Stroke Patient Care Performance Improvement Guide

For information about collection, abstraction, reporting, and utilization of your patient care data for performance improvement, please contact the following MDH staff who will be happy to help you:

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To obtain this information in a different format, email health.stroke@state.mn.us. Printed on recycled paper.

Introduction

A successful, effective, and sustainable stroke program at an acute stroke ready hospital requires dedicated staff, establishment of key structural processes, and a commitment to continuous quality improvement. The Minnesota Department of Health has provided the framework for a successful stroke program at an acute stroke ready hospital through our *Reference Guide for Acute Stroke Ready Hospital Designation*. This guide provides best practices, tools, and templates specifically related to the **performance improvement component** of a successful stroke program.

Performance Improvement requires having key team members; defined clinical and administrative processes; and a clear process for the tracking, evaluation, and application of patient care process data.

Resource: Reference Guide for ASRH designation
Source: Minnesota Department of Health Stroke Program Resources (https://www.health.state.mn.us/diseases/cardiovascular/stroke/resources.html)

Stroke Program: Key Team Members

Your most important resources for a successful stroke program and performance improvement process are your staff – people. Think of these as the chefs, line cooks, and house staff. These include the following:

- Stroke Program Coordinator
- Stroke Medical Director
- Registrar/Abstractor(s)
- Acute Stroke (Response) Team
- Stroke Committee Members
    - Emergency Department Providers
    - Emergency Department Nursing
    - Emergency Medical Services (EMS)
    - Pharmacy
    - Laboratory
    - Radiology
    - Quality
    - Telestroke partner, if applicable
    - Administration

Collectively all of these team members can make up your Stroke Program Committee. Many hospitals tack “stroke committee” on to existing committees, instead of creating a separate meeting, because of their low stroke patient volume. Utilizing a multidisciplinary approach provides representation from all departments that will assist in driving new processes and change forward.

In many Acute Stroke Ready Hospitals, the stroke program coordinator also serves as the abstractor.

Stroke Program: Structural Components

Performance improvement requires a several structural components – protocols, logs, and forms – in order to support various actions and activities described below. Think of these as the ingredients for the meal that is created and served in a restaurant. These include the following items, which you'll need to establish, create, and develop:

- Acute Treatment/Response Protocol
- Telestroke Protocol
- ED Patient/Stroke Code Activation Log
- Stroke Patient Performance Improvement Case Review Tracking Log
    - Stroke Registry Patient Log
- Case Review Form (also known as a Tracking Form, Feedback Form, or PI Filter Form)
- Performance Metric Reports
- Quality/Performance Improvement Project Form/Worksheet

Sample protocols, a activation log, a performance improvement case review tracking log, case review form, performance metric reports, and QI project form sample are available – free and ready-to-use. You can find sources of these templates and tools in the following sections.

Primary Performance Improvement Activities

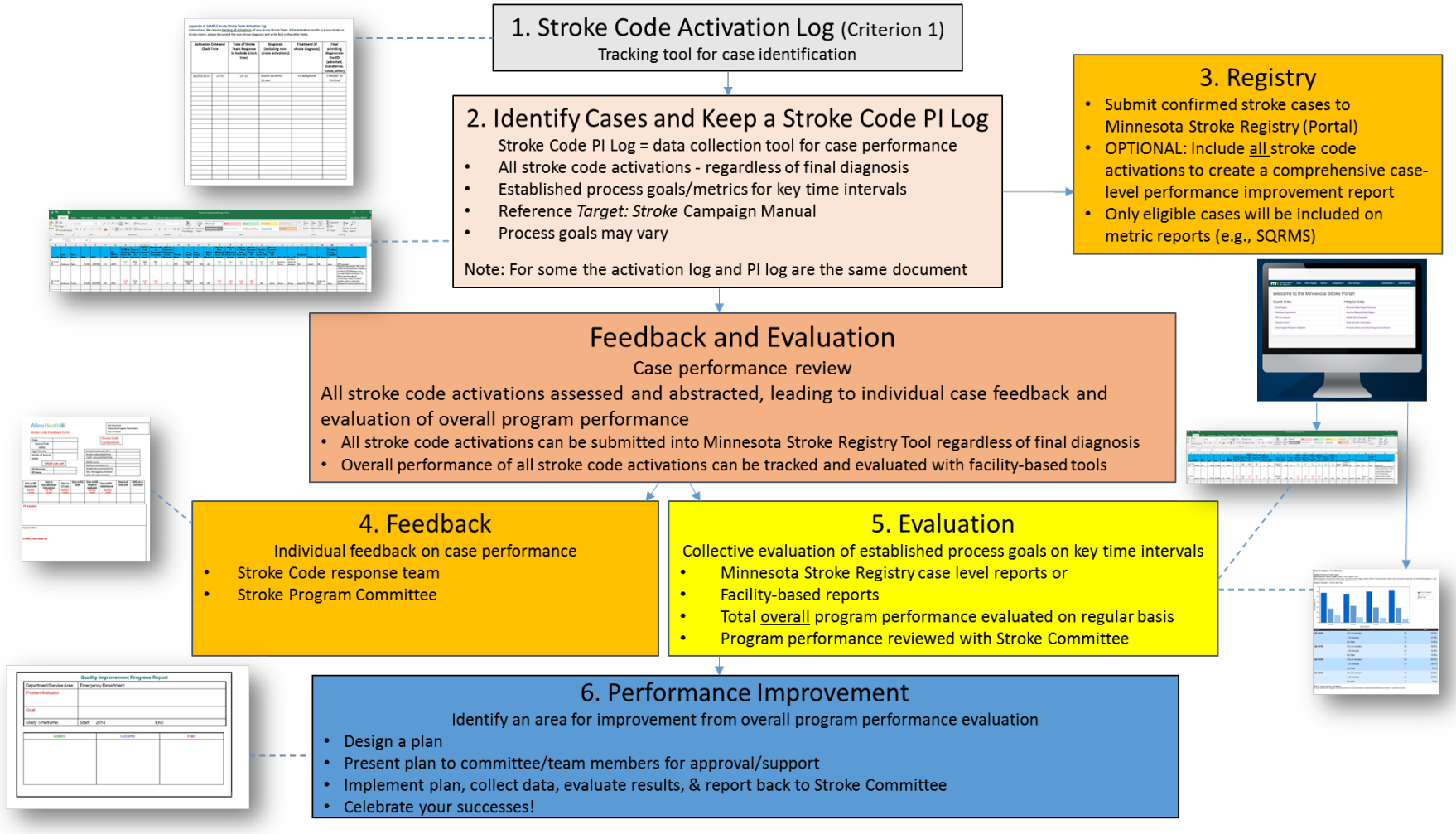
There are five primary activities that are essential to creating and maintaining a successful performance improvement process for your stroke program. Think of these as the tasks and activities that would be necessary to go from making the meal to serving it. These activities are the following:

1. Establish a stroke code activation log
2. Identify cases to track for performance improvement
3. Abstract and submit data on stroke patients into the Minnesota Stroke Registry
4. Provide feedback on individual patients to staff
5. Evaluate your performance by utilizing a case review tracking log with established program goals
6. Identify program goals and conduct performance improvement projects

These activities are outlined in Exhibit 1 on page 5. This guide describes these activities in detail, with examples, templates, and tools that are free and ready for you to download, adapt to meet your needs, and use.

Last, but certainly not least: **celebrate your success**! Post your results on the walls of your emergency department, break rooms, hallways, and meeting rooms. Create posters that show your improvements over time. Write about your projects and how they resulted in better patient care in staff-wide emails and newsletters. Recognize your staff and their collective performance and success at meetings and events. Your staff will feel pride and ownership in performance improvement when their efforts are visibly appreciated and celebrated!

Exhibit 1. Stroke Patient Care Performance Improvement Model©



1. Establish a stroke code activation/patient log

Establish a **stroke patient/stroke code activation case log** in the emergency department. Emergency department staff should be trained to enter cases into this log. It may be simply your regular/normal ED case log that has an indicator for patients that were diagnosed with strokes, activated a stroke code, or both. The purpose of this log is to help stroke coordinator identify cases that should be tracked. This may also be referred to as a **"stroke code activation log,"** if in fact it is used to record all patient cases for which a stroke code was activated.

The minimum information that should be tracked in this log:

- Activation date/time
- Acute Stroke Team Date/Time
- Diagnosis
- Treatment
- Final admitting diagnosis

Note: this stroke code activation log is required documentation for criterion #1 for the Acute Stroke Ready Hospital Designation application.

Example: Appendix A
Source: Reference Guide for ASRH designation, Appendix A – page 10
Source: Minnesota Department of Health Stroke Program Resources
(https://www.health.state.mn.us/diseases/cardiovascular/stroke/resources.html)

2. Identify cases and keep a stroke code performance improvement log to track for performance improvement and identify stroke registry cases (case ascertainment)

The stroke coordinator should **identify cases** on a regular basis, depending on the typical volume and frequency of stroke patients and patients for which a stroke code was activated. (For hospitals that have one or more stroke patients nearly every day, the stroke coordinator should be looking for cases daily. For lower volume hospitals, the stroke coordinator should be seeking cases at least once a month.) These patients can and should be identified from all of the following sources:

a. The emergency department stroke code activation log (see Activity 1 above)
b. ICU patient log
c. Inpatient patient log
d. Medical record ICD-10 discharge diagnosis report

The next activities describe what the coordinator should do after identifying patient cases.

Resource: Minnesota Stroke Registry Abstraction Guide, "Case Ascertainment," Page 4
Source: Minnesota Department of Health Stroke Program Resources
(https://www.health.state.mn.us/diseases/cardiovascular/stroke/resources.html)

3. Abstract and submit data on stroke patients into the Minnesota Stroke Registry

Data must be submitted by all Minnesota hospitals to the Minnesota Stroke Registry **on all confirmed acute stroke and TIA patients.** Because your *performance improvement case review tracking log* (See Activity #5 below) should include all patients with a confirmed stroke diagnosis or activated a stroke code (whether or not the patient actually had a stroke), the patients required to be entered into the stroke registry will be a subset of those on your log.

