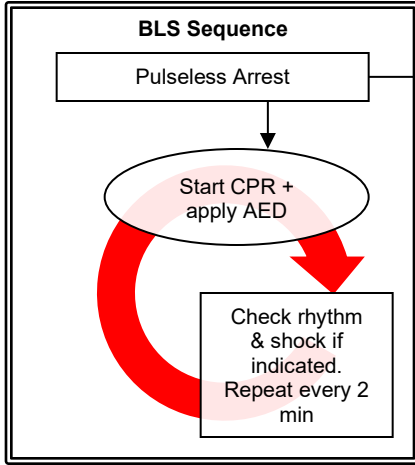


3000 MEDICAL PULSELESS ARREST ALGORITHM



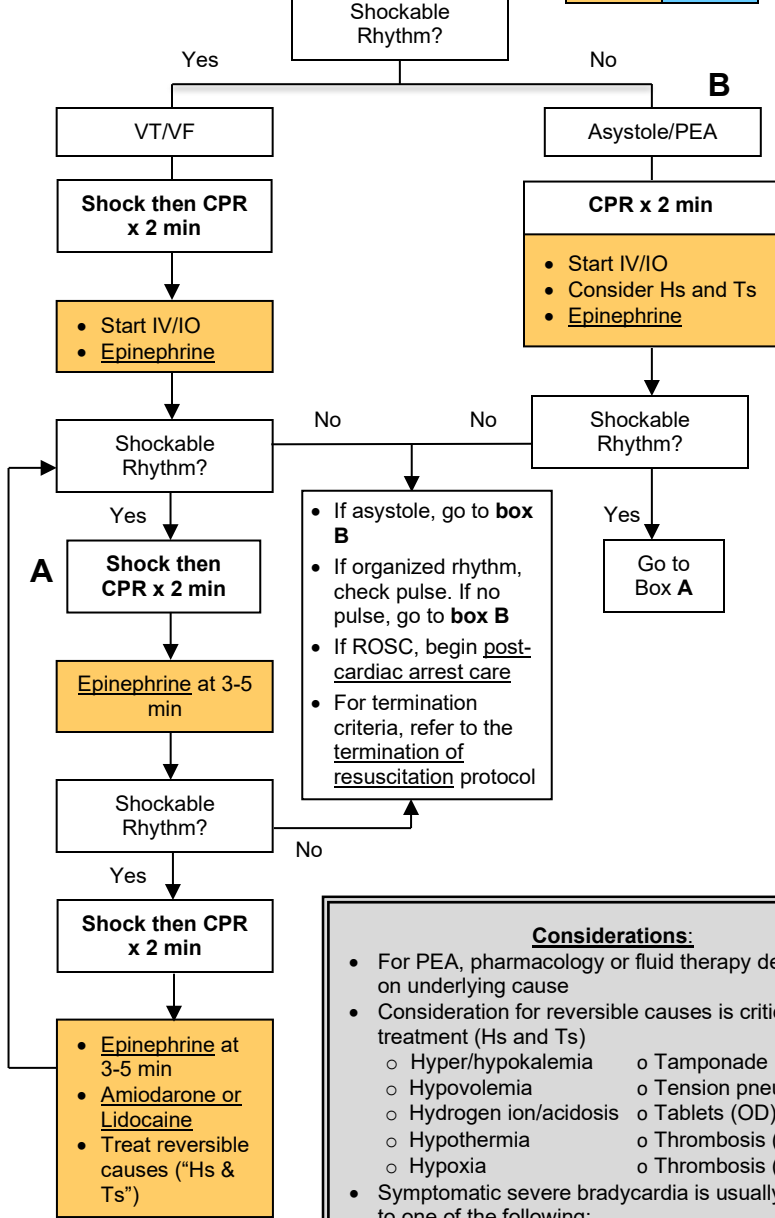
- ALS Sequence**
- Start CPR
 - Attach manual defibrillator ASAP
 - Give O₂

EMR OEC	EMT EMT-IV	AEMT
	EMT-I	Paramedic

- Defibrillation**
- EMT + AEMT use AED
 - Intermediate and Paramedic use manual defibrillator
 - After 3 unsuccessful defibrillation attempts, consider changing the pad vector

- Mechanical CPR Devices:**
- During operation of these devices, patients may show signs of consciousness such as eye or arm movement with absent vital signs.
 - Consider administering a benzodiazepine if patient appears agitated even with absent vital signs.
 - Devices generally need to only be stopped for ECG analysis; keep the device operating and check for asynchronous pulse.

- Suspected hyperkalemic arrest (renal failure/dialysis patient):**
- Give IV calcium, IV sodium bicarb and albuterol
 - Flush IV line between meds



- Considerations:**
- For PEA, pharmacology or fluid therapy depending on underlying cause
 - Consideration for reversible causes is critical to treatment (Hs and Ts)
 - Hypovolemia
 - Hypothermia
 - Hypoxia
 - Tamponade
 - Tension pneumothorax
 - Thrombosis (MI)
 - Thrombosis (PE)
 - Symptomatic severe bradycardia is usually related to one of the following:
 - Ischemia (MI)
 - Drugs (beta blocker, calcium channel blocker)
 - Electrolytes (hyperkalemia)
 - For hypothermic patients:
 - Handle very gently
 - Single defibrillation attempt only
 - Start IV with warm IV fluid
 - Insulate patient
 - Single dose epinephrine IV/IO

3010 MEDICAL PULSELESS ARREST CONSIDERATIONS

ADULT PATIENT

Compressions

- Follow current ACLS guidelines for chest compressions
- Minimize interruptions, resume compressions immediately after shocks, rhythm checks. Check pulses only if organized rhythm
- Push hard and fast and allow complete chest recoil
- Assess quality of CPR with continuous waveform capnography
- If $\text{ETCO}_2 < 10$, improve quality of compressions
- If using automated CPR devices, use manufacturer's specifications

Defibrillation

- Biphasic: manufacturer recommendation. If unknown, use maximum energy
- Monophasic: 360 J
- After 3 unsuccessful defibrillation attempts, consider changing the pad vector.

Ventilations

- Open the airway, place NPA/OPA, place O_2 at 15 L/min for first 4 minutes of chest compressions, unless hypoxic arrest suspected (e.g.: asphyxiation, overdose, status asthmaticus), in which case begin ventilations immediately.
- Do not over ventilate
- If no advanced airway, 30:2 compressions to ventilation ratio
- If advanced airway in place ventilate at rate of 10 breaths/min

Airway

- An advanced airway (supraglottic airway, ETT) may be placed at any time after initial 4 minutes of passive oxygenation, if applicable, or as soon as possible if asphyxial arrest suspected, provided placement does not interrupt compressions

ROSC

- Pulse and blood pressure
- Sustained abrupt rise in ETCO_2 , typically > 40
- Obtain 12-lead ECG after ROSC and before transport to identify cardiac alert.

PEDIATRIC PATIENT

Compressions

- Follow current PALS guidelines for chest compressions
- Minimize interruptions, resume compressions immediately after shocks, rhythm checks. Check pulses only if organized rhythm
- Push hard ($\geq 1/3$ of anteroposterior chest diameter) and fast (100-120/min) and allow complete chest recoil
- Assess quality of CPR with continuous waveform capnography

Defibrillation:

- 1st shock 2 J/kg, subsequent shocks 4 J/kg
- EMT + AEMT use AED
- Intermediate and Paramedic use manual defibrillator

Ventilations

- If no advanced airway, alternate ventilations and compressions in 15:2 ratio
- If advanced airway in place, ventilate continuously at 10 breaths/minute
- Do not over ventilate

Airway

- BVM preferred for all pediatric patients
- An appropriately sized supraglottic airway may be placed as an alternative if BVM ventilations are inadequate
- Intubation should only be performed if you are unable to manage the patient's airway with a supraglottic airway

ROSC

- Pulse and blood pressure
- Sustained abrupt rise in ETCO_2 , typically > 40

Regarding where to work arrest and presence of family members:

- CPR in a moving ambulance or pram is suboptimal
- In general, work cardiac arrest on scene either to return of spontaneous circulation (ROSC), or to field pronouncement, unless scene unsafe
- Family presence during resuscitation is preferred by most families, is rarely disruptive, and may help with grieving process for family members. Family presence during resuscitation is recommended, unless disruptive to resuscitation efforts
- **Contact Receiving Hospital** for termination of resuscitation

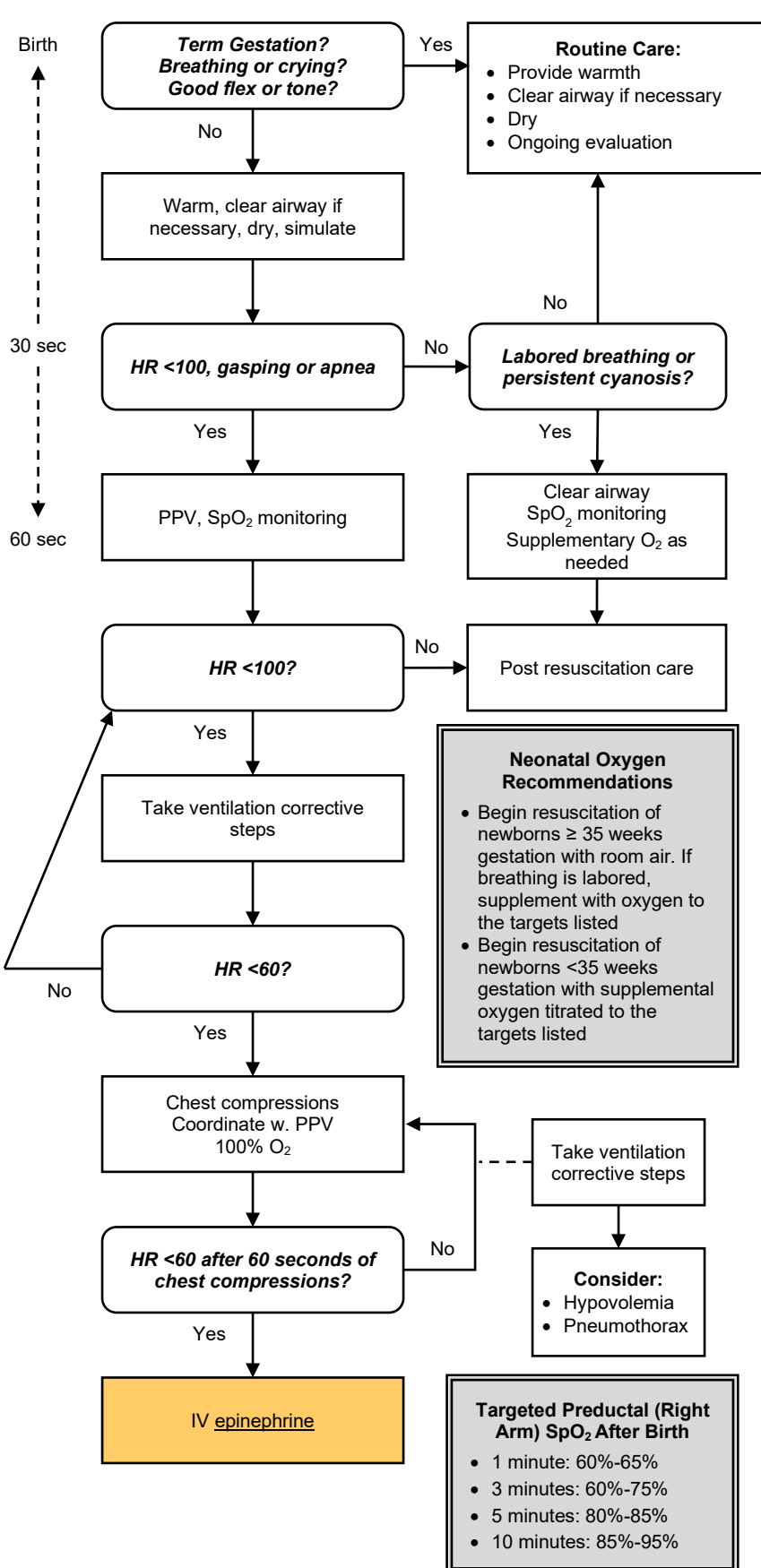
Pacing

- Pacing is not recommended in cardiac arrest.

ICD/Pacemaker patients

- If cardiac arrest patient has an implantable cardioverter defibrillator (ICD) or pacemaker: place pacer/defib pads at least 1 inch from device. Biaxillary or anterior posterior pad placement may be used

3020 NEONATAL RESUSCITATION



EMT	AEMT
EMT-I	Paramedic

General Considerations

- Newborn infants who do not require resuscitation can be identified generally based on 3 questions:
 - Term gestation?
 - Crying or breathing?
 - Good muscle tone?
- If answer to all 3 questions is "yes" then baby does not require resuscitation and should be dried skin-to-skin on mother covered to keep warm
- If answer to any of 3 questions is "no" then infant should receive 1 or more of the following 4 categories of intervention in sequence:
 - Initial steps in stabilization (warm, clear airway, dry, stimulate)
 - Ventilation
 - Chest compressions
 - Administration of epinephrine and/or volume expansion
- Initial resuscitation steps should be completed within 60 seconds as illustrated
- The decision to progress beyond initial steps is based on an assessment of respirations (apnea, gasping, labored, or unlabored breathing) and heart rate (>/< 100 bpm)

Assisting Ventilations

- Assist ventilations at a rate of 40-60 breaths per minute to maintain HR > 100
- Use 2 person BVM when possible

Chest Compressions

- Indicated for HR < 60 despite adequate ventilation w. supplemental O₂ for 30 seconds
- 2 thumbs-encircling hands technique preferred
- Allow full chest recoil
- Coordinate with ventilations so not delivered simultaneously
- 3:1 ratio for compressions to ventilations

Medications

- Epinephrine is indicated if the newborn's heart rate remains less than 60 beats/min after at least 30 seconds of PPV AND another 60 seconds of chest compressions coordinated with PPV using 100% oxygen

Termination of Resuscitation

- Keep family informed and provide them with realistic expectations regarding the outcome of extended resuscitation.

