

CPR GUIDELINE
REVIEW 2020
pediatrics

BLS

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MD EM

Major new changes AHA 2020

- 1) Enhanced algorithms and visual aids
- 2) Early initiation of CPR has been re-emphasized
- 3) Use of real-time audiovisual feedback is suggested to improve quality
- 4) Continuously measuring arterial blood pressure and end-carbon dioxide (ETCO₂) during ACLS resuscitation may be useful to improve CPR quality
- 5) Routine use of double sequential defibrillation is not recommended
- 6) Intraosseous (IO) access is acceptable if IV access is not available
- 7) In pregnancy focuses on maternal resuscitation, with preparation for early perimortem cesarean
- 8) And some advices about post CPR care(discuss later)

cpr

← قانونی

← انسانی

← تشخیصی

اول

Safety

زمان طلایی احیای قلب ریوی

فاصله زمانی بین شروع مرگ بالینی و ایجاد تغییرات غیر قابل برگشت در سلولهای مغز را زمان احیای قلبی ریوی می گویند این زمان کوتاه و در حدود ۶ - ۴ دقیقه می باشد .

اگر در ثانیه های اول ایست قلبی ریوی ، CPR شروع شود شانس موفقیت تا ۹۰٪ هم می رسد با هر دقیقه گذشت زمان، ۷-۱۰ درصد از شانس بقای مددجو کاهش می یابد. مراحل انجام احیای قلبی ریوی (CPR)

Survival Chain زنجيره بقا

INTERA HOSPITAL CARDIAC ARREST :IHCA •

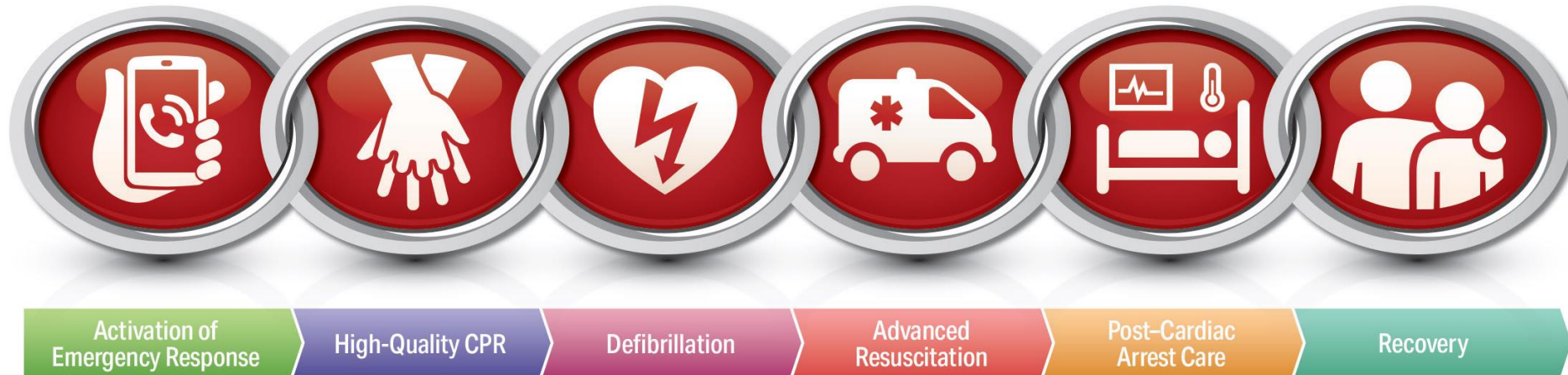
OUT OF HOSPITAL CARDIA ARREST :OHCA •

ADULT chains of survival

IHCA



OHCA



Pediatrics chains of survival

IHCA



OHCA



Age definition In CPR

- ▶ Newly born
- ▶ Neonate
- ▶ Infant
- ▶ pediatrics



Look, listen and
feel for breathing
and pulse

 ADAM.

تصمیم گیری برای شروع احیا

❖ آیا بیمار پاسخ میدهد یا خیر؟ *responsive or unresponsive*

❖ تنفس بیمار چگونه است؟ بدون تنفس.....تنفس
غیرطبیعی....طبیعی

❖ کنترل نبض در کمتر از ۱۰ ثانیه

ONE-RESCUER BLS FOR CHILDREN

- ▶ 1. Tap their shoulder and talk loudly to the child to determine if they are responsive.
- ▶ 2. If the child does not respond and is not breathing (or is only gasping for breath), yell for help. If someone responds, send the second person to call 911 and to get an AED.
- ▶ 3. Assess if they are breathing while feeling for the child's carotid pulse (on the side of the neck) or femoral pulse (on the inner thigh in the crease between their leg and groin) for no more than 10 seconds
- ▶ 4. If you cannot feel a pulse (or if you are unsure), begin CPR by doing 15 compressions followed by two breaths. If you can feel a pulse but the pulse rate is less than 60 beats per minute, you should begin CPR. This rate is too slow for a child

TWO-RESCUER BLS FOR CHILDREN

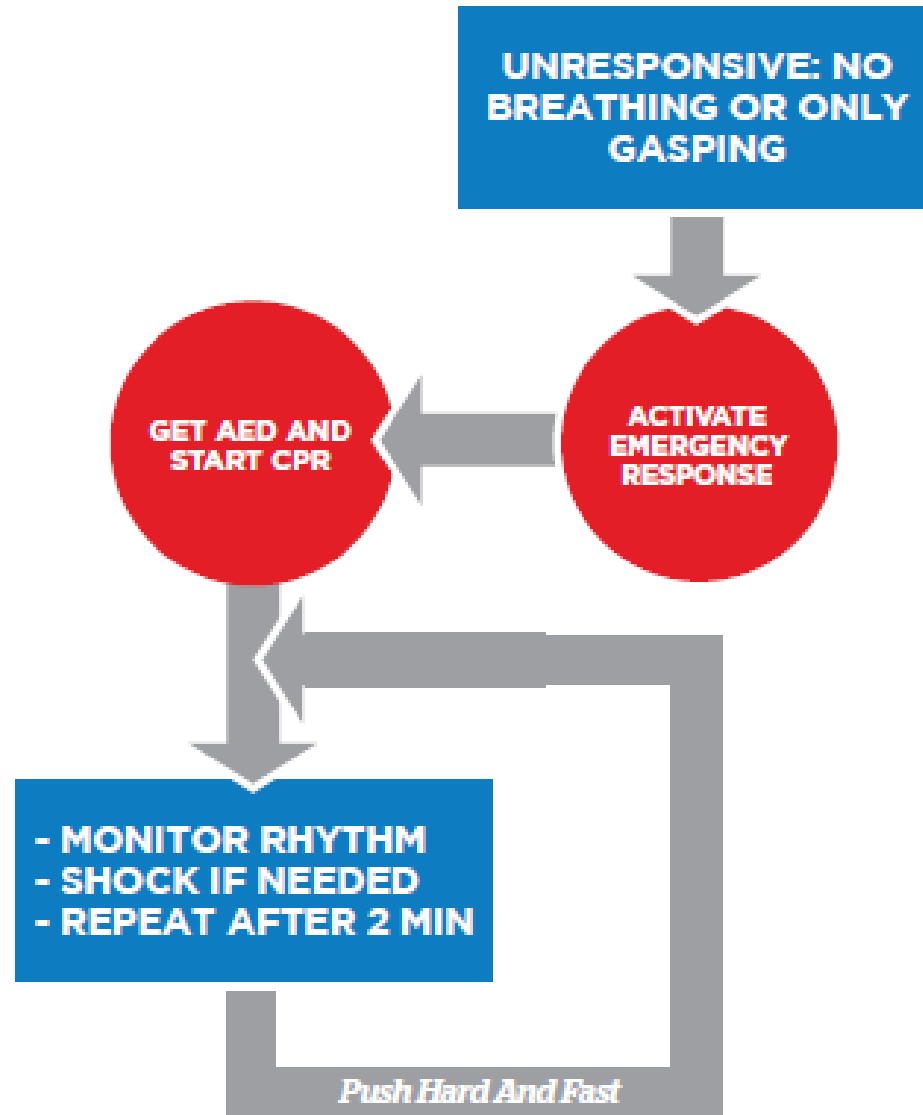
- ▶ 1. Tap their shoulder and talk loudly to the child to determine if they are responsive.
- ▶ 2. If the child does not respond and is not breathing (or is only gasping for breath), send the second rescuer to call 911 and get an AED.
- ▶ 3. Assess if they are breathing while feeling for the child's carotid pulse (on the side of the neck) or femoral pulse (on the inner thigh in the crease between their leg and groin) for no more than 10 seconds.
- ▶ 4. If you cannot feel a pulse (or if you are unsure), begin CPR by doing 15 compressions followed by two breaths. If you can feel a pulse but the rate is less than 60 beats per minute, begin CPR. This rate is too slow for a child.

ONE-RESCUER BLS FOR INFANTS

If you are alone with an infant, do the following:

- ▶ 1. Tap the bottom of their foot and talk loudly to the infant to determine if they are responsive.
- ▶ 2. If the infant does not respond, and they are not breathing (or if they are only gasping), yell for help. If someone responds, send the second person to call EMS and to get an AED.
- ▶ 3. Assess if they are breathing while feeling for the infant's femoral or brachial pulse for no more than 10 seconds
- ▶ After performing CPR for about two minutes (usually about ten cycles of 15 compressions and two breaths) if help has not arrived, call EMS while staying with the infant

Simple Adult BLS Algorithm



ONE-RESCUER BLS/CPR FOR ADULTS

Be Safe

- Move the person out of traffic.
- Move the person out of water and dry the person. (Drowning persons should be removed from the water and dried off; they should also be removed from standing water, such as puddles, pools, gutters, etc.)
- Be sure you do not become injured yourself.

Assess the Person

- Shake the person and talk to them loudly.
- Check to see if the person is breathing. (Agonal breathing, which is occasional gasping and is ineffective, does not count as breathing.)

Call EMS

- Send someone for help and to get an AED.
- If alone, call for help while assessing for breathing and pulse. (The AHA emphasizes that cell phones are available everywhere now and most have a built-in speakerphone. Call for help without leaving the person.)

CPR

Potential harm from CPR

- ▶ Guideline recommend initiation of CPR for presumed cardiac arrest without concern of harm to patient not in cardiac arrest

زمان لازم جهت کنترل تنفس و نبض ★

شک بین طبیعی و غیر طبیعی ★

تنفس نا منظم پس از A ★

Gasp ★

غذا در حلق ★

Choking (PALS)

- ❑ If the infant or child is conscious, maintaining his or her own airway, and able to cough and make some sounds, ***do not interfere***.
- ❑ Administer supplemental oxygen if indicated. Encourage the child to cough
- ❑ If the conscious infant or child cannot cough or make any sound, clear the obstruction by performing abdominal thrusts (if the patient is 1 year or older) or back slaps and chest thrusts (if the patient is younger than 1 year)

foreign body airway obstruction

- ▶ Backslaps ---→ when cough is ineffective
- ▶ Manual extraction ----→ for visible items
- ▶ No blind sweeps
- ▶ Abdominal thrust --→ older than one year old
- ▶ Chest thrust --→ for unconscious individual
- ▶ Magill forceps -----→ trained provider
- ▶ Suction-based clearance device--→ Not suggest routinely

Chocking Infant



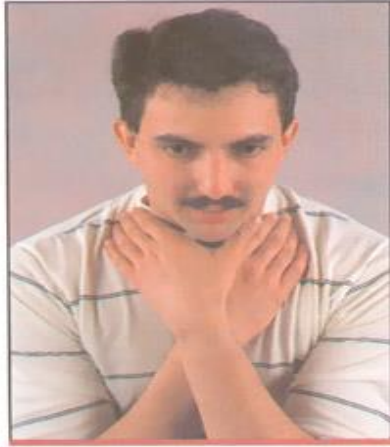
FIGURE 109-3. Back blows to clear airway of choking infant. (Image used with permission of Rita K. Cydulka, MD, MS, MetroHealth Medical Center.)



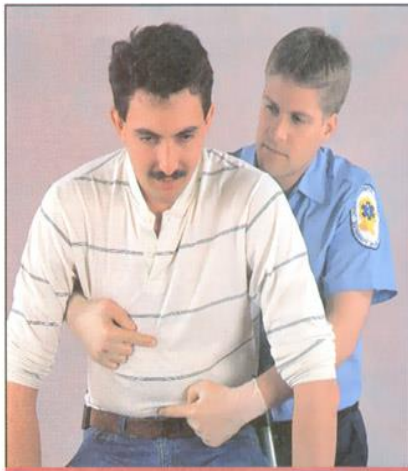
FIGURE 109-4. Chest thrusts to clear airway of choking infant. (Image used with permission of Rita K. Cydulka, MD, MS, MetroHealth Medical Center.)