That said, if you are tracking your patient cases through/in the Minnesota Stroke Portal, you MAY enter ALL patients from your PI log into the Minnesota Stroke Registry Tool. Patients that do not meet eligibility criteria will be excluded from MDH and CDC performance metric calculations. (If you track your patients in a separate log, then you can submit only "registry" patients to MDH.)

A subset of data that we collect submitted to the Minnesota Stroke Registry are subsequently submitted in turn to CDC for the Paul Coverdell National Acute Stroke Registry. Hospital identities are not included with any case records in this data transmission.

Data for the Minnesota Stroke Registry are required at a minimum to be submitted quarterly. We strongly encourage hospitals to identify, abstract, and submit patient case data monthly. Either the stroke coordinator or a data abstractor/registrar will need to dig into various parts of the patient medical record to find (abstract) the data needed for the stroke registry case record. A typical patient record for a patient who was treated and transferred takes 20 minutes to abstract and enter into the stroke registry.

a. The Minnesota Stroke Portal includes a report that outputs a **performance improvement case review tracking log**, as described below for Evaluation (Activity 5). What this means is that you can enter data on all of your patients that activated a stroke code (instead of an Excel spreadsheet) into just the Minnesota Stroke Portal and use this as your platform to both track and analyze your patient data.

b. The Minnesota Stroke Portal includes a **reporting** feature to output your aggregated **performance metrics**. (Examples: Door-to-Imaging<25 min; Door-to-Needle <60 min)
    i. Use this feature to produce your reports for presentations, discussion, and performance improvement project planning at your **monthly or bi-monthly stroke committee meetings**.
    ii. You are required to provide three years of performance metric data to MDH in your **ASRH Designation Application**. This reporting feature allows you to create these required tables. Applications for designation are submitted once every three years.
    iii. ASRH hospital are also required to present data on their patients for their **ASRH Designation Site Visit**. The Minnesota Stroke Portal provides reports as

described above that you can use in presenting your data – in case-review log form as well as in performance metric tables and charts. These visits occur once every three years.

c. Data submitted to the Minnesota Stroke Registry will meet data submission requirements for the stroke measures for **Minnesota Statewide Quality Reporting and Measurement System (SQRMS) reporting**.

4. Provide feedback on individual patients to staff

Individual patient case results can be summarized into a single **case review form** to provide feedback to individuals who were involved in the patient's experience, and teams or committees that may review these cases as a group. This type of form is commonly referred to by several different names: case report form, case review form, PI Filter Form, feedback form, stroke code feedback form, stroke audit report/form, time tracker, tracking worksheet, tracking form. You will need to dig into various parts of the patient medical record to find information about the patient to include on this form. You may have a separate form specifically for EMS.

a. This case review report can be shared with the following staff:
   i. EMS
   ii. Attending physician
   iii. Emergency department nurse(s)
   iv. Lab technicians
   v. Pharmacy tech/pharmacist
   vi. Radiology tech
   vii. Radiologist
   viii. Quality director/Quality analyst
   ix. Registrar/Abstractor
   x. Medical Director
b. These case review reports can also be reviewed in group meetings with the acute stroke team, stroke committee, or both.

Examples: Appendix B
- Target: Stroke Patient Time Tracker
- Stevens County: Stroke PI Filter Tracking Worksheet for Case Review
- Essentia Health Deer River: Stroke Tracking Form
- EMS Feedback form

Source: Reference Guide for ASRH designation
Source: Minnesota Department of Health Stroke Program Resources (https://www.health.state.mn.us/diseases/cardiovascular/stroke/resources.html)

5. Evaluation: utilize your performance improvement case review tracking log and aggregate reports with established program goals

All patients confirmed as having a stroke and/or that activated a stroke code should be recorded in a **performance improvement case review tracking log**. This is usually done in a spreadsheet or other software application. (*Microsoft Excel* is the most common software application.) The data that should be tracked include times of various diagnostic and procedural activities and calculated time intervals throughout the patient's emergency department experience. These are your performance goals/metrics and often referred to as "door to" indicators.

We support the American Heart Association's *Target: Stroke time interval goals* as metrics that hospitals should track at a minimum. These goals are the following:

Action	Time
Door to physician	≤10 minutes
Door to stroke team	≤15 minutes
Door to CT/MRI initiation	≤25 minutes
Door to CT/MRI interpretation	≤45 minutes
Door to needle time	≤60 minutes

Your program should design goals that are realistic and that also coincide and/or challenge national standards. You will need to dig into the patient medical record to find the data included in this log.

a. These data may be analyzed case-by-case for "fall-outs," that is, those patients for which time goals were missed. Review these on your own and discuss them in group meetings with the acute stroke team, stroke committee, or both.

b. The *Minnesota Stroke Portal* includes a report that outputs a performance improvement case review tracking log. What this means is that you can enter data on all of your patients that activated a stroke code (as an alternative to an Excel spreadsheet) into the *Minnesota Stroke Portal,* and use this report as your platform to track and analyze your patient data. This report is simply an option for you, and is not required.

c. These data may also be tabulated and aggregated to assess overall performance to see trends. You may generate reports in the Minnesota Stroke Portal or create your own. Review these reports in meetings with the acute stroke team and stroke committee.

   For example, if you find that the CT initation is consistently delayed, this provides evidence for the development of a performance improvement project on this issue. Incorporating group meetings and the stroke committee will assist in developing process change, disseminating these ideas forward, and provide support/buy in for the change.

Other useful performance metrics to track on this log are also known as the "door to" indicators Examples from the *Target:Stroke Patient Time Tracker* are: ED physician assessment, brain imaging ordered, brain imaging initiated, brain imaging interpreted, lab tests ordered, lab test completed, alteplase ordered and, alteplase initiated.

We strongly recommend using a performance improvement case review tracking log, as an effective way to implement a successful performance improvement program.

Example: Appendix C

6. Evaluate program goals and conduct performance performance improvement projects

Performance Improvement projects and actions should be systematically, formally planned and implemented. These can range from simple changes in practice to complex, systems-wide projects. The basic process is to a) plan a change or project, b) implement the change, c) evaluate the impact, d) make adjustments and/or decisions to institutionalize the change based on your evaluation. Make sure to keep staff and key team members informed of results along the way. Data collection, assessment of program goals/metrics and data reports, and evaluation of process changes are essential variables in maintaining an effective performance improvement process.

This means that your stroke committee needs to take these ingredients, tools, and your resources and translate them into your own actions to improve your care. You need to decide what your gaps are, discuss what the solutions can be to closing those gaps, and implement those solutions. The data that you are collecting – in the performance improvement case review log and in the stroke registry – helps you both determine what those gaps are, and determine the impact of any changes that you implement.

(Note: Staff education is sometimes treated as a performance or quality improvement activity. While education is necessary and important, we encourage you not to confuse merely educating your staff as performance improvement. It can be a part of a broader effort to improve care, but more sustained improvements in care involves a purposeful process as described above.)

Ideas for performance improvement projects to implement can be found in Appendix E.

Example: Appendix D Source: Reference Guide for ASRH designation, Appendix F5 Source: Minnesota Department of Health Stroke Program Resources (https://www.health.state.mn.us/diseases/cardiovascular/stroke/resources.html)

Appendix A: Stroke code activation/patient log

Acute Stroke Team Activation Log

Instructions: We require tracking all activations of your Acute Stroke Team. If the activation results in a non-stroke or stroke mimic, please document the non-stroke diagnosis and write N/A in the other fields.

Activation Date and Clock Time		Time of Stroke Team Response to bedside (clock time)	Diagnosis (including non-stroke activations)	Treatment (if stroke diagnosis)	Final admitting diagnosis in the ED (admitted, transferred, home, other)
12/03/2015	*14:05*	*14:10*	*Acute Ischemic Stroke*	*IV Alteplase*	*Transfer to United*

Appendix B: Example Case Review Forms

- Target: Stroke Patient Time Tracker
- Stevens County: Stroke PI Filter Tracking Worksheet for Case Review
- Stroke Tracking Form (Essentia Health Deer River)
- EMS Feedback Form Example 1
- EMS Feedback Form Example 2
- EMS Feedback Form Example 3

Patient Time Tracker

Updated 2014

TARGET: STROKE PHASE II

ACUTE ISCHEMIC STROKE TREATMENT GOAL:

DTN Time Within 60 Minutes
DTN Time Within 45 Minutes

Place patient sticker here.

Last Known Well Date: _____ Time: _____

Weight: _____ (kg) **Total IV tPA Dose:** _____ (mg) **IV tPA Bolus:** _____ (mg)

Clock starts for Door-to-Needle (DTN)	**Date+**	**Clock Time**
Patient Arrival:	_____	_____
Stroke Team Activation:	_____	_____
Stroke Team Arrival:	_____	_____
ED Physician Assessment :	_____	_____
Brain Imaging Ordered:	_____	_____
Brain Imaging Initiated:	_____	_____
Brain Imaging Interpreted:	_____	_____
Lab Tests Ordered:	_____	_____
Lab Test Completed:	_____	_____
IV tPA Ordered*:	_____	_____
IV tPA Initiated: (Goal ≤ 60 minutes) (Goal ≤ 45 minutes)		

+ Date only needs to be entered once, unless the time span crosses midnight and date changes
* If IV tPA not given, select reason(s) for non-treatment within the Patient Management Tool™ (PMT). See Get With The Guidelines® coding instructions for definitions.)

☐ DTN Time data feedback provided

Patient's Care Team Members

_____

Patient time tracker sheets are valuable quality improvement tools. Using time tracker sheets raises stroke team members' awareness of DTN time. Reviewing sheets can help to identify problem areas or aid in spotting patterns to target for process change.

