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# STATE OF MICHIGAN TRAUMA SYSTEM ANNUAL REPORT 2023

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## Introduction

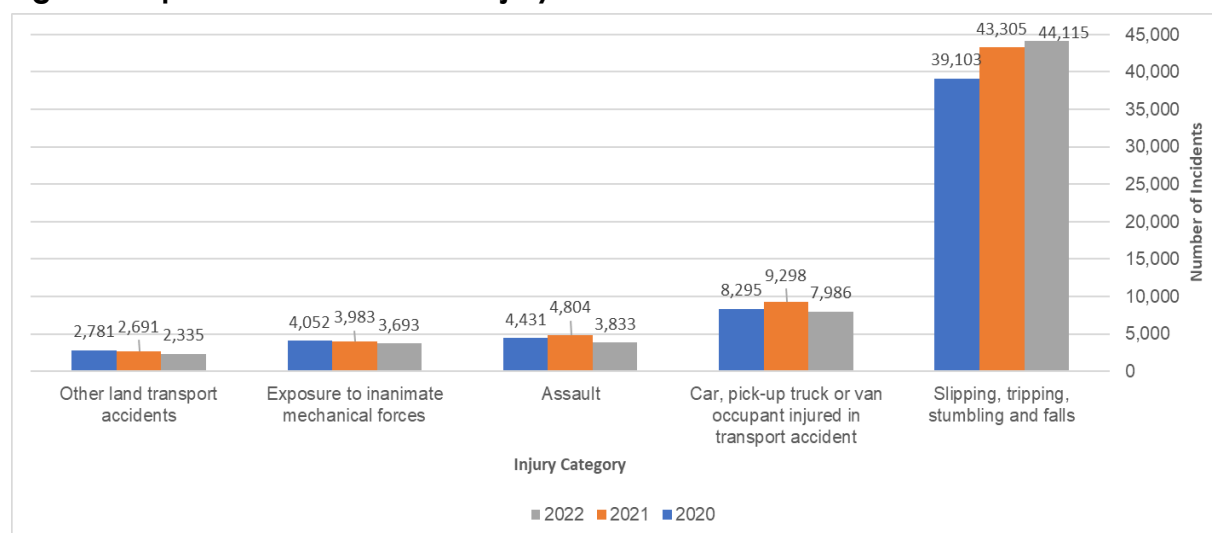
The statewide trauma system is charged with providing seamless care for the injured through a regionalized, coordinated, and accountable system. Michigan has been addressing the needs of the injured by implementing injury prevention programs, supporting prehospital and inpatient care, and engaging in efforts to better understand rehabilitation and the work needed to return productive life after injury. The regional trauma system continues to monitor its effectiveness, engage in addressing identified gaps using data to drive change and build relationships and collaborations.

Trauma system building informed system planning for similar time sensitive emergencies (stroke, and ST-elevation myocardial infarction or STEMI). In November of this year the stroke and STEMI Administrative Rules were adopted by the Secretary of State. The Administrative Rules describe the operationalization of a system approach that integrates into the existing trauma system that support getting these stroke and STEMI patients to the right resources at the right time.

## Data

Data continues to drive trauma system decision making and priorities, issue identification, inform performance improvement, and system evaluation, there are currently **652,476** incidents in the state trauma registry. There are 127 trauma facilities that participate in data submission to the state trauma registry. Figure 1 below illustrates the top five mechanisms of injury that occurred in Michigan over the past three years. Falls remain first in the top five mechanisms of injury. Both the regions and individual trauma facilities identify and track this data which allows for program resource planning and focused injury prevention initiatives to address this and other targeted issues.

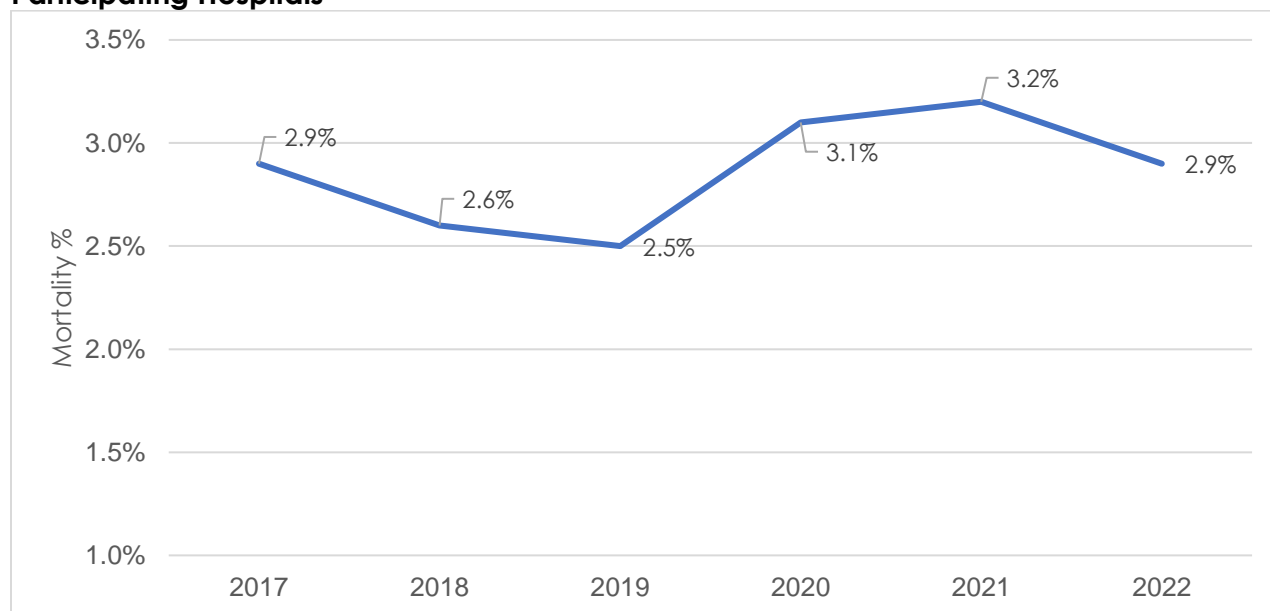
**Figure 1 Top Five Mechanisms of Injury for 2020-2022**



Source: Michigan Trauma Registry

Mortality data collected and reported by the Michigan Trauma Quality Improvement Project (MTQIP) shows that mortality was at 2.9% in 2022 which was a decrease from the year prior (3.2%), (figure 2).

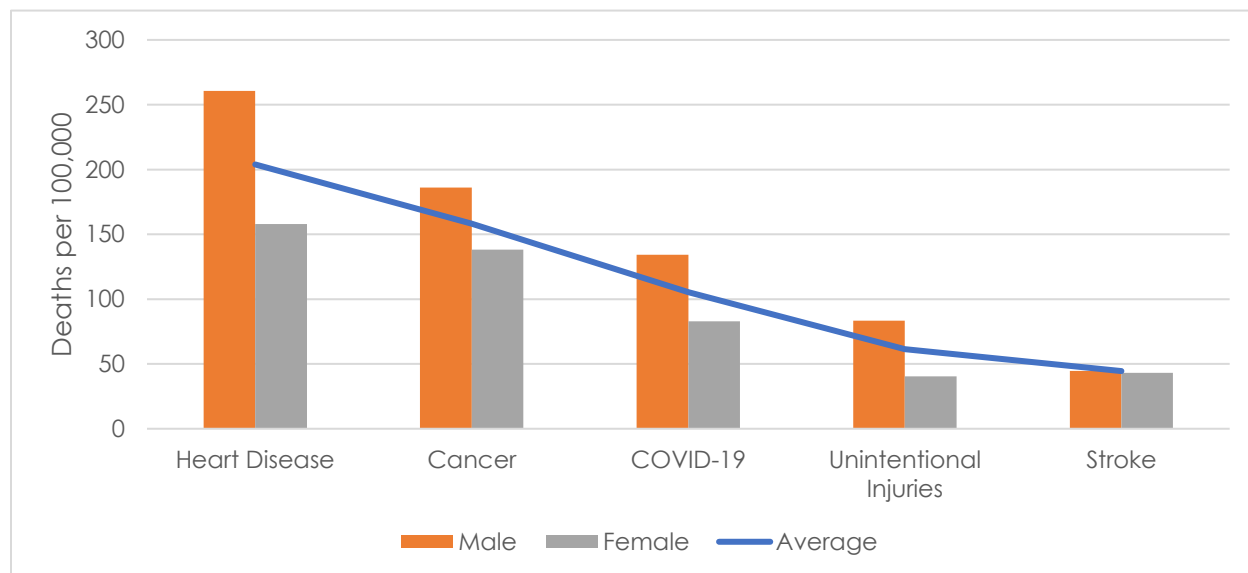
**Figure 2 Mortality Percent Overall by Year for Michigan Trauma Quality Improvement Project Participating Hospitals**



