



AIRLIFT 
NORTHWEST

HARBORVIEW
MEDICAL
CENTER 
UW Medicine

UW Medicine
SCHOOL OF MEDICINE

Armagan Dagal MD, FRCA, MHA, Antalya, 2017



No conflict of interest

EMERGENCY

Level 1 Trauma Center

| | |
|---------------|--------|
| ED visits | 64,500 |
| Admissions | 17,000 |
| Trauma Admits | 6,000 |
| ISS >10 | 2,800 |
| Beds | 413 |
| ICU | 100 |

Trauma is a disease



**New seatbelt design:
45% less car accidents!!**



if the al...

Harborview Injury Prevention & Research Center

Reducing the impact of injury and violence on people's lives through research, education, training and public awareness.



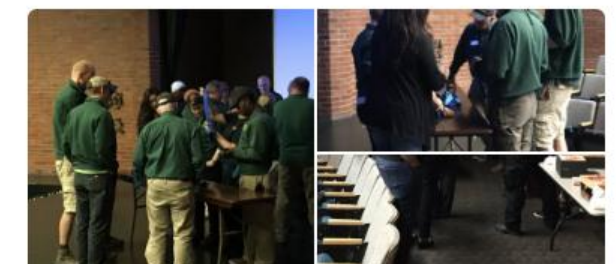
Tweets by @HIPRC

 Harborview Injury Retweeted



Eileen Bulger
@bulgercot

Thanks to the Seattle Woodland Park zoo for hosting a Stop the Bleed training and putting in bleeding control kits [#stopthebleed](#) [@UWSurgery](#)