TIME LOST IS BRAIN LOST.
Learn more at Stroke.org/TargetStroke.

American Heart Association | American Stroke Association. life is why

GET WITH THE GUIDELINES. STROKE

TARGET: STROKE

Stroke PI Filter Tracking Worksheet
Stevens Community Medical Center

Patient Name: _____ Admit Date: _____

Medical Record #_____ Account #_____

Data Point	Time	Yes	No	N/A	Minutes
Initial Patient eval of arrival in the ED	10 minutes				
Notify the Stroke Team	15 minutes				
Initiate a CT scan	25 minutes				
Interpret the CT scan	45 minutes				
Door to needle for IV rt-PA from arrival	60 minutes				
NIH Stroke scale Used					

☐ No improvement opportunities identified

Comments:

Signature:	Date:

Essentia Health
Here with you

Essentia Health Deer River
STROKE TRACKING FORM:

Information is confidential: For authorized use only

MRN:	**Team Members:**
Date:	
Age:	**NOTES:**
Last known well time:	
Mode of Arrival:	
Stroke Alert Called: YES NO **Initiated by:**	
Headache: YES NO	
Trauma Related: YES NO	
Neuro Deficits: YES NO Specify in Notes	
Cincinnati Stroke Scale:	**OUTCOME:**
NIHSS:	
Pt Weight Documented: YES NO	
EKG: Normal_____ Abnormal_____ **Rhythm**	
Glucose Documented: YES NO	
2 LG Bore IV Sites: YES NO	
Diagnosis:	
Alteplase Indicated: YES NO	
Disposition: Expired Transferred Admitted Facility: **Transferred by: ALS Ground Air Medical**	
TIME GOALS in MINUTES:	
Door to Stroke Alert: Goal: <5 min	**Creatinine-Time Ordered to Result:** Goal: < 45 min
Door to ED physician: Goal: <10 min	**Door to CT:** Goal: <10 min
Stroke Alert to Video Connection: Goal: <10 min	**Door to Alteplase:** Goal: <30 min

10/2016

SAMPLE #1 FEEDBACK FORM FOR EMS

CONFIDENTIAL

Stroke Code Follow Up

Case Review	
Age	75
Date	12/10/18
Mode of Arrival	EMS
EMS ONLY	Agency Name
ED Provider	Dr.
Telestroke Provider	Dr.
Primary RN	Nicky
ED Disposition	Transferred Hospital
ED Dx	Stroke s/p IV alteplase
NIHSS	3
Admit Info	
LOS	NA
Discharge Dx	NA
Discharge Disposition	NA

Run Number	123456789
Pre-notification	Yes
Stroke Scale	Yes
LKW	Yes
BP & BG documented	Yes
IV start	Yes

Stroke Code Metrics	**Goal Times**	**Met**	**Time**	**Minutes**
LKW Clock Time	Documented	Yes	1000	
Door Time/ LKW to Door Time	Documented	Yes	1045	45 minutes
Door to Code	< 10 minutes	Yes	1040	-5 minutes (pre arrival)
Door to Provider	< 10 minutes	Yes	1048	3 minutes
Door to Stroke Team	< 15 minutes	Yes	1040	-5 minutes (pre arrival)
Door to CT	< 25 minutes	Yes	1050	5 minutes
Door to CT read	< 45 minutes	Yes	1059	9 minutes
Door to Decision	< 45 minutes	Yes	1015	30 minutes
Door to Drug	< 60 minutes	Yes	1025	40 minutes
Door to Transfer Door to Admit	< 90 minutes <120 minutes	Yes	1100	75 minutes

Comments/Process Improvement
Excellent EMS documentation. Pre-notification received and stroke code/response team activated prior to arrival. EMS took patient straight to CT. CT read as normal. BP slightly elevated and treated with IV Labetalol x 2 doses. Treated with IV alteplase for suspected stroke. Transferred to HOSPITAL via Air Care for higher level of care.

SAMPLE #2 FEEDBACK FORM FOR EMS

Essentia Health
Here with you

A Certified Comprehensive Stroke Center

A quality improvement initiative.

Run Report:

Documentation	Goal	Run Report
Cincinnati Pre-Hospital Stroke Screen	Documented	
Blood Glucose	Documented	
Establish Time of LKW	Documented	
Establish Time of Symptom Onset/Discovery of Symptoms	Documented	
Pre-Notification to Hospital	Documented	
Establish IV (18G in AC) x 2	Documented	
12 Lead EKG	Documented	

Hospital Care

Incident #:	
Date:	
Stroke Alert:	
NIHSS on Arrival:	
Admitting Diagnosis:	
Treatment:	• Medical Therapy: • IV alteplase: • IA alteplase: • Mechanical Retrieval:
Length of Stay:	
NIHSS at Discharge:	
Discharge Disposition:	

Essentia-Fargo Feedback:

Please feel free to share this information with providers involved in the care. Please do not hesitate to contact us at 701-364-4509 if you have any questions or have specific educational needs. Thank you for the great work you and your team do every day.

Kirsten Relle, RN, BSN
Stroke Program Educator
Kirsten.Relle@essentiahealth.org

Confidential Information: To be used for quality improvement and education.

SAMPLE #3 STROKE PATIENT FEEDBACK FORM FOR EMS

Essentia Health

1-Pass Recanalization of MCA

Case Reported by Dr. Dandamudi, Essentia Health Fargo

PATIENT OVERVIEW

- 86 y/o Female
- Last Known Well Time: 0230
- CTA at HOSPITAL showing left frontal MCA occlusion (M2 segment)
- NIHSS upon Admission to Angio: fluctuating from 5-12 with SBP

CASE CONCLUSION

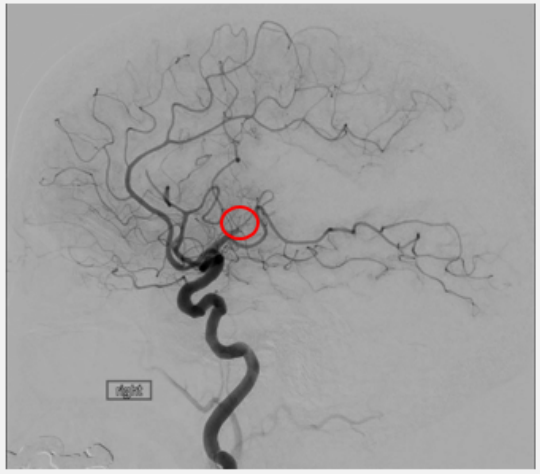
NIHSS post procedure: 1: mild dysarthria

Referring Hospital:
Referring Hospitalist:
Altru IP RN:
Stroke Coordinator:

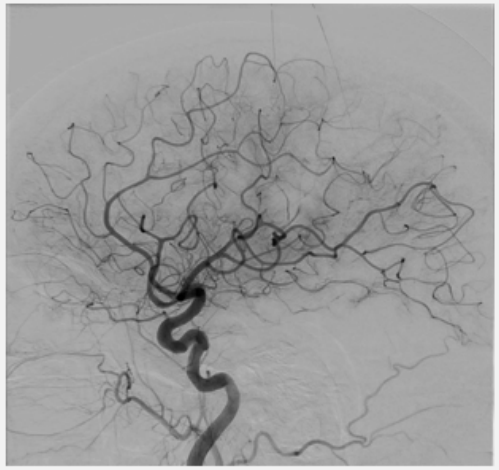
PROCEDURAL DESCRIPTION

- Complete occlusion of left MCA
- Successful aspiration thrombectomy was performed resulting in TICI 2B recanalization of the left MCA
- Arrival to ED: 1259 Arrival to OR: 1345 Groin puncture: 1415 TICI 3 Recanalization: 1445
- Total procedural time (groin puncture to full revascularization) = **30 minutes**

Initial lateral angio



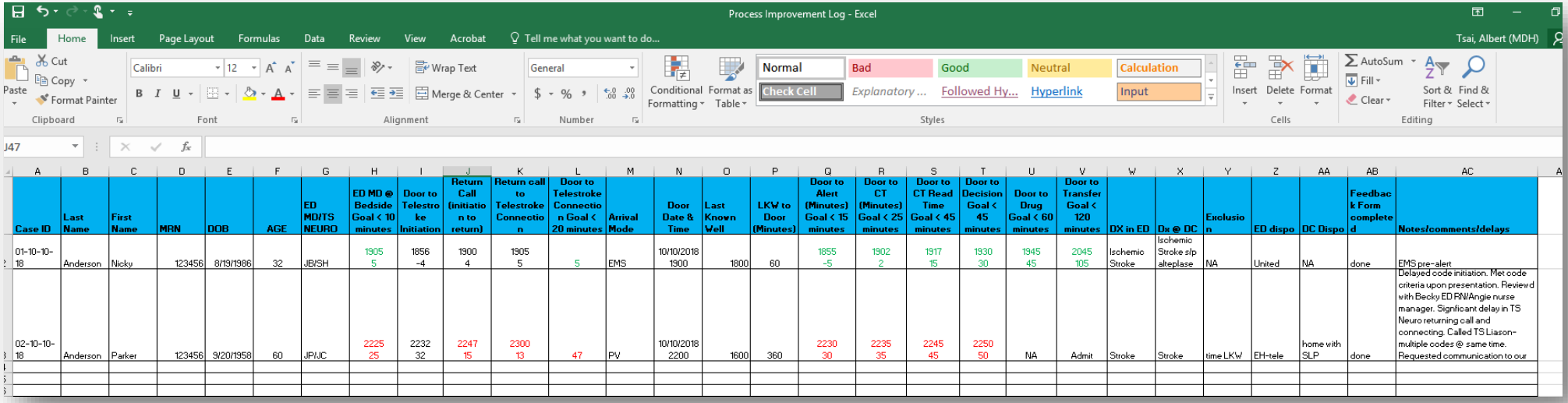
TICI 2B Recanalization after aspiration thrombectomy



Neuro-Interventionalist:
Anesthesiology:
IN RN:
IN Technicians:
Stroke Program Manager:

3000 32nd Ave S.
Fargo, ND 58104
STROKE HOTLINE:
701-364--CALL
http://www.essentiahealth.org/fargo

Appendix C: Performance improvement case review tracking log



Process Improvement Log - Excel

Case ID	Last Name	First Name	MRN	DOB	AGE	ED MD/TS NEURO	ED MD @ Bedside Goal < 10 minutes	Door to Telestroke Initiation	Return Call (initiation to return)	Return call to Telestroke Connection	Door to Telestroke Connection Goal < 20 minutes	Arrival Mode	Door Date & Time	Last Known Well	LKW to Door (Minutes)	Door to Alert (Minutes) Goal < 15 minutes	Door to CT (Minutes) Goal < 25 minutes	Door to CT Read Time Goal < 45 minutes	Door to Decision Goal < 45 minutes	Door to Drug Goal < 60 minutes	Door to Transfer Goal < 120 minutes	DX in ED	Dx @ DC	Exclusion	ED dispo	DC Dispo	Feedback Form completed	Notes/comments/delays
01-10-10-18	Anderson	Nicky	123456	8/19/1986	32	JB/SH	1905 5	1856 -4	1900 4	1905 5	5	EMS	10/10/2018 1900	1800	60	1855 -5	1902 2	1917 15	1930 30	1945 45	2045 105	Ischemic Stroke	Ischemic Stroke s/p alteplase	NA	United	NA	done	EMS pre-alert
02-10-10-18	Anderson	Parker	123456	9/20/1958	60	JP/JC	2225 25	2232 32	2247 15	2300 13	47	PV	10/10/2018 2200	1600	360	2230 30	2235 35	2245 45	2250 50	NA	Admit	Stroke	Stroke	time LKW	EH-tele	home with SLP	done	Delayed code initiation. Met code criteria upon presentation. Reviewd with Becky ED RN/Angie nurse manager. Signficant delay in TS Neuro returning call and connecting. Called TS Liason- multiple codes @ same time. Requested communication to our

Appendix D: Sample Tracking Performance Improvement Project Form

Performance Improvement Progress Report

Department/Service Area:	Emergency Department/Radiology	
Problem/Indicator:	Stroke code activations door to CT metric. Goal time for door to CT is 25 minutes. Average time for door to CT is currently 30 minutes. 40% of stroke code activations are within goal time for door to CT metric.	
Goal:	Decrease average door to CT for stroke code activations to 20 minutes or less resulting in higher percentage within goal time.	
Study Timeframe:	**Start:** 01/07/2019	**End:** 03/04/2019
Actions: EMS stroke code arrivals that are stable will stay on the EMS cot and go straight to CT.	**Outcome:** EMS stroke code arrivals will see a decrease in door to CT time to average 15 minutes or less. 80% of EMS arrivals will be within goal.	**Plan:** Data to track/evaluate: Door to CT for overall stroke code activations, % within goal time, door to CT for EMS arrivals, door to CT for private vehicle arrivals. Review above outcome data at Stroke committee meeting on 04/08/2019. Include successes and barriers.
Private vehicle arrivals will be triaged quickly. Once stroke code activated they will be transported straight to CT instead of roomed.	Private vehicle stroke code arrivals will achieve a decrease in door to CT time to average 15 minutes or less. 80% of private vehicle arrivals will be within goal.	Data to track/evaluate: Door to CT for overall stroke code activations, % within goal time, door to CT for EMS arrivals, door to CT for private vehicle arrivals. Review above outcome data at Stroke committee meeting on 04/08/2019. Include successes and barriers.

Appendix E: Performance Improvement Project Ideas

12 Key Best Practice Strategies

Target: Stroke™ advocates the adoption of these 12 key best practice strategies for reducing door-to-needle times for intravenous alteplase in acute ischemic stroke.

1. **EMS Pre-Notification:** Emergency Medical Service (EMS) providers should provide early pre-notification to the receiving hospital when stroke is recognized in the field. EMS pre-notification of hospitals can significantly shorten time to brain imaging, reduce door-to-needle times with IV alteplase, and enhance the number of eligible patients treated.

2. **Stroke Tools:** A Stroke Toolkit containing rapid triage protocol, clinical decision support, stroke-specific order sets, guidelines, hospital specific algorithms, critical pathways, NIH Stroke Scale, and other stroke tools should be available and utilized for each patient.

3. **Rapid Triage Protocol and Stroke Team Notification:** Acute triage protocols facilitate the timely recognition of stroke and reduce time to treatment. Acute stroke teams enhance stroke care and should be activated as soon as there is hospital pre-notification from EMS personnel of a stroke patient or the stroke patient is identified in the emergency department. Rapid neurologic evaluation should be performed as soon as possible in ED or on the CT table.

4. **Single Call Activation System:** A single call should activate the entire stroke team. A single-call activation system for the stroke team is defined here as a system in which the emergency department calls a central page operator, who then simultaneously pages the entire stroke team, including notification to ensure rapid availability of the scanner for stroke protocol brain imaging.

5. **Timer or clock attached to the chart, clip board or patient bed*:** Acute ischemic stroke care requires an accurate, timely, coordinated and systematic evaluation of the patient. A universal clock visible to the healthcare providers is an enabling tool for improving the quality of care.

6. **Transfer Directly to CT Scanner*:** Guided by pre-specified protocols, eligible stroke patients can, if appropriate, be transported from the ED triage area directly to the CT scanner for initial neurologic examination and brain imaging to determine alteplase eligibility, bypassing the ED bed. The stroke patient, treating physician and nurse, and alteplase go to the CT scanner with the patient or meet the patient there, the neurologic exam is performed on the CT table, and once the CT is read by the treating physician as non-hemorrhagic, the initial bolus alteplase is delivered while the patient is still on the CT table. Appropriate written protocols with explicit inclusion/exclusion criteria should be in place to ensure that patients requiring emergency medical assessment or stabilization are not directly triaged to CT. Alternatively, rapid assessment by the ED physician while the patient remains on the EMS transport gurney can be performed to ensure hemodynamic/respiratory stability and to evaluate for other emergency diagnoses followed by transport to the CT scanner.

7. **Rapid Acquisition and Interpretation of Brain Imaging:** It is essential to initiate a brain CT scan (or MRI) as soon as possible after patient arrival. Consider initial CT interpretation by stroke neurologist and reserving advanced imaging for unclear cases only. At the minimum, the CT scan should be performed within 25 minutes of arrival and complete interpretation of the CT scan within 45 minutes of arrival to exclude intracranial hemorrhage prior to administration of intravenous alteplase.

8. **Rapid Laboratory Testing (Including point of Care Testing if Indicated):** When indicated, laboratories such as glucose and for patients in whom coagulation parameters should be assessed because of suspicion of coagulopathy or warfarin treatment, INR (PT)/PTT results should be available as quickly as possible and no later than 30 minutes after ED arrival. If standard STAT laboratory turnaround times cannot meet this target, point-of-care testing in the ED can provide the data in the needed timeframe. Glucose testing by EMS in field or prior to arrival should be performed.

9. **Mix Alteplase Ahead of Time:** A useful strategy is to mix drug and set up the bolus dose and one-hour infusion pump as soon as a patient is recognized as a possible alteplase candidate, even before brain imaging. Early preparation allows alteplase infusion to begin as soon as the medical decision to treat is made. It is the policy of the drug manufacturer to replace, free of charge, medication that are mixed but not used in time-critical emergency situations like this. Check with your hospital pharmacy for the proper procedures that will allow you to use this strategy to shorten time to treatment without financial risk.

10. **Rapid Access and Administration of Intravenous Alteplase*:** Once eligibility has been determined and intracranial hemorrhage has been excluded, intravenous alteplase should be promptly administered without delay. The alteplase should be readily available in the emergency department or CT scanner (if CT scanner is not located in the ED) and can be retreated and dispensed directly by the ED and stroke neurology team. The initial alteplase bolus should be administered while the patient is on the CT table. Dosing charts and standardized order sets can also facilitate timely administration and minimize dosing errors.

11. **Team-Based Approach:** The team approach based on standardized stroke pathways and protocols has proven to be effective in enhancing the number of eligible patients treated and reducing time to treatment in stroke. An interdisciplinary collaborative team is also essential for successful stroke performance improvement efforts. The team should frequently meet to review your hospital's processes, care quality, patient safety parameters, and clinical outcomes, as well as make recommendations for improvement.

12. **Prompt Data Feedback*:** Accurately measuring and tracking your hospital's door-to-needle times, IV alteplase treatment rates in eligible patients, other time intervals, and performance on other stroke performance/quality measures equip the stroke team to identify areas for improvement and take appropriate action. A data monitoring and feedback system includes the use of the Get With The Guidelines-Stroke Patient Management Tool (PMT) and creating a process for providing timely feedback and recommendations for improvement on a case-by-case basis and in hospital aggregate. This system helps identify specific delays, devise strategies to overcome them, set targets, and monitor progress on a case-by-case basis.

The hospital administration should provide the resources and financial support to implement and maintain these strategies. Hospitals without local stroke expertise available 24 x 7 should explore building relationships with stroke centers to facilitate more timely evaluation, decision-making and treatment. Many hospitals have found telehealth solutions for image interpretation or clinical evaluation critical to building successful acute stroke teams

See the Target: Stroke Manual for more information.

*Target: Stroke™ Phase II survey results indicated these strategies were used less frequently by hospitals; yet these strategies are associated with significant reductions in DTN times.

Learn more at stroke.org/TargetStroke

Adapted from 12 Key Best Practice Strategies, Target: Stroke Phase II, American Heart Association