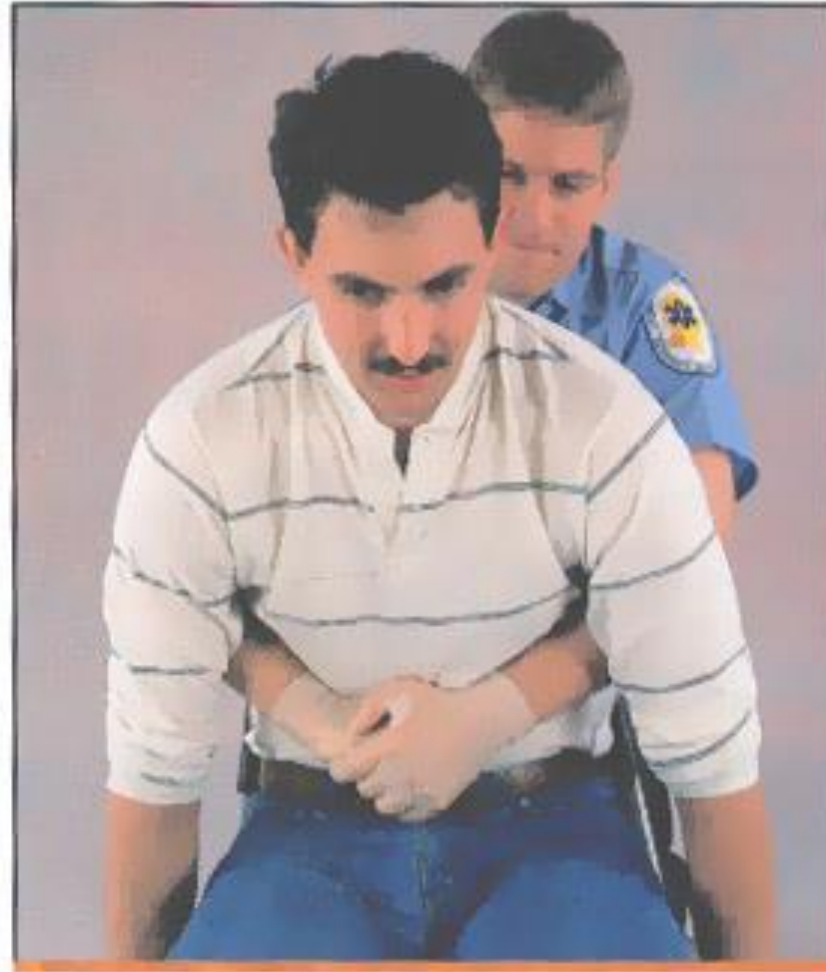
Heimlich Maneuver



A sign of choking.



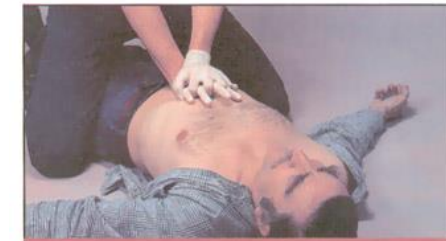
Locate the patient's xiphoid process and navel.



Apply abdominal thrusts (Heimlich Maneuver).



Locate the xiphoid process and the navel in an unconscious patient.



Perform an abdominal thrust on an unconscious adult.

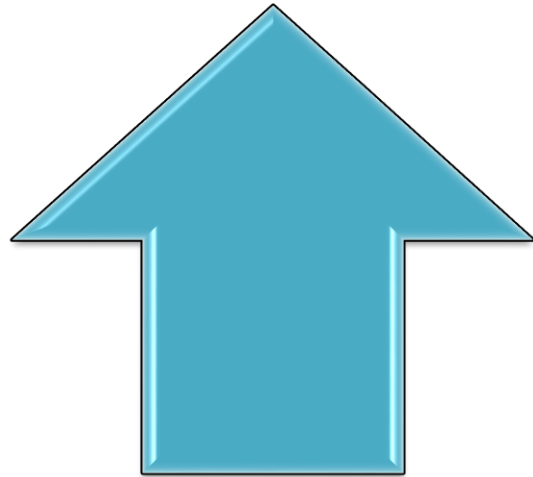


Chest thrusts for a pregnant woman.

اولویت های انجام کار

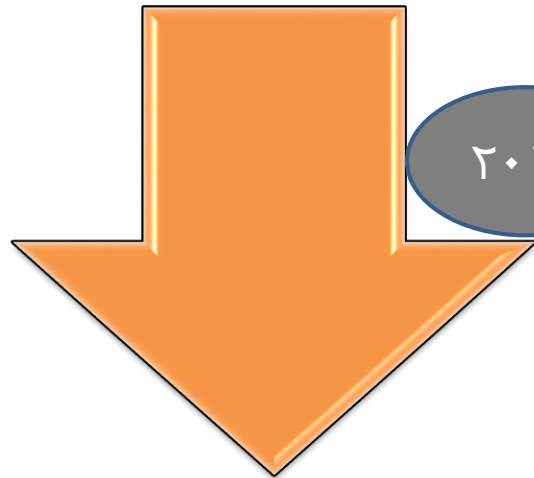
C - A - B

۲۰۲۰



۲۰۱۰

A - B - C



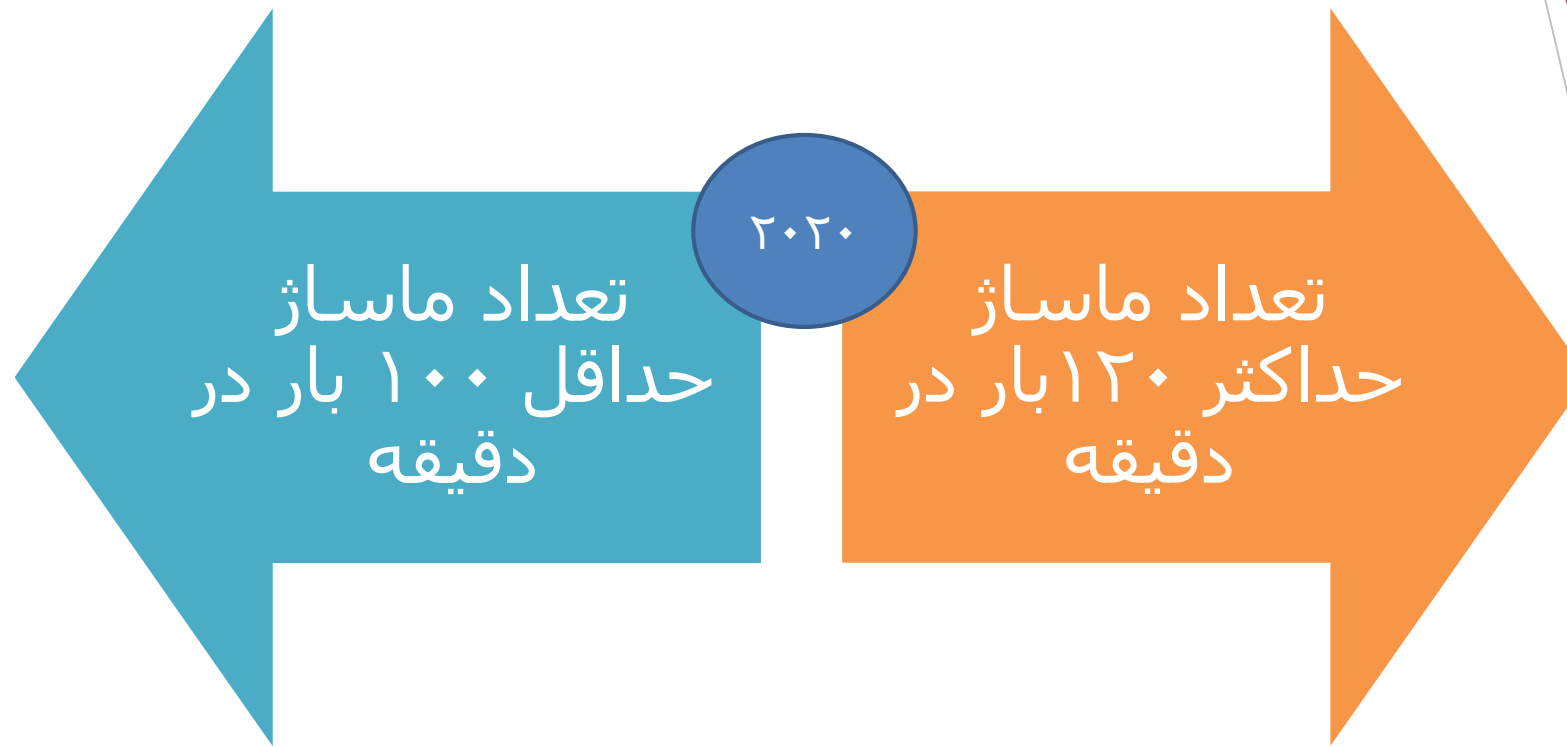
اجزا	بزرگسالان و نوجوانان	کودکان (1 سال تا بلوغ)	شیرخواران (سن کمتر از 1 سال به استثناء نوزادان)
ایمنی صحنه	از ایمنی صحنه برای احیاگران و قربانی اطمینان حاصل کنید		
تشخیص ایست قلبی	<p>ارزیابی پاسخ دهی قلبی عدم تنفس یا فقط gaspings (به معنی: تنفس غیرطبیعی) عدم وجود نبض مشخص طی 10 ثانیه (ارزیابی تنفس و نبض می تواند کمتر از 10 ثانیه به صورت همزمان انجام گیرد)</p>		
فعالسازی سیستم پاسخ دهی اورژانس	<p>اگر تنها هستید و تلفن همراه ندارید، جهت فعالسازی سیستم پاسخ دهی اورژانس و آوردن AED، قبل از شروع عملیات CPR قربانی را ترک کنید.</p> <p>در غیر این صورت فرد دیگری را فرستاده و بلافاصله CPR را شروع کنید.</p> <p>استفاده از AED به محض دسترسی</p>	<p>ایست قلبی شاهد</p> <p>همانند مراحل بزرگسالان و نوجوانان عمل کنید (در سمت چپ)</p> <p>ایست قلبی غیرشاهد</p> <p>به مدت 2 دقیقه CPR کنید</p> <p>جهت فعالسازی سیستم پاسخ دهی اورژانس و آوردن AED قربانی را ترک کنید. سپس برگشته و CPR را برای شیرخوار یا کودک شروع کنید.</p> <p>استفاده از AED به محض دسترسی</p>	

فرد آموزش ندیده در صحنه احیا قلب

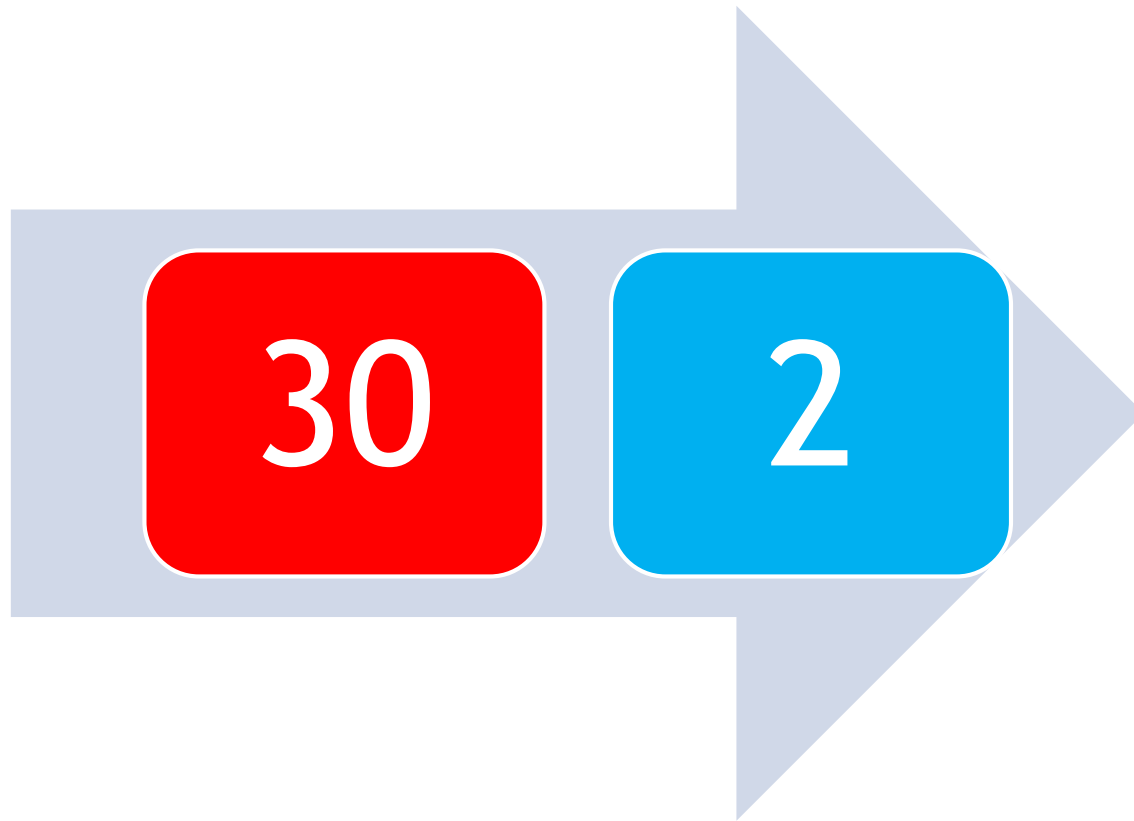
▶ اگر تنهاست.....