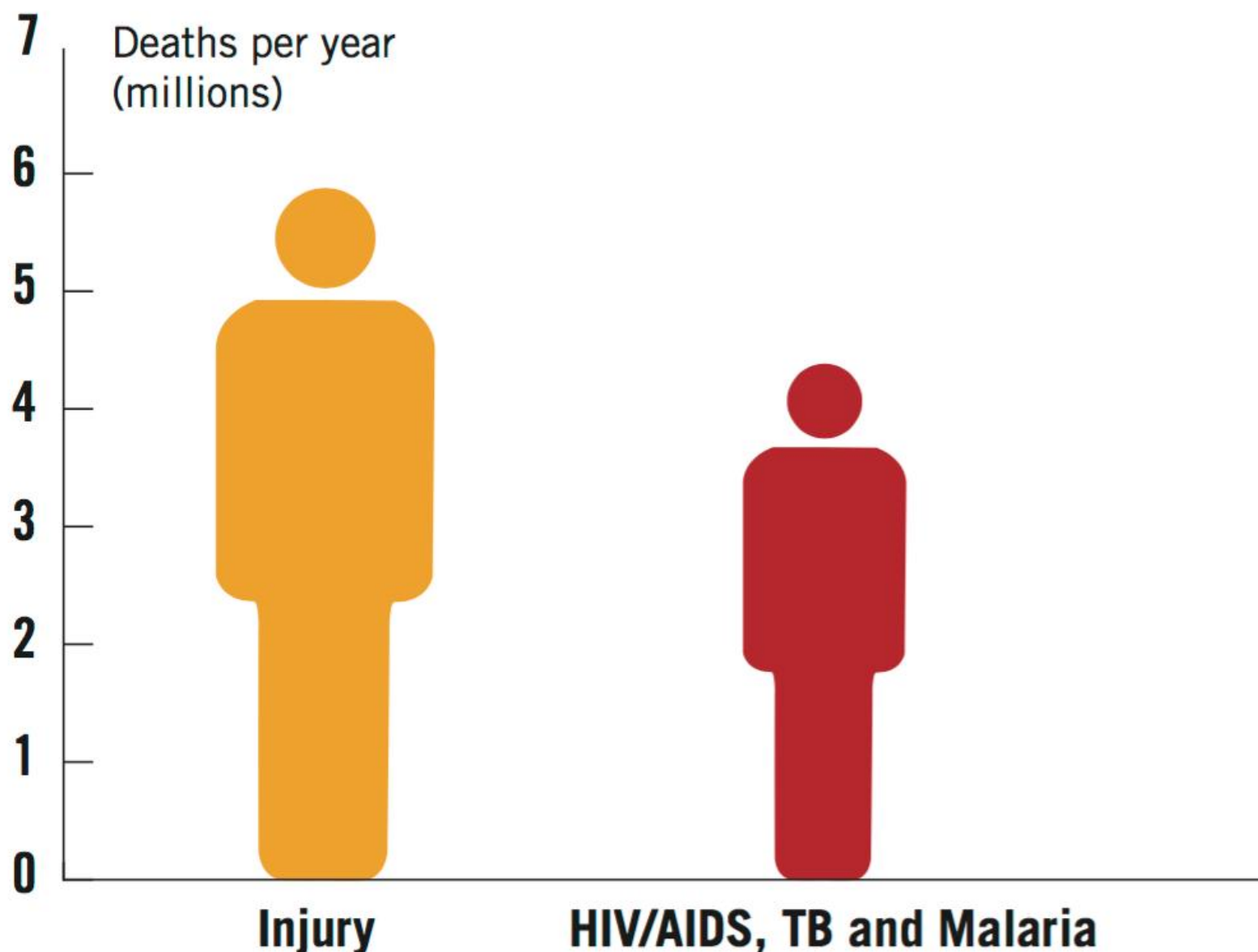


The Problem

5.8 million people die each year as a result of injuries

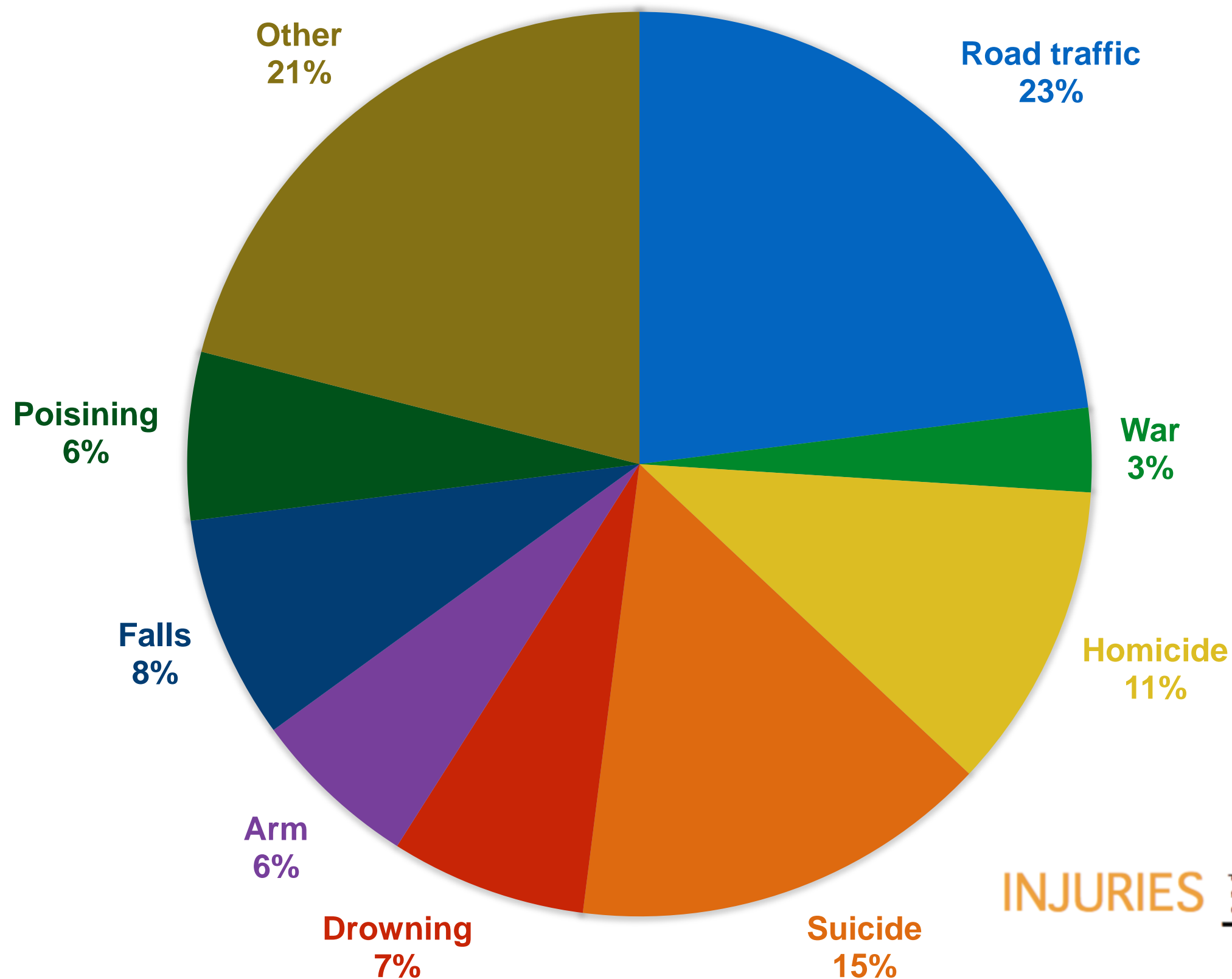
10% of world deaths

32% more deaths than the malaria, TB and HIV/AIDS combined



INJURIES and VIOLENCE
THE FACTS

How injuries claim lives



INJURIES and VIOLENCE
THE FACTS



International disparities in trauma care

Armagan Dagal^a, Sarah E. Greer^b, and Maureen McCunn^c

Table 1. World's estimated 20 leading causes of death 2015–2030

2014 Apr;27(2):233-9.

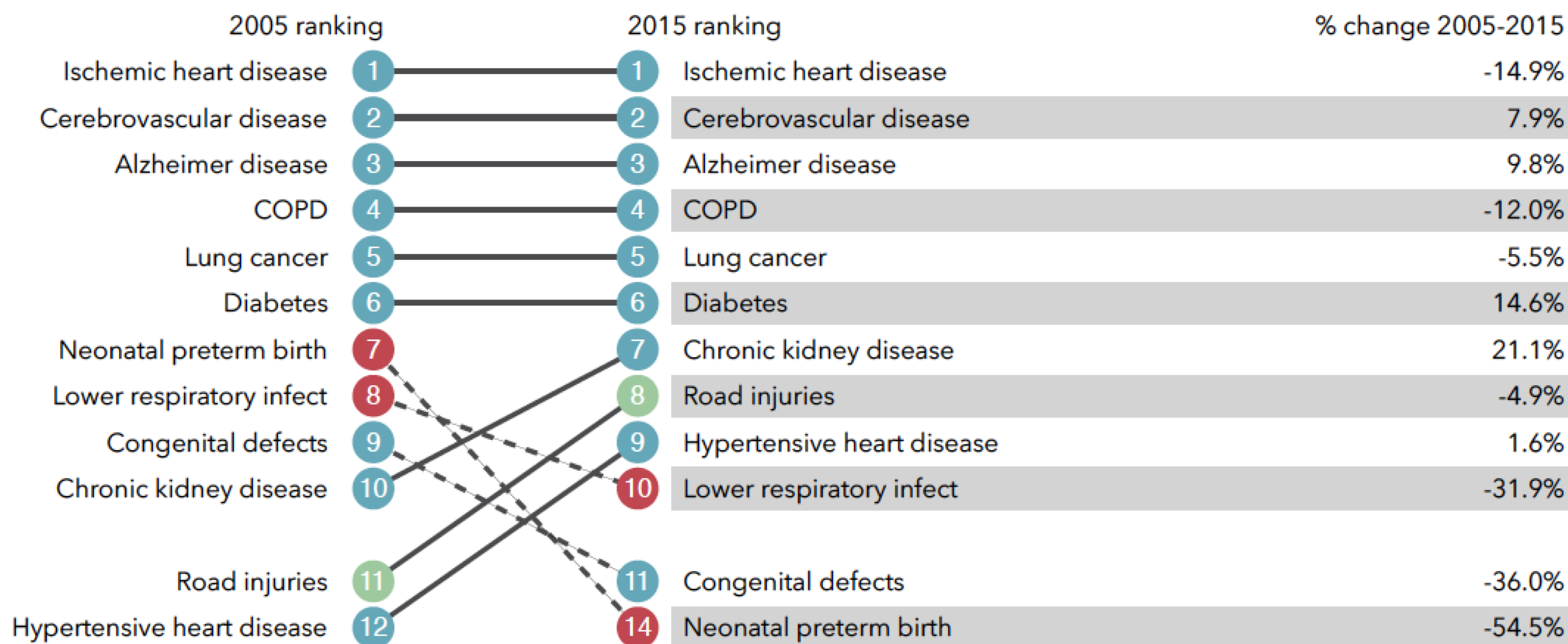
World

| 2015 | | | | |
|------|---------------------------------|---------------|----------|-------------------------------|
| Rank | Cause | Deaths (000s) | % deaths | Deaths per 100 000 population |
| 1 | Ischemic heart disease | 7594 | 13.2 | 105 |
| 2 | Stroke | 6700 | 11.7 | 92 |
| 3 | Lower respiratory infections | 3223 | 5.6 | 44 |
| 4 | COPD | 3217 | 5.6 | 44 |
| 5 | Diarrhoeal disease | 1808 | 3.2 | 25 |
| 6 | HIV/AIDS | 1667 | 2.9 | 23 |
| 7 | Trachea, bronchus, lung cancers | 1636 | 2.9 | 23 |
| 8 | Diabetes mellitus | 1556 | 2.7 | 21 |
| 9 | Road Injury | 1423 | 2.5 | 20 |
| 10 | Hypertensive heart disease | 1137 | 2.0 | 16 |
| 11 | Preterm birth complications | 1133 | 2.0 | 16 |
| 12 | Cirrhosis of the liver | 1028 | 1.8 | 14 |
| 13 | Tuberculosis | 887 | 1.5 | 12 |
| 14 | Kidney diseases | 871 | 1.5 | 12 |
| 15 | Self-harm | 836 | 1.5 | 12 |
| 16 | Liver cancer | 825 | 1.4 | 11 |
| 17 | Stomach cancer | 797 | 1.4 | 11 |
| 18 | Birth asphyxia and birth trauma | 768 | 1.3 | 11 |
| 19 | Colon and rectum cancers | 751 | 1.3 | 10 |
| 20 | Falls | 714 | 1.2 | 10 |

| 2030 | | | | |
|------|-----------------------------------|---------------|----------|-------------------------------|
| Rank | Cause | Deaths (000s) | % deaths | Deaths per 100 000 population |
| 1 | Ischemic heart disease | 9245 | 13.2 | 112 |
| 2 | Stroke | 8578 | 12.2 | 104 |
| 3 | COPD | 4568 | 6.5 | 55 |
| 4 | Lower respiratory infections | 3535 | 5.0 | 43 |
| 5 | Diabetes mellitus | 2464 | 3.5 | 30 |
| 6 | Trachea, bronchus, lung cancers | 2413 | 3.4 | 29 |
| 7 | Road Injury | 1854 | 2.6 | 22 |
| 8 | HIV/AIDS | 1793 | 2.6 | 22 |
| 9 | Diarrhoeal disease | 1617 | 2.3 | 20 |
| 10 | Hypertensive heart disease | 1457 | 2.1 | 18 |
| 11 | Cirrhosis of the liver | 1201 | 1.7 | 14 |
| 12 | Liver cancer | 1186 | 1.7 | 14 |
| 13 | Kidney diseases | 1152 | 1.6 | 14 |
| 14 | Stomach cancer | 1143 | 1.6 | 14 |
| 15 | Colon and rectum cancers | 1075 | 1.5 | 13 |
| 16 | Self-harm | 1007 | 1.4 | 12 |
| 17 | Falls | 976 | 1.4 | 12 |
| 18 | Alzheimer's disease and dementias | 966 | 1.4 | 12 |
| 19 | Preterm birth complications | 917 | 1.3 | 11 |
| 20 | Breast cancer | 805 | 1.1 | 10 |



What causes most deaths?



Türkiye Kaza İstatistikleri



183,011 Ölümlü – yaralanmalı kaza

304,421 yaralanma

7,530 Ölüm

Türkiye İstatistik Kurumu, 2015

Concept of Trauma Systems

“To design and implement an inclusive trauma system that assures the care of all injured patients and ensures that optimal care is provided at all stages of the patient journey”

SPECIAL ARTICLE

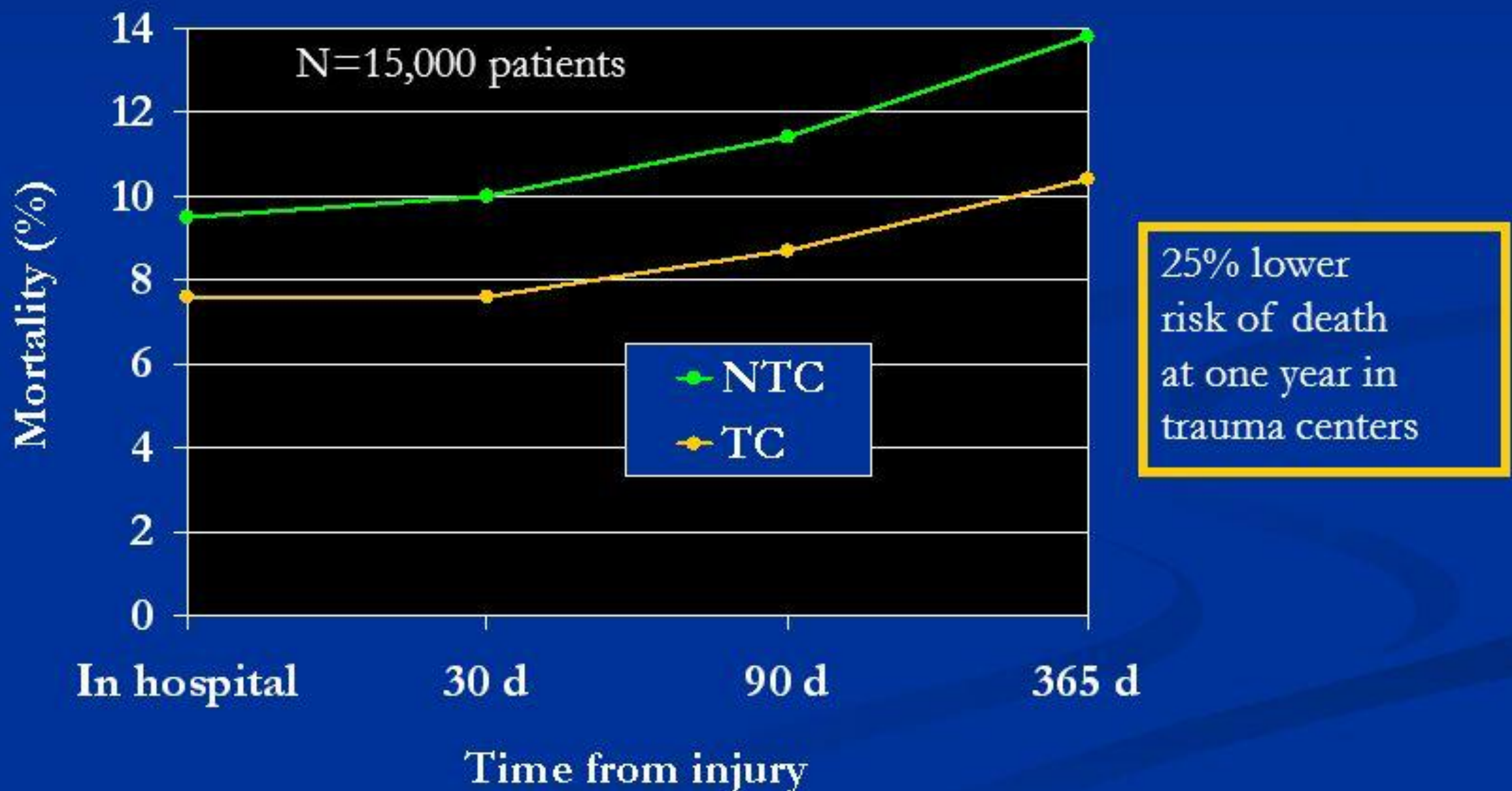
A National Evaluation of the Effect of Trauma-Center Care on Mortality

Ellen J. MacKenzie, Ph.D., Frederick P. Rivara, M.D., M.P.H.,
Gregory J. Jurkovich, M.D., Avery B. Nathens, M.D., Ph.D.,
Katherine P. Frey, M.P.H., Brian L. Egleston, M.P.P., David S. Salkever, Ph.D.,
and Daniel O. Scharfstein, Sc.D.

In-hospital mortality rate TC vs NTC
(7.6 % vs. 9.5 %; RR, 0.80; 95 %CI, 0.66 to 0.98)

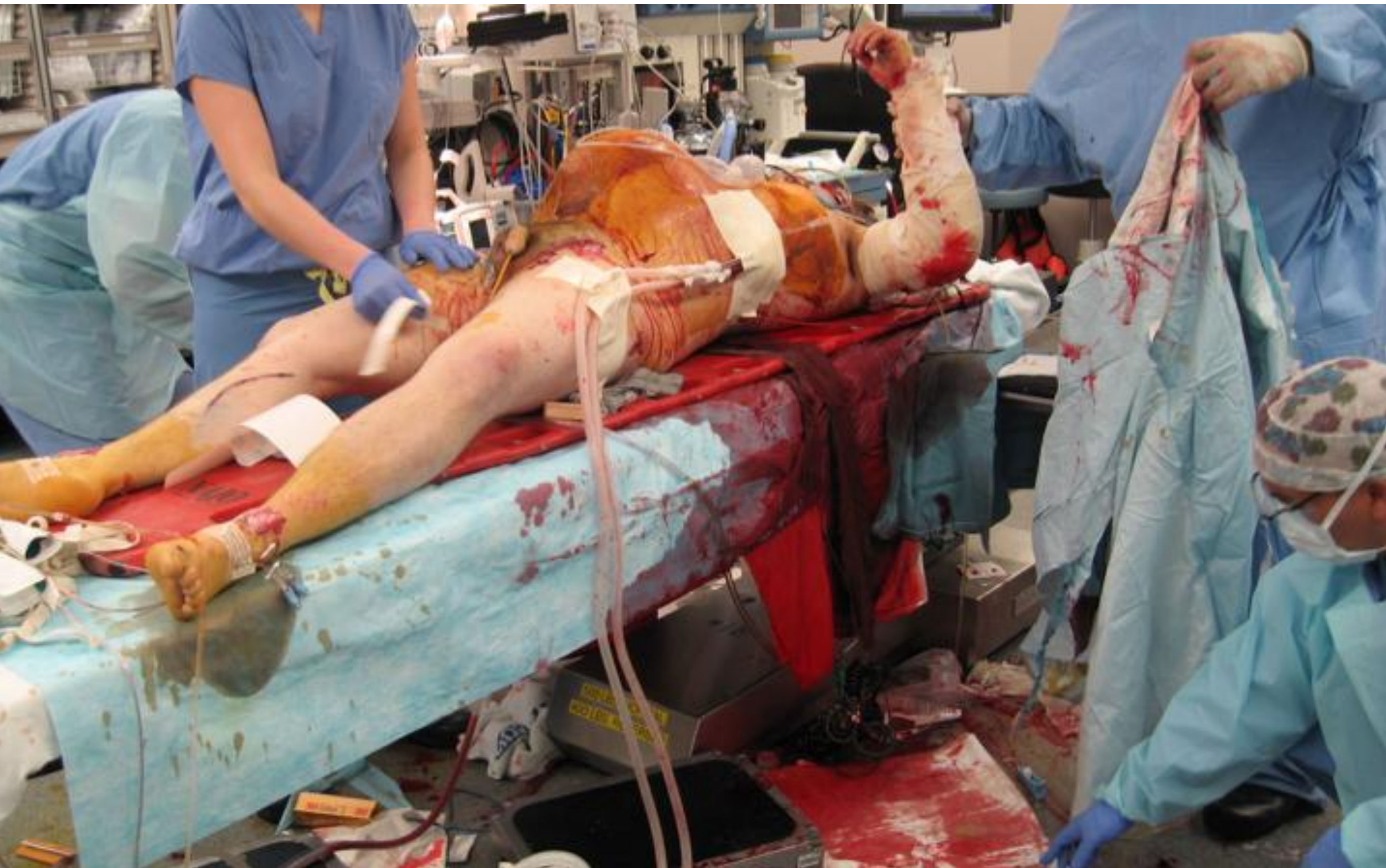
National Evaluation of the Effect of Trauma Center Care on Mortality

N Engl J Med, 2006



Ideal Triage

- Direct patients with serious injuries to centers with available resources and personnel
- Direct those with less serious injuries to all other centers within same geographic area



DECEASED

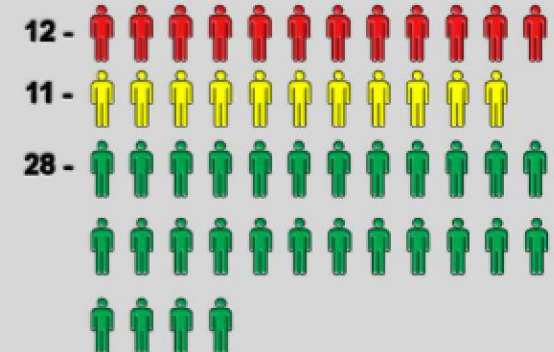
IMMEDIATE

DELAYED

MINOR



HOSPITAL TRANSPORTS (51)



DEATHS ON SCENE 4 -

Muğla, Mayıs 13, 2017



**24 kişi ölü
10 kişi ağır yaralı**

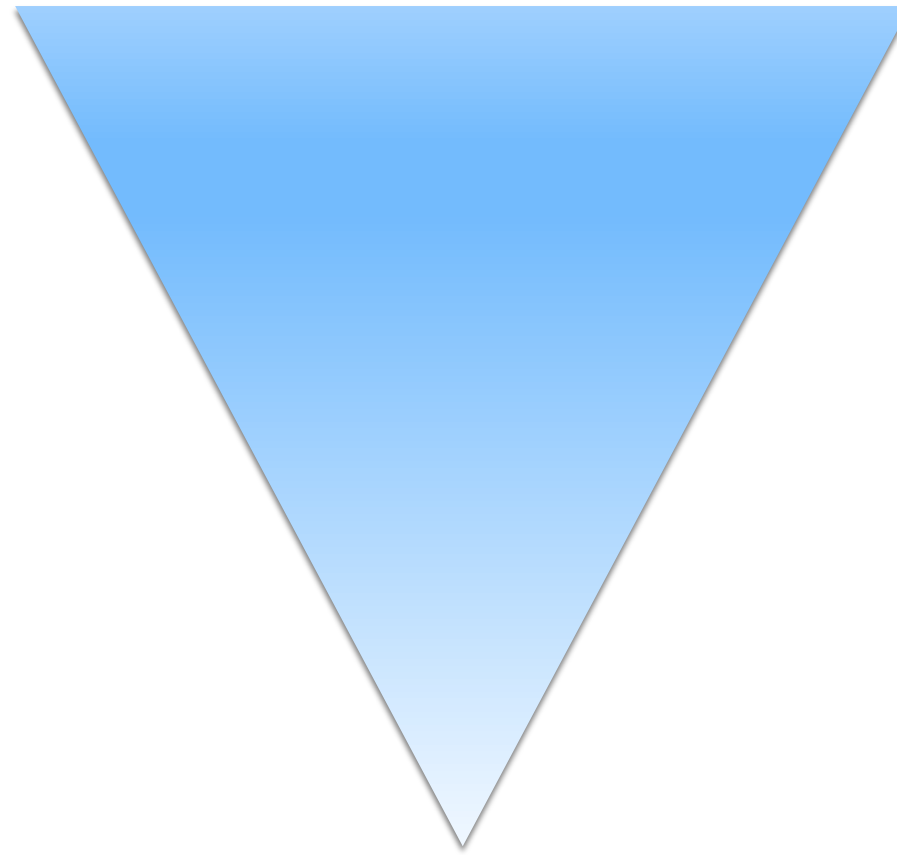
Compare the quality of health care organizations



Compare the quality of health care organizations

Structure

Process



Outcome

Protocols, Guidelines, Checklists

September, 2016



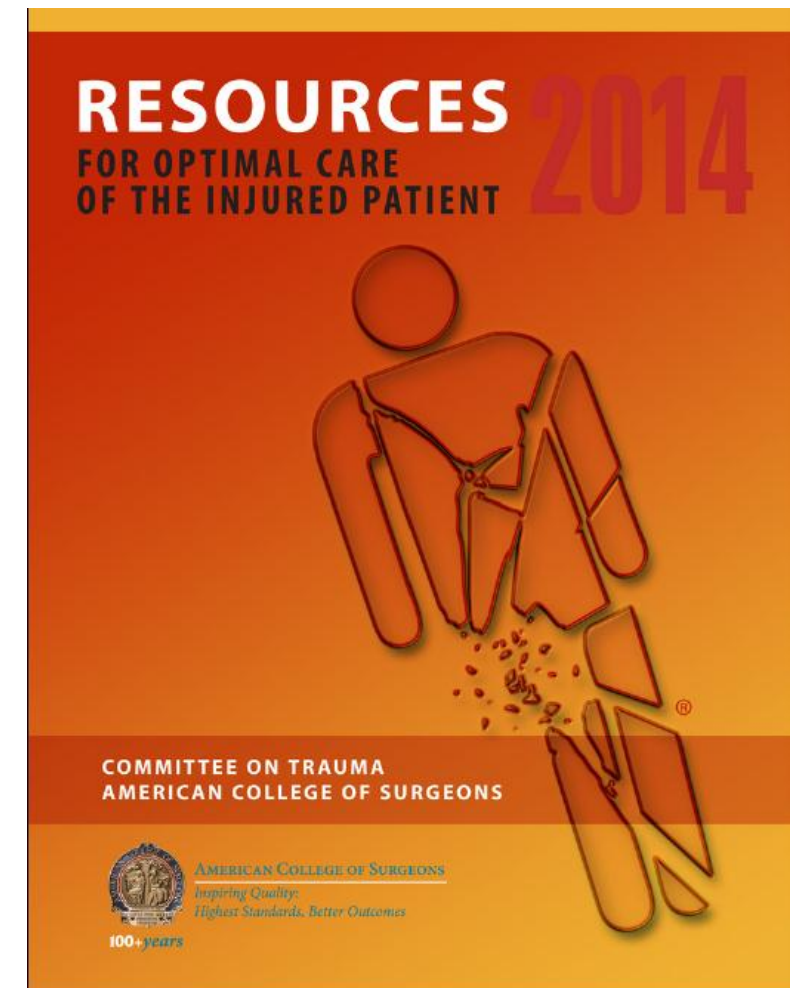
Guidelines for the Management of Severe Traumatic Brain Injury 4th Edition

GUIDELINES

Damage control resuscitation in patients with severe traumatic hemorrhage: A practice management guideline from the Eastern Association for the Surgery of Trauma

Jeremy W. Cannon, MD, SM, Mansoor A. Khan, MBBS (Lond), PhD, Ali S. Raja, MD, Mitchell J. Cohen, MD, John J. Como, MD, MPH, Bryan A. Cotton, MD, Joseph J. Dubose, MD, Erin E. Fox, PhD, Kenji Inaba, MD, Carlos J. Rodriguez, DO, John B. Holcomb, MD, and Juan C. Duchesne, MD, Philadelphia, Pennsylvania

AAST Continuing Medical Education Article



Journal of Trauma and Acute Care Surgery:
March 2017

Trauma Care Checklist



Immediately after primary & secondary surveys:

| | |
|--|---|
| IS FURTHER AIRWAY INTERVENTION NEEDED? May be needed if: • GCS 8 or below • Hypoxaemia or hypercarbia • Face, neck, chest or any severe trauma | <input type="checkbox"/> YES, DONE <input type="checkbox"/> NO |
| IS THERE A <i>TENSION</i> PNEUMO-HAEMOTHORAX? | <input type="checkbox"/> YES, CHEST DRAIN PLACED <input type="checkbox"/> NO |
| IS THE PULSE OXIMETER PLACED AND FUNCTIONING? | <input type="checkbox"/> YES <input type="checkbox"/> NOT AVAILABLE |
| LARGE-BORE IV PLACED AND FLUIDS STARTED? | <input type="checkbox"/> YES <input type="checkbox"/> NOT INDICATED <input type="checkbox"/> NOT AVAILABLE |
| FULL SURVEY FOR (AND CONTROL OF) EXTERNAL BLEEDING, INCLUDING: | <input type="checkbox"/> SCALP <input type="checkbox"/> PERINEUM <input type="checkbox"/> BACK |
| ASSESSED FOR PELVIC FRACTURE BY: | <input type="checkbox"/> EXAM <input type="checkbox"/> X-RAY <input type="checkbox"/> CT |
| ASSESSED FOR INTERNAL BLEEDING BY: | <input type="checkbox"/> EXAM <input type="checkbox"/> ULTRASOUND <input type="checkbox"/> CT <input type="checkbox"/> DIAGNOSTIC PERITONEAL LAVAGE |
| IS SPINAL IMMOBILIZATION NEEDED? | <input type="checkbox"/> YES, DONE <input type="checkbox"/> NOT INDICATED |
| NEUROVASCULAR STATUS OF ALL 4 LIMBS CHECKED? | <input type="checkbox"/> YES |
| IS THE PATIENT HYPOTHERMIC? | <input type="checkbox"/> YES, WARMING <input type="checkbox"/> NO |
| DOES THE PATIENT NEED (IF NO CONTRAINDICATION): | <input type="checkbox"/> URINARY CATHETER <input type="checkbox"/> NASOGASTRIC TUBE <input type="checkbox"/> CHEST DRAIN <input type="checkbox"/> NONE INDICATED |

Before team leaves patient:

| | |
|---|---|
| HAS THE PATIENT BEEN GIVEN: | <input type="checkbox"/> TETANUS VACCINE <input type="checkbox"/> ANALGESICS <input type="checkbox"/> ANTIBIOTICS <input type="checkbox"/> NONE INDICATED |
| HAVE ALL TESTS AND IMAGING BEEN REVIEWED? | <input type="checkbox"/> YES <input type="checkbox"/> NO, FOLLOW-UP PLAN IN PLACE |
| WHICH SERIAL EXAMINATIONS ARE NEEDED? | <input type="checkbox"/> NEUROLOGICAL <input type="checkbox"/> ABDOMINAL <input type="checkbox"/> VASCULAR <input type="checkbox"/> NONE |
| PLAN OF CARE DISCUSSED WITH: | <input type="checkbox"/> PATIENT/FAMILY <input type="checkbox"/> RECEIVING UNIT <input type="checkbox"/> PRIMARY TEAM <input type="checkbox"/> OTHER SPECIALISTS |
| RELEVANT TRAUMA CHART OR FORM COMPLETED? | <input type="checkbox"/> YES <input type="checkbox"/> NOT AVAILABLE |



Mass Casualty Incidents 1999 - 2015

9

The number of
MCI's
recorded in
2015

45

The total deaths
resulting from
MCI's recorded
in 2015



3,487
Total Casualties



Since the Columbine Massacre in 1999, 91 Mass Casualty Incidents have been recorded. These tragedies have resulted in the death of 3,487 individuals and injuries to nearly 7,000 more.

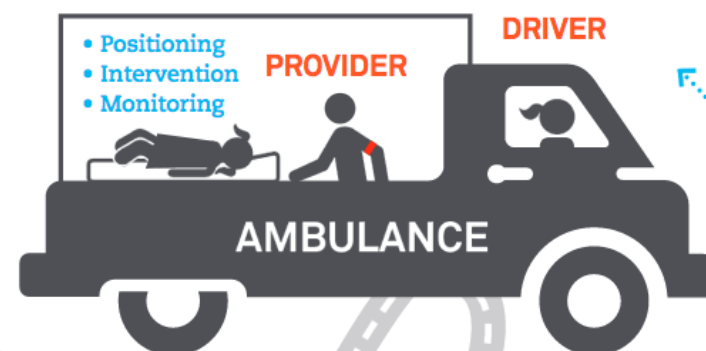




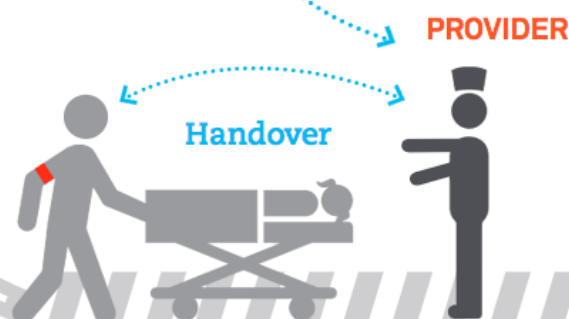
EMERGENCY CARE SYSTEM FRAMEWORK

All around the world, acutely ill and injured people seek care every day. Frontline providers manage children and adults with injuries and infections, heart attacks and strokes, asthma and acute complications of pregnancy. An integrated approach to early recognition and management saves lives. This visual summary illustrates the essential functions of a responsive emergency care system, and the key human resources, equipment, and information technologies needed to execute them.

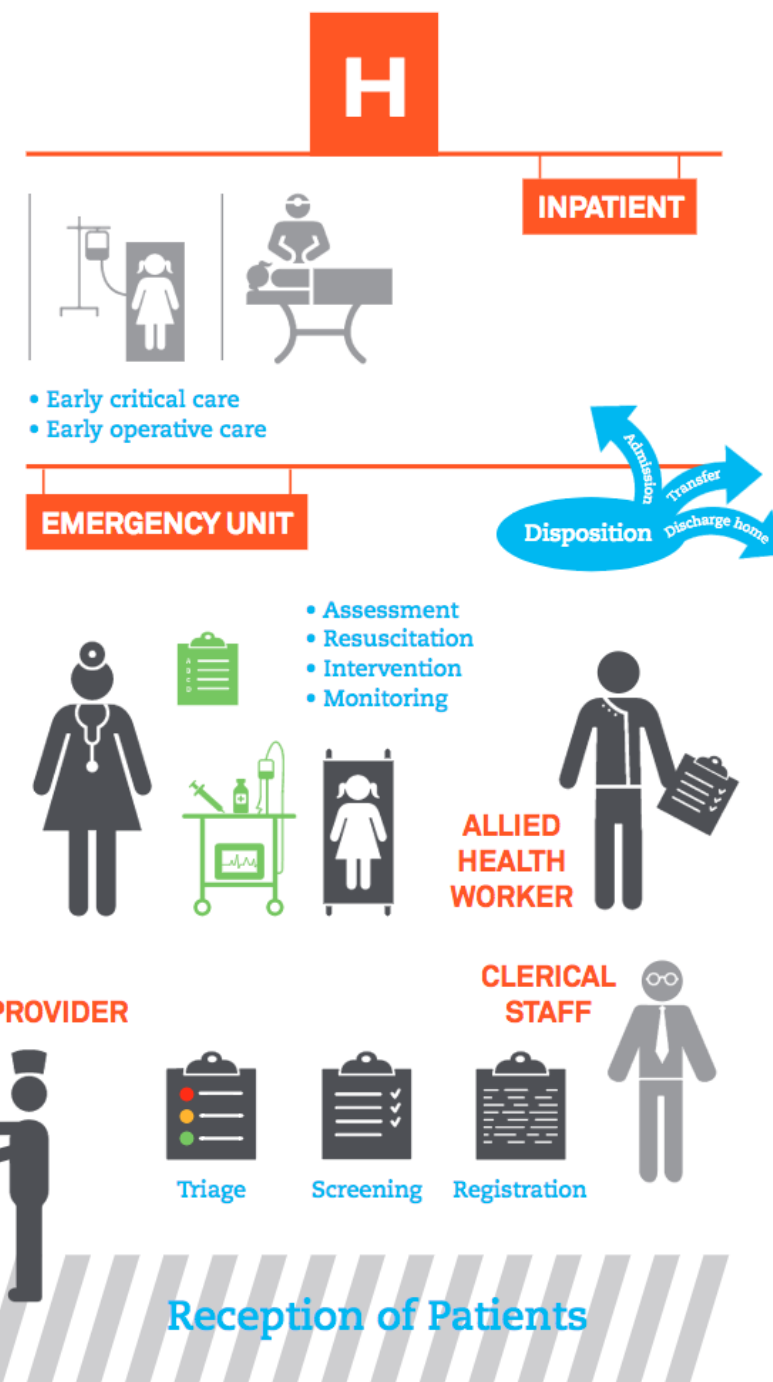
HUMAN RESOURCES **FUNCTIONS** **EQUIPMENT, SUPPLIES, INFORMATION TECHNOLOGIES**



Field to Facility Communication



Handover



SCENE

- BYSTANDER RESPONSE
- DISPATCH
- PROVIDER RESPONSE

TRANSPORT

- PATIENT TRANSPORT
- TRANSPORT CARE

FACILITY

- RECEPTION
- EMERGENCY UNIT CARE
- DISPOSITION
- EARLY INPATIENT CARE

Inclusive vs Exclusive Trauma Systems

Inclusive System

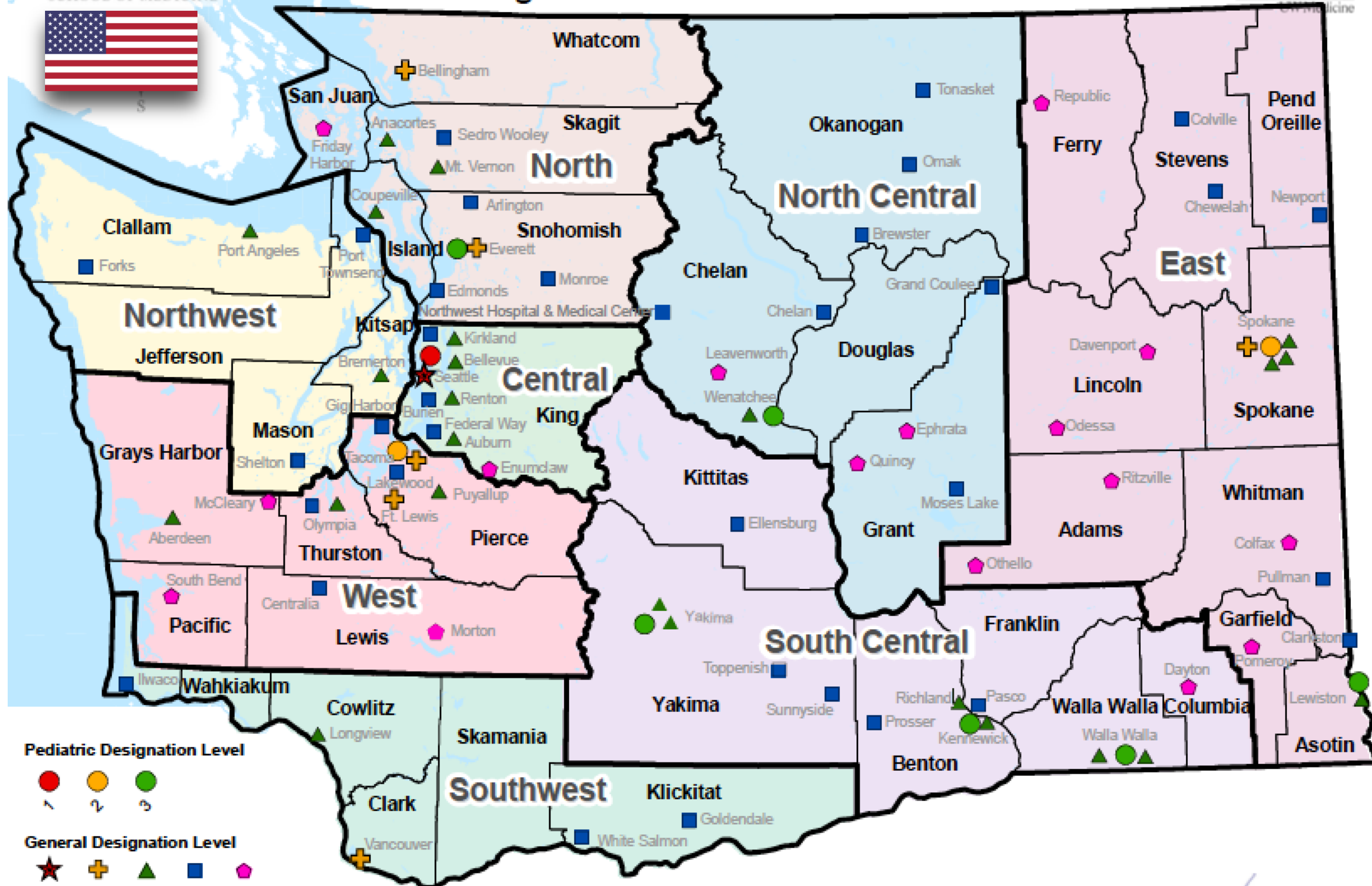
Exclusive System

Level I / II

- Definitive care, Urban

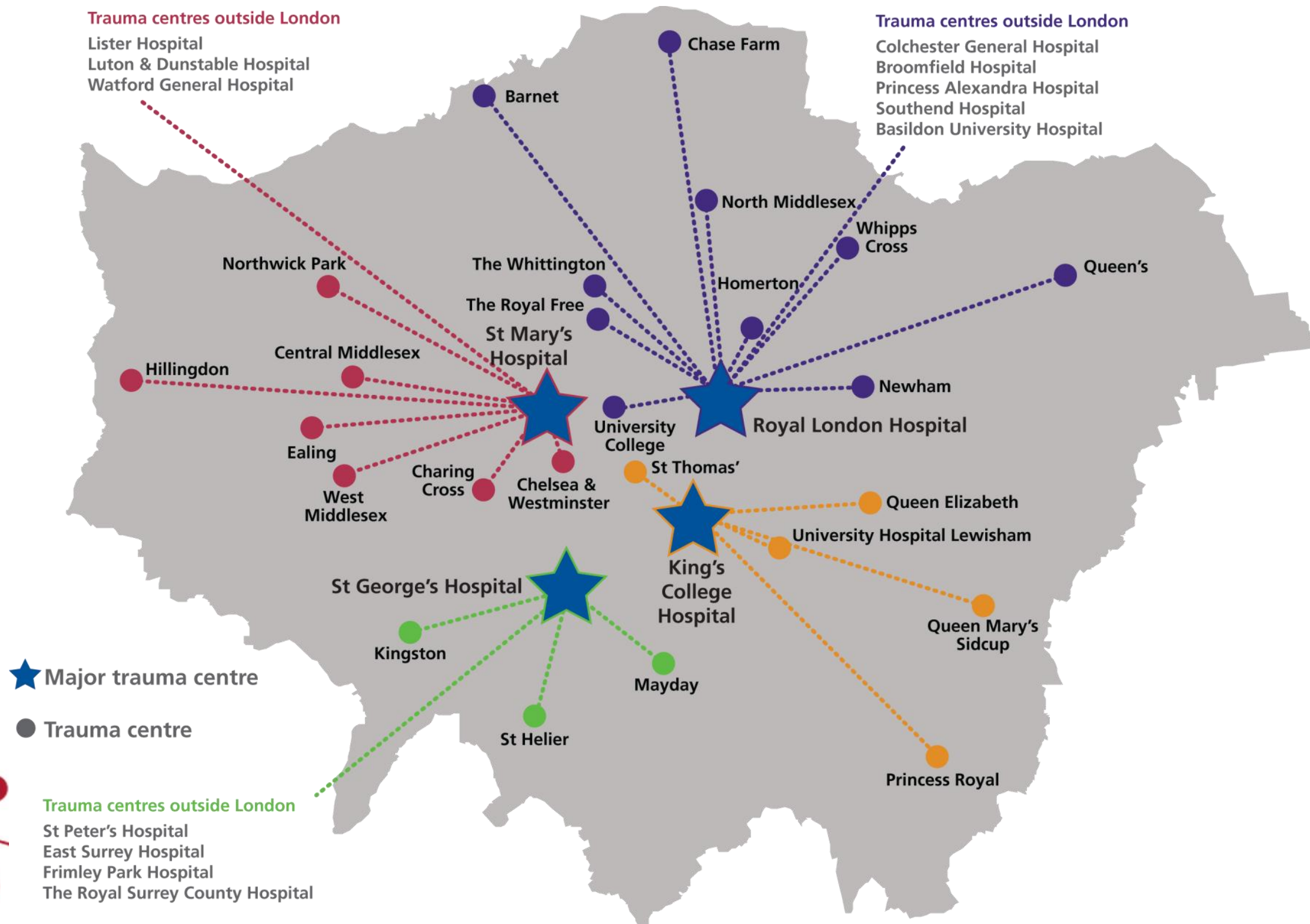
Level III / IV / V

- Initial care, Rural
- All centers involved in quality assurance
- Easier identification of need to transfer
- Decentralized in case of disaster





London Major Trauma System



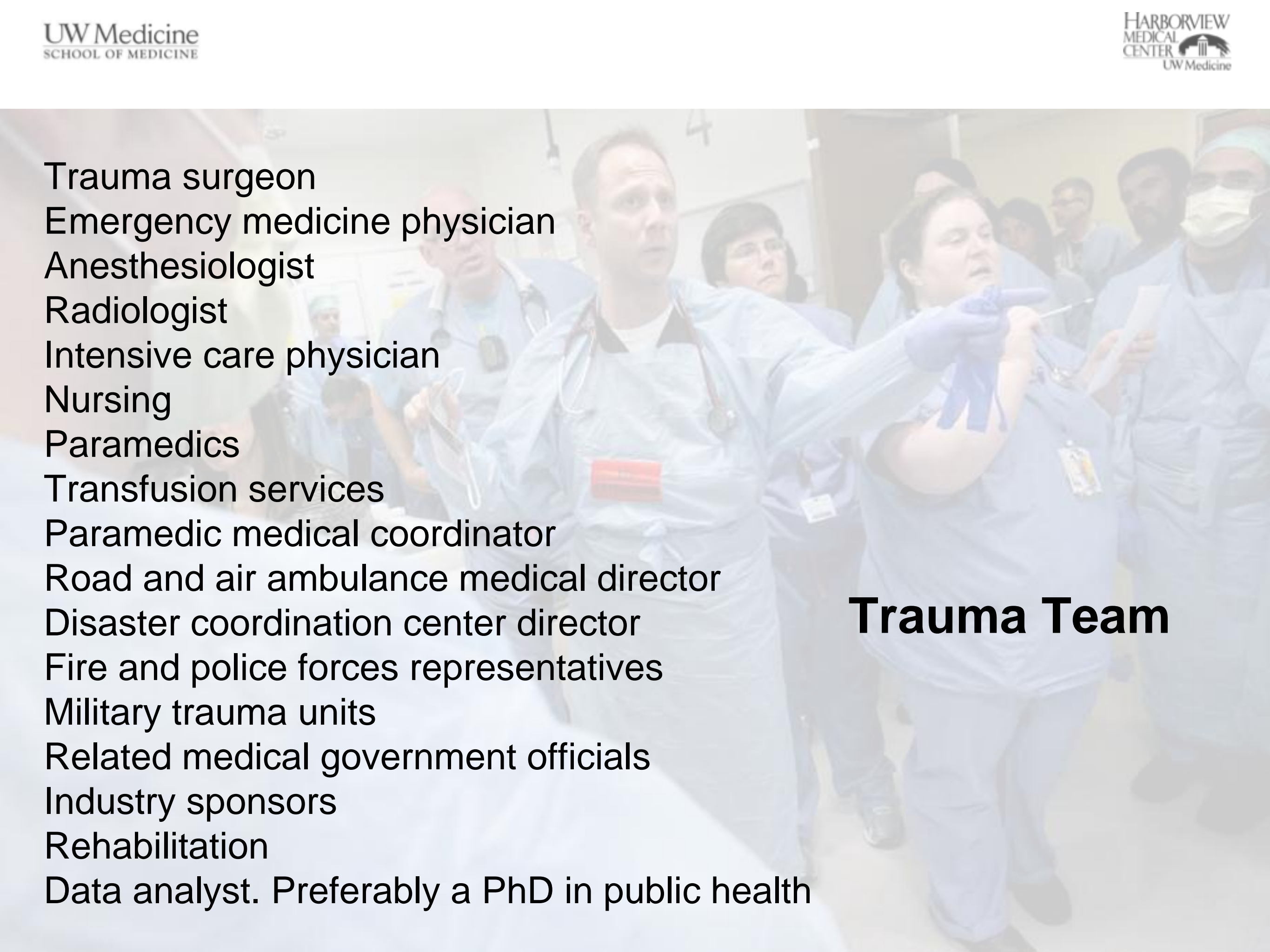
24/7 Trauma Team



24/7 Trauma Team

A photograph of a trauma team in a hospital setting. Several medical professionals in blue scrubs are gathered around a patient lying on a gurney. One man in the center is looking towards the camera with a slight smile. The background shows medical equipment, including a monitor and a light fixture. A semi-transparent blue box is overlaid on the image, containing white text.

