Tackling a million deaths: Paving a path for Trauma Systems Development in India

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All India Institute of Medical Sciences
All India Institute of Medical Sciences

Pt Jawaharlal Nehru First Prime Minister Republic of India

Rajkumari Amrit Kaur, First Union Health Minister Republic of India
Our aim is “to provide state of the art, efficient and compassionate trauma care, from resuscitation to rehabilitation, to all Acutely injured patients and those requiring its specialized services. Develop patterns of teaching, training, research and preventive strategies related to injury of highest standard.”
Injury Surveillance Data

APEX TRAUMA CENTRE
AIIMS, NEW DELHI
# Initial Triage ED

<table>
<thead>
<tr>
<th>YEAR</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.D. FOOTFALL</td>
<td>49894</td>
<td>55698</td>
<td>58923</td>
</tr>
<tr>
<td>DATA ANALYSED FOR</td>
<td>11752</td>
<td>12601</td>
<td>11814</td>
</tr>
</tbody>
</table>

**Diagram:**
- **Red:** 5.15%, 4.90%, 4.50%
- **Yellow:** 17.50%, 16.80%, 14.90%
- **Green:** 76.50%, 77.60%, 80.05%
- **Brought Dead:** 0.75%, 0.70%, 0.54%
Gender Distribution

2011, N = 11752

- Female, 2443, 21%
- Male, 9309, 79%

2012, N = 12601

- Female, 2702, 21%
- Male, 9899, 79%

2013, N = 11814

- Female, 2620, 22%
- Male, 9194, 78%
Age Distribution

![Age Distribution Chart]
Broad Classification by Cause of Injury

- **Road Traffic Injuries**: 50% (2011), 50% (2012), 49% (2013)
- **Unintentional/Accidental**: 36% (2011), 34% (2012), 38% (2013)
- **Assault**: 11% (2011), 13% (2012), 11% (2013)
- **Railway Track Injuries**: 1.5% (2011), 1.5% (2012), 1.5% (2013)
- **Intentional Self Harm**: 1% (2011), 0.7% (2012), 0.8% (2013)
- **Non Trauma**: 0.5% (2011), 0.3% (2012), 0.3% (2013)
- **Air Crash**: 0.01% (2011), 0.01% (2012), 0.01% (2013)

**Counts by Year**
- **2011, n = 11752**
- **2012, n = 12601**
- **2013, n = 11814**
Mechanism of Injury

- 2011, N=11752
- 2012, N=12601
- 2013, N=11814
Who brought Injured Victims to Hospital?

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family &amp; Relatives</td>
<td>56%</td>
</tr>
<tr>
<td>Police</td>
<td>59%</td>
</tr>
<tr>
<td>Known-Person</td>
<td>63%</td>
</tr>
<tr>
<td>CATS</td>
<td>6%</td>
</tr>
<tr>
<td>By-Stander</td>
<td>96%</td>
</tr>
<tr>
<td>Ambulance Personnel</td>
<td>2%</td>
</tr>
<tr>
<td>Self</td>
<td>6%</td>
</tr>
<tr>
<td>Who Hit Patient</td>
<td>1%</td>
</tr>
<tr>
<td>Others</td>
<td>0%</td>
</tr>
</tbody>
</table>

RACS ANNUAL SCIENTIFIC CONGRESS AND ANZCA ANNUAL SCIENTIFIC MEETING
Who brought the R.T.I. Victims?

- Police: 43%
- Family & Relative: 42%
- Known Person: 35%
- By-Stander: 5%
- CATS: 5%
- Ambulance Personnel: 2%
- Self: 2%
- Who Hit Patient: 1%

RACS ANNUAL SCIENTIFIC CONGRESS AND ANZCA ANNUAL SCIENTIFIC MEETING
Vehicles used to bring patients

- PCR: 32% (2011, N=11752), 28% (2012, N=12601), 23% (2013, N=11814)
- Pvt. 4 wheeler: 16% (2011, N=11752), 20% (2012, N=12601), 16% (2013, N=11814)
- Taxi: 2% (2011, N=11752), 1% (2012, N=12601), 2% (2013, N=11814)
- Motorized 2 wheeler: 1.50% (2011, N=11752), 0.80% (2012, N=12601), 0.53% (2013, N=11814)
- Public transport: 0.50% (2011, N=11752), 0.25% (2012, N=12601), 0.30% (2013, N=11814)
- Self Walking: 0.15% (2011, N=11752), 0.10% (2012, N=12601), 0.02% (2013, N=11814)
- Others: 0.02% (2011, N=11752), 0.03% (2012, N=12601), 0.07% (2013, N=11814)
- Air Ambulance: 0% (2011, N=11752), 0.10% (2012, N=12601), 0% (2013, N=11814)
Referral

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Direct</th>
<th>Referred</th>
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<tbody>
<tr>
<td>2011</td>
<td>11752</td>
<td>9021</td>
<td>2731</td>
</tr>
<tr>
<td>2012</td>
<td>12601</td>
<td>9325</td>
<td>3276</td>
</tr>
<tr>
<td>2013</td>
<td>11814</td>
<td>8635</td>
<td>3179</td>
</tr>
</tbody>
</table>
Road Traffic Injuries

- Patient In/On Vehicle: 68% 68% 70%
- Pedestrian: 27% 28% 28%
- Unknown: 5% 4% 3%
Victims Vehicle

- 2011, N=3980
- 2012, N=4254
- 2013, N=4042
Helmet Usage by Status of Patient

- (2013) Pillion, N=582
  - Helmet: 13%
  - No Helmet: 87%

- (2013) Driver, N=2030
  - Helmet: 52%
  - No Helmet: 48%

- (2012) Pillion, N=561
  - Helmet: 15%
  - No Helmet: 86%

- (2012) Driver, N=2081
  - Helmet: 52%
  - No Helmet: 48%

- (2011) Pillion, N=517
  - Helmet: 23%
  - No Helmet: 77%

- (2011) Driver, N=1937
  - Helmet: 63%
  - No Helmet: 34%
Unintentional/ Accidental Injuries

2011, N= 4287
2012, N= 4391
2013, N= 4439
NATIONAL SCENARIO
RTI: Disastrous Proportions

• A Boeing 747 jet carries about 400 passengers

• Deaths in 2012 from road traffic accidents are equivalent to more than a jet crash every single day.
Killer Roads

1. Out of every 10 road fatalities in the world is an Indian, taking the country to the top of this dubious chart.

2. Urban Epitaph: These top 10 of India's cities account for the most deaths due to road accidents:
   - Mumbai: 17.6%
   - Delhi: 14.3%
   - Chennai: 8.7%
   - Pune: 6.6%
   - Bangalore: 6.4%
   - Ahmedabad: 5.1%
   - Hyderabad: 4.3%
   - Nagpur: 3%
   - Surat: 3%
   - Jabalpur: 2.9%

Figures in percentage of total road deaths in the top 10 cities. Source: National Crime Records Bureau

3. User Unfriendly: Almost all kinds of road users kill or are killed on Indian roads.
   - 32.2%: Bus and Truck
   - 5.3%: Tractor-Tire
   - 8.8%: Pedestrian
   - 10.5%: Car and jeep
   - 21.8%: Two-Wheeler
   - 5.7%: Three-Wheeler
   - 8.8%: Others

Source: NCRB

RACS ANNUAL SCIENTIFIC CONGRESS AND ANZCA ANNUAL SCIENTIFIC MEETING
Road Traffic Injuries
PUBLIC HEALTH PROBLEM

- Increasing at an annual rate of 3%
- 12% of all deaths
- 168,000 RTI deaths annually
- One death every 2-3 minutes
- 78% men in age 20-44
- Approx 75,000,000 injured in RTI
- Approx 3% of GDP is lost on RTI alone
- Mortality for same injury 6x more
Trauma: Silent Genocide

