Feedback Reports for Improving STEMI Care

Daniel Moore, RN, BSN, CEN

As a bedside and charge RN working in the emergency department (ED), I spent the first 10 years of my career identifying, caring for, and rushing many STEMI patients to the cath lab. I was directly involved in creating shorter ED dwell times when I saw a new opportunity arise — a ST-elevation myocardial infarction (STEMI) Program Nurse Coordinator position became available in December 2015. I was ready to expand my practice and was fortunate to be selected. Today, I work in both STEMI and cardiovascular recovery roles: I also hold a part-time position in our cardiovascular recovery unit (CVR). I'm proud to say I have never left the bedside in my 20 years as an RN.

Early on in my STEMI coordinator role, I saw the previous coordinator's STEMI feedback reports that went to the care team (Figure 1 is an original feedback report I inherited, dated 1-20-16). Fortunately, this coincided with our institution, Asante Rogue Regional Medical Center in Medford, Oregon, acquiring a more user-friendly visual angiogram-recording program by McKesson. It offered the opportunity to provide better visual aids, along with adding the STEMI electrocardiogram (ECG), as reinforcement tools for meeting time goals, teaching opportunities, and to scratch the curiosity itch of the patient outcome. Collaborating with my outstanding medical co-directors, I bounced formatting and content ideas off of them along with researching how other STEMI coordinators provide feedback. Our feedback reports have evolved since 2016 to their current form (examples provided below).

We send these feedback reports to every team member who comes into contact with a STEMI patient, primarily from first medical contact through the cath lab (whether ED or EMS activated). For patients that go for emergent coronary artery bypass graft (CABG) surgery or have a different path post-cath lab, we send the reports to the OR, cardiovascular intensive care unit (CVICU), and Heart Center personnel through discharge. These feedback reports have patient information de-identified to be compliant with HIPAA; they are titled only with a date for our own tracking and filing purposes.

For our four outlying hospitals that are >2 hours away and offer thrombolysis and transfer, our feedback reports focus on the time goals of Door to EKG and Door to Needle (thrombolysis). We also confirm outlying

EMS Feedback: Mercy Flights

Patient Name: XXXXXX **DOB:** XXXXXX **Date of Service:** 1/20/2016
Cardiology: Lightheart/Gross **ED Monitor tech:** Tena Coddington **Cath lab crew:** Jennifer Russell, Joshua Carter **Mercy Flights:** Beaux Brasseur, Dylan Yeager

	Actual	Goal
First Medical Contact (BY EMS)	10:31	
1st EKG time (by EMS)	10:33	
Door to EKG time (minutes)	2 minutes	<10
Arrival to ARRMC ED		
Arrival in RRMC Cath lab time	11:10	
Intervention time at 1st device or balloon time	11:21	
Arrival in Cath lab to device time (minutes)	11 minutes	≤30
First Medical Contact to device time (minutes)	48 minutes	≤90

Findings: 100% Thrombotic occlusion to the RCA.

Treatment: Successful percutaneous coronary intervention (PCI) of the occlusion in the RCA with a 4 mm x 28mm Bare Metal Vision Stent with 0% post-procedure residual obstruction.

Outcome: The patient was discharged home on 1/22/16 in good condition to follow up with cardiac rehab.

Excellence: Great job in quickly getting the EKG and activating STEMI!

Recommendations: none.

We are supplying this feedback to optimize our coordinated team response for every STEMI patient.

Thank you for your ongoing effort to provide quick and excellent care to our STEMI patients.

Sincerely,

Dr. Brian Gross and Daniel Moore RN

Our STEMI program Coordinators

Figure 1. The starting point: an original ST-elevation myocardial infarction (STEMI) feedback report from January 2016.

