



Protocols and Pathways: Ischemic and Hemorrhagic Stroke

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Disclosures

- No disclosures related to this presentation

Objectives

- Discuss the definitions of clinical pathways and protocols.
- Identify and discuss the potential benefits of implementation of clinical pathways.
- Review the evidence related to clinical pathways recommendations in stroke.
- Identify and discuss key components for inclusion in ischemic and hemorrhagic stroke clinical pathways.



Definitions

Clinical pathways and protocols in stroke

Definitions

Clinical Pathway

“A clinical pathway is a method for the patient-care management of a well-defined group of patients during a well-defined period of time. A clinical pathway explicitly states the goal and key elements of care based on Evidence Based Medicine (EBM) guidelines, best practice and patient expectations by facilitating the communication, coordinating roles and sequencing the activities of the multidisciplinary care team, patients, and their relatives; by documenting, monitoring and evaluating variances; and by providing the necessary resources and outcomes.”

Protocols

“Clinical protocols can be seen as more specific than guidelines, defined in greater detail.

Protocols provide a comprehensive set of rigid criteria outlining the management steps for a single clinical condition or aspects of organization”

Definitions

- Clinical Pathway
 - Multidisciplinary approach
 - Physicians, nursing, ancillary services
 - Evidence based approach to standardized patient care
 - Focused on improving quality of care
- Protocols
 - Guideline based outline of management of a specific condition
 - Focused on adherence to guidelines

Protocol vs Pathway

What's the difference??

- Protocols are treatment recommendations that are often based on guidelines.
 - Similar to clinical pathway, the goal of the clinical protocol may be to decrease treatment variation.
- Protocols are most often focused on guideline compliance rather than the identification of reducing unnecessary steps in the patient care process.
- Unlike critical pathways, protocols may or may not include a continuous monitoring or data-evaluation components.

Clinical Pathways

Benefits of implementation

- To improve patient care
- To maximize the efficient use of resources
- To help identify and clarify the clinical processes
- To support clinical effectiveness, clinical audit and risk management

- The aim of a clinical pathway is to improve the quality of care, reduce risks, increase patient satisfaction and increase the efficiency in the use of resources.



Stroke Specific Pathways/Protocols Evidence Based Practice



Protocols and Pathways: Stroke

Evidence Based Practice: from the literature

- Target: Stroke Key Practice Strategies
 - Strategy #4: Stroke tools
 - “A stroke toolkit containing clinical decision support, stroke-specific order sets, guidelines, hospital-specific algorithms, critical pathways, NIH Stroke Scale, and other stroke tools should be available and used for each patient”
 - Strategy #9: Team-based approach
 - “The team approach based on standardized stroke pathways and protocols has proven effective in increasing 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 meet frequently to review your hospital’s processes, care quality, patient safety parameters and clinical outcomes, as well as to make recommendations for improvement.”
- Target: Stroke Phase II recommendations
 - Rapid triage *protocol* and stroke team notification
 - Facilitates timely recognition of stroke and reduces time to treatment

Protocols and Pathways: Stroke

Evidence Based Practice: from the literature

- Qualitative evaluation of “top performing” hospitals GWTG registry found process to be a key theme to successful early administration of IV tPA
 - Process = established care protocols and patterns
- National Health and Family Planning Commission of China findings from testing of stroke clinical pathway
 - Pathways streamline management of patients with stroke
 - Avoid unnecessary delays
 - Improve quality of treatment
 - Improve quality of rehabilitation
 - Resulted in decreased LOS and overall healthcare costs
 - No sacrifice in treatment quality was noted in this trial

Olsen, D, et al. (2011). A qualitative assessment of practices associated with shorter door-to-needle time for thrombolytic therapy in acute ischemic stroke

Deng, et al. (2014) Reduction of length of stay and costs through implementation of clinical pathways for stroke management in China



Pathways and Protocols in Stroke

Necessary components and considerations



Necessary Components

Stroke Protocols and Pathways

- Multidisciplinary Team
 - Nursing
 - Vascular Neurology
 - Neurosurgery
 - Neurocritical Care (if available)
 - Neurointerventional Surgery



Necessary Components

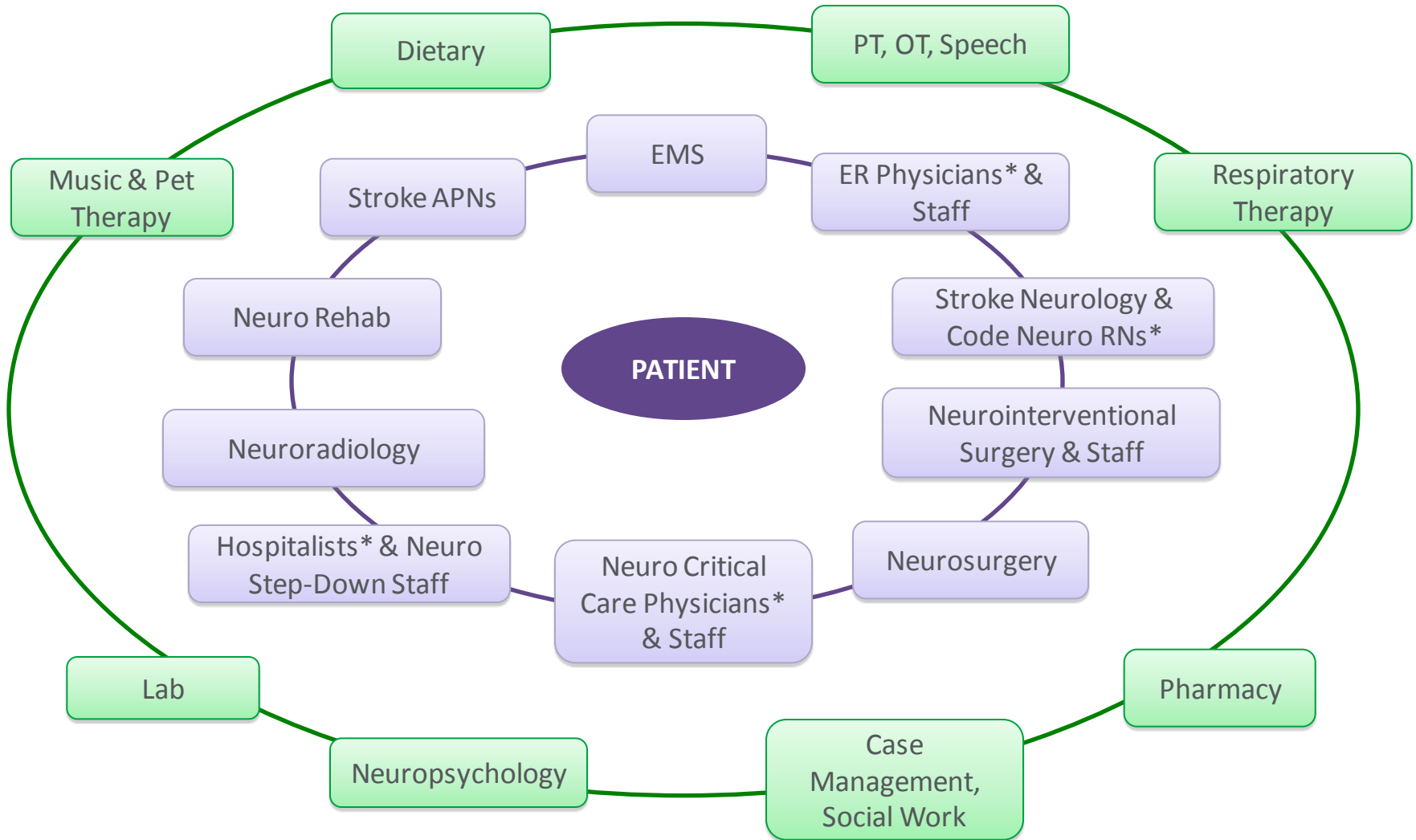
Stroke Protocols and Pathways

- Other team members
 - Emergency medicine
 - Radiology
 - Rehab medicine
 - Physical therapy
 - Occupational therapy
 - Speech therapy
 - Pharmacy
 - Hospice services



Necessary Components

Stroke Protocols and Pathways



Necessary Components

Stroke Protocols and Pathways

- A smaller “core team” should be developed within the larger team creating the pathway.
- The team’s lead person (or people) should be charged with
 - Coordination of the project
 - Ensuring the opinions of all needed have been obtained and considered
 - Finally coordination of the approval/roll out phase



Necessary Components

Stroke Protocols and Pathways

- Re-evaluation
 - Consider re-evaluation and updating of protocols and pathways per hospital policy (~ every 2 years)
- Updated guidelines?
 - Consider meeting with core team
 - Develop updated pathways/protocols
 - Submit for multidisciplinary team approval
- Have a plan!
 - What to do when updates are needed
 - How to proceed with update, approval and implementation of practice/guideline changes

Protocols and Pathways

Specific components for Ischemic and Hemorrhagic stroke

CODE BAT
NeuroIR/Interventional Labs Tracking Tool
Time PI project

Neurology _____
 NeuroIR Physician _____
 Neuro IR midlevel _____
 Anesthesiology _____

Team location at time of Code Bat: In house - Offsite

Please Document in Military Time:

Time Code BAT called/paged:

Arrival Time at CDH Door: ED arrival: _____ Transfer Hospital: _____

Time CTP processed:

Time NeuroIR team activated: Stroke called From Field? Yes No

Time 1st Neuro Tech arrival: Time Midlevel arrival:

Time RN arrival:

OSH/CDH? Time start? Yes No OSH CDH

NeuroIR MD Arrived: NIHSS prior to ANGIO:

Neurologist Arrived:

Angio Suite:

Time up:

Result:

Device 1: _____
Time up: _____
Result: _____

Device 2: _____
Time up: _____
Result: _____

Device 3: _____
Time up: _____
Result: _____

Post:

(time deterrents)

SENT TO NeuroIR LAB)
Abby Doerr: x32123

PATIENT LABEL

Necessary Components

Stroke Protocols and Pathways

- Ischemic Stroke/TIA: first 72 hours
 - Diagnostic testing
 - Treatments
 - IV tPA (if appropriate)
 - Rapid reversal of anticoagulation (if appropriate)
 - Blood pressure management
 - Nursing considerations
 - Monitoring
 - Neuro assessments
 - Cardiac monitoring
 - Temperature
 - Glucose
 - Dysphagia screening
 - Fluid balance

Necessary Components

Stroke Protocols and Pathways

- Ischemic Stroke/TIA: first 72 hours
 - Nutrition
 - Nutrition and hydration needs?
 - NG feeding within 24 hrs for those unable to safely swallow
 - Referrals/Consults
 - Education
 - Discharge Planning
- Prevention of complications
 - GI prophylaxis
 - Aspiration pneumonia
 - Oral care
 - VTE prophylaxis
 - Chemical vs mechanical?
 - Infection risk
 - Avoiding unnecessary use of indwelling urinary catheters
 - SKIN

Necessary Components

Stroke Protocols and Pathways

- **Hypertension management:** Goals for target BP are uncertain currently, however, the following are recommended
 - **Prethrombolysis:** SBP <185 mm Hg and DBP <110 mm Hg
 - class I: level of evidence B
 - **Post-r-tPA bolus:** target <180 mm Hg SBP, <105 mm Hg DBP
 - **Nonthrombolysed ischemic stroke:** BP lowering by ~15% during the first 24 h after stroke
 - Withhold medications unless SBP >220 mm Hg or DBP >120 mm Hg (class I: level of evidence C)
 - **ICH:** Intensive BP lowering is safe and feasible
 - BP lowering within 6 h of ICH onset to a target systolic BP of <140 mm Hg may improve functional outcome at 3 mo after stroke as compared with a traditional BP-lowering target of <180 mm Hg (class I: level of evidence B)
 - **Subarachnoid hemorrhage:** Reduction of systolic BP to a target of 90/160 mm Hg until the aneurysm has been occluded by endovascular or surgical means (GPP)

Necessary Components

Stroke Protocols and Pathways

- Hemorrhagic: first 72 hours
 - Diagnostic testing
 - CT brain
 - Treatments
 - Blood pressure management
 - Anticoagulation reversal
 - Nursing considerations
 - Monitoring
 - Neuro checks
 - BP/temp/glucose
 - Nutrition
 - Hydration/nutrition needs

Necessary Components

Stroke Protocols and Pathways

- Considerations
 - How long to wait for trach and peg?
 - Aspiration precautions
 - Dietary considerations – when to begin tube feedings?
 - When to get out of bed?
 - Early mobilization
 - Baseline/repeat imaging?
 - Post bleed imaging, timeline preference?
 - Labs?
 - Hypercoagulation work up?
 - keeping in mind the TJC mandated timelines (Lipids, glucose, etc)
 - Cardiac work up?
 - ECHO, TEE?



