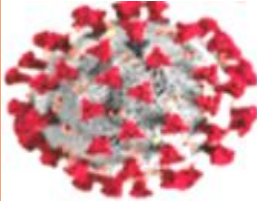






American  
Heart  
Association®

# COVID-19 + CPR



خلیل برهان زہمی  
کارشناس ارشد پرستاری  
اورژانس

اللہ یحفظکم



مراقبت‌های حوزه سلامت در هنگام همه‌گیری عفونی، دشوارتر و نیازمند ملاحظات دقیق‌تری است. برخی اقدامات معمول برای احیای قلبی- ریوی (Cardiopulmonary Resuscitation (CPR) با نام فرآیندهای ایجاد کننده آئروسول (Aerosol Generating Procedures (AGP)) شناخته شده و از جمله پر خطرترین فرآیندهای انتقال دهنده COVID-19 به کادر درمان و محیط می‌باشند. درمان افراد نیازمند احیا (CPR) و همزمان محافظت از ایشان در برابر عفونت جاری، به همراه پیشگیری از سرایت عفونت به بیماران دیگر، همراهان، و کادر درمان، مجموعه دقیقی از پیش‌بینی‌ها و آمادگی‌ها را طلب می‌کند.

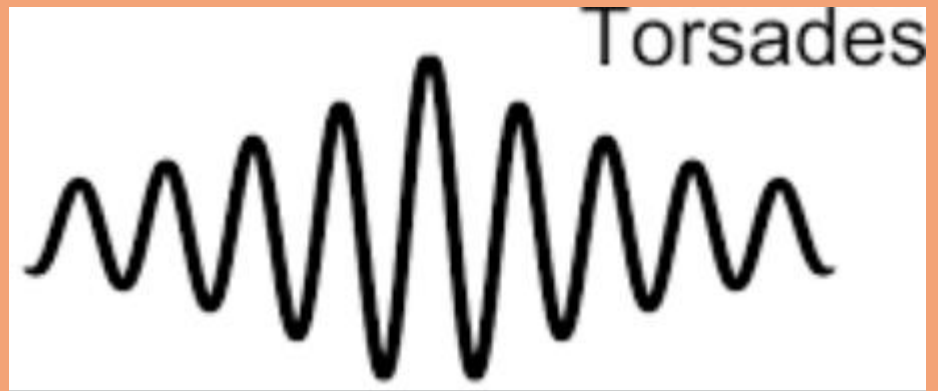
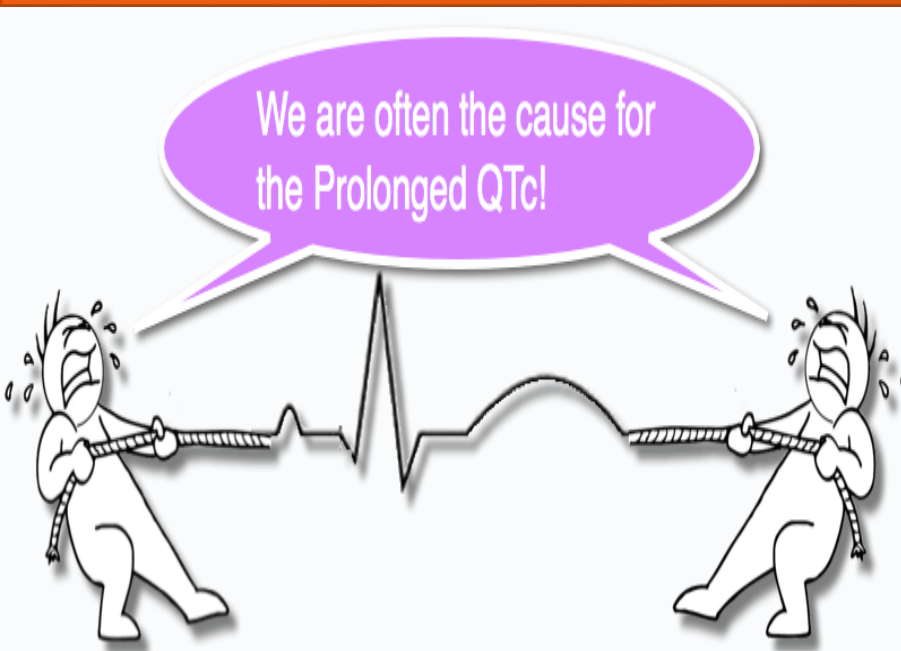
- The outbreak of SARS-CoV2 infections has created important challenges:
  - **P**atients with or without COVID-19?
  - **C**COVID-19 is highly transmissible, particularly during resuscitation.



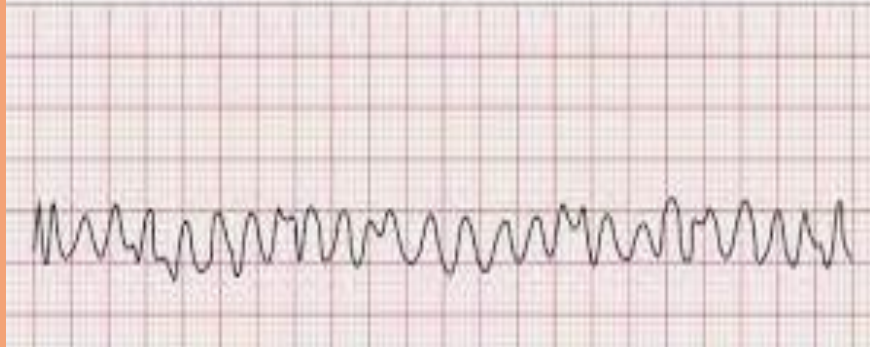
- Cardiac arrest survival occurring both **in-hospital** and **out-hospital**.
- That success has relied on initiating proven resuscitation interventions, such as high-quality chest compressions and defibrillation, within **seconds to minutes**.

- Patients with COVID+ require:
  - Hospital admission **12%-19%**
  - Critically ill **3%-6%**

- Hypoxemic respiratory failure secondary to **ARDS**, **myocardial injury**, **ventricular arrhythmias**, and **shock** are common among critically ill patients and predispose them to **cardiac arrest**, as do some of the proposed treatments, such as hydroxychloroquine and azithromycin, which can **prolong the QT**.



Ventricular Fibrillation (VF)



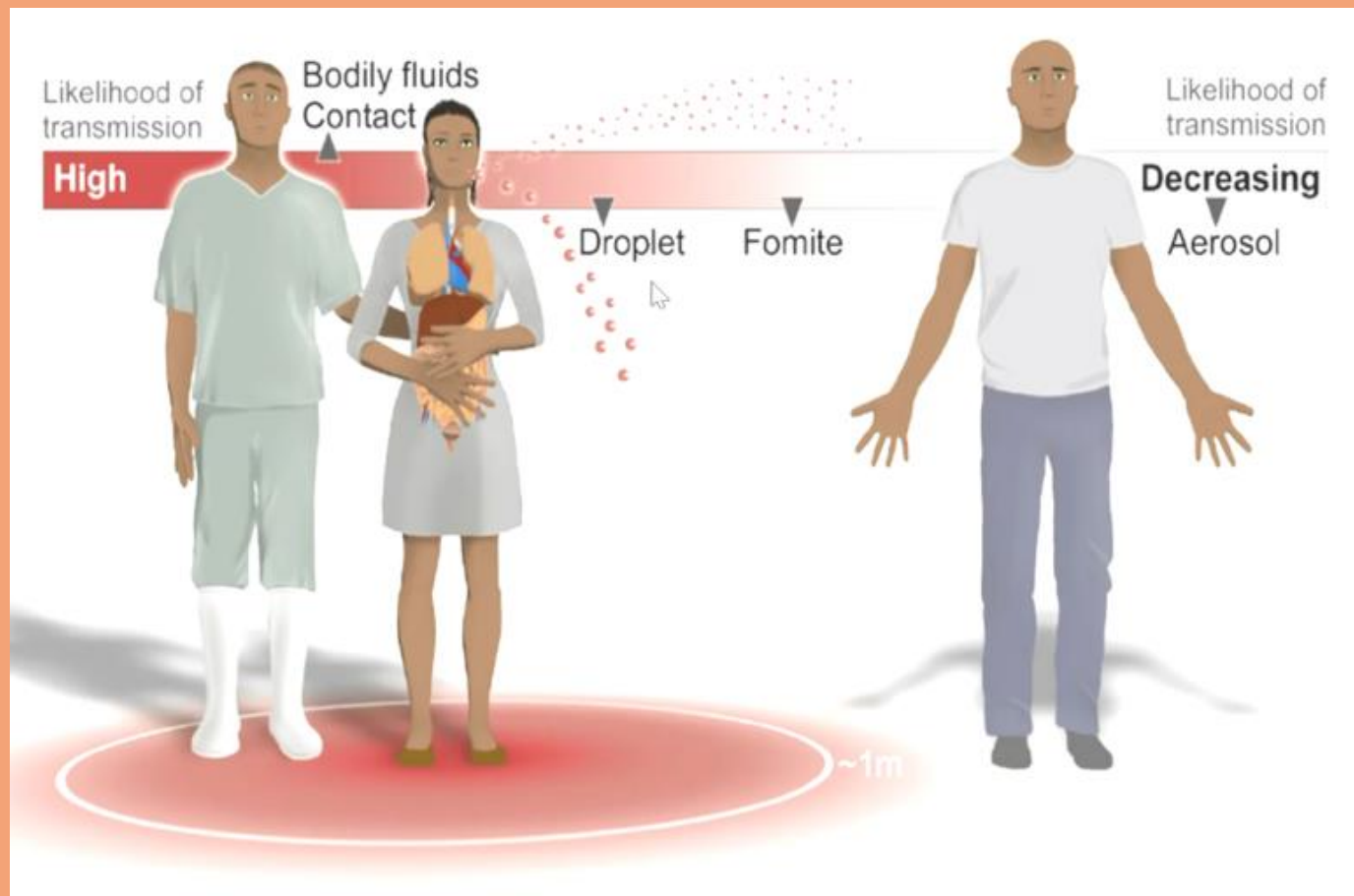
**SCD**



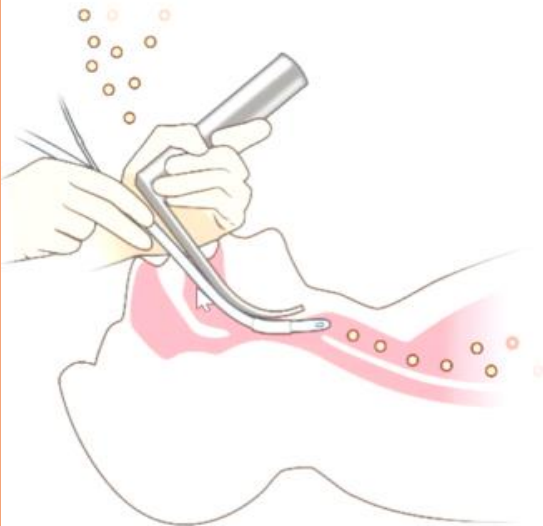
- Healthcare workers are already the **highest risk** profession for contracting the disease. This risk is compounded by worldwide shortages of (PPE).

- Resuscitations added risk for many reasons:
- 1- CPR including **aerosol-generating procedures**  
*Chest compressions, PPV, and Airway management.*

During those procedures, viral particles can remain suspended in the air with a half-life of approximately **1 hour** and be inhaled by those nearby.



Induced aerosol generation in  
respiratory tract



*Examples: Intubation, Bronchoscopy, CPR*

Mechanical aerosol generation in  
respiratory tract



*Examples: Ventilation, Suctioning*

- 2. Resuscitation efforts require **close contact** with patient.
- 3. these efforts are **high-stress** emergent events in which the immediate needs of the patient requiring resuscitation may result in lapses in infection control practices.



- AHA:

CPR recommendations in the context of the COVID-19 pandemic and considered the unique pathophysiology of COVID-19 with reversal of hypoxemia as a central goal.

# Out-Hospital Cardiac Arrest

- Recognize cardiac arrest:
- Looking for the absence of signs of life
  - **Absence of normal breathing.**
  - **Feel for a carotid pulse** if trained.

Do not listen or feel for breathing by placing your ear and cheek close to the patient's mouth.



- If there are any doubts about the diagnosis of cardiac arrest, the default position is to **start chest compressions** until help arrives.

- Depending on **local prevalence** of disease and evidence of community spread, it may be reasonable to suspect COVID-19 in all OHCA's, by default.

## Out-of-Hospital Cardiac Arrest (OHCA)

- **Bystander CPR** are at risk to COVID-19 during CPR
- Rescuers with increasing age and the presence of comorbid conditions, such as heart disease, diabetes, hypertension, and chronic lung disease, are at increased risk of becoming critically ill if infected with SARS-CoV2

# BLS Healthcare Provider Adult Cardiac Arrest Algorithm for Suspected or Confirmed COVID-19 Patients

*Updated April 2020*

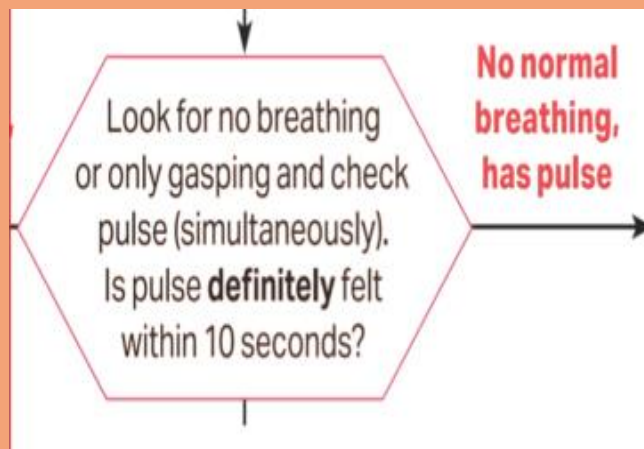
Verify scene safety

- **Don PPE**
- **Limit personnel**



Victim is unresponsive.  
Shout for nearby help.  
Activate emergency response system  
via mobile device (if appropriate).  
Get AED and emergency equipment  
(or send someone to do so).





- Provide rescue breathing using bag-mask device with filter and tight seal.
- 1 breath every 5-6 seconds, or about 10-12 breaths/min.
- Activate emergency response system (if not already done) after 2 minutes.
- Continue rescue breathing; check pulse about every 2 minutes. If no pulse, begin CPR (go to "**CPR**" box).
- If possible opioid overdose, administer naloxone if available per protocol.

