or if the crossings are poorly lit or underpasses badly maintained.

v. Encouraging use of safer modes of travel

Whether measured by the time spent traveling or by the number of trips, travel by bus and train is many times safer than any other mode of road travel. Policies that stimulate the use of public transport, and its combination with walking and cycling, are thus to be encouraged.

Strategies that may increase the use of public transport include :

— improved mass transit systems (including improvements to routes covered and ticketing procedures, shorter distances between stops, and greater comfort and safety of both the vehicle and the waiting areas);

— better coordination between different modes of travel (including the coordination of schedules and the harmonization of tariff schemes);

— secure shelters for bicycles;

— allowing bicycles to be carried on board trains, ferries and buses;

— “park and ride” facilities, where users can park their cars near public transport stops;

— improvements to taxi services;

— higher fuel taxes and other pricing reforms that discourage private car use in favor of public transport.

vi.) Graduated driver licensing systems.

The high risks faced by young drivers and motorized two-wheeler riders in their first months of driving. For young car drivers, the two principal risks are night time driving and transporting young passengers. In response, graduated driver licensing systems were first introduced in New Zealand in 1987, and are now widely implemented in Canada, the United States and some other places. These schemes provide gradual access to a full driving

license for novice drivers and riders. The reduction in the incidence of crashes resulting from the introduction of these systems varies from 4% to over 60%. The major reductions would seem to arise from more supervised driving and from a high degree of compliance with restrictions. It is not as yet clear, though, which of the many restrictions— including limits on the number of passengers carried, use of seat-belts, lower blood alcohol concentration (BAC) limits and night-time driving bans – is the most cost-effective. Graduated driver licensing schemes have generally been well accepted.

vii.) Safety-awareness in planning road networks.

The framework for the systemic management of road safety in high-income countries is increasingly defined by the following activities:

- classifying the road network according to their primary road functions;
- setting appropriate speed limits according to those road functions;
- Improving road layout and design to encourage better use.

These approaches can, in principle, be adapted to the contexts of middle-income and low-income countries. Within these general principles, safety engineering and traffic management should aim:

- To prevent road use that does not match the functions for which the road was designed;
- To manage the traffic mix by separating different kinds of road users, so as to eliminate
- Conflicting movements of road users, except at low speed.
- To prevent uncertainty among road users about appropriate road use.

viii. Traffic-calming measures.

At speeds below 30 km/h pedestrians can coexist with motor vehicles in relative safety. Speed management and traffic-calming include techniques such as discouraging traffic from entering certain areas and installing physical speed-reducing measures, such as roundabouts, road narrowing, chicanes and road humps. These measures are often backed up by speed limits of 30 km/h, but they can be designed to achieve various levels of appropriate speed.

ix.) Safety audits.

Road safety audits are required to check that the proposed design and implementation are consistent with safety principles, and to examine whether further design changes are needed to prevent crashes.

x.)Remedial action at high-risk crash sites.

Examples include:

- physical changes to roads to make them safer (e.g. the introduction of skid-resistant surfacing.
- the installation of central refuges and islands;
- improved lighting, signs and markings;
- changes in the operation of junctions, for example, by installing small roundabouts, changing the signal control or improving signs and markings.

Such measures can be applied at:

- high-risk sites, for instance, a particular bend or junction;
- along a section of route where the risk is greater than average, though the measures are not necessarily concentrated at specific sites;
 - over a whole neighborhood.

xi.) Setting and enforcing alcohol impairment laws.**Blood alcohol concentration limits for the general driving population.**

The risk of crash involvement starts to increase significantly at BAC levels of 0.04 g/dl. A variety of BAC limits are in place across the world – ranging from 0.02 g/dl to 0.10 g/dl. The BAC limit for the operation of a vehicle in India is 30mg/dl

Minimum drinking-age laws: Minimum drinking-age laws specify an age below which the purchase or public consumption of alcoholic beverages is illegal. In India, the minimum drinking age is 18 years.

xii.) Mass media campaigns

It is generally accepted that enforcement of alcohol impairment laws is more effective when accompanied by publicity aimed at:

- making people more alert to the risk of detection, arrest and its consequences;
- Making drinking and driving less publicly acceptable;
- Raising the acceptability of enforcement activities.
- setting and enforcing seat-belt and helmet use.