Protocols and Pathways: Stroke

Samples and Examples

Protocols and Pathways: Stroke

Examples

- Samples/examples are available for download
 - www.heart.org
 - Get with the Guidelines – Stroke Clinical Tools Library
 - St. Vincent's Medical
 - Hemorrhagic
 - Non-hemorrhagic/TIA Stroke
 - Massachusetts General protocols

Get With The Guidelines®-Stroke Clinical Tools



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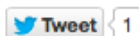
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Updated: Mar 2, 2013

Clinical Tools for Quality Improvement

Get With The Guidelines®-Stroke is much more than a data registry. It's a comprehensive program for supporting quality stroke care, including a library of tools and resources to help improve processes and maximize effectiveness.

The library includes forms and tools that have proven successful at other hospitals participating in Get With The Guidelines-Stroke. We offer these documents only to give you an idea of other hospitals' solutions. By including the documents on this website, the American Heart Association does not represent that they are complete, accurate or efficacious, or that they follow all of the American Heart Association guidelines for secondary and primary prevention of cardiovascular events or stroke. Hospitals should design their order sets, discharge instructions and other tools based on their own procedures and professional experience.

If you're having trouble viewing the tools, click [here](#).

Get With The Guidelines®-Stroke Clinical Tools Library

▼ Feedback Form

We value your feedback on the clinical tools library and its content. Please take a moment to provide us with your feedback on how we could make this toolkit better (e.g., additional tools and resources you would want to see available in the future).

[Complete](#) the Get With The Guidelines Toolkit Feedback Form.

▶ [Supporting Guidelines](#)

▶ [Fact Sheet, 30-day Measures, and CRF](#)

▶ [Resources](#)

▶ [Discharge Orders/Discharge Instructions](#)

▶ [Dysphagia Screening Tools](#)

▶ [Order Sets](#)

▶ [Other Best Practices Tools](#)

▶ [Pathways/Algorithms](#)

▶ [Patient Education](#)

▶ [Specific Order Sets](#)

▶ [Stroke Classification](#)

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▼ Pathways/Algorithms

- [Cullman Regional Medical Center Pathway Stroke-TIA](#)
- [St. Agnes and Waupun Hospital: ED Stroke team](#)
- [St. Agnes and Waupun Hospital: Transfer protocol](#)
- [St. Vincent's Medical Center Pathways Non Hemorrhagic TIA Stroke Plan of Care](#)
- [St. Vincent's Medical Center Pathways Hemorrhagic Stroke Plan of Care](#)

▶ [Order Sets](#)

▶ [Other Best Practices Tools](#)

▶ [Pathways/Algorithms](#)

▶ [Patient Education](#)

▶ [Specific Order Sets](#)

▶ [Stroke Classification](#)

▶ [Stroke Center Certification](#)

▼ Other Best Practices Tools

- Allegheny General Hospital: Stroke Audit Tool
- Atlanta Medical Center Tenet: Stroke Board
- Butler Memorial Hospital: Stroke Thrombolytic Therapy Checklist
- Columbia St. Mary's: Stroke Education Assessment Teaching Record
- Cullman Regional Medical Center: Quality Measures Booklet
- Forsyth Medical Center Code Purple Timeline
- Forsyth Medical Center Dashboard
- Massachusetts General Hospital: Adult Intracerebral Hemorrhage
- Massachusetts General Hospital: BP Management
- Massachusetts General Hospital: Thrombolysis
- Massachusetts General Hospital: IV#IA Pretreatment
- Massachusetts General Hospital: IV t-PA Treatment
- Massachusetts General Hospital IV t-PA Administration
- Oregon Health & Science University: Practice Standard Inpatient Ischemic
- Oregon Health & Science University: Practice Standard for ED
- Oregon Health & Science University: Practice Standard tPA
- Oregon Health & Science University: Instructions for Dilution and Administration tPA
- Oregon Health & Science University: Practice Standard for Inpatients ICH
- Oregon Health & Science University: Practice Standard For Inpatients SAH
- Oregon Health & Science University: tPA Dosing Chart
- Oregon Health & Science University: Stroke Checklist
- SCA Prevention: AMI Patient Discharge Contract
- SCA Prevention: HF Patient Discharge Contract
- The Reading Hospital and Medical Center: t-PA worksheet
- The Reading Hospital and Medical Center: tPA Calculation Dosages
- UCLA: PROTECT Coverletter For Folders
- UCLA: PROTECT PCP Letter
- UCLA: Self Monitor Log for Clinic
- University of Toledo Medical Center: Patient Education Record

