Introduction Presentation

Adnan Hyder, MD, PhD
Maria Segui-Gomez, MD, ScD
Bloomberg School of Public Health
Lecture Topics

- Course orientation
- Introduction and review of injury prevention
- Global burden of injuries
- Injury prevention programs around the world
Section A

Course Orientation
Controlling the Burden of Injuries—A Global Perspective

- Objectives
- Welcome and introductions
- Course structure and grading policy
Objectives

- In this course, you will learn three skills needed to reduce the burden of injuries:
  - Methods used to understand the magnitude and determinants of injuries
  - Magnitude of the problem in different countries around the world
  - Interventions—current and potential—to reduce the burden of injuries
Section B

Introduction
Injuries

- Body damage resulting from acute exposure to excess energy (whether thermal, mechanical, electrical, or chemical) or from the absence of such essentials as heat or oxygen
Why?

Infectious disease model

Microorganism

Environment

Vector

Host
Why?

Infectious disease model:
- Microorganism
- Environment
- Vector
- Host

Injury model:
- Energy
- Environment
- Vector or Vehicle
- Host
How to Describe Them

- Etiology: Inappropriate energy transfer
- Vehicles or vectors: Motor vehicles, bullets, animals, etc.
- Pathology: Fractures, dislocations, sprains, strains, concussions, etc.
- Treatment: Outpatient, hospitalization, etc.
- Prognosis: Recovery, sequelae, death
Common Classifications

**Themselves**
- Nature of injury (e.g., fracture, laceration, contusion)
- Body region affected (e.g., head, chest, abdomen)
- Severity (e.g., fatal, non-fatal)

**Mechanism of Injury**
- Mechanism (e.g., blunt, penetrating, burn)

**The Hazard that Caused Them**
- Cause (e.g., motor-vehicle, falls, drowning)
- Type of activity (e.g., work, sport, recreational)
- Product involved (e.g., firearm, snowmobile)
- Location of activity (e.g., school, outdoors, home)
- Intent (intentional, unintentional)
Those Classifications

- Are exhaustive and may be exclusive within classification
- But we have been using selected categories within classifications and created a non-exclusive, non-exhaustive system
- This has led to developing a fragmented and incomplete system
Why Are Injuries Relevant at All?

*Individual and Societal Consequences*

- Mortality (death)
- Morbidity (non-fatal injuries)
- Disability (short- and long-term sequelae)
- Cost
History of the Field

- De Haven (1942): Survivability of events
  - Stapp (1955): Energy tolerance
- Gordon (1949): Application of epidemiological framework
- Gibson (1961): Energy as source of injury
- Haddon (1970): Preventability strategies—matrix and principles
  - Nader (1965): Consumer protection
  - Baker (since late 60s): Public health leadership in measuring the burden of injury

Lessons Learned

- Severity of injuries depends on:
  - Energy being dissipated
  - Shapes of the colliding objects
  - Rigidity of colliding objects
  - Tolerance of host

- Injuries are predictable
  - Epidemiology, risk factors
Lessons Learned

- Injuries are preventable
  - Primary, secondary, and tertiary prevention
  - Individual, vector, environment-level interventions
# The Haddon Matrix

<table>
<thead>
<tr>
<th></th>
<th>Host</th>
<th>Vector</th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-event</td>
<td>(Human)</td>
<td>(Vehicle)</td>
<td>Physical</td>
</tr>
<tr>
<td>Event</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-event</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Key Cultural Traditions

- Accidents vs. injuries
  - “Accidents happen” vs. injuries are not accidents
- Passive vs. active primary prevention interventions
- Individual vs. environment
Section C

Burden of Injuries
# Leading Causes of Global Mortality, 2001

<table>
<thead>
<tr>
<th>Disease or Injury</th>
<th>Thousands (Deaths)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ischemic heart diseases</td>
<td>6,880</td>
</tr>
<tr>
<td>Cerebrovascular disease</td>
<td>5,096</td>
</tr>
<tr>
<td>Lower respiratory infections</td>
<td>3,863</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>2,943</td>
</tr>
<tr>
<td>COPD</td>
<td>2,520</td>
</tr>
<tr>
<td>Perinatal conditions</td>
<td>2,438</td>
</tr>
<tr>
<td>Diarrheal disease</td>
<td>2,124</td>
</tr>
</tbody>
</table>

### Leading Causes of Global Mortality, 2001

<table>
<thead>
<tr>
<th>Disease or Injury</th>
<th>Thousands (Deaths)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB</td>
<td>1,660</td>
</tr>
<tr>
<td>Road traffic accidents</td>
<td>12,59</td>
</tr>
<tr>
<td>Trachea bronchus and lung cancer</td>
<td>1,210</td>
</tr>
<tr>
<td>Malaria</td>
<td>1,080</td>
</tr>
<tr>
<td>Hypertensive heart disease</td>
<td>939</td>
</tr>
<tr>
<td>Self inflicted injuries</td>
<td>814</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>808</td>
</tr>
</tbody>
</table>
## Global Burden of Disease 2000

*Causes of Death*

<table>
<thead>
<tr>
<th>Causes</th>
<th>Death ($*10^6$)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td>Group 2</td>
<td>33</td>
<td>66</td>
</tr>
<tr>
<td>Group 3</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

*Source: Peden M, 2002*
A Central Question

- Do injury patterns differ around the world?
Comparison of death rates/100,000 by various mechanisms in WHO regions 2000

Source: The Injury chart book WHO 2002
Mortality Rates by Regions

- Injury rates higher in developing countries
  - 118.8 injury-related-deaths per 100,000 in Africa
  - 47.6 injury-related-deaths per 100,000 in the HIC Europe

Source: WHO, 2000
Global Mortality by sex and cause 2000

Source: The Injury Chart book, WHO
Injury Deaths in South Africa

- In Africa injuries causes approx. 100 deaths per 100,000 population per year ranking third behind diarrhea and malaria
- Most common injuries causing death:
  - Fall
  - Road traffic injuries
  - Assault
  - Burns
  - Poisoning

Injury Deaths in Mexico (1996)

- Accidents are the third leading cause of deaths in Mexico
- 8% of mortality in 1996 due to accidents
- Motor vehicle crashes caused 45.5% of accident related deaths in 1996
- Most frequent locations with injury mortality were public roads, streets, or the home

Source: PAHO/WHO Collaborating Centers
http://165.158.1.110/english/hcn/hcnprofiles.htm
Adjusted Male Mortality from Homicides

Selected Countries—Rates/ 100,000 pop., 1989-91

Total Number of Deaths Worldwide from MVC, 85-89

- Argentina: 6,576
- Chile: 2,015
- Mexico: 19,644
- Phillipines: 1,491
- Sri Lanka: 842
- Kuwait: 974

Age Standardized-World Standard Mortality Rates/ 100,000 pop

From MVC, 85-89

Deaths / 100,000 pop in Various Countries of Latin America

Source: WHO, 1996
Age-Adjusted Injury Death Rates
By Cause, Los Angeles County and Mexico City, 1994–95

## Top Three Causes of Injury Deaths in China and U.S.

<table>
<thead>
<tr>
<th>China</th>
<th>U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTI</td>
<td>RTI</td>
</tr>
<tr>
<td>Suicide</td>
<td>Interpersonal Violence</td>
</tr>
<tr>
<td>Drowning</td>
<td>Falls</td>
</tr>
</tbody>
</table>

*Source: WHO 2002*
Injury death rates per 100,000 pop. in China and US., 2000

Source: WHO 2002
Section D

Injury Prevention Around the World
Injury Prevention Programs

- Young (late 1950’s)
- Small
- Scattered (and inconsistently applied)
- Neither comprehensive nor exclusive (uncoordinated)
- Different target objectives
- Research vs. program implementation (vs. participatory action research)
Myths to Injury Prevention

- Individual behavior and uncontrollable random events cause most injuries
- Injury interventions don’t exist (feasibility)
- Injury interventions don’t work (ineffective)
  - Risk homeostasis
- Injury interventions are too expensive (inefficient)
Barriers to Injury Prevention

- Fragmented interest (classification matters)
- Lack of common language
- Limited scientific and policy information
- Economic and political constraints
  - Limited funding
  - Fragmented responsibilities
  - Organizational difficulties
  - Turf battles
- Lack of leadership

Adapted from: Christoffel et al., 1999
Types of Programs

- Target area: Local / regional / national / multinational / international

- Focus:
  - Implementation and standardization of surveillance, coding, and reporting
  - Identification of dangerous items / standardization of product safety standards
  - Legislation and regulation
  - Training
  - Implementation programs/practice
  - Research
Some Highlights

- WHO
  - Violence and injury prevention department
  - Safe communities
- European consumer safety association
- Institute for International Health
- Research “health and violence” (Colombia)
Brief History of the U.S. Programs

Before the Mid-1950’s

- Almost nothing

Continued
Brief History of the U.S. Programs

Mid-1950’s to Mid-1960’s

- U.S. Public Service Division of Special Health Services Program of Accident Prevention (1956)
- American Association for Automotive Medicine (now Association for the Advancement of Automotive Med.) (1957)
Brief History of the U.S. Programs

Mid-1960’s to early 1970’s

- Flurry of activity
  - Individuals among others: Haddon, Nader, Baker, Waller
  - Establishment of:
    - National Highway Safety Bureau (now NH Traffic Safety Administration) (1967)
    - Consumer Product Safety Commission (1972)

Continued
Brief History of the U.S. Programs

Mid-1970’s to Mid-1985

- Not much
Brief History of the U.S. Programs

The 1980’s


- Congress developed CDC-based injury prevention program (NCIP and CI RPs)
Brief History of the U.S. Programs

Since 1980


- Inclusion of goals in *Healthy People 2000*, DHHS (1990)

Brief History of the U.S. Programs

- Concern appears only after the physical, economic, social and physiological costs have exceeded the threshold level of maximum tolerable disturbance
How to Promote the Field

❖ Awareness
  – Of the problem
  – Of its solutions

❖ Collaboration / coordination
• Strengthen individual knowledge and skills
• Changing organizational practices
• Influencing policy and legislation
• Fostering coalitions and networks
• Educating providers
• Promote community education

*Source: Cohen, et al., Injury Prev 1999; 5: 203–207*