فقط ماساژ

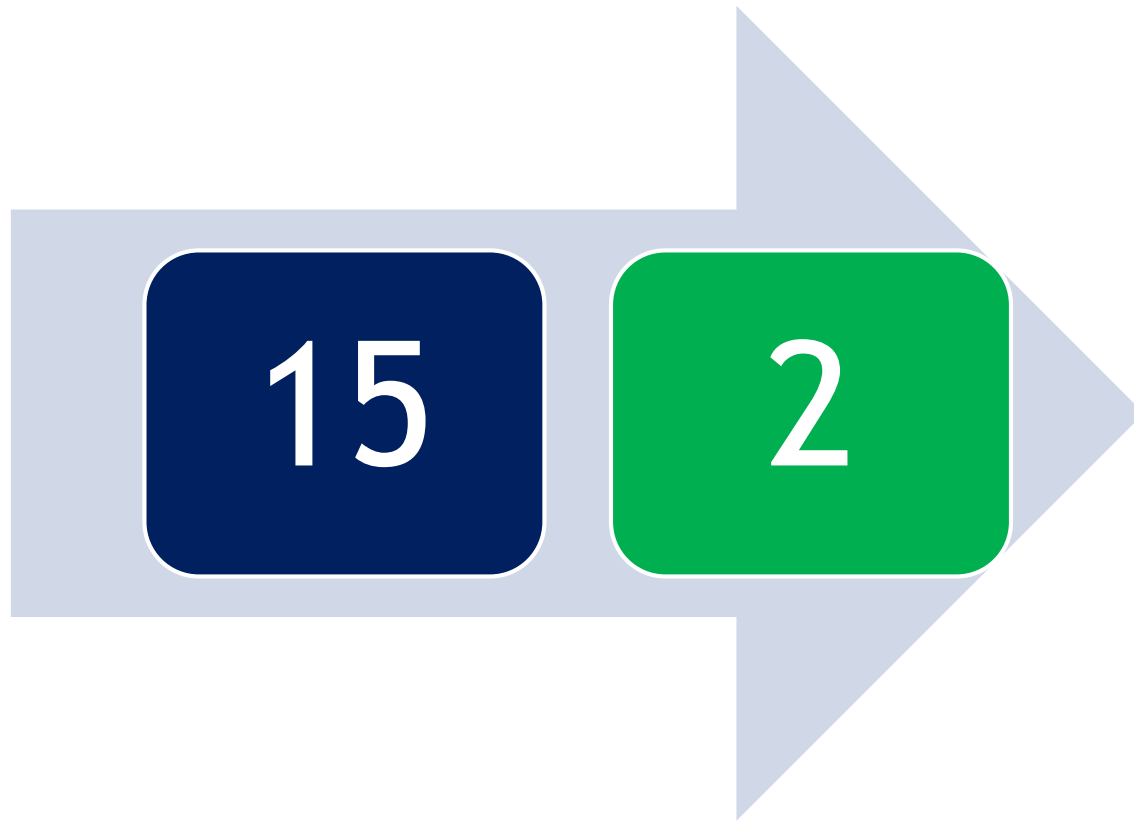
تعداد ماساژ در دقیقه



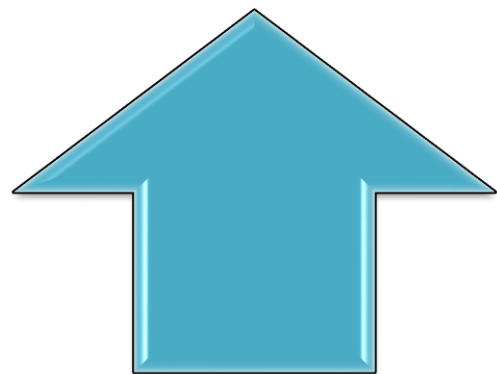
ADULT Compression to ventilation
ratio



Pediatrics Compression to
ventilation ratio

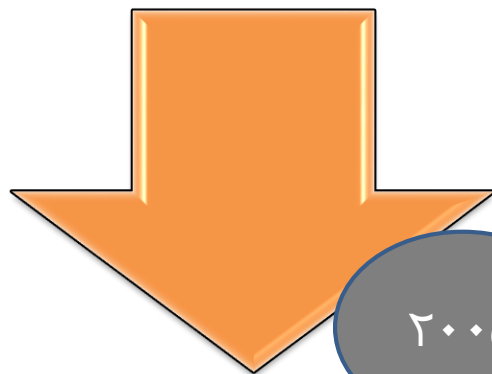


عمق ماساژ در دستورالعمل قدیم



عمق ماساژ **حداقل ۲**
اینچ

۲۰۱۰



عمق ماساژ **حدود ۱٫۵ تا**
۲ اینچ

۲۰۰۵

عمق ماساژ در بزرگسالان

۲۰۲۰

عمق ماساژ
حداقل ۵
سانتیمتر

عمق ماساژ
حداکثر ۶
سانتیمتر

عمق ماساژ

BLS FOR INFANTS

- ▶ **Compression depth should be one-third of the chest depth; for most infants, this is about 1.5 inches (4 cm).**

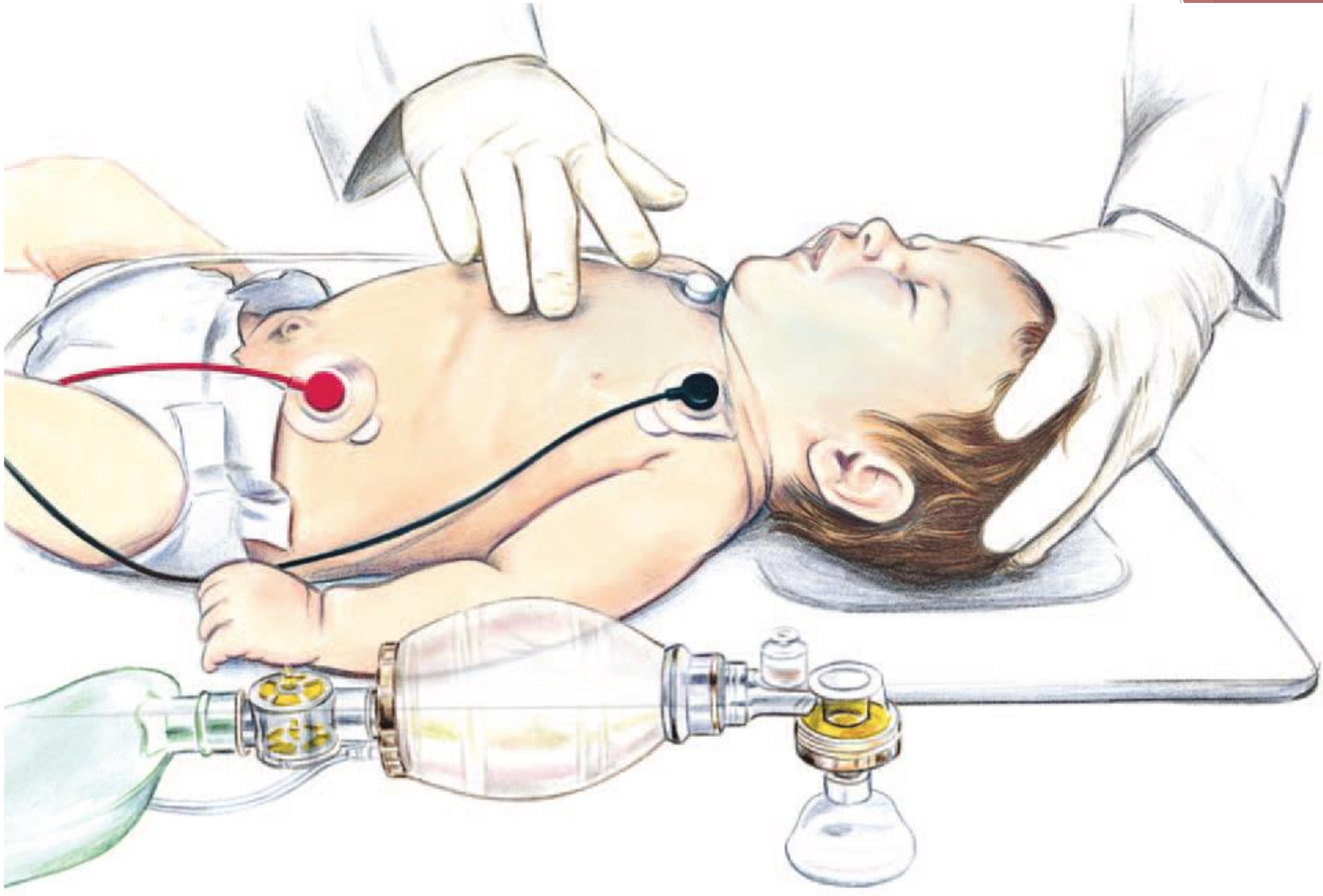
BLS FOR CHILDREN

- ▶ **Compression depth should be one-third of the chest depth; for most children, this is 2 inches (5 cm)**

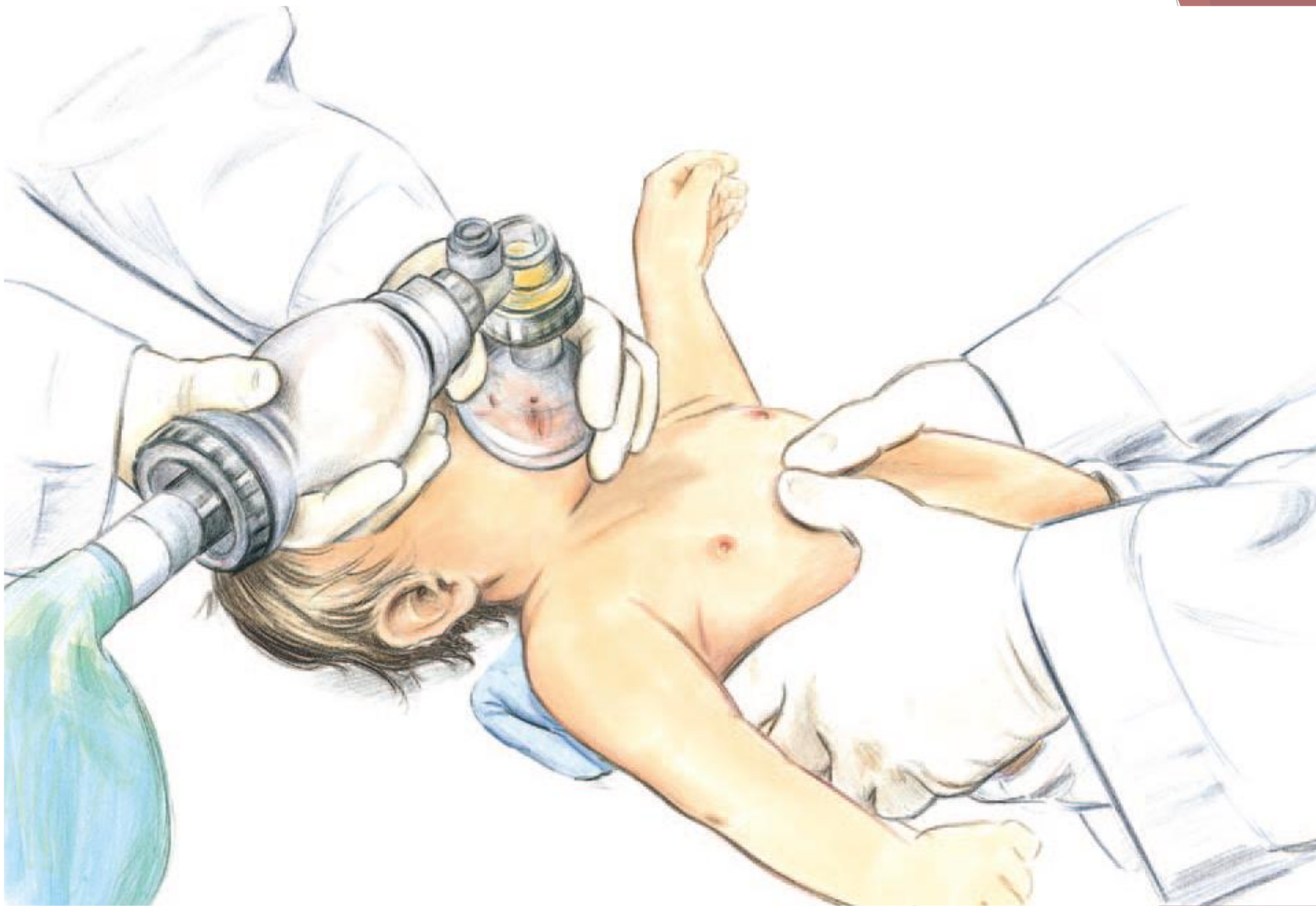
Chest compression in INFANT

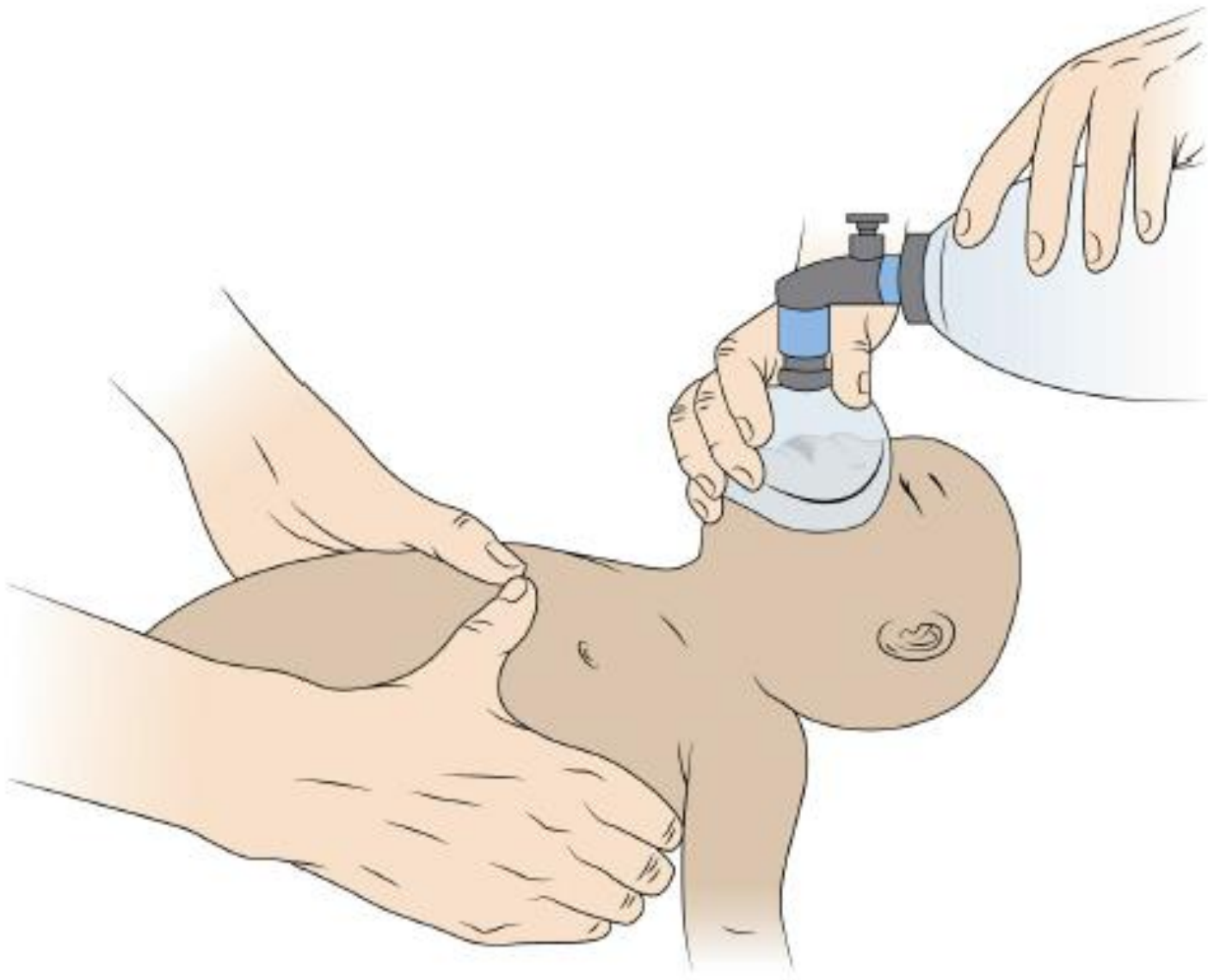
- ▶ **During CPR, compressions can be performed on an infant using two fingers (with one rescuer) or with two thumb-encircling hands (if there are two rescuers and rescuer's hands are big enough to go around the infant's chest)**















