Access To Trauma Advancements Within The Texas Trauma System

Ronald Stewart, MD, FACS
Jorie Klein, RN
Garrett Hall, CSTR
Christopher Drucker, PhD, DSHS
Joseph Minei, MD, FACS, MBA
Texas Trauma System Committee
Objectives

- Review the evolution and advances of the Texas Trauma System
- Review mechanisms for funding of the Texas Trauma System
- Review the building of the Texas EMS, Trauma Acute Care Foundation
- Define the role of acute health care providers in developing, maintaining and enhancing the trauma system
- Define current challenges
That all the people of Texas, because of the effectiveness of our prevention programs, are the least likely in the nation to be seriously injured or killed; but if injured, have the best chance for survival and maximal potential for recovery.
TRAUMA SYSTEM
LEGISLATION

Omnibus Rural Health Care Rescue Act (HB-18)
May 1989

Major Provisions

Directed the Bureau of Emergency Management to:

a. Develop and monitor a statewide trauma system

b. Designate trauma facilities

c. Develop trauma registry

d. Monitor patient care in each health care facility in state
Texas Trauma Technical Advisory Committee
TRAUMA SYSTEM RULES

(Amboted by the Texas Board of Health in January 1992)

Major Provisions

1. Divide the state into 22 regions
   (Trauma Service Areas-TSAs)

   a. Must consist of at least three counties

   b. Must have at least a potential General (Level III)
      trauma facility willing to take on Lead trauma facility
      responsibilities

   c. May be re-aligned
Developed Into Regional Trauma / Health Care Coordinating Councils:

a. Systems for EMS / Trauma Care

b. Systems for Disaster Response

c. System for Cardiac / Stroke

d. Systems for Pediatric Care

e. Grant development / distribution

f. Education / Resource Development
SYSTEM DEVELOPMENT

Twenty-Two Regional Advisory Councils Established (1995)

Panhandle RAC
B RAC
North Texas RAC
Big Country RAC
North Central Texas Trauma RAC
Northeast Texas RAC
Piney Woods RAC
Deep East Texas Trauma RAC
Far West Texas
  & Southern New Mexico RAC
Texas “J” RAC

Concho Valley RAC
Central Texas Trauma Council
Heart of Texas RAC
Brazos Valley RAC
Capital Area Trauma RAC
Southwest Texas RAC
Southeast Texas Trauma RAC
East Texas Gulf Coast RAC
Golden Crescent RAC
Seven Flags RAC
Coastal Bend RAC
Lower Rio Grande Valley RAC
1. None available until FY 98

2. Bills to fund uncompensated trauma care were filed in the 1991, 1993, and 1995 legislative sessions, but did not pass.

3. In 1997, legislation created an EMS/Trauma System Fund; it was appropriated $4 million for the FY98/99 biennium.

4. In 1999, the EMS/Trauma System Fund was appropriated a projected $9.5 million for the FY00/01 biennium.
EMS/TRAUMA CARE SYSTEM ACCOUNT - 1999
(former SB-102)

- Established by SB-102

- Specifies allotments:
  - $250,000 extraordinary emergencies
  - 70% - eligible EMS providers
  - 25% - eligible RACs
  - 3% - TDH administrative costs
  - 2% - uncompensated trauma care

- $4 million for biennium

- Tertiary Care Account
Trauma System Development

- 2014
- Level I Trauma Centers – 16
- Level II Trauma Centers – 17
- Level III Trauma Centers – 50
- Level IV Trauma Centers – 192

- Total 275 + In Development
Emergency and Trauma Care In Texas

Policy Brief

(Health Policy Forum Sponsored by Robert Wood Johnson Foundation)

- Defined the “Emergency in Emergency and Trauma Care”, for the State of Texas
- Review of Policy and Health Implications of an Emergency / Trauma System in Crisis
- Began to Establish “We Have A Problem”
Texas Trauma & Emergency Health Care Statewide Coalition

- SB 1311
  - Extraordinary Emergency Allotment ($500,000)
  - EMS Allotment (50%)
  - RAC Allotment (20%)
  - Administrative Costs (3%)
  - Uncompensated Trauma Care Allotment (27%)
- Estimated Total FY04 $50 million
Texas Trauma & Emergency Health Care Statewide Coalition

- HB 3588
  - Texas Mobility Fund - Safe Driver Bill
  - Uncompensated Trauma Care (96%)
- Estimated Total $50,000,000 FY04
- 200,000,000 in 2005-2006
- 96% *Uncompensated Care in Designated Trauma Centers* (15% Floor to all Designated Hospitals)
- 1% RACs
- 2% EMS
- 1% TDH
- 15% Floor to all Designated Hospitals
The Consolidated Texas Health and Human Services System

as directed by HB 2292, 78th Legislature

Health and Human Services Commission

Executive Commissioner
- HHS Centralized Administrative Services
- Medicaid
- Health Services
- Mental Health Services
- State Hospitals
- Community Services
- Alcohol & Drug Abuse Services
- Child Protective Services
- Adult Protective Services
- Child Care Regulatory Services
- Disability Services
- Mental Retardation Services
- State Schools
- Community Services
- Nursing Home Services
- Aging Services

Governor

HHS Transition
Legislative
Oversight Committee
- 2 Senate members
- 2 House members
- 3 Public members
- HHS Commissioner, ex-officio

Office of Inspector General

HHSC
DHS

Aging & Disability Services Council

State Health Services Council

Family & Protective Services Council

Assistive & Rehabilitative Services Council

Department of Aging and Disability Services
Commissioner

Department of State Health Services
Commissioner

Department of Family and Protective Services
Commissioner

Department of Assistive and Rehabilitative Services
Commissioner

DHS
MHMR
TDaA
MHMR
TCADA
TDH
THCiC

PRS

ECI
TCB
TCDDHH
TRC

Agencies formerly providing programs

7/30/03
Texas EMS, Trauma & Acute Care Foundation – 2007

- Formal Organization
- Site Surveys For Level III and IV – Site Surveyor Credentialing
- Divisions
  - EMS
  - Trauma
  - RAC
  - Pediatric
  - Disaster
  - Injury Prevention / Research
  - Professional Education – TOPIC
- Membership – 22 RACs
Texas ACS System Consultation

- May 2011

- Findings
  - Registry – Data To Manage System
  - State Leadership
  - Trauma System Plan
  - Funding – Strong
  - RACs – Strong in Some Regions
  - State PI Process
EMS Agencies in Texas by Response Type

Figure 1

<table>
<thead>
<tr>
<th>Response Type</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency 911 &amp; transfer</td>
<td></td>
</tr>
<tr>
<td>Emergency only 911</td>
<td></td>
</tr>
<tr>
<td>Transfer only</td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td></td>
</tr>
</tbody>
</table>
EMS Agencies Reporting by Response Type

<table>
<thead>
<tr>
<th>Response Type</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency 911 &amp; Transfer</td>
<td>50.00%</td>
</tr>
<tr>
<td>Emergency 911 only</td>
<td>62.00%</td>
</tr>
<tr>
<td>Transfer only</td>
<td>5.00%</td>
</tr>
<tr>
<td>Unknown</td>
<td>0.00%</td>
</tr>
</tbody>
</table>
Figure 4: Incidents by Age Group and Sex

The bar chart shows the number of incidents by age group and sex. The x-axis represents age groups, while the y-axis represents the number of incidents in thousands. The chart compares the number of injuries among males (blue bars) and females (red bars) across different age groups. The highest number of incidents is for the age group 75 and above, with males having more incidents than females in this group.
## Top 5 Mechanisms of Injury

<table>
<thead>
<tr>
<th>Mechanism</th>
<th>Records</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>67,064</td>
<td>37.6</td>
</tr>
<tr>
<td>Motor vehicle traffic</td>
<td>66,065</td>
<td>37.0</td>
</tr>
<tr>
<td>Other specified</td>
<td>16,432</td>
<td>9.2</td>
</tr>
<tr>
<td>Struck by – against</td>
<td>9,479</td>
<td>5.3</td>
</tr>
<tr>
<td>Transport other</td>
<td>5,312</td>
<td>3.0</td>
</tr>
<tr>
<td>All other causes</td>
<td>14,126</td>
<td>7.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>178,478</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Month of Incident

Records

Thousands

Month

January
February
March
April
May
June
July
August
September
October
November
December
Figure 11: Hour of Day

![Graph showing the number of records by hour of day.]

- **Axes:**
  - **Y-axis:** Thousands of records
  - **X-axis:** Hours (0000 to 2100)

- **Graph Key:**
  - The graph shows a peak in records between 1800 and 2100 hours.
  - There is a significant drop in records between 2100 and 0000 hours.
  - The graph indicates a consistent increase in records from 0000 to 1200 hours.

- **Legend:**
  - The points on the graph are represented by blue diamonds.

This graph provides insights into the distribution of emergency medical services (EMS) records by hour of day in Texas for the year 2013.
Median Total Prehospital Time (in Minutes) by Top 5 Mechanisms of Injury

- Fall: 40 minutes
- Motor vehicle traffic: 35 minutes
- Other specified: 35 minutes
- Struck by – against: 30 minutes
- Transport other: 40 minutes

Mechanism of Injury vs. Number of Minutes
2012 Texas EMS Trauma Registry
Reported Trauma Incidents by Trauma Center Level
N=117,122
## 2011 Billed Hospital Charges

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sum of Charges</td>
<td>4,081,417,143</td>
</tr>
<tr>
<td>Average Charges</td>
<td>45,308</td>
</tr>
<tr>
<td>Minimum Charge</td>
<td>47</td>
</tr>
<tr>
<td>Maximum</td>
<td>9,195,635</td>
</tr>
</tbody>
</table>

- Responses of $999,999,999 and $999,999,998 or less than $50 were defined as invalid.
- 23.04% or 26,052 records were invalid.
Comparison of Texas Trauma Incidents by Age to NTDB Trauma Incidents by Age

