



ARKANSAS DEPARTMENT OF HEALTH

Trauma Section

The Arkansas Trauma System

An Overview for EMS

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Developing a System of Care

The Arkansas Department of Health (ADH), Trauma Section is the agency that was responsible for implementing and maintaining the Trauma System established by Act 393 (2009). This act provisions funding, establishes rules and defines the components needed to ensure a coordinated, statewide Trauma System. As the administrator, the ADH performs the following functions:

- Ensures that grant funds reach hospitals and emergency service (EMS) providers
- Creates rules regarding the operation of the Trauma System throughout the State
- Oversees the Arkansas Trauma Call Center (ATCC), a communications system used by hospitals and EMS providers.
- Provides funding for trauma education and various programs that support the trauma system, many that will be discussed in this overview.

The ADH works closely with the Trauma Advisory Council (TAC). The TAC provides guidance and advice to ADH regarding the Trauma System rules 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.

EMS is a critical component of the Arkansas Trauma System. The mission of EMS is to provide timely and appropriate emergency medical care and transportation of the ill and injured. To ensure that patients receive the best care possible, it is imperative to routinely re-evaluate standards of care, develop strategies for implementation of new policies and procedures, maintain compliance with trauma rules and regulations, and identify their strengths and weaknesses in meeting those standards.

To achieve this end, the ADH works to facilitate the following fundamental principles and engage EMS agencies to:

1. Practice Quality Improvement to facilitate positive patient outcomes.

2. Require every provider to participate in the effort to improve EMS
3. Implement EMS Quality Improvement at the agency level
4. Commit to quality care by each EMS agency starting at the provider level

EMS provider agencies, dispatch agencies, hospitals, regional councils, and the state EMS office, all play an important role in the implementation of an integrated Quality Improvement program.

Understanding Hospital Designation

Hospitals seeking designation as a trauma center through the ADH's Trauma Section must first establish a trauma program within their facility that meets the required criteria as set forth by the State. The hospital begins designation by sending a letter to the ADH. The ADH will organize a survey team appropriate to the facility and sends a confirmation letter to the hospital with a set date for their Trauma Designation Site Survey. The hospital will then complete a pre-review questionnaire (PRQ) that outlines their compliance with the Arkansas Rules and Regulations. During the site visit, trauma nurses from the Arkansas Department of Health along with trauma subject matter experts including trauma surgeons and other trauma program surveyors will tour the facility and evaluate the trauma program components.

If a trauma designated hospital experiences a change in their ability to meet the minimum required criteria at any time during the designation period, it must notify the Trauma Regional Advisory Council (TRAC) and the ADH Trauma Section immediately. This element is critical to the effectiveness of the statewide trauma program. Changes may require other hospitals and local EMS providers to adjust their operating guidelines.

Arkansas Trauma Center designation is valid for three years and before expiration the facility must apply for and complete the re-designation process. Trauma centers apply for re-designation six

months before their expiration date. An existing designation may be provisionally extended if the hospital applied for re-designation in a timely manner and is either scheduled for a site visit, awaiting the results of the visit, or responding to deficiencies identified during the visit.

The re-designation site survey visits focus on several areas including:

1. Compliance with the designation criteria
2. Progress made toward strengthening the weaknesses identified during prior site visits
3. Identifying how the system can collaboratively support the ongoing and future needs of the hospital's trauma care commitment.

Specific suggestions for improvement always have an educational focus and the visits are intended to be constructive, and not punitive.

Before becoming designated, a formal trauma program must be established within the hospital. In addition to developing policies and protocols that address trauma team deployment, emergent transfers and performance improvement, the hospital board and medical staff must demonstrate a commitment to providing trauma care commensurate with the standards published by the ADH. Support for a hospital's participation in the statewide trauma system is demonstrated when both the board of directors and the medical staff resolve to provide the resources necessary to attain and sustain designation. The hospital's trauma program will require both a Trauma Medical Director which is a physician to provide clinical oversight and a Trauma Program Manager who is an RN that is responsible for the administrative functions of the trauma program.

The Importance of the Trauma Team and Early Activation

Successful systematic approaches to trauma care integrate EMS and early notification. A trauma team activation should be a clear procedure for assembling the trauma team that provides immediate

resuscitation for the seriously injured patient. It is vital to the efficient functioning of a trauma hospital. This procedure should specify when the team must be assembled, who is to respond and how they are to be notified. Early notification and appropriate destinations for your trauma patient is vital and will be discussed later in this document.

Hospitals must work with their EMS providers to establish guidelines for early notification. Hospitals must also train with protocols designed to quickly identify seriously injured patients using the ATCC to help route them directly to the most appropriate trauma hospital. It is expected that the hospital trauma team will be activated upon notice by EMS. It is up to the individual hospital to determine if EMS personnel will activate the team or if EMS will consult with the emergency department provider who then decides the need for activation. Ongoing cooperation with destination hospitals helps to control over and under triaging.

EMS and inter-facility Transfers

A well-functioning trauma system is able to not only treat seriously injured trauma patients effectively and efficiently but also recognize when to transfer patients to a higher acuity facility in a timely manner. To this end, level I, II, III, and IV designations do not reflect the quality of care provided in those hospitals, but rather the facilities capacity and resources availability. Improved outcomes are closely associated with the time it takes for a facility to determine the need for and to accomplish the transfer. Trauma centers must establish procedures that direct the process for quickly and efficiently transferring a trauma patient to definitive care. Elements include anatomical and physiological criteria that, if met, will immediately initiate the transfer.

EMS Services and personnel play a key role in this process. The establishment of a close working relationship with local hospitals will contribute to the development of an efficient transfer

process. Some inter-facility transfers can be avoided by following the ATCC recommendations and transporting trauma patients to the most appropriate facility from the field.

Performance and Quality Improvement

The ADH Trauma Section contracts with Qsource-Arkansas to serve as the Trauma Quality Improvement Organization (QIO) for Arkansas. Qsource-Arkansas reviews the quality of trauma services provided to patients at the facility, regional and statewide levels. They promote optimal patient outcomes with collaborative outreach and education throughout the trauma care system.

Some of the technological advances brought to the Arkansas Trauma System by Qsource-Arkansas include the following:

- eDeath Forms- Each hospital is required to report all trauma deaths on the Trauma Death Quality Improvement form. Access to this electronic document is hosted by Qsource-Arkansas on the AR Trauma Quality Improvement website. Quarterly, Qsource-Arkansas reconciles the submitted forms with the AR registry and identifies any missing death forms. This report is provided to ADH.
- Electronic Pre-Review Questionnaire (PRQ) and related documents- Hospitals are required to submit a PRQ prior to their designation site survey. This document is in electronic format on the AR Trauma Quality Improvement website. Qsource-Arkansas grants the hospital access to complete and submit their PRQ. The PRQ is made available via system automation to the ADH Trauma Section and the assigned site surveyors. Other documents related to the PRQ are the checklist, Executive Summary and chart templates. These are also available to the ADH Trauma Section and site surveyors. Once

the documents are completed, they are routed electronically to the hospital Trauma Program Manager (TPM).

- Injury and Violence Prevention (IVP) Calendar- Qsource-Arkansas hosts the ADH IVP calendar. This is updated with ADH approved educational opportunities and IVP meetings. <http://www.qsource.org/ivp-calendar-2/>
- Trauma Calendar- Qsource-Arkansas hosts the ADH Trauma Calendar. This is updated with ADH approved educational opportunities and trauma-related meetings. <http://www.qsource.org/resource-hub/trauma-calendar/>
- Electronic Rules and Regulations Revision- The revised Trauma Rules and Regulations are currently open for comment. The electronic comment process is hosted by Qsource-Arkansas via a web-based tool.
- TRAC QI support: Qsource-Arkansas auditors are available to provide support to the TRAC QI Chairs. The auditors develop care maps and timelines for case discussion.
- Coordination of State Quality Improvement (QI) Committee meetings- Qsource-Arkansas schedules and coordinates State QI meetings. They develop an agenda for the meeting and assemble patient care timelines for case discussion.

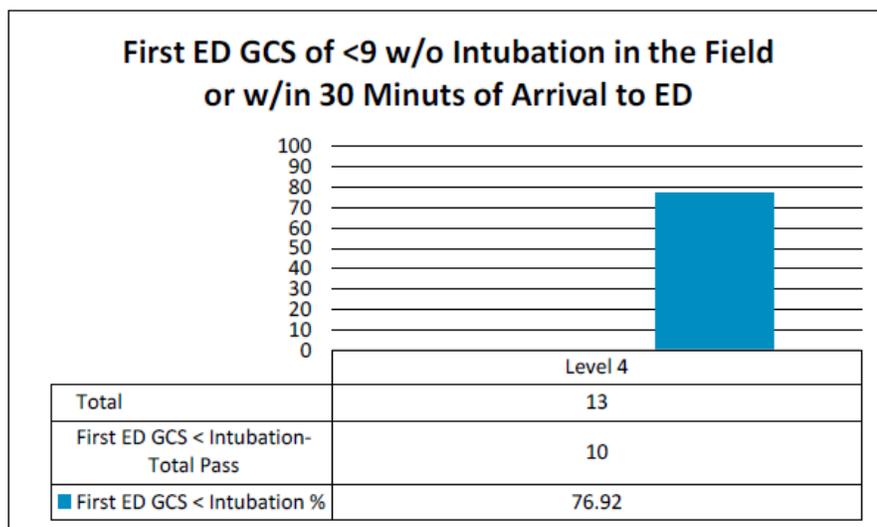
The electronic advances by Qsource-Arkansas aid the hospital designation site surveys and involvement with the TRACs and State QI facilitates the Quality Improvement efforts of ADH. Qsource-Arkansas audits designated trauma facilities quarterly. Qsource-Arkansas receives a random sample of patient charts, derived from the Trauma Registry, from ADH. Qsource-Arkansas audits facilities on the following schedule: Q1 = Level 1 & 2 facilities, Q2 = Level 3 facilities, Q3 = Level 4 facilities. Following the audits, Qsource-Arkansas provides facility level and state level reports on pre-determined Process Improvement measures sanctioned by ADH. Cumulative State and Trauma Regional Advisory Council (TRAC) reports are provided annually.

Through validation audits, Qsource-Arkansas provides inter-rater reliability checks of the trauma registry. In our validation audits, Preventable Mortality Review, electronic PRQ, and eDeath applications, and State QI Committee coordination, we have the opportunity to interact with every trauma designated hospital and many pre-hospital agencies and provide reports that assist our stakeholders to improve trauma care. Qsource’s validation audits reviews ATCC notifications at the hospital level. ATCC notification by pre-hospital is reviewed in the Preventable Mortality Review Committee.

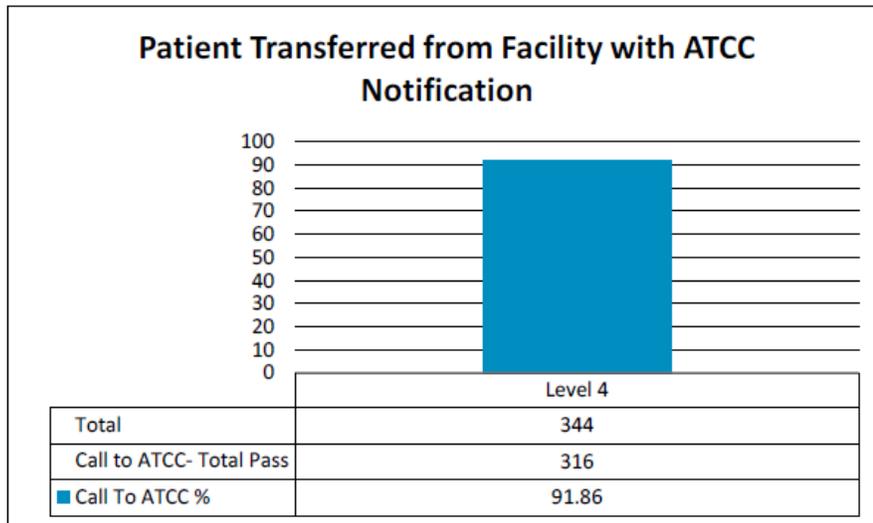
Our work to promote quality and efficiency within the AR trauma system is vital to all providers caring for the AR trauma patient. Reports are developed on a quarterly basis and include the following examples:

