TOMORROW STARTS TODAY.

Neuro/Stroke & SOP 2017 Changes

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Advocate Condell Medical Center
Tomorrow starts today.

Neuro/Stroke

Objectives

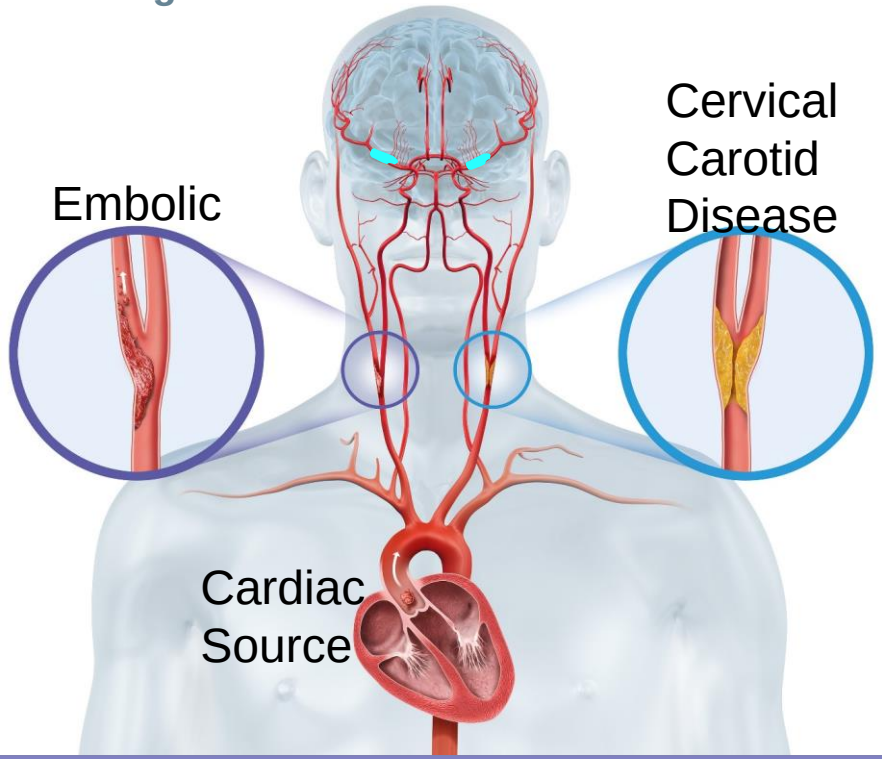
- By the end of this module, the EMS provider will be able to:
  - Identify 4 common stroke scenarios.
  - Identify at least 5 signs/symptoms of stroke
  - Apply assessment techniques to determine if and how a Cincinnati Prehospital Stroke Screen is required/performed.
  - Describe the role of time in stroke patient outcomes
  - Identify proper documentation on patient care report
  - Identify the changes in the 2017 Region X SOP's
  - Identify the new SOP's and why they are an important addition
  - Identify new medications in the SOP's and why they are an important addition
  - Understand the rationale behind other major changes in the 2017 Region X SOP's
  - Continue to study with goal to pass SOP exam in January, 2018 with a score of 80% or better
    - Apply knowledge learned to patient care in the field after passing new SOP exam.

4 Common Stroke Scenarios

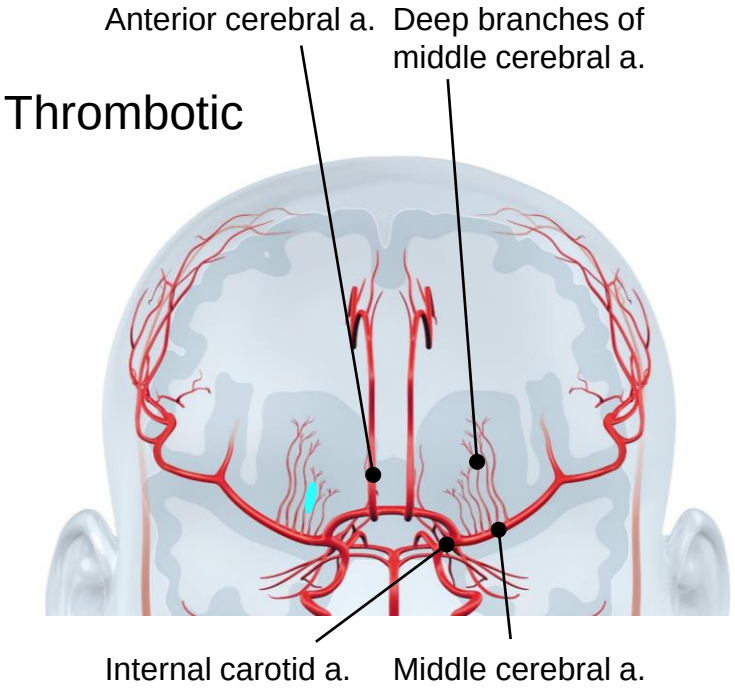
- Small Vessel Stroke
- Hypovolemic Stroke
- Large Vessel Stroke
- Hemorrhagic Stroke

Ischemic Stroke Mechanisms

Large Vessel Occlusion



Small Vessel Occlusion



Assessment

- All of your calls begin the same way
  - “Slurred speech”
  - “Weakness”
  - “Unresponsive”
  - “Worst headache of my life”