STEMI Thrombolytic Medication Orders 1-5

1. **ASA** 162 to 325 mg uncoated/chewable PO
2. **Heparin** 60 mg/kg IV, maximum dose 4000 units IV, followed by an infusion @ 12 units/kg/hr IV, maximum dose 1000 units/hr, to achieve a PTT of 50 to 70 seconds.
3. **TNKase** IV within 30 minutes of arrival/STEMI ECG if not contraindicated. **Have patient sign consent form.**
   → Refer to the table below for weight-based dosing
4. **Clopidogrel**: **Age ≤ 75 → 300 mg PO**
   Age > 75 → 75 mg PO
5. **Atorvastatin** 80 mg PO

TNKase: Absolute Contraindications:

- History of any intracranial hemorrhage
- History of ischemic stroke within the preceding 3 months, with the important exception of acute ischemic stroke seen within 3 hours, which may be treated with thrombolytic therapy
- Presence of a cerebral vascular malformation or a primary or metastatic intracranial malignancy
- Symptoms or signs suggestive of an aortic dissection
- A bleeding diathesis or active bleeding, with the exception of menses; thrombolytic therapy may increase the risk of moderate bleeding, which is offset by the benefits of thrombolysis
- Significant closed-head or facial trauma within the preceding three months

TNKase: Relative Contraindications:

- History of chronic, severe, poorly controlled HTN or uncontrolled HTN at presentation (blood pressure > 180 mmHg systolic and/or > 110 mmHg diastolic; severe HTN at presentation can be an absolute contraindication in patients at low risk)
- History of ischemic stroke more than 3 months previously
- Dementia
- Any known intracranial disease that is not an absolute contraindication
- Traumatic or prolonged (> 10 min) cardiopulmonary resuscitation
- Major surgery within the preceding 3 weeks
- Internal bleeding within the preceding 2-4 weeks or an active peptic ulcer
- Non-compressible vascular punctures
- Pregnancy
- Current anticoagulation therapy (e.g. warfarin, apixaban, rivaroxaban, dabigatran)
- Subacute Bacterial Endocarditis (SBE)
- Pericarditis

TNKase weight-based dosing table:

Patient Weight * (kg)	Patient Weight * (lb)	TNKase (mg)	Reconstituted (5 mg/mL) TNKase (mL)
< 60	< 132	30	6
60 to < 70	132 to < 154	35	7
70 to < 80	154 to < 176	40	8
80 to < 90	176 to < 198	45	9
≥ 90	≤ 198	50	10

*Dosing in the ASSENT-2 trial was based on actual or estimated patient weight.

References: UpToDate-Fibrinolysis for STEMI, 4/2/2019 Genentech, Inc. package insert for TNKase 8/2018 STEMI Thrombolytic Medication Orders 4/17/24 KD/BG Page 2 of 2

Figure 2. STEMI medications protocol for outlying hospitals that give thrombolysis.

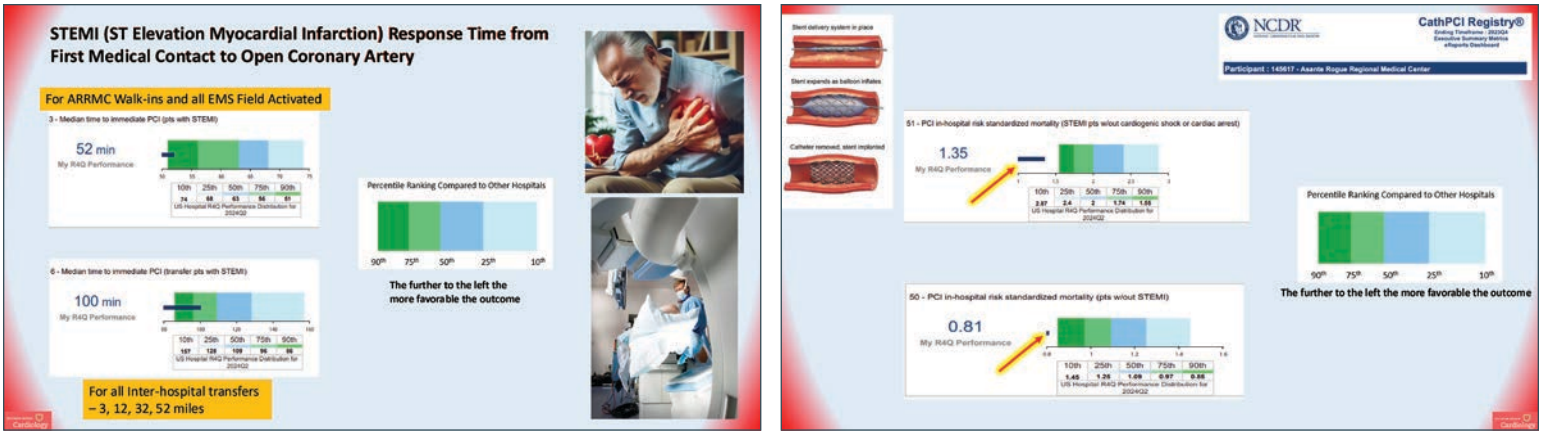


Figure 3. Data for Asante Rogue Regional Medical Center from the American College of Cardiology National Cardiovascular Data Registry (ACC NCDR).[1]