RESULTS

- **Hospital**
 - Dr. R.M.L Hospital, N.Delhi
- **Period of data collection**
 - 1st Jan to 31st Dec 2006.
- **Total medical record for the period**
 - 28,884 (emergency admission)
- **Number of records reviewed**
 - 5309 (injury cases)
- **Number of record identified**
 - 1353 (RTA cases)
- **Number of records coded on to performa**
 - 1353.
 - Number for proformas entered
 - 1353.

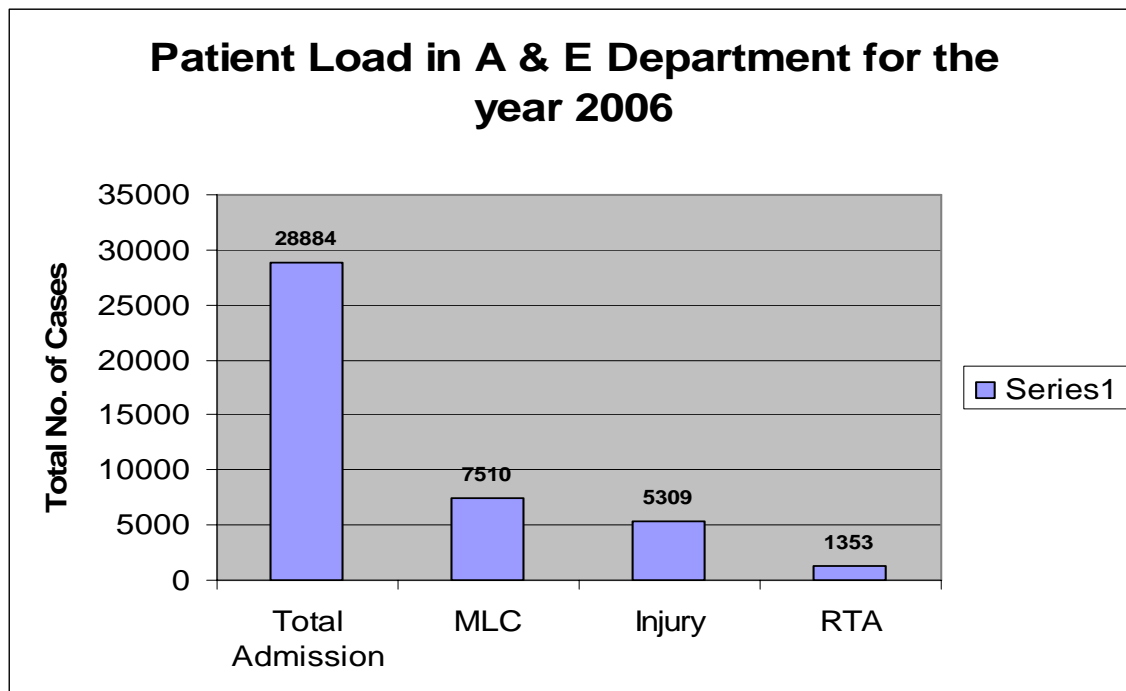
Patient Load in A & E Department for the year 2006

The data for the period of twelve months from January 2006 to December 2006 were collected for the purpose of study. During the year 2006 a total no 28884 emergency cases were admitted, out of which 7510 cases were MLC. Records of 5309 injury cases were identified and of 1353 RTA cases were segregated, recorded in data capture format, and entered in excel format in computer for an analysis. Maximum attendance was observed during post monsoon season in August, September, & October 2006.