First ED GCS of < 9 without Intubation in the Field or within 30 Minutes of Arrival to the ED

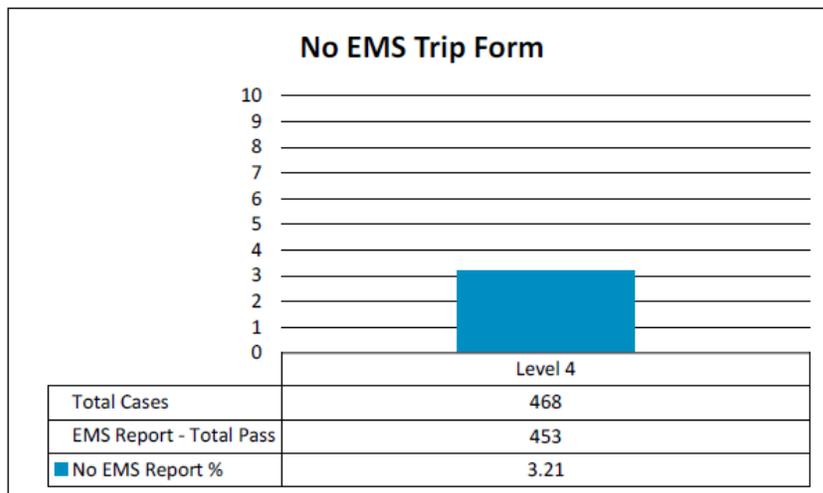
Demonstrates the findings of the measure in reverse by representing the percentage that the patient with a GCS of less than 9 was intubated in the field or within 30 minutes of arrival to the ED; therefore, reflects the percent passing.



Patient Transferred from Facility with ATCC Notification- Represents the percentage of time that it is documented within the medical record that ATCC was notified when a transfer to another acute care facility was needed.



EMS-Represents the frequency that EMS was involved in the care of the patient but no EMS Trip Form was provided, as noted in the ATR or medical record.



Qsource-Arkansas’ contribution helps identify quality improvement opportunities within the trauma system. They provide recommendations for improvement and to make care more efficient and effective. Qsource-Arkansas works with the ADH, the Trauma Advisory Council, the Trauma

Regional Advisory Councils, individual trauma healthcare providers, and various stakeholders to perform this work.

The Arkansas Trauma Registry

The collection and use of data is central to a successful trauma program locally, statewide and nationally. A trauma registry is established primarily to ensure the quality of care, but it has a secondary benefit of providing data for the surveillance of morbidity and mortality. Trauma hospitals and EMS Services are required to submit a number of data points to the Arkansas Trauma System. Additionally, each hospital can design a unique dataset to collect and analyze to further their PI objectives.

The Arkansas Trauma Registry (ATR) is a database of patients with traumatic injuries (based on inclusion criteria specifics) in participating hospitals. A typical record includes injury information, prehospital information including EMS info from an ePCR, ED treatment and disposition and outcome information. The ATR is an essential component of the trauma system because it houses patient data which can then be used to produce aggregate data on the in-hospital care of all patients served by the Arkansas Trauma System. It also plays a large role in the designation and review process for participating facilities and contributes to the PI and QI process.

ATR data is often compared with ATCC data to ensure compliance with ATCC regulations. While not currently integrated, the EMS registry would be another source of information the ATR could use to produce verifiable data regarding patient care. Prehospital information is recorded by the registrars the reliability and accuracy of that information are reliant on the source of reported data from the EMS agency and crew. A project is in development to link the EMS, ATS and ATCC

registry. This will result in a database with an enormous query-potential for use in research, patient care inquiry and systems improvement.

Arkansas Trauma Communication Center

The Arkansas Trauma Communication Center (ATCC) - or TraumaComm - is a centralized coordination center for Emergency Medical Services (EMS) and Emergency Departments. TraumaComm is unique as the Nation's only statewide center coordinating both pre-hospital and inter-facility patient movement. TraumaComm is fully integrated into the daily operations of the Trauma System from the point of injury to the arrival at a tertiary care facility and many aspects in between. It is important for the EMS provider to fully understand how and why the Arkansas Trauma Rules and Regulations and the Arkansas Emergency Medical Services Rules and Regulations impact their day-to-day patient care decisions. Contacting TraumaComm with all Major and Moderate (defined by the Arkansas Field Trauma Triage Decision Scheme) is required by both of these rule sets and is intended to be used to decrease the mortality rates of the traumatically injured. When used together - the Field Triage Decision Scheme and coordinating destinations with the TraumaComm Dashboard - outcomes are sure to improve for each patient.

A recent 18-month study of inter-facility transfers measured patients who arrived via EMS with an associated scene call to TraumaComm, patients who arrived by Privately Owned Vehicle (POV), and patients who arrived by EMS without a call. The statistics show room for increased utilization of TraumaComm. For patients identified as Major, 39% of those transferred arrived via EMS without an associated scene call compared to 42% of those by POV; only a 3% difference to arrive by EMS. For Moderate trauma patients, 47% of those transferred arrived by EMS without an associated EMS scene call compared to 31% by POV. This group would show that a patient is 16%

better served by going to an ED by POV than by EMS agencies that do not contact TraumaComm. It is important to understand that the goal of the Trauma System is not to eliminate these transfers but to decrease them by routing patients to the closest appropriate ED. There will continue to be inter-facility transfers for numerous reasons that are out of EMS, TraumaComm, and Emergency Department control; however, when everyone uses the Trauma System as intended, we know that mortality rates decrease.

