STROKE 2019

DR. SCOTT MCPHERSON
MEDICAL DIRECTOR, ST. DOMINIC COMPREHENSIVE STROKE PROGRAM
FOR A PATIENT WITH A NEW NEUROLOGIC DEFICIT WITH NO HEMORRHAGE ON CT HEAD (AND MEETS THE STANDARD EXCLUSION CRITERIA), WHICH OF THE FOLLOWING ONSET TIMES WOULD QUALIFY THEM FOR IV TPA

A. <3 hours
B. <4.5 hours
C. <6 hours
D. <12 hours

A. <3 hours

25% 25% 25% 25%
A B C D
Stroke Treatments

If you are having a stroke it is important to get immediate medical attention—**Call 9-1-1.** The sooner you get treatment the better. Immediate treatment may help minimize the long-term effects of stroke and improve recovery outcomes.

Can Stroke Be Treated?

There are several treatment options for stroke depending on the cause of your stroke. If you are having an ischemic stroke or a stroke that is caused by a blood clot your healthcare professional may recommend drug treatment.

Drug Treatment

There is only one Food & Drug Administration (FDA) approved drug treatment for acute Ischemic stroke. Thrombolytic therapy (tPA) is given via intravenous therapy (IV) and works by dissolving the clot and improving blood flow to the part of the brain being deprived of blood flow. tPA should be given within three hours (and up to 4.5 hours in certain eligible patients) of the time symptoms first started.

Mechanical Devices

Some ischemic strokes are treated with small mechanical devices that remove or break up blood clots. If clot-busting drugs are ruled out, another option one of the many FDA approved mechanical devices. A surgeon inserts a small mechanical device into the blocked artery using a thin tube. Once inside, the tool traps the clot, and either breaks it up or the surgeon pulls it out of the brain, reopening the blocked blood vessel in the process.

A hemorrhagic stroke (often called a bleed) occurs if an artery in your brain leaks blood or ruptures (breaks open). The first steps in treating a hemorrhagic stroke are to find the cause of bleeding in the brain and then control it. Some of the options for treatments include surgical clips or coils inserted in aneurisms (weaknesses in the blood vessel wall), controlling high blood pressure, and surgery to remove the bleeding vessel and blood that has spilled into the brain.

Medical advances have greatly improved survival rates and recovery from stroke during the last decade. Your chances of survival and recovery outcomes are even better if the stroke is identified and treated immediately.
HOW DID WE GET HERE?
In 1995 published in the NEJM the Thrombolytic therapy trial for acute ischemic stroke utilizing t-PA was published.

The trial has 2 parts. Part 1 tested whether t-PA improved NIHSS by at least 4 points or had resolution of neurologic deficit within 24 hours. Part 2 used global test statistic to assess clinical outcome at 3 months according to mRS, Glasgow outcome scale, NIHSS, and Barthel index.
Part One-No improvement

Part Two-All 4 outcome measures improved (global odds ratio for favorable outcome, 1.7; 95% confidence interval, 1.2 to 2.6) as compared with patients given placebo, patients given t-PA were 30% more likely to have minimal to NO disability at 3 months.
These results in spite of 6.4% hemorrhage rate with t-PA vs 0.6% placebo
In 2008, European Cooperative Acute Stroke Study III demonstrated benefit of IV t-PA up to 4.5 hours, extending window of treatment.
NEJM in 2013 published study comparing endovascular treatment alone vs. standard IV t-PA treatment of stroke within 4.5 hours onset.
A total of 181 patients assigned to each treatment group. At 3 months there was no statistical difference in alive without disability, fatal or non-fatal intracranial hemorrhage, fatality rate.
2 other studies of 2013, the IMSIII and the MR Rescue also failed to show benefit

No Harm, Just No Benefit
Question:

In the subset of patients with large proximal anterior circulation strokes, does intra-arterial intervention in addition to usual care offer improvement?
Bottom Line:
YES.

Patients with large proximal anterior circulation strokes, intra-arterial therapy within 6 hours improved functional independence at 90 days without increase ICH or mortality.