ST VINCENTS MEDICAL CENTER PLAN OF CARE

Page 1 of 4

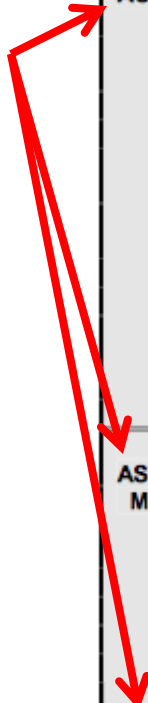
DIAGNOSIS: NON-HEMORRHAGIC/TIA STROKE

CODE STATUS: Full _____ DNR -S _____ DNR-C _____

MEDICAL RECORDS _____ Requested _____ Here _____

ALLERGIES: _____ LOS

	DAY 1	N	D	E	DAY 2	N	D	E	DAY 3	N	D	E
DIET	Date: NPO, until patient passes nursing swallow screen Diet as tolerated, feed or assist as necessary Aspiration precautions				Date: NPO, if swallowing impaired Diet as tolerated Re-evaluate swallowing Aspiration precautions				Date: If still NPO, consider NGT Diet as tolerated Aspiration Precautions			
ACTIVITY	Bedrest x 24 hours HOB elevated 30 degrees, 90 degrees for meals ROM b.i.d. Self-care, assist as necessary Feed, assist if necessary Toilet every 2 h while awake Bed mobility, assist as necessary Functional decline protocol SR # ___ ↑ Call bell in reach, unaffected side Fall Prevention				PT/OT/ST progress per plan of care Bed mobility, assist as necessary OOB to chair x 30 min b.i.d. ROM b.i.d. Ambulate with assist b.i.d. (> ___ft) Toilet every 2 h while awake SR # ___ ↑ Call bell in reach/unaffected side Fall Prevention or ruby slippers				Toilet every 2 W/A Bed mobility, assist as necessary ROM b.i.d. OOB to chair x 1 hour b.i.d. Ambulate with assist _____ft b.i.d. PT/OT/Speech: progress per plan of care Fall prevention SR # ___ ↑ Call bell in reach/ unaffected side			
ASSESSMENTS	VS/Glasgow Coma Scale q 1h x 4h; then q 4h x 24 hours Swallow screen Orthostatic BP on admission I&O Scale weight NIHSS daily Pedal Pulses every shift				Vital signs/Glasgow Coma Scale q 4 h, q shift when stable Evaluate for depression and decreased motivation & notify MD Orthostatic B/P x 1 (24 h after adm) I&O q shift Scale weight (if not done on adm) NIHSS daily Pedal Pulses every shift				Vital Signs/Glasgow Coma Scale q shift Evaluate for depression and decreased motivation and notify MD I&O q shift NIHSS daily Pedal Pulses every shift			
LABS	NTD <input type="checkbox"/> PTT repeated per heparin protocol Hemoccult all stools				NTD <input type="checkbox"/> PTT per protocol Hemoccult all stools				NTD <input type="checkbox"/> PTT per heparin protocol Hemoccult all stools			



ST VINCENT'S MEDICAL CENTER PLAN OF CARE

Patient Label

DIAGNOSIS: HEMORRHAGIC STROKE

CODE STATUS: Full _____ DNR -S _____ DNR-C _____

MEDICAL RECORDS _____

Requested

Here

Page 1 of 4

LOS

ALLERGIES:

	DAY 1	N	D	E	DAY 2	N	D	E	DAY 3	N	D	E
	Date:				Date:				Date:			
DIET	NPO, until patient passes nursing swallow screen Diet as tolerated, feed or assist as necessary Aspiration Precaution				NPO, if swallowing impaired Diet as tolerated Re-evaluate swallowing Aspiration Precaution				If still NPO, consider NGT Diet as tolerated Aspiration Precaution			
ACTIVITY	Bedrest x 24 hours, unless specified by MD HOB ↑ 30 degrees, ↑ to 90 degrees for meals Fall Prevention Call bell in reach, unaffected side Aspiration precaution HOB @ 30 Seizure precautions				PT/OT/ST progress per plan of care Bed mobility, assist as necessary OOB to chair x 30 min b.i.d. Fall Prevention Call bell in reach, unaffected side Aspiration precaution Ambulate with assist b.i.d. (> ___(ft))				Bed mobility, assist as necessary ROM bid OOB to chair Ambulate with assistance bid PT/OT/ST: progress toward plan of care Fall Prevention Call bell in reach, unaffected side			
ASSESSMENTS	Vital signs every 1 h x 4; every 2 h x 4; every 4 h x 24, if stable Neuro signs every 1 h x 4, every 2 h x 4; 4 h x 24, if stable NIHSS every day Remote Telemetry I & O every shift Assess pain every shift Pedal Pulses every shift				Vital signs every 4 W/A Neuro signs every 4hr NIHSS every day I&O every shift Assess pain every shift Pedal Pulses every shift				Vital signs every shift Neuro signs every shift NIHSS every day I&O every shift Pain assess every s Evaluate for depression and notify MD Pedal Pulses every shift			
LABS	NTD <input type="checkbox"/> Fasting labs: Cholesterol, HDL, LDL, Triglycerides Hemocoat all stools				NTD <input type="checkbox"/> Hemocoat all stools				NTD <input type="checkbox"/> CBC with platelet count Hemocoat all stools			

INTERDISCIPLINARY PLAN OF CARE:

Instructions:

Participant:		PT = Patient		F = Family		O = Other							
Teaching Method:		D = Demonstration		VI = Verbal Instruction		P = Printed Material		A = Audiovisual		T = Translator		O = Other	
Date	Problem	Expected Outcome	Resolved/Met	Comments	Initials								
Day 1		Knowledge deficit	Pt./S.O. understands hospital environment										
			Pt./S.O. understands standard precautions										
			Pt./S.O. states understanding of Dx and care plan										
			Pt./S.O. acknowledge availability of support systems										
		Coping Deficit	Pt's airway remains patent, lungs remain clear										
		Airway Obstruction	No aspiration occurs										
	Stroke Education/Prevention Pt and or Family. receives stroke education packet: <ol style="list-style-type: none"> Explains: What is a stroke Personal Modifiable Risk Factors Stroke Warning signs & symptoms, activation for EMS Discussed need for follow up after D/C 												

Adult Intracerebral Hemorrhage

Prior to making any medical decisions, please view our [disclaimer](#).

Guidelines for Emergency Management of Intracerebral Hemorrhage

Identification of patients with suspected intracranial hemorrhage requires urgent brain imaging. Unenhanced CT is the study of choice given its availability, ease of use and sensitivity to subarachnoid hemorrhage, but MR imaging may contribute to the evaluation and management of suspected brain hemorrhage. Intracranial hemorrhage includes epidural (EDH), subdural (SDH), subarachnoid (SAH), intraventricular (IVH), hemorrhagic transformation of ischemic stroke (HT), venous hemorrhage from cortical vein or sinus thrombosis (CVST), and intracerebral (ICH). For patients with ICH, the following underlying conditions must always be considered: coagulopathy, trauma, vascular lesions, venous thrombosis, aneurysmal rupture and hemorrhagic mass lesions such as tumors.

FUNC Score Calculator

While this is not a part of the MGH Adult Intracerebral Hemorrhage protocol, the FUNC score^[1] may be useful to clinicians by providing guidance in clinical decision-making and patient selection for clinical trials.

ICH volume (cc)

Age (yrs)

ICH Location

GCS

Pre-ICH Cognitive Impairment

Calculate FUNC Score

For more informations, see the [FUNC Score Calculator](#) page.