Patient Load in A & E Department for the year 2006

Months	Total Attendance	Total Admission	MLC
January	12717	2336	644
February	13085	2361	604
March	14698	2722	690
April	15317	2634	572
May	13275	2045	596
June	14846	2355	546
July	15672	2524	694
August	17981	2555	652
September	18037	2994	608
October	23145	3824	652
November	13916	2534	646
December	11427	2266	606
Total	184116	28884	7510

Patient Load in A & E Department for the year 2006

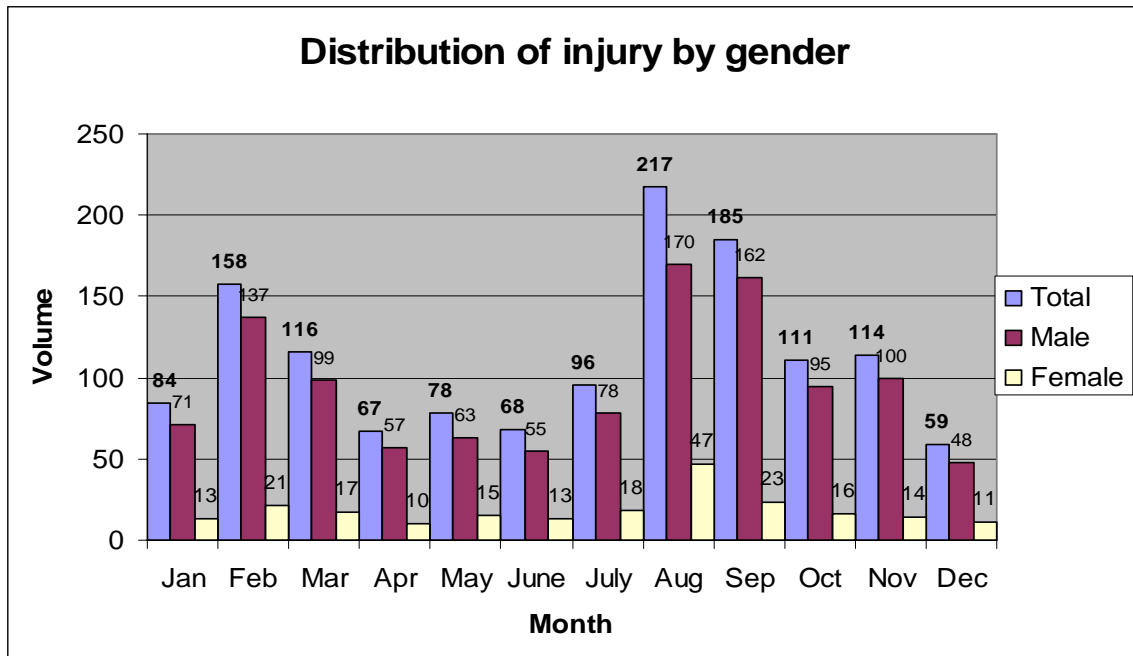


Distribution of Injuries by Gender

Males are almost six times more prone to injuries than females. During the year 2006 maximum no of injuries were seen during post monsoon season.

Distribution of Injuries by Gender

Month	Total	Male	Female
Jan	84	71	13
Feb	158	137	21
Mar	116	99	17
Apr	67	57	10
May	78	63	15
June	68	55	13
July	96	78	18
Aug	217	170	47
Sep	185	162	23
Oct	111	95	16
Nov	114	100	14
Dec	59	48	11
Total	1353	1135	218

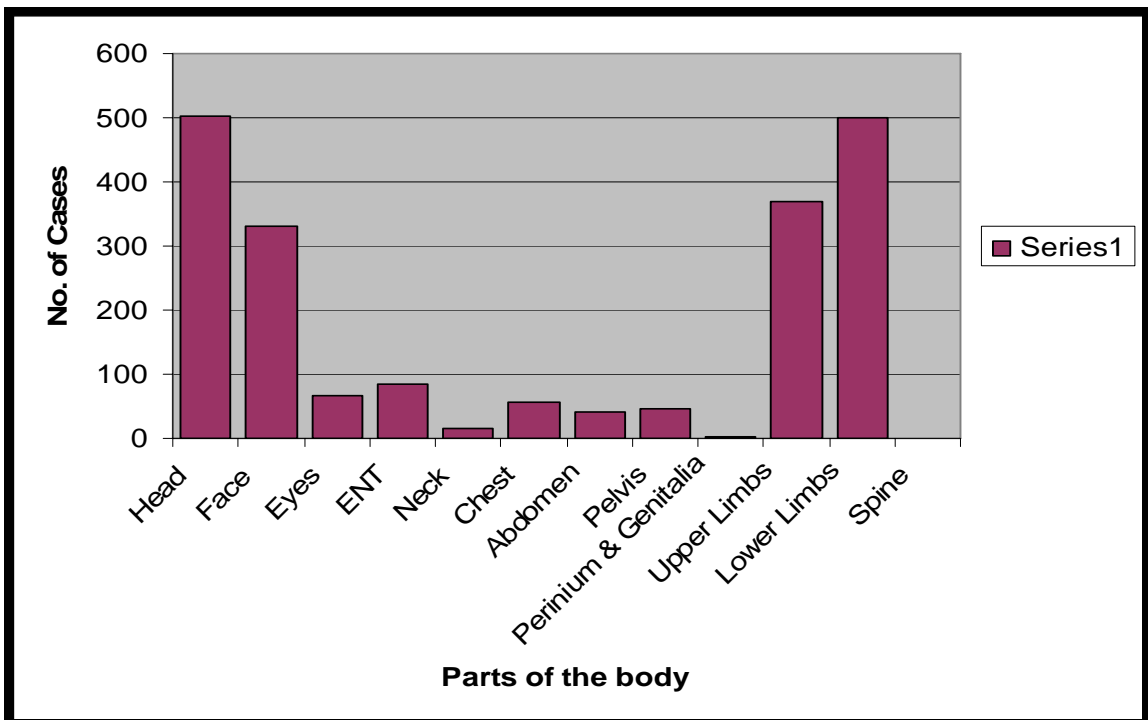


Injury Distribution by site

A maximum no of 503 cases (25%) were observed to be involving head in the body region followed by lower limbs 499 cases (25%) upper limbs 370 cases (18%). The least no of cases 1% observed to be involving the perineum and genitalia.

Injury Distribution by site

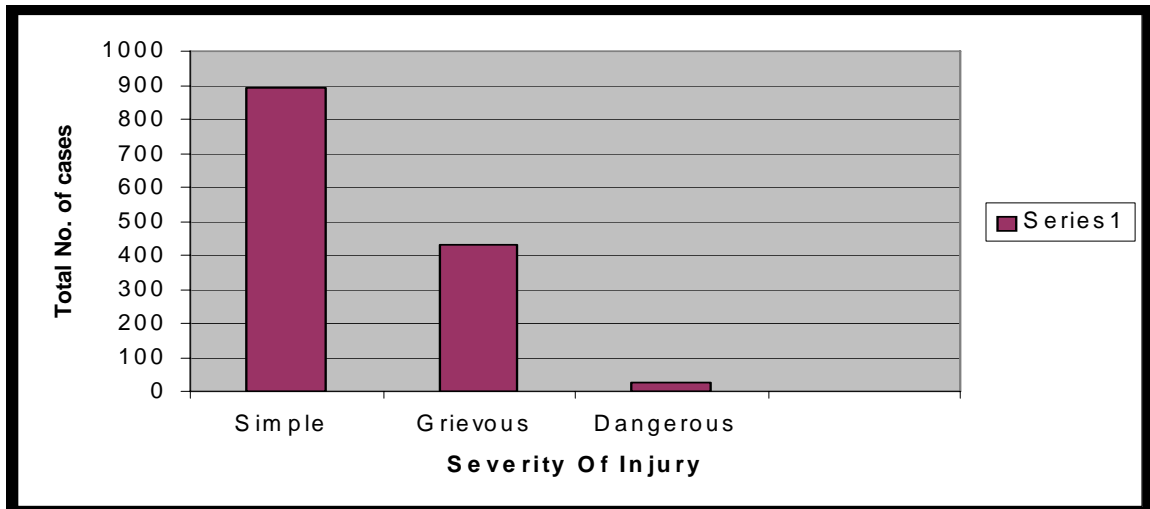
Parts of the body	Total No. of Cases	percentage
Head	503	26%
Face	331	16%
Eyes	67	3%
ENT	85	4%
Neck	15	1%
Chest	57	3%
Abdomen	40	2%
Pelvis	46	2%
Perinium & Genitalia	2	1%
Upper Limbs	370	18%
Lower Limbs	499	25%
Spine	0	
Total	2015	



Breakup of injury cases according to severity

A total no of 894 cases (66%) attending hospital were simple, while 433 cases (32%) were grievous & 26 cases (2%) were dangerous.