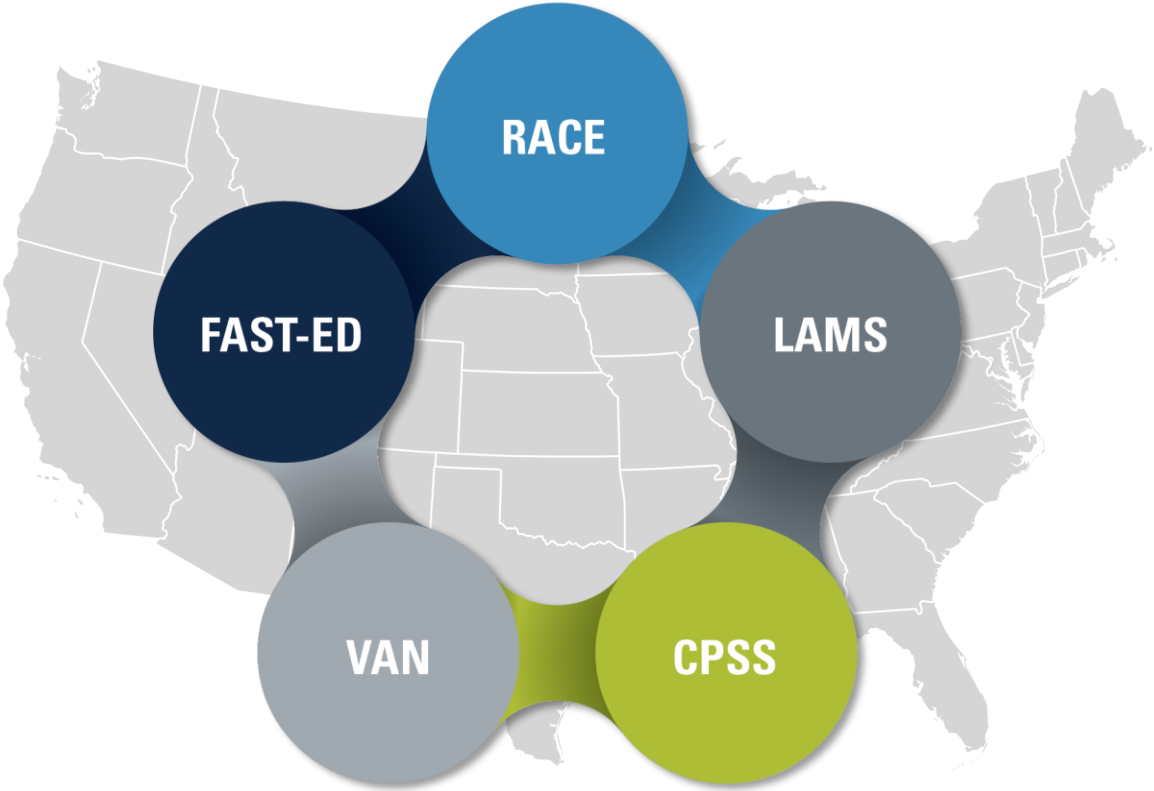
  There are differences within the causes of these symptoms

Signs and Symptoms of Stroke

- Symptoms of stroke vary depending of the part of the brain that is affected
- Symptoms often include **sudden onset:**

Numbness or weakness of the face, arm, or leg- usually on one side of the body
Difficulty speaking or understanding
Blurred vision or trouble seeing in one or both eyes
Dizziness, confusion or loss of balance/coordination
Extremely severe headache with no known cause

Common stroke severity scales



All photographs taken by Stryker.

CPSS

Cincinnati Pre-Hospital Stroke Scale	
FACE	Both sides move normally
	One side is weak or flaccid
ARM	Both arms have equal normal strength
	One arm is weak or doesn't move at all
SPEECH	Speech is normal and appropriate
	Speech is slurred, inappropriate words or mute

With 2 or more positive items present, there is **89% sensitivity** and **73% specificity** to the patient having a NIH score >15

Major Subsets of Stroke

- Ischemic
  - Lack of blood supply caused by occlusion (clot) within a vessel
  - Small vessel (common)
  - Large vessel less common, but 40-45% of your cases
  - HYPOVOLEMIC: we are improving our recognition of this subset. Caused by lack of flow due to either occlusive or hypotensive causes. Look for these in the elderly
  - This is caused by a clot or piece of vascular plaque blocking the forward flow of blood in an artery. This is the most common form of brain attack (stroke)
  - Most of us develop arterial plaque in our vessels as we age. This mechanism is responsible for 85% of brain attacks
- Hemorrhagic
  - Lack of blood supply is caused by a diversion of blood flow outside of the vessel (bleeding into brain parenchyma)
  - Blood under pressure leaks out of an artery in the brain with the result of brain tissue downstream from the leak being deprived of blood flow as well as direct destruction of brain tissue from blood mass
  - 15% of brain attacks are due to hemorrhage

Different Stroke Types Require Different Treatments

Small vessel strokes

- Small vessel strokes can be treated with clot breaking drugs (tPA for example) which help restore blood flow within brain tissue

Hemorrhagic stroke

- Hemorrhagic stroke requires advanced imaging and a neuro ICU
- Coiling is a possible treatment for a ruptured aneurysm

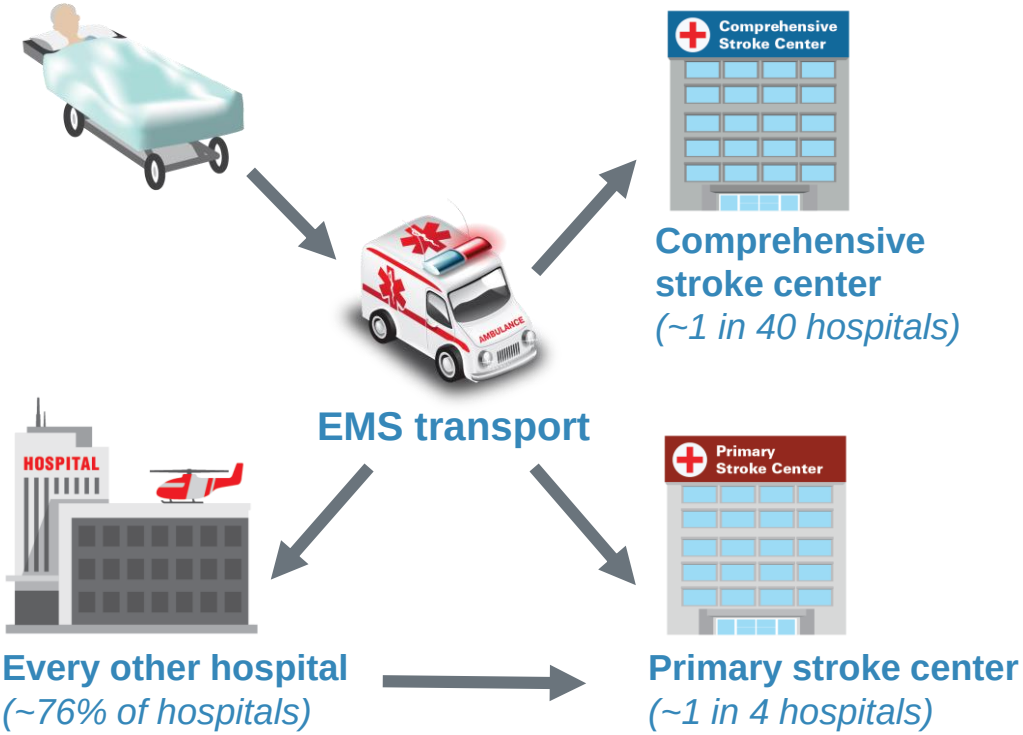
Large vessel strokes

- Large vessel strokes may require advanced imaging to localize site of clot
- tPA is **not generally effective** in breaking the clot
- These patients require a combination of tPA and mechanical intervention (clot retrieval) for optimum outcome

Family Hospital Preference?

- Families may have a preference for a particular hospital
- That institution may not be the **best** treatment choice for your patient
- You can advocate for your patient‘s best interest based on:
  - Your knowledge of stroke
  - Your assessment using a stroke severity scale
- This may be a delicate conversation, but remember, you are bound to look after your patient first.

Why hospital choice matters in stroke



Comprehensive stroke center
(~1 in 40 hospitals)

EMS transport

Every other hospital
(~76% of hospitals)

Primary stroke center
(~1 in 4 hospitals)

- **~75% chance** of losing time by going to a hospital not equipped to treat acute stroke
- **Frequently, time lost can be >12 hours**
- Current gold standard for treatment:
  IV tPA <4.5 hours
  Thrombectomy <8 hours

All photographs taken by Stryker.

Why go comprehensive?

- Minimize the time for clot retrieval- definitive patient treatment
- Improve patient outcomes
- Lake County lacking comprehensive stroke hospital