**No breathing  
or only gasping,  
no pulse**



**CPR**

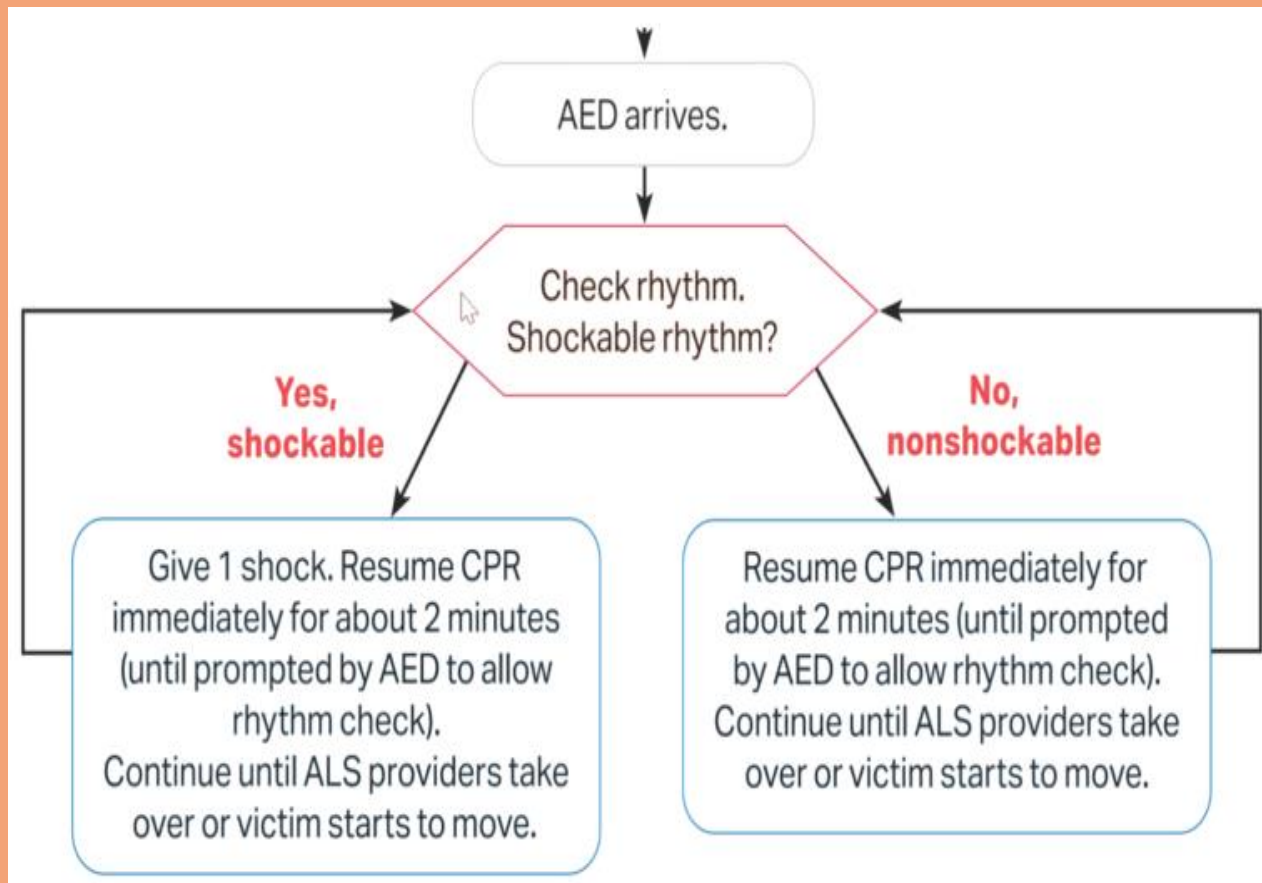
Begin cycles of 30 compressions and 2 breaths  
using bag-mask device with filter and tight seal

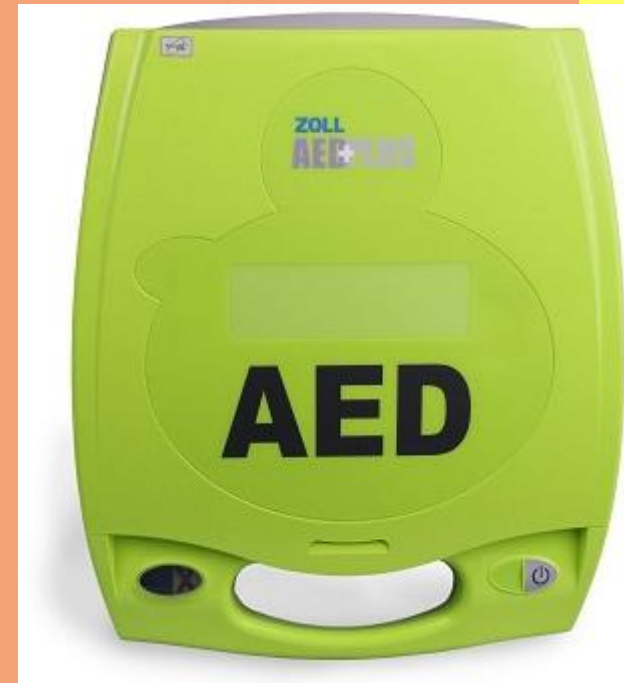
OR

continuous compressions with passive  
oxygenation using face mask.

Use AED as soon as it is available.





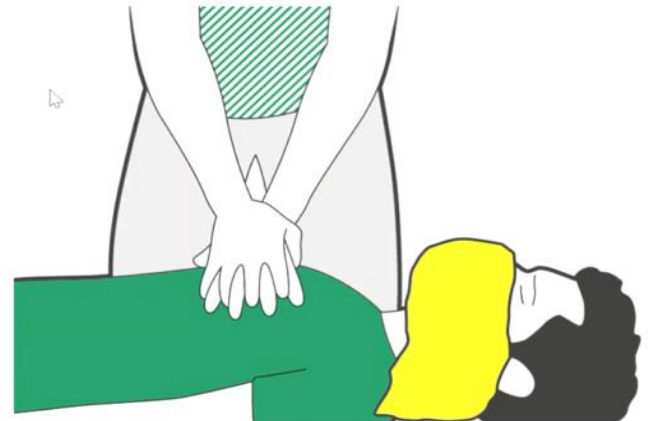


## Chest compressions

- **For adults:** at least **hands-only CPR**, especially if they are household members who have been exposed to the victim at home.
- A face mask or cloth covering the mouth and nose of the rescuer and/or victim may reduce the risk of transmission to a non-household bystander



## Cover mouth





## Chest compressions

- **For children:** Lay rescuers should perform chest compressions and consider **mouth-to-mouth ventilation**.
- If unable or unwilling, a face mask or cloth covering the mouth and nose of the rescuer and/or victim may reduce the risk of transmission.

## Telecommunication (Dispatch):

- Screen all calls for COVID-19 symptoms (eg, fever, cough, shortness of breath).



## Transport

- Family members and other contacts of patients with suspected or confirmed COVID-19 should not ride in the transport vehicle.



# Transport

- If return of spontaneous circulation (ROSC) **has not been achieved** after appropriate resuscitation efforts in the field, consider not transferring to hospital given the low likelihood of survival for the patient, balanced against the added risk of additional exposure to prehospital and hospital providers.





## In-Hospital Cardiac Arrest (IHCA)

- Pre-arrest

If the patient is at risk for cardiac arrest, consider proactively moving the patient to a negative pressure room/unit, if available, to minimize risk of exposure to rescuers during a resuscitation

- Close the door, when possible, to prevent *airborne contamination* of adjacent indoor space.

بسته کامل PPE را از محل تعیین شده در بخش خود بردارید. پیش از شروع CPR آن را بپوشید. این بسته می‌بایست شامل موارد زیر باشد: گان جراحی بلند یا گان یکسره ضد آب، دو جفت دستکش، یک عدد ماسک N95 یا FFP2 یا FFP3، کلاه، عینک یا شیلد صورت، و یک جفت روکفشی باشد. هرگز پیش از مجهز شدن به پوشش فوق، CPR را شروع نکنید. این کار ممکن است شروع پروسه احیا را اندکی به تاخیر بیندازد؛ با این حال حفظ ایمنی اعضای تیم درمان در اولویت است. با آماده‌سازی بسته‌های PPE به تعداد کافی در محل معرفی شده به پرسنل (مثلاً ترالی اورژانس) می‌توانید تاخیر احیا را به حداقل برسانید.

## ACLS Cardiac Arrest Algorithm for Suspected or Confirmed COVID-19 Patients

A

### Don PPE

- Limit personnel
- Consider resuscitation appropriateness

1



### Start CPR

- Give oxygen (limit aerosolization)
- Attach monitor/defibrillator
- Prepare to intubate

1

## General Principles for Resuscitation in COVID-19 Patients

- **Reduce provider exposure to COVID-19 (Strategies):**
  - Before entering the scene, all rescuers should don PPE
  - Limit personnel in the room
  - Consider mechanical chest compressions devices
  - Clearly communicate COVID-19 status to any new providers before their arrival on the scene



6 Team members in CPR



## INSIDE

MONITOR

DRUGS  
AND  
MONITOR

INTUBATOR

CRICOID  
AND  
EQUIPMENT

AIRWAY  
EQUIPMENT



## OUTSIDE

RUNNER



# Start Chest Compression

- **High Quality Chest Compression:**

- **As soon as possible**
- **Minimal interruption**
- **Avoid hyperventilation**
- **Rate: 100-120 c/min**
- **Depth: 5-6 cm**

## 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  $PETCO_2 < 10$  mm Hg, attempt to improve CPR quality.
- Intra-arterial pressure
  - If relaxation phase (diastolic) pressure  $< 20$  mm Hg, attempt to improve CPR quality.

## Proned patients at the time of arrest

- Patients who are in the prone position with an advanced airway, avoid turning the patient to the supine position unless able to do so without risk of equipment disconnections and aerosolization.

hands in the standard position over the **T 7/10**

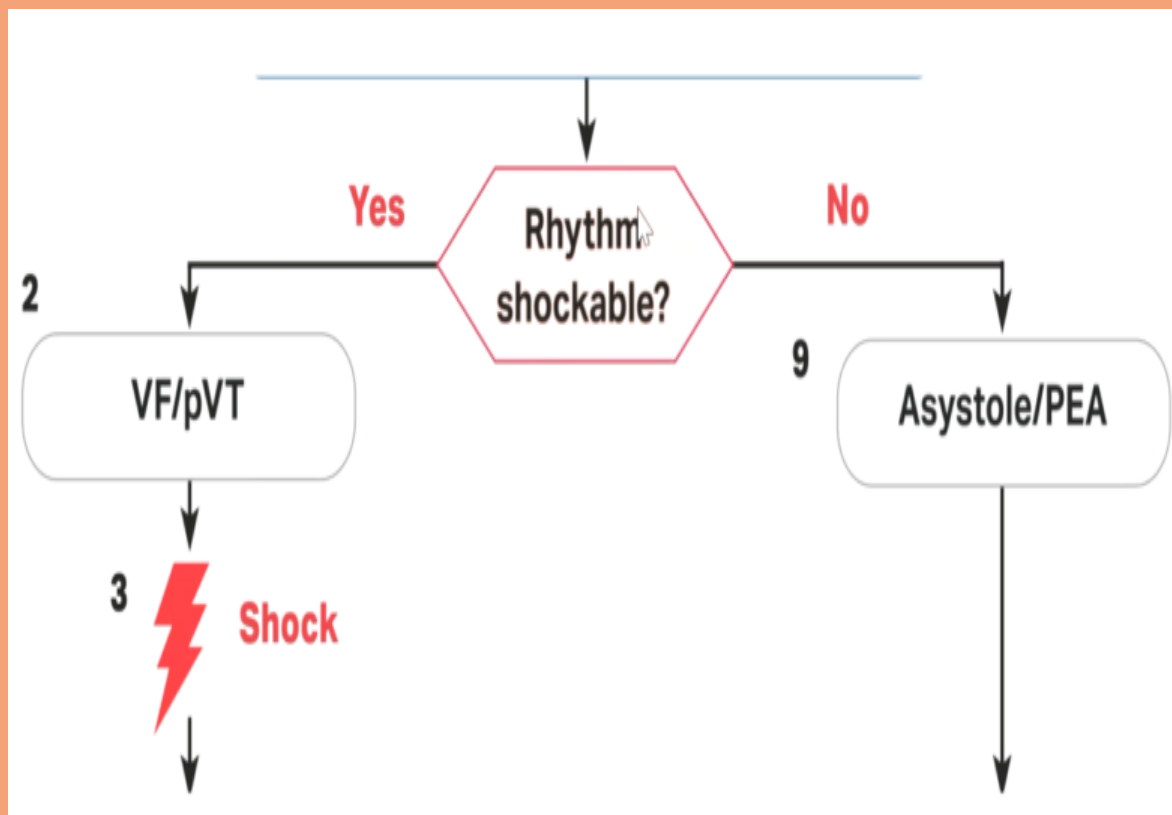


Defib. pads in posterior-apical position









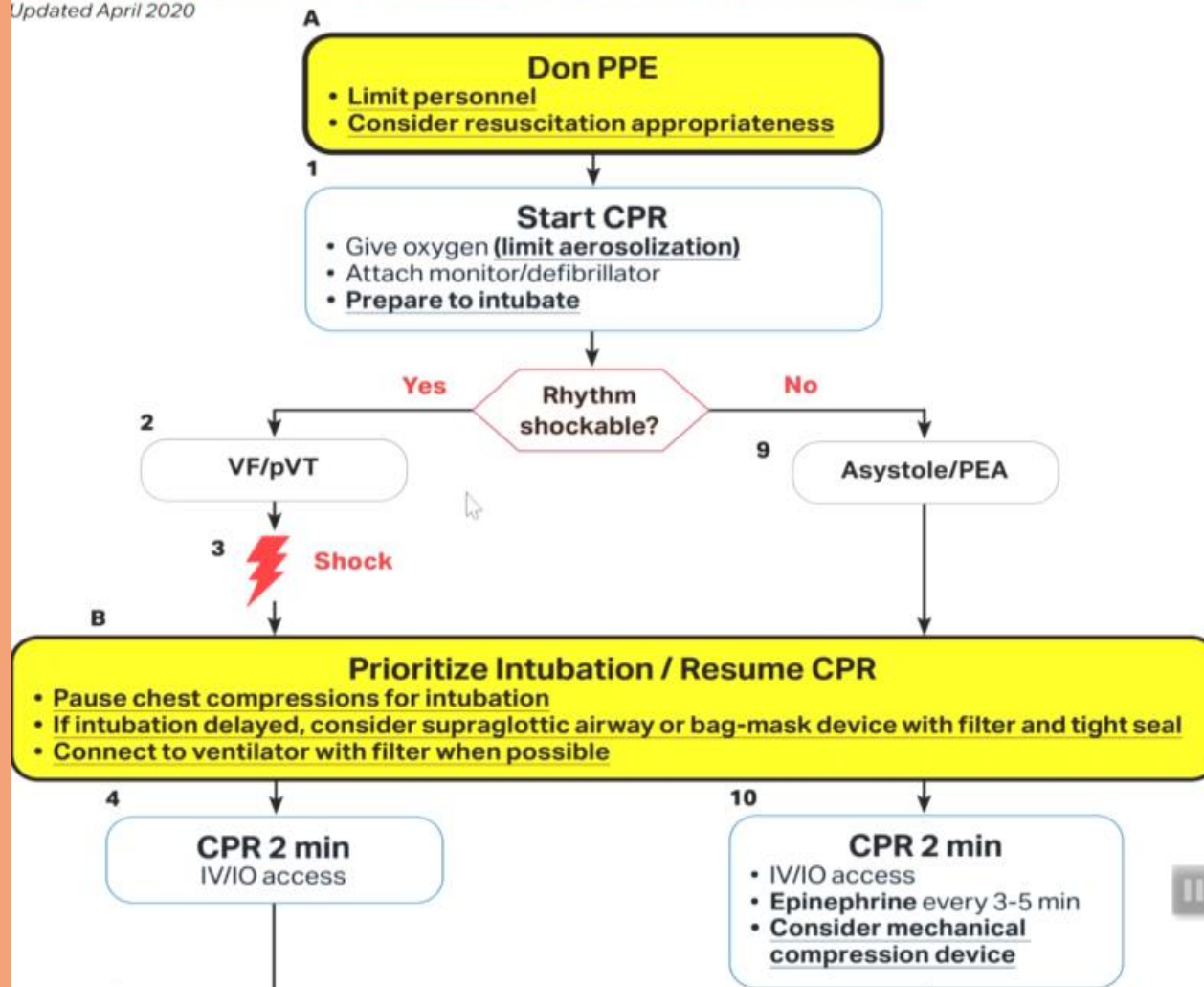


## Prioritize Intubation / Resume CPR

- Pause chest compressions for intubation
- If intubation delayed, consider supraglottic airway or bag-mask device with filter and tight seal
- Connect to ventilator with filter when possible

# ACLS Cardiac Arrest Algorithm for Suspected or Confirmed COVID-19 Patients

Updated April 2020



# Mask of oxygen

- If the patient is already receiving supplemental oxygen therapy using a face mask, leave the mask on the patient's face during chest compressions as this may limit aerosol spread.
- If not in situ, but one is readily available, put a simple oxygen mask on the patient's face

## Mask of oxygen

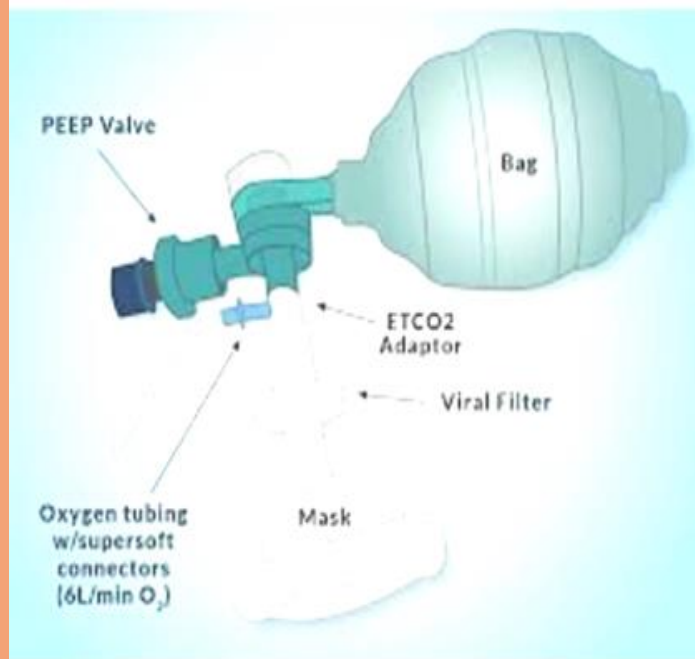


## Prioritize oxygenation and ventilation lower aerosolization risk

- Strategies:
  - Attach a HEPA filter securely to any manual or mechanical ventilation device in the **path of exhaled** gas before administering any breaths
  - Connect the **endotracheal tube** to a ventilator with a HEPA filter
  - Minimize the likelihood of failed intubation attempts (Video laryngoscopy)

