Protocols and Pathways: Ischemic and Hemorrhagic Stroke

Abby Doerr, APN, FNP-BC, ANVP, SCRN
Procedural APN: Neurointerventional Surgery
Northwestern Medicine Central DuPage Hospital
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
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

Fonarow, G. et al. (2011) Improving door-to-needle times in acute ischemic stroke: the design and rationale for the AHA/ASA Target: Stroke Initiative
AHA Target: Stroke Phase II, 2014
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

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
It takes an ARMY to care for the acute stroke patient
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
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

Middleton, Grimley & Alexandrov (2015) Triage, treatment and transfer:...
Necessary Components

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

Middleton, Grimley & Alexandrov (2015) Triage, treatment and transfer:...
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
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
- Stroke Center Certification
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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
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
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**ST. VINCENT’S MEDICAL CENTER PLAN OF CARE**

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**CODE STATUS:** Full ______  DNR-S ______  DNR-C ______

**MEDICAL RECORDS:** Requested ______  Here ______

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<td>CBC with platelet count</td>
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### Stroke Education/Prevention
Pt and/or Family receives stroke education packet:

1. Explains: What is a stroke
2. Personal Modifiable Risk Factors
3. Stroke Warning signs & symptoms, activation for EMS
4. Discussed need for follow up after D/C

### 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
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.

<table>
<thead>
<tr>
<th>ICH volume (cc)</th>
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<tr>
<td>Age (yrs)</td>
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<tr>
<td>ICH Location</td>
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<tr>
<td>GCS</td>
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<tr>
<td>Pre-ICH Cognitive Impairment</td>
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</tbody>
</table>

Calculate FUNC Score

For more information, 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 / stepdown  
| Day 2  
| ICU / stepdown  
| Day 3  
| - Neuro status stabilized/improved  
| - Avoid medical complications (aspiration, fever, infection)  
| - Initial diagnostic tests results documented  
| - Rehab therapies initiated as appropriate  
| - t-PA pts. transferred from ICU or stepdown to ward as appropriate  
| - Neuro status stabilized/improved  
| - 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  

## Goals/Outcomes
- 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

## Laboratory/ Diagnostic Tests
- STAT CT Brain *without contrast*  
- 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

---

**CODE BAT CALLED**

**STROKE TEAM is page**
- Text Message includes: Patient Name, Age, NIHSS, Time of Onset

- **CT clears table**
- Pharmacy on alert to prepare tPA
- Anesthesia on alert
- Lab expedites Stroke Panel

**STROKE NEUROLOGY (or designee) evaluates PATIENT**

- **CT NEGATIVE FOR BLEED?**
  - **YES**
  - **NO**

---

**IV tPA Candidate**
- <3 hours
  - NIHSS 4-18 (NINDS)
  - No tPA contraindications
  - YES
  - PATIENT consents to IV tPA
  - Admit to PCP with NEUROLOGY consult with medical management
  - NO
  - NEUROLOGY consults with INR for Interventional options

- 3-4.5 hours
  - NIHSS 4-25
  - Consider additional exclusion criteria
  - Obtain signed consent
  - YES
  - PATIENT consents to IV tPA
  - Admit to PCP with neurology consult with medical management
  - NO
  - NEUROLOGY consults with INR for Interventional options

---

**Non IV tPA Candidate / Possible Intervention**
- >4.5 hours
  - NIHSS >4
  - Window depends on collateral supply and viable tissue (CTP or MR perfusion).
  - Within 24 hours, posterior fossa stroke
  - YES
  - PATIENT consents to INR
  - Admit to PCP with INR consult for Interventional options
  - NO
  - Admit to PCP with NEUROLOGY consult with medical management

---

**Non Intervention**
- CTP or MRI or MR Perfusion shows no collateral supply or viable tissue.
- Admit to PCP with NEUROLOGY consult with medical management

---

**Hemorrhage**
- NEUROSURGEON PAGED
  - Parenchymal
  - Subarachnoid
  - NEUROSURGEON decision re: Surgery, Admit, Transfer
  - YES
  - PATIENT consents to INR
  - Admit to PCP with NEUROLOGY consult
  - NO
  - Admit to PCP with NEUROLOGY consult

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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](http://www.heart.org)
  – Review the evidence
Questions?
Thank you!