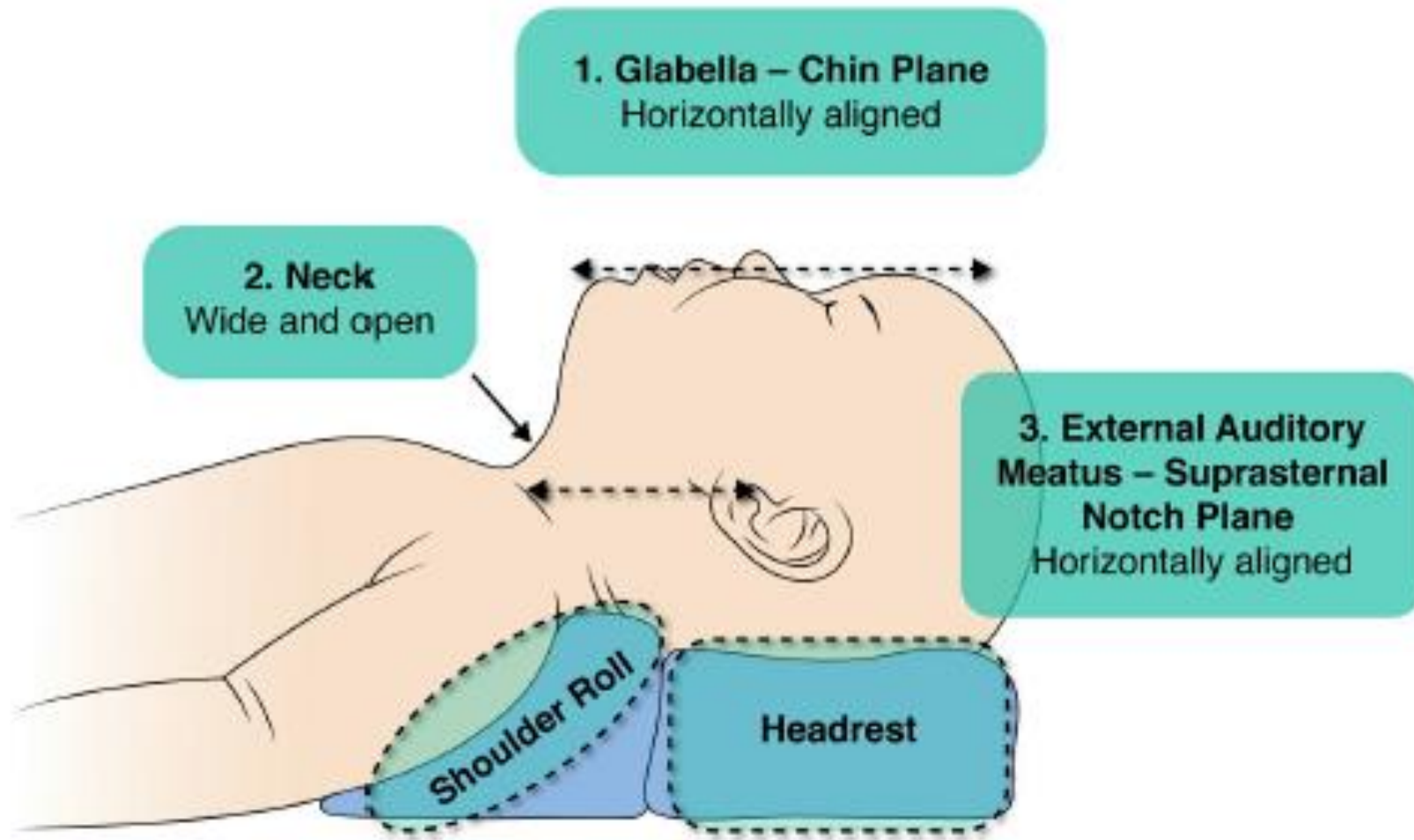


Figure 20. Head tilt in infants

INFANTS (0 to 12 months)

CHILDREN (1 year to puberty)

According to the 2020 CPR guidelines, for all ages of children, the new ratio of compressions to ventilations should be 15:2.

Check for infant's pulse using the brachial artery on the inside of the upper arm between the infant's elbow and shoulder.

Check for child's pulse using the carotid artery on the side of the neck or femoral pulse on the inner thigh in the crease between the leg and groin.

Perform compressions on the infant using two fingers (if you are by yourself) or two thumbs with hands encircling the infant's chest (with two rescuers).

Perform compressions on a child using one or two-handed chest compressions depending on the size of the child.

Compression depth should be one-third of the chest depth; for most infants, this is about 1.5 inches (4 cm).

Compression depth should be one-third of the chest depth; for most children, this is 2 inches (5 cm).

If you are the only person at the scene and find an unresponsive infant or child, perform CPR for two minutes before you call EMS or go for an AED.

If you witness a cardiac arrest in an infant or child, call EMS and get an AED before starting CPR.

If you witness a cardiac arrest in an infant or child, call EMS and get an AED before starting CPR.

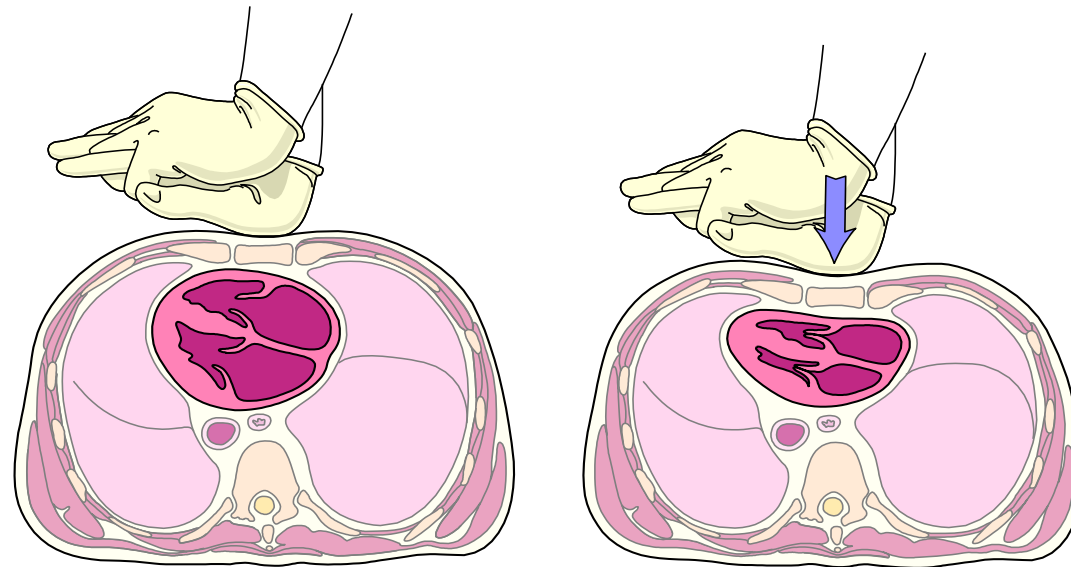
Chest Compression sequence ...

Do on a firm surface when possible

CPR mode of bed ?

DO NOT move to the floor to improve

Recoiling

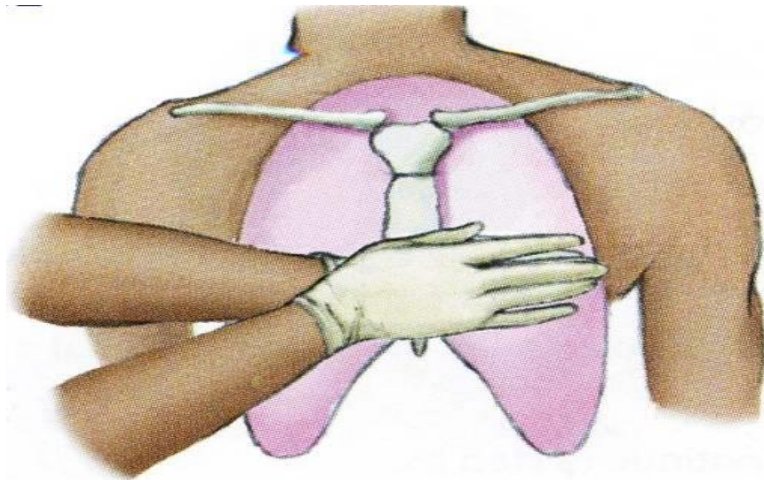




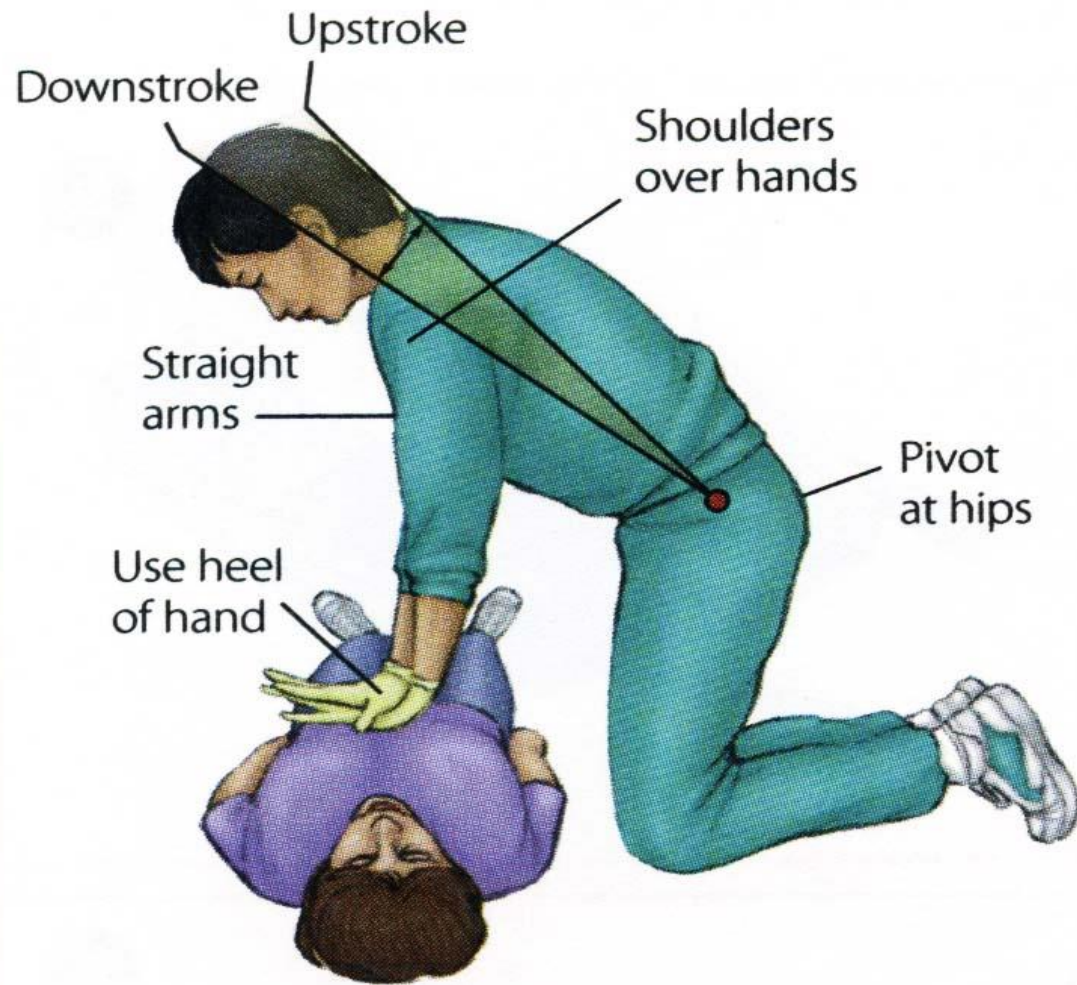
Determine correct hand positions.

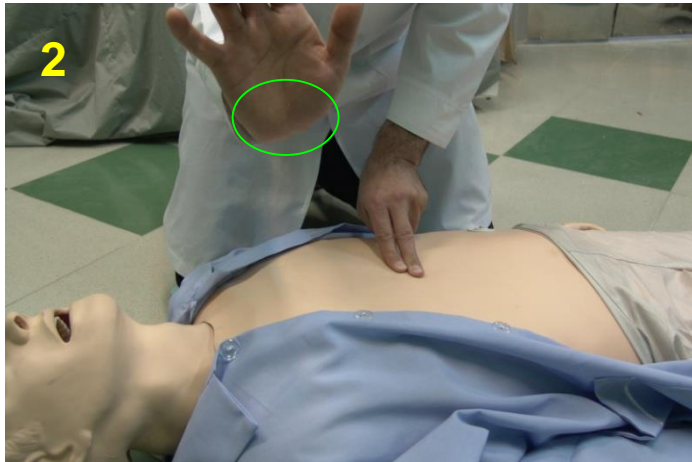


Determine correct hand positions.



