

# **Improving Rural Systems of Care for Time Critical Diagnoses: A Review of State Flex Program Activities**

**Flex Monitoring Team  
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## KEY FINDINGS

- Collaboration between state Flex programs and the time critical diagnoses (TCD) stakeholders encourages a consistent focus on rural TCD issues and improves system-level communication.
- Flex funds can be used to leverage other state EMS resources to improve rural TCD performance and undertake projects for which there may be no other source of funding.
- Data collection at the local, regional, state, and program level remains challenging, impacting the ability to improve EMS TCD system performance and monitor Flex Program impact.
- Training is a significant area of state Flex program TCD activity, but states struggle to directly connect participation in the trainings to changes in local EMS operations and/or performance.
- State Flex programs must move beyond training and partnership activities to engage EMS, CAHs, and other stakeholders in making local/regional system changes to improve TCD services.

## INTRODUCTION

This paper examines the efforts of state Flex programs to support the development of Emergency Medical Services (EMS) time critical diagnoses (TCD) systems of care, which includes stroke, ST-Elevation Myocardial Infarction (STEMI), and trauma. The severity of these conditions necessitate a coordinated regionalized approach to transportation, diagnosis, and treatment to meet recommended treatment windows (e.g., the golden hour in trauma or a door to balloon time of 90 minutes for patients with STEMI) to maximize patient outcomes.<sup>1,2</sup> These efforts to support the engagement of rural EMS agencies in TCD systems of care are an optional but important area of Flex Program activity under Program Area 3 - Population Health Management and Emergency Medical Services Integration.<sup>3</sup> Through a review of state Flex grants and progress reports as well as interviews with state Flex coordinators and EMS stakeholders, we examined state Flex program initiatives to improve TCD system capacity and integrate EMS into local/regional systems of care, particularly those served by Critical Access Hospital (CAHs).

## BACKGROUND

A system of care approach for time critical diagnoses (TCD) incorporates the goal of timely assessment and transport to the most appropriate facility for treatment. The concept of the “golden hour” in trauma (the 60 minutes from injury to definitive care before the risks for mortality increase) and the adage that “time is muscle” in STEMI (in which delays in treating

myocardial infarction increase the likelihood and amount of cardiac muscle damage) underscore this approach.<sup>4,5</sup> While originally used in trauma, this concept of rapid response and appropriate treatment within clinically-defined time parameters that maximize patient outcomes has been used to standardize the rapid assessment, stabilization, and transport to treatment for patients experiencing stroke, STEMI, or trauma. “The right patient, the right place, the right time, and the right care” was the mantra used by Dr. Bill Jermyn, former Director of Emergency Medical Services for the Missouri Department of Health and Senior Services, to spur statewide legislation making Missouri the first state to comprehensively integrate TCD into a system of care.<sup>1</sup> Dr. Jermyn developed the 360°/365 Emergency Medical Care System model to describe a continuum of care that includes public health; EMS, 911, and dispatch; pre-hospital notification; hospital emergency department protocols and care; acute care; rehabilitation; and quality improvement.<sup>1</sup>

The evidence underlying TCD systems of care demonstrates that outcomes for patients with trauma, stroke, and STEMI are improved by specialty treatment at accredited regional referral centers within established time windows.<sup>6</sup> In a report on regionalizing emergency care by the Institute of Medicine,<sup>7</sup> participants examined issues associated with regionalization of emergency care for STEMI and stroke, noting that an integrated and coordinated approach can help to ensure that patients get to the right hospital in a timely fashion and receive clinically appropriate care. Accountability can be promoted through systems of verification and analysis of data to examine processes and outcomes thereby ensuring that the components of the system are working as they should.<sup>7</sup>

A successful TCD system of care requires the organization and coordination of all components of the health care system to ensure: 1) prompt and accurate diagnosis of the patient’s condition using evidence-based protocols and guidelines; 2) transport to the most appropriate treatment location while providing protocol-driven care en route; and 3) receipt of the most appropriate treatment while minimizing any delays throughout the process.<sup>1,2,8</sup> For this to happen within the defined clinical time frames for effective care, TCD systems implement a simultaneous care process in which assessment and transport decisions are made earlier in the episode of care rather than the more common sequential process in which evaluation and management occur in a linear fashion.<sup>6</sup> Studies of the response to TCD events have found that the sequential approach to care adds steps to the process which can result in unnecessary delays in treatment. TCD systems of care seek to reduce the number of steps in an episode of care by allowing EMS personnel, with appropriate training and equipment operating under established evidence-based protocols, to make pre-hospital decisions to transport patients to the appropriate specialty referral hospital (rather than the nearest emergency department) and to activate those services prior to arrival.

To do this requires a rural workforce prepared to meet local and regional demands with training on the latest protocols and assessment tools to recognize, assess, and treat TCD events; ambulances with appropriate equipment and technology to support timely triage and assessment of TCD events (e.g., 12-lead electrocardiogram capacity for stroke and STEMI patients); communications systems that allow the effective linkage of pre-hospital, hospital, and specialty services; and established protocols that allow early activation of appropriate specialty services and empower EMS personnel to make transport decisions to minimize the time from first contact to appropriate care.<sup>1</sup> For the system to function effectively, EMS, hospital, specialty, and oversight

personnel should be engaged in the development of these protocols and systems of care. It is also important that involved providers meet following TCD events to debrief on system performance and identify opportunities for improvement.

Our previous work highlighted the evidence supporting the development of STEMI systems of care and described opportunities for state Flex programs to work with EMS and CAHs in improving STEMI care.<sup>8</sup> We found that state Flex program participation on statewide standards committees provided critical representation of the unique needs of rural EMS agencies, hospitals, and communities. Through their participation, state Flex coordinators advocated for the tools and resources needed by rural EMS providers to participate in rural TCD systems of care and ensured that TCD standards and protocols reflected the realities of dealing with TCD events in rural areas. Additionally, state Flex programs were able to facilitate the improvement of system capacity and coordination through the provision of technical assistance and training to EMS agencies and hospitals, dissemination of best practices, and engagement with CAHs and STEMI receiving hospitals to address capacity gaps and coordinate services to achieve a 90-minute door to balloon time.

### **Requirements for EMS Activity for Fiscal Year 2015-2017 Competitive Funding Cycle**

The Funding Opportunity Announcement (FOA)<sup>3</sup> for the three-year competitive Flex funding cycle outlined three areas of activity for states wishing to undertake EMS and TCD activity under Program Area 3: Population Health Management and Emergency Medical Services Integration. These activity categories were: 3.03 - Community-level Rural EMS System Assessment; 3.05 - Improve Time Critical Diagnoses EMS System Capacity; and 3.06 - Improve EMS Capacity and Operational Projects. States interested in undertaking EMS and TCD projects were required to assess EMS capacity and performance in Year 1 and use the results to guide their interventions for the funding cycle. Under this optional area of activity, the FOA limited state Flex program spending to 25 percent of their overall awards.

This brief focuses on state Flex program activities to improve state, regional, and/or local TCD system capacity. To support these efforts, the FOA suggested measures that states could use to monitor the impact of their activities (see Appendix)<sup>1</sup>. These measures focused on a series of interim capacity and performance improvement issues (e.g., the development of TCD performance improvement committees, implementation of STEMI, stroke, and trauma protocols and guidelines, and the percentage of personnel trained in the use of these protocols) as well higher level outcome measures (e.g., local/regional systems functioning as integrated systems of emergency care, EMS agencies with improved performance on key TCD measures, and EMS systems with improved TCD performance).

The measures chosen should reflect the scope of TCD activities proposed by individual states. These measures, while not required, can be used by states to monitor improvements in EMS

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<sup>1</sup>These measures are separate from the EMS-focused measures in the Performance Improvement and Measurement System (PIMS) which ask states to report the number of EMS entities that: (1) participated in TCD system improvement activities during the budget period; (2) participated in TCD improvement activities and improved their performance during the budget period; (3) participated in EMS capacity and operational performance improvement activities during the budget period; and (4) participated in EMS capacity and operational improvement activities and improved their performance for the budget period.

TCD capacity; enhanced coordination between EMS, CAHs, and other providers in a system of care; improvements in local EMS TCD quality through implementation of evidence-based protocols and guidelines for STEMI, stroke, and trauma; adoption of dispatch protocols; and, at the highest level, improvement in local and/or regional system performance. For this brief, we examined the scope of state Flex program TCD activities and explored the extent to which they may contribute to the achievement of these goals.

## APPROACH

To understand state Flex program efforts to improve TCD capacity and performance, the Flex Monitoring Team at the University of Southern Maine undertook a project to assess the scope of state activity in this area through a review of their applications and progress reports as well as through interviews with state Flex program staff and EMS informants. We reviewed the states' Flex Program grant applications for the 2015-2017 funding cycle to identify states that proposed and implemented TCD activities (Table 1)<sup>ii</sup>. Seventeen states proposed TCD initiatives in their 2015 funding applications. Of this group, Georgia, Kansas, and Virginia did not propose TCD related activities in all three years of the funding cycle. We contacted Flex coordinators in these states by email and telephone to verify the status of their TCD projects. Although TCD activities were included in their FY 2017 work plans, Arizona, Illinois, and Missouri indicated they were no longer pursuing their planned activities due to shifting Flex Program priorities and staffing changes within their state EMS bureaus.

**Table 1. State Flex Program Engagement in EMS/TCD Activities During Fiscal Years 2015-2017**

State	Fiscal Year 2015 EMS/TCD Activity	Fiscal Year 2016 EMS/TCD Activity	Fiscal Year 2017 EMS/TCD Activity
Arizona	Yes	Yes	No
Georgia	Yes	No	No
Idaho	Yes	Yes	Yes
Illinois	Yes	Yes	No
Kansas	Yes	Yes	No
Maine	Yes	Yes	Yes
Minnesota	Yes	Yes	Yes
Missouri	Yes	Yes	Yes
Nebraska	Yes	Yes	Yes
North Dakota	Yes	Yes	Yes
Oregon	Yes	Yes	Yes
South Dakota	Yes	Yes	Yes
Utah	Yes	Yes	Yes
Virginia	Yes	No	No
Washington	Yes	Yes	Yes
Wisconsin	Yes	Yes	Yes
Wyoming	Yes	Yes	Yes

<sup>ii</sup>The funding cycle was extended to include FY 2018; because these applications were not available to us for review during our project period, our summary is based on the FY 2015-17 grant applications.

The activities proposed by the 17 states included convening stakeholders from EMS agencies, state EMS offices, and CAHs to assess TCD needs and develop TCD systems of care; identifying TCD best practices; collecting and analyzing data on TCD measures; providing training and education to EMS providers and CAHs; and supporting efforts to improve EMS TCD data capacity. A central element of these proposed efforts involved the engagement of EMS stakeholders throughout the process including the assessment of EMS needs, planning initiatives to address those needs, developing training materials and identifying best practices for use by EMS agencies, and implementing their planned activities. Much of this work was facilitated through collaboration between state Flex programs and state EMS bureaus. This collaboration took place through the participation of state Flex program staff members in EMS and TCD advisory committees as well as the use of state Flex funding to engage state-level EMS stakeholders in Flex TCD activities through direct contracts or financial support for TCD staff positions.

Table 2 provides a brief description of the EMS TCD activities for the 17 states with TCD activity in one or more years of the funding cycle. In terms of the scope of activity, 16 state Flex programs described collaboration with their state EMS offices and/or participation in statewide trauma, STEMI, or stroke task forces or committees. The form of these collaborative efforts often involved direct contracts with state EMS agencies to undertake TCD assessment, education, training, and data collection or the provision of funding support for staff positions to undertake these activities. Sixteen state Flex programs supported the provision of TCD training and education through EMS/TCD conferences and events, provision of training directly to CAHs and EMS agencies, or “scholarships” for participation of EMS and/or CAH personnel in conferences and meetings. Eleven states provided direct funding and support for state EMS and/or TCD conferences and events. Ten states described initiatives to collect and analyze TCD data to drive TCD performance improvement initiatives, improve EMS and CAH data capacity, or link EMS run data to hospital event data. Of this group, North Dakota described support for collaborative efforts between the state EMS agency and the North Dakota Health Information Network to facilitate EMS and TCD data reporting. Five states described the provision of direct technical assistance and/or funding support to rural EMS agencies and CAHs to improve TCD participation and performance.

After a review of their applications and screening phone calls with the Flex Coordinators in the 17 states with TCD activity during the 2015-2017 funding cycle, we selected six states (Maine, Minnesota, Nebraska, North Dakota, South Dakota, and Wisconsin) to participate in a more detailed review of their planned TCD activities. Using a semi-structured interview protocol, we conducted interviews with the Flex Coordinators and EMS officials in these states to understand the scope of their TCD initiatives, the challenges encountered in undertaking this work, and the impact of their efforts.

**Table 2. Summary of FY 2015–2017 Flex EMS TCD Activities by Category**

State	Brief Description	Training/ Education	Committee Participation/ Collaboration	Conference or Event Support	Data Collection/ Analysis	Direct TA and Financial Support
<b>Arizona</b>	Compile best practices of TCD systems and disseminate information to rural EMS agencies. Convene CAHs, EMS, and local community partners to identify EMS TCD capacity issues. Train CAHs (Level IV trauma centers and non-trauma centers) on best practices on STEMI, stroke, and heart attack patients. Collect indicator data from CAHs and rural EMS on TCD. Collaborate with the Bureau of EMS to identify EMS reporting requirements in CAH communities.	X	X		X	X
<b>Georgia</b>	Convene regional stakeholders to review chest pain/STEMI care delivery patterns, define an ideal system of care, identify gaps and barriers in current system, and formulate recommendations for improvement. Convene stakeholder group meetings. Develop and disseminate a performance measurement dashboard.		X		X	
<b>Idaho</b>	Support keynote speaker at rural EMS conference with presentation focused on TCD. Engage rural EMS in CAH communities in TCD systems of care through simulation-based team training through the Idaho Simulation Network. Support Rural Trauma Team Development training for CAHs and EMS agencies serving CAHs. Sponsor Medical Directors Roundtable in collaboration with Idaho EMS Bureau.	X	X	X		
<b>Illinois</b>	Provide financial assistance to rural EMS and CAHs to improve TCD system performance and outcomes. Support consultant to review STEMI response times and provide guidelines on new national stroke algorithms to improve response times.	X			X	X
<b>Kansas</b>	Increase EMS adoption of evidence-based protocols for trauma and stroke and share data between providers to facilitate improvement. Convene state and local EMS stakeholders to advise Flex program on EMS capacity and TA, improve communication, and increase capacity to collect and use data for quality improvement. Provide training and TA on quality improvement to rural EMS agencies.	X	X		X	X
<b>Maine</b>	Work with Maine Trauma Advisory Committee and Trauma Advisory Team to develop statewide trauma system; convene quarterly meetings and facilitate engagement of CAHs and rural EMS agencies. Share best practices with emergency department and EMS personnel and provide training to individual CAHs. Provide funding to support a trauma coordinator position and chairperson for the Maine Stroke Committee. Support the Stop the Bleed program to improve awareness of stroke issues and response to stroke events.	X	X	X		

State	Brief Description	Training/ Education	Committee Participation/ Collaboration	Conference or Event Support	Data Collection/ Analysis	Direct TA and Financial Support
<b>Minnesota</b>	Conduct a statewide rural EMS sustainability and TCD survey and work with an external group to assess EMS/TCD systems. Work with Department of Health to analyze EMS run data under the oversight of a TCD steering committee. Develop a quality reporting process between CAHs and rural EMS focused on trauma, stroke, and other TCDs. Work with EMS bureau to identify and address TCD target goals; develop TCD quality reporting process, and facilitate TCD protocol training. Identify metrics for TCDs based on best practices and/or benchmarks. Support epidemiological analysis of EMS run data and linkage with hospital ED data. Implement a pilot in northwest Minnesota under a contract with Greater Northwest EMS to coordinate meetings and activities to support TCD system improvement.	X	X	X	X	
<b>Missouri</b>	Work with state EMS agency to establish TCD transport protocols for rural EMS.	X	X			
<b>Nebraska</b>	Use EMS assessment data to direct education/TA activities; work on statewide cardiac plan to improve STEMI/stroke systems of care; set target goals; and provide TA to CAHs and EMS to achieve target goals. As part of the trauma center designation process, interview rural EMS agencies and assess linkages/protocols with trauma centers. Develop a stroke system of care in response to state legislation. Work with EMS Bureau to provide stroke training to EMS agencies. Develop statewide cardiac (STEMI) plan with training provided to CAHs and EMS systems. Support a two-day EMS medical director's conference.	X	X	X	X	X
<b>North Dakota</b>	Partner with EMS Association and state EMS/Trauma Division to facilitate CAH TCD leadership training. Collaborate with health department on CAH stroke readiness; provide support for EMS regional meetings/trainings to include TCD issues. Develop training that includes TCD for EMS medical directors and nurses working on ambulances. Develop Stop the Bleed campaign.	X	X	X	X	
<b>Oregon</b>	Partner with Oregon Hospital Association to strengthen Area Trauma Advisory Boards and expand their capacity in quality improvement and data reporting for TCD. Create a database on Ambulance Service Agencies (ASAs) use of protocols (including TCD) and quality improvement activities (delayed); review QI management practices of ASAs; provide simulation-based training to CAHs and EMS agencies in three communities using Idaho Simulation Network.	X	X	X	X	



State	Brief Description	Training/ Education	Committee Participation/ Collaboration	Conference or Event Support	Data Collection/ Analysis	Direct TA and Financial Support
<b>South Dakota</b>	Hold regional quarterly webinars/calls with state EMS, CAHs, hospitals, trauma surgeons, surgeons at CAHs, and other health care providers to review trauma calls and analyze response performance. Coordinate annual trauma summit with first day reserved for trauma coordinators, conduct Trauma Nurse Core Courses. Support trauma coordinator to conduct a trauma 101 course for new hospital trauma coordinators. Track measures on EMS performance and trauma activations. Participate in a collaborative to create a cardiac-ready community initiative to educate the public on the symptoms of a cardiac event and how to respond.	X	X	X	X	
<b>Utah</b>	Provide on-site training to CAHs, rural hospitals, and EMS providers to improve transfer times, record keeping and system performance. Collaborate with Office of EMS to assess TCD performance of EMS agencies in relation to performance measures in the FOA.	X	X		X	
<b>Virginia</b>	Collaborate with Bureau of EMS to identify TCD resource hospitals for EMS agencies. Disseminate information to all EMS agencies.	X	X			
<b>Washington</b>	Work with EMS, CAHs, and regional EMS and Trauma Councils to improve stroke, STEMI, and cardiac arrest performance and encourage CAHs and rural EMS participation in regional TCD systems. Promote adoption of revised stroke triage tool by EMS agencies, support Emergency Cardiac & Stroke Program Coordinator participation in EMS QI activities and Coverdell National Acute Stroke Program quality improvement forums, support EMS participation in Northwest Rural Health Conference, and support EMS Leadership Academy.	X	X	X		
<b>Wisconsin</b>	Conducted statewide survey of EMS agencies (the Patient Care Assessment) to understand EMS use of TCD protocols and policies. Use results to develop EMS TCD patient management best practices toolkit and provide technical assistance to low-performing EMS agencies to improve TCD practices and policies. Support rural hospital stroke improvement conference.	X	X	X	X	X
<b>Wyoming</b>	Develop EMS TCD training modules focused on TCD protocols; develop EMS leadership training; and support EMS conference participation.	X	X	X		
<b>TOTAL</b>		<b>16</b>	<b>16</b>	<b>10</b>	<b>11</b>	<b>5</b>

## RESULTS

This section provides detail on the types of TCD initiatives undertaken by the six state Flex programs participating in the qualitative phase of this study. We describe important areas of state activity to improve local/regional TCD capacity including collaboration between state Flex programs, state EMS agencies, EMS agencies, and CAHs; efforts to enhance state and local TCD capacity; development of training and educational programs, and data collection issues.

### Collaboration between State Flex Programs and EMS Stakeholders

In earlier work with STEMI systems of care, we identified the importance of the collaboration between state Flex programs, EMS, and TCD stakeholders.<sup>8</sup> This reliance on collaborative partnerships remained an important component of state Flex program TCD performance improvement initiatives in this funding cycle. These collaborative partnerships supplement state Flex program EMS capacity, enhance the credibility of Flex program staff with state and local EMS stakeholders, improve communications between acute and emergency systems of care, facilitate input into state Flex program planning efforts, and allow use of Flex funds to address rural EMS issues for which there may be no other funding. Sixteen of the 17 states with TCD initiatives in this funding cycle described collaborative relationships with state EMS agencies, statewide trauma, stroke, or STEMI committees, and/or regional and local TCD stakeholders. As discussed earlier, collaboration may take the form of participation in state EMS and/or STEMI, stroke, or trauma committees and task forces. It may also take the form of contracts between the state Flex programs and state EMS bureaus to undertake the proposed TCD activities and/or the provision of funding to support the hiring of staff to conduct this work.

**Maine's** Flex program works closely with state EMS officials and TCD stakeholders. The state Flex program has committed Flex funds to the Maine EMS agency to conduct EMS educational opportunities and meetings, and provide staff support as detailed in a memorandum of understanding. As part of its TCD work, Maine funds a trauma coordinator as well as a staff position to support the Maine Stroke Alliance Committee. Through funding for these positions, the state Flex program has helped build internal state EMS capacity to undertake work to improve TCD systems of care. The Maine Stroke Alliance Committee which includes representatives from several hospitals, the American Heart Association, the state Flex program, and the Maine EMS office, brings stakeholders together to build a stroke system of care. The Flex Coordinator encourages CAHs participation in this committee.

In addition to collaborating with the state EMS Regulatory Board on its survey of rural EMS providers and providing funding to the Board to conduct a limited number of targeted sustainability assessments of vulnerable EMS agencies, the **Minnesota** Flex program supports three regional Time Critical Care Collaboratives, two in the northwest and one in the southwest areas of the state, focused on trauma, stroke and STEMI cases. The goal is to facilitate coordinated efforts between regional EMS programs and CAHs to improve TCD performance. The Collaboratives are developing a feedback form to facilitate communication between pre-hospital, emergency, and hospital providers during stroke/STEMI patient transfers and provide a standardized data collection tool to support EMS performance improvement. EMS agencies report that participation in these Collaboratives has been positive.

The **Nebraska** Flex program works closely with and provides funding to the Nebraska Office of Emergency Health Systems to improve TCD capacity. In 2016, the Nebraska Legislature passed LB722, the Stroke System of Care Act, which outlined responsibilities of the Department of Health and Human Services to establish an effective system of care for stroke patients that includes hospitals and EMS agencies and the mandatory use of stroke protocols by EMS providers. The Nebraska Flex program is working with the Nebraska Stroke Task Force and the Nebraska Office for Emergency Health Systems to develop training and educational programs on stroke protocols for EMS agencies and CAHs. State officials hope to leverage this work with stroke to improve STEMI and cardiac systems of care.

Staff from **North Dakota's** Flex program collaborate closely with state EMS officials as well as the state EMS association and serve on various statewide committees including the North Dakota EMS Advisory Committee and the cardiac and stroke task forces. Recognizing the disconnect between many CAHs and EMS agencies at the community level, the North Dakota Flex program provides financial support for three to four regional CAH/EMS meetings to help build relationships, increase communication across and between facilities, and jointly discuss clinical issues including TCD. These meetings allow common issues to be discussed and addressed in a non-threatening environment.

**South Dakota** has a unique linkage between their state Flex program and EMS as both are housed within the Office of Rural Health. The Director of EMS and Trauma described the Office as a “collaborative cohesive group with EMS, trauma, and rural health.” He further noted that they “work well together” and that their “paths cross almost all the time.” This has facilitated, in his words, a “global” approach to initiatives. Externally, the Flex program and EMS collaborate with the American Heart Association and Emory University on a cardiac-ready community initiative, a public awareness campaign to help the public to recognize the signs and symptoms of cardiac events and how to respond.

The **Wisconsin** Flex program has established collaborative relationships with its state EMS agency to implement two surveys of EMS agencies, one focused on EMS operational issues and one focused specifically on EMS TCD capacity. The state Flex program employs a contractor through an agreement with MetaStar, a quality improvement organization, to provide one-on-one technical assistance to a limited number of EMS agencies and work on EMS and TCD issues. As a university-based Office of Rural Health and Flex program, staff stressed the importance of this contractual, collaborative relationship since they do not have internal EMS capacity as some state government-based Flex programs do. Wisconsin has also partnered with the American Heart Association and the Paul Coverdell National Acute Stroke Program (Coverdell) on its annual stroke conference; MetaStar for EMS agency assessments and technical assistance; and the Paramedic Foundation to produce its workbook/toolkit for EMS agencies. The state Flex program provides the sole source of funding for these initiatives.

### **Enhancing State and Local Capacity to Address Time Critical Diagnoses**

Through agreements with state Flex programs, state EMS offices used Flex funding to build state and local TCD system capacity through support for key staff positions, develop clinical and leadership training programs, offer public education, and use Flex grant funds to leverage other funding opportunities.