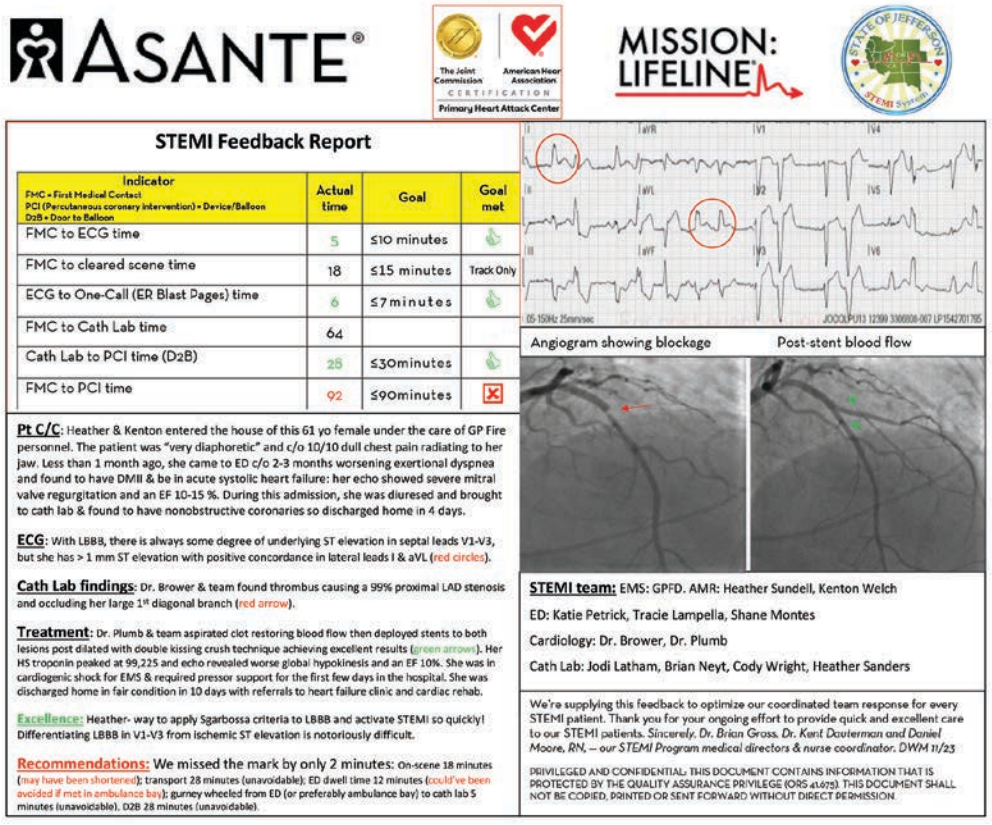


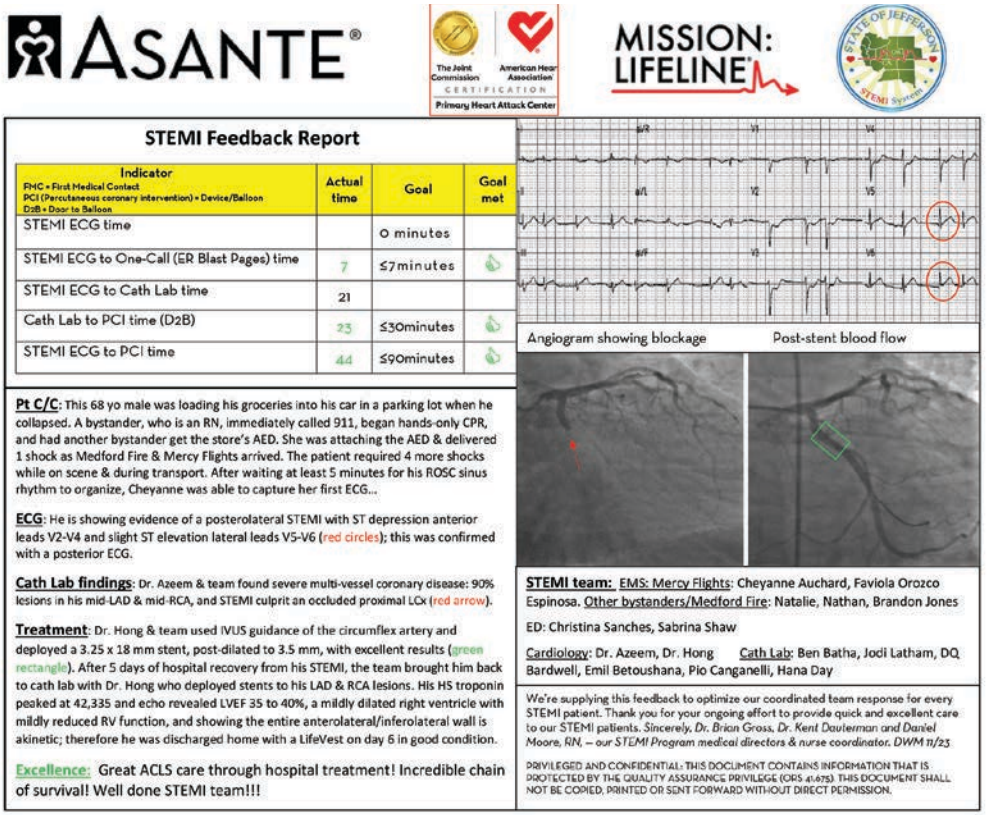
Figure 4. An EMS feedback report with opportunity for improvement.

hospital team members administered additional recommended STEMI medications (ASA, heparin, clopidogrel, atorvastatin), and if not, we offer gentle encouragement to refer to their laminated protocol (Figure 2 is our STEMI medications protocol for outlying hospitals that give thrombolysis and we make sure this protocol sheet is available for them).

An approach of timely, consistent feedback to patient care personnel fosters team engagement, helping to facilitate great patient outcomes. This is evident in our four consecutive years of achieving American College of Cardiology National Cardiovascular Data Registry (ACC NCDR) Chest Pain Myocardial Infarction (CPMI) Platinum level, with many years of gold and silver level beforehand (our associated NCDR data can be seen in Figure 3),

"Receiving reports on the outcome of the patients we take care of are invaluable to prehospital providers. These reports give us confirmation on our thought processes driving our treatments or learning opportunities of what could have been done differently. It furthers our knowledge of the heart anatomy and understanding the symptoms that were presented compared to the heart tissue/vessels affected. It gives us encouragement knowing that what we did made a difference instead of wondering. When I receive a report that my patient underwent successful interventions with a good outcome and I was able to play a role in their process, it is the biggest thank you I could ever receive."

— Teresa Arrwood, NRP, Ambulance Director/Training Program Coordinator Etna Ambulance



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STATE OF JEFFERSON STEMI System

STEMI Feedback Report

Indicator FMC = First Medical Contact PCI (Percutaneous coronary intervention) = Device/Balloon D2B = Door to Balloon	Actual time	Goal	Goal met
STEMI ECG time		0 minutes	
STEMI ECG to One-Call (ER Blast Pages) time	7	≤7minutes	
STEMI ECG to Cath Lab time	21		
Cath Lab to PCI time (D2B)	23	≤30minutes	
STEMI ECG to PCI time	44	≤90minutes	

Pt C/C: This 68 yo male was loading his groceries into his car in a parking lot when he collapsed. A bystander, who is an RN, immediately called 911, began hands-only CPR, and had another bystander get the store's AED. She was attaching the AED & delivered 1 shock as Medford Fire & Mercy Flights arrived. The patient required 4 more shocks while on scene & during transport. After waiting at least 5 minutes for his ROSC sinus rhythm to organize, Cheyanne was able to capture her first ECG...