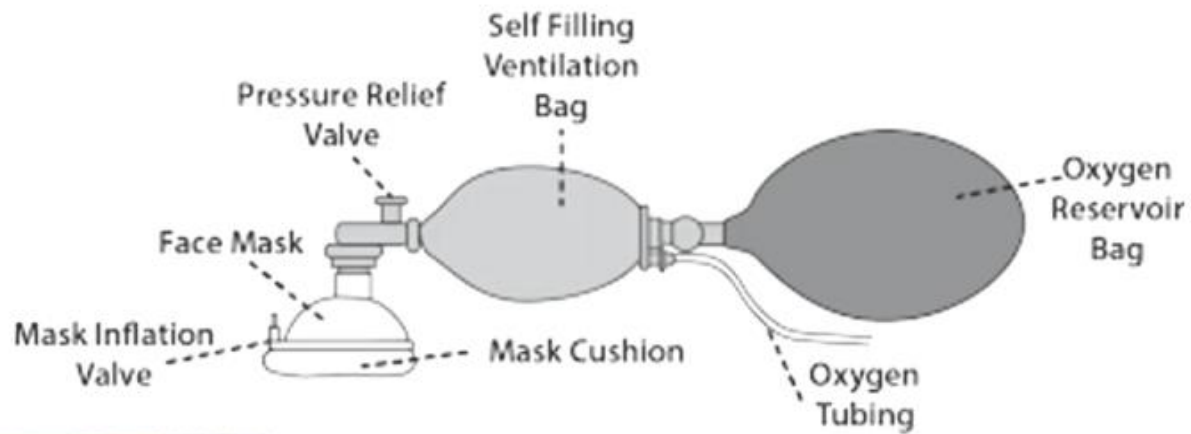


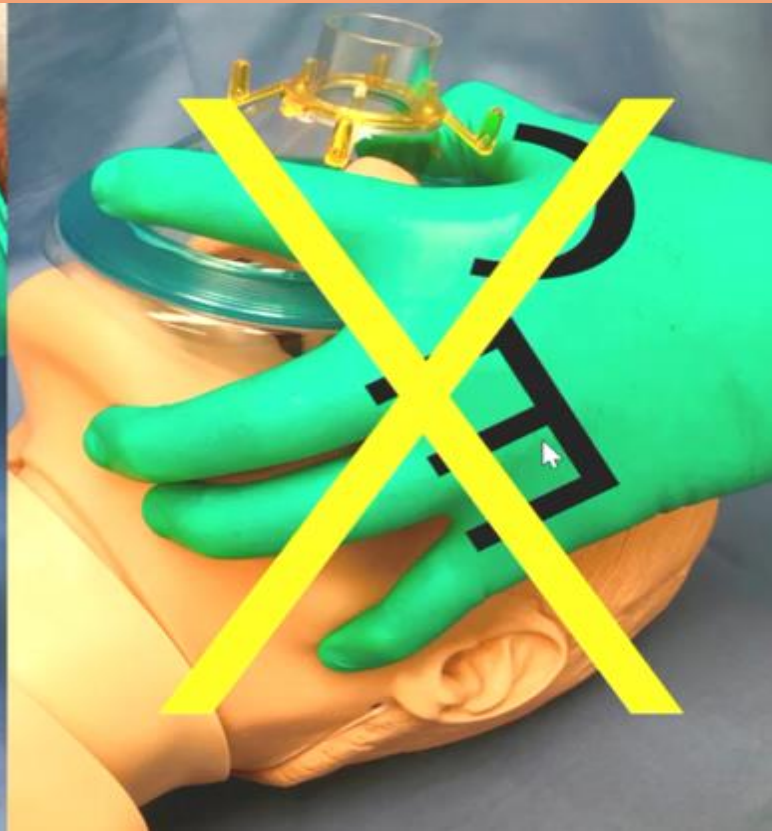
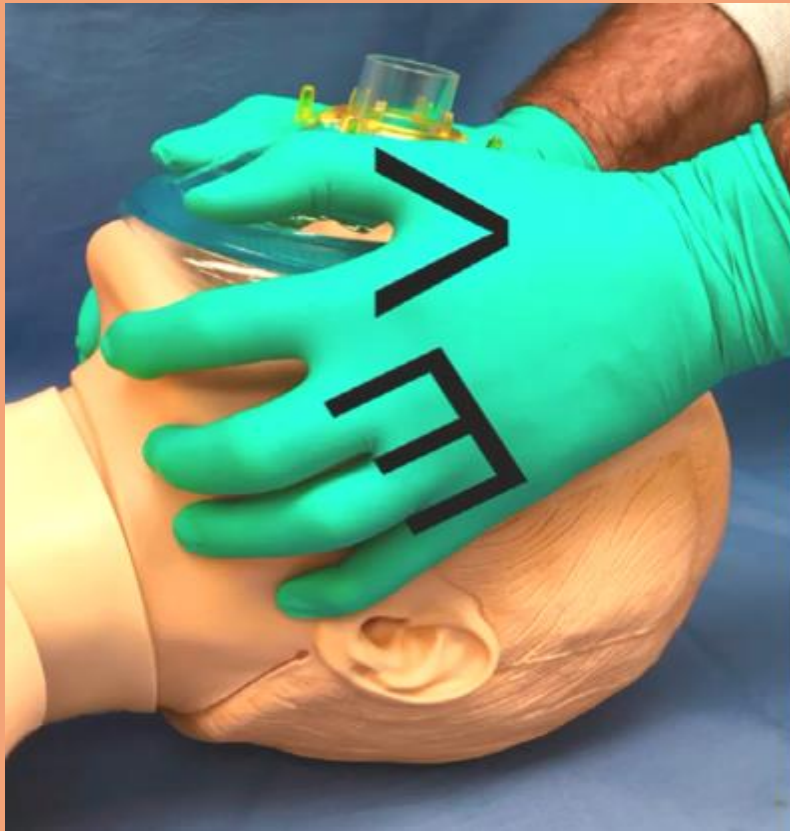
## AMBU+ HEPA filter