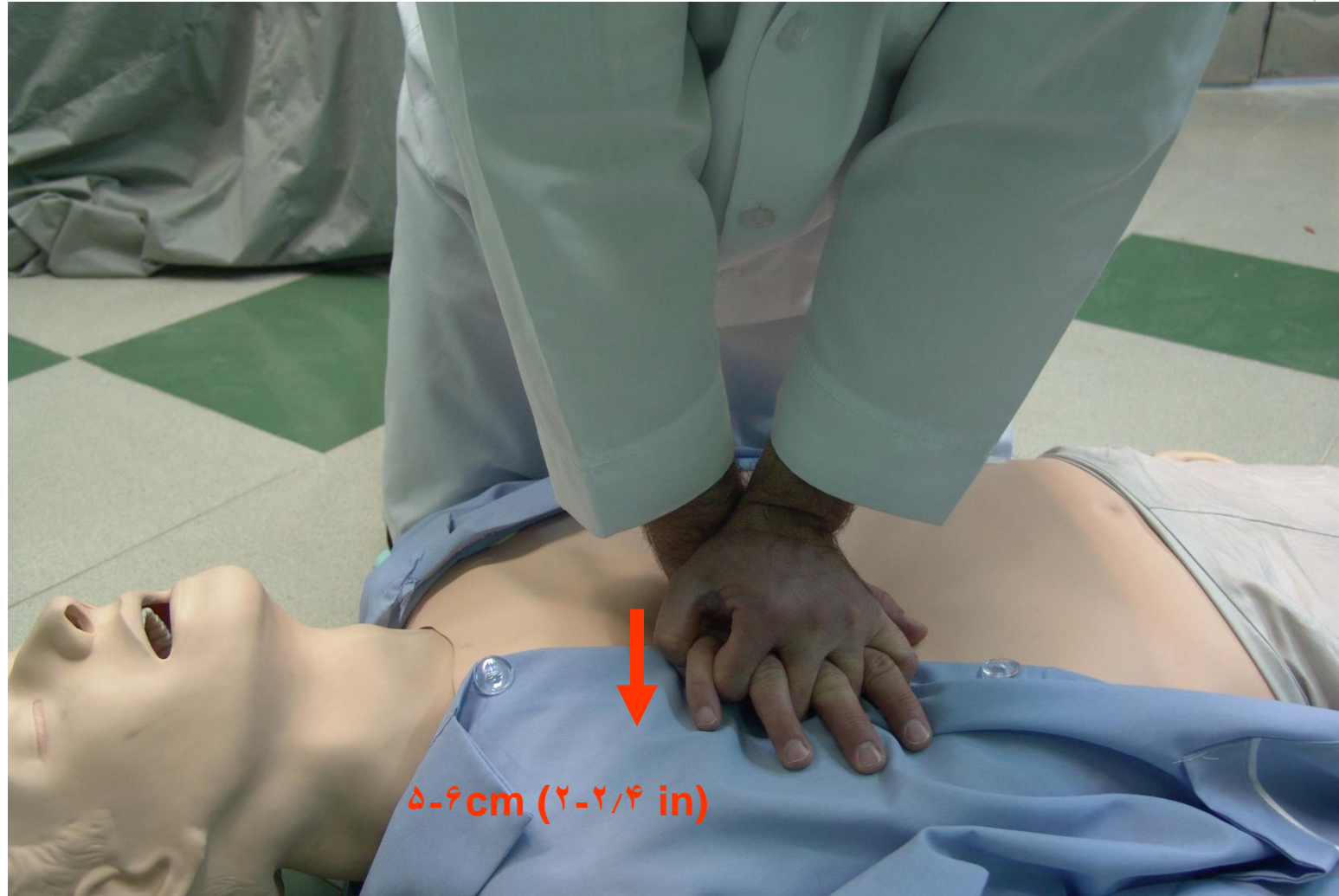
Begin chest compressions.







Chest Compression



نکات مهم

ماساژ با عمق و تعداد کافی

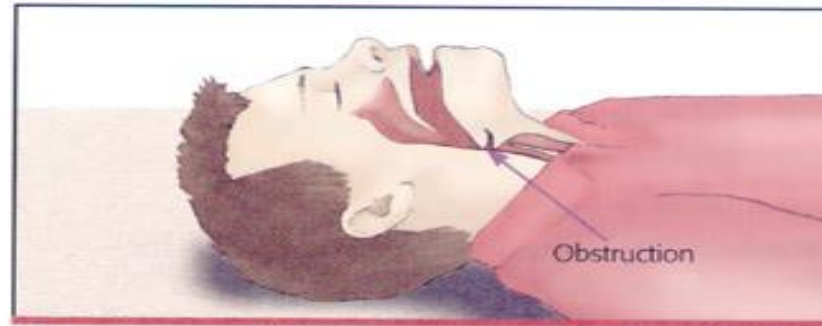
رهاسازی کامل دست بین ماساژها

به حداقل رساندن هر گونه تداخل و تاخیر در ماساژ

اجتناب از ونتیلاسیون اضافی

Open the Mouth & Airway

Head Tilt/Chin Lift



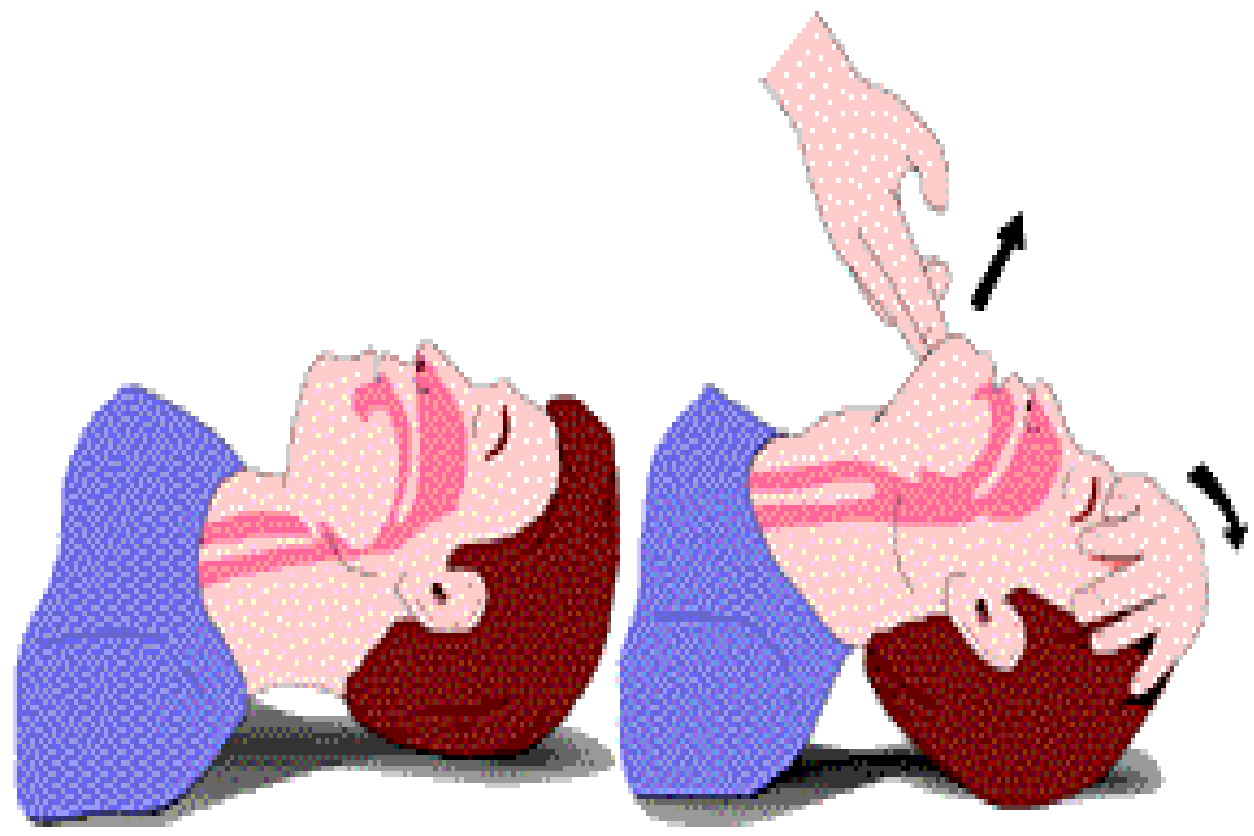
A common cause of airway obstruction is the tongue blocking the airway.



Open the patient's airway using the head-tilt/chin-lift technique.



The jaw-thrust maneuver should open the patient's airway without extending the neck.



Open AIRWAY





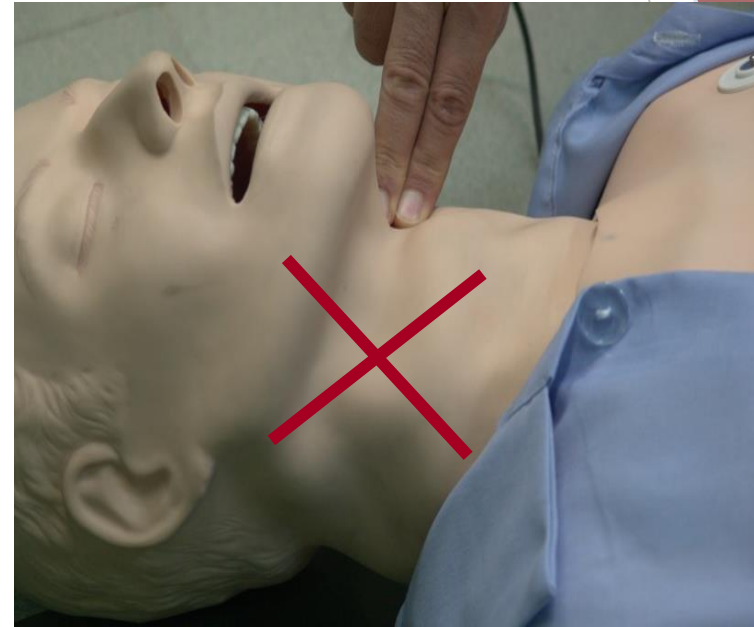
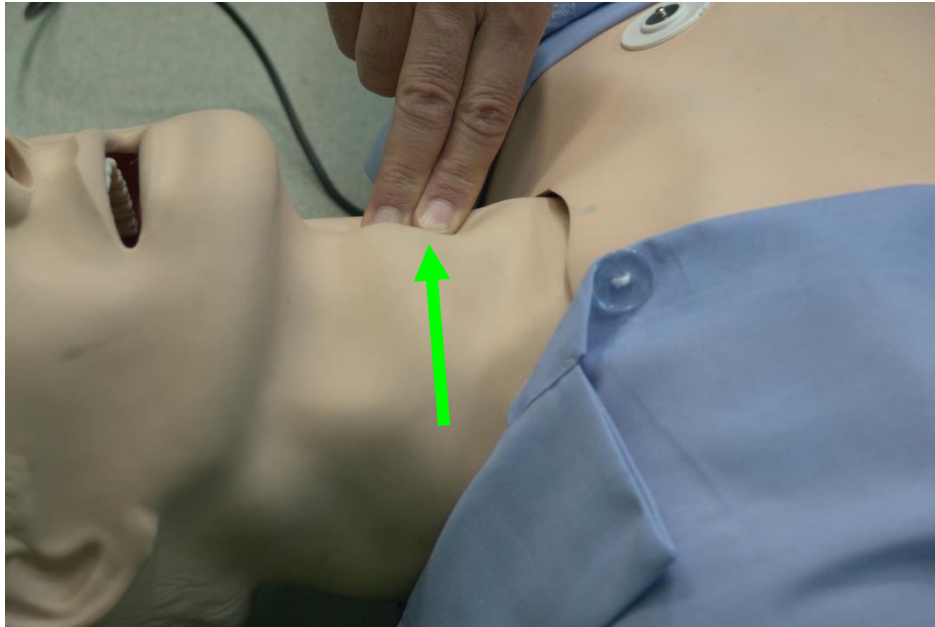
Oxygen Dose During CPR

- ▶ *Treatment Recommendation*
- ▶ This treatment recommendation (below) is unchanged from 2015.
- ▶ We suggest using the highest possible inspired oxygen concentration during CPR (**weak recommendation, very low-certainty evidence**).

چک پالس

در CPR

Check Pulse



لمس کدام نبض مهم است ؟

✓ کاروتید

✓ فمورال

✓ داخل بازوئی (براکیال)



circulation

Check pulse:

brachial, femoral, carotid

Which finger?

2nd , 3rd

Max. time?

check breathing & pulse , max 10 s.

In hypothermia ->->-> 35 s.