Staffed with Paramedics, TraumaComm uses various software along with the EMS provider's or ED staff's radio/phone report to route trauma patients to the closest, most appropriate trauma center. In comparison, TraumaComm serves as the Air Traffic Controller for the trauma patient. Imagine there are numerous types and sizes of aircraft flying our skies 24/7. Compare the size of the aircraft to the severity of the trauma patient. The larger the aircraft, the longer the runway needed, as well as additional services needed for that plane than at a local airport. Using our EMResource "Trauma Dashboard" and the information provided by the EMS Provider and/or ED staff, TraumaComm recommends destinations based on the likelihood that the tertiary care facility's current status would best serve the patient's injuries/suspected injuries.

What is the EMResource trauma dashboard? A web-based software tracks every hospital's capability and capacity at any given time. This application is "live" and maintained by each hospital to represent both services provided and bed capacity for fifteen (15) different trauma categories. This software is the sole source used in TraumaComm's destination determination.

Metro	ER	CT	Oper Room	General Surgery	Neuro Head	Spine	Ortho	ICU-Trauma/Surgical	ICU-Medical	Peripheral Vascular Injuries	Cardiac/ Great Vessel Injuries	Angiography/IR	Isolated Facial Injuries
Arkansas Childrens Hosp	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open
Arkansas Heart Hosp	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
Baptist Health - LR	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open
Baptist Health - NLR	Open	Open	Open	Open	Not Provided	Not Provided	Open	Open	Open	Open	Open	Open	Not Provided
Baptist Health Med Center - Conway	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
CHI St Vincent - LR	Open	Open	Open	Open	Open	Open	Open	Open	Open	No Capability	Open	Open	Open
CHI St Vincent - Morrilton	Open	Open	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided
CHI St Vincent - Sherwood	Open	Open	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Open	--	Not Provided	Not Provided	Not Provided	Not Provided
Conway Reg Med Cntr	Open	Open	Open	Open	Not Provided	No Capability	Open	Open	Open	No Capability	Open	Open	Not Provided
North Metro Med Cntr	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
Saline Memorial Hosp	Open	Open	Open	Open	Not Provided	Not Provided	Open	Open	Open	Not Provided	Not Provided	Open	Not Provided
UAMS	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open

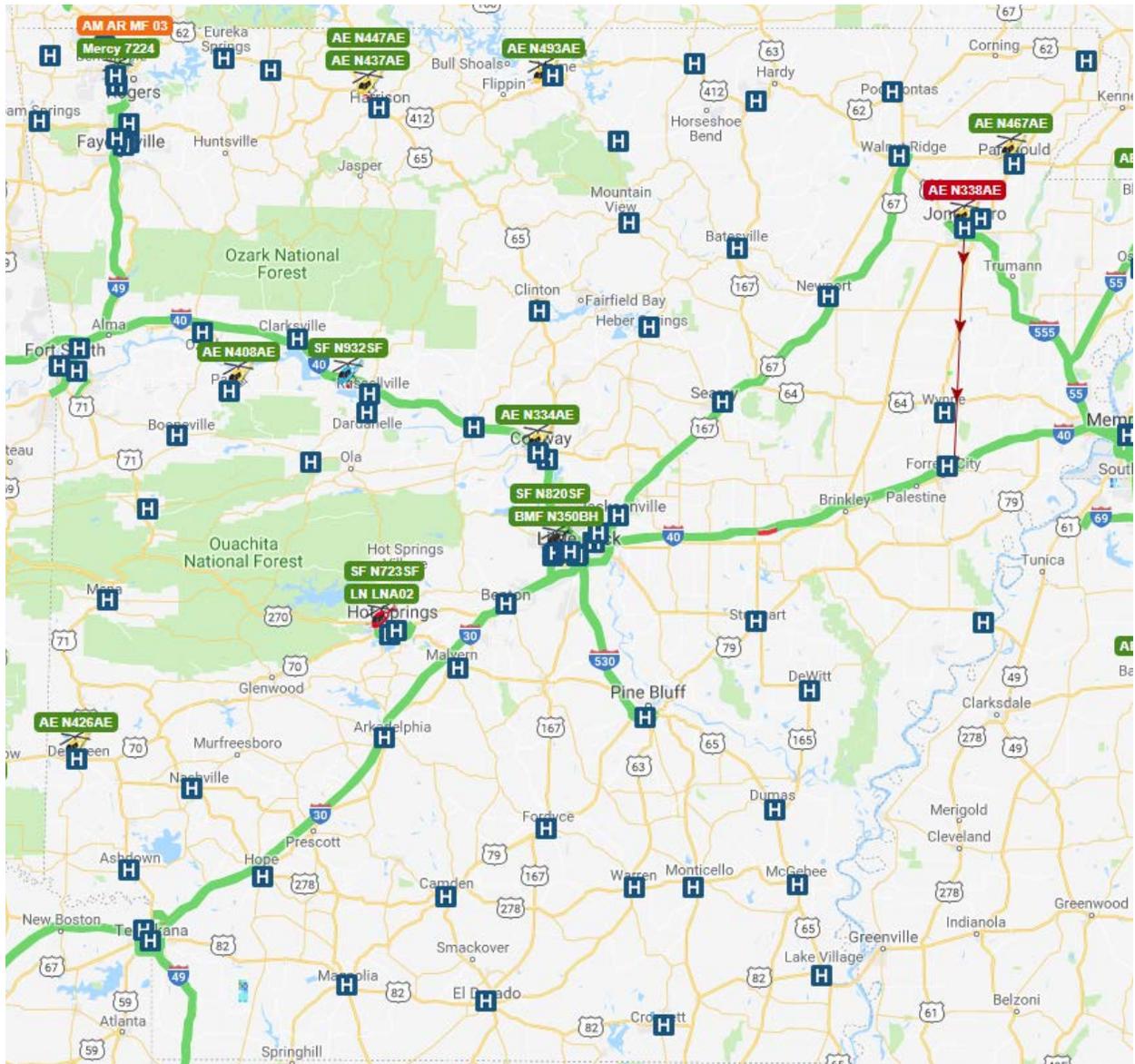
TraumaComm is essential to the Arkansas Trauma System, as it has become the “Standard of Care” for medical providers to use in their care and treatment of the trauma patient. Viewed as the one-stop shop, the first question asked in patient care reviews is “was TraumaComm contacted?” The burden is on TraumaComm to ensure the patient arrives at the appropriate ED. Only with TraumaComm’s creation did the pathway for patient care change. Now for our system, TraumaComm notifies hospitals on behalf sending ED’s seeking acceptance, not admittance, based on the capability and capacity of the hospital. For EMS, the same can be said however, we are not looking for acceptance rather than providing early notification/alerts to the ED’s to allow for earlier activation of their trauma teams.

