

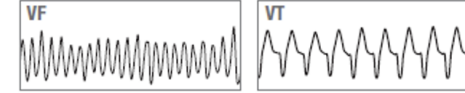
# ISOBS Safety Checklist for Office-Based Anesthesia Crises

| Office-based Emergency Manual                     |  |
|---|--|
| ACLS  | 16- Embolism (fat, venous, pulmonary)                            |
| 1- Cardiac arrest- VF/VT                          | 17- Hemorrhage   |
| 2- Cardiac arrest- asystole/PEA                   | 18- Hypercapnia  |
| 3- Bradycardia- unstable                          | 19- Hypotension (adult + ped dosing)                             |
| 4- Tachycardia- unstable                          | 20- Hypoxia  |
| PALS  | 21- LAST (adult + ped dosing)                                    |
| 5 Cardiac arrest- VF/VT                           | 22- Loss of access   |
| 6- Cardiac arrest- asystole/PEA                   | 23- Mental status change and postoperative cognitive dysfunction |
| 7- Bradycardia- unstable                          | 24- MH (adult + ped dosing)                                      |
| 8 -Tachycardia- unstable                          | 25- Spinal Anesthesia: Adverse Events                            |
| Emergency   | 26- