Trauma Systems Planning & Development

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It will never happen to me.

Persons who sustain major injury are doing something irresponsible.

My local hospital can take good care of me if something does happen.

Besides, traumatic injury is not preventable.
Cause of Death, United States* (age 1-44 yrs.)

- Heart disease: 13%
- Cancer: 17%
- Other: 14%
- Intentional injury: 35%
- Unintentional injury: 25%

* National Center for Injury Prevention & Control, CDC
Historical progression of scope

- Individual practices
- Departmental practices
- Institutional practices
- Organized programs & centers
- Local, regional systems
- State, national systems
The ‘continuum’ of trauma care...

A Preplanned Trauma Care Continuum

- Data-driven injury prevention
- EMS prehospital standardized and medically supervised care
- Emergency Department triage and care
- Surgical [OR] teams ready 24/7
- ICU triage is a continuous process / protocols in place and enforced
- Rehabilitation facility engaged with patient
- In-hospital trauma center team 24/7 alerted & ready to go prior to patient arrival for immediate treatment
- Step down unit or general surgical floor for continued care
- Enhanced 911 standardized discharged protocols
- Standardized triage and transport [air vs. ground] protocols reflective of patient needs / facility resources / bypass
- Both pediatric and adult surgical ICUs maintain open bed capability 24/7
- Mental health and social services automatic consult

Injury

Primary Care
Home with out-patient rehabilitation
In-patient rehabilitation facility
Trauma system

An organized set of legal, regulatory, administrative, clinical and human resources and facilities integrated in a way that provides optimal care to victims of major injury and informs and supports injury prevention.
1992 MTCSP: What a system IS.

- Leadership
- System Development
- Legislation
- Finances
- Injury Prevention & Control
- Human Resources
  - workforce / education
- Pre-hospital
  - EMS, transport, communication, disaster
- Definitive Care
  - TCs, transfers, rehab
- Information systems
- Evaluation (perform. Improvement)
- Research
Figure 2: The ‘inclusive’ trauma system utilizes the full spectrum of acute care facilities to provide trauma care.
2006 Model Trauma System Planning and Evaluation: 
*What a system DOES.*

- Assessment
- Policy Development
- Assurance
• **Assessment**
  - systems needs vrs. resources (gap anal.)
  - injury epidemiology of State
  - ‘burden of injury’ & system performance
  - cost effectiveness

• **Policy Development**
  - Comprehensive authority
  - Trauma Plan & modifications
  - Prevention public policy
  - Establishes evidence-based system guidelines
  - Ongoing policy development driven by assessment

• **Assurance**
  - Use of laws, regulations, standards
  - System PI & oversight body (TCs, RACs, STAC)
  - Integration of primary, secondary, tertiary prevention
  - Strategic planning (workforce, all-hazards preparedness, etc)
OK, I get the ‘system’ thing, but do they work?
A National Evaluation of the Effect of Trauma-Center Care on Mortality

Ellen J. MacKenzie, Ph.D., Frederick P. Rivara, M.D., M.P.H.,
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Context Despite calls for wider national implementation of an integrated approach to trauma care, the effectiveness of this approach at a regional or state level remains unproven.

Objective To determine whether implementation of an organized system of trauma care reduces mortality due to motor vehicle crashes.

Design Cross-sectional time-series analysis of crash mortality data collected for...
Inclusive Trauma Systems: Do They Improve Triage or Outcomes of the Severely Injured?

Garth H. Utter, MD, MSc, Ronald V. Maier, MD, Frederick P. Rivara, MD, MPH, Charles N. Mock, MD, PhD, Gregory J. Jackovich, MD, and Avery B. Nathens, MD, PhD, MPH

Adjusted odds ratios for mortality

- Exclusive: 1
- More inclusive: 0.93
- Most inclusive: 0.77

61,496 patients 24 states
Systems exclusive to inclusive
J.Trauma 2004
Nine in ten Americans indicate it is extremely or very important for their state to have a trauma system.

% indicating how important it is for their state to have a trauma system in place:

- **90%** Extremely important
- **47%** Very important
- **42%** Somewhat important
- **9%** Not very important
- **1%** Not at all important

A trauma system involves trauma centers working together with 9-1-1, ambulances, helicopters and other health care resources in a coordinated and pre-planned way. This network of care is designed to get seriously injured people to the place with the right resources as quickly as possible.

**Q700** HARRIS POLL, March 2005: How important is it that your state have a trauma system in place?

**Base:** All respondents (N=1000)
- Trauma is a major public health problem
- Traumatic injury is preventable (1\textsuperscript{o}, 2\textsuperscript{o}, 3\textsuperscript{o})
- Trauma care is an essential public service
- Systems are the ultimate delivery structures
- Trauma centers are central to trauma systems
- Goal = global reduction in morbidity & mortality
OK, systems work, they’re essential, & people want them. Do we all have access to these ‘trauma systems’?
The current environment:

- Health care system dysfunctional
- ‘Market-driven’ operations
- Constrained resources
- MD practice pressures
- Reduced compensation
- Generational lifestyle changes
- = Changing expectations…
- MD & institutional commitment to trauma is not stable
Access: Obstacles in trauma system participation

- **Physician staff commitment**
  - Lifestyle: long, irregular hours, sleep deprivation
  - Practice: opportunity costs, restriction, reimbursement, malpractice

- **Intimidating, verification / designation requirements**

- **Lack of knowledge / experience**

- **Financial risk:**
  - Under-funded care, contractual agreements
  - Limited transfer $$: DSH, local tax subsidies
  - On-call fees for physicians
  - Lack of specific state/regional funding
Recent Trends towards non-inclusive systems

- Lack of commitment and/or resources
  - just refer all injuries to high level centers
  - lack of specialist availability
  - Development of specialty hospitals (no ERs)

- Increasing centralization of all trauma care
  - variable impact on adverse selection
  - results in poor utilization of resources
  - may overwhelm existing centers
  - may delay treatment of some injuries
  - may lessen the ‘system’ response to MCI / disaster

Figure 2: The ‘inclusive’ trauma system utilizes the full spectrum of acute care facilities to provide trauma care
A Resource-Based Assessment of Trauma Care in the United States

Avery B. Nathens, MD, PhD, MPH, Gregory J. Jurkovich, MD, Ellen J. MacKenzie, PhD, and Frederick P. Rivara, MD, MPH

523,780 patients  18 states
J.Trauma 2004
Fractures in Access to and Assessment of Trauma Systems

Mary J Vassar, MS, John J Holcroft, BS, M Margaret Knudson, MD, FACS, Kenneth W Kizer, MD, MPH, FACEP

360,743 patients - California
JACS 2003

360,743 patients - California JACS 2003

Trauma Center  Non- TC

% 0 10 20 30 40 50 60 70

All pts  deaths  age >55  TBI > 55

56  68.1  60.3  56
44  31.9  39.7  44

Trauma Center
Non- TC
OK, they work, they’re essential, & people want them. Access is not so good. What are the problems encountered in expanding trauma systems?
Trauma Systems: Common Problems
(based on ACS surveys)

- Reluctance to use enabling legislation
- Inconsistent or non-integrated leadership
- Absent or ineffective state (STACs) or regional (RACs) oversight body
- Trends towards exclusive systems
Trauma Systems: Common Problems (based on ACS surveys)

- Limited funding
- No comprehensive trauma plan
- No real system-based PI
- Ends of the continuum poorly integrated (silo’ing): prevention & rehabilitation in particular
Trauma Systems: Common Problems (based on ACS surveys)

- Insufficient medical direction for state/regional trauma system
- Lack of agreements between sending & receiving hospitals
- Limited, often inadequate public and legislative education RE trauma system importance & needs
OK, lots of problems....
How’s California doing?
California trauma “system”