ECG: He is showing evidence of a posterolateral STEMI with ST depression anterior leads V2-V4 and slight ST elevation lateral leads V5-V6 (red circles); this was confirmed with a posterior ECG.

Cath Lab findings: Dr. Azeem & team found severe multi-vessel coronary disease: 90% lesions in his mid-LAD & mid-RCA, and STEMI culprit an occluded proximal LCx (red arrow).

Treatment: Dr. Hong & team used IVUS guidance of the circumflex artery and deployed a 3.25 x 18 mm stent, post-dilated to 3.5 mm, with excellent results (green rectangle). After 5 days of hospital recovery from his STEMI, the team brought him back to cath lab with Dr. Hong who deployed stents to his LAD & RCA lesions. His HS troponin peaked at 42,335 and echo revealed LVEF 35 to 40%, a mildly dilated right ventricle with mildly reduced RV function, and showing the entire anterolateral/inferolateral wall is akinetic; therefore he was discharged home with a LifeVest on day 6 in good condition.

Excellence: Great ACLS care through hospital treatment! Incredible chain of survival! Well done STEMI team!!!

Angiogram showing blockage | Post-stent blood flow

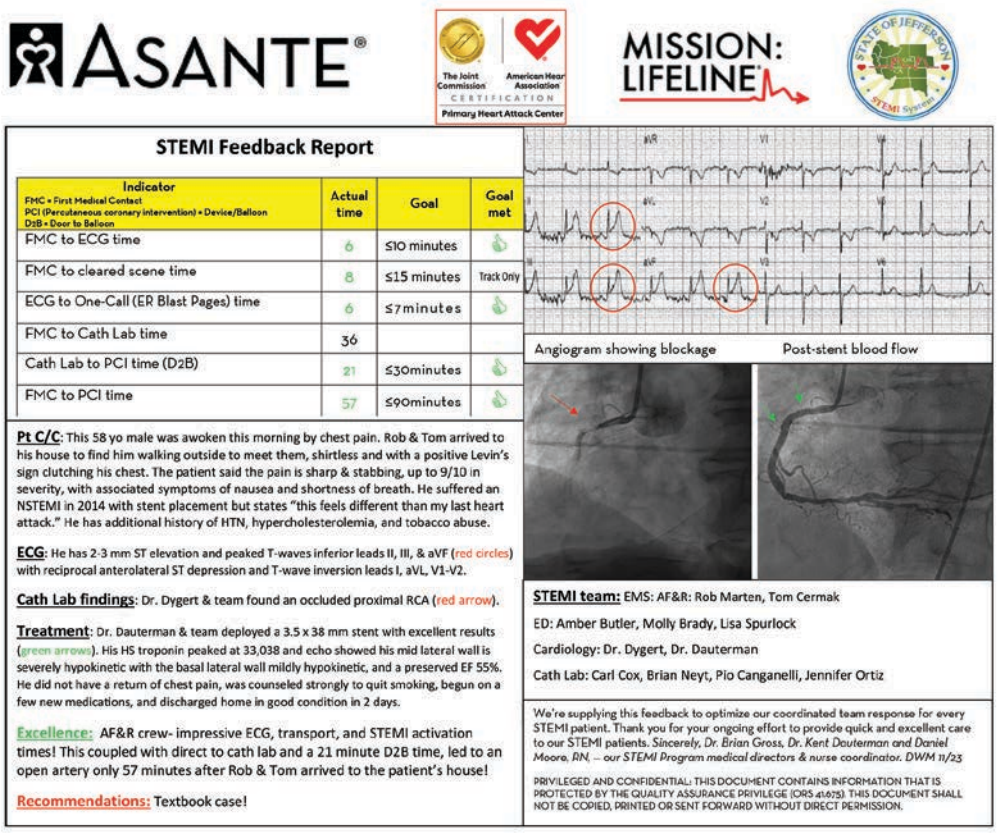
STEMI team: EMS: Mercy Flights: Cheyanne Auchard, Faviola Orozco Espinosa. Other bystanders/Medford Fire: Natalie, Nathan, Brandon Jones