As mentioned earlier, **Maine's** Flex program provides funding to Maine's EMS Bureau to enhance state capacity to address TCD issues. This includes funding for the Trauma Manager within the EMS Bureau to support trauma activity within the state. The state Flex program also provides funding to a non-profit public health agency to house the chairperson for the Stroke Advisory Committee which is charged with improving stroke systems of care statewide. To do so, a survey was developed in collaboration with the Stroke Advisory Committee to identify where stroke services are located and which protocols are in use. The survey was sent to all Maine hospitals in 2017 and 33 of Maine's 34 acute care hospitals responded, including 15 of Maine's 16 CAHs. The survey provided important information on pre-hospital notification and transport issues that will be used to guide efforts to improve the performance of the stroke systems. For example, over 90 percent of responding hospitals indicated that they had not developed transport protocols with local EMS services to allow EMS to transport patients directly to a stroke care center rather than to the local hospital. These results highlight opportunities to ensure that local EMS agencies are fully trained on stroke documentation and that hospitals have the necessary protocols and rapid response teams in place.

The **Minnesota** Flex program has enhanced the state's capacity to analyze and use run data from the MNStar ambulance reporting system by providing financial support for the epidemiologists working with these data. The epidemiologists are mapping the MNStar ambulance run data to hospital records, which allows the transport and transfer of TCD patients to be followed as a continuous episode of care. These data will help the state and the Flex program measure local system performance and develop interventions to improve that performance. Flex funding has also been used to support a pilot project to enhance communication between CAHs, EMS agencies, and referral hospitals through a contract with Stratis Health, a non-profit organization focused on quality improvement and patient safety. The first pilot site in the northwest corner of Minnesota included two CAHs, two EMS agencies, and a referral hospital in Grand Forks, ND. The participants developed a feedback and communication form to improve communication between the different levels of care. The initial focus was on stroke and trauma. The northwestern region pilot has grown to include other regional hospitals and EMS agencies. A second pilot site in the southwest corner of the state held its kickoff meeting in March of 2018. The southwestern region has a larger number of CAHs, many of which are in the Sanford Health system, which typically refer to Sanford Health system hospitals in South Dakota. Although the numbers are small, the pilot projects are growing and building regional capacity to improve stroke and trauma care.

**Nebraska's** Emergency Health Systems Program uses Flex dollars to leverage funding from a state block grant to provide start-up education to hospitals and EMS agencies on stroke issues; promote awareness of stroke protocols; and develop a resource list of stroke-capable hospitals to guide EMS transport decisions. Flex funding also supported a contract with the American College of Surgeons to conduct an in-depth assessment of the state trauma system. The results are being used to assist local EMS agencies with quality improvement.

**North Dakota's** Flex program supports the North Dakota EMS Association to work with EMS and CAHs to develop pre-hospital screening tools for stroke, system performance measures, and communication feedback processes to monitor and improve regional TCD systems of care.

As discussed earlier, the state Flex program supports regional calls between CAHs and EMS to close gaps in communication at the local level. Although not solely focused on TCD, these calls provide direct feedback to EMS on their performance and identify TCD improvement opportunities.

In **South Dakota**, Flex supports a trauma coordinator position responsible for trauma improvement efforts. State Flex funds also support a cardiovascular quality improvement project with the American Heart Association that includes EMS involvement. In its work with trauma, South Dakota conducts regional improvement webinars/calls in four regions of the state involving representatives from EMS, CAHs, trauma surgeons, local surgeons at CAHs, and other interested healthcare stakeholders to review trauma cases. Four to five cases are reviewed at each meeting and the participants discuss EMS's response to the calls, the interventions performed, transport issues, treatment at the CAH, and any transfers to a tertiary care center. Trauma surgeons typically lead the calls and provide feedback on improvement opportunities. Since starting this process four years ago, Flex and EMS staff feel that it has provided a platform for working through issues and has resulted in improvements to the system.

**Wisconsin's** Flex program portfolio of initiatives to improve TCD capacity and patient care practices is driven by the results of two 2016 statewide surveys on TCD and the Attributes of a Successful Rural Ambulance Service<sup>9</sup> conducted by the Wisconsin Office of Rural Health. The TCD Patient Care Assessment survey focused on the capacity of rural EMS agencies to respond to TCD events. The results are being used to provide one-on-one assistance for up to nine EMS services identified as needing improvement. These assessments and technical assistance are conducted by a consultant through a Flex-funded contract with MetaStar, a Quality Improvement Organization. The goal is to use the survey data to identify vulnerable EMS agencies and work with those agencies to improve performance at the local level. The process allows EMS services to talk openly about strengths and weaknesses regarding TCD patient care, stimulating conversation within, between, and among EMS services. Results of the surveys indicated that rural EMS agencies needed assistance with implementing quality improvement initiatives, working with receiving hospitals on performance improvement, and improving communication and coordination. Staff highlighted the importance of one-on-one technical assistance with EMS agencies and the level of improvement that can result from such work. Recognizing the limitations of funding and the effort involved with one-on-one consultations, the Flex program is developing a TCD workbook/toolkit for use by EMS agencies to improve their local systems of care. It will provide best-practices for local adoption and/or adaptation.

## **Training**

Opportunities for building TCD system capacity requires training and certification. To that end, state EMS offices used Flex funds to support training of EMS personnel through conference registration, in-house trainings, and leadership support. Sixteen of the 17 states with TCD initiatives in this funding cycle reported some form of training or education opportunity for EMS. These trainings have included sessions at rural health meetings, programs directly targeting TCD events such as annual stroke meetings, and participation in ongoing conference calls/webinars and in TCD committees.

The **Maine** Flex program encourages CAHS and local EMS agencies to participate in the regular meetings of its Stroke Advisory Committee. Maine also includes EMS and TCD topics in its regular meetings with the Directors of Nursing and quality improvement coordinators from Maine's CAHs. The Flex program has also worked to increase public awareness of stroke and other bleeding emergencies through the "Stop the Bleed" program, a national initiative developed by the Department of Homeland Security that trains bystanders to assist in a bleeding emergency before EMS arrives on scene.<sup>10</sup> Increasing public awareness of and response to TCDs is an important area of activity in TCD systems of care.<sup>1</sup>

**North Dakota** Flex conducts regional calls and meetings that serve as learning opportunities for participating CAHs and EMS agencies. North Dakota also provides several leadership and training opportunities for both CAH and EMS management staff. Although they do not focus solely on TCD issues, they are among the topics on the agenda. North Dakota's newly created Medical Directors subcommittee of the EMS Advisory Council is developing online training for local EMS agencies with a focus on TCD issues. Like Maine, the Flex program has implemented a Stop the Bleed public awareness campaign to improve community awareness of the symptoms of stroke and how to respond.

Staff from the **Wisconsin** Flex program stressed the importance of leadership and management training programs. In the past, Wisconsin sponsored a 60-hour leadership development academy developed by a leadership development firm specializing in EMS and rural healthcare. Approximately two years ago, Wisconsin's Flex program discontinued the academy as they recognized that many rural agencies needed training focused on day-to-day management issues rather than higher-level leadership functions. Wisconsin contracted with an EMS consulting group to develop a curriculum focused on operation and management covering the following topics: (1) the attributes of a successful EMS service; (2) call schedules; (3) continuing education; (4) policies and procedures manuals; (5) budgeting; (6) quality improvement, evaluation, and assurance; (7) public relations; (8) human resources; (9) state administrative rules, statutes, and programs; and (10) operational self-assessment. The state Flex program is seeking proposals from organizations to conduct trainings based on this curriculum.

Although the curriculum does not specifically address TCD issues, it focuses on developing the capacity of rural EMS organizations through attention to policies and procedures, continuing education, and quality improvement. These trainings can be used to leverage the information on TCD performance obtained through Wisconsin's TCD assessment service, the TCD best practices workbook/toolkit described above, and the direct technical assistance provided through the MetaStar contract to improve TCD system capacity and performance for local EMS agencies. Additionally, Wisconsin has offered sessions on TCD at its annual summer conference, supported an annual stroke conference for more than eight years, and held a STEMI-focused conference in February that had 200 participants.

The **Minnesota** and **South Dakota** Flex programs conduct regional calls and meetings that serve as learning opportunities for CAH and EMS staff. Minnesota also supports an annual EMS conference that typically features presentations on TCD issues. Similarly, the South Dakota Flex program supports the South Dakota Ambulance Association Conference which also includes presentations on TCD activities.

One of the challenges of training programs is documenting the impact of those programs on TCD systems of care. Some states, such as Wisconsin, conduct pre/post training surveys of participants to assess changes in knowledge and self-reported organizational performance following participation in the training. Others track the number of meetings and webinars held and the number of participants in those events. While useful, pre/post survey collect self-reported outcomes and may not reflect real world changes. Similarly, the number of events and participants are process measures that provide little insight into how the participants use the knowledge obtained. Given limitations on the amount of Flex funding that can be dedicated to EMS activity, training programs and conferences provide a cost-effective way to reach EMS audiences but are likely insufficient to drive lasting change in local/regional EMS system operations and performance. Wisconsin's experience demonstrates that trainings supplemented by direct technical assistance programs are an effective way to drive system change.

## Data Collection

The ability to collect and analyze EMS data is an essential foundation for building high-functioning TCD systems of care. Improvement in local, regional, and state EMS and TCD data capacity are critical to driving TCD system performance improvement and documenting the impact of Flex program TCD activities. Key stakeholders reinforced the challenges associated with data collection for rural EMS agencies including a high reliance on volunteer staff, heavy workloads, and increasing demands for data reporting and measurement.

Respondents noted that the importance of identifying a consistent set of core measures that rural agencies are willing to use is key to successful data collection to monitor TCD and EMS performance. The National Highway Traffic Safety Administration, the National Association of State EMS Officials (NASEMSO), the Joint Committee on Rural Emergency Care (created by NASEMSO and the National Organization of State Offices of Rural Health (NOSORH)), and the Federal Office of Rural Health Policy all have a role to play in identifying rural relevant EMS performance measures. The Flex Monitoring Team has already conducted significant work in this area that can serve as a foundation for developing and obtaining consensus on a recommended set of core measures.<sup>11</sup>

Despite this foundation, the Flex Program's experience with CAH reporting on the Medicare Beneficiary Quality Improvement Program (MBQIP) measures suggests that reaching high level consensus on a set of rural relevant hospital quality measures was substantially easier than achieving widespread provider use. MBQIP was implemented in phases beginning in September 2011 and required significant work by FORHP, the FMT, the Technical Assistance and Services Center (TASC), and state Flex programs to encourage CAHs to report at least one performance measure from the set.<sup>12</sup> This experience suggests that once consensus is achieved on a core set of EMS performance measures, these national stakeholders will need to work with state EMS agencies to encourage their use in state data collection efforts. Ideally, any proposed measures should be part of state EMS data reporting requirements.

A number of state Flex programs focused their activities on improving local and state capacity to collect and track EMS data as part of their portfolio of EMS work. The **Minnesota** Flex program, for example, supports the EMS office's project on MNStar data to track trauma and

TCD. The EMS Regulatory Board manages the data with the EMS office accessing the data in order to run TCD programs. Working through a successful contractual process, the EMS office procured several years of data, and are working to link these data with hospital records. This will allow the analysis of care provided during a TCD event from pre-hospital to hospital care and the identification and correction of data quality issues.

**South Dakota**, through the South Dakota Cardiovascular Collaborative, supports improvements in EMS data collection by identifying and tracking data on heart disease and stroke. The goal is to use the data to drive policy changes by identifying measures to monitor and enhance system performance. As an example, South Dakota's system improvement goals includes reducing ambulance chute times, which is a controllable measure of staffing availability, dispatch capability, and system response. Efforts are underway to analyze data from the National EMS Information System (NEMESIS) on response times to emergency calls at the local and state levels. Additionally, the South Dakota EMS office works with the state trauma registry to track EMS activation on calls. EMS officials noted the challenges of integrating data across TCD episodes of care as EMS and trauma data are collected and maintained in two separate, unlinked systems. Their long-term goals include working with the state Health Information Exchange (HIE) to facilitate the ability to share and connect EMS and hospital data electronically.

The **North Dakota** Flex program, through its subcontract with the state EMS Office, works with EMS agencies to track outcomes related to EMS capacity building around TCD, specifically the percentage of EMS staff trained on TCD protocols and the percentage of agencies working on QI protocols related to TCD. The Flex program is also working at a regional level with EMS on the use of pre-hospital screening tools and facilitating discussions on performance measures. EMS officials noted the challenge of linking EMS run data with hospital and trauma registry data and described long-running conversations with the state Health Information Network (HIN) about the possibility of integrating EMS data into the HIN.