2012 Texas Annual Report

2012 NTDB Annual Report
## Trauma Incidents by Age

Compared to NTDB 2012 Annual Report

<table>
<thead>
<tr>
<th>Age</th>
<th>Incidents</th>
<th>Percent</th>
<th>Deaths</th>
<th>Case Fatality Rate</th>
<th>Incidents</th>
<th>Percent</th>
<th>Deaths</th>
<th>Case Fatality Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 year</td>
<td>1686</td>
<td>1.440%</td>
<td>32</td>
<td>1.8980%</td>
<td>9469</td>
<td>1.224%</td>
<td>188</td>
<td>1.9854%</td>
</tr>
<tr>
<td>1 - 4</td>
<td>5636</td>
<td>4.812%</td>
<td>81</td>
<td>1.4372%</td>
<td>26790</td>
<td>3.464%</td>
<td>431</td>
<td>1.6088%</td>
</tr>
<tr>
<td>5 - 9</td>
<td>5092</td>
<td>4.348%</td>
<td>29</td>
<td>0.5695%</td>
<td>26404</td>
<td>3.414%</td>
<td>216</td>
<td>0.8181%</td>
</tr>
<tr>
<td>10 - 14</td>
<td>4883</td>
<td>4.170%</td>
<td>35</td>
<td>0.7168%</td>
<td>29276</td>
<td>3.786%</td>
<td>279</td>
<td>0.9530%</td>
</tr>
<tr>
<td>15 - 19</td>
<td>7239</td>
<td>6.181%</td>
<td>188</td>
<td>2.5970%</td>
<td>56558</td>
<td>7.314%</td>
<td>1721</td>
<td>3.0429%</td>
</tr>
<tr>
<td>20 - 24</td>
<td>8959</td>
<td>7.650%</td>
<td>249</td>
<td>2.7793%</td>
<td>67970</td>
<td>8.790%</td>
<td>2512</td>
<td>3.6957%</td>
</tr>
<tr>
<td>25 - 34</td>
<td>14099</td>
<td>12.039%</td>
<td>433</td>
<td>3.0711%</td>
<td>100576</td>
<td>13.006%</td>
<td>3500</td>
<td>3.4800%</td>
</tr>
<tr>
<td>35 - 44</td>
<td>11436</td>
<td>9.765%</td>
<td>321</td>
<td>2.8069%</td>
<td>81537</td>
<td>10.544%</td>
<td>2560</td>
<td>3.1397%</td>
</tr>
<tr>
<td>45 - 54</td>
<td>12653</td>
<td>10.804%</td>
<td>352</td>
<td>2.7819%</td>
<td>96609</td>
<td>12.493%</td>
<td>3355</td>
<td>3.4728%</td>
</tr>
<tr>
<td>55 - 64</td>
<td>11335</td>
<td>9.679%</td>
<td>385</td>
<td>3.3966%</td>
<td>83375</td>
<td>10.782%</td>
<td>3154</td>
<td>3.7829%</td>
</tr>
<tr>
<td>65 - 74</td>
<td>9970</td>
<td>8.513%</td>
<td>306</td>
<td>3.0692%</td>
<td>60667</td>
<td>7.845%</td>
<td>2981</td>
<td>4.9137%</td>
</tr>
<tr>
<td>75 - 84</td>
<td>12895</td>
<td>11.011%</td>
<td>423</td>
<td>3.2803%</td>
<td>71492</td>
<td>9.245%</td>
<td>4322</td>
<td>6.0454%</td>
</tr>
<tr>
<td>≥ 85</td>
<td>11222</td>
<td>9.582%</td>
<td>431</td>
<td>3.8407%</td>
<td>62476</td>
<td>8.079%</td>
<td>4129</td>
<td>6.6089%</td>
</tr>
<tr>
<td>NK / NR</td>
<td>7</td>
<td>0.006%</td>
<td>2</td>
<td>28.5714%</td>
<td>100</td>
<td>0.013%</td>
<td>60</td>
<td>60.0000%</td>
</tr>
<tr>
<td>Total</td>
<td>117112</td>
<td>100%</td>
<td>3274</td>
<td>2.7896%</td>
<td>773299</td>
<td>100%</td>
<td>29408</td>
<td>3.8029%</td>
</tr>
</tbody>
</table>
### Top 5 Non-fatal Injury Categories

<table>
<thead>
<tr>
<th>Rank</th>
<th>Description</th>
<th>#</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Fall</td>
<td>43,404</td>
<td>48.23</td>
</tr>
<tr>
<td>3.</td>
<td>Struck by, Against</td>
<td>6,968</td>
<td>7.74</td>
</tr>
<tr>
<td>4.</td>
<td>Transport, Other</td>
<td>4,131</td>
<td>4.59</td>
</tr>
<tr>
<td>5.</td>
<td>Cut/Pierce</td>
<td>3,894</td>
<td>4.33</td>
</tr>
</tbody>
</table>
## 5 Leading Fatal Injury Categories
EMS/Trauma Registry 2011

<table>
<thead>
<tr>
<th>Rank</th>
<th>Description</th>
<th>#</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Motor vehicle traffic</td>
<td>1,148</td>
<td>35.15</td>
</tr>
<tr>
<td>2.</td>
<td>Fall</td>
<td>1,040</td>
<td>31.84</td>
</tr>
<tr>
<td>3.</td>
<td>Firearm</td>
<td>520</td>
<td>15.92</td>
</tr>
<tr>
<td>4.</td>
<td>Struck by, Against</td>
<td>122</td>
<td>3.74</td>
</tr>
<tr>
<td>5.</td>
<td>Other specified and classifiable</td>
<td>79</td>
<td>2.42</td>
</tr>
</tbody>
</table>
Major Disaster Declarations

- 1979 – 2013
- 61 Declarations – More than any other state
- Explosion
- Wildfires
- Hurricanes
- Tropical Storms / Severe Storms / Tornadoes
- Flooding
- Mass Shootings
Disaster Integration

Coordinated Effort
Community Integration
Investment in Different Expertise
Right For The Community
STAND READY
Current Challenges