In addition to coordinating patient destinations, TraumaComm also facilitates telemedicine evaluations for patients who have sustained hand trauma and burns. These two injury types have the fewest amount of specialist within our state. These two programs are used to provide live, face-to-face evaluations of these specialty injuries, offer immediate treatment recommendations, and determined the urgency of transfer/treatment for the injuries. This is accomplished by a partnership with the University of Arkansas for Medical Science’s Center for Distance Health and numerous hand and burn surgeons throughout the state; another first in the Nation. These programs allow the

EMS provider to transport to the closest ED where the patient can receive the telemedicine evaluation then the decision is made whether to transfer for follow-up care. Over the four years of the hand program, historically only 30% transfer for specialty care, and <5% transfer for emergent revascularization or replant surgery.

Additionally, TraumaComm serves as the conduit for the Trauma Image Repository (TIR). Once patients are accepted by a tertiary care facility, TraumaComm sends electronic notification to the TIR staff to “push” the appropriate images from the sending ED to the receiving ED. Another “1st” in the Nation, this system allows all radiological studies to be available to the tertiary facilities before the patient’s arrival. This system has allowed numerous patients to be delivered directly to the Operating Room (OR), bypassing the second ED and decreasing the time to surgery. It also decreases the amount of radiation a patient may be subjected to for unnecessary repeat studies.

The newest innovation within TraumaComm is the FleetEyes project. Born out of the Preventable Mortality Study, a statewide “flight following” system that provides the status and location for the air ambulances is felt to be beneficial for the EMS providers and hospitals alike, in their decision to transport by ground or air. Knowing where the air ambulance is and its status of available or not available is a resource option for all within the Trauma System. TraumaComm can additionally can place these aircraft on ground standby, air stand-by; or a launch to scenes, predetermined landing zones, or hospital helipads. TraumaComm can also assist the EMS provider in Multi-Casualty Incidents. TraumaComm can serve as your transportation officer, dedicating up to three AWIN Trauma channels for your event; inbound ambulances, on-scene ambulances, outbound ambulances, as well as destination coordination.



When should EMS call TraumaComm and what should they report?

Ideally, as soon as possible once the primary assessment has been completed and an accurate report can be given, i.e. once the patient is in the ambulance, hemorrhages controlled, airway secured, ready for transport. “Why call so early, I know where I’m going/where the patient needs to go?” Although EMS understands their local hospital’s normal day-to-day capabilities, they may not know the exact status. Is the CT machine down? Is the surgeon in a lengthy case and would be unable to evaluate and care for this patient? The list goes on. And without your report, we wouldn’t

know about the potential impact this patient's condition could have on the next patient. The earlier you can give your report to TraumaComm, the more time we and you have for options to be considered. As important, the earlier you contact TraumaComm, the earlier we can contact the ED and relay your report (we provide trauma alerts on 100% of Major trauma cases) to allow them to activate their trauma team as the patient condition warrants. Wouldn't it be nice that if you had a 30-45 minute transport time to an ED when you arrived the surgeon and their staff was in the ED waiting on you? Consider the "Golden Hour" to be from the insult of injury to the time the surgeon is cutting skin, not the time to ED arrival.

What should be in the TraumaComm report?

When giving your radio report to TraumaComm, some items to always provide are two sets of FULL vital signs. (1) the current set, and (2) the lowest set. It is imperative to pass along to TraumaComm and the ED staff if the patient EVER experienced hypotension (<90 Systolic) (<110 Systolic if > 65y/o) or hypoxia. **One episode of either double the patient's mortality rate.** It is not as important to relay the treatments that you have done as much as it is what you cannot do. *"I cannot stop an external hemorrhage, I cannot intubate, etc."* Also report whether the patient takes anti-platelets or anticoagulants(blood thinners). These patients also have an increased chance of complications from the simplest of injuries due to these medications. One last area to report on in Motor Vehicle Collisions (MVC) is the condition of the vehicle. One of the easiest ways to capture these patients into the Moderate category is to realize and relay the intrusion into the vehicle. TraumaComm may ask questions to gather additional data after your initial report in order to provide the most accurate destination recommendation, as well as to best categorize them as a Major, Moderate, or Minor.

As previously mentioned, TraumaComm makes recommendations based on the radio/phone report given, location, and the status of the dashboard as it pertains to the closest Emergency Departments. An ongoing trial that began April 1, 2018, is incorporating our current standards for destination recommendation, but also applying the Revised Trauma Score, Shock Index, and a few of the nuances we know to exist within Arkansas. To summarize the hypothesis, do patients who have a “Positive” Shock Index and/or Revised Trauma Score require higher level of care than the Trauma Dashboard would recognize. Regardless of “what you see” do certain modalities have better outcomes if these “positives” are present?

How does TraumaComm validate its performance with EMS reports?

Data, data, data.....it is amazing the picture that can be painted with data. TraumaComm provides the EMS Owner/Operators with monthly volume reports that show each and every call their service(s) called into TraumaComm from the field. This report shows the date of the incident, Trauma Band #'s, which base the unit was out of, the ED ATCC recommended, and the ED the patient was transported to. Additionally, ATCC provides a report that captures patients, who arrived at an ED by EMS, who was transferred to a tertiary care facility, yet EMS did not call ATCC prior to arrival at the ED. These two reports capture two-thirds of all trauma volume. Once linkage with Imagetrend is accomplished, 100% of Major and Moderates are accounted for.

Back to TraumaComm validating its performance: how many patients transferred after EMS followed ATCC's recommendation? Remember, one of our goals is to decrease transfers. With this goal, by performing Quality Assurance on 100% of these patients (EMS arrival with ATCC coordination), ATCC strives to meet a 95% threshold. Again based on the radio report given and the dashboard status.....did ATCC make the appropriate recommendation? We never assume that all transfers should be prevented, maybe surprisingly to some, there are times when specific

physiological derangements dictate that Major trauma patients stop at a Level III Trauma Center for “damage control” in the Operating Room, then transfer for further care.