### **Providing Technical Assistance to Local EMS Agencies**

The **Wisconsin** Flex program has provided technical assistance to local EMS agencies performance on the use of relevant TCD patient care policies, practices and EMS protocols through a contract with MetaStar, its QIO organization. Through this contract, MetaStar employs a consultant who has worked with nine rural EMS agencies. Using the result of a review TCD patient care policies, practices, and protocols used by targeted group of local EMS agencies, the consultant met with the service directors and crew members of three agencies during the first round of technical assistance to develop benchmarks for recommended improvements. An example of one such benchmark is "on-scene times of less than or equal to 15 minutes for patients suffering from cardiac arrest, STEMI, stroke or trauma, at least 80% of time." The initial report for the consultant's work with the first three EMS agencies was provided to the Wisconsin State Office of Rural Health in August 2017. The final report described a series of metrics that the agencies identified for their use including on scene times of less than 15 minutes for TCD patients; an increase in the acquisition of 12 lead electrocardiograms; the incorporation of advanced life support (ALS) personnel in pre-hospital care; and work with their EMS Medical Directors to develop policy and protocol on use of ALS. Additionally, the report recognized the lack of feedback on feedback on TCD events from hospitals as a component of demonstrating



patient outcomes. The report also described initiatives implemented by the three agencies to improve their TCD performance.

The consultant is currently completing the work with the additional six agencies and the preparation of the final report is underway. The goal, at the end of the targeted assistance for these nine EMS agencies, is to conduct a retrospective analysis of the reports to identify best practices that have driven improvement in the established benchmarks.

Additionally, the state Flex Program contracted with the Paramedic Foundation to use the results from its TCD survey to create individual best practice toolkits on STEMI, stroke, cardiac arrest, and trauma as a resource for EMS agencies wishing to improve their TCD performance. These toolkits are available on the Wisconsin Office of Rural Health website.<sup>13</sup>

**Nebraska** is exploring participation in Get with the Guidelines program for stroke<sup>14</sup> as a way of establishing guidelines and expectations for system performance. They are examining EMS run data to identify local system performance on those guidelines and to determine where education and training efforts should be focused. State EMS officials plan to examine local system performance following the provision of education and training to determine the impact of these efforts. They acknowledge that the challenge of quantifying impact may be complicated by the low volume of stroke activity in rural areas as there may be several instances of stroke handled by an EMS agency in one year and none in the next.

## DISCUSSION

Our review of the state Flex program activities to support EMS TCD systems of care shows that state Flex programs are invested in working with their state EMS departments on system capacity issues. These partnerships enable state Flex programs to access the expertise of state EMS personnel and stakeholders as well as build on their familiarity with EMS agencies and resources at the community level. As noted, it is common for state Flex programs to use contracts with state EMS departments to develop and implement rural EMS projects. State EMS departments can use Flex funding to leverage existing funding to address rural concerns and to undertake projects for which there may be no other sources of funding. Maine, Minnesota, and Wisconsin provide examples of the use of Flex funds to address data concerns, quality improvement needs, and TCD system development at the state and local levels. Partnerships with other external stakeholders such as QIOs and TCD committees and alliances were also used to support TCD performance improvement initiatives.

At the same time, many state Flex program staff serve on rural EMS and TCD advisory committees and provide a rural perspective on the impact of state-level decisions on rural TCD systems of care. These linkages facilitate collaboration between the state Flex programs and their respective state EMS departments and have resulted in improved communication between key stakeholders and a consistent focus on rural EMS issues. For example, North Dakota's Flex Director sits on the state's EMS Advisory Committee. Flex program staff from North Dakota emphasize the importance of bringing all parties "to the table" for networking meetings which includes EMS leaders, the state trauma coordinator, and the QIO. As another example, the Minnesota Flex program has a longstanding working relationship with their state EMS

department which has allowed them to jointly pursue quality improvement initiatives and to address TCD data needs by mapping run data to hospital records. These state-level relationships also facilitate collaboration between the CAHs and EMS at the local level. A growing area of state Flex program activity includes networking meetings, regional CAH/EMS meetings, and task force groups that include representation of both EMS and CAH personnel.

Of the themes identified through our study, the issue of data collection remains the most challenging. From the state's perspective, they face challenges collecting, analyzing, and reporting EMS run and capacity data from local EMS agencies, many of which have limited data reporting capacity. At the same time, states face challenges analyzing and using these data for TCD system performance improvement. Due to the high reliance on volunteers and limited local resources, many local EMS agencies struggle with consistently collecting and reporting data on the quality of their services. FORHP and state Flex programs can play an important role in addressing these data challenges. FORHP can work with its Flex stakeholders including the Rural Quality Improvement Technical Assistance Center (RQITA), the FMT, and TASC to provide technical assistance to state Flex programs on the use of state-level EMS data to support efforts to improve and monitor rural EMS systems of care. Relevant topics could include an overview of EMS agency and run data collected by states; a discussion of the NEMSIS system and its use in monitoring rural EMS and TCD performance; examples of how to work with state EMS agencies to access and analyze available data; a review of the potential role for state health information to facilitate the connection between EMS and hospital data; how to use these data to monitor the impact of state Flex program EMS and TCD initiatives; and how these data might be connected to hospital data to better monitor the outcomes of TCD events. Minnesota's work to link EMS run data with hospital data to monitor TCD events and South Dakota's use NEMSIS data to monitor response time to emergency calls and its work with the state trauma registry to track EMS activation on trauma calls are examples of state Flex program efforts to address EMS data concerns and could be replicated by other state Flex programs.

At the same time, state Flex programs have trouble collecting data necessary to monitor program performance. Although the TCD performance measures described in the Flex FOA (see the Appendix) may be used to monitor the outcomes of state Flex program TCD initiatives, Flex coordinators reported difficulty in using these measures if the necessary data are not already collected by state EMS departments. As an alternative, many states rely on output measures (e.g., the number of training programs conducted or the number of attendees participating in meetings) to monitor their activities. States such as Wisconsin are using pre/post meeting surveys to determine changes in knowledge and satisfaction with the programs. While these output measures and self-reported changes in knowledge are useful information for Flex programs, they fall short of allowing the states Flex programs to fully quantify the impact of their efforts. States need to better connect their initiatives to outcomes that reflect real change in the operations and performance of rural TCD systems of care. Some state Flex program have identified interim outcomes measures that are more substantive than the process measures commonly employed by many state Flex programs. Nebraska and Wyoming, for example, monitor TCD outcomes by examining the increase in the percentage of EMS personnel trained on STEMI and stroke issues along with the increase in the percentage using standardized American Heart Association STEMI and stroke protocols. States using the Attributes of a Successful Rural Ambulance

Survey such as Wisconsin and Nebraska or their own internally developed surveys such as Minnesota may use the results of these surveys, if conducted over time, to monitor the impact of their Flex programs' TCD initiatives. Additionally, use of the data from these surveys allow local agencies to identify their performance measures and benchmarks (e.g., chute or on-scene time) that are most relevant to their own needs.