ریتم های شوک پذیر

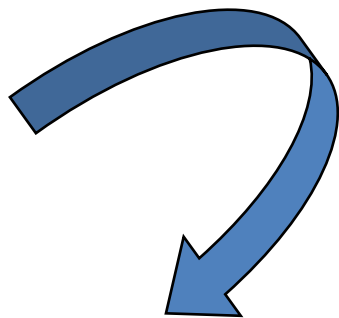
Vf / VT

ریتم های شوک ناپذیر

PEA / آسیستول

ریتم را کنترل نمائید

VT, VF



PEA, Asystole



Pediatrics CPR Major Update 2020

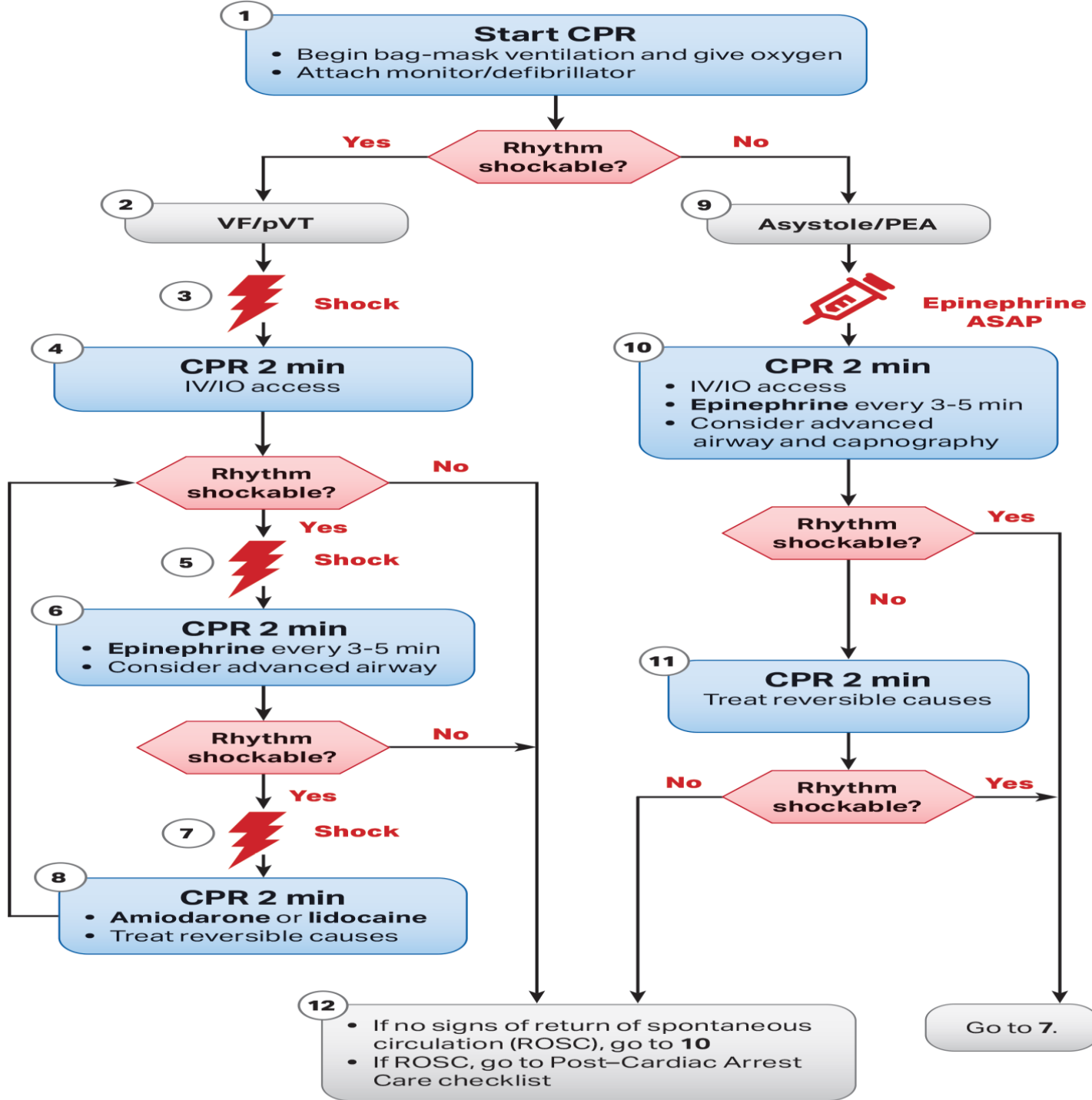
12-20/min
2010

- 1) For infants and children with a pulse but absent or inadequate respiratory effort, **give 1 breath every 2 to 3 seconds (20-30 breaths/min).**
- 2) When performing CPR in infants and children with an advanced airway, it may be reasonable to target a respiratory rate range of 1 breath every 2 to 3 seconds (20-30/min), accounting for age and clinical condition.

CPR Quality In Pediatrics

- Push hard ($\geq \frac{1}{3}$ of anteroposterior diameter of chest) and fast (100-120/min) and allow complete chest recoil
- Minimize interruptions in compressions
- Change compressor every 2 minutes, or sooner if fatigued
- If no advanced airway, 15:2 compression-ventilation ratio
- If advanced airway, provide continuous compressions and give a breath every 2-3 seconds

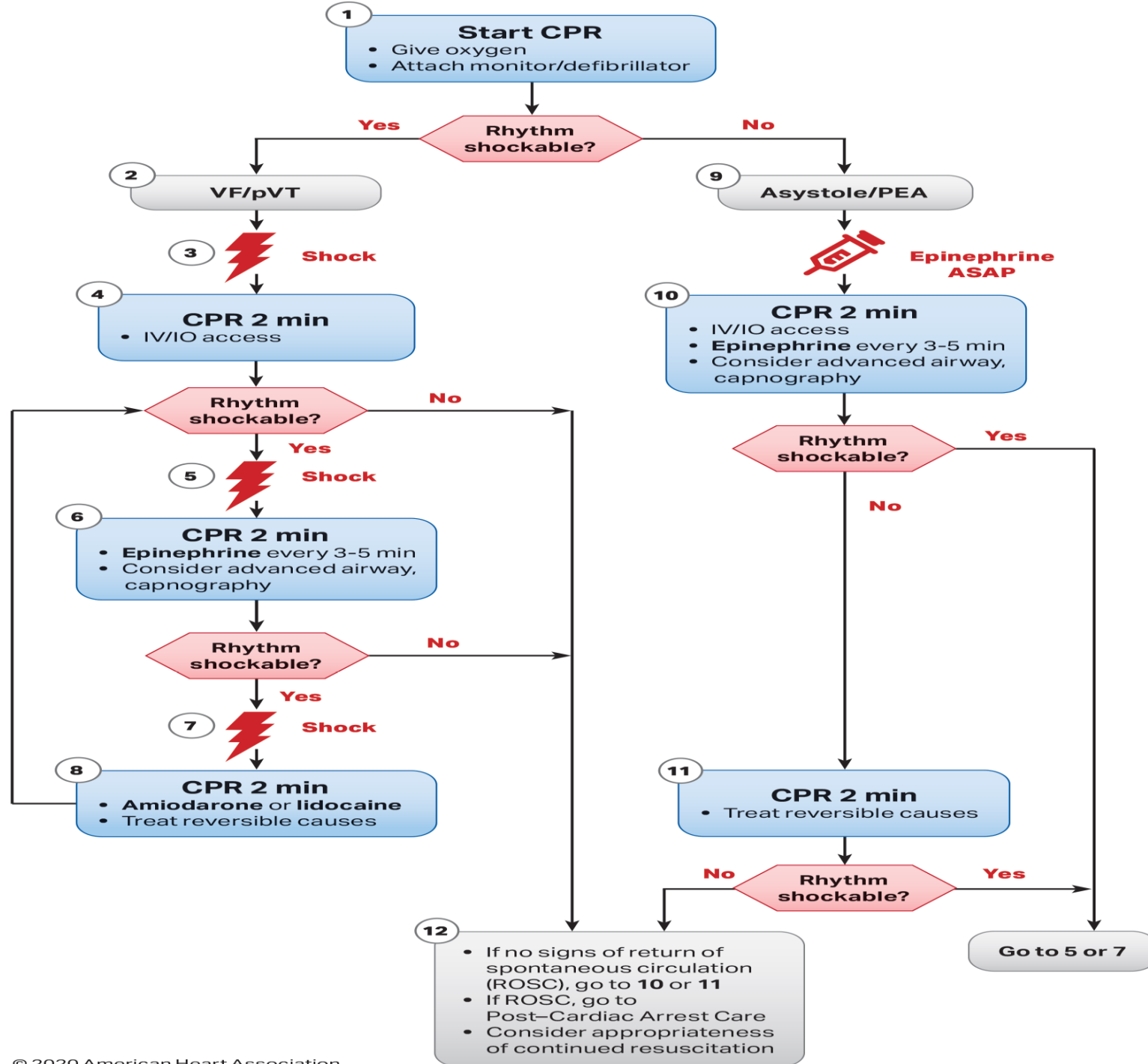
Pediatric Cardiac Arrest Algorithm.



Pediatrics Drug Therapy in CPR

- **Epinephrine IV/IO dose:**
0.01 mg/kg (0.1 mL/kg of the 0.1 mg/mL concentration).
Max dose 1 mg.
Repeat every 3-5 minutes.
If no IV/IO access, may give endotracheal dose: 0.1 mg/kg (0.1 mL/kg of the 1 mg/mL concentration).
- **Amiodarone IV/IO dose:**
5 mg/kg bolus during cardiac arrest. May repeat up to 3 total doses for refractory VF/pulseless VT
or
Lidocaine IV/IO dose:
Initial: 1 mg/kg loading dose

Adult cardiac arrest algorithm



Adult cardiac arrest

CPR Quality

- Push hard (at least 2 inches [5 cm]) and fast (100-120/min) and allow complete chest recoil.
- Minimize interruptions in compressions.
- Avoid excessive ventilation.
- Change compressor every 2 minutes, or sooner if fatigued.
- If no advanced airway, 30:2 compression-ventilation ratio.
- Quantitative waveform capnography
 - If PETCO₂ is low or decreasing, reassess CPR quality.

Adult defibrillation

Shock Energy for Defibrillation

- **Biphasic:** Manufacturer recommendation (eg, initial dose of 120-200 J); if unknown, use maximum available. Second and subsequent doses should be equivalent, and higher doses may be considered.
- **Monophasic:** 360 J

Adult CPR

Drug Therapy

- **Epinephrine IV/IO dose:**
1 mg every 3-5 minutes
- **Amiodarone IV/IO dose:**
First dose: 300 mg bolus.
Second dose: 150 mg.
or
Lidocaine IV/IO dose:
First dose: 1-1.5 mg/kg.
Second dose: 0.5-0.75 mg/kg.

Reversible Causes

- **Hypovolemia**
- **Hypoxia**
- **Hydrogen ion (acidosis)**
- **Hypo-/hyperkalemia**
- **Hypothermia**
- **Tension pneumothorax**
- **Tamponade, cardiac**
- **Toxins**
- **Thrombosis, pulmonary**
- **Thrombosis, coronary**

Dro

Drowning

**Unresponsive and
not breathing normally?**

**Shout for help and
call emergency services**

Open airway

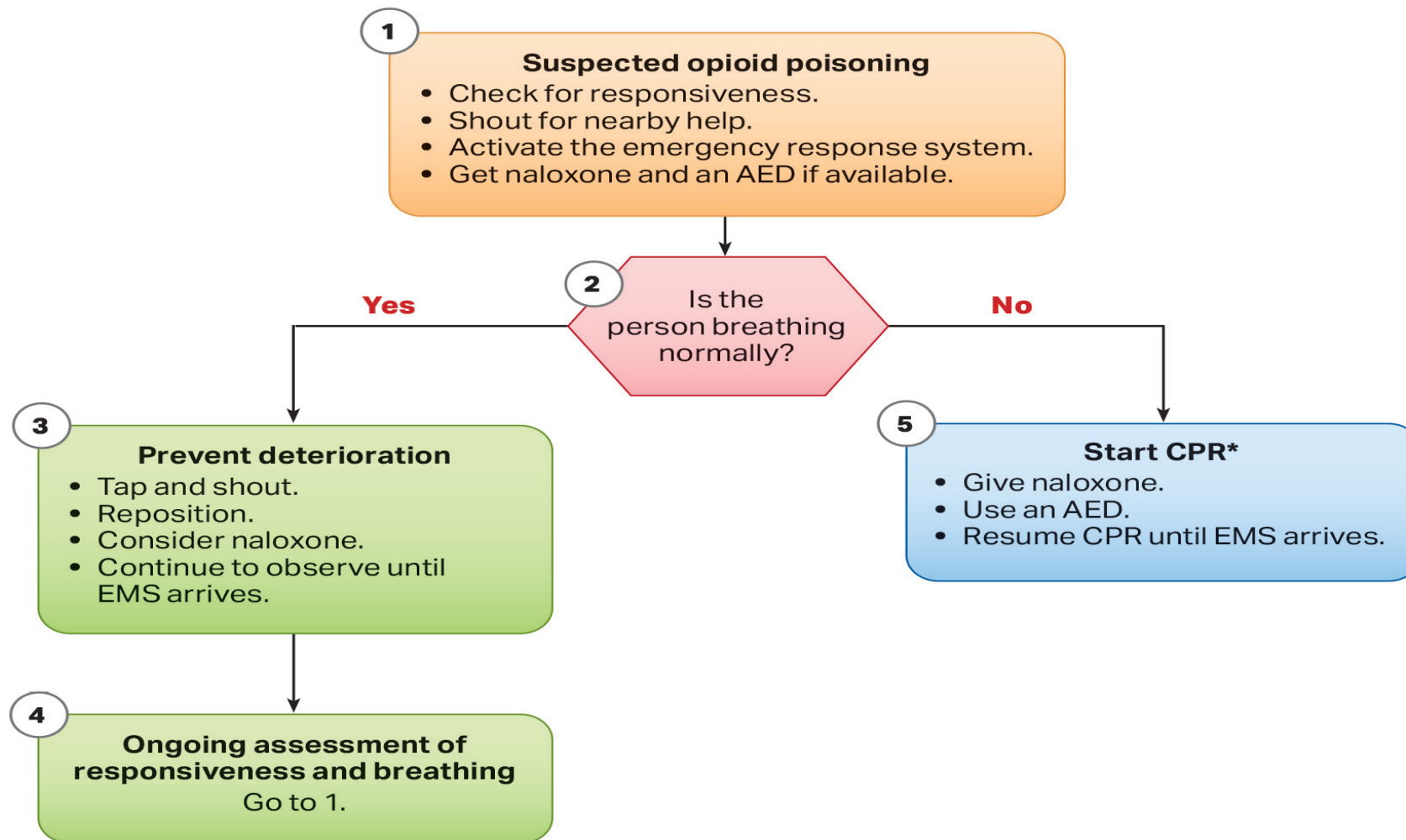
**Give 5 rescue breaths / ventilations
supplemented with oxygen if possible**

Signs of life?