Source: State of Michigan Trauma System Report, Michigan Trauma Quality Improvement Project July 2023

The top five leading causes for Michigan residents in 2021 were heart disease, cancer, COVID-19, unintentional injuries, and stroke, in that order (figure 3).

**Figure 3**  
**Age-adjusted Mortality Rates for the Five Leading Causes by Sex, Michigan 2021**



Source: Division for Vital Records & Health Statistics, Michigan Department of Health & Human Services ([Age-adjusted Rates by Leading Causes of Death by Sex \(michigan.gov\)](https://michigan.gov/health-services))

Quality data is the key in identifying issues, providing measures of performance, injury prevention initiatives, and ultimately impacting patient outcomes in the state trauma system. Aggregate reporting allows for system evaluation from prehospital through discharge of the injured. Work continued through the year to review trauma registry data for quality, completeness, and accuracy. The State Database Manager and the Division Epidemiologist presented educational sessions with office hours presentations that were well attended, with positive reviews by trauma registrars and those responsible for trauma data abstraction and entry. Topics included a review of appropriate data entry and file submission processes, available resources, basic report writing and troubleshooting. Throughout the year, the statewide trauma advisory committee (STAC) was routinely provided updates about the submission process, missing or incomplete data, trends, and issues. Data presentations were made throughout the year. In June STAC was provided an aggregate report based on registry data that included information about injury severity scores, mechanisms of injury and ED length of stay and other metrics. They also heard a presentation about a “Safe Handoff” project conducted in Region 6 that explored enhancing the communication process between prehospital providers and ED staff during a patient handoff. In December there was presentation on a Region 1 project about the interaction of substance use and traumatic injury. Trending data has been added to the Regional

Professional Review Organization Inventory system assessment tool to provide a more detailed overview of the system components and issues. Work on revisions to the report and discussions on additional metrics that would be useful to include is continuing.

## Regions

### **Region 1**

Region 1 had the unfortunate experience in February of having to manage a mass casualty incident involving a shooter on the campus of Michigan State University. During this incident, the Regional Healthcare Coalition was able to test the functionality of their Everbridge paging system to notify area hospitals and agencies of the incident to prepare to receive patients. Healthcare Coalition has conducted several exercises to test the capacity of this paging system in 2023, including a debrief of the Livingston tornado touchdown from August, showing how their work in calendar year 2022 led to the success of the system during the MSU shooting incident.

Many of the facilities in the region participated in the Systems of Care grant to support both their trauma programs and their Stroke and STEMI programs. The region was also able to support two projects with the remaining funds to support regional trauma training and education. Some notable projects included the training of a car seat certified technician for car seat checks and the purchase of new car seats to give to families, stroke and STEMI community education to include stickers and coffee sleeves, a Oculus system for virtual trauma education simulation, the hosting of a tactical emergency casualty care course for first responders at Michigan International Speedway to support their NASCAR and Faster Horses operations, and many Stop the Bleed kits purchases to support community trauma education.

The new Regional Trauma Coordinator began working in early 2023 and started out visiting many of the facilities, meeting stakeholders and supporting the work of the region. The Regional Trauma Advisory Committee (RTAC) and the Regional Trauma Network (RTN) met several times to update the trauma workplan for region 1. These workplan updates included incorporating objectives from the state's strategic workplan as well as updating objectives from the previous regional workplan. The region was also able to restart their education and injury prevention subcommittees to work with the RTN and RTAC to guide activities in both areas.

### **Region 2 South**

The regions stakeholders and committee members continue to work on the regional work plan and regional initiatives. The Regional Professional Standards Review

Organization (RPSRO) is continuing to track tourniquet usage from 2019-2023. This data provides information on who applied the tourniquet, mechanism of injury, mode of transport to hospital, did use of tourniquet activate the trauma system, appropriate use and application, patient outcome, was the time of application and removal time monitored to prevent complication of tourniquet use. There were 145 tourniquets applied in 2023. This is an increase from 2022 when 122 were applied. The tourniquet data shows police applied 41% of the tourniquets and likely saved several lives due to the quick response typically police are first on scene. EMS applied 31% tourniquets. The facility implemented a massive transfusion protocol for 17% of the tourniquet applied cases. Combat Application Tourniquets (CAT) were used 50% of the time and 50% were either other types or tourniquets unknown. Facilities (36%) have started to activate their trauma system when tourniquet application is known this was not tracked in 2022. The data has been useful in determining that facilities receiving injured with tourniquets by EMS are taken to the correct facility (trauma level) for care. For example, Level I facilities received 62% of the patients with tourniquets, Level II facilities received 35% patients, Level III received .02% and Level IV received 2 by private vehicle, those tourniquets were applied by ER. Education is needed on documentation related to time applied and removed with plan to update Police, Fire and EMS regarding the importance of this documentation. There is a plan to acknowledge those who saved a life by applying a tourniquet, this will be provided by the trauma facilities after presenting to the Regional Trauma Advisory Committee.

Tranexamic acid (TXA) administration is also being tracked in the Region, there were 13 cases of TXA administration reviewed by RPSRO with one mortality noted. EMS is using a TXA protocol which includes patients that must have evidence of blood loss, systolic blood pressure below 90 with trauma related causing blood loss, adult, destination to a Level I or Level II and long extractions times to identify proper use of TXA. The receiving trauma hospital(s) in the region are generally not giving a second dose due to quick surgical intervention. In the 1<sup>st</sup> quarter of 2024, the region is planning on requesting EMS data to cross check registry and the EMS data collected for accuracy and completeness.

The region is monitoring in "real time" the reporting mechanism in the EMS software that identifies trauma patients that may have been initially transported to a facility without the needed resources by focusing on the second transfer. Currently there were 8 double transfers in 2023, these were reviewed, and loop closure completed.

A 2023 Diversion Log has been started, there were 5 diversions in 2023 and these were due to either; OR HVAC repairs, no beds/ holds on bed, back up generated failed, generated power test failed knocking out critical infrastructure, water, communication,

and power. The Medical Control Authorities (MCA's) involved were aware of the diversions and the times they started and ended.

## **Region 2 North**

This year the region continued work on the plan and initiatives outlined in the 2020-2023 regional workplan. In the region seven facilities prepared for and participated trauma program re-verification visits. The RPRSO conducted a retrospective review of the first year (2022-2023) of data collected on the administrative of TXA in the region.

The Macomb County MCA developed and implemented a new protocol that will allow EMS to administer antibiotics for open fractures when appropriate, data from this project will inform the discussion about a potential expansion of the protocol to become a regional protocol.

The RTAC discussed the Adult/Pediatric Trauma Triage protocol with a focus on pediatrics, there was discussion around imaging and their impact on time to transfer. A focus on education around the consideration for bypass to get a trauma patient to the right trauma center the first time was discussed. St. Clair County has already adopted and trained personnel regarding the protocol and use of the stroke scale system for destination decisions, Oakland County is still collecting data on the accuracy of the FASTED scoring by EMS and Macomb County is beginning the education process for EMS and hospitals.

To assist in building the Systems of Care for stroke and STEMI the region is implementing the FAST-ED Stroke Severity Scoring system to assist EMS to recognize large vessel occlusions. This scoring will allow EMS to bypass a Stroke Ready and Primary Stroke facility and transport to a Thrombectomy Capable, or Comprehensive Stroke Center getting the patient to the right place the first time.

The Injury Prevention committee met and determined the region will focus on falls prevention, motor vehicle crashes and firearm injuries as regional projects.

## **Region 3**

Region 3 trauma centers continue to develop and mature. The region has 17 designated trauma centers, one (1) provisional trauma center and one (1) non-designated hospital. There were six re-verification visits and one (1) initial site visit conducted in 2023. The trauma centers in the region continue to collaborate and assist each other providing injury prevention programs to their communities such as Stop the Bleed (STB) training, Matter of Balance, and Car Seat Safety. The hospitals also participated in a large regional Stop the Bleed (STB) initiative that was primarily focused on schools and was funded through the Systems of Care project grant.



The Region 3 Trauma Education Subcommittee held its annual Region 3 Trauma Symposium on April 13th. The full day symposium was attended by nearly 300 individuals. 8 different speakers and 11 vendors participated in the event to inform trauma stakeholders of the current trends related to trauma. The symposium offered 6 CME and EMS credits.

The Region 3 Trauma Triage, Transport and Destination Subcommittee met several times along with the RPSRO, RTAC and RTN officers to discuss the supplemental EMS regional trauma triage and destination protocol. The group unanimously felt the supplemental protocol no longer matches the trauma resources or needs of the region. The group was presented with the upcoming EMS protocols slated for release that includes the ACS trauma triage criteria. After several discussions the group recommended that the region would no longer institute the supplemental protocol instead encourage MCAs to adopt the state trauma triage protocol as written.

## **Region 5**

This year, the region completed many objectives from the 2020-2023 workplan application while writing a new application for 2024-2026. The objectives that the region could not complete have rolled over into the new workplan or were revised. The RPSRO Committee is currently working with TPMs, EMS liaisons, and physicians to collect data from ImageTrend® to look at delays in interfacility transfers. The RTN and MCAs have also played a crucial role in educating the region on new updates and timelines with new EMS protocols.

This year, each hospital in the region that was involved in Systems of Care or intended to become involved was eligible to apply for up to \$20,000 in grant funding to use system development. The grant funding was spent mainly on education for hospitals staff, followed up by equipment needed by facilities. The Injury Prevention Committee collaborated with regional hospitals to pool funds to buy 640-gun safes for their communities. Each gun safe had a QR code attached to it, linking users to websites focused on gun safety and how to secure guns safely. Some gun safes were passed out at Concealed Pistol Licenses courses, and others teamed up with Michigan State Police for distribution. With lingering effects from the COVID-19 pandemic, Region 5 was able to hold more face-to-face educational courses throughout the year for hospital and community stakeholders. Some courses taught were Stop the Bleed, Concussion Prevention, CPR Training, Fall Prevention, Helmet Safety, Medication/Prescription Safety, and Distracted Driving/Driving Safety.

## **Region 6**

Region 6 continues to have an engaged Regional Trauma constituency with active participation by hospital trauma staff, trauma physician, and EMS leaders. Three RTAC committees- Injury Prevention, Education, and Process Improvement (PI)- have been responsible for successful achievement or advancement of most workgroup objectives and special projects, however, workplan objectives from all areas within the workplan continue to advance.

The Education Committee provided six regional trauma education events. These included Tips for Preparing for Designation, The Role of the Trauma Registrar, Safe Hospital to EMS Handoff, Care of the Trauma Patient with an LVAD, PI Chart abstraction, and Pediatric Readiness.

The Regional Professional Standards Review Organization (RPSRO) provides oversight to several PI projects which are the collaborative work of both the PI workgroups and the Education Committee. The safe patient hospital to EMS handoff project results from a handoff communication gap identified in a case review. EMS and hospital trauma partners worked together to enhance the EMS Interfacility Transfer Form and educate hospital and EMS staff on the importance of good handoff communication at the time of transfer. Hospital coordinators implemented the forms in their hospital Emergency Departments, and some are using for all EMS transfers throughout their hospital. Several audits established that the form is being used. A final audit to establish continued use of the form is scheduled for January 2024. Another PI project the region initiated is to review and identify opportunities in the timeliness of Emergency Department transfers of the most seriously injured trauma patients to a higher level of care. An ED LOS (Length of Stay) workgroup was established with support from the Department's Epidemiologist and Trauma Registrar. Initial data show areas for further investigation in 2024. The goal is to ensure that Regional Level III and IV hospitals identify and expedite the transfer of the most seriously injured trauma patients. Injury Prevention (IP) activities also remain robust in the Region.

A substantial portion of the 2023 Michigan System of Care grant funding went to supporting injury prevention projects such as fall prevention, gun safety, and stroke education. Finally, the Region transitioned from MS Teams only meetings to hybrid in-person/MS Teams meetings in 2023.

## **Region 7**

Trauma program capabilities and leadership continue to evolve in the region. The concept of a more hub and spoke model/regional approach to services and care is being piloted which could inform practices in the future as care challenges continue. All hospitals in the Region have successfully achieved designation except for one (1)

which lost their trauma designation and two (2) that remain provisional. The turnover of trauma program managers and trauma medical directors continues. The Regional Trauma Coordinator (RTC) organized a bi-monthly education session followed by an open forum to discuss specific topics, such as activations and the components of the hospital trauma program PI plan.

All hospitals in the region were invited to apply for a Systems of Care grant that supported either education, injury prevention/risk reduction, infrastructure, or performance improvement eleven facilities in the region received grants to support system building work most of them focusing on education, infrastructure, and injury prevention.

Region 7 trauma system stakeholders presented about trauma system response after the tornado direct hit in Grayling in 2022, the challenges and lessons learned at as well as an injury prevention Life Jacket project involving stations at the park at the Michigan Systems of Care Conference MCA-Trauma-Stroke-STEMI conference in September.

Regional injury prevention has focused on falls with active programs in every hospital in the Region.

## **Region 8**

Region 8 continues to grapple with the challenges of healthcare in a larger rural area with low trauma volume. Two hospitals lost their trauma designations, and four hospitals are still provisional. Eight of the 14 hospitals had turnover with their trauma program manager and /or trauma medical director. Hospital administrators have also experienced turnover, and more hospitals were acquired by larger health systems. The Regional Trauma Coordinator (RTC) conducted numerous orientations and continues to schedule individual and group sessions on specific topics, such as activations and the components of a hospital trauma program performance improvement plan. Regional Trauma Advisory Committee participation is solid it workplan objective achievements.

Region 8 Trauma collaborates with Regional Healthcare Preparedness by querying hospitals on their redundant means of communications. This resulted in those plans being used when communications systems partially failed in 2023. Another organization that Region 8 Trauma supports is the Michigan Department of Natural Resources statewide Ride Right Committee. By data collection and analysis, the Ride Right campaign continues to be a data driven initiative, using data collected to drive the initiative.

The Region 8 Medical Control Authority network (R8MCAN) and the Trauma Network continue to work together on projects. In 2023, one of the MCA Network physician

members and the RTC embarked on a project to collect what the MCAs have chosen in their new protocols so that comparing and contrasting can occur with an education module for field and hospital providers.

## Verification and Designation

Michigan hospitals continue to support the trauma system by becoming verified or reverified and designated as Level I, II, III or IV trauma facilities, 85 percent of the hospitals in Michigan have become designated trauma facilities.

The virtual verification process continues to facilitate site reviews by allowing the site reviewers to review the required documentation remotely and conduct the facility visit virtually. The technical support is provided by two members of the verification program team and the Regional Trauma Coordinator who attends to support any inquiries about the regional trauma system. Information on the process and requirements for participation can be found [here](#).

Maintaining the resources and support necessary to be a designated trauma facility in the current environment can be challenging, there are currently 6 non-designated facilities in Michigan. The regional trauma system and the Systems of Care Section are continuing to monitor the impacts of non-designation including how to formally define the status, how to report out the data collected, the possible long-term effects.

The Verification and Designation team continues to support the process by providing ongoing education to stakeholders.

## Systems of Care

The Bureau has been engaged in a systems approach for time sensitive emergencies for many years, recognizing that stroke and STEMI like trauma, require rapid assessment and access to appropriate treatments to support positive outcomes. This forward-facing approach that commits to the principal of getting the right patient to the right resource to support the best outcome has been adopted by many states across the country. The Bureau is now formally known as the Bureau of Emergency Preparedness, EMS, and Systems of Care to reflect the ongoing system work of EMS, trauma, stroke, and STEMI. Staff have been added to the Systems of Care Section to support the work of system building for stroke and STEMI. The initial work included a White Paper drafted in collaboration with state content experts, titled *A Statewide System of Care for Time Sensitive Emergencies The Integration of Stroke and STEMI Care into the Regional*

*Trauma System* ([link](#)) this document guided the language that was drafted into the Administrative Rule sets that define how the system for stroke and STEMI will be operationalized.

The Systems of Care Section remains engaged in ongoing planning and discussions on the next system building steps for stroke and STEMI. In development is a “system assessment survey” designed to collect some baseline information on stroke and STEMI education and training, where programs are in their development and their data collection processes. Timelines and the stages of implementation are in discussion and will be influenced by the ongoing Request for Proposals for the trauma, stroke, and STEMI registry(s). Updates will be added to the Frequently Asked Questions document found here([link](#)).

## Projects

### **Rehabilitation**

The Trauma Rehabilitation Needs Assessment report published in 2022 was a springboard to the “Understanding the Patient Experience of Rehabilitation after Injury” project. This project will attempt to understand the very individual experience patients have recovering from an injury to better understand where the challenges are, what can be improved and what was done well. The project has been in the planning stages for most of the year and will be launched in partnership with a healthcare system in early 2024 and a final report will be available in August.

### **biospacial Project**

Michigan does not currently have a statewide registry to collect data about stroke and STEMI as it does with trauma. This project was implemented to gather information about the required elements necessary, particularly a data dictionary, to build those data collection systems. Biospatial, is a software vendor that worked with the Bureau in past and developed the analytical tools needed to measure field triage and reporting for trauma and is serving as another storage site for the registry dataset which will allow for facilitated data analysis and display. The company is also continuing to work on several projects with EMS and MDHHS. The project engendered a deeper understanding on the part of the Section staff as to what goes into developing a registry software program and the vendor had insights into the requirements (statutorily and evaluation driven) that need to be collected and analyzed for a state registry. The final report including recommendations was submitted by biospatial in September.

## Grants

The Michigan Systems of Care Trauma, Stroke and STEMI projects were designed to address four broad categories of system building: injury prevention/risk reduction, education, infrastructure, and performance improvement. The department with the support of the Regional Medical Control Authorities who acted as the project leads awarded 311 separate grants to applicants. The categories that were funded were education and training, injury prevention/risk reduction and infrastructure. Innovative projects, best practices and community outreach was evident in the work which will serve as a catalyst for ongoing system improvement.

## System Evaluation

The STAC, Regional Trauma Advisory Committees, and Regional Professional Standards Review Organizations met throughout the year to review data, discuss issues, report on projects and initiatives, and vote on policy and procedures as needed. The Regional Trauma Network Boards did not consistently meet as there were limited issues that required Board action, the restrictions of the Open Meetings Act that requires in-person meetings for this board necessitated a thoughtful approach to scheduling.

The Michigan Trauma System Strategic Plan 2024-2029 was written with input from STAC and trauma stakeholders. The Regional Trauma Network applications were submitted to STAC in October and EMSCC in November and approved by both bodies. The Regional Trauma Networks were recognized by the Michigan Department of Health and Human Services for three years (2024-Dec. 2026). A significant number of goals and objectives in the strategic plan are regionally focused and the new network application reflected this. The Regional Trauma coordinators will be supporting the regions as they work on their workplans and initiatives. This work will continue to be reported to the STAC quarterly as well as regional workplan progress and administrative rule requirements.

The Risk Adjusted Benchmarking (RAB) project for Level III Trauma Facilities is ongoing. An additional ongoing project is the voluntary audit project Level III facilities are working on with the MTQIP team to monitor data completeness and accuracy. Of the 26 Level III facilities engaged in RAB, nine will participate in the audit project this year (two have volunteered for the audit annually since 2019). Validation error rates so far range from 2.2% to 3.5%.

Data hygiene practices are ongoing including monitoring user access and permissions, ensuring EMS NTDS data elements are included in the registry after STAC supported the return of these elements from the previous 2019 NTDS, monitoring IDTX file transfers and

troubleshooting data input, identifying data discrepancies and null values including those in MIEMISIS as it relates to patient disposition.

## Conclusion

Michigan's trauma system continues to mature, working to continually improve care for the injured and to capitalize on the efficiencies the system has realized. Those include improved communication, stronger partnerships, data driven change, mentoring and program building between Level I and Level II trauma facilities and the smaller facilities throughout the state, follow up and learning about care delivery to improve patient outcomes. This work laid the foundation that the stroke and STEMI system will build on particularly now when the most efficient use of resources and capacity is and will remain essential to ensuring equitable, quality care for all of Michigan's residents and visitors. This regionalized, coordinated, and accountable systems of care will continue to ensure the right patient gets to the right resource at the right time.