A group of people who work together in a coordinated way,
which maximizes each team member's strengths,
to achieve a common goal



Trauma surgeon
Emergency medicine physician
Anesthesiologist
Radiologist
Intensive care physician
Nursing
Paramedics
Transfusion services
Paramedic medical coordinator
Road and air ambulance medical director
Disaster coordination center director
Fire and police forces representatives
Military trauma units
Related medical government officials
Industry sponsors
Rehabilitation
Data analyst. Preferably a PhD in public health

Trauma Team







All others bring DATA!



IHME

Institute for Health Metrics
and Evaluation

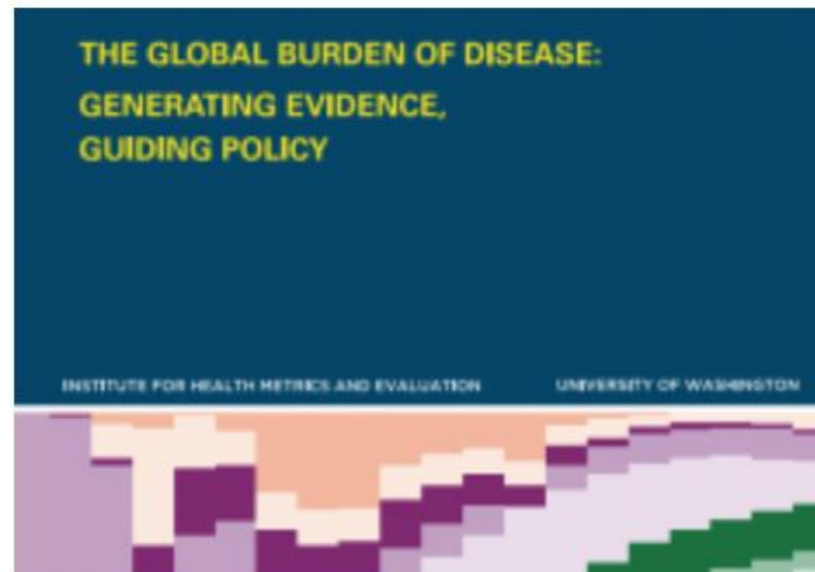
[Home](#)[Results](#)[News &
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Variations in ischemic heart disease, stroke deaths across US counties

Photo by Giovanni Variottinelli. New York, 2006



[GBD News & Events](#)



[GBD Publications](#)



[GBD Data](#)



View

Flow

Treemap

Pyramid



Year

2013

Sex

Both

Male

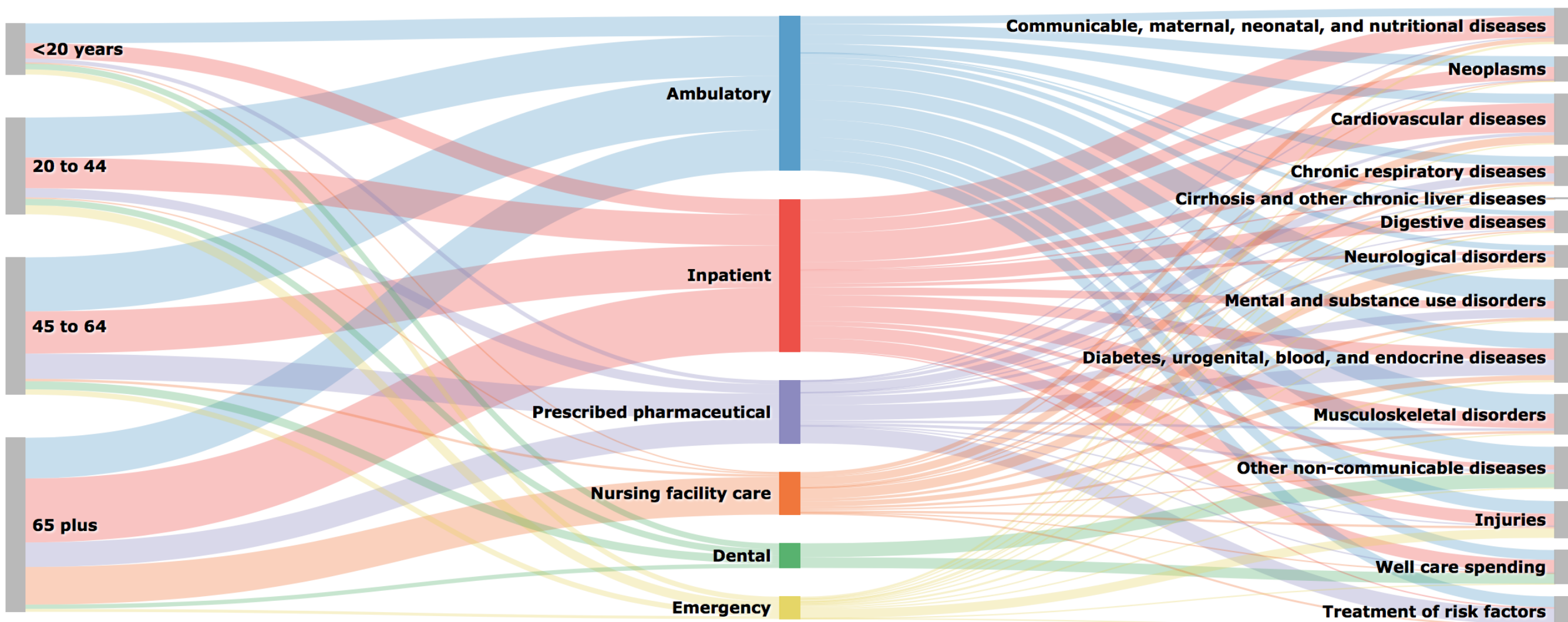
Female

Total for 2013, Both sexes: \$2.10 trillion

Age: All ▾

Type of care: All ▾

Cause: All ▾



Update Mode **Auto** ManualTime Series **Age Pattern** Map

C.1 Transport injuries ▾

Model: #69899 [Global] ▾

Turkey ▾

Male Female # Rate per 100K %

Values: 0.00 to Chart Max

GIC **linear** log(e)**Show data** Non-outliers Outliers HideRaw Corr. Redist. **Final**