ED: Christina Sanches, Sabrina Shaw

Cardiology: Dr. Azeem, Dr. Hong Cath Lab: Ben Batha, Jodi Latham, DQ Bardwell, Emil Betoushana, Pio Canganelli, Hana Day

We're supplying this feedback to optimize our coordinated team response for every STEMI patient. Thank you for your ongoing effort to provide quick and excellent care to our STEMI patients. *Sincerely, Dr. Brian Gross, Dr. Kent Dauterman and Daniel Moore, RN, – our STEMI Program medical directors & nurse coordinator. DWM 11/23*

Figure 5. A cardiac arrest in the field, STEMI after return of spontaneous circulation (ROSC), resuscitated with a good outcome.



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STATE OF JEFFERSON STEMI System

STEMI Feedback Report

Indicator FMC = First Medical Contact PCI (Percutaneous coronary intervention) = Device/Balloon D2B = Door to Balloon	Actual time	Goal	Goal met
FMC to ECG time	6	≤10 minutes	
FMC to cleared scene time	8	≤15 minutes	Track Only
ECG to One-Call (ER Blast Pages) time	6	≤7minutes	
FMC to Cath Lab time	36		
Cath Lab to PCI time (D2B)	21	≤30minutes	
FMC to PCI time	57	≤90minutes	

Pt C/C: This 58 yo male was awoken this morning by chest pain. Rob & Tom arrived to his house to find him walking outside to meet them, shirtless and with a positive Levin's sign clutching his chest. The patient said the pain is sharp & stabbing, up to 9/10 in severity, with associated symptoms of nausea and shortness of breath. He suffered an NSTEMI in 2014 with stent placement but states "this feels different than my last heart attack." He has additional history of HTN, hypercholesterolemia, and tobacco abuse.

ECG: He has 2-3 mm ST elevation and peaked T-waves inferior leads II, III, & aVF (red circles) with reciprocal anterolateral ST depression and T-wave inversion leads I, aVL, V1-V2.

Cath Lab findings: Dr. Dygert & team found an occluded proximal RCA (red arrow).

Treatment: Dr. Dauterman & team deployed a 3.5 x 38 mm stent with excellent results (green arrows). His HS troponin peaked at 33,038 and echo showed his mid lateral wall is severely hypokinetic with the basal lateral wall mildly hypokinetic, and a preserved EF 55%. He did not have a return of chest pain, was counseled strongly to quit smoking, begun on a few new medications, and discharged home in good condition in 2 days.

Excellence: AF&R crew- impressive ECG, transport, and STEMI activation times! This coupled with direct to cath lab and a 21 minute D2B time, led to an open artery only 57 minutes after Rob & Tom arrived to the patient's house!

Recommendations: Textbook case!

Angiogram showing blockage | Post-stent blood flow

STEMI team: EMS: AF&R: Rob Marten, Tom Cermak

ED: Amber Butler, Molly Brady, Lisa Spurlock

Cardiology: Dr. Dygert, Dr. Dauterman

Cath Lab: Carl Cox, Brian Neyt, Pio Canganelli, Jennifer Ortiz

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Figure 6. An EMS feedback report where the team made every time goal.

