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Management of Acute Stroke (BAT) and Thrombolytic Therapy

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Educational Objectives

- To **define the emergency management** of the patient presenting with signs and symptoms suggestive of acute stroke.
- To define **roles and responsibilities** of staff
- To establish **time goals** for assessment and treatment
- To **describe the process and flow of patient care** for acute stroke patients arriving via EMS to University Hospital
- To **define the treatment of the acute stroke patient with IV thrombolytic drug and mechanical reperfusion therapy**
- Policy /protocol Review
- To review the **Stroke Core Measures** and **Comprehensive Stroke Core Measures**

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University Hospital
achieved
Advanced Stroke care Certification
as a
Joint Commission Comprehensive Stroke Center
in June 2015
and was recertified in 2017, 2019 and 2021.

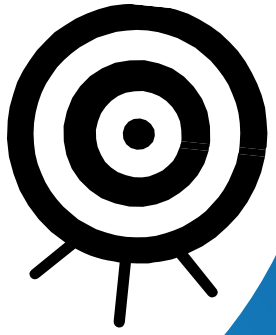
Requirements

Acute Stroke Care policies and protocols

Door to needle time < 60 mts

Achievement of stroke core measures and comprehensive stroke core measures

(STK & CSTK)



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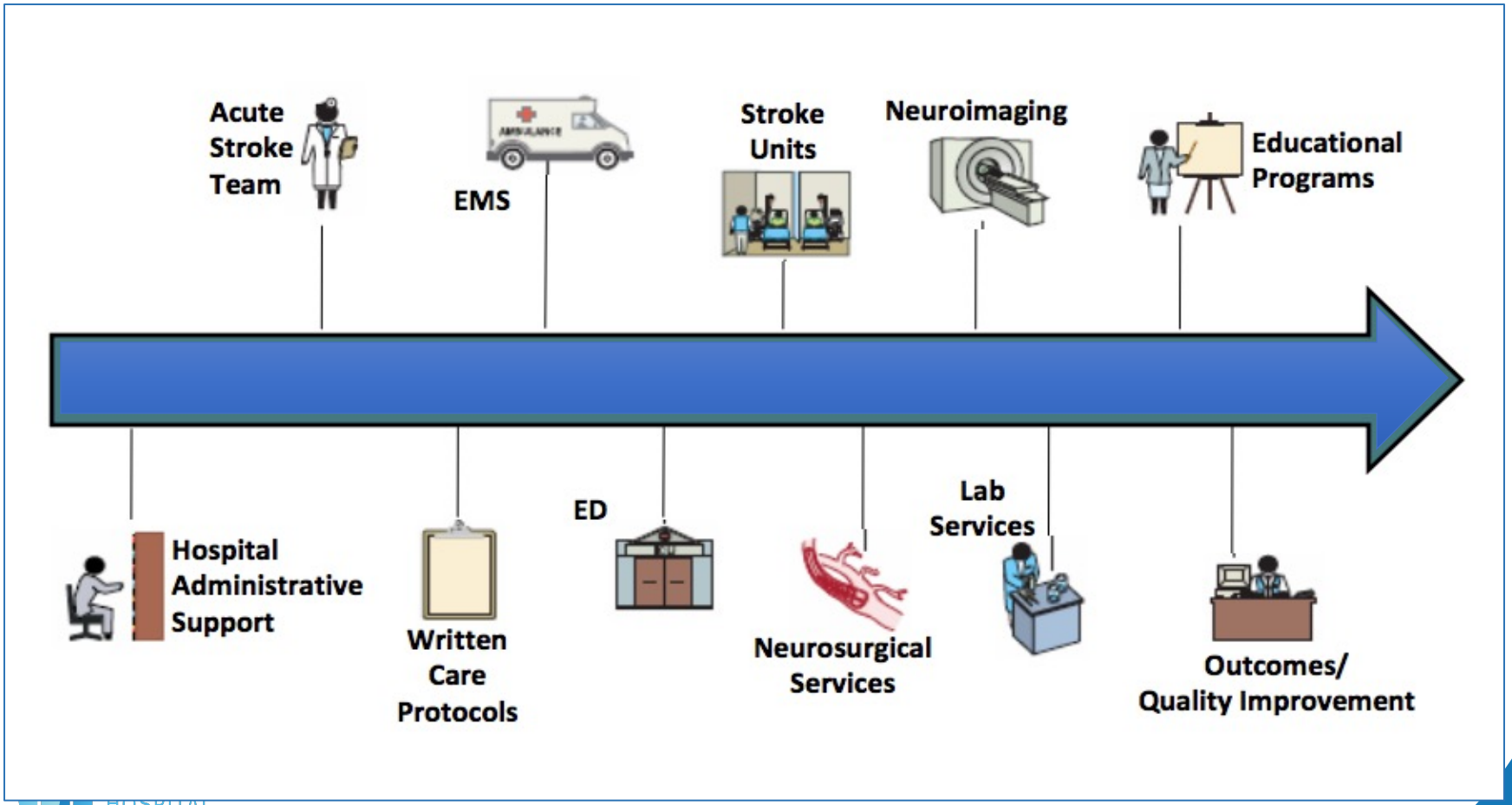
University Hospital is a **Comprehensive Stroke Center**, certified by the **Joint Commission** and the **NJ DOH**

We have the following components:



Comprehensive Stroke Centers provide:

Personnel (includes designated stroke nurses and interventional/endovascular physician(s)) with Expertise in…

- Critical care medicine
- Vascular neurology
- Vascular neurosurgery
- Vascular surgery
- Diagnostic radiology & neuroradiology
- Rehabilitation therapy
- Physical Medicine & Rehabilitation
- Swallowing assessment
- APN (dedicated to stroke)
- RT

Surgical and Neuro-interventional Therapies

- CEA
- Clipping of intracranial aneurysm
- Endovascular ablation of IAs/AVMs
- IA reperfusion therapy
- Endovascular Rx on vasospasm
- Placing intracranial pressure transducer
- Clipping intracranial aneurysm
- Placing ventriculostomy
- Hematoma removal/draining

Infrastructure

- Stroke unit
- ICU
- Around-the-clock interventional services
- Around-the-clock OR staffing
- Stroke surgery

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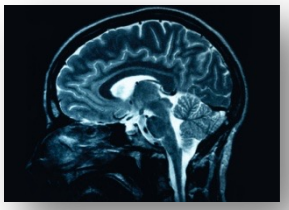
Education/Research

- Community education and prevention
- Professional education
- Patient education

Diagnostic Techniques

- MRI with Diffusion
- MRA/MRV
- CTA
- TCD
- Digital cerebral angiography
- Carotid duplex U/S
- Transesophageal echo



Door to Needle (DTN) = < 60 minutes

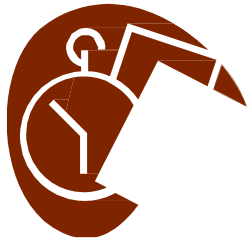
Optimal DTN ≤ 30 minutes

PATIENTS SHOULD BE TREATED WITH IVtPA WITHIN 3 HOURS OF WHEN PATIENT WAS LAST KNOWN TO BE WELL.

A SUBSET OF PATIENTS CAN HAVE TREATMENT STARTED WITHIN **4.5 HOURS** OF LAST KNOWN WELL.

Time Goals

ONCE THE PATIENT IS IN THE HOSPITAL:



- Time from patient arrival at ED, or if in-house discovery of symptoms, to notification of Brain Attack Team (BAT)……..……..≤15 min
- Time from arrival in ED or symptom discovery to CT scan……..……..……..≤20 min
- Time from CT order to CT interpretation…….....≤45 min
- Time from arrival to completion of laboratory tests, EKG, and CXR, if ordered……..……..…..≤45 min
- Door-to-needle time for IV thrombolytic (t-PA) treatment……..……..…..≤60 min
  - Secondary goal: Door to needle time of ≤45 minutes in ≥ 75% of patients and of ≤ 30 minutes in ≥ 50% of patients (this requires, faster imaging, reading, decision and tPA administration)
- Time from order of neurosurgical evaluation to onset of evaluation……..……..…...30 min
- Neurosurgical intervention…….....as clinically needed

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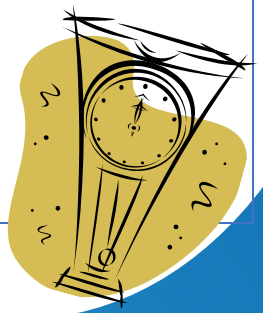
Stroke is a Brain Attack

- **Early recognition and treatment is key**
- Time is critical to maintaining a healthy BRAIN
- 2,000,000 brain cells die every minute during a stroke
- Every minute lost without treatment increases the chance of death or disability
- Intravenous Alteplase and Tenecteplase (TNK) are the IV thrombolytic drugs available to treat acute ischemic strokes. Alteplase is FDA approved for acute ischemic stroke. In UH we are using Tenecteplase (TNK) as of February 2022, consistent with AHA guidelines.



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Symptoms of Stroke

ALL symptoms are SUDDEN

- numbness or weakness of the face, arm, or leg – especially on one side of the body
- confusion, trouble speaking or understanding
- trouble seeing in one or both eyes
- trouble walking, dizziness, loss of balance or coordination
- severe headache with no known cause

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Brain Attack Team (BAT)

Who is on the Brain Attack Team?

- Stroke Resident, Stroke Fellow, and Stroke Attending
- Stroke Advanced Practice Nurse/ Stroke Coordinator
- Stroke Endovascular Fellow and Endovascular Attending

When to call BAT?

- If suspicion for acute stroke with

  Last Known Well (LKW) < 24 hours

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How to call BAT?

- In UH:
  - Inpatients: Dial 1-1-1 and ask operator to activate BAT pager and Emergency Response Team (ERT). BAT team and ERT will immediately come to see the patient.
  - Outpatients (non-ED outpatient areas, halls, visitors): Dial 111 and ask operator to page Dr. Bandaid. Patient will be taken to ED.
- Outside of UH (DOC, ACC, Parking areas, Bergen Bldg, Cancer Center, etc.): Call 9-1-1 or 973-972-7000 and report time and location. EMS will take patient to ED.
- BAT group pager activated by REMCS as well as overhead page

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What happens in a BAT?

- Acute Stroke suspected < 24 hours since last known to be normal (Last Known Well) N.B. This time guideline reflects new 2018 guidelines to <24 hours for cases with documented large vessel occlusion and viable brain tissue.

- BAT is called for LKW ≤ 24 hours

- Brain Attack Team notified by page and overhead intercom. For inpatients, ERT is also called by overhead page.
- BAT order set initiated by ED/primary physician
- Patient rapidly assessed by ED/primary physician and by BAT Team
- Patient placed on monitor, patient taken to CT for CT head by primary nurse and BAT Team. Two IVs started, blood work picked up by lab technician.

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What happens in a BAT?

- All patients are weighed using the bed scale located in the imaging suite before the imaging and the weights are entered in EPIC by the tech/RN.

- Additional imaging is performed as needed, as determined by BAT team: CT angiogram/CT perfusion/MRI Brain

- Primary nurse performs/documents initial vital signs and neuro check, then BP q15 min x 1 hour

- Radiology ensures rapid access to CT, provides interpretation of studies

- Decision made by BAT team if IV thrombolytic will be given, and/or endovascular intervention

- If patient arrives by UH EMS, the process is *further streamlined*
  - EMS draws blood in the field
  - EMS takes patient directly to CT, after ED physician determines that the patient is clinically stable

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Patient is a candidate IV thrombolysis, what next?

- Joint decision between ED/primary physician and BAT team after review of indications/contraindications of IV thrombolytic drug
- If IV thrombolytic drug to be given, BAT MD assumes primary responsibility for the patient and orders IV thrombolytic drug using the order set
- BP is controlled as outlined in the order set (<180/105)
- Primary nurse (if inpatient, ERT nurse) mixes and withdraws the bolus dose into the syringe and gives the bolus dose to the BAT MD, who is responsible for pushing the bolus.
- The nurse and BAT MD go over the time out procedure and *verbalize time of bolus*
- The RN then documents the dose & time of bolus in MAR and the BAT MD enters the dose and time in BAT consult note as well.

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Thrombolysis process in acute stroke (cont'd)

- If patient deemed a candidate for endovascular procedure, BAT team will arrange immediate procedure.
- Primary nurse continues neuro checks and BP monitoring as defined in the order set
- MD is called stat if the patient has an acute neurologic deterioration, new headache, acute hypertension (>180/105), nausea or vomiting.
- Patient is admitted to the ICU. The "Stroke ICU Admission – post thrombolytic with or without thrombectomy" order set is utilized (discussed in 2nd half of this orientation) by the accepting team. This order set continues the important monitoring of the patient post IV Thrombolysis.

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EPIC Order sets: search by typing “Stroke”

Suspect acute stroke <24 hours from “last known well” (LKW)?

- “Acute Stroke (BAT)” orders: **ED/primary MD orders** these at the same time as calling the BAT team
  - Order set has pre-checked orders for CT head, CTA, CTP, IV lines, bloodwork, vital signs and neuro checks, cardiac monitoring, oxygen, swallow screen..

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Decision is made to give IV thrombolytic drug (if LKW ≤ 4.5 hours) and if no contraindications to IV thrombolytic drug.

"Stroke IV Thrombolysis Treatment" Order set: BAT MD orders IV thrombolytic drug (Tenecteplase [TNK]) after discussing with primary team .

Order set

Has a Clickable link to review Indications & Contraindications

Defines dosing and administration

Defines the management of hypertension prior, during and post thrombolytic administration.

Defines post IV thrombolytic monitoring requirements

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Patients who are candidates for Mechanical Endovascular Reperfusion Therapy

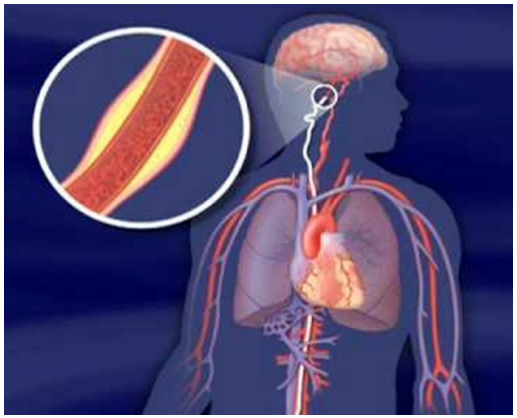
Time goals:

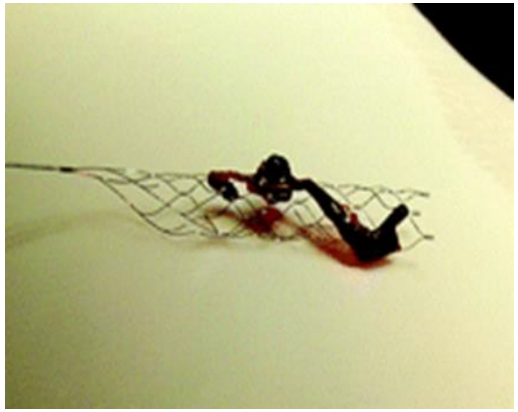
- Time from arrival to arterial puncture (Door to Puncture) ED patients :≤90 min
- Time from arrival to arterial puncture (Door to Puncture) transferred from OSH≤ 60 min
- Time from arrival to recanalization/revascularization ……≤120 min

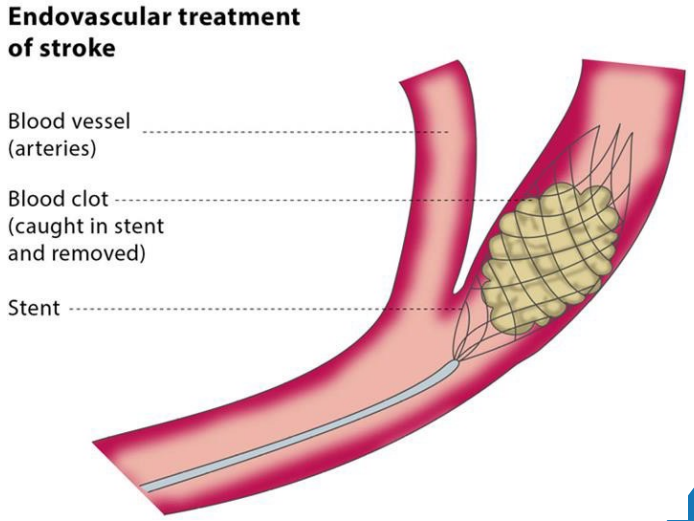
Time goals : To be eligible for GWTG Target Stroke Honor Roll Advanced therapy

Door to start of device (door to first Pass) ED patients : ≤ 90 minutes

Door to start of device (door to first Pass) transferred from OSH : ≤ 60 minutes







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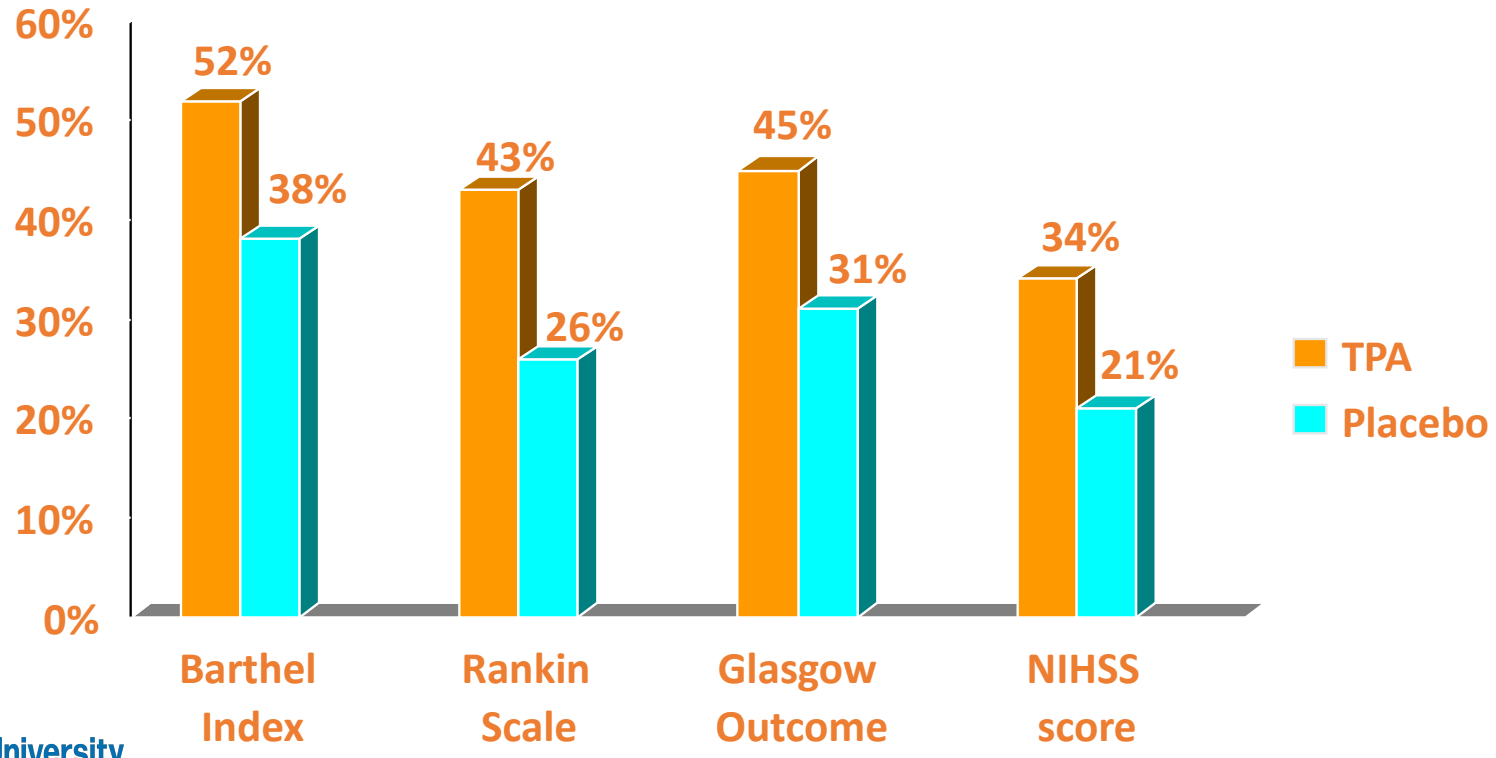
https://heart.irp.iqvia.com/measure.html?study_id=1388&physician_id=219308&study_rev_id=882

NINDS TPA Stroke Trial

Excellent outcome at 3 months on all scales



Global outcome statistic: OR=1.7, 50% v. 38%= 12% benefit

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N Engl J Med 1995;333:1581-7

Policies

- Process for the Initial Management of the Brain Attack Team (BAT)

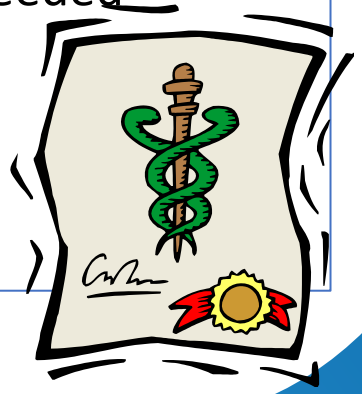
  Patient: ***Suspected Acute Ischemic or Hemorrhagic Stroke***

  - Covers the first hour of management once a stroke is suspected (less than 24 hours since Last Known Well)
  - Covers both outpatients (ED) and inpatients

- Thrombolysis Policy for the Treatment of Acute Ischemic Stroke

  - Covers the administration of IV tPA, initial post-infusion management, and transfer to endovascular suite as needed

- These are **NOT** admission policies or admission order sets



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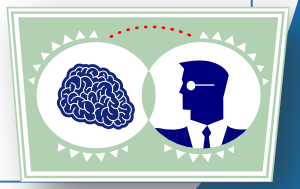
Safe, rapid treatment of acute stroke patient

- These policies define roles and responsibilities of all hospital personnel caring for the acute stroke patient.
- The goal is to treat appropriate patients with IV thrombolytics , and in some cases with endovascular removal of clot, safely and improve outcomes.
- **These policies conform with Best Practices to meet Joint Commission standards for excellence in stroke care.**



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Policies define responsibilities and work flow

- EMS
- Primary Nurse
  - ED: nurse is assigned.
  - Inpatient: Primary nurse & Emergency Response Team responder
- ED physician or primary physician
- Brain Attack Team: Neurologists Stroke APN/ Stroke coordinator
- Radiology technician, resident, attending
- Laboratory personnel
- Unit clerks, medical technicians

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Joint Commission Stroke Core Measures

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Joint Commission Core Measures for Stroke

- STK-1 VTE prophylaxis
- STK-2 Antithrombotic Therapy at Discharge
- STK-3 Anticoagulation for A-fib/A-flutter
- STK-4 Thrombolysis: Arrive in 2 hr, treat by 3 hr (IV tPA was discussed in 1st half of presentation)
- STK-5 Antithrombotic Therapy by day 2
- STK-6 Statin at discharge
- STK-8 Stroke Education
- STK-10 Assessed for Rehabilitation

Additional Quality Measures:

- Dysphagia Screen
- LDL documented
- Intensive statin therapy
- Smoking cessation

https://www.jointcommission.org/measurement/specification-manuals

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Joint Commission *Comprehensive* Measures for Stroke

The following are the responsibility of the Stroke Team, NS and Endovascular team to implement and document (and will not be discussed further here):

- **CSTK-01** National Institutes of Health Stroke Scale (NIHSS Score Performed for Ischemic Stroke Patients)
- **CSTK-02** Modified Rankin Score (mRS) at 90 Days
- **CSTK-03** Severity Measurement Performed for SAH and ICH Patients (Overall Rate) within 6 hours of ED arrival and prior to any procedure
- **CSTK-04** Procoagulant Reversal Agent Initiation for Intracerebral Hemorrhage (ICH)
- **CSTK-05** Hemorrhagic Transformation (Overall Rate)
- **CSTK-06** Nimodipine Treatment Administered within 24 hours of ED arrival
- **CSTK-08** Thrombolysis in Cerebral Infarction (TICI Post-Treatment Reperfusion Grade)
- **CSTK-09** Arrival Time to Skin Puncture
- **CSTK-10** Modified Rankin Score (MRS at 90 days: Favorable Outcome)
- **CSTK-11** Timeliness of Reperfusion: Arrival time to TICI 2B or Higher
- **CSTK-12** Timeliness of Reperfusion: Skin Puncture to TICI 2B or Higher

https://www.jointcommission.org/measurement/specification-manuals

Stroke Admission & Discharge Order Sets

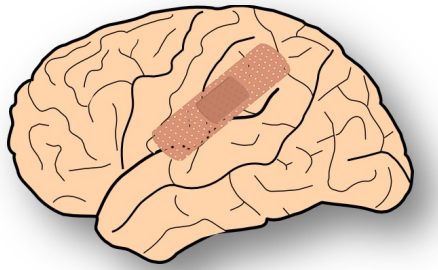
EPIC order sets:

- ICU Admission no tPA/Thrombectomy alone/Hemorrhagic stroke
- ICU Admission Post Thrombolytic with or without Thrombectomy
  - NEU IP STROKE PCU + FLOOR ADMISSION
  - NEU IP STROKE DISCHARGE

Note: All Neurosurgical Order Sets include Core Measure requirements.

Why use the Stroke Order Sets?

- Prevent peri-stroke complications
- Reduce risk of recurrent stroke
- Assist multidisciplinary team in stroke care
- Optimize compliance with the Joint Commission Core Measures



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VTE Prophylaxis by Day 2

- Part of every Stroke Admission Orderset
- Stroke patients are high risk for VTE
- For acute hemorrhagic stroke patients, if chemical prophylaxis can not be used, venodyne boots are required
- Nurse placing the venodyne boots MUST document this in the electronic record

Dysphagia Screen

- All patients suspected of having an acute stroke have the swallow screen done by the primary nurse
- Usually completed in the ED and documented in EPIC
- If patient *fails*, the nurse informs the MD, the patient is made NPO including meds, and an SLP consult must be obtained
- A failed swallow screen cannot be repeated. ONE and DONE
- All medication/hydration orders until cleared by SLP will require an alternate route (NGT, IV, rectal)

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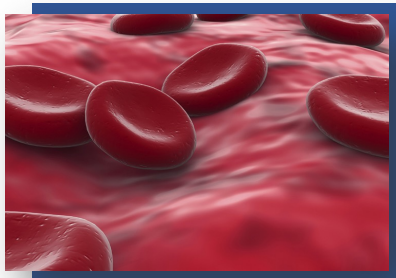

Antithrombotic Therapy at Day 2 & Antithrombotic Therapy at Discharge

- All patients with an ischemic stroke must be given an antiplatelet agent ***by the end of day two***, unless contraindicated and contraindication documented. Choices:
  - Aspirin 81 mg or 325 mg daily
  - Clopidogrel (Plavix) 75 mg daily
  - Other antiplatelet agents as determined by stroke attending
- All patients with ischemic stroke must be ***discharged on an antiplatelet agent***, unless contraindicated
- Exceptions: Patients on anticoagulation for atrial fibrillation/atrial flutter, Patients with other contraindications
- Must document reason not given
- Must include in the AVS. Verbal instruction to take aspirin is not sufficient.

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Anticoagulation for A-fib/A-flutter

- All patients with ischemic stroke who have paroxysmal or continuous atrial fibrillation or atrial flutter must be discharged on an anticoagulant.
- If contraindications for anticoagulation exist, reason for not prescribing must be documented

LDL Documented & Statin at Discharge

- All patients must have an LDL ordered and result documented by the end of day two.
- All patients must be discharged on a statin agent if:
  - LDL 70 or above
  - Patient was taking a statin leading up to admission
  - Document reason if not given

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Intensive Statin Therapy

- Patients with cerebrovascular disease should be given intensive statin therapy
- **Atorvastatin 80 mg daily** (or equivalent alternate statin agent) is recommended.

Stroke Education
Smoking Cessation

- Patients should have individualized and documented education on:
- "Stroke**SMART911**":
  - **S**igns & symptoms of stroke
  - **M**edications and the reasons for taking them
  - Follow up **A**ppointments
  - **R**isk Factors for stroke
  - **T**ime is Brain! Call **9-1-1**
- Patients who smoke should have counseling on how to stop smoking

Assessed for Rehabilitation

- Order sets include consultation requests from Physical Therapy, Occupational Therapy, and Speech & Language Pathology
- PT/OT/SLP are in-house 6 days a week, and on call for the 7th day.
- PT/OT/SLP are part of the stroke multidisciplinary team and make recommendations regarding post-discharge rehab placement

Stroke patient discharge & follow up

- ONLY use stroke discharge order set
- All stroke patients must be seen as an outpatient within 10-12 weeks, optimally 4-6 weeks
- Please arrange stroke clinic appointment by using EPIC secure chat message to UH schedulers

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All our policies and procedures follow AHA Clinical Practice Guidelines:

- Guidelines for the Early Management of Patients with Acute Ischemic Stroke
- Guidelines for the Prevention of Stroke in Patients With Stroke and Transient Ischemic Attack
- Comprehensive Overview of Nursing and Interdisciplinary Rehabilitation Care of the Stroke Patient
- Guidelines for the Management of Spontaneous Intracerebral Hemorrhage
- Guidelines for the Management of Aneurysmal Subarachnoid Hemorrhage

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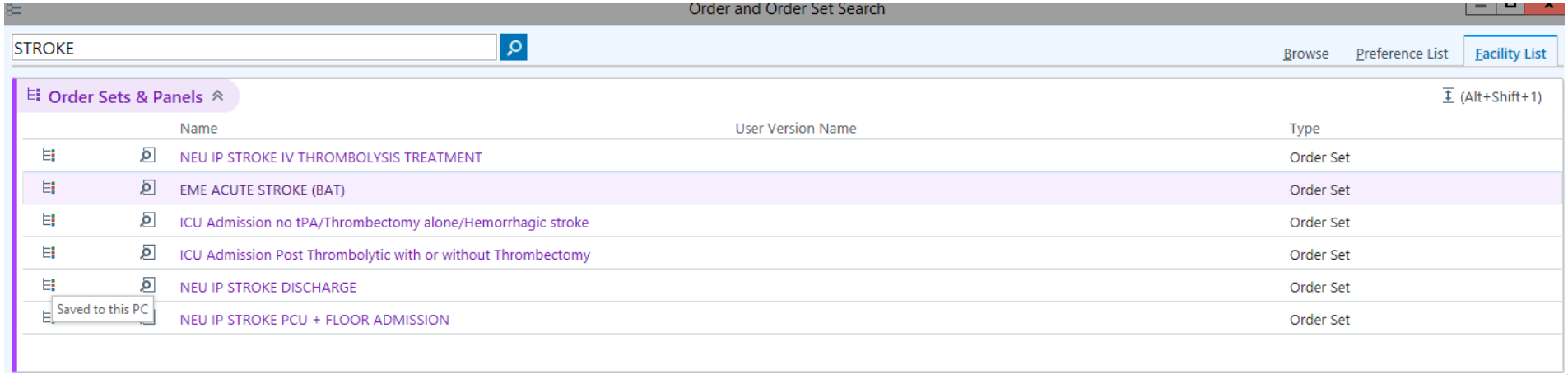
MUST USE Stroke Order Sets that are available in EPIC for admission and discharge

All patients with a diagnosis of stroke should be discharged from the hospital using a stroke discharge order set to avoid any fall outs in the discharge treatment such as antiplatelets, statin , anticoagulation etc



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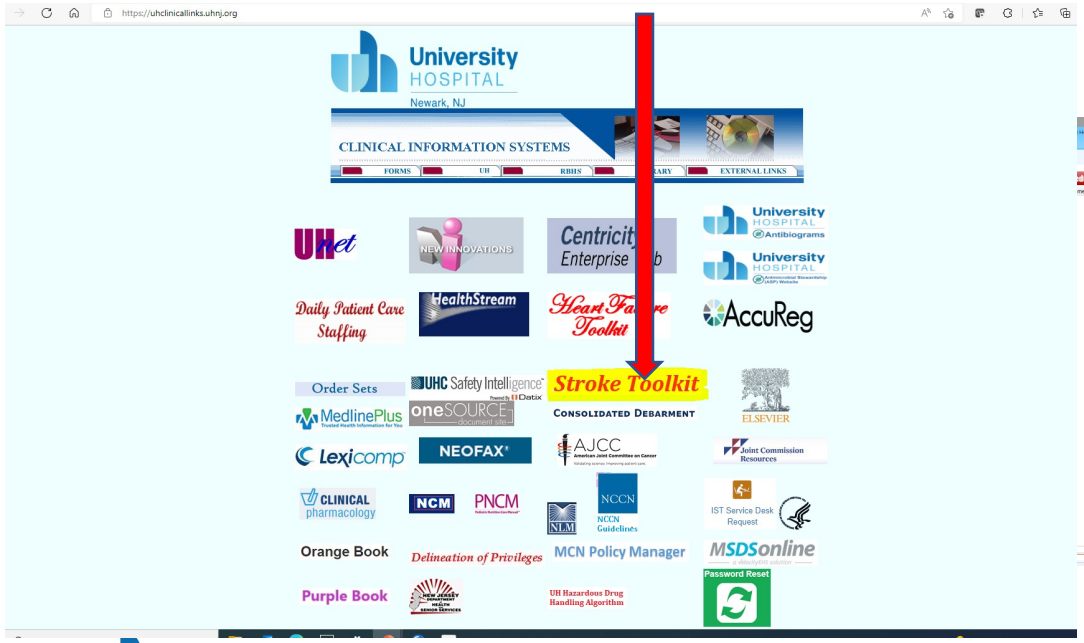
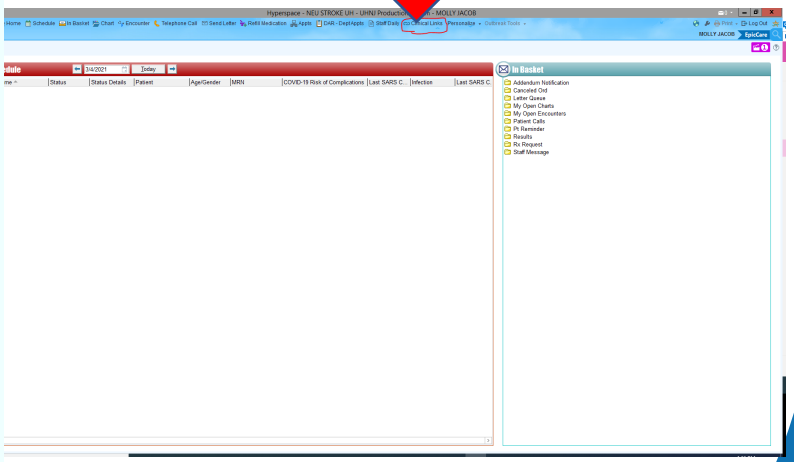
Where to find Policies and Clinical Practice Guidelines

- When you click on the "Stroke Toolkit" icon on *Clinical Links*, the window will open (https://uhclinicallinks.uhnj.org
- Found on every desktop computer in nursing stations at University Hospital
- Clinical links can also be accessed by logging in to EPIC : hyperspace bar (see below)



EPIC



STROKE TOOLKIT

https://uhclinicallinks.uhnj.org/S_Toolkit.aspx

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CLINICAL INFORMATION SYSTEMS

- **Mission, Scope and Services**
  - Introduction to the Stroke Program
  - Stroke Program Table of Organization
  - Stroke Rounds
  - Stroke Program Leaders at University Hospital
- **Clinical Practice Guidelines**
  - 2019 Guidelines for the Early Management of Patients with Acute Ischemic Stroke
  - 2022 Guideline for the Management of Patients With Spontaneous ICH
  - 2012 Guidelines for the Management of Aneurysmal Subarachnoid Hemorrhage
  - 2021 Guideline for the Prevention of Stroke in Patients with TIA and Stroke
  - 2021 Scientific Statement - Management of Central Retinal Artery Occlusion
  - 2009 Scientific Statement - Overview of Nursing and Interdisciplinary Care of the Acute Ischemic Stroke Patient
  - 2021 Update of 2009 Scientific Statement - Nursing Care of the Patient with Acute Ischemic Stroke (EndovascularIntensive Care Unit-Postinter)
  - 2021 Update of 2009 Scientific Statement - Nursing Care of the Patient With Acute Ischemic Stroke (Posthyperacute and Prehospital Discharge)
- **Stroke Policies**
  - Swallow Screen Policy 2021
  - BAT Policy 2021
  - Thrombolysis Policy 2021
  - Post Angio Assessment Policy
  - Post Angio Assessment Tool
- **Outcomes**
  - Stroke Data
  - What are Stroke Core Measures
  - Stroke Core Measures Jan-Dec 2021
  - Comprehensive Stroke Core Measures Jan-Sept 2021
- **EMS**
  - NJ EMS stroke guidelines
  - REMCS BAT notification procedure
  - EMS Standing Order
- **Community Education and Stroke Survivor Resources**
  - **Community Education and Stroke Survivor Resources**
    - Community Resources for the Stroke Survivor and Their Families
    - Connecting with the Community
    - Connecting with the Community by FB

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Stroke Checklist during hospital stay

If any items are not done, must document reason

Ischemic and Hemorrhagic Stroke

[ ] Nursing swallow screen documented before anything, given by mouth, including medications. NPO if patient fails. Consult SLP.

[ ] VTE prophylaxis by day 2

[ ] Assessed by PT, OT, SLP

Ischemic Stroke

[ ] Thrombolytic therapy considered

[ ] NIHSS documented by neurology within 12 hours of ED arrival & prior to any thrombolytic therapy

[ ] Antithrombotic therapy by day 2

[ ] LDL result by day 2

[ ] Anticoagulation therapy for atrial fibrillation/flutter when cleared by neurology

Hemorrhagic Stroke

[ ] ICH/SAH score documented by neurosurgery within 6 hours of ED arrival. If procedure done in that time period, document prior to a procedure.L

[ ] SAH: Nimodipine administered within 24 hours of ED arrival

Stroke Discharge Checklist

If any items are not done, must document reason

[ ] USE STROKE DISCHARGE ORDER SET

[ ] Antiplatelet agent prescribed (ischemic stroke)

[ ] For patients with atrial fibrillation/flutter, anticoagulation prescribed

[ ] Statin medication prescribed (if LDL 70 or greater, or patient on statin prior to admission)

[ ] Appropriate rehabilitation arrangements made

[ ] Stroke and patient-specific risk factor education* given, patient and/or family encouraged to ask questions

Please note:

[ ] When follow up appointment(s) given include place, date, time, and who to call if change needs to be made

[ ] Give patient/caregiver Stroke Care Survey to anonymously complete & return before leaving hospital

**Stroke Education begins on admission!*

Stroke**S.M.A.R.T. 911**

- **S**ymptoms of stroke
- **M**edications and the reasons for taking them
- **A**ppointments
- **R**isk Factors for stroke
- **T**ime is Brain! Call **9-1-1**

Be Stroke Smart!

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American Heart Association.

American Heart Association.
Get With The Guidelines.
Stroke

The American Heart Association and
American Stroke Association proudly recognizes

University Hospital

Newark, NJ

Get With The Guidelines® - Stroke GOLD PLUS with Target: Stroke Honor Roll Elite and Target: Type 2 Diabetes Honor Roll

Achievement Award Hospital

The American Heart Association recognizes this hospital for its continued success in using the **Get With The Guidelines*** program.

Thank you for applying the most up-to-date evidence-based treatment guidelines to improve patient care and outcomes in the community you serve.*

Nancy Brown
Chief Executive Officer
American Heart Association

Donald M. Lloyd-Jones, MD, ScM, FAHA
President
American Heart Association

*For more information, please visit **Heart.org/GWTGQualityAwards**.

References

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