- **40%**
  - Transport related Injuries

- **60%**
  - Falls (pediatric/old age group)
  - Work Place Trauma
  - Agricultural related trauma
  - Fire Arms, Intentional self harm
  - Assault, Fall of objects
  - Burns, Drowning
  - Natural Disasters
  - Terrorist Attacks
  - Possibility of “NBC” events
Injury Pyramid

• Each Death ~ 30 Severely Injured Patients
  – Will have considerable post injury disability
  – Brain Injury, Spinal Injury, Amputations
  – 4 million

• Each Death ~ 70 Non-Life threatening and minor Injuries
  – 9 million
  – Transport related trauma

Gururaj et al, NIMHANS, Bangalore
DECADE OF ACTION FOR ROAD SAFETY 2011-2020

Road safety management
Safer roads and mobility
Safer vehicles
Safer road users
Post-crash response
Accidental Death and Disability: Neglected Disease of Modern Society

White Paper – 1965
Division of Medical Sciences
National Academy of Sciences
US Senate & White House
Care of the severely Injured

• Requires a broad framework of policies and protocols in a given geographical area
• Seamless transition between each phase of care, integrating health resources
• Team work between various agencies

‘Getting the right patient to the right place at the right time for the right care’
Very high mortality and morbidity (16 times) for the same Injury severity in India as compared to western data

- Primitive or no existence of **TRAUMA SYSTEMS**
- Lack of dedicated Pre-hospital care
- Absence of trained manpower in Prehospital; In-hospital Acute trauma care and rehabilitation
- Lack of Trauma related hospital data (registry) and Trauma Quality improvement programs.
TRAUMA CENTERS CANNOT FUNCTION ALONE
HAVE TO BE A PART OF TRAUMA SYSTEM
Assessment of Critical Gaps

• **Physical Resources**: Infrastructure, Equipment and Technology
  - Medical Care
  - Communication

• **Human Resources**: Staffing and Training

• **Process**: Organization and Administration
Pre Hospital Care – India Lives in 2 Centuries Simultaneously
Pre-Hospital Scenario – Rural India

- **Virtually non-existent** in most rural and semi-urban areas in India
- ‘**Golden hour**' concept is still an unachieved goal
- **Gross discrepancy** in pre-hospital services between urban and rural settings, as well as between paying and non-paying patients.
Pre-Hospital Scenario – Urban India

• Physical Resources
  – Formal Ambulance licensing not mandatory
    • Poor Quality – Ill equipped ambulances
  – Multitude of organizations
    • Government
    • Police
    • Fire brigades
    • Hospitals
    • Private agencies
  – No Single number exists
  – Absence of robust and centralized communications center

• Human Resources
  – Absence of cadres of paramedical staff
  – Absence of minimal educational and training standards for paramedics

• Organization
  – Absence of guidelines
    • triage, patient-delivery decisions, pre-hospital treatment plans and transfer protocols
  – No Integrated EMS/Trauma Council
Definitive Trauma Care Scenario

• **Physical Resources**
  – **Definitive Trauma Care**
    – Government hospitals
    – Corporate hospitals
    – Small clinics across the country
  – **Government Sector**
    – Have to cater to enormous numbers
    – Free, but quality of Care very variable
    – Most University Hospitals fulfill the criteria of Level I Facility
      » Acute care Infrastructure/ ED (Weak Link)
  – **Corporate Hospitals**
    – Good Infrastructure but no numbers (Insurance penetration Low)
    – Located in Large cities
    – No norms to govern standards & relations with the public trauma system
  – **Mushrooming of Small Trauma Centers**

• **Human Resources**
  – No trained Manpower in Acute care of Injured
    – Medical Professionals
    – Nursing
  – Absence of ED Protocols
  – Level of training and experience in providing life support is not uniform
  – Dedicated Trauma teams ??
  – No dedicated Trauma surgeons/ ED Physicians/ Nurses

• **Result**
  – Responsibility is not clearly defined
  – Clinical decisions are often delayed
  – Absence of clear perceptions of clinical responsibility amongst specialists
# Gap Analysis