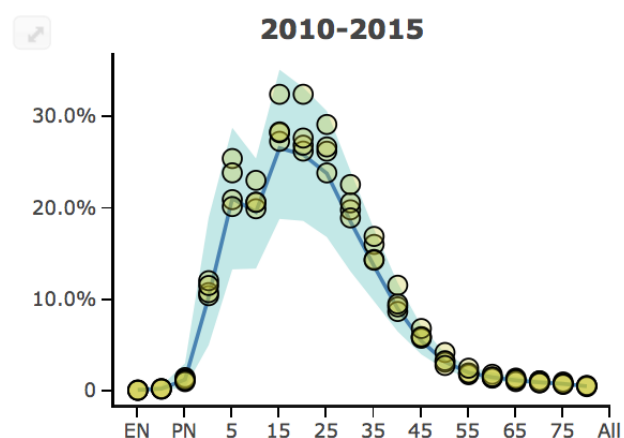
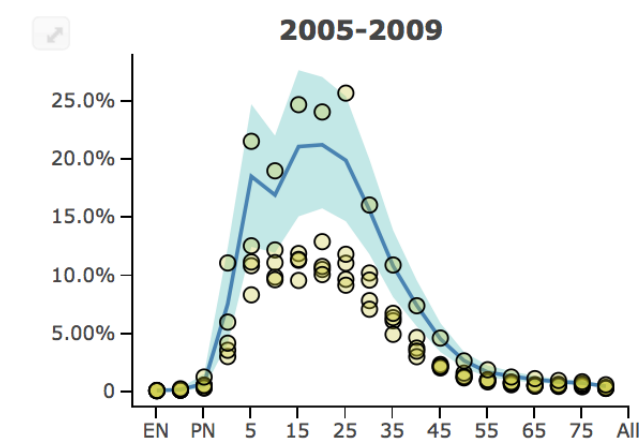
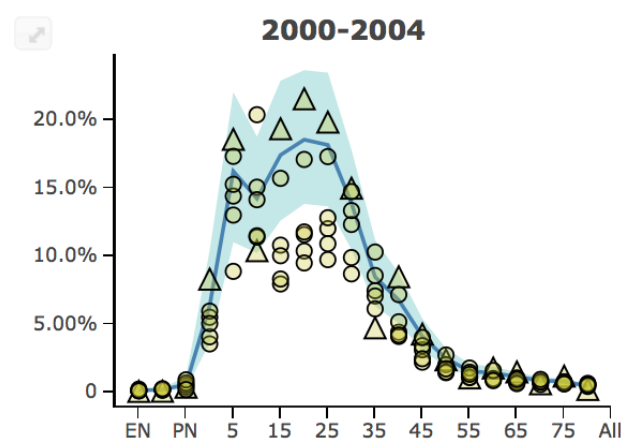
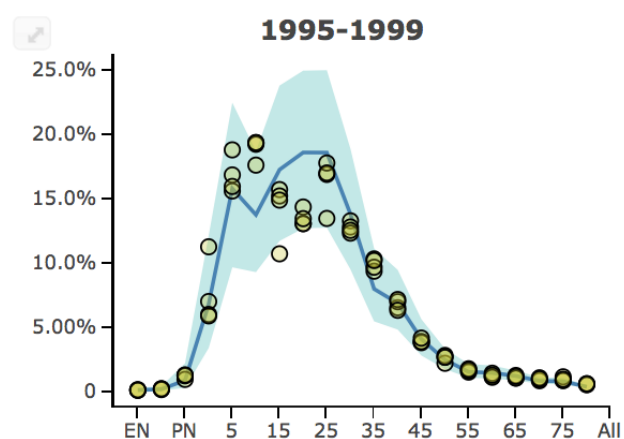
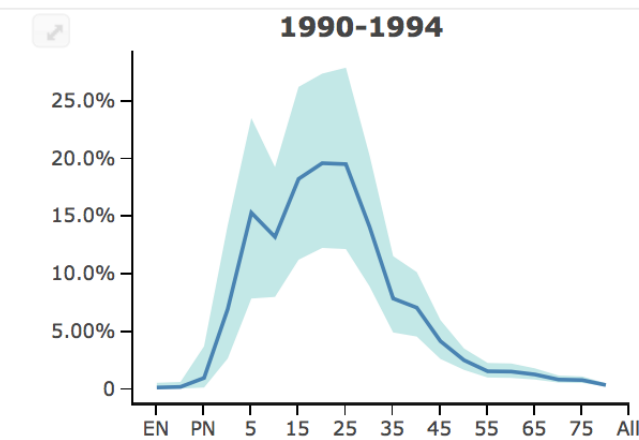
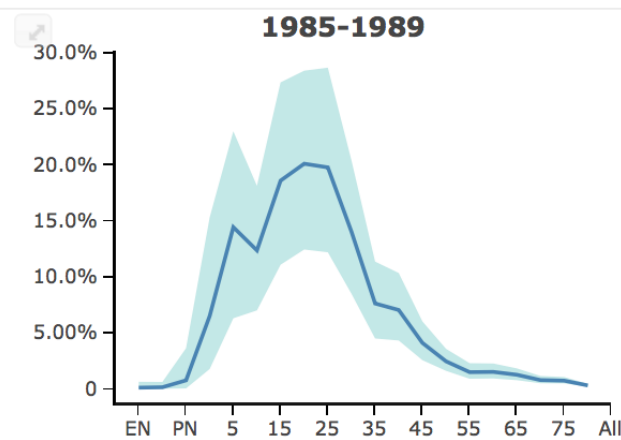
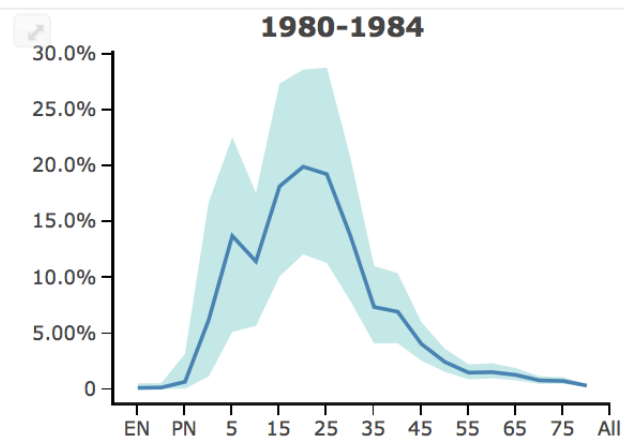
Source Legend (click text to hide/show)

Estimate Range

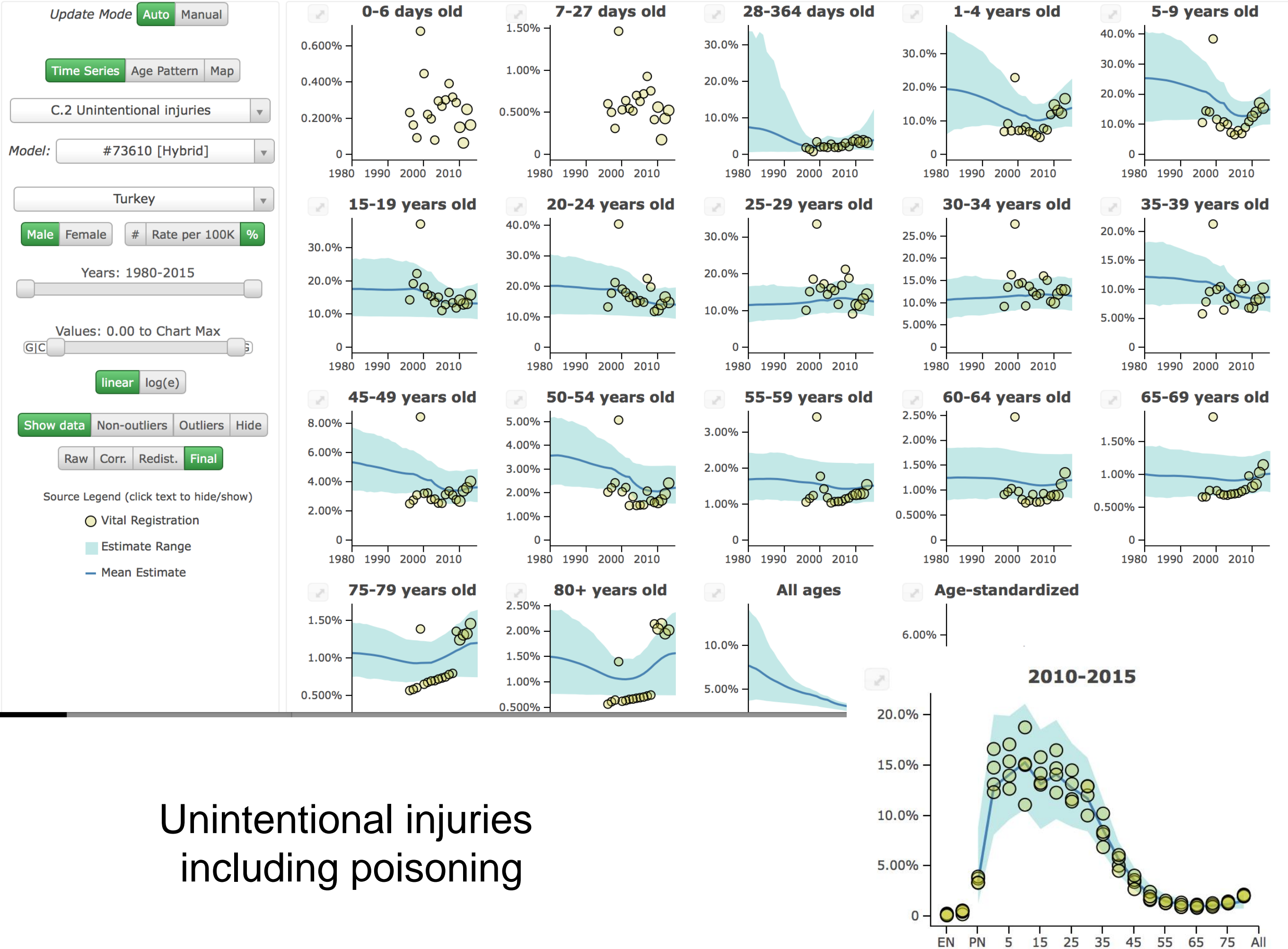
Mean Estimate

Vital Registration

Verbal Autopsy



Transport related injuries



Summary

**Trauma systems
Improve outcomes**

**Trauma teams
Multidisciplinary
Single objective
Effective communication**

**Develop
standards & consensus**

Data

a.dagal@gmail.com