- Serving disaster-prone, dispersed population
- Provides coverage for very urban & very rural regions
- County –based & de-centralized
- Optional. No requirement for county/regional/state plan
- Relies on local versus regional/State-wide oversight
- State & many local systems are grossly under-funded
- For its size, California’s state trauma office is under-staffed & unable to perform all the needed functions
- There is no trauma plan for state
- Large variations in LEMSA trauma system configurations & practices
CALIFORNIA STATEWIDE TRAUMA PLANNING

ASSESSMENT AND FUTURE DIRECTION

Cesar A. Aristeiguieta, MD
Director
Emergency Medical Services Authority
September 2006

- Description of trauma system standards & models
- History & status of trauma care & funding in California
- HRSA BIS tool used to evaluate California’s system
- Draws conclusions derived from this BIS assessment
- Defined short, medium & long term goals for the California system
- Makes recommendations RE system development
- **THIS IS NOT A TRAUMA PLAN**
OK, more issues, so where do we go from here?
Educate & build legislative & public support
Establish enabling legislation
Fund the system (exclusive of TCs)
Needs assessment / gap analysis
Perform external consultative review
Structure comprehensive trauma plan
Adopt operational standards & verification
Develop oversight structures & process
Initiate system performance improvement
Drive ongoing system development: PI
Action needed...

- Work to resolve centralization conflicts (LEMSAs)
- Construct a state-wide trauma plan
  - Utilize existing state & federal documents
  - Review & survey existing systems

The Governor’s 2005 directive:
“I am directing the EMS Authority, informed by it’s Trauma Advisory Committee, to complete its statewide trauma plan.
Write & approve the plan.

- Develop a manageable system structure:
  - Regional structure: 1, 3, 6 regions? (not 31 or 58)
- System-wide needs assessment
- System oversight responsibilities
  - regional audit/advisory committees
- Statewide system PI
  - state trauma registry
  - PI plan
California: Trauma Regions & RTCCs

Region I - North
- Coastal Valleys EMS Agency
- El Dorado County EMS Agency
- NorCal EMS Agency
- North Coast EMS Agency
- Sacramento County EMS Agency
- San Joaquin County EMS Agency
- Sierra-Sacramento EMS Agency

Region II - Bay Area
- Alameda County EMS Agency
- Contra Costa County EMS Agency
- Marin County EMS Agency
- Monterey County EMS Agency
- San Benito County EMS Agency
- Solano County EMS Agency
- San Francisco County EMS Agency
- San Mateo County EMS Agency
- Santa Clara County EMS Agency
- Santa Cruz County EMS Agency

Region III - Central
- Central California EMS Agency
- Kern County EMS Agency
- Merced County EMS Agency
- Mountain Valley EMS Agency
- Tuolumne County EMS Agency

Region IV - South-West
- Los Angeles County EMS Agency
- Orange County EMS Agency
- San Luis Obispo County EMS Agency
- Santa Barbara County EMS Agency
- Ventura County EMS Agency

Region V - South-East
- Imperial County EMS Agency
- Inland Counties EMS Agency
- Riverside County EMS Agency
- San Diego County EMS Agency
System-based (versus center-based) PI

- Old model designed for developing trauma centers
- Relied on shared center-derived PI issues (MAC model)
- Focus was on provider vrs. system errors
- Few system indicators
  - system preventable deaths
  - mis-triage, delayed triage / re-triage
  - access & time to definitive care
Funding the trauma system (not trauma care)

- SYSTEM = STATE, REGIONAL, COUNTY
- Motor vehicle fees, fines, penalties (non-MV also)
- 911 system surcharges
- Intoxication / DUI offense fees
- Controlled substance act or weapons violation fees
- “Play or pay” fees for non-participating hospitals
- Tobacco & ETOH taxes
- Property tax supplements
- Tribal gaming
- Hospital licensure linked to participation in TS
- Use of destination / activation fees
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