States would benefit from additional technical assistance related to logic modeling and outcome measurement provided by TASC and the FMT to support their efforts to document the impact of their initiatives. States would also benefit from a better understanding of the EMS and TCD performance measures included in the Flex FOA (see Appendix) through technical assistance on using those linking the measures to their initiatives using logic models and theory of change. In particular, a number of the measures represent interim evidence-based steps are likely to lead to improved performance and could logically be linked to training initiatives. Examples of these measures include changes in the percentage of EMS staff at the agency level trained in STEMI, stroke, and trauma protocols, the percentage with operational TCD system performance improvement committees, the percentage of agencies using American Heart Association Guidelines for STEMI, or the percentage using CDC guidelines for field triage of injured patients (trauma) of all ages. Technical assistance provided to the states should also include a discussion of ways to obtain data on these changes as part of the planning process.

## **CONCLUSIONS**

TCD system of care improvement activities undertaken by state Flex programs are predominantly focused on engagement in statewide committees on STEMI, stroke, and trauma and conducting local, regional, and statewide training opportunities for EMS and emergency hospital personnel. Flex funds are often used to supplement existing state or grant funding focused on these initiatives by supporting the salaries of state level coordinators for STEMI, stroke, or trauma. The involvement of state Flex programs in these areas of activity help to ensure that the needs of rural EMS agencies, hospitals, and communities are considered as state plans and policies are developed. It is difficult, however, to assess the impact of these initiatives on overall system performance or the extent to which these partners may understand the use of the suggested TCD performance measures described in the Flex FOA to monitor the impact of Flex-funded TCD activities. States and their EMS partners would benefit from a more detailed understanding of why these measures are important, how they can be used to monitor improvements in system capacity and performance, and how these data can be collected at the state level. State Flex programs would also benefit from a better understanding of the EMS data already available through their states such as licensing and regulatory data collected by state EMS bureaus, EMS run data reported by local EMS providers, and performance data reported by states to NEMSIS. FORHP, in collaboration with Flex stakeholders including TASC, the FMT, RQITA, and the Joint Committee on Rural Emergency Care, could support the development of technical assistance resources to enhance state Flex program TCD and EMS data capacity. Additionally, state EMS data reported to NEMSIS represents a potential data source for use by state Flex programs to monitor TCD and EMS performance. Its use for this purpose is currently being explored in a current FMT project to review rural EMS performance measures and related data sources.

As they approach the next competitive funding cycle, state Flex programs would benefit from expanding beyond their reliance on training activities as central components of their TCD portfolios of activity. As discussed earlier, training is an important activity but difficult to connect to local level changes in TCD operations and performance and is rarely sufficient on its own to drive local/regional TCD performance improvement. Wisconsin, for example, followed its trainings and TCD toolkits with direct technical assistance on TCD issues to nine local agencies. This technical assistance has helped these agencies to identify and implement operational changes to improve their TCD performance.

State Flex programs would also benefit from implementing more substantive interventions targeted at directly assessing local system capacity and performance. An example includes Minnesota's support for linking EMS run data with hospital records to allow for monitoring TCD events as part of a continuum of care. Another example includes Nebraska's implementation of the Get with the Guidelines program for stroke combined with the use of EMS run data to analyze local system capacity, target direct technical assistance to local agencies, assess the impact of TCD performance improvement initiatives, and monitor overall TCD system performance.

Efforts to improve TCD systems of care and the capacity of EMS services (and their CAH partners) to function effectively in these systems of care are important areas of state Flex program activity. Beyond the state level work that Flex Programs do, additional work is needed to directly identify and quantify gaps in local EMS capacity as well as opportunities to improve that capacity. Some states such as Minnesota, Nebraska, and Wisconsin have undertaken initiatives that provide a pathway for other states to follow to engage in this important area of Flex activity. As other states would benefit from opportunities to learn more about what these states are doing and how they might undertake initiatives targeted to their own states' needs, FORHP and its Flex partners (e.g., TASC, FMT, and RQITA) are positioned to provide information on the impact of these efforts through a more thorough examination of these initiatives and the dissemination of this information through case studies, webinars, and technical assistance programs.

Exposure to these programs and a greater understanding of the opportunities for state Flex programs to assist local EMS agencies and CAHs in developing and improving TCD systems of care represent critical technical assistance opportunities as states prepare their applications for the next competitive Flex funding cycle. Key Flex staff and EMS stakeholders from these states should be encouraged to share their information with other state Flex programs through participation in appropriate meetings and webinars including the Flex Reverse Site Visits, JCREC's annual rural EMS meeting, TASC's Flex Program Workshop (formerly the New Flex Coordinator orientation meeting), and NOSORH's regional meetings and webinars. TASC and the FMT are also well positioned to provide the technical assistance necessary to help state Flex Programs develop strategic interventions to improve EMS capacity, enhance TCD systems of care, and create better linkages between local EMS agencies, CAHs, and other rural hospitals.

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## APPENDIX

### Time Critical Diagnoses and EMS Performance Measures<sup>3</sup>

#### Performance Measures for Activity 3.05 - Improve Time Critical Diagnoses EMS System Capacity

- Percent of EMS agencies
  - With operational TCD system PI committees
  - Implementing strategies to address resource and work force needs
  - with EMS staff trained at the agency level trained on STEMI, stroke, and trauma
  - Using AHA Lifeline Guidelines for STEMI and stroke
  - Using CDC guidelines for field triage of injured patients (trauma) all ages
  - Using ED dispatch programs and protocols
  - Functioning as integrated systems of emergency care
  - With improved performance on key TCD measures (e.g., D2B of  $\leq 90$  minutes)
  - With improved financial and quality performance
  - With improved EMS systems performance locally and regionally

#### Performance Measures for Activities 3.06 - Improve EMS Capacity and Operational Projects

- Percent of EMS agencies
  - Billing third party payers/patients
  - Using patient billing and financial data for performance improvement
  - With quality improvement protocols and processes
  - Using quality data for performance improvement
  - Involved in local/regional EMS systems of care in which participants meet regularly to review data on quality and system performance
  - With performance improvement plans
  - With improved regional/local EMS system capacity