- And…

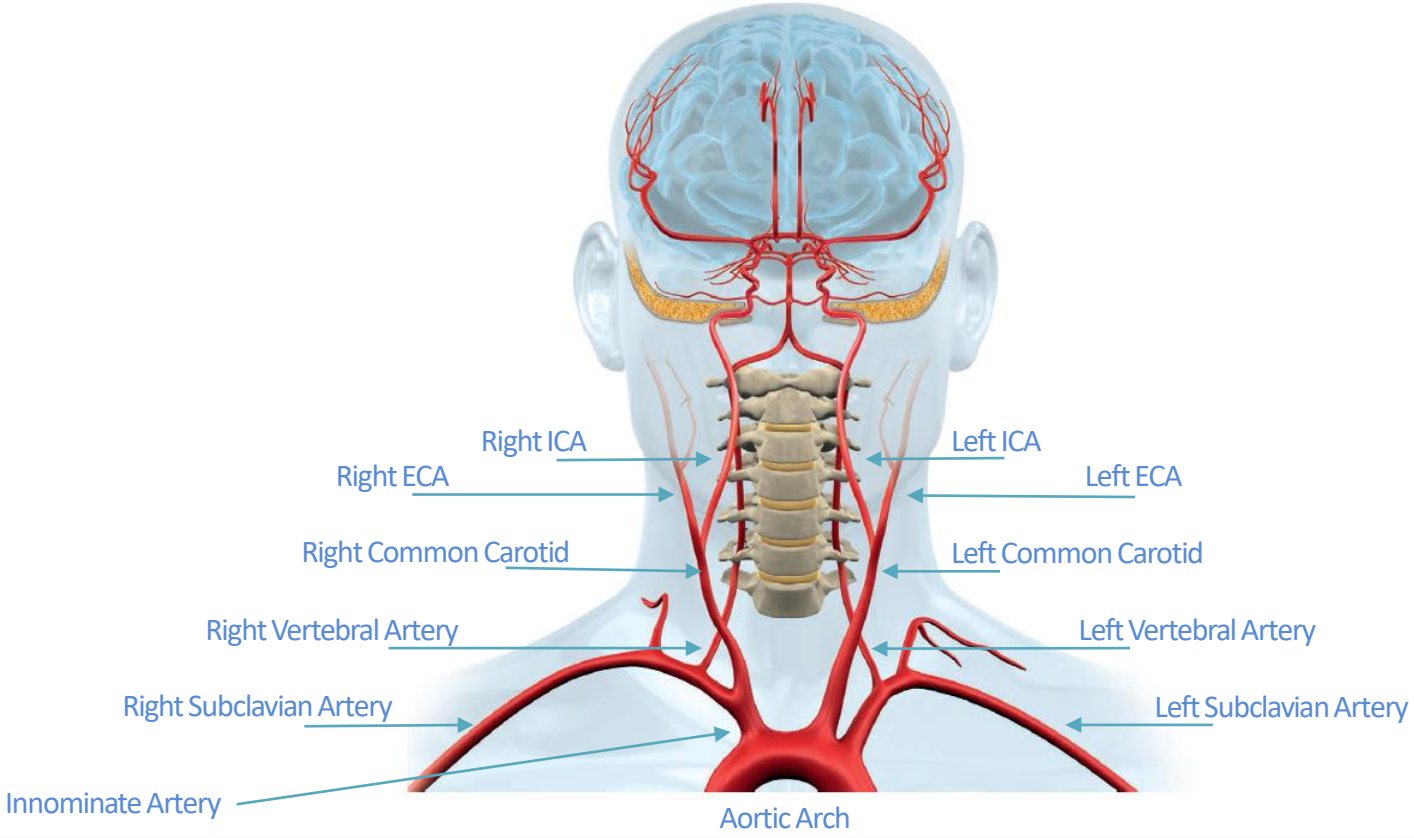
Physiological Impact of Stroke

Estimated Pace of Neural Circuitry Lost in a Typical Large Vessel Acute Ischemic Stroke

Time	Neurons Lost	Synapses Lost	Myelinated Fibers Lost	Accelerated Aging
1 second	32,000	230 million	218 yards	8.7 hours
1 minute	1.9 million	14 billion	7.5 miles	3.1 weeks
1 hour	120 million	830 billion	447 miles	3.6 years
Avg. stroke	1.2 billion	8.3 trillion	4470 miles	36 years

Saver, Jeffrey, *Time is Brain – Quantified*. Stroke 2006; 37: 263-266.