- Integration of new technology / information
- Funding
- Securing our funding
- Data management
- Sunset Commission – Potential changes
- DATA TO DRIVE DECISION MAKING
Increased Trauma Center Volume is Associated with Improved Survival After Severe Injury: Results of a Resuscitation Outcomes Consortium Study

Joseph P. Minei, MD, MBA, UT Southwestern Medical Center, Dallas, TX
Timothy C. Fabian, MD, UT Health Science Center, Memphis, TN
Danielle M. Guffey, MS, University of Washington, Seattle, WA
Craig D. Newgard, MD, MPH Oregon Health & Science University, Portland, OR
Eileen M. Bulger, MD, University of Washington, Seattle, WA
Karen J. Brasel, MD, Medical College of Wisconsin, Milwaukee, WI
Jason L. Sperry, MD, MPH, University of Pittsburgh Medical Center, Pittsburgh, PA
Russell D. MacDonald, MD, MPH University of Toronto, Toronto, Ontario, CA
for the Resuscitation Outcomes Consortium Investigators
Out-of-hospital Hypertonic Resuscitation After Traumatic Brain Injury

Out-of-Hospital Hypertonic Resuscitation Following Severe Traumatic Brain Injury
A Randomized Controlled Trial

Conclusion Among patients with severe TBI not in hypovolemic shock, initial resuscitation with either hypertonic saline or hypertonic saline/dextran, compared with normal saline, did not result in superior 6-month neurologic outcome or survival.

Trial Registration clinicaltrials.gov Identifier: NCT00316004

JAMA. 2010;304(13):1455-1464
Aims

• Prospective data from ROC HS studies

• Primary Aims
  – Volume – Survival relationship
  – Designation level – Survival relationship

• Secondary Aims
  – Volume – Complications relationship
  – Designation level – Complications relationship
Methods – Independent Variables

• Annual trauma center volume
  – Hospital trauma registry report

• Designation level
  – Local state or provincial designating authority
  – Follow ACS-COT verification process

• 2070 patients, 1251 TBI, 819 Shock

• Overall, 24-hr and 28-day mortality
  – Every increase of 500 admissions – 7% decrease of mortality
Outcomes

• Trauma center volume was associated with
  – Improved survival after severe injury
  – Improved neurological outcomes after severe TBI
  – Increased ventilator free days
  – Less severe organ failure

• Level I designation was associated with
  – Improved 28 day survival after shock

• More non-infectious complications
Conclusions

• High volume centers
  – Lower odds of mortality
  – Improved processes that mitigate complication
    • Ventilator protocols
    • Less severe organ failure

• Field triage guidelines
  – Severely injured to highest volume centers

• Trauma center proliferation
  – Approached with caution
Funding Changes & Challenges

• Tobacco Endowment
  – Cancer Prevention and Research Institute of Texas
    • Appropriated $13.1 million 2014
    • $18.95 million 2015
• Tobacco Endowment
  – Reduced from $4.7 to $2.4
• Changes in 3588 distribution
Why Is It Important

- Road fatality rate 1.41 deaths / hundred million
- 230,506 individuals injured in MVC in 2012
- 1,099 individuals killed MVC Alcohol crash
- 63,610 serious injuries / 87,087 serious injury
- Rural fatalities 55.7%
- NO DEATHLESS DAYS ON TEXAS ROADWAYS IN 2012
FACTS

- 1 person was killed every 2 hours 35 minutes
- 1 person injured every 2 minutes 17 seconds
- 1 reportable crash every 75 seconds

- Where
- Who
- Who will be standing ready
Access to Advancement

- Regional Systems
- TTCF / ACS COT
- TETAF
- TQIP
- GETAC
  - Trauma System Committee
    - Medical Directors Best Practice Workgroup
    - Trauma Registry Workgroup
    - Non-Physician Providers Workgroup
    - Electronic Medical Record Best Practice Workgroup
    - RAC Development Workgroup
Summary

- Continuing to Move To Inclusive System
- Criteria Revisions
  - Added Geriatric Specific Criteria
  - Pediatric Specific Criteria
  - Regional Participation – Registry
  - NTDB
  - PI Concurrent
  - Registry Concurrent – Data Validation
- Requires Commitment, Dedication, Funding