

# Development of a State Trauma System

R. Todd Maxson, M.D. FACS

Professor Surgery

University of Arkansas for Medical  
Sciences

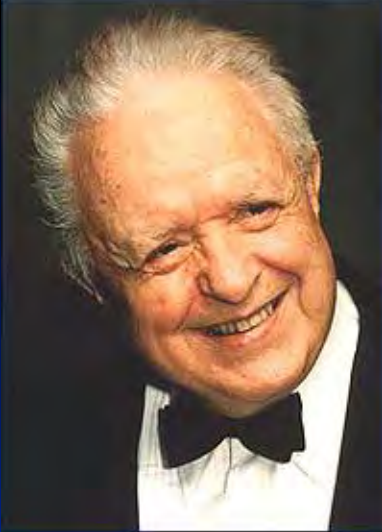
Surgeon in Chief

Rachel Fuller Endowed Chair

Arkansas Children's Hospital

# Conflict of Interest

- Past Chair ACS VRC
- Past President PTS
- Board Member TCAA
- Board Member ATOMAC  
Pediatric Trauma Research  
Network
- I am the President of the  
Arkansas based,  
State Trauma Assessment and  
Advisory Group.      STAAG



# R. Adam Cowley, MD

- “shock is a momentary pause in the act of death,”
  - 1960 - Two beds
  - 1966 – National Academy of Science
  - 1968 – Military helicopters
  - 1973 – Friend of Gov. Marvin Mandel was injured.
- Shock Trauma

# American Medical Association

- Arkansas ranked 50<sup>th</sup> in the United States for timely trauma center accessibility for its citizens.
- Pre-hospital times are long leading to preventable mortality

AMA 293:2633-  
2633, 2005

# American College of Surgeons Committee on Trauma

- Overall injury fatality is 50% higher than the national average
- CDC Data puts mortality for children involved in motor vehicle crashes at almost three times the national average.

Michael Rotondo, MD  
Chair COT  
Nov. 2008

# National Report Card of the State of Emergency Medicine

- Arkansas' emergency care system is the worst in the nation.
- Receiving a “ D-”
- Only state without a designated / verified trauma center.

American College of  
Emergency Physicians  
December 2008

# Cost of Injury in Arkansas

- Motor vehicle collisions **alone** cost the State an estimated \$254 Million annually
- Direct medical cost alone
- Total “Cost” most likely exceeds a Billion annually.

# Elvis Presley Trauma Center Memphis Tenn.

- Financial Crisis
- No money from the State of Tennessee
- Providing care for thousands of injured Arkansans
- Needing to cut services



Mortality rates are among the highest  
in the Country

Resources are limited and dwindling



“So, what are ***you***  
going to do about it?”

# The Task at Hand



# How it happened

Some “**Luck**”

A lot of **Persistence**

Meaningful **Data**

**Finding win-wins**



# What happened

- Legislative and Executive
- State Surgeon General
- Administrative agency
- Professional associations
  - ◆ AMS, AHA, AAA, AEMTA
- Stakeholder groups
  - ◆ TAC
  - ◆ Physicians, EMS, Hospitals, Injury Prevention, Data experts, Quality expert

Identify issues  
Create solutions

# At this point, what is needed is:

- Hearing Everyone's Needs/Desires
- Coming to a shared and concise message
- Showing your hand

# What's in it for me?

Associations - protect specific interests and resist cost increases

- Cost of designation compliance

- Paying for care

- Paying for performance

Physicians - we moved here to avoid trauma

Citizens – Urban problem

# 2009 Legislature

- Established a ***funded*** mandate for the creation of a trauma system
  - ◆ Infra-structure within the ADH
  - ◆ State-wide trauma registry
  - ◆ Call center for rapid transportation
  - ◆ Designation of Trauma Centers
  - ◆ Establishment of TRAC
  - ◆ Develop quality indicators
  - ◆ Continuous Quality Improvement Program







Bed Reporting 2024

ATCC

Show Map Customize Print Excel Refr

Northeast

	Trauma Center	ER (Trauma)	Gen. Surgeon	OR	ICU (Trauma)	MEDSURG	CT	Ortho	Neuro-Head	Neuro-Spine	Peripheral Vasc.	Great Vessel	IR	Isolated Facial	Isolated Eye
SMC Reg Med Cntr	Level 4	Open	Not Provided	Not Provided	Not Provided	Open	Open	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided
St Bernards Med Cntr	Level 3	Open	Open	Open	Open	Open	Open	No Capability	No Capability	No Capability	Open	Open	Open	Not Provided	Not Provided

Northwest

	Trauma Center	ER (Trauma)	Gen. Surgeon	OR	ICU (Trauma)	MEDSURG	CT	Ortho	Neuro-Head	Neuro-Spine	Peripheral Vasc.	Great Vessel	IR	Isolated Facial	Isolated Eye
Arkansas Children's Northwest	Pedi 4	Open	Open	Open	Not Provided	Open	Open	Open	Not Provided	Not Provided	Not Provided	Not Provided	Open	No Capability	Not Provided
Cox South	Level 1	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open
Eureka Springs Hosp	Level 4	Open	Not Provided	Not Provided	Not Provided	No Capability	Open	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided
Mercy ER-Bella Vista	Off Campus ED	Open	Not Provided	Not Provided	Not Provided	No Capability	Open	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided
Mercy Hospital - Rogers	Level 3	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open
Mercy Hospital - Springfield MO	Level 1	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open
North Ark Reg Med Cntr	Level 3	Open	Open	Open	Open	Open	Open	Open	Not Provided	Not Provided	Not Provided	Not Provided	Open	Open	Open
NW Med Cntr - Bentonville	Level 4	Open	Not Provided	Not Provided	Not Provided	Open	Open	Open	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided
NW Med Cntr - Springdale	Level 4	Open	Not Provided	Not Provided	Not Provided	Open	Open	Open	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided
Siloam Springs Reg Hosp	Level 4	Open	Not Provided	Not Provided	Open	Open	Open	Open	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided
Washington Reg Med Cntr	Level 2	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open

Southeast

	Trauma Center	ER (Trauma)	Gen. Surgeon	OR	ICU (Trauma)	MEDSURG	CT	Ortho	Neuro-Head	Neuro-Spine	Peripheral Vasc.	Great Vessel	IR	Isolated Facial	Isolated Eye	OB
Ashley Co Med Cntr	Level 4	Open	Open	Open	Not Provided	Open	Open	Not Provided	Not Provided	Open	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided
Baptist Health - Stuttgart	Non-Participating	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
Chicot Memorial Med Cntr	Level 4	Open	Not Provided	Not Provided	Not Provided	Open	Open	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	NP
Jefferson Reg Med Cntr	Level 3	Open	Open	Open	Open	Open	Open	Open	Not Provided	Not Provided	Not Provided	Not Provided	Open	Not Provided	Not Provided	Open

Southwest

	Trauma Center	ER (Trauma)	Gen. Surgeon	OR	ICU (Trauma)	MEDSURG	CT	Ortho	Neuro-Head	Neuro-Spine	Peripheral Vasc.	Great Vessel	IR	Isolated Facial	Isolated Eye	OB
Baptist Health - Arkadelphia	Level 4	Open	Open	Open	Not Provided	Open	Open	Open	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Open
Baptist Health - Hot Spring County	Level 4	Open	Not Provided	Not Provided	Not Provided	Open	Open	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided
CHI St Vincent - Hot Springs	Level 2	Open	Open	Open	Open	Open	Open	Open	Open	Open	Not Provided	Not Provided	Open	Open	Not Provided	Open
Christus St Michael Health System	Level 3	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Not Provided	Not Provided	Not Provided	Not Provided	Open
Dallas County Medical Center	Level 4	Open	Not Provided	Not Provided	Not Provided	Open	Open	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Open
Magnolia Reg Med Cntr	Level 4	Open	No Capability	Open	Open	Open	Open	Open	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided
Ouachita Co Med Cntr	Level 4	Open	Not Provided	Not Provided	Open	Open	Open	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided
South Arkansas Regional Hospital	Level 3	Open	Open	Open	Open	Open	Open	Open	Not Provided	Not Provided	Not Provided	Not Provided	No Capability	Not Provided	Not Provided	Not Provided

Map controls: pressure, 3D, animation, zoom in/out, scale (0-200 mm/h)

# Just One Example

- Hand injuries were transferring (usually flying) out of state every day for “re-implantation”.
- \$ millions of cost
- State-wide telemed triage program
- Virtually eliminated

# Data is Essential

It doesn't apply to us. We're different

We don't have data

The data isn't accurate

The data is old

# What's needed at this point:

- Real – Meaningful – Reliable - Local DATA
- Validate (completeness and accuracy)
  - ◆ EMS data
  - ◆ Hospital Data
  - ◆ Post acute
  - ◆ Linkage
- System Performance & Benchmarking



# When you break that code here is what you can do

## Arkansas Trauma System



The Arkansas Department of Health (ADH) is the agency responsible for implementing and maintaining the Trauma System, which originated from [Act 393](#). As such, ADH ensures a multitude of duties in the provision of ensuring an optimal Trauma System. One is to ensure that grant funds reach hospitals and emergency service (EMS) providers. Another is to create rules regarding the operation of the Trauma System throughout the State. Additionally, the Trauma System creates and maintains a communications system to be used by hospitals and EMS providers, as well as providing for an Arkansas Trauma Call Center (ATCC). As part of the ATCC upkeep, ADH ensures that education is provided to ATCC individuals and entities, as they play crucial roles in the Trauma System. Trauma also works closely with the Trauma Advisory Council (TAC), which provides guidance and advice to ADH regarding the Trauma System implementation and ongoing operations. In addition, the TAC conducts other liaison activities with a wide variety of individuals and groups that have an interest in the Trauma System.



## R ATS Trauma System Indicators

### + 5 ATS Trauma System Program

	Most Recent Period	Current Actual Value	Current Target Value	Current Trend	Baseline % Change
+ PM ATS Median emergency department length of stay of hypotensive patients with penetrating injuries before going to the operating room	Q2 2024	28.0 minutes	30.0 minutes	↘ 2	-15% ↘
+ PM ATS Percent of hypotensive patients with penetrating injuries who spend more than two hours in the emergency department before going to the operating room	Q2 2024	5.9%	25.0%	↘ 2	-68% ↘
+ PM ATS Median emergency department length of time of hypotensive, GCS <9, or ISS 16+ who are transferred from Level 4 trauma centers	Q2 2024	173.5 minutes	60.0 minutes	↗ 2	47% ↗
+ PM ATS Percent of hypotensive, GCS <9, or ISS 16+ who are transferred from Level 4 trauma centers where the EDLOS is more than 2 hours	Q2 2024	68.6%	50.0%	↗ 1	37% ↗
+ PM ATS Percent of transfer patients that did not go through the ATCC	Q2 2024	7.7%	5.0%	↘ 1	-51% ↘

# What you can do

- Risk adjusted benchmarked data
  - ◆ EMS
  - ◆ Hospitals
  - ◆ System
- Directional targets for education and funding

# The Challenge with Trust

Nobody wants to share data

It MUST be required

There MUST be infrastructure to analyze and report back.

The Patient Safety and Quality Improvement Act of 2005 protects “patient safety work products”

# The MOST powerful tool in our System

- Preventable Mortality Review
  - ◆ Statistically balanced sample of all trauma deaths that reached care
  - ◆ Delphi process of ALL types of providers
  - ◆ Two day process
  - ◆ Charts are complete



# The MOST powerful tool in our System

- Preventable Mortality Review

- ◆ Data is abstracted
- ◆ Standard reporting tool
  - ★ Preventability
  - ★ OFI
  - ★ Target area of OFI
  - ★ Contributing factors
    - Education, process, resources, etc.
- ◆ PI feedback

# The MOST powerful tool in our System

- Preventable Mortality Review
  - ◆ The output is de-identified
  - ◆ Confidentiality
  - ◆ Protected from discoverability by PSWP
  - ◆ 11 years no breaches
  - ◆ Done quarterly

# Success begot success

- Snowball effect
- Funding with pin-point accuracy
- Be innovative and fail fast



# Arkansas Trauma Society

In Conjunction with the American College of Surgeons - Arkansas Chapter



Review

> J Am Coll Surg. 2024 Apr 1;238(4):426-434.

doi: 10.1097/XCS.0000000000000935. Epub 2023 Dec 27.