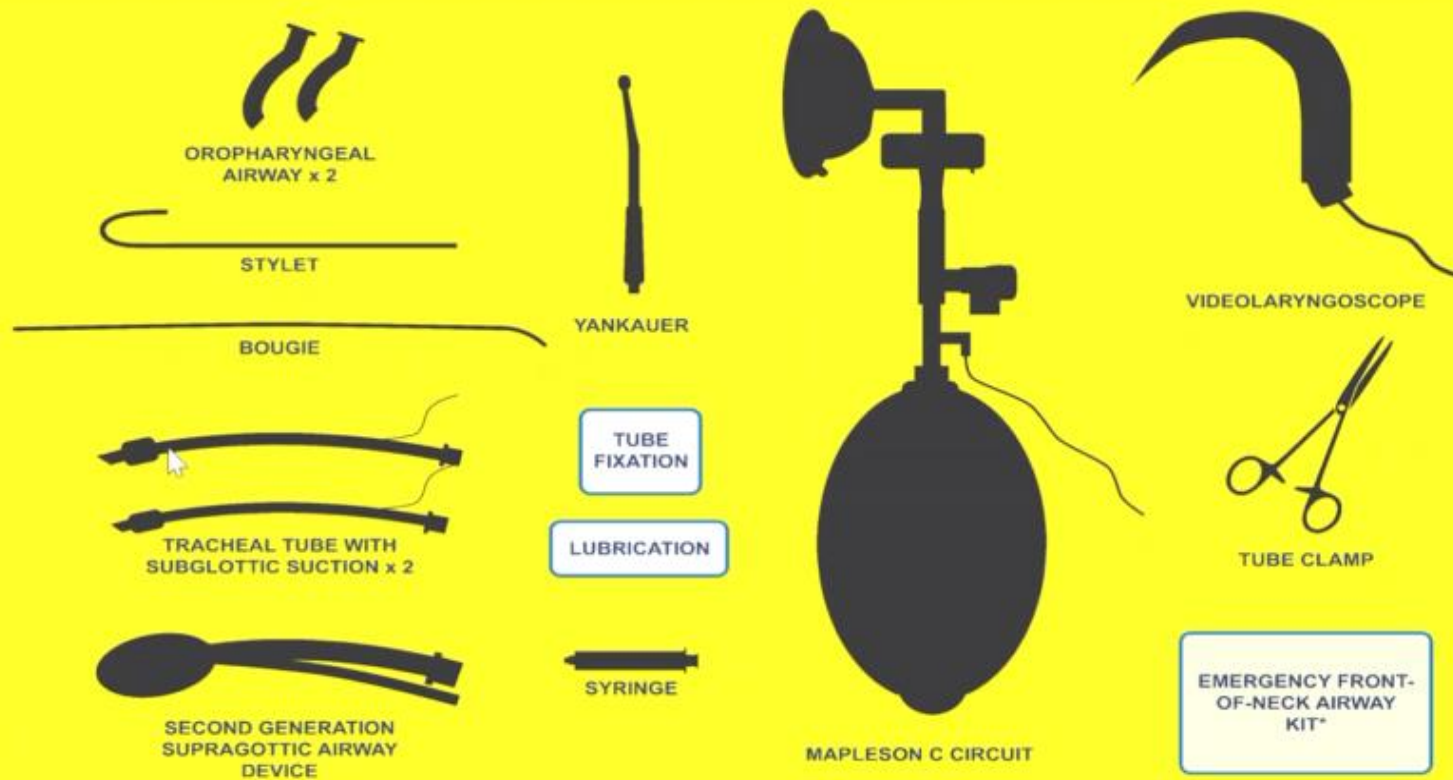
# Ambu bag

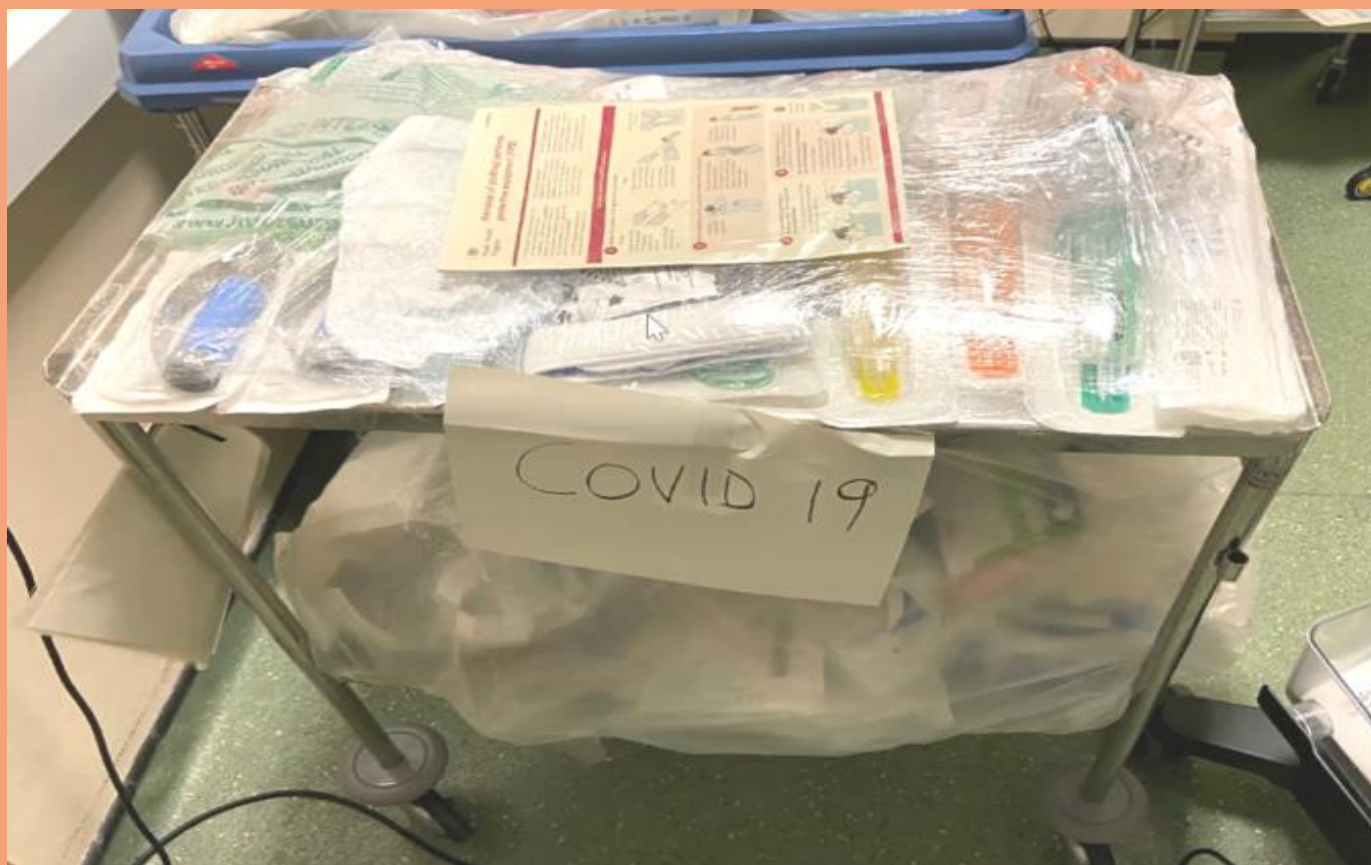






## Emergency tracheal intubation kit dump COVID-19







## Advanced Airway

- Minimize closed-circuit disconnection
- Use intubator with highest likelihood of first pass success
- Consider video laryngoscopy
- Endotracheal intubation or supraglottic advanced airway
- Waveform capnography or capnometry to confirm and monitor ET tube placement
- Once advanced airway in place, give 1 breath every 6 seconds (10 breaths/min) with continuous chest compressions



انتوباسیون باید فقط توسط فرد آموزش دیده و متبحر (مسئول راه هوایی)، و در صورت امکان با کمک ویدیولارنگوسکوپ انجام شود. پیش از حضور مسئول راه هوایی، چنانچه حمایت تنفسی ضروری است، از ماسک و آمبوبگ فقط به صورت Passive Fixation استفاده شود به این معنی که بدون انجام ونتیلیاسیون و آمبو زدن، ماسک روی صورت بیمار فیکس نگه داشته و اکسیژن داده شود.



## Prioritize oxygenation and ventilation lower aerosolization risk

- Strategies:
  - If intubation is delayed, consider manual ventilation with a **supraglottic airway** or bag-mask device with a HEPA filter.
  - Once on a closed circuit, minimize disconnections to reduce aerosolization.

## Intubated patients

- Consider leaving the patient on a mechanical ventilator with **HEPA filter** to maintain a **closed circuit** and reduce aerosolization.



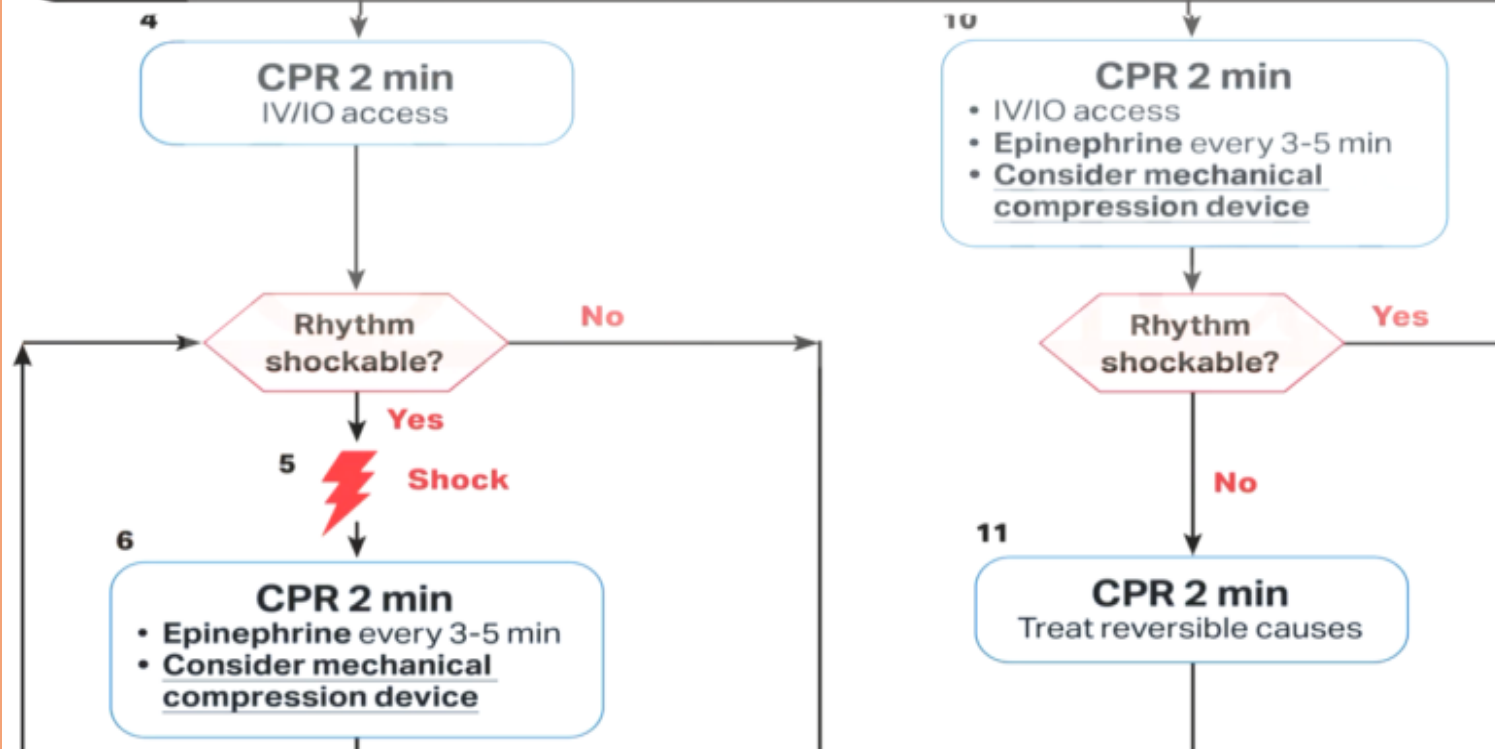


# Adjusting MV setting

- Increase the FIO<sub>2</sub> to 100%
- Mode: PCV
- Target volume: 6 mL/kg IBW
- Adjust the trigger to Off
- Adjust respiratory rate to 10/min
- Adjust alarms to prevent alarm fatigue

## Prioritize Intubation / Resume CPR

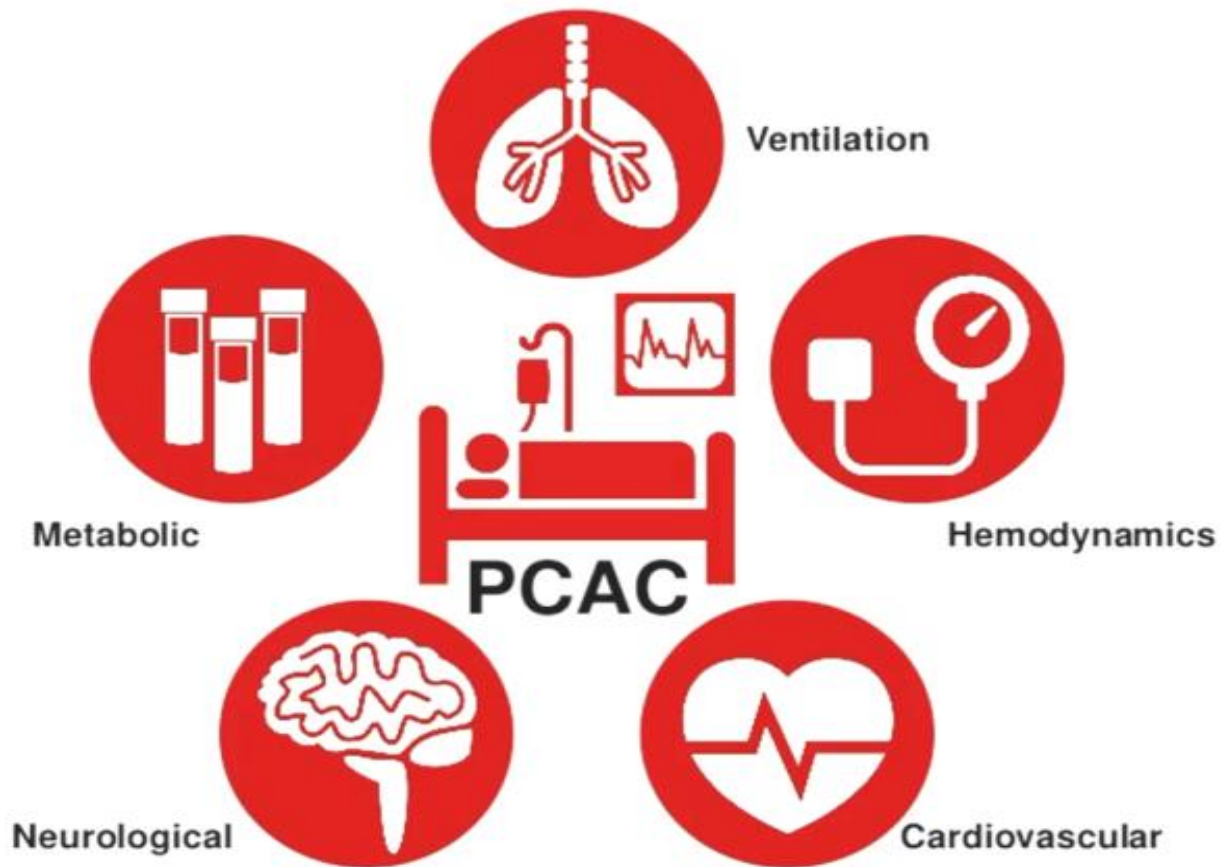
- Pause chest compressions for intubation
- If intubation delayed, consider supraglottic airway or bag-mask device with filter and tight seal
- Connect to ventilator with filter when possible





## Auto-pulse







**\*\*تهویه بیش از حد باعث کاهش برون ده قلبی می شود\*\***

✓ قبل از آماده شدن دفیبریلاتور باید ماساژ قلبی ادامه یابد.  
✓ پس از شوک دادن نیز باید ماساژ قلبی فوراً ادامه یابد و ۲-۱ دقیقه بعد ریتم قلبی کنترل گردد.

✓ قبل از انتوباسیون: **۳۰ ماساژ: ۲ تنفس**

✓ بعد از انتوباسیون: **۱۲۰ - ۱۰۰ ماساژ: ۱۰-۸ تنفس** بدون قطع ماساژ

✓ برای گرفتن IV Line نباید CPR قطع شود. برای انتوباسیون حتی الامکان CPR برای مدت کوتاهی قطع شود (۳۰ ثانیه)

✓ در صورت عدم وجود راه وریدی میتوان داروها را بصورت داخل استخوانی

(IO= Intra Oseuos) تجویز کرد.

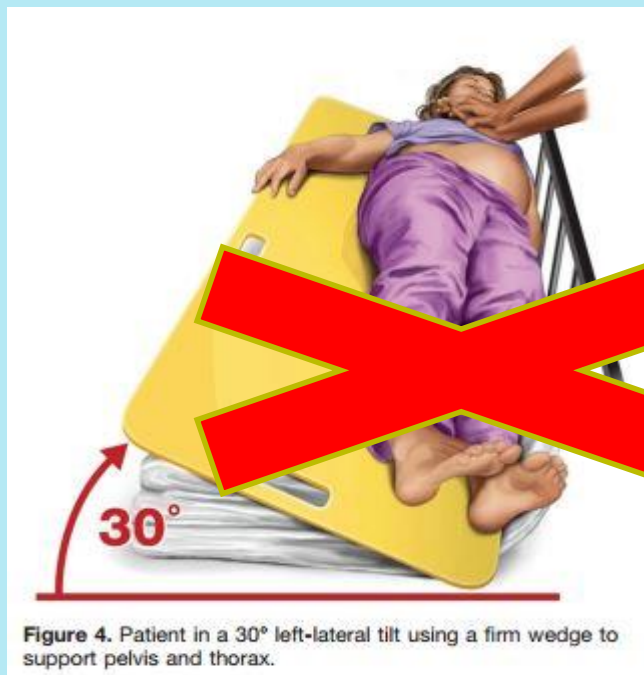
✓ میتوان از لوله تراشه نیز داروها را تجویز کرد.

(آدرنالین، آتروپین، لیدوکائین، وازوپرسین و نالوکسان)

❖ آدرنالین را میتوان با ۲/۵-۲ برابر دوز معمول در ۱۰-۵ سی سی آب مقطر یا نرمال سالین در لوله تراشه تزریق کرد.

✓ داروهای آدرنرژیک مثل آدرنالین نباید در خط وریدی با بیکربنات سدیم مخلوط شوند زیرا این داروها را غیرفعال می سازند.

✓ در خانمهای حامله که دچار ایست قلبی میشوند برای برداشتن فشار رحم از روی ورید اجوف تحتانی در وضعیت خوابیده، جابجا کردن رحم به چپ با دست توصیه میشود.



در صورتیکه علی رغم اقدامات مذکور ماساژ قفسه سینه موفق نباشد، سزارین اورژانسی انجام میشود.

❖ سایر اقدامات CPR و دفیبریلاسیون با افراد غیرحامله تفاوتی ندارد.

در زمان احیا از انفوزیون سرم  
بصورت Free خودداری نمایید .



از توجه شما سپاسگزارم.