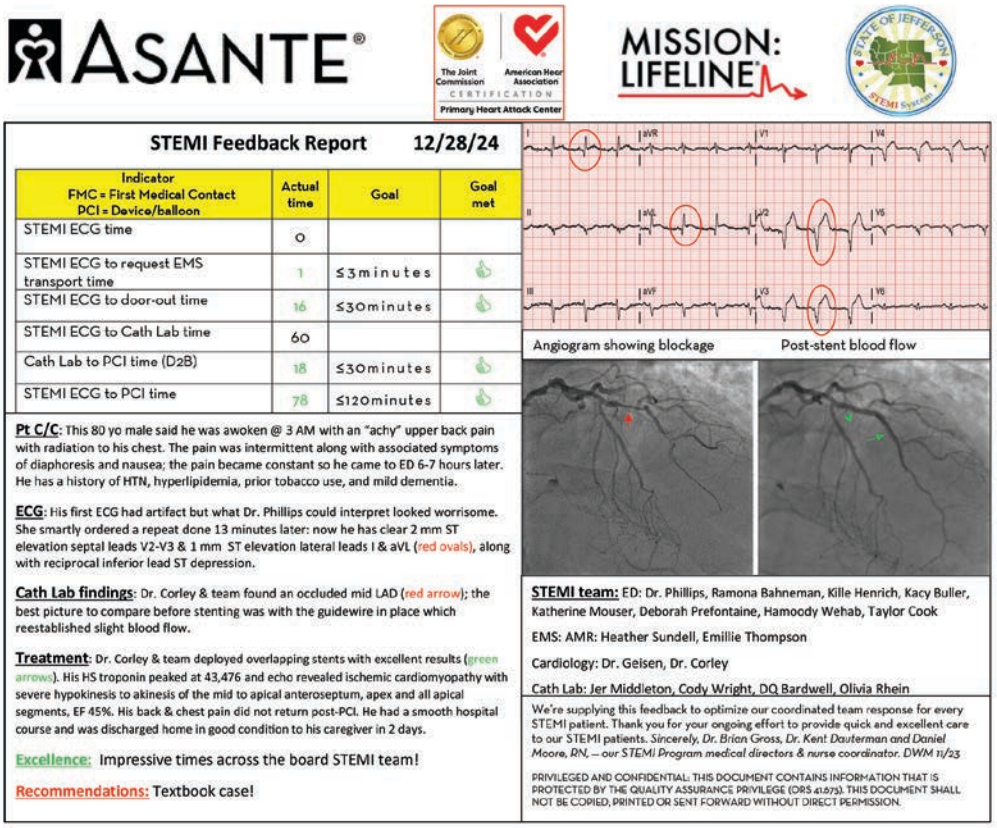
as well as receiving gold for STEMI and non-STEMI from American Heart Association (AHA) Mission: Lifeline STEMI nearly all of the last 8 years. We meet regularly with ED and EMS personnel to greet new people in critical roles and collaborate on new evidence to update our practices. Annually we hold a combined meeting that includes each ED and their primary EMS agency within our primary percutaneous coronary intervention (PPCI) area, sharing the previous years' data in order to look for trends and opportunities. This approach has created a positive practice environment for patient care staff, who have regularly expressed appreciation for the education and feedback from the STEMI medical co-directors and STEMI coordinator.

Asante Rogue Regional Medical Center had 369 total STEMI activations in 2023 and >400 STEMI activations in 2024. Of the 369 STEMI activations in 2023, 332 were from our PPCI area and 37 from our four outlying hospitals. Out of the 369, 171 underwent PCI, 30 had a CAGB, and 21 were medially managed. The remainder were not STEMI diagnoses. Examples of the feedback reports are below:

2/15/24: This feedback report focused on opportunities for improvement and showed how minutes at each element contributed to the final outcome — in this case, a 2-minute delay led to a failure to meet the 90-minute overall metric (Figure 4 is an EMS feedback report with opportunity for improvement).

5/3/24: This feedback report focused on the importance of high-quality CPR and early defibrillation with out-of-hospital cardiac arrest (OHCA). This was critical to bypass the ED for stabilization direct to cath lab and onto an incredible door-to-ballon (D2B) time with intact neurological outcome for the patient (Figure 5 is a cardiac arrest in the field, STEMI after return of spontaneous circulation [ROSC], resuscitated with a good outcome).