One of the cornerstones we live by is “always get better at what we do!” We strive for perfection and to be a calm voice and resource for the EMS provider at all times. If you ever have any questions, concerns, compliments, complaints, or would like to come by and visit, please do not hesitate to reach out.

Trauma Regional Advisory Council (TRAC)

A Trauma Regional Advisory Council (TRAC) is an organized group of citizens who represent all healthcare entities within a specified and clearly defined trauma service area. The stakeholders include all trauma centers, physicians, nurses, EMS Providers, and EMS Training sites. There are seven TRACs throughout Arkansas. All meet routinely to address local issues such as protocol development, education, performance/quality improvement (QI) and data analysis. QI plays an important role in the TRAC. Each TRAC has a QI subcommittee that constantly monitors the quality of trauma care delivered in its region and addresses issues that have been determined to adversely affect patient care whether it be at the pre-hospital, hospital, or post-acute care stages. Individuals directly involved in the case are invited to appear before the QI Subcommittee and discuss the identified issues. Each TRAC has its own medical director to provide medical oversight for the QI issue. TRAC’s have structured membership, by-laws and committees that may differ from one TRAC to the other. Members from each trauma center and EMS agency are required to attend 50% of the meetings each year.

Each TRAC receives grant funding in the amount of \$5,000 for maintenance of the TRAC infrastructure (total of \$35,000 for all seven TRACs). In addition, each TRAC receives \$5,000 (total

of \$35,000 for all seven TRACs) to be used for Injury Prevention initiatives. All EMS providers are encouraged to attend these meetings to provide a field perspective on the trauma system and how it can be improved.

The Trauma Advisory Council and the Quality Improvement Process

The Arkansas Trauma System has been in operation since 2009 and has improved the outcomes of Arkansans who have suffered trauma by providing a robust and comprehensive system approach to serious injury. The Trauma Advisory Council (TAC) serves as an advisory body to the Arkansas Department of Health on matters pertaining to trauma and the Trauma System, receiving input from the various societies and associations that deliver care to Arkansans.

The TAC has several committees that help provide input and advice to the ADH:

- EMS- provides input from EMS associations and also advises on the distribution of trauma funds for EMS education
- Hospital- provides verification of trauma centers and recommends changes to regulations for hospital trauma centers
- Rehabilitation- provides input into the rehabilitation needs for trauma victims
- TRAC/QI- quality improvement and Trauma Regional Advisory Council (TRAC) input

The TRAC/QI committee provides state-wide oversight into the quality improvement process for trauma. This QI process is vitally important to recognize areas for improvement and enhance communication and education to our providers. Quality improvement can best be achieved in an environment where poor outcomes are recognized as opportunities to learn and improve our trauma care. There is Federal and State protection for confidentiality and protection from legal discovery for

those issues undergoing review, and as long as that review is conducted as part of an organized quality improvement process.

The quality review starts at the trauma center level where regular committee reviews of trauma cases look for areas of improvement and identify preventable complications or deaths. Local EMS providers are invited to participate in these reviews along with the physicians and nurses of the trauma center. There are seven TRACS in our state that review trauma deaths and complications as part of the system-wide quality improvement review process. EMS, trauma center personnel, and the TRAC Trauma Medical Director and QI Chairs all participate in these reviews. They recommend changes to the Trauma System, improvement in regulations, and identify cases for review at the state level which are conducted at regular meetings of the TRAC/QI committee meeting.

In addition to the case review at the trauma center and TRAC level, Qsource-Arkansas, acting as the state trauma Quality Improvement Organization (QIO), hosts a review of a portion of the trauma deaths each quarter. The review is conducted by expert reviewers from ED medicine, trauma surgery, nursing, and EMS, who review a sampling of trauma deaths looking for areas of preventable trauma mortality. Some of these cases are then sent to the TRAC/QI committee for further review along with recommendations for new educational efforts in specific areas identified by the committee that would benefit our patients.

These TRAC/QI meetings are attended by each TRAC Medical Director or QI Chair along with representatives of the TAC. Guests are invited to help review cases in which they participated. These meetings are designed to be both educational as well as form the basis for new educational efforts in trauma to reduce complications and deaths going forward.

The Preventable Mortality Committee

For those providing care during traumatic situations, having a systematic approach to care can be the difference between life and death. Quality Improvement (QI) processes help providers identify the most efficient means to generate consistent, optimum results when providing care by measuring and correcting variations from accepted standards. Within the Arkansas Trauma System, QI issues and concerns are reviewed at the regional level via the QI Subcommittees of the Trauma Regional Advisory Councils (TRACs).

However, some issues may be particularly flagrant or involve an issue that crosses TRACs or is statewide. These issues are referred to the Trauma Advisory Council (TAC) QI/TRAC Subcommittee for review and recommendation of actions to the TAC. All QI proceedings are protected by Federal and State statute and are not subject to the Freedom of Information Act nor can information be subpoenaed through the judicial process. This protection provides essential confidentiality that allows for an open and honest review of the issues.

The ADH Trauma Section contracts with Qsource-Arkansas, which serves as the Trauma Quality Improvement Organization (QIO) for Arkansas. Qsource-Arkansas reviews the quality of services provided to patients at the facility, regional and statewide levels, and promotes optimal patient outcomes with collaborative outreach and education throughout the trauma care system. After collecting and analyzing trauma performance measure data, reports are developed and findings are presented to the TAC, key trauma stakeholders, and providers to inform quality improvement.

Under the QI umbrella, the ADH Trauma Section also conducts a Preventable Mortality Review, coordinated by Qsource-Arkansas, which includes a panel of trauma experts who review a sampling of mortality cases looking at the entire continuum of care. The goal of the Preventable Mortality Review is to examine a sampling of trauma deaths from around our state and to determine

which of those deaths might have been prevented by improved or appropriate care. Arkansas is the only state in the nation with an ongoing Preventable Mortality Review and uses the Preventable Mortality Review to understand where more educational programs, protocols, or standards are needed to save the lives of our citizens.