THE RIGHT QUESTION WAS ASKED!
Large artery occlusions of proximal anterior circulation (ICA, M1, M2, A1, AZ) account for about one-third of anterior ischemic strokes.

However, conventional IV t-PA is able to achieve recanalization in less than one-fifth of patients.
MR CLEAN randomized 500 patients with a radiographically confirmed proximal arterial occlusion in anterior circulation to treatment with IA intervention within 6 hours of symptoms vs. standardized care.

Both groups received IV t-PA.
MR CLEAN (2014)

MR CLEAN demonstrated that IA intervention arm had significantly improved 90 day outcomes (mRS) compared with usual care arm (OR 1.67, 95% CI 1.21-2.3).

No difference in ICH or mortality.

33% functional independence IA vs. 19% standard treatment
With this data, the other worldwide studies Canadian ESCAPE, Australia EXTEND-IA, Spain REVASCAT, and SWIFT PRIME were all terminated early due to their ethical clauses.

All showed identical results to MR CLEAN.
Thus, it became UNETHICAL to NOT treat with intervention.
OH BOY!

Game On.....
MS STROKE SYSTEM SETUP
EMS
STROKE LEVEL 1 REQUIREMENTS

- **Stroke Level 1**
  - Consists of a core team of personnel, infrastructure, and expertise to diagnose and treat stroke patients who require intensive medical, surgical, and interventional vascular care. The team consists of a neurologist, neurosurgeon, and endovascular specialists.
  - Fully equipped Emergency Department (ED) for rapid diagnosis and treatment using standard CT imaging within 25 minutes and ability to have results reported within 45 minutes of test completion.
  - Lab services available 24/7 with appropriate result reporting.
  - Neurology, Neurosurgery, and Endovascular specialists available 24/7.
  - Intensive Care capability available with critical care specialist available 24/7.
  - Complete rehabilitation services (physical therapy, occupational therapy, and speech therapy) staffed by trained professionals and available for all patients within 24 to 48 hours of admission.
  - Readily available for transfer of patient from field or lower care facility.
  - Maintenance of adequate helicopter landing site on campus.
  - Operating room and appropriate support staff available 24/7 for emergency surgery when necessary.
  - Radiologic and diagnostic imaging with expedited reporting available 24/7.
  - this should include angiography with endovascular capabilities.
  - Must participate in the American Heart Association (AHA) "Get With The Guidelines ® - Stroke Registry. A multi-disciplinary quality improvement team, should meet at least quarterly to review data and lead quality improvement initiatives.
  - Stroke Medical Education (CME) annually.
  - Community and professional educational projects should be ongoing.
**STROKE LEVEL 2 REQUIREMENTS**

- **Stroke Level 2** -- (must have all of the requirements of Level 1 EXCLUDING endovascular capabilities)
- Consists of a core team of personnel, infrastructure, and expertise to diagnose and treat stroke patients who require intensive medical and surgical care.
- The team consists of a diagnostic radiologist, neurologist, and neurosurgeon. Fully equipped ED for rapid diagnosis and treatment using standard CT imaging within 25 minutes and ability to have results reported within 45 minutes of test completion.
- Lab services available 24/7 with appropriate result reporting.
- Radiology and Neurology specialists available 24/7.
- Intensive Care capability available with critical care specialist available 24/7.
- Complete rehab services (physical therapy, occupational therapy and speech therapy) staffed by trained professionals and available for all patients within 24 to 48 hours of admission.
- Readily available for transfer of patient from field or lower care facility.
- Maintenance of adequate helicopter landing site on campus.
- Operating room and appropriate support staff available 24/7 for emergency surgery when necessary.
- Radiologic and diagnostic imaging with expedited reporting available 24/7.
- Must participate in the AHA Get With The Guidelines ® - Stroke Registry. A multi-disciplinary quality improvement team should meet to review data and lead quality improvement initiatives at least quarterly.
- Stroke team members must document at least eight hours of CME annually.
- Community and professional educational projects should be ongoing.
STROKE LEVEL 3 REQUIREMENTS