The Following Guidelines Apply to Intracerebral Hemorrhage (ICH)

These guidelines should be used only as medical and educational reference tools. They are not intended to be used as a diagnostic decision-making system and must not be used to replace or overrule a physician's judgment or diagnosis. Application of this information in a particular situation remains the professional responsibility of the practitioner.

The following steps should be considered in parallel rather than in sequence, especially in the stabilization of vital functions and correction of coagulopathy.

- A. Assess vital functions. Determine if intubation is required for patient safety during imaging evaluation. If so, consider use of an ultra-short acting neuromuscular blockade or sedative-hypnotics agent to allow for rapid

Guidelines for BP Management in Acute Stroke

Page Sections

- [Eligible for IV thrombolytic therapy \(with the exception of elevated BP\)](#)
- [Not eligible for thrombolytic therapy \(for reasons other than just elevated BP\)](#)

Prior to making any medical decisions, please view our [disclaimer](#).

Eligible for IV thrombolytic therapy (with the exception of elevated BP)

- Pretreatment
 - Systolic greater than 185 OR diastolic greater than 110
 - Labetalol 10 - 20 mg IV over 1 - 2 min
 - nitropaste 1 - 2 in
 - if still elevated,
 - May repeat or double labetalol every 10 min to maximum dose of 300 mg, or give initial labetalol dose, then start labetalol drip at 2 - 8 mg/min
 - Nicardipine 5 mg/h IV infusion as initial dose and titrate to desired effect by increasing 2.5 mg/h every 5 min to maximum of 15 mg/h
 - if blood pressure is not controlled by labetalol or nicardipine, consider sodium nitroprusside or rule out other cause of acute hypertension such as hypertensive urgency
- During/after treatment
 1. Monitor blood pressure
 - Check blood pressure every 15 min for 2 h, then every 30 min for 6 h, and finally every hour for 16 h
 2. Diastolic greater than 140
 - Sodium nitroprusside 0.5 mcg/kg/min IV infusion as initial dose and titrate to desired blood pressure
 3. Systolic greater than 230 OR diastolic 121 - 140.
 - Option 1
 - Labetalol 10 mg IV for 1 - 2 min
 - May repeat or double labetalol every 10 min to maximum dose of 300 mg, or give initial

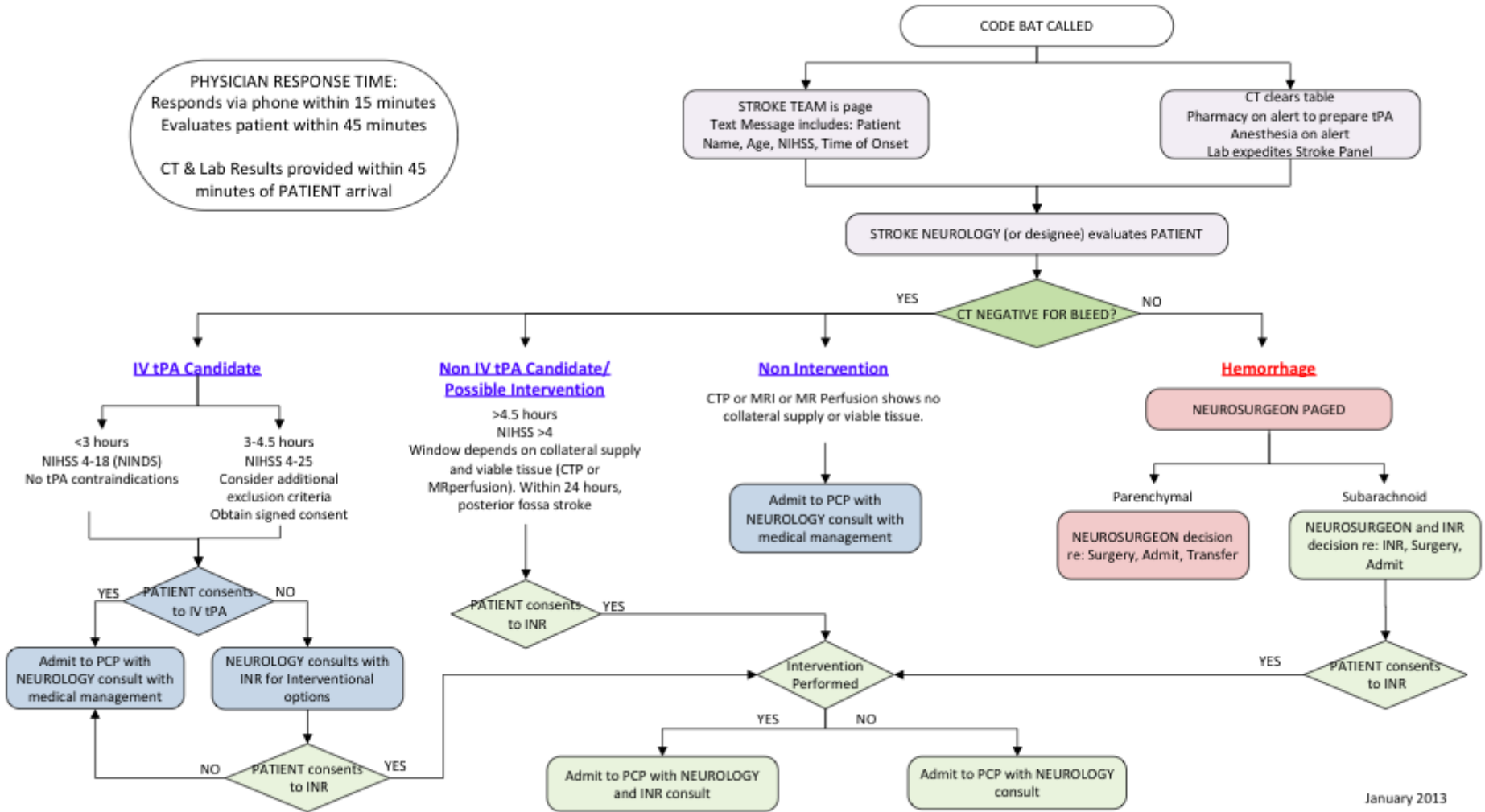
Acute Ischemic Stroke Critical Pathway

	Admission Day Day 0-1 (1st 24 hrs) ER to ICU / <u>stepdown</u>	Day 2 ICU / <u>stepdown</u>	Day 3
Goals/Outcomes	<ul style="list-style-type: none"> -Identify acute ischemic stroke patient. -Document time of symptom onset. -Evaluate for appropriate treatment options and/or clinical trial. -Avoid Aspiration -Record NIHSS Barthel Index Rankin 	<ul style="list-style-type: none"> -Neuro status stabilized/improved -Avoid medical complications (aspiration, fever, infection) -Initial diagnostic tests results documented -Rehab therapies initiated as appropriate -t-PA pts. <u>transferred</u> from ICU or <u>stepdown</u> to ward as appropriate 	<ul style="list-style-type: none"> -<u>Neuro status stabilized/improved</u> -Avoid medical complications -Initial diagnostic tests results documented -Rehab therapies continued -Pt's family understands disease process -Transfer from upper level care to ward -Discharge if ready -NIHSS, Barthel, Rankin
Laboratory/ Diagnostic Tests	STAT CT Brain <u>without contrast</u> EKG CXR	Fasting Lipids Fasting Hgb A1C Fasting Homocysteine level	PTT q 6 hrs (if on Heparin) PT/INR (if on Warfarin) Follow up on abnormal tests as needed

Central DuPage Hospital Stroke Response

PHYSICIAN RESPONSE TIME:
 Responds via phone within 15 minutes
 Evaluates patient within 45 minutes

CT & Lab Results provided within 45 minutes of PATIENT arrival



January 2013

Summary

Pathways and Protocols in Stroke

- Pathways require a multidisciplinary approach
- Pathways and protocols promote a systematic, evidence based, potentially streamlined hospitalization
 - Pathways: improving quality care
 - Protocols: adherence to guidelines
- Creating pathway: research, review others work, determine what is best for YOUR clinical setting
- Remember: do not reinvent the wheel!
 - Phone a friend
 - www.heart.org
 - Review the evidence

WHY REINVENT THE
WHEEL WHEN YOU
DON'T HAVE TO?





Questions?
Thank you!