## Progressive Reduction in Preventable Mortality in a State Trauma System Using Continuous Preventable Mortality Review to Drive Provider Education: Results of Analyzing 1,979 Trauma Deaths from 2015 to 2022

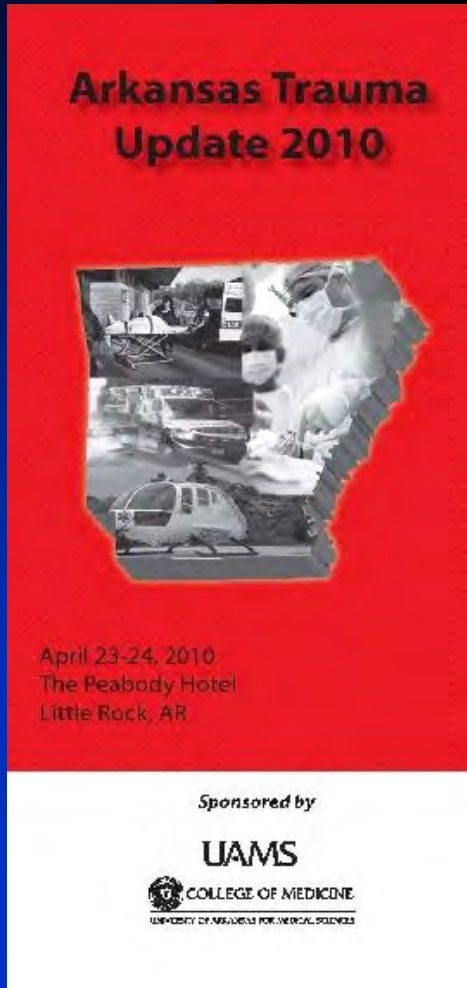
Charles D Mabry<sup>1</sup>, Benjamin Davis<sup>1</sup>, Michael Sutherland<sup>2</sup>, Ronald Robertson<sup>1</sup>,  
Jennifer Carger<sup>3</sup>, Deidre Wyrick<sup>1 4</sup>, Terry Collins<sup>1</sup>, Austin Porter<sup>5</sup>, Kyle Kalkwarf<sup>1</sup>



Severe TBI Treatment

# What's been accomplished ?

## Trauma education



- EMT and paramedic training
- First State-wide trauma symposium
- Use PMR and Dashboard Data to drive targeted education

The Arkansas  
provision of en  
throughout the  
(ATCC). As par  
Council (TAC),  
individuals and

BLOG

SOUT

De

Sta

Mabr

Rona

Auth

Journ

+ PM ATS

+ PM ATS

# Officials Tout Reduced Rate of Preventable Deaths on 10th Anniversary of Arkansas Trauma Center

January 17, 2020

the  
na System  
er  
a Advisory  
of

Pdf

Baseline %  
Change

-15% ↘

-68% ↘

47% ↗

37% ↗

-51% ↘



# What's in it for me?

Legislative bodies – Cost savings (9.5:1), supported by lobbying groups

Associations – Demanded by members Saved time, money particularly in rural areas

Citizen – We support it because it protects me and my family



# The ASK without good data

- One time appropriation for System assessment
  - ◆ Data validation across the system
  - ◆ Preventable Mortality review
  - ◆ Needs assessment with an educational campaign



# The Big ASK – with good data

- Sustainable System Funding
  - ◆ Ensure operational resources
    - ★ Some in and much outside of State governmental agencies
  - ◆ Deliverables are defined and measurable.
  - ◆ Financial impact can be calculated.
  - ◆ Room for Growth

# Summary

- System building is challenging but there are defined steps
- Key is to find win-wins – they exist
- Data is essential to:
  - ◆ Have
  - ◆ Use
  - ◆ Report
  - ◆ Repeat.