- **Stroke Level 3** -- (must have the ability to diagnose and stabilize patient for transfer to Level 1 or 2 Referring Center)
- ED physician, other qualified physician, or physician extender available 24/7 to diagnose and initiate appropriate treatment.
- Rapid diagnosis and treatment using standard CT imaging within 25 minutes and ability to have results reported within 45 minutes of test completion.
- Lab services available 24/7 with appropriate result reporting.
- Acute stroke-trained providers should be available 24/7 to direct IV Alteplase (t-PA) administration.
- Transition plans must be established for rapid transfer of patient to Level 1 or 2 Stroke Center. Factors that may necessitate transfer include:
  - Consider utilizing “Drip and Ship” after initiation of Alteplase if neurosurgery coverage is not available.
  - Patients with rapid clinical decline.
  - Patients without response to IV Alteplase or outside IV Alteplase window who may benefit from neuro intervention.
  - Other factors as clinically necessary.
- Must participate in the Get With The Guidelines® - Stroke Registry. A multi-disciplinary quality improvement team should meet to review data and lead quality improvement initiatives at least quarterly.
- Community and professional educational projects should be ongoing.
5. An Emergency Department physician initiates a Stroke Alert upon the arrival of the patient who has been transferred from another facility after receiving a tissue plasminogen activator (tPA).

6. An Emergency Department physician initiates a Stroke Alert when the patient arrives with symptoms of a wake-up stroke.

7. If the patient is at Dominican Plaza, Cancer Center, Behavioral Health Services North Campus and such locations that are not part of St. Dominic Hospital South Campus, 911 is called.

8. A Stroke Alert is initiated by using the PULSARA STOP STROKE app as outlined on Phase 1 Hyper-Acute Stroke order set and Wake Up Orders for Pt Outside of IV TPA Window.

9. This procedure is used 24 hours per day every day.

10. For additional information regarding the stroke alert team, contact the Stroke Program Coordinator or the nurse practitioner assigned to neurology.

**Related Documents:**
1. Acute Stroke Patient Transfers from Another Facility, St. Dominic Hospital procedure
2. Code 99, St. Dominic Hospital guideline
3. Patient Evaluation Response Team (PERT), St. Dominic Hospital guideline

**References:**
1. Phase 1 Hyper-Acute Stroke order set, https://www2.stdom.com/SSLWebPages/DoctorOrderForms/index.cfm
2. Wake Up Orders for Pt Outside of IV TPA Window order set, https://www2.stdom.com/SSLWebPages/DoctorOrderForms/index.cfm
<table>
<thead>
<tr>
<th>Date &amp; Time</th>
<th>Acute Stroke Discharge Orders</th>
<th>Page 2 of 3</th>
</tr>
</thead>
</table>

**1) General**
- Discharge
- Discharge Diagnosis is not active
- Discharge is not available
- Discharge Instructions:

**2) Condition at Discharge**
- Good
- Fair
- Stable

**3) Diet**
- Regular
- Couples diet
- Heart Healthy
- Heart Healthy ADA
- N/A restricted
- Other Diet

**4) Social Worker Consult:** Please arrange for home services through primary care provider
- St. Dominic’s Corporation 601-200-4920
- PT
- OT
- ST
- Home Health - Stroke – Transition to Care Program (Sign Face to Face form)
- PT
- OT
- ST
- RN
- Home Health Other (Sign Face to Face form)
- PT
- OT
- ST
- RN
- Home Aides
- Other:

**5) Schedule Follow-up appointment**
- With Primary care provider
- With neurologist
- With Stroke clinic in 2 weeks
- With Stroke clinic in 2 weeks AND 90 days for patients who received IV TPA or Intravenous Thrombolytic Treatment
- Other:
- Other:

**6) Provide Stroke education:**
- Complete Home assessment, share key points and pass on contact:
- Physical and occupational therapy for each day: letter
- Provide information regarding next steps:

**7) Medications**
- Per Discharge Medication list:

**DOCTOR’S ORDERS**

---

**DOCTOR’S ORDERS**

---

**DOCTOR’S ORDERS**

---

---
ST. DOMINIC-JACKSON MEMORIAL HOSPITAL
JACKSON, MISSISSIPPI

DOCTOR'S ORDERS

DATE/TIME

1. Admin in HU to IV as
   ordered

2. Geographical

3. Vital signs (with non-invasive): q3hrs x 2 hrs, q6hrs x 8 hrs, q4 x 24 hrs after
   rescue

4. Code status

5. Continue

6. If arterial sheath is in place
   A. Bed rest, keep
   upright 45 degrees or higher than 30 degrees, may bag roll PBN.
   B. Keep sheath stopping in TCC with 1000 units heparin per 250 ml NS
   C. Keep sheath propposed bag elevated to greater than 300 degrees in all axes.
   D. Change sheath flush bag PBN. Keep flush bag above level of the torso in all
   cases

   No use to sheath from line.

   C. Check
   pressure x 3 and start x with filter tip sheath

7. If arterial sheath is not removed
   A. Bed rest, keep
   upright 45 degrees or higher than 30 degrees, may bag roll PBN.
   Beginning 2 hrs after sheath cut out
   B. Vital signs q3hrs x 2 hrs, q6hrs x 8 hrs and then q4 x 24 hrs.
   C. Check
   pressure x 3 and start x with filter tip sheath

8. If arterial sheath is not been secured with Angio-Seal
   A. Bed rest, keep
   upright 45 degrees or higher than 30 degrees, may bag roll PBN
   Beginning 2 hrs after sheath cut out
   B. Vital signs q3hrs x 2 hrs, q6hrs x 8 hrs and then q4 x 24 hrs.
   C. Check
   pressure x 3 and start x with filter tip sheath

9. Notify physician for
   STAT blood products as
   ordered

   A. Hemoglobin greater than 10 g/dl
   B. Platelets greater than 100,000

   Do not exceed 2 units of hematopoiesis in 24 hrs.

   If both ordered, give Daclatisparg as a prophylactic dose to

   30 mg (minimum) 4 mg IV q 6 hrs PBN massage or wound
   Hemopap (prophylactic)

   12.5 mg q 6 hrs PBN masssage or wound dressing (patient is less than or equal to 125lbs)

   OR
   50 mg IV q 6 hrs PBN massesage or wound dressing (patient is greater than 125lbs)

   Antibiotic (appropriate) 15 mg PO or PBN intarsection

   3. Medication (intravenous anticoagulation therapy): q 2ml x 2 ml, q 4 x 24 hrs.

   4. P10 0.9% saline PBN exchange

   5. Milk of Magnesia concentrate (magnesium hydroxide) 50 ml, P10 daily PBN exchange

   6. Colace (Usual dose) 300 mg PO bid.

   7. Pharmacy to identify and label drugs

   8. Notify attending physician for receipt as above

   9. For further orders, please contact your physician.
# Protocol

## Ischemic Stroke: Stroke Decortication (SAP/Alabama) Phase 2

### St. Dominic-Jackson Memorial Hospital

#### Ischemic Stroke: Stroke Decortication (SAP/Alabama) Phase 2

**Date**

**Time**

---

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Admit to Stroke ICU as soon as possible (see 2)</td>
</tr>
<tr>
<td>2.</td>
<td>CM: Stroke Nursing order (do not delete)</td>
</tr>
<tr>
<td>3.</td>
<td>TIA Analysis (from Neuro ICG) for 15 min (see 4)</td>
</tr>
<tr>
<td>4.</td>
<td>Vital Signs and Neuro Checks: Measures blood pressure and perform neurological assessments every 15 minutes during and after IV TPA infusion for 2 hours, then every 30 minutes for 6 hours, then hourly until 24 hours after IV TPA treatment. Increase the frequency of blood pressure measurement if systolic blood pressure is &gt;160mmHg or if diastolic blood pressure is &gt;100mm Hg. Continuous cardiac monitoring for 24 hours after stroke onset with initiation. This order supersedes any other vital sign order placed before this order has been followed and completed.</td>
</tr>
<tr>
<td>5.</td>
<td>Keep IV pole until nursing bedside monitoring completed and protocol</td>
</tr>
<tr>
<td>6.</td>
<td>seizure prevention</td>
</tr>
<tr>
<td>7.</td>
<td>Order Pedocals or heparin for acute MI</td>
</tr>
<tr>
<td>8.</td>
<td>Delirium</td>
</tr>
<tr>
<td>9.</td>
<td>Activity: Strict bed rest (until) respite assessment, then activity level as directed</td>
</tr>
<tr>
<td>10.</td>
<td>Antihypertensive: Keep head of bed elevated 30-45 degrees at all times</td>
</tr>
<tr>
<td>11.</td>
<td>Notify MS of neurological changes</td>
</tr>
<tr>
<td>12.</td>
<td>Notify Obstetrician (if pregnant)</td>
</tr>
<tr>
<td>13.</td>
<td>C2 or ventricular and their needs to keep SBP &lt;90</td>
</tr>
<tr>
<td>14.</td>
<td>Initiate and complete Parameter/Intravenous Serum on transfer from ICU</td>
</tr>
<tr>
<td>15.</td>
<td>No sedative, anticonvulsant or anticoagulation for 24 hours except for emergency and with MS Order</td>
</tr>
<tr>
<td>16.</td>
<td>LAB: 24 hours post IV infusion</td>
</tr>
</tbody>
</table>
| 17. | Consult: 
| a. | Cardiac Nutrition Services for evaluation and dietary education (see Stroke Patient) |
| b. | Consult Speech Therapy (Stroke Patient) include cognitive assessment |
| c. | Consult Pulmonary Therapy (Stroke Patient) |
| d. | Consult Respiratory Therapy (Stroke Patient) |
| e. | Consult Rehabilitation Services (OT, PT) include home and work assessment (see Stroke Patient) OT: includes documentation of assessment (see Stroke Patient) PT: includes documentation of assessment (see Stroke Patient) |
| f. | Consult Rehabilitation Services (OT, PT) include home and work assessment (see Stroke Patient) |
| g. | Hospital Nutrition Services Manager for discharge planning and Smoking Cessation (see Stroke Patient) |
| h. | Hospital Nutrition Services Manager for discharge planning and Smoking Cessation (see Stroke Patient) |
| 18. | Physician Consultation: 
| a. | Stroke/SAP Team consists of Neurologists, Neuroradiologists, Interventional Neurologists, Stroke Nurse, Stroke Rehabilitation, and Pulmonary-FAST: How to Activate EMS/ICU, Need for Follow-up after Discharge, Prescribed Medications, Smoking Cessation, Use Inclusion |

---

**ST. DOMINIC-JACKSON MEMORIAL HOSPITAL**

**JACKSON, MISSISSIPPI**

### Ischemic Stroke: Stroke Decortication (SAP/Alabama) Phase 2

**Date**

**Time**

---

**Meditations:**

- **I** (Infarct)
- **D** (Diastolic Blood Pressure greater than or equal to 120)
- **S** (Systolic Blood Pressure greater than 120 or 2 or more consecutive BP checks at least 10 minutes apart)
- **O** (Other)

**Orders:**

1. **Notify MS IMMEDIATELY**
2. **Give Labetalol 2 mg IV over 2 minutes every 4 hours** (see comment)
3. **Continue blood pressure monitoring**
4. **Hold Labetalol for Acute Asthma or other exacerbation or for SBP less than 90 or for NB and/or 90** (see comment)
5. **Continued Blood Pressure Monitoring**

**Initial Diagnosis:**

**Bilateral**

**B** (Bilateral)

---

**Medications:**

- **I** (Infarct)
- **D** (Diastolic Blood Pressure greater than or equal to 120)
- **S** (Systolic Blood Pressure greater than 120 or 2 or more consecutive BP checks at least 10 minutes apart)
- **O** (Other)

---

**Doctor's Orders:**

**Physician Signature:**

---

**Date**

**Time**

---

**Physician Signature:**

---
TIA or Ischemic Stroke (Non r-tPA/Alteplase)  Phase 2

1. Admit to ______________________
   2. CM: Stroke (Nursing order – do not delete)
   3. IV Access: _________________________ Sodium Chloride 0.9% 1000ml at __________ml/hr
   4. Fluids and I&O Chart:
      For ICU patients: 3 L in 24 hrs, then routine or more often as needed.
      For non-ICU patients: Every 4 or 8 hrs then every 4 hours or more often as needed.
      Continue cardiac monitoring
   5. Urine Narcotics (Formulary)
   6. Sodium and albumin screening completed
   7. Seizure Precautions
   8. Diet: Keep NPO until nursing swallow screen completed
   9. Seizure Precautions
   10. Activity:
      Stroke bed rest until rehab assessment, then activity level as directed
   11. Notify MD of Neurological changes
   12. Anticoagulation: Continue heparin or LMWH
   13. Cardiac Monitoring
   14. Initiate and complete Pneumonia/Influenza Screen on admission or on transfer from ICU.
   15. DVT Prophylaxis: Place SCD's until ambulatory

16. LABS: (Do not repeat if done in ED)
   a. CBC w/diff STAT once
   b.uria C&S STAT once
   c. Serum Creatinine (Nursery, Pediatric, & Geriatric patients)
   d. Tidal Lipid Profile STAT once
   e. Chest X-ray
   f. Electrolytes STAT once
   g. Urine A1C STAT once
   h. Other

17. Consults:
   a. Consult Nutrition Services for evaluation and dietary education – Stroke Patient
   b. Consult Speech Therapy – Stroke Patient – include cognitive screen
   c. Consult Diabetes Nurse – (for diabetic patients only)
   d. Consult Respiratory Therapy – Stroke Patient
   e. Consult Social Services and Case Manager for discharge planning and Smoking Cessation
   f. Consult Rehab Services: OT, PT, evaluate and treat – Stroke Patient OT: include depression screen
   g. Patient is ineligible to receive rehab services because symptoms resolved.

18. Physician Consult:

Date & Time
DOCTOR'S ORDERS
SD40-3

ST. DOMINIC-JACKSON MEMORIAL HOSPITAL
JACKSON, MISSISSIPPI

Page 1 of 2

Pharmacy Mnemonic: ISNOTPA1

*DOCTOR'S ORDERS*

ST. DOMINIC-JACKSON MEMORIAL HOSPITAL
JACKSON, MISSISSIPPI

Page 2 of 2

Pharmacy Mnemonic: ISNOTPA1


20. Diagnostics: Indication needed to process order Indication (If other)
   a. MRI Brain & MRA Brain and neck without contrast – Indication
   b. MRI Brain without contrast, without MRA – Indication
   c. CT of Brain without contrast (for stroke – Indication)
   d. CTA (angiography) – Indication
   e. Cardiac Duplex Ultrasound for ____________________________
   f. Echocardiogram – Indication


   - Systolic Blood Pressure greater than 230 OR Diastolic Blood Pressure greater than 120: or more consecutive SBP checks at least 10 mm Hg apart

   - Notify MD IMMEDIATELY

   - Give Labetalol (intravenous) every 1-2 minutes every 4 hr PRN (for 5x comment)

   - Continue blood pressure monitoring

   - CAPITALS FOR ACUTE ANTIMIA OR CPH EXACERBATION OR FOR HEART RATE LESS THAN 50 OR FOR EJECTION FRACTION OF 25% OR 3RD DEGREE HEART BLOCK

   - Notify MD immediately

   - Systolic Blood Pressure 25-290 mm Hg or 200 mm Hg IV infusion at least 2.5 mg/hr every 15 minutes for a MAP of at least 95 mm Hg

   - Continue Blood Pressure Monitoring

22. Medications: Do not give 3 grams of acetaminophen in 24 hours
   a. Antipyrine (APAP) 250 mg po daily
   b. Acetaminophen (APAP) 250 mg po daily
   c. Naproxen sodium (NAPR) 500 mg po daily
   d. Cumulative Education (if applicable)
   e. Anti-platelets: 1 mg/t 30 mins prior to imaging procedure for agitation. May repeat X STAT.
   f. (Consult STATIM for ED: 2, 100, 45, 360 for Diabetic patients 1, 0, 0)
   g. No acetaminophen
   h. Intravenous (IV) and PO orders selected, give by the oral route unless patient is unable to take PO med. If unable to take PO meds, give by the IV route.
   i. 300 mg Fentanyl (Fentanyl) 60 min prior to imaging procedure for agitation.
   j. Tylenol (acetaminophen) 325 mg tablets PO q 6 hrs PRN.
   k. If patient is unable to take PO med, administer suppository rectally.
   l. Tylenol (acetaminophen) 650 mg suppository per rectum q 6 hrs PRN temp > 104° F for headache.

Date Time
PHYSICIAN SIGNATURE

BOTTOM EDGE OF PATIENT LABEL
<table>
<thead>
<tr>
<th>Date/Time</th>
<th>DOCTOR'S ORDERS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Initial Acute Stroke Orders</th>
<th>PROTOCOL</th>
</tr>
</thead>
</table>

1. **Venous Line:** Insertion of 18g IV in the antecubital fossa or hand, sidearm if possible.
2. **Oxygen:** Maintain O2 saturation of 95-100%.
3. **Continuous ECG Monitoring:** Monitor for any changes or arrhythmias.
4. **Antihypertensives:** Use as needed to maintain systolic BP <140 mmHg.
5. **Sublingual Nitroglycerin:** 1 mg every 5 minutes up to 5 mg total, or subcutaneous nitroglycerin if BP <90 mmHg.
6. **Aspirin:** 325 mg orally immediately.
7. **Clopidogrel:** 600 mg orally immediately.
8. **Heparin:** 5000 units subcutaneously every 4 hours.
9. **IV Fluids:** IV fluids to maintain normal vital signs.
10. **Antithrombotics:** Per protocol.

**Laboratory:**
- **Blood Pressure:** Maintain BP within normal limits.
- **Heart Rate:** Maintain HR within normal limits.
- **O2 Saturation:** Maintain O2 saturation of 95-100%.

**Diagnosis:**
- **Acute Ischemic Stroke:** Likely.
- **Intracerebral Hemorrhage:** Rule out.

**Follow-up:**
- **Re-evaluate every 1 hour for the first 4 hours, then every 2 hours thereafter.**
- **Document all changes in vital signs and clinical status.**

**Physician Signature:**
[Signature]

**Chief:**
[Signature]

**Resident:**
[Signature]
Stroke Orders for Pt Outside of IV TPA Window
Includes Wake-Up Stroke and Unknown Last Known Well

1. Vital Signs/Neuro checks every 1 hour or more often as needed. Notify MD of any Neurological changes.
2. Hypertension: Monitor BP every 1 hour. Notify MD of any changes.
3. 12 lead EKG
4. 2L/h fluid rate
5. Notify to conclude MD is notified. Keep rate in the 120s and place in progressive care.
6. Order: Strict Bedrest
7. Prevent Pneumonia: Notify/onset of dyspnea or cough lasting >5 minutes.
8. Premedication: Notify/within 20min of BP falling below 90/60.
9. Baseline EKG: Notify/changes in systolic BP by 30 or diastolic BP by 15.
10. Notify to complete Neuro checks every 1 hour or more often as needed.

11. S.C. Intubation: Notify/when intubation is needed
12. Oxygen 2L Nasal Cannula or mask to keep O2 sat >94%
13. Continuous cardiac monitoring
14. 12 lead EKG
15. IV access:
   - Sodium Chloride 0.9% 1000 ml at ______ ml/hr
16. Nurse to complete NIH Stroke Scale immediately upon arrival and place in progress notes.
17. Diet: Keep NPO until nursing swallow screening completed and passed
18. Precautions:
   - Strict bedrest
   - Keep Head of Bed elevated 30-45 degrees at all times.
19. Use PULSARA app to activate team. Nurse Practitioner to contact Interventionalist.
20. CM: Stroke Patient (Nursing order-do not delete)
21. LABS:
   - CBC w/diff  STAT once
   - Blood Alcohol once STAT
   - Accucheck glucose STAT once
   - Cardic marker (troponin) once STAT
   - CMP  STAT once
   - Serum Pregnancy Test STAT once (from menarche to menopause unless history of BTL or hysterectomy)
   - PT/INR STAT once
   - Urine Drug Screen once STAT
   - PTT STAT once
   - UA once STAT
22. Portable chest x-ray: Indication:_____________
23. Initiate Glycemic Control protocol
24. DIAGNOSTICS:
   - ED staff to transport patient to Radiology. CT Stroke Protocol STAT.
   - MRI diffusion: FLAIR: T1
   - Indication: Established or Suspected CVA
   - Autopsy: Suspicion of Sudden Cardiac Death
25. Blood Pressure Management:
   - Systolic Blood Pressure >120
   - Diastolic Blood Pressure >80
   - or mean arterial blood pressure <90
   - Notify MD immediately
   - Give Labetalol 10mg IV over 1-2 minutes x1. May not repeat.
   - Continuous blood pressure monitoring
   - Hold LABETALOL FOR ACUTE ASTHMA OR CHF EXACERBATION OR FOR HEART RATE LESS THAN 50 OR FOR RHYTHM OF 2ND OR 3RD DEGREE HEART BLOCK.
   - Notify MD immediately
   - Begin Nicardipine 20 mg in 200ml sodium chloride IV infusion at ______. Increase by 2.5 mg/hr every 15 minutes for MAP of _____. Max rate is 15 mg/hr.
   - Continuous Blood Pressure Monitoring

Based on Findings:
No Intervention Indicated:
- Return patient to ED for routine care
- Prepare patient for procedure
- Notify care team to leave room
- Surface scan
- Physician to read x-ray in hospitalist to transfer care for admission

Intervention Indicated:
- Prepare patient for procedure
- Notify care team to leave room
- Surface scan
- Physician to read x-ray in hospitalist to transfer care for admission
PROTOCOL
# Ischemic Stroke Volume

<table>
<thead>
<tr>
<th></th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018 YTD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ischemic</strong></td>
<td>776</td>
<td>820</td>
<td>865</td>
<td>997</td>
<td>1014</td>
</tr>
<tr>
<td><strong>IV TPA</strong></td>
<td>47</td>
<td>61</td>
<td>83</td>
<td>101</td>
<td>88</td>
</tr>
<tr>
<td><strong>Drip and Ships</strong></td>
<td>54</td>
<td>72</td>
<td>95</td>
<td>140</td>
<td>134</td>
</tr>
<tr>
<td><strong>AIS Interventional</strong></td>
<td>41</td>
<td>70</td>
<td>103</td>
<td>108</td>
<td>88</td>
</tr>
<tr>
<td><strong>% treated</strong></td>
<td>18%</td>
<td>22%</td>
<td>25%</td>
<td>28%</td>
<td>30%</td>
</tr>
</tbody>
</table>
## HEMORRHAGIC STROKE VOLUME

<table>
<thead>
<tr>
<th></th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018 YTD</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICH</td>
<td>71</td>
<td>90</td>
<td>86</td>
<td>138</td>
<td>132</td>
</tr>
<tr>
<td>SAH</td>
<td>31</td>
<td>44</td>
<td>41</td>
<td>31</td>
<td>30</td>
</tr>
<tr>
<td>TOTAL</td>
<td>102</td>
<td>134</td>
<td>127</td>
<td>166</td>
<td>162</td>
</tr>
<tr>
<td>CLIPPINGS</td>
<td>21</td>
<td>10</td>
<td>3</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>COILINGS</td>
<td>51</td>
<td>53</td>
<td>54</td>
<td>57</td>
<td>47</td>
</tr>
<tr>
<td>TOTAL</td>
<td>72</td>
<td>63</td>
<td>57</td>
<td>61</td>
<td>49</td>
</tr>
</tbody>
</table>
CASE STUDIES
ANTERIOR CIRCULATION
ISCHEMIC
POSTERIOR CIRCULATION
ISCHEMIC