9/3/24: This feedback report focused on the rapid EMS times with early STEMI activation. With only a 22-minute drive to cath lab door, the early page gave the cath team time to get ready so the patient could bypass the ED and go directly to cath lab. These fast times across the board led to our STEMI patient average 2-day hospitalization and in this case, with minimum infarction time (high-sensitivity



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STATE OF JEFFERSON STEMI System

STEMI Feedback Report 12/28/24

Indicator FMC = First Medical Contact PCI = Device/balloon	Actual time	Goal	Goal met
STEMI ECG time	0		
STEMI ECG to request EMS transport time	1	≤3minutes	
STEMI ECG to door-out time	16	≤30minutes	
STEMI ECG to Cath Lab time	60		
Cath Lab to PCI time (D2B)	18	≤30minutes	
STEMI ECG to PCI time	78	≤120minutes	

Pt C/C: This 80 yo male said he was awoken @ 3 AM with an "achy" upper back pain with radiation to his chest. The pain was intermittent along with associated symptoms of diaphoresis and nausea; the pain became constant so he came to ED 6-7 hours later. He has a history of HTN, hyperlipidemia, prior tobacco use, and mild dementia.

ECG: His first ECG had artifact but what Dr. Phillips could interpret looked worrisome. She smartly ordered a repeat done 13 minutes later: now he has clear 2 mm ST elevation septal leads V2-V3 & 1 mm ST elevation lateral leads I & aVL (red ovals), along with reciprocal inferior lead ST depression.

Cath Lab findings: Dr. Corley & team found an occluded mid LAD (red arrow); the best picture to compare before stenting was with the guidewire in place which reestablished slight blood flow.

Treatment: Dr. Corley & team deployed overlapping stents with excellent results (green arrows). His HS troponin peaked at 43,476 and echo revealed ischemic cardiomyopathy with severe hypokinesis to akinesis of the mid to apical anteroseptum, apex and all apical segments, EF 45%. His back & chest pain did not return post-PCI. He had a smooth hospital course and was discharged home in good condition to his caregiver in 2 days.

Excellence: Impressive times across the board STEMI team!

Recommendations: Textbook case!

Angiogram showing blockage — Post-stent blood flow

STEMI team: ED: Dr. Phillips, Ramona Bahneman, Kille Henrich, Kacy Buller, Katherine Mouser, Deborah Prefontaine, Hamoody Wehab, Taylor Cook

EMS: AMR: Heather Sundell, Emillie Thompson

Cardiology: Dr. Geisen, Dr. Corley

Cath Lab: Jer Middleton, Cody Wright, DQ Bardwell, Olivia Rhein

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Figure 7. A feedback report where EMS knew to bypass a non-PCI capable hospital.

"Mercy Flights uses the reports to provide educational feedback to our clinical providers and look for opportunities for system improvements. More globally, we use the reports to celebrate the collective impact all clinical providers engaged in the patient's care have on the patient's health and wellbeing. The reports truly showcase the need for a coordinated effort throughout our region between EMS, first responders, and our hospital partners. We don't take this collaboration for granted — it has taken years of work to reach the outcomes we have in our health system."

— Sheila Clough, CEO, Mercy Flights

troponin only to 30k and ejection fraction 55% with a 100% occlusion) (Figure 6 is an EMS feedback report where the team made every time goal).

12/28/24: This feedback report highlights the large size of our STEMI system of care, with a 63.5-mile transport. This EMS crew bypassed one of our referral hospitals because they know their protocol so well. This female patient with many co-morbidities arrived in cardiogenic shock and the STEMI team stabilized her quickly, intervened on her right coronary artery, addressed her several other medical and social needs, and still had her discharged home in 2 days (Figure 7 is a feedback report where EMS knew to bypass a non-PCI capable hospital).

Conclusion and Summary

Our consistent and timely feedback to direct-care and leadership staff who take care of our shared STEMI patients has been an effective strategy to consistently achieve the safe patient journeys and great outcomes within our STEMI system of care. I encourage other STEMI system stakeholders to implement similar feedback reports, and hold regular meetings with EMS and hospital clinical staff to educate, increase engagement, and deliver better patient outcomes. ■

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REFERENCE

1. NCDR CathPCI Registry, Ending Timeframe: 2024Q2, Executive Summary Metrics. Participant: 145617 – Asante Rogue Regional Medical Center

View the article online and download a PDF:

Cath Lab Digest

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