Vascular supply to the brain



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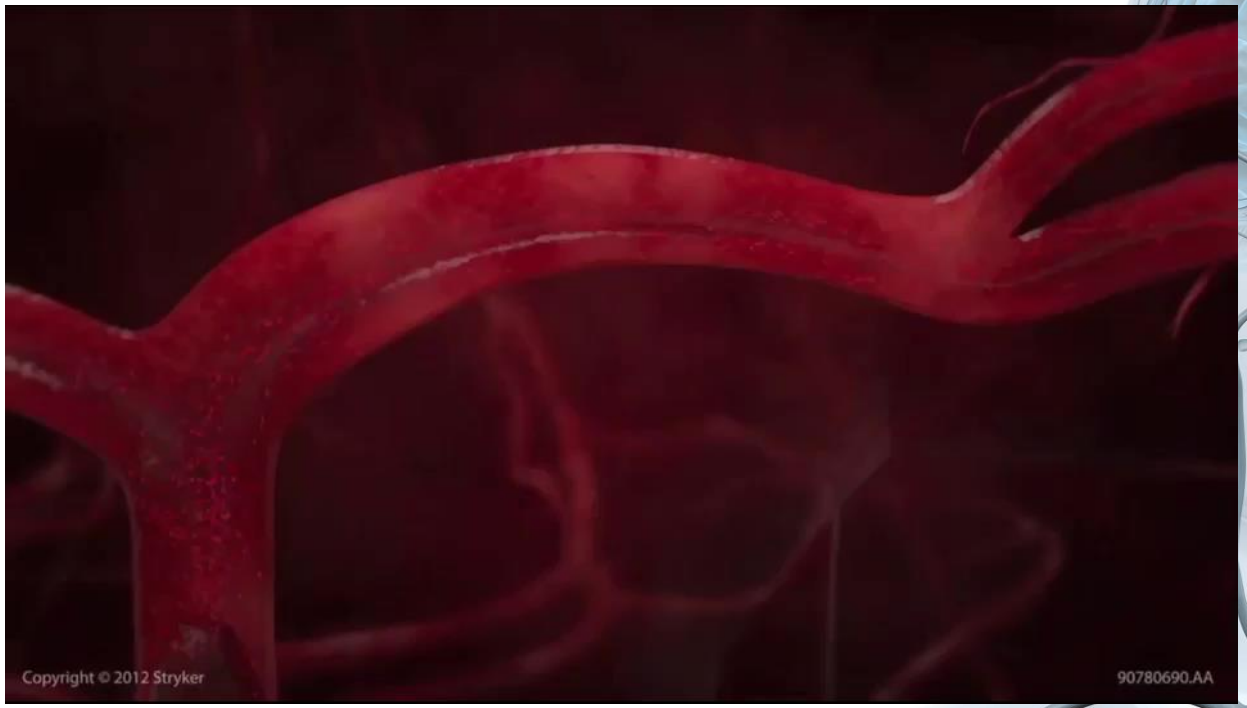
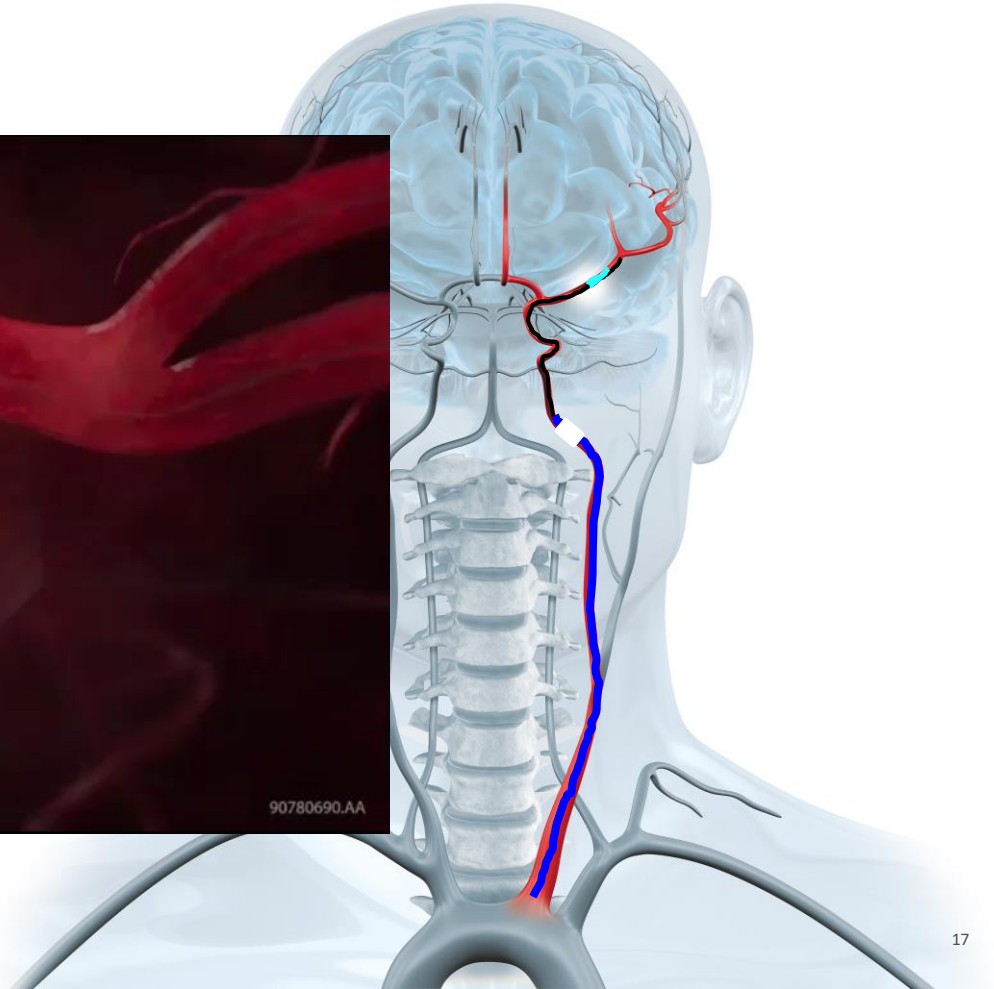
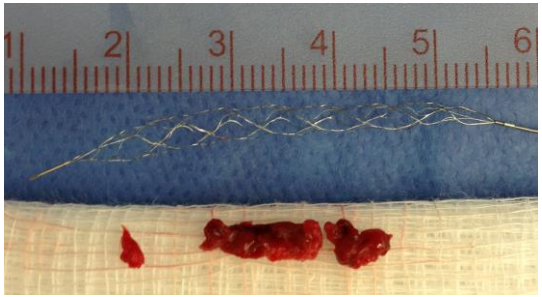
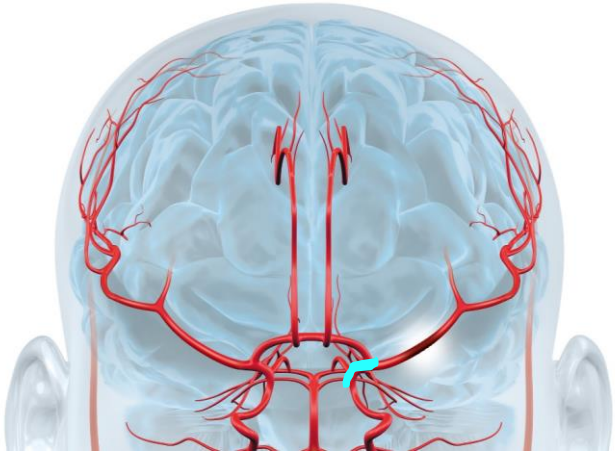




Endovascular Approach

Carotid Terminus Occlusion





Documentation

- **Must** include
  - **Last known well time**
    - Please get in the practice of using an actual time
    - Steer clear of “approx. 1hr ago, or last night”
  - **Blood glucose level**
  - **CPSS**

Conclusions

- 4 basic patterns of stroke:
  - small vessel, hypovolemic, hemorrhagic, and large vessel
  - You must become familiar with the stroke scoring system your system uses, and apply it to all patients suspected of having a stroke
- Crucial pieces of history include last time patient seen normal, blood glucose level, and a family member contact for possible consent. **Time is brain!**
- Be aware of the difference between: Stroke ready hospitals, primary stroke hospitals, and comprehensive stroke hospitals
  - Lytic treatment (tPA) may be given up to 4.5 hrs after onset of symptoms
  - Endovascular therapy within 8 hrs from onset of symptoms
  - **Don‘t waste the patient‘s time and brain**
  - **Dont delay transport for IV access!!!**
- Different therapies are available for different strokes:
  - Simple lytic therapy (tPA) is effective for small strokes; however, endovascular therapy is standard of care for larger more complex strokes

2017 SOP Changes

TAKE NOTES: Will Be Tested in January 2018

General Overview

- Capnography (EtCO2) now required as a standard of care.
- Fluid challenge for the adult is 500mL
- Some peds medications are now age-based vs. weight based
  - Dextrose
  - Glucagon
- New Medications
  - Sodium Bicarbonate
  - Magnesium Sulfate

General Overview

- New SOP's
  - Adult Sepsis
  - Pediatric Head/Spinal
  - Pediatric GCS

*Highlighted (shaded) areas throughout SOP reflect ALS provider specific skills.

Sequence for Transmission of Patient Info

- Capnography (EtCO2) when indicated
  - Drug assisted intubation
  - Sedation
  - Respiratory complaints

Abbreviated Report

- An abbreviated report may be provided to or REQUESTED BY Medical Control

Adult Routine Medical Care

- Addition of capnography monitoring.
- Obtain 12-Lead ECG **as** indicated and report interpretation findings.
- Fluid challenges in **500mL** increments
- Transport to the closest appropriate facility

Adult Drug Assisted Intubation

- Combitube has been **REMOVED**
- Only rescue airway is King Airway
- Please **attempt intubation x1 BEFORE** rescue airway
- Added: Continuous waveform capnography monitoring

Transition of Care from AED Trained Personnel to ALS

- New with BLS and ALS SOP's
- Narcan for suspected opioid emergencies

Adult Asystole/PEA

- **500mL** Fluid Challenges
- Repeat fluid challenge as necessary
  - Confirm clear breath sounds

- **Removed: ROSC**

Withdrawing Resuscitative Efforts

- Only a physician may make the determination to withdraw
- Must reaffirm the following:
  - No response to at least 20 minutes of high quality ALS care
  - EtCO2 has remained less than 10

Adult Acute Coronary Syndrome

- Fluid challenge at **500mL**
- **Early 12-lead acquisition**
- Aspirin to be administered
- If IV unsuccessful- contact medical control before NTG
- Report computer interpretation of 12-lead **AND** provider interpretation

Adult Cardiogenic Shock

- Fluid Challenge at **500mL** if breath sounds are clear
- Reassess frequently

Adult Narrow Complex Tachycardias (SVT/rapid A-fib/A-flutter

- If patient is UNSTABLE, manage pain appropriately with cardioversion.

Adult VF/Pulseless VT

- Dialysis Patients
  - **Sodium Bicarbonate 8.4% 50mEq IV/IO (1 amp)**
- Torsades de Pointes
  - Contact Medical Control to consider: **Magnesium Sulfate IV/IO 2gm in 100mL D5W over 5 minutes.**

Adult Wide Complex Tachycardia (VT) w/Pulse

- In the UNSTABLE patient: manage pain appropriately with cardioversion

Adult Acute Pulmonary Edema

- **REMOVED:** Morphine for the stable patient

Adult Asthma/COPD with Wheezing

- Epinephrine 1:1,000 (1mg/mL) is now: **0.5mg IM**
- No magnesium sulfate for the **adult**
- Nebulizer administration and Epinephrine now BLS skills

Adult Allergic Reaction/ Anaphylactic Shock

- Stable w/airway involvement
  - Epinephrine now **0.5mg IM**
    - may repeat every 5 minutes
  - **500mL** Fluid challenge
    - If breath sounds clear
- Anaphylactic Shock- Unstable
  - **500mL** Fluid challenge

NEW SOP- SEPSIS

- Determine if patient meets sepsis criteria
  - Suspected Infection and **2 or more** of the following:
    - **Temperature >38* C (100.4* F) OR <36* C (96.8* F)**
    - **Respiratory rate >20 breaths per minute**
    - **Heartrate >90 beats per minute**
    - **EtCO2 less than or equal to 25 mmHg**
- Administer Fluid Challenge
  - **Target 30mL/kg**
- Contact Medical Control
  - Early notification of sepsis
- Dopamine administration
  - Maintain SBP >90 mmHg

Altered Mental Status

- Narcan (naloxone) routes updated to include IM injection
- Narcan IM and IN are added to BLS skills
- Appropriate to administer to all unresponsive victims of possible opioid-associated life threatening emergencies

Stroke

- Verbiage changes
  - "Time of onset" changed to "**last known well time**"
  - Cincinnati Stroke Scale (CSS) changed to **Cincinnati Prehospital Stroke Scale (CPSS)**
- **DO NOT DELAY** transport to obtain IV access unless it is required based on patient presentation.

Adult Hypertensive Emergencies

- **Lasix** has been **REMOVED**
- Contact medical control for Nitroglycerin 0.4mg SL order

Adult Diabetic Emergencies

- Fluid challenge **500 mL** increments, titrate to desired response
  - If breath sounds are clear

Adult Seizures/Status Epilepticus

- With versed administration, monitoring patient with Capnography (EtCO2) is **now required**
- OK to administer Versed IN if patient actively convulsing
  - Lowers risk of needle stick/body fluid exposure

Severe Febrile Respiratory Illness

- **REMOVED**: Travel in an influenza region
- **REMOVED**: Pneumonia on chest x-ray
- Added: Close contact with person confirmed or suspected illness **in the last 10 days**.

Adult Routine Trauma Care

- Added to Initial Assessment: Sucking Chest Wound
- Added in Rapid Trauma Assessment
  - Pulse ox or capnography (EtCO2)
- **Permissive Hypotension**
  - **SBP target: 90mmHG**
  - **Low enough to avoid exsanguination but high enough to maintain perfusion**

Region X Field Triage/Transport Criteria

- Go-live was August 1, 2017
- New criteria will be printed in 2017 SOP's
- Be familiar with changes

Adult Head/Spinal Injuries

- New: Separate SOP for pediatrics
- For Seizure activity: Versed
  - Monitor with continuous capnography/EtCO2
- Continued seizure activity
  - Contact medical control to repeat Versed

Selective Spinal Immobilization

- Selective Spinal Immobilization replaced Full Spinal Immobilization
- Encompasses full picture of patient
- Can use cot to maintain spinal stability
  - Foam cushion better forms to patient spinal curvature
  - Less pressure points

Adult Burns

- Fluid Challenge: **500mL** increments as indicated by patient condition

Adult Nausea Management

- **DO NOT ADMINISTER ZOFRAN** to patients who are pregnant

Adult Drowning

- SOP title change - Previously called Adult Near Drowning

Adult Heat Emergencies

- Fluid challenge at **500 mL** increments

Adult Hypothermia/Cold Emergencies

- Added: Manage pain with **Morphine**

Emergency Childbirth

- **Delayed cord clamping**
- **REMOVED**: Meconium aspirator
- Excessive vaginal bleeding: **500mL** fluid challenges

Resuscitation of the Newborn

- **REMOVED**: Suctioning
  - Routine suctioning no longer recommended in the newborn
  - Support ventilations with positive pressure
  - Priorities are: warming the patient and maintaining temperature, positioning the infant, and clearing secretions when needed.

Obstetrical Complications

- Bleeding in Pregnancy (Placenta previa, abruptio, threatened miscarriage)
  - IV Fluid Challenge **500 mL** increments
- Hypertensive Disorders of Pregnancy (Eclampsia/Pre-eclampsia)- Pregnancy is greater than 20 weeks, or post-partum
  - **Magnesium Sulfate 50% 4g in 100mL D5W over 15 min**

Routine Pediatric Medical/Trauma Care

- Added in initial assessment: Determine need for Selective Spinal Immobilization
- Verbiage change
  - Medication should be age/weight based (previously just weight based)
- Added: Capnography/EtCO2
- Added: Evaluate cardiac rhythm and obtain 12-Lead ECG if appropriate

Pediatric Drug Assisted Intubation

- **REMOVED**: Atropine
- Versed maximum changed to adult maximum 20mg
- Added: Verify tube placement with capnography/EtCO2

Pediatric Asystole/PEA/Pulseless Idioventricular Rhythms

- **REMOVED**: Refer to ROSC Hypothermia Induction
- **REMOVED**: “Tablets” replaced with Toxins

Pediatric Bradyarrhythmias

- Added: IV fluid challenge 20mL/kg then TKO
- Added: Contact medical control to consider Atropine 0.02 mg/kg IVP/IO
  - Atropine may be repeated once if no response- **maximum total dose is 1mg**

Pediatric VF/Pulseless VT

- Defibrillate @ 2, 4, 6, 8, then 10 j/kg
- Amiodarone 5mg/kg, may repeat once
- Torsades de Pointes
  - Contact Medical Control to consider: **Magnesium Sulfate, 25mg/kg in 100mL D5W over 5 minutes.**

Pediatric Tachycardia with Poor Perfusion

- Added: “Signs of Shock” to Possible Ventricular Tachycardia column

Pediatric Tachycardia with Adequate Perfusion

- Added to possible causes: Toxins, Trauma

- Note: If receiving sedation for cardioversion- must monitor with continuous capnography/EtCO2

Pediatric Shock

- Cardiogenic shock
  - IV Fluid challenge @ 10mL/kg then 20mL/hr (TKO)
  - **Contact Medical Control to consider additional IV fluid challenges** or Dopamine

Pediatric Asthma

- **Magnesium Sulfate 25mg/kg in 100mL D5W over 10 minutes**
- Epinephrine 1:1,000 (1mg/1mL) adult maximum is now **0.5mg**

Pediatric Croup/Epiglottitis

- Epiglottitis
  - If condition deteriorates, attempt to ventilate with BVM
  - **REMOVED: be prepared for intubation attempt x1**
  - **Nebulized epinephrine 1:1,000 (1mg/mL) dilution table added**

Lb/kg	<11lb/5kg	13lb/6kg	18lb/8kg	>22lb/10kg
Epinephrine	**Contact Medical**	3mg (3mL)	4mg (4mL)	5mg (5mL)
Normal Saline	**Control**	2mL	1mL	None

Pediatric Respiratory Failure

- Monitor with continuous capnography/EtCO2

Pediatric Allergic Reaction/Anaphylaxis

- EpiPen added (BLS)
  - <15kg/33lb- contact medical control
  - 15-29kg/33-65lb- 0.15mg
  - >30kg/66lb- 0.3mg
- Epinephrine 1:1,000 (1mg/1mL)
  - Dose changed to **0.5mg** adult maximum
- Epinephrine 1:10,000 (1mg/10mL)
  - Added: every 5 minutes as indicated

Pediatric Altered Mental Status

- Added: 15g Glucose Oral
- Added: **DEXTROSE BY AGE**
  - <1 yr: 12.5% 4mL/kg IVP/IO
  - 1-8 yr: 25% 2mL/kg IVP/IO
  - >8 yr: 50% 1mL/kg IVP IO
- Added: **GLUCAGON BY AGE**
  - 0.5mg IM/IN ≤8
  - 1mg IM/IN >8
- Added: Contact medical control to administer Narcan by wt.

Pediatric Seizures

- Versed
  - Still weight based, but age restricted maximum
    - **≤5 years 6mg MAXIMUM**
    - **≥6 years 10mg MAXIMUM**
  - Must monitor with continuous capnography/EtCO2
  - Titration: Start slow! Monitor your patient as you push. Stop when seizure stops. Note amount remaining in syringe.
    - Do not administer more than 2mg at one time
- Added
  - DEXTROSE BY AGE and GLUCAGON BY AGE

Pediatric Burns

- Added: IV/IO Fluid Challenge for Thermal and Electrical burns as indicated **BY AGE**
  - ≤5yr: rate125mL/hr
  - 6-13yr: rate 250mL/hr
  - ≥14yr: rate 500mL/hr

Pediatric Pain Management

- Added:
  - Fentanyl **1mcg/kg** IVP/IN/IO (100mcg max/dose)
  - May repeat in 5 minutes
    - 1mcg/kg IVP/IN/IO to adult TOTAL maximum 200mcg
    - If respiratory depression occurs- Narcan IN/IVP/IO/IM by weight
      - ≤20kg: 0.1mg/kg
      - >20kg: 2mg

Pediatric Nausea Management

- **DO NOT ADMINISTER ZOFRAN** to patients who are pregnant

NEW SOP: Pediatric Head/Spinal Injuries

Pediatric Routine Trauma Care

STABLE
Patient alert
Skin warm and dry
PGCS: Mild

UNSTABLE
Altered mental status
PGCS: Moderate-Severe

Support ventilation, administer 100% O2 as indicated
If rapid neurological deterioration (non-reactive/unequal pupils or posturing) consider performing hyperventilation guided by capnography (aim for PaCO2 of 35 with perfusing rhythm)

Obtain Blood Glucose Level- if results are <60 administer:
Dextrose 12.5% 4mL/kg IV/IO <1yr
Dextrose 25% 2mL/kg IV/IO 1-8yr
Dextrose 50% 1mL/kg IV/IO >8yr
Or
Glucagon 0.5mg IM/IN <8yr
Glucagon 1mg IM/IN >8yr

IV fluid challenge 20ml/kg if indicated
If evidence of shock, repeat fluid challenge 20 ml/kg up to max of 60ml/kg

Consider Pediatric Drug Assisted Intubation

If actively seizing, refer to Pediatric Seizure Protocol

New SOP: Pediatric GCS Tool

Pediatric GCS			
	<2years	≥2 years	Score
Eye Opening	Spontaneous To Speech To Pain No Response	Spontaneous To Speech To Pain No Response	4 3 2 1
Verbal Response	Coos, babbles, appropriate words Irritable, Cries but consolable Cries to pain, inconsolable Moans to pain No Response	Oriented/Appropriate words Confused Inappropriate word/persistent cry Incomprehensible sounds No Response	5 4 3 2 1
Motor Response	Normal spontaneous mvmt Withdraws from touch Withdraws from pain Abnormal flexion Abnormal extension No Response	Obeys commands Localizes to pain Withdraws from pain Abnormal flexion Abnormal extension No Response	6 5 4 3 2 1
Total Pediatric Glasgow Coma Scale (3-15)			

New SOP: Pediatric GCS Scoring

PGCS <8 (SEVERE)	PGCS 9-12 (MODERATE)	PGCS 13-15 (MILD)
• Administer 100% O2 • Support ventilation with BVM • Provide hyperventilation **only for impending herniation** (NR pupils or posturing) • Intubate orally as indicated • Control hemorrhage • Reassess PGCS • Observe • Refer to Seizure Protocol as indicated • Transport	• Administer 100% O2 • Support ventilation with BVM • Control hemorrhage • Reassess PGCS • Observe • Transport	• Administer 100% O2 as indicated • Control hemorrhage • Reassess PGCS • Observe • Transport

Pediatric Heat Emergencies

- Added: Valium 0.2mg/kg IVP/IO (max 2mg dose) over 2 minutes ever 15 minutes until shivering stops
  - Total MAXIMUM: 10mg

Pediatric Hypothermia/Cold Emergencies

- Added to control pain:
  - Morphine Sulfate 0.1mg/kg IVP/IO (max 2mg dose) over 2 minutes.
  - May repeat every 2 minutes as needed to MAXIMUM TOTAL of 10mg

Pediatric Toxic Ingestions

- Added: Poison Control Center Phone Number
  – 800-222-1222

Suspected Child Abuse

- Added: When contacting DCFS, identify self as “State Mandated Reporter”

Electrical Device Weapon Exposure

- Added: Pediatric Medical/Trauma Care

Behavioral Emergencies

- Adult and Peds are separated in SOP (columns)
- For peds: Pediatric Routine Medical Care
  - **CONTACT MEDICAL CONTROL FOR MEDICATION ORDERS**

Adult IO

- Added: If using proximal humerus site: immobilize arm to limit movement

12-Lead Placement and Defib Guidelines

- Device specific defibrillator energy recommendations updated

Care of Patients with Functional Needs

- LVAD
  - If unconscious and not breathing MAY START CHEST COMPRESSIONS
  - Transport all LVAD equipment with the patient
  - Can shock/defibrillate patients with LVAD
    - Anterior/Posterior Placement of pads advised

References

- Bledsoe, B,Porter, & Cherry, R. (2017). Paramedic Care Principles and Practice. Volumes 1-5. 5th ed.
- Stroke basics for improved EMS practice and performance: Improved triage of stroke patterns in the field. 2017. Stryker. Pfiedler Enterprises.
- The Evolving Landscape of Acute Ischemic Stroke Treatment. 2017. Stryker. Pfiedler Enterprises.
- 2015 American Heart Association Guidelines for CPR and ECC
- Illinois Emergency Medical Services for Children. Pediatric Prehospital Protocols. January 2016.
- Region X Standard Operating Procedures. 2017.
- http://www.nihstrokescale.org/
- https://www.fda.gov/Drugs/GuidanceComplianceRegulatoryInformation/Surveillance/AdverseDrugEffects/ucm351864.htm