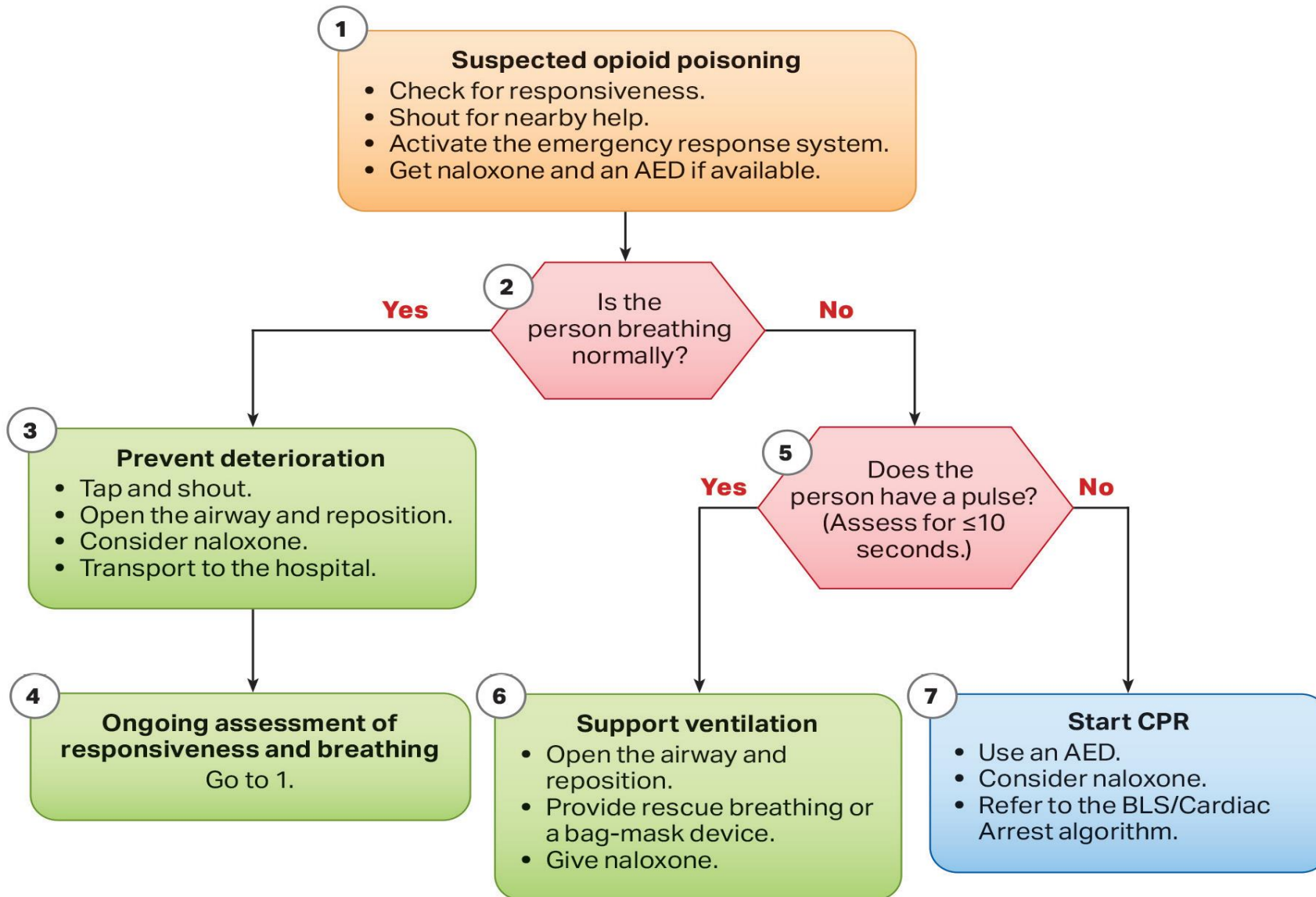
Start CPR 30:2

**Attach AED and
follow instructions**

Opioid-Associated Emergency for Lay Responders Algorithm



Opioid-Associated Emergency for Healthcare Providers Algorithm



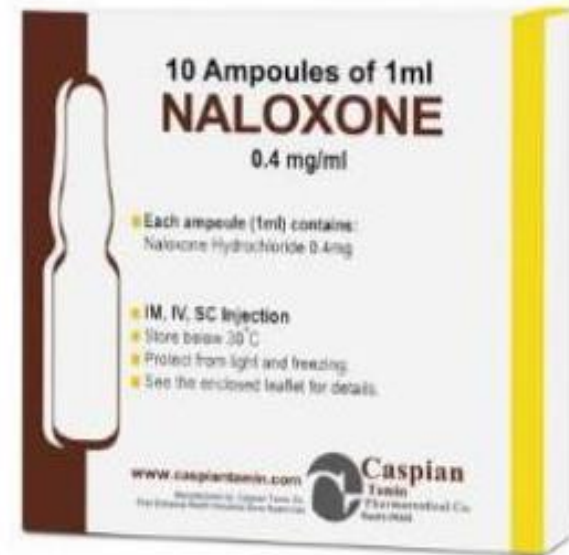
Opioid Toxicity

- ▶ Treatment Recommendations
- ▶ This treatment recommendation (below) is unchanged from 2015
- ▶ We recommend the use of naloxone by IV, intramuscular, subcutaneous, IO, or intranasal routes in respiratory arrest associated with opioid toxicity **(strong recommendation, very low-quality evidence).**
- ▶ We can make no recommendation about the modification of standard ALS in opioid-induced cardiac arrest

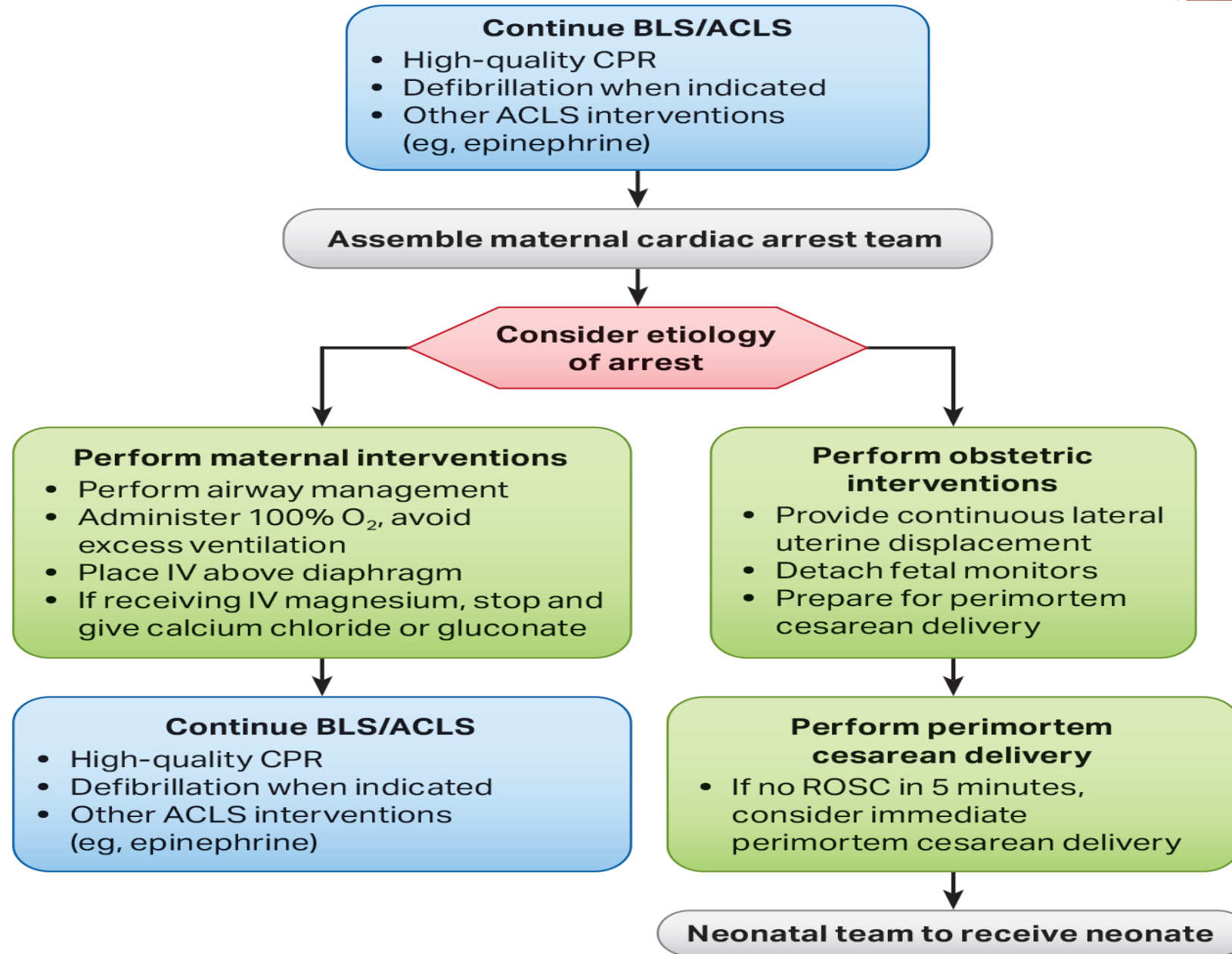
• IN داخل بینی: 2 میلی گرم



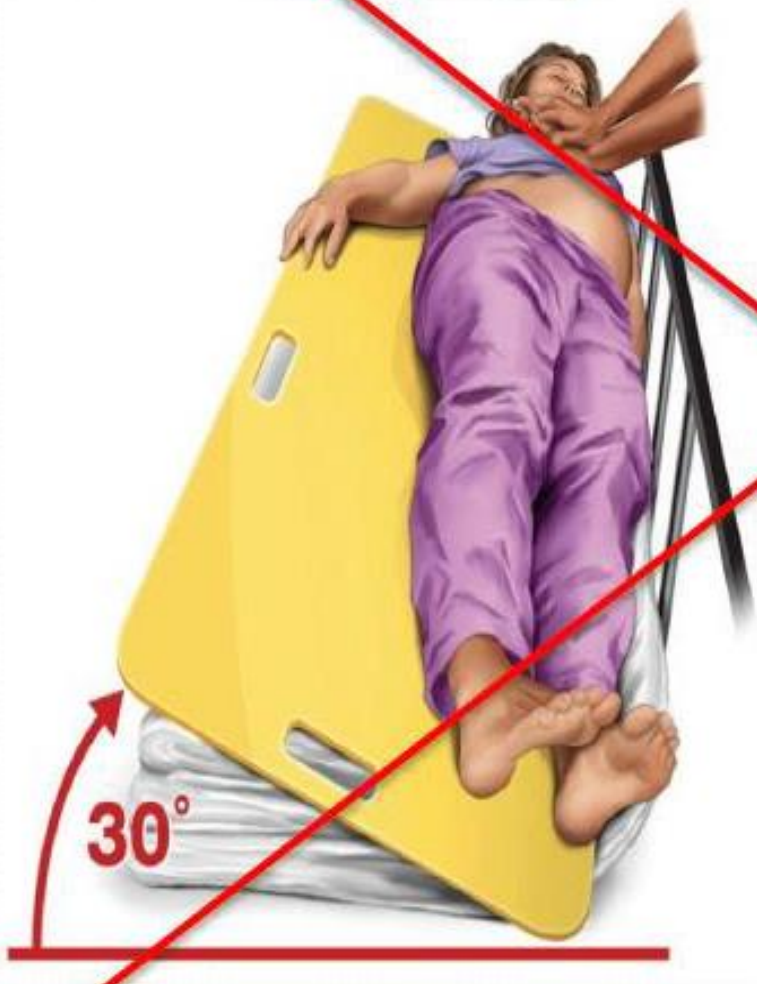
• IM عضلانی: 4 میلی گرم



Cardiac Arrest in Pregnancy In-Hospital ACLS



وضعیت دادن به خانم باردار



- در حاملگی خوابیده به پهلو چپ باید از **تخته وچ** شکل استفاده شود

- موقع **CPCR** باید این بیماران را در زاویه **27-30 درجه** قرار داد یا با دست رحم را به سمت چپ جابجا کرد.