Breakup of injury cases according to severity



Breakup of cases as per outcome

There was only 2% mortality (30 cases) while 83% cases (1147 cases) recovered. Outcome in 14% cases who were LAMA/absconded is not known.

Breakup of cases as per outcome

Outcome	Total no. of Cases
Recovered	1147
Not Recovered	Nil
Residual Disability	8
Dead	30
Not Known	168
Total	1353

Breakup of nature of injury

A maximum no 688 (39%) were of cut/open wound & 641 no of cases (35%) were observed as other injuries (abrasion, tenderness, bruise, swelling etc.) 373 no of cases (21%) were of fracture, least no of cases 85 in no (5%) were of haematoma.

Breakup of nature of injury

Nature of Injury Cases	Total No. of cases
Fracture	373
Sprain	6
Cut / open wound	688
Sharp / penetrating wound	8
Haematomas	85
Burn	Nil
Percentage of Burn	Nil
Others	641
Not Known	Nil
Total	1801

Relationship of alcohol in RTA cases

It was observed that a total no. of 232 cases (17%) were found to be under the influence of alcohol. By taking remedial measures RTA cases can be prevented. In 57 cases (4%) nothing was mentioned in the case sheet about alcohol consumption.

Relationship of alcohol in RTA cases

Alcohol consumption	No. of Cases
Injured	232
Counterpart	Nil
Not applicable	1064
Not known	57
Total	1353

Mode of Transport used for Patient

A total no of 658 cases (49%) RTA case was brought to A&E department of the hospital by police in PCR van followed by 208 no of cases (15%) were brought in private vehicles. Only 81 cases (6%) were brought by CATS & government ambulances from other hospitals. In 268 cases (20%) mode of transport is not known / mentions.

Mode of Transport used for Patient

Mode of Transport	Total No. of Cases
Pvt. Ambulance	60
Govt. Ambulance	78
CATS	81
PCR Van	658
Pvt. Vehicle	208
Auto Rickshaw	Nil
Others, Specify	Nil
Not Known	268
Total	1353

Suggested guidelines

For implementation of ISS in hospital

- Prospective data collection
- Minor modifications in format as under:
- Q-2- OPD number be replaced by Emergency number.
- Q-2C-IP number be replaced by CR number.
- Q-4- B/B- option 5 “SELF” be added.
- Q-5- “Time of occurrence be included with date of occurrence.
- Q-28- Part of body injury- to include “mouth injury”/ tooth injury.
- Q-34- “Out come” Insignificant difference between 2&3 ie not recovered / residual disability.

Site Of Data Collection

- General info & personal details
(Q.1- 8) At – Admission counter.
- Details of Injury / RTA/ Prehospital care
Q.(9-24) –CMO ROOM.
- Details of Injury management, out come
Q. (25-34)- Treating physician.

Who will be responsible for ISS In Hospital?

- Nodal officer

Who has to collect data?

- Different categories of hospital staff

What information to be collected?

- Information as per modified DCF

Mechanism for data entry.

- Manual

Is additional staff required

- Yes.

What is the additional infrastructure required

- Space-room for surveillance staff.
- Equipment.

Financial Implication

- Non-recurring cost – space & equipment.
- Recurring cost – consumables

Use of Reports Generated

- Useful for health care service providers for assessment, review & improvement of Health related project .

Dissemination Of Reports

- Yes, to all stake holders.

Advocacy For Injury Prevention

- Required to be done by relevant agencies.

Audit of Trauma Care Services

- Essential.

How to develop linkages

- By putting information on web site by cross linking.