The Trauma Image Repository (TIR)

The Trauma Image Repository (TIR) is a web-based virtual server that is used for the temporary storage of radiologic images of traumatic injuries. Images in this repository can be viewed or uploaded or viewed later by physicians in other trauma designated hospitals who have accepted a trauma patient for transfer to their facility for a higher level of care. The TIR can also be used in exceptional cases that require emergency access to images otherwise unavailable through other means.

The TIR is an avenue to view trauma patient's electronic image prior to transport from a referring facility. Electronic images such as CT, MRI, X-RAY, PET, ECHO, and ultrasound can be viewed or sent directly to the receiving facility's in-house Picture Archiving and Communications System (PACS) at all Level I, II and many of the Level III trauma centers that received trauma transfers. Since its beginning in July 2011, more than 15 million images have been received on trauma patients transferred for a higher level of care. Currently, 31 of the 80 sites can receive images directly into the PACS for viewing in more familiar settings.

Hand and Burn Trauma telemedicine programs.

Real-time hand and burn telemedicine consults (TM consults) have eliminated a significant number of unnecessary in-state and out-of-state transfers. The hand and burn injuries can be

evaluated immediately and care provided at the originating hospital which allows the hand surgeon and the attending physician to develop a plan of care that often results in a clinic follow up in the following days. Before this program, patients often were transferred, many out-of-state and by air ambulance, only to be discharged from the receiving facility within 24 hours.

The purpose of such access is to provide a more efficient means of communicating with the originating physician and to provide continuity of care for the patient in an emergency situation. Our state-wide image repository enhances access to care for trauma patients. Emergency room staff at the trauma sites can send images within minutes of imaging the patient. The images are available at the receiving facility prior to the patient's departure with the ability to make life-saving decisions and planning well before the transfer of the patient.

The TIR has eliminated the need to re-image the patient in the majority of these patients which has prevented additional radiation exposure, delay to treatment and duplication of cost while improving the outcomes of many of the traumatically injured patient. Every hospital in Arkansas that provides emergency care has the ability to send images to the TIR and has telemedicine units in their ED's to provide real-time Telemedicine consults for hand and burn trauma. Every hospital that is part of the Arkansas Trauma system can send and most can receive images on trauma patients for real-time evaluation of care prior to transport.

A reviewer examines all consults for the quality of the video connection and presentation of the patient to the surgeons. These reviewers also provide instructions to improve the quality of care. Feedback is given to the trauma coordinators and ATCC when a potential problem is identified and recommended corrections are provided to ensure patient privacy and quality of care.

Trauma Coordinators at participating and non-participating sites continue to receive feedback from weekly and monthly quality improvement reviews. Each Trauma Coordinator is provided updates for compliance and immediately contacted if there is an immediate concern regarding the

TIR or telemedicine consult. An instruction guide is provided to each trauma coordinator and available online in the TIR. The Center for Distance Health continues to develop online resources for TIR training and re-education for the use of telemedicine equipment. Timeliness and cost-effectiveness in having access to images from all transferring hospitals is essential in making the TIR a valuable resource to all people of Arkansas. Center for Distance Health is currently piloting a program for pre-hospital evaluation for stroke victims with one of two EMS services in Southwest AR. CDH is also planning a pilot that will involve telemedicine consults to provide assistance for mild TBI patients.

Arkansas Trauma Rehabilitation Program

The Arkansas Trauma Rehabilitation Program's (ATRP) main purposes are to increase access to rehabilitation, address the lifelong care needs of survivors of traumatic injuries, evaluate existing programs, educate healthcare professionals, and identify vital resources for survivors of traumatic injuries. Adults with traumatic brain injuries in particular are an underserved population. There are few safety net resources for these individuals as opposed to developmentally disabled individuals who have similar functional difficulties.

The ultimate goal of the program is to optimize the health and quality of life of trauma patients rehabilitating from traumatic brain injuries, spinal cord injuries, and traumatic amputations. Education of survivors, supporting family, friends, and healthcare professionals about physical medicine and rehabilitation is a major activity of the program. The best current practices in the primary clinical treatment guidelines for spinal cord injury and traumatic brain injury patients is disseminated for healthcare professionals across the state. The Program maintains a Traumatic Brain Injury Registry with the purpose of tracking patients to provide information for the resources in the

community and to provide data-driven information for policy makers. The Program also provides a comprehensive resource list for survivors, families, and clinicians that is constantly updated for each community in Arkansas. The program facilitates telemedicine services which connects post-traumatic injury patients who are often in remote areas of Arkansas to specialized physical medicine rehabilitation physiatrists for consultation.

A secondary goal in the program is to increase the efficiency of the healthcare system by reducing waste and costs. Through better education and resource utilization, the costs of medical care can be reduced, rehabilitation rates can be increased, and some patients can enter the workforce faster. Furthermore, through the utilization of the call center, the use of emergency services including EMS and emergency departments can be reduced.

Partnering with ADH for matching funds from the ATRP program, a grant through the Department of Health and Human Services (DHHS) with the Admiration of Community Living State Partnership (ACL) will allow for the opportunity to create an advisory board, provide access to resources in Arkansas in the underserved areas for persons and families who have survived TBI, and help with the development of a waiver and trust fund program. These funds have allowed the hiring of a Program Communicator to connect resources and explore opportunities for improving the lives of the families and survivors. Some of the programs that this position oversees include:

Triumph Call Center which:

- Provides 24/7 nurse triage that can help decide if a patient should go to the emergency department or can be referred to one of the on-call physicians.
- Provide information for family members needing resources for the patient's condition or special needs.
- Answer questions for healthcare professionals attending to trauma rehabilitation patients.

Arkansas Trauma Rehabilitation Symposium

- Communicates information about the latest issues in trauma rehabilitation for clinicians.
- Shares experiences of national and local experts.

Traumatic Brain Injury Health and Human Services Grant

- Admission of Community Living State Partnership will allow for the opportunity to:
 - Provide access to resources for the underserved survivors of TBI
 - Create a statewide TBI Advisory Board
 - Pursue a Waiver or Trust Fund Program for TBI survivors

Traumatic Brain Injury Registry

- Requires reports by the local hospital personnel within the fifth day after discharge.
- Requires accreditation of all hospitals in the Arkansas Trauma System
- Provides Clinical Management Guidelines for traumatic rehabilitation practitioners
- Provides Traumatic Brain Injury Rehabilitation Guidelines
- Communicates six clinical guidelines of best practices
- Provides Spinal Cord Injury Guidelines for traumatic rehabilitation practitioners
- Communicates nine clinical guidelines of best practices
- Ensures no management guideline is older than three years
- Ensures guidelines are authored by physiatrists who are the highest specialty credentialed rehabilitation physicians in Arkansas

TBI Survivor Programs

- Brain injury support groups

Telemedicine

- The TBI specialist provides teleclinic consultation to hospitals, nursing homes for survivors close to their residence.

- The Spinal Cord Injury specialist provides teleclinic consultation to hospitals, nursing homes for survivors close to their residence.
- This eliminates the inconvenience for survivors to travel to Little Rock for a clinic visit to the rehabilitation specialists.

Telemedicine Special Project

- This teleclinic is targeted for rehabilitation survivors at home.
- Healthcare practitioners team with home health and community paramedic services to facilitate therapy and rehabilitation for the survivor at home.

Research Projects

Investigations of traumatic injury rehabilitation survivors in Arkansas will likely include

- ATRP subsidized the first assessment of TBI survivors in Arkansas
- Opportunities to combine the TBI Registry, Trauma Registry, and EMS databases to gain a better understanding of TBI and Spinal Cord Injuries in Arkansas.

Learn on Demand

- Continuing Education modules for healthcare professionals
- Clinical management guidelines are updated and then presented live and recorded for the Website.

Survivor & Family Resource Directory

- Website providing local resources in the community

Rehabilitation is a key component of any trauma system. This program provides patients, families, and caregivers a resource to help with answers to health-related questions or concerns. This program also assists individuals to locate resources as the survivor transitions back into the home from a hospital or long-term care facility.

The ATRP is housed at UAMS which is the only adult Level I Trauma Center in Arkansas.

ATRP personnel regularly visit the Level I and II Trauma Centers on a monthly basis and the Level III and IV Centers annually. Because of the close relationship of the other trauma centers and the database the trauma coordinators enter patients with moderate to severe TBI information into. The ATRP staff and TBI Program director will follow up and provide needed information and resources for patients and families of persons who have survived TBI.

- Integrates into CDH programs and the advancing telehealth environment
- Work closely with Spinal cord commission to provide information/resources
- Work closely with BHRI, SVI, and Neurorestorative to provide education and identify needs and opportunities
- Contact with researchers from multiple programs, including ADH, ACHI, and multiple departments across UAMS
- Bring various disability groups together for our TBI grant

It can be expanded to provide follow up information with the hopes of reducing unnecessary transfers to hospitals for conditions related to the chronic conditions or symptoms that may have resulted in frequent hospital visits.

- Reducing the need for transports through telehealth visits
- Reducing unnecessary transports usage of emergency services through Triumph call center
- The call center can also serve as a direct resource for the EMS provider themselves when dealing with post-acute TBI/SCI patients

Trauma Education

Over the past several years the way trauma education funding has been distributed has changed. Currently, there is no educational “bucket” of money for hospitals or EMS Associations like previous years. Trauma education funds are expensed is as follows:

1. \$151,000 is held in reserve for required national courses that the Trauma Section will coordinate (TPM, AAMA/AIS-coding, TOPIC, potential Leadership course provided by the Trauma Centers of America)
2. \$50,000 to the Ambulance Association and EMT Association combined to deliver EMS education based on the preventable mortality study
3. Level 4's receive an additional \$15,000 – total \$40,000 (This will help provide funding for their educational requirements)
4. Level 3's receive an additional \$10,000 – total \$135,000 (This will help provide funding for their educational requirements)
5. Level 1's and 2's receive an additional \$12,000 to pay for TQIP fees and ACH will receive an additional \$50,000 to support an accredited burn center (This was agreed to in a TAC meeting a few years ago)
6. A variety of other conference is also supported financially across the state when requests are made to the department.

The Arkansas Ambulance and EMT Associations are great partners in that they support and provide educational opportunities across the state, whether it is the Annual EMS Conference, statewide difficult airway classes, or other educational outreach initiatives that are supported by the Trauma System.

The Arkansas Trauma Society (ATS) is an affiliate of the Arkansas Chapter of the American College of Surgeons and is dedicated to the improvement of the care of trauma patients in Arkansas. The ATS hosts an annual Arkansas Trauma Update in which national and state leaders in trauma provide educational lectures for physicians, nurses, and EMS providers. The content of the Arkansas Trauma Update is influenced by lessons learned and gaps in education that are identified in our system-wide QI process outlined above. In addition, the ATS produces other courses devoted to the trauma provider such as the ACS Advanced Trauma Life Support course (ATLS), the Trauma Nurse Care Course (TNCC), and is now developing a new course: Arkansas Rural Trauma Team Development Course (ARTTDC) which is designed to provide essential education in the care of the trauma patients for rural trauma centers. Showing how physicians, nurses, and EMS providers can work together in an efficient fashion to deliver organized and essential care to our rural trauma patients is the aim of the ARTTDC course.

To an EMS provider in Arkansas, it is essential that we provide education so that he or she will understand how best to care for their patients who have suffered from trauma. Any trauma system capable of addressing all forms of trauma occurring in all environments and locations will have complexities. Knowing the various parts of our Arkansas Trauma System and how best to use each component will allow the EMS provider to then deliver the best care possible to their patient and to use the Trauma System to its full potential. Understanding how the QI process works in our Trauma System to improve the care of our patients is also important. It is important for each EMS provider to know how they can improve the System by actively participating in their local Trauma Center QI process, the TRAC QI process in their region, and also at the State level via the TRAC/QI meetings.