3030 POST CARDIAC ARREST CARE

Post-Cardiac Care

- Following ROSC, several simultaneous and stepwise interventions must be performed to optimize care and maximize patient outcome
- Survival and neurologic outcome worsen with fever, hypoxia, hypo/hypercapnia, and hypotension. Post-ROSC care should focus on prevention of these elements

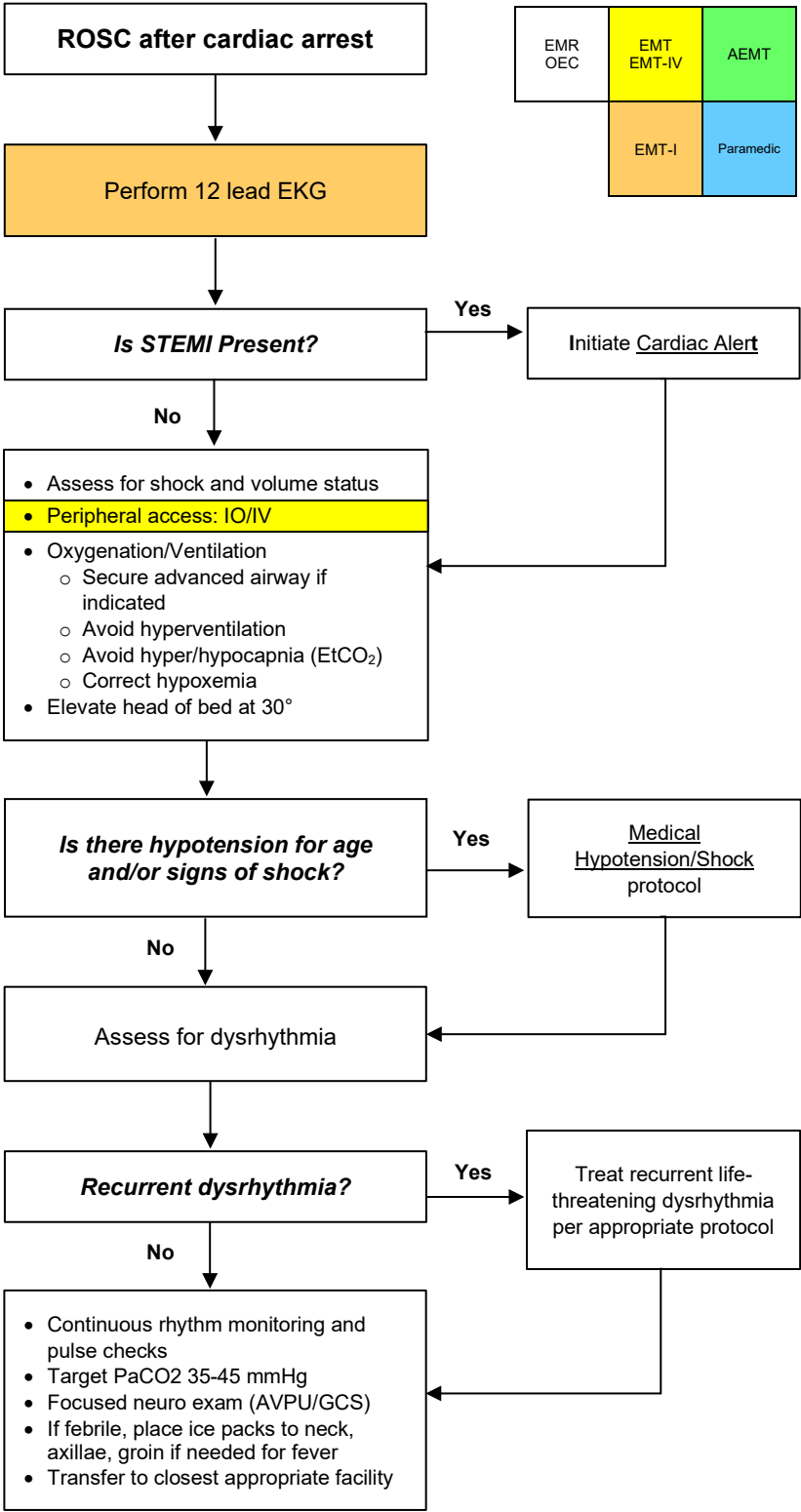
Return of spontaneous circulation (ROSC) criteria:

Pulse and measurable blood pressure
Increase in ETCO₂ on capnography

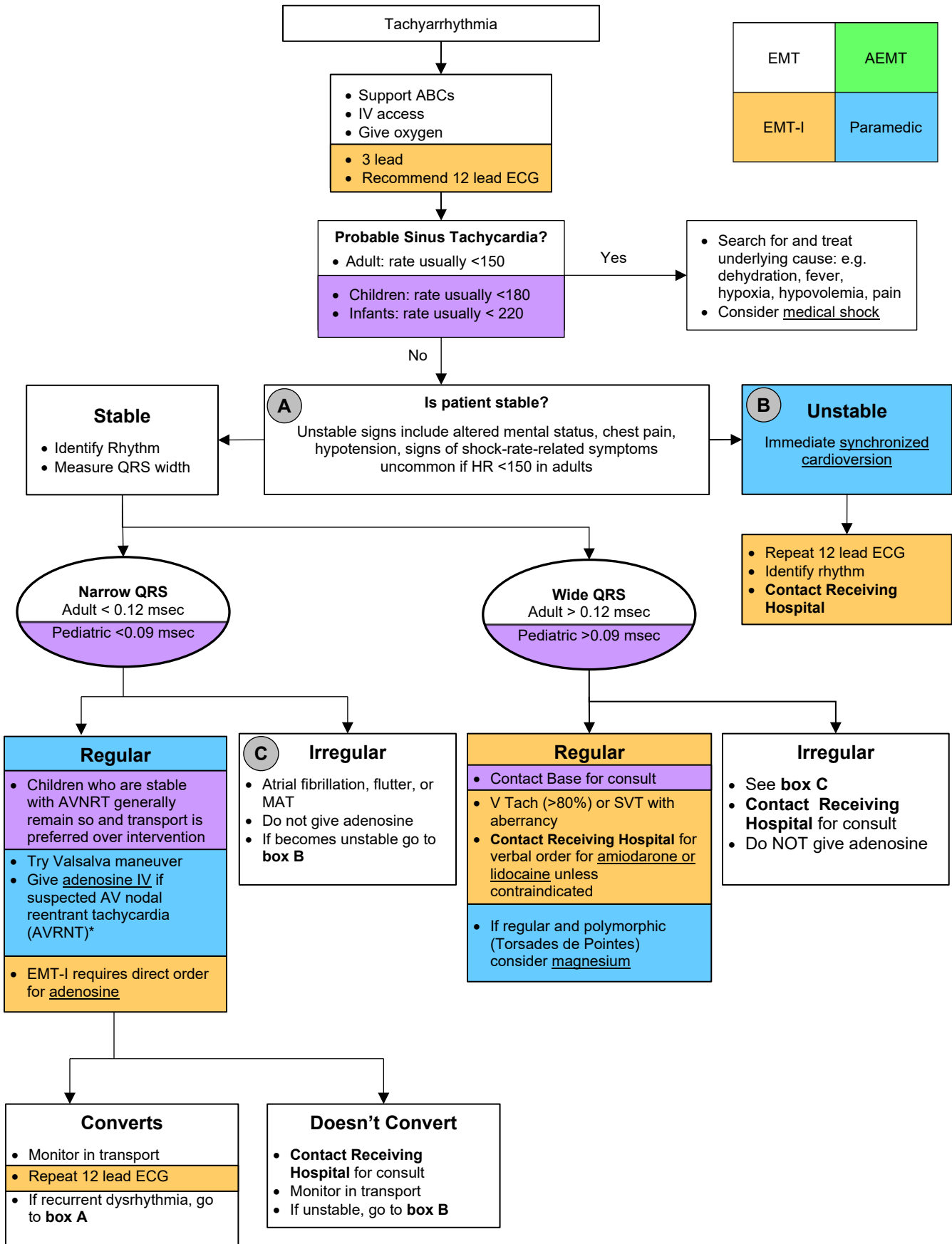
Document:

- Time of arrest (or time last seen normal)
- Witnessed vs. unwitnessed arrest
- Initial rhythm shockable vs. non-shockable
- Bystander CPR given
- Time of ROSC
- GCS after ROSC
- Initial temperature of patient after ROSC, if possible

EMR OEC	EMT EMT-IV	AEMT
	EMT-I	Paramedic



3040 TACHYARRHYTHMIA WITH POOR PERFUSSION



3040 TACHYARRHYTHMIA WITH POOR PERFUSION

Brugada Criteria:

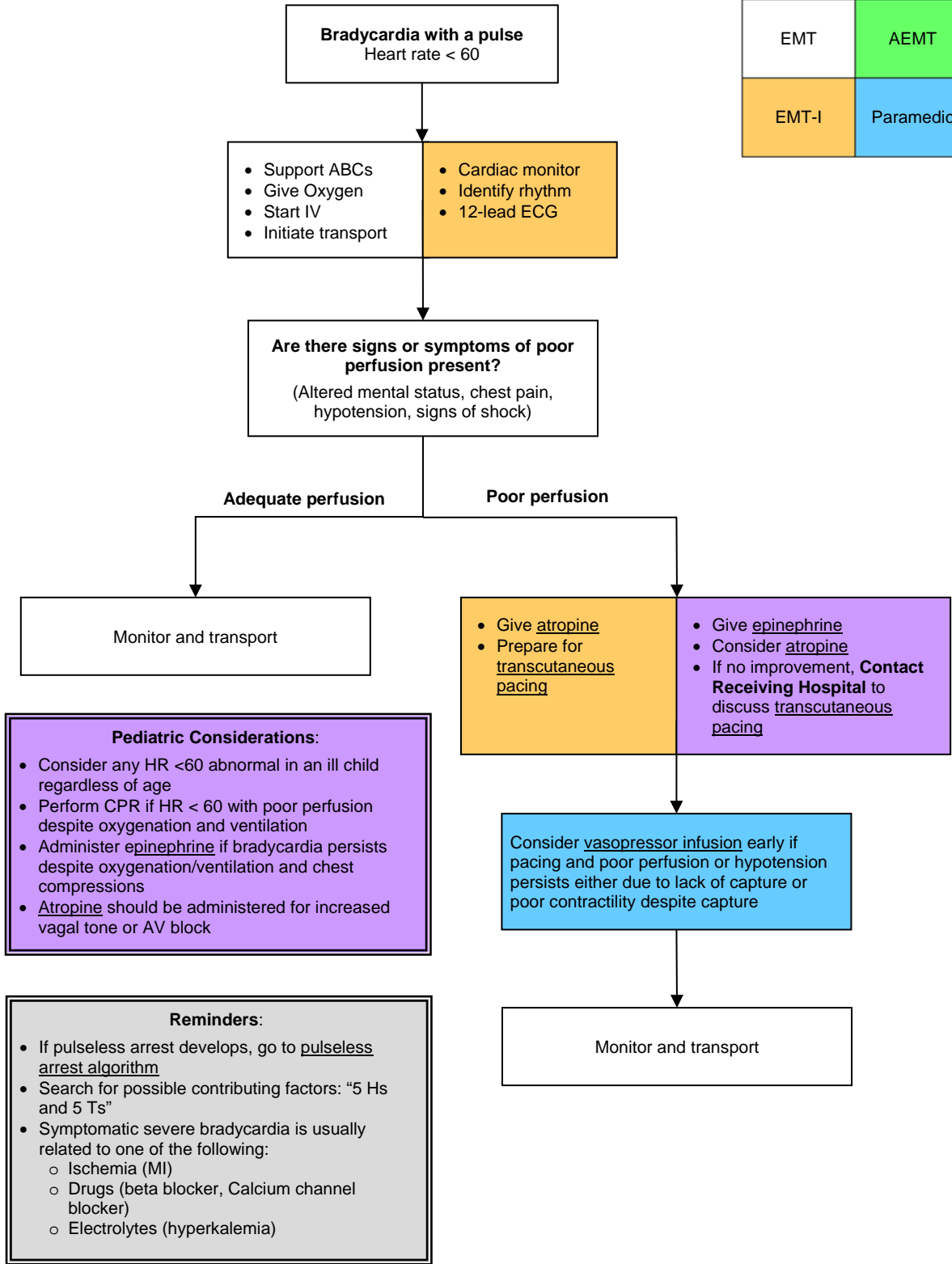
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graph TD
    A[Negative Concordance Present] -- Yes --> B[Tx as VT]
    A -- No --> C[R-S Interval > 100 msec]
    C -- Yes --> D[Tx as VT]
    C -- No --> E[AV Dissociation Present]
    E -- Yes --> F[Tx as VT]
    E -- No --> G[Morphologic Criteria Present:  
V1: Taller Left Rabbit Ear  
V1: wide r wave  
V6: rS  
V6: S]
    G --> H[Tx as VT]
    
```

Negative concordance in V1-6 leads	95% favors VT
R-S interval > 100 msec. Measured from the beginning of the R to the deepest part of S	90% favors VT
AV Dissociation Present	90% favors VT
Taller Rsr in V1	95% favors VT
Fat initial r wave in V1	90% favors VT
RSR' complex in V1	90% favors VT
rS in V6	87% favors VT
S in V6	95% favors VT
R axis	Favors VT but not strongly
Rate > 250	Favors SVT

3050 BRADYARRHYTHMIA WITH POOR PERFUSION

EMT	AEMT
EMT-I	Paramedic



3060 CHEST PAIN

EMR OEC	EMT EMT-IV	AEMT
	EMT-I	Paramedic

Consider life threatening causes of chest pain in all patients

- While assessing ABCs titrate oxygen, monitor vital signs and cardiac rhythm, start IV
- Obtain 12-lead ECG
- Administer aspirin if history suggests possible cardiac chest pain

STEMI?

No

Yes

- Notify receiving facility immediately if Cardiac Alert criteria met
- Place combination defibrillation/pacing pads on patient

Consider SL nitroglycerin if suspected cardiac chest pain and no contraindication

An **EMT** may administer patient's prescribed nitroglycerin, **Contact Hospital** for verbal order

For hypotension following nitroglycerin give 250 ml NS bolus, reassess, and repeat bolus as needed. Do not give additional nitroglycerin.

Consider opioid for chest pain refractory to nitroglycerin, if no contraindication

- Consider repeat 12-lead if initial 12-lead non-diagnostic and/or patient's condition changes
- Consider additional 12-lead views such as R sided leads for R ventricular infarct if inferior MI present

Life threatening causes of chest pain:

- Acute coronary syndrome (ACS)
- Pulmonary embolism
- Thoracic aortic dissection
- Tension pneumothorax

Nitroglycerin Contraindications:

- Suspected right ventricular ST-segment elevation MI (inferior STEMI pattern plus ST elevation in right-sided precordial leads e.g. V4R)
- Hypotension SBP < 100
- Recent use of erectile dysfunction (ED) medication (e.g. Viagra, Cialis)

Causes of Chest Pain in Children:

- Costochondritis
- Pulmonary causes
- Ischemia is rare but can be seen with a history of Kawasaki's disease with coronary aneurysms
- Cyanotic or congenital heart disease
- Myocarditis
- Pericarditis
- Arrhythmia
- Anxiety
- Abdominal causes

3070 CARDIAC ALERT

EMT-I

Paramedic

Goal:

- To identify patients with ST-segment elevation myocardial infarction (STEMI) in the prehospital setting and provide advanced receiving hospital notification in order to minimize door-to-balloon times for percutaneous coronary intervention (PCI)

Inclusion Criteria:

- Chest discomfort consistent with ACS
- 12-lead ECG showing ST-segment elevation (STE) at least 1 mm in two or more anatomically contiguous leads

Exclusion Criteria:

- Wide complex QRS not meeting modified Sgarbossa's criteria below (paced rhythm, LBBB, other)
- Symptoms NOT suggestive of ACS (e.g.: asymptomatic patient)
- If unsure if patient is appropriate for Cardiac Alert, discuss with receiving hospital MD

Actions:

- **If patient does not meet inclusion criteria, or has exclusion criteria, yet clinical scenario and ECG suggests true STEMI (example Sgarbossa's criteria), request medical consult with receiving hospital emergency physician.**
- Treat according to chest pain protocol en route (cardiac monitor, oxygen, aspirin, nitroglycerin and opioid as needed for pain control).
- Notify receiving hospital ASAP with ETA and request CARDIAC ALERT. Do not delay hospital notification. If possible, notify ED before leaving scene.
- Start 2 large bore peripheral IVs – Preferably on patient left side
- Place combination defibrillator/pacing pads on patient
- Rapid transport

Additional Documentation Requirements:

- Time of first patient contact
- Time of first ECG

Modified Sgarbossa's Criteria:

- Concordant ST-segment elevation ≥ 1 mm in any lead
- Concordant ST-segment depression ≥ 1 mm in lead V1 – V3
- Discordant ST/S Ratio ≤ -0.25



ST/S Ratio

Ratio of ST-segment elevation measured at the J point to the R or S wave, whichever was most prominent

Source: <https://www.aliem.com/2013/12/modified-sgarbossa-criteria-ready-primetime/>

3080 HYPERTENSION

EMR OEC	EMT EMT-IV	AEMT	EMT-I	Paramedic
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Intent:

- A. Even with extremes of blood pressure, treat the medical emergency **associated** with hypertension (“treat the patient, not the number”)
 - 1. Treat chest pain, pulmonary edema, or stroke according to standard protocols (pain control will usually improve BP significantly)
- B. Do not use medication to treat asymptomatic hypertension
- C. Do not treat hypertension in acute stroke

4030 STROKE

EMR OEC	EMT EMT-IV	AEMT	EMT-I	Paramedic
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Assess and stabilize ABCs

POSSIBLE STROKE
Any acute onset neurological deficit not likely due to trauma regardless of age

Assess Cincinnati Prehospital Stroke Scale
(Presence of single sign sufficient)

If patient has any positive finding on Cincinnati Prehospital Stroke Scale,
IMMEDIATELY TRANSPORT TO HOSPITAL

Rule out or treat hypoglycemia

While working towards expedited transport:

- Determine when last KNOWN to be normal and document **specific** time (e.g., "At 2:15 PM", **not** "1 hour ago")
- Obtain medical history
- Document medications
- Identify family or friend who may assist with history and decision-making, get contact info and strongly encourage to come to ED as they may be needed for consent for treatments

Contact Receiving Hospital during transport for Stroke Alert if patient meets criteria

- Titrate O₂
- Start IV and draw blood**
- Check cardiac rhythm, consider 12 lead
- Ensure full monitoring in place: cardiac, SpO₂
- Elevate head 30°, if possible

Fully monitor patient and continually reassess:

- Improvement or worsening of deficit
- Adequacy of ventilation and oxygenation
- Cardiovascular stability

Stroke Mimics (for all ages):

- Hypoglycemia
- Postictal paralysis
- Complex migraine
- Overdose
- Trauma
- Bell's palsy

Cincinnati Prehospital Stroke Scale
Think "FAST" (face, arm, speech, time)

Assess Facial Droop
Say: "Smile for me", or "Show me your teeth"

Assess Arm Pronator Drift
Demonstrate, and say: "Put your arms up for me like this and hold them while I count to 10"

Assess Speech
Say: "Repeat after me: you can't teach an old dog new tricks", or "No ifs, ands, or buts"

CPSS does not identify all strokes. See below

- The CPSS is highly *specific* for stroke, but is not extremely *sensitive*, meaning if you have a positive CPSS, you are almost certainly having a stroke, but if you do not have a positive CPSS, you still may be having a stroke
- The MEND exam incorporates other components from the NIH Stroke Scale (NIHSS) that, while it takes more time to complete, provides greater sensitivity and is a more thorough exam.
- Perform CPSS initially on scene as soon as it is determined the patient is possibly having a stroke followed by a MEND exam **during transport**.

If time permits, perform MEND exam

Assess Mental Status

Level of consciousness - AVPU
Speech - Repeat "You can't teach an old dog new tricks." (Abnormal=wrong words, slurred speech, no speech)
Questions - Age, month
Commands - Close, open eyes

Assess Cranial Nerves

Facial droop - Show teeth or smile (Abnormal = One side does not move as well as other)
Visual fields - 4 quadrants
Horizontal gaze - Side to side

Assess Limbs

Motor arm - Close eyes and hold out both arms (Abnormal = arm can't move or drifts down)
Motor leg - Open eyes and lift each leg separately
Sensory arm - Close eyes and touch, pinch
Sensory leg - Close eyes and touch, pinch each limb
Coordination arm - Finger to nose
Coordination leg - Heel to shin

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4031 STROKE ALERT

Criteria for Stroke Alert

All criteria below must be met to call a "Stroke Alert":

1. Positive CPSS/MEND finding
2. Time of onset of signs and symptoms until hospital arrival less than 24 hours
3. Blood glucose level over 60 mg/dL and under 400 mg/dL

EMR OEC	EMT EMT-IV	AEMT
	EMT-I	Paramedic

Notes:

- Contact Receiving Hospital for physician consult if you feel patient is possibly having stroke but does not meet criteria.

Cincinnati Prehospital Stroke Scale (CPSS)

Think "FAST" (face, arm, speech, time)

Assess Facial Droop

Say: "Smile for me", or "Show me your teeth"

Assess Arm Pronator Drift

Demonstrate, and say: "Put your arms up for me like this and hold them while I count to 10"

Assess Speech

Say: "Repeat after me: you can't teach an old dog new tricks", or "No ifs, ands, or buts"

CPSS does not identify all strokes.

MEND Exam

Assess Mental Status

- Level of consciousness - AVPU
- Speech - Repeat "You can't teach an old dog new tricks." (Abnormal=wrong words, slurred speech, no speech)
- Questions - Age, month
- Commands - Close, open eyes

Assess Cranial Nerves

- Facial droop - Show teeth or smile (Abnormal = One side does not move as well as other)
- Visual fields - 4 quadrants
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- Motor arm - Close eyes and hold out both arms (Abnormal = arm can't move or drifts down)
- Motor leg - Open eyes and lift each leg separately
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- Sensory leg - Close eyes and touch, pinch each limb
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