وضعت دادن به خانم باردار

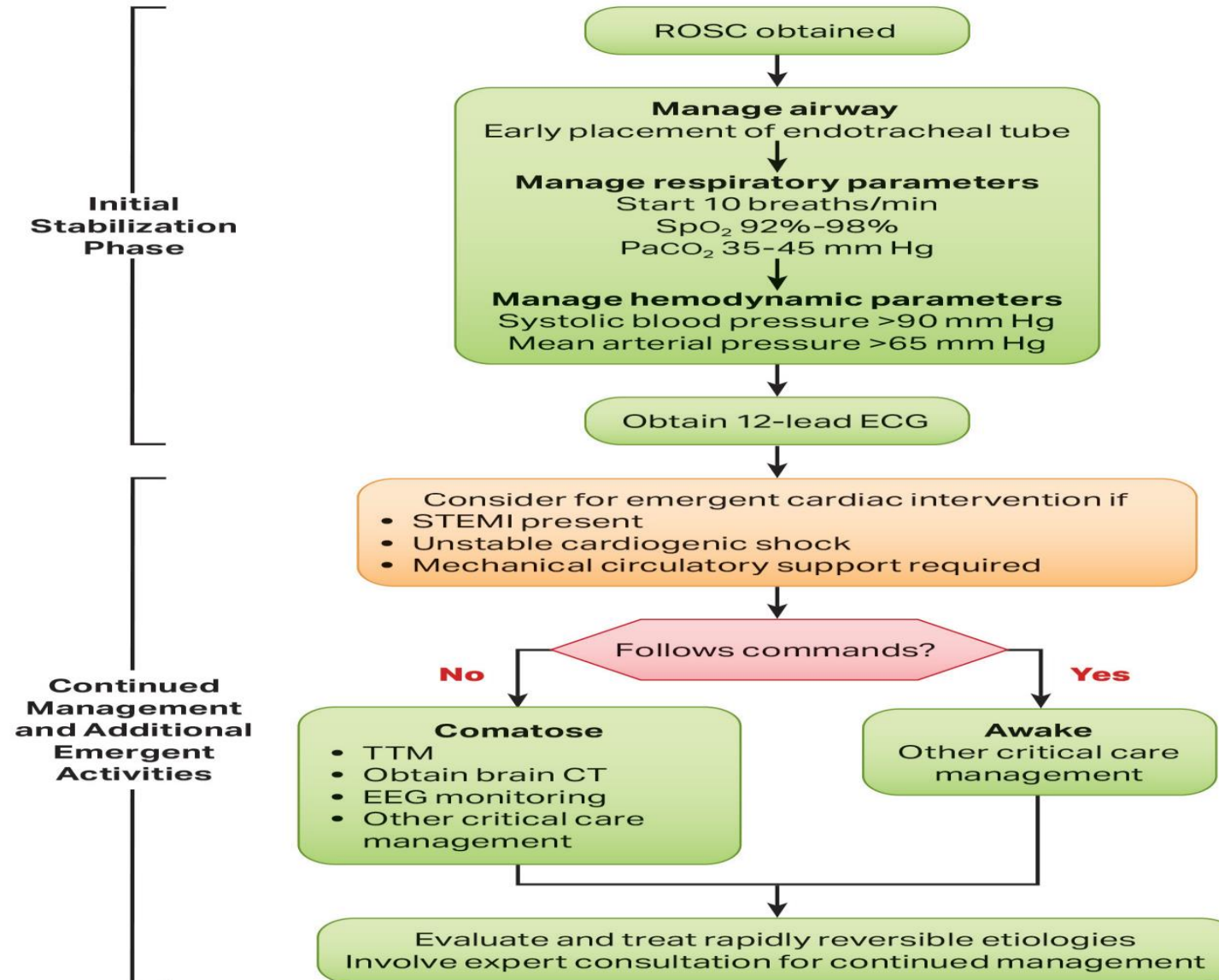
- تکنیک دیگر برای برداشتن فشار از روی آئورت واجوف:
جابجایی رحم به سمت چپ با تکنیک 1 و 2 دستی



Cardiac Arrest in Pregnancy

- ▶ *Treatment Recommendation*
- ▶ This treatment recommendation (below) is unchanged from 2015.
- ▶ We suggest delivery of the fetus by perimortem cesarean delivery for women in cardiac arrest in the second half of pregnancy **(weak recommendation, very low-quality evidence)**.
- ▶ There is insufficient evidence to define a specific time interval by which delivery should begin.
- ▶ High-quality usual resuscitation care and therapeutic interventions that target the most likely cause(s) of cardiac arrest remain important in this population.
- ▶ There is insufficient evidence to make a recommendation about the use of left-lateral tilt and/or uterine displacement during CPR

Adult Post-Cardiac Arrest Care Algorithm



Adult Immediate Post-Cardiac Arrest Care Algorithm

VENTILATION/OXYGENATION:

Avoid excessive ventilation. Start at 10 to 12 breaths per minute and titrate to target PETCO₂ of 35 to 40 mm Hg.

DOSES/DETAILS

IV Bolus:

1 to 2 liters normal saline or Lactated Ringer's. If inducing hypothermia, consider 4°C fluid.

Epinephrine IV Infusion:

0.1 to 0.5 mcg/kg per minute

Dopamine IV Infusion:

5 to 10 mcg/kg per minute

Norepinephrine IV Infusion:

0.1 to 0.5 mcg/kg per minute

REVERSIBLE CAUSES:

- Hypovolemia
- Hypoxia
- H⁺ (acidosis)
- Hypothermia
- Hypo-/hyperkalemia
- Tamponade, cardiac
- Toxins
- Tension pneumothorax
- Thrombosis, pulmonary

RETURN OF
SPONTANEOUS
CIRCULATION

Optimize Ventilation and Oxygenation

- Maintain O₂ saturation $\geq 94\%$
- Consider advanced airway and waveform capnography
- Do not hyperventilate

Treat hypotension (SBP <90 mm Hg)

- IV/IO fluid bolus
- Vasopressor infusion
- Consider treatable causes
- Assess 12-lead ECG

FOLLOW COMMANDS?

YES

NO

STEMI OR HIGH
SUSPICION OF AMI

CONSIDER
INDUCED
HYPOTHERMIA

CORONARY
REPERFUSION

ADVANCED CRITICAL CARE

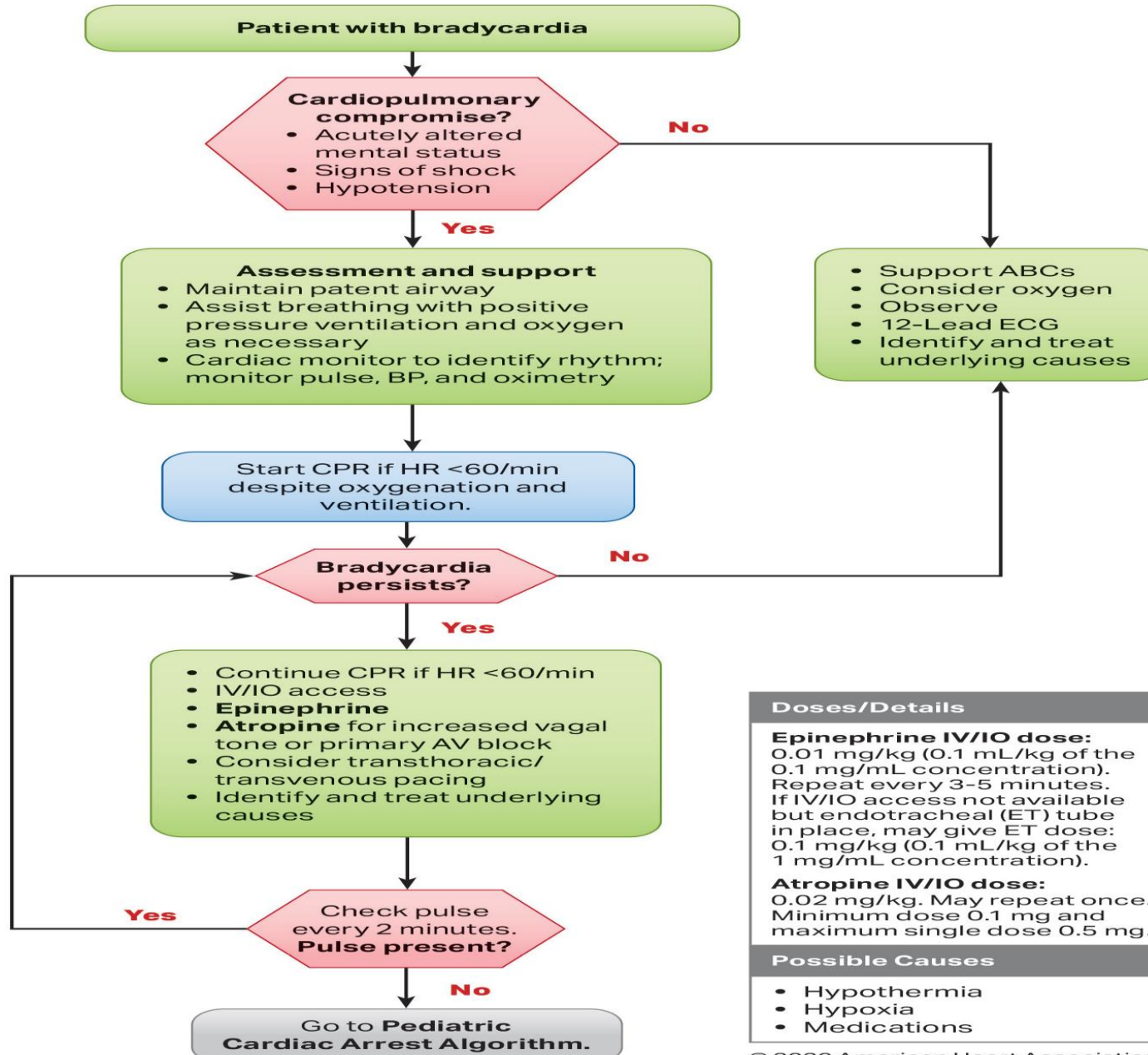
NO

YES

Oxygen Dose After ROSC in Adults

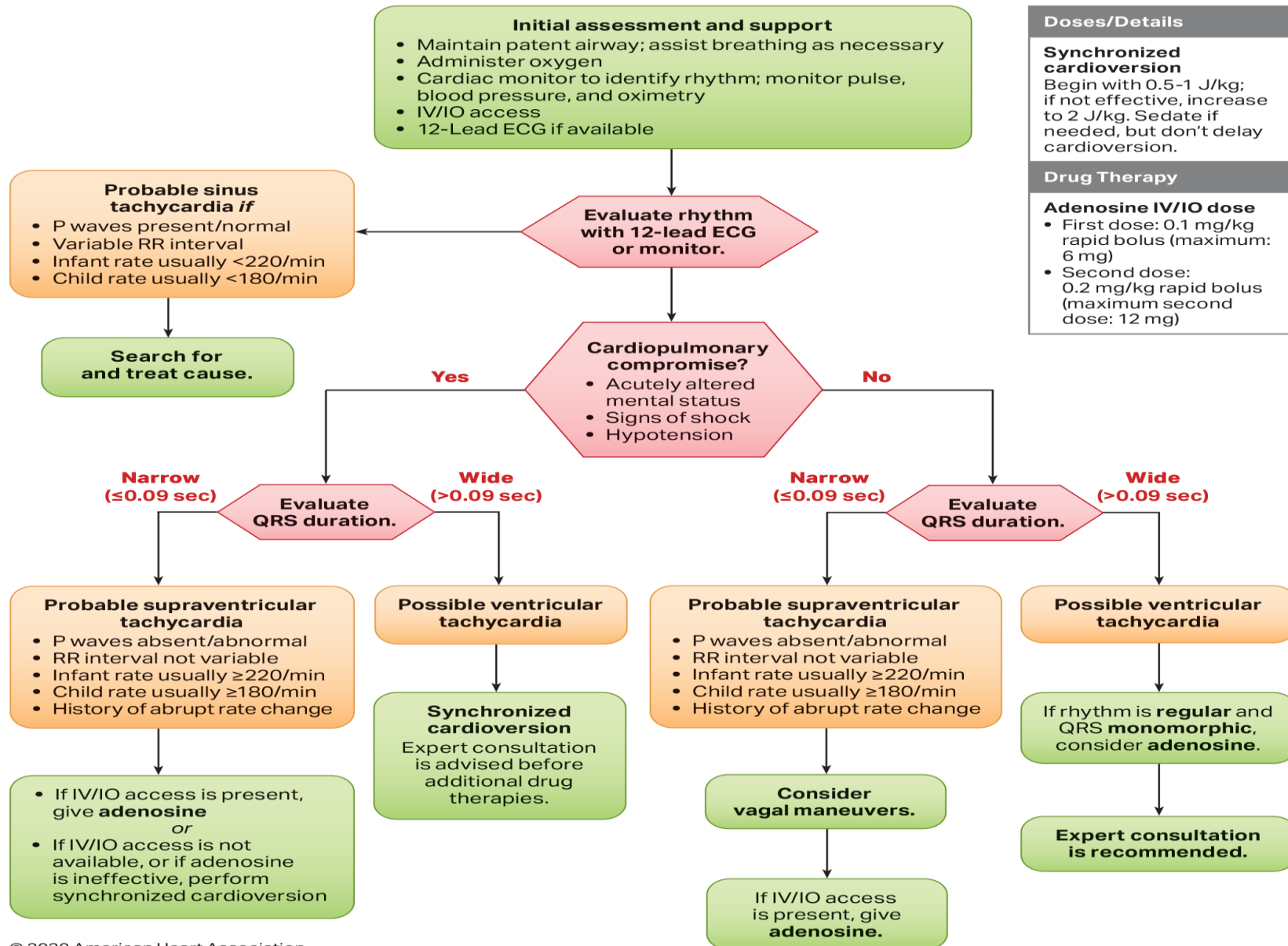
- ▶ Both hypoxemia and hyperoxemia during postresuscitation care have been associated with worse outcomes.
- ▶ **Hypoxemia** may **worsen ischemic brain** injury and injury to other organs, and **hyperoxemia** may lead to **increased oxidative stress and organ damage after reperfusion**
- ▶ *Treatment Recommendations*
- ▶ We suggest the use of 100% inspired oxygen until the arterial oxygen saturation or the partial pressure of arterial oxygen can be measured reliably in adults with ROSC after cardiac arrest in any setting
(**weak recommendation, very low-certainty evidence**).
- ▶ We recommend avoiding hypoxemia in adults with ROSC after cardiac arrest (**strong recommendation, very low-certainty evidence**).
- ▶ We suggest avoiding hyperoxemia in adults with ROSC (**weak recommendation, low-certainty evidence**).

Pediatric Bradycardia With a Pulse Algorithm



Doses/Details
<p>Epinephrine IV/IO dose: 0.01 mg/kg (0.1 mL/kg of the 0.1 mg/mL concentration). Repeat every 3-5 minutes. If IV/IO access not available but endotracheal (ET) tube in place, may give ET dose: 0.1 mg/kg (0.1 mL/kg of the 1 mg/mL concentration).</p> <p>Atropine IV/IO dose: 0.02 mg/kg. May repeat once. Minimum dose 0.1 mg and maximum single dose 0.5 mg.</p>
Possible Causes
<ul style="list-style-type: none"> • Hypothermia • Hypoxia • Medications

Pediatric Tachycardia With a Pulse Algorithm



Doses/Details
Synchronized cardioversion Begin with 0.5-1 J/kg; if not effective, increase to 2 J/kg. Sedate if needed, but don't delay cardioversion.
Drug Therapy
Adenosine IV/IO dose • First dose: 0.1 mg/kg rapid bolus (maximum: 6 mg) • Second dose: 0.2 mg/kg rapid bolus (maximum second dose: 12 mg)

CPR طولانی مدت