<table>
<thead>
<tr>
<th></th>
<th>Pre-Hospital Care</th>
<th>In-Hospital Acute Care</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rural/ Semi Urban</td>
<td>Urban</td>
</tr>
<tr>
<td><strong>Infrastructure</strong></td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td><strong>Trained and Skilled Manpower</strong></td>
<td>-</td>
<td>±</td>
</tr>
<tr>
<td><strong>Organization</strong></td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
National Trauma Policy

• “Guidelines on Essential Trauma Care” – 2004
  – Low and Middle Income Countries
• First National Consultation on Essential Trauma Care - Ahmedabad 2005
  – Laid down the thrust areas for National Trauma Policy
National Trauma Policy – Thrust Areas

• Improvement in Health care Infrastructure at rural levels
• Strengthen organizational aspect – **Establish Trauma Systems**
  – Pre Hospital
  – Information Transfer and communications
  – Inter-facility Transfer
  – Protocol Development
• Trauma Education / Interest Generation
  – Pre-Hospital
  – Definitive Care
• Rehabilitation
• Evaluation and Research (Trauma Registries)
Pre-hospital Care

- Pre Hospital Care being given by a private agency with a common number “108”
- Adopted by 12 States and is in different phases of Commissioning
- ALS + BLS
- Short Term Trained personnel
- Communications Center with GPS enabled systems

No Legislation/ EMS Body to govern and Audit Sustainability??
India's largest highway project for capacity enhancement of National Highways by four/six laning of around 13,146 Km.
4 levels of Trauma Care

- **L IV** – Ambulance every 50 Kms
  - 271: NHAI
- **L III** - Every 100-150 Kms along the NH – Initial evaluation & stabilization to trauma patient
  - 157 Level III Centers
- **L II** - Every 300 Kms – Definitive care for severe trauma patients (Existing medical colleges)
  - 74 Level II Centers
- **L I** - Each and every state with highest level of definitive and comprehensive care of patient with complex emergencies.
  - 27 level-I trauma centers will be established
CAPACITY BUILDING – Manpower Training

• Manpower training through short term courses like: PHTLS; AIIMS-BECC; ATLS; ATCN;AUTLS; Rural Trauma Team Development Course

• Long Term Capacity building: MS (Trauma Surgery); MD (Trauma Intensive Care); M.Ch (Trauma Surg. & Critical Care)
DEVELOPMENT OF A HOSPITAL BASED TRAUMA REGISTRY AT APEX TRAUMA CENTER, AIIMS

- Basic Identification data
- Unique Hospital number
- Demographic profile
- MLC/ Non-MLC
- Detailed Event description (not coded by ICD 10 at present)
- Description of brought by personnel and vehicle (eg. Trained v/s Untrained; Ambulance v/s Non-Ambulance)
- Direct attendance or Referred case
- Condition at time of arrival (including physiological parameters)
- ED Interventions performed
- Detailed Diagnosis (coded as per AIS 2005 – Update 2008) (Coding as per ICD10 not yet started)
- Definitive Surgeries/ Procedures
- Disposition/ Outcome (Discharge/Death/ LAMA/ Abscond etc.)
Towards improved trauma care outcomes in India

- Karolinska Instituet, Sweden
- Tata Institute of Social Sciences
- JPN Apex Trauma Center, Delhi
- LTMMC, Mumbai
- Chennai
- Kolkata
- Srinagar
Trauma Systems Research Initiatives

Reducing the burden of injury in India and Australia through development and piloting of improved systems of care

Research Project will run for the next four years
Try to find the best ways of delivering needed care to injured people
Multipronged Approach

Laws and enforcement

Data

Education

Policies

Capacity development

Trauma care

Advocacy
“Success is going from failure to failure without loss of enthusiasm”
THANK YOU

Incredible India

Love is a shrine of religion.

Beauty is a source of colour.

Time is a thread of colour.

Hope is a furry of colour.

Life is an infinity of colour.

Incredible in the bag of colour.

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