Stroke Survival Table of contents:

Basics about rounds
Important numbers listed
Admission work up
Check list
TPA
Contraindications
BP control
Complications
Bleeds
Malignant MCA
Toast criteria
Younger population and strokes
Older population and strokes
Surviving stroke

ROUNDS:
- **Dr. Onteddu** rounds at 830. If ICU patients will meet there first
  - 6098650813
- **Dr. Nalleballe** rounds at 8:00. Will meet on H8
  - 609-865-0350
- IR attendings: **Dr Amole** 2815466483 and **Dr Radvany** 4435468131
  - CT reading room: 5016266924
- Grab the stroke team pager every morning
- Make the list/update the list prior to rounds.
- Will get “daily stroke list” email. In Red is what documentation needs to be addressed. Resident on stroke team to complete these
- Deonna gets there around 715am. Discuss with her which patients to take (most likely she has been following certain patients prior)
- Rounding is usually done by 11am
- Deonna will talk to social workers during ‘huddle time’, however do not rely on this, always check out your patients to social workers and see what updates there are and any new needs for the patients.
- Write notes and update the list.
- Check on ICU patients and any imaging/labs throughout the day
- Checkout at 4pm to on call resident.
- If there is a direct admission:
  - stroke resident does the admission (not pgy 3/pgy 4)
- To make ED patient into a “pathway”
  - Call center to have stroke pathway activated or call UAMS operator who can connect to call center and activate pathway pager
  - **Stroke alert**: 5016866080
  - **UAMS operator**: 5016867000
- Noon conferences:
  - MTRF in 8th floor spine center.
  - Wednesday at noon there is neuro rads conference in diner hall.
  - On Thursday’s there is chairman’s rounds at 8am in 8th floor spine center.
- If there is a patient that is shared by another neurology faculty, please send email to that staff notifying their patient has been admitted to the service.
- **New responsibilities to come for next year**: PGY-2 VS PGY-3 VS PGY4. Will add once Hillary has finished.
ADMISSION ADVICE:

Work up for each stroke patient includes:
- CBC/BMP/UA/Trop I
- Should include these labs for large cortical infarcts & bleeds: PT/PTT/INR type and screen
- HgA1c and LDL
- BP control (please follow updated stroke guidelines and JNC 2017 New guidelines. On last page there is insert)
  - 24 hrs after tpa given <180/105. PRN hydralazine vs labetalol
  - If no tpa given, permissive HTN for the first 24 with goal of <220/120. PRN labetalol vs hydralazine for control of blood pressure
  - Thrombectomy: USUALLY 140-160 depending on TICI grading- ask IR attending after procedure is finished.
  - If bleed present: < 140 in first 6 hrs
- EKG and CONTINUOUS TELEMETRY
- Pt/OT evals
- Stroke education
- MRI brain w/o contrast and MRA head/neck without contrast
  - (if patient already had CTA H/N on admission, then no MRA H/N needed)
- ECHO WITH BUBBLE looking for:
  - EF: if significantly lowered could have higher turbulence or mural thrombus that can result in emboli (ESUS)
  - PFO
    - ¼ people have one
    - ~6-7x more likely to have a stroke.
    - REDUCE, CLOSE, RESPECT: all clinical trials for PFO:
      - patient specific treatment
      - Respect trial: did show decreased in risk of stroke after closure. CLOSE trial in 2017, benefit for closure in young patients with large PFO or atrial septal aneurysm
  - If have PFO present will need to get LE duplex
  - If left atrial thrombus present
    - patient will need AC with COUMADIN

Check and check again Check-list: these are often forgotten:
- Make sure to order all home meds if not NPO (should cont BB, clonidine, dilt/dig, lasix).
  - If NPO, and do not foresee patient passing swallow study, to place NG/DHT tube 24 hrs after tpa and restart all home medications as via NG/DHT TUBE! To begin tube feeds too
- SCD/TED + lovenox sub q (no subq if had tpa)
- Moderate SSI and any home insulin regimen: goal 140-180
- ASA 24 hrs after tpa (and if no bleed on imaging) or ASA rectally if NPO.
- NIHSS on admission and dysphagia screen: these are on LEFT TAB labeled “neurology scales”
- If part of the clinical study will need LFT and EKG on admission and discharge day
- Continuous telemetry
- EVERY patient should have CODE status discussed upon admission. Can always revisit this topic w/patient and family as clinical picture changes
TPA:
DO NOT NEED SIGNED CONSENT p 18 on guidelines

“Because of this proven benefit and the need to expedite treatment, when a patient cannot provide consent (eg, aphasia, confusion) and a legally authorized representative is not immediately available to provide proxy consent, it is justified to proceed with IV thrombolysis in an otherwise eligible adult patient with a disabling AIS.”

TPA Contraindications
- >4.5 hours window
- Active internal bleeding (<21 days) [such as GI bleed]
- CT findings (ICH, SAH, or major infarct signs)
- H/o intracranial hemorrhage
- INR > 1.7 and/or PT <15s for pt w/ hx of warfarin use
- NOAC: must not have taken for >48hrs OR normal PTT, INR, PLT count, clotting time, thrombin, time
- Infective endocarditis
- SBP > 185 or DBP > 110 mmHg despite treatment
- Cannot give to patients who have had LMWH w/in the previous 24hs
- Platelets <100,000, PTT > 40 sec after heparin use, or PT > 15 or INR > 1.7, or known bleeding diathesis (do not have to test, HOWEVER, if suspected low platelets like known MM patient, DO get platelet count)
- Recent intracranial or spinal surgery, head trauma, or stroke (<3 mo.)
- Recent surgery/trauma (<14 days)
- Use of tpa w/in 3 months
- Severe head trauma w/in 3 months
- Intra axial intracranial neoplasm is harmful
- Hx of intracranial/spinal surgery w/in 3 months
- ‘reasonable in pt w/ seizure at onset of acute stroke if evidence suggests residual impairment are 2/2 to stroke and not post ictal
- Unruptured Aneurysms <10mm is reasonable—larger is not well established
- CMB with small number (1-10) can reasonable receive TPA – case by case

DOSING:
- tPA dosing (0.9 mg/kg, maximum dose 90 mg over 60 min with initial 10% of dose given as bolus over 1 min)

If patient received tpa:
- BP GOAL <180/105
- Must be in icu for 24hrs
- If received MRI 24 hrs after—do not need repeat CT head unless unstable
- Should transfer to floor after 24 hrs and start asa and DVT ppx (if stable and no bleed)
COMPLICATIONS:

**Intracranial bleeding w/in 24 hrs after IV tpa: notify attending**
- STOP TPA (if still running)
- CBC, PT/PTT, fibrinogen level, type/screen
- Emergent CT head
- Cryoprecipitate (has factor 8): 10 U over 10-30mins. More for fibrinogen <200
- Tranexamic acid 1000mg IV in 10mins or aminocaproic acid 4-5g over 1 hr
- NSGY consult if large bleed

**Malignant MCA**
- swelling most typical in first 3-5 days
- if concern: want to watch for change in neuro exam q1 while in ICU
- if large vessel and afraid of swelling, order type/screen/INR and can notify NSGY of case *(discuss code status with family)*
- HAMELT, destiny, destiny 2 trials (age major factor with these)
  - Studies showed hemi crani would decrease in mortality by 50%
  - Morbidity was improved if patient was <60 yo and performed within the first 2 days (good outcome was considered mRS of 0-3)
    - mRS >4 needs assistance even for walking
    - mRS >5 bedridden
    - >6 death
TOAST criteria for stroke classification

TOAST: cardioembolic, large vessel atherosclerosis, small vessel/lacunar (<1.5cm), stroke of other determined etiology (dissection, hypercoag, etc) and cryptogenic

- Large aa athero:
  - >50% stenosis or occlusion of major cortical aa: exam with cortical signs
  - H of TIAs in same vascular area. Carotid bruits
  - Lesions >1.5cm

- Cardioembolic:
  - Arterial occlusions usually from heart.
  - Imaging >1.5cm or multiple vascular territories
    - Cortical signs on exam if large vessel
  - High risk:
    - Mechanical prosthetic valve, mitral stenosis w/afib, afib, left atrial/ventricular thrombus, sick sinus, recent MI <4 wks, dilated cardiomyopathy, atrial myxoma, infective endocarditis
  - Medium:
    - Mitral valve prolapse, mitral stenosis w/o afib, left atrial turbulence, atrial septal aneurysm, PFO, bio-prosthetic cardiac valve, CHF, hypokinetic left ventricular segment

- Small vessel:
  - Hx of hpld/dm/htn/smoking is key.
  - From athero and lipohyalinosis
  - Usually brain stem or subcortical lesions <1.5cm
  - Lipohyalinosis: vascular hypertrophy and remodeling.
    - Inward remodeling and increased permeability of the BBB
    - Arterioles beyond the Virchow robin space and capillaries are encased by end feet processes of astrocytes. Making them more vulnerable to changes in perfusion pressure, hypo-perfusion
  - On mri: leukoaraiosis

- Rare
  - Hypercoagulable states
  - Hematologic d/o

- Cryptogenic
STROKES: YOUNG

- Dissections (MC cause)
  - Sudden onset. Neck pain (can ask about wreck, manipulations, roller coasters, but most are idiopathic)
  - MC in younger population (W>M)
  - aspirin for 3 months/consider AC (if extracranial dissection)
  - fibromuscular dysplasia → renal u/s

- Coagulopathy:
  - unique order: if patient <50 yo w/o cause and thinking of coagulopathy—order includes: hypercoag panel WITH antι-cardiolipin, lupus ac, and beta 2 glycoprotein
    - PACNS: very rare!
      - Systemic: Behcet syndrome, polyarteritis nodosa, ANCA ab (wegeners, microscopic polyangitis, eosinophilic churg strauss) cryoglobulinemic, SSLE, sjogrens, dermatomyositis, rheumatoid arthritis, antiphospholipid syndrome, sarcoidosis, intravascular lymphoma
      - infection (syphilis, lyme, bartonella, mycobacterium, HSV/VZV/CMV, hepatitis, HIV, aspergillis, coccidioides, histo, cysticercosis
        - Serum: ANA screen (ab ssa/ssb, double stranded dna), HIV, Hepatitis screen, ESR/CRP, ANCA
        - LP: VDRL, HSV, VZV, CMV
  - heritable
    - Sickle cell: ¼ experiences stroke in adulthood.
      - MC in children
      - Dx Peripheral smear. Hg electrophoresis
      - Eric trial: slight associated with SS trait
      - Unique order: HPLC profile >> it does the electrophoresis and reflex test for the hemoglobin s
    - Type 5 leiden
      - MC heritable.
      - Associated with CVA
      - To AC is variable and is case by case
    - Anti-thrombin 3
    - Protein c /s deficiency
    - CADASIL:
      - Kids in 20s with migraines, cognitive decline
      - Step wise disease
      - Notch 3
      - AD
- **SUSAC:**
  - Triad: hearing loss, retinal branch occlusions, and encephalopathy
  - Hyperintense lesion in corpus callosum on t2 wt MRI
- **Collagen 41a (COLA41A)**
  - Cerebral small vessel disease with hemorrhages, autosomal dominant-type 1 porencephaly, and hereditary angiopathy with nephropathy, aneurysms, and muscle cramps (HANAC) syndrome
- **MELAS**
  - Mitochondrial disorder
- **Marfan**
  - AD disorder of fibrillin in connective tissue
  - Inc risk of intracranial aneurysm vs low EF from poor ventricular contraction (MV prolapse—valve replacements)
- **Moya moya**
  - Phenomenon vs genetic
  - Strong correlation with Japanese heritage (genetic)
  - Related to: atherosclerosis, infections, SS, fanconia, vasculitis (SLE, anti ro/la, DM1, ect), connective tissue disorders, chromosomal
  - On imaging will see “puff of smoke” or b/l stenosis of M1 segments
  - **acquired**
    - Malignancy:
      - More related to adenocarcinoma (theory is more common because of mucin production)
      - Venous and arterial clotting
      - Tx LMWH for at least 6 months
    - **anti phospholipid ab**
      - Must AC for life with vit K antagonist
      - Screen: anti cardiolipin, lupus ac, beta 2 glycoprotein
      - SAPPORO criteria: 1 clinical venous/arterial thrombotic event and 1 + blood serum on 2 different occasions
- **drugs:**
  - **stimulants:**
    - Cocaine
    - Methamphetamines
    - Usually cause vasospasms vs vasculitis
  - **k2**
    - RCVS and intracerebral hemorrhage
Strokes in OLDER population:
- >50 yo more likely to be 2/2 cardio embolic vs atherosclerotic
  - AFIB (CHADSVASc criteria for AC)
    - MRI: stroke is usually cortical or juxta-cortical and/or multiple vascular territories
    - larger dilatation of atrium (possible pre exposure to afib)
    - ESUS (embolic source of unknown source)
      - can still AC
  - Extracranial athero
    - CHANCE trial:
      - 3 weeks asa/plavix
    - If low flow on MRA may evaluation with CTA or C-duplex.
      - If 100% occluded nothing to do.
      - If symptomatic stenosis → consult vascular surgery.
  - Intracranial atherosclerosis
    - SAMMPRIS trial:
      - 3 months ASA/plavix
  - Small vessel
    - Control blood sugar:
      - Blood glucose goal of 140-180
    - HPLD:
      - want to decrease LDL be 50%
      - High dose statin (considered 40mg vs 80mg atorvastatin)
        - 80 mg atorvastatin from SPARCL trial
    - Stop smoking
  - HTN:
    - ASA and JNC 2018 BP guidelines
      - Stage 1 HTN now considered SBP 130-139.
      - Stage 2 HTN is now SBP> 140
      - “patients can be started on a single agent, but consideration should be given to starting with 2 drugs of different classes for those with stage 2 hypertension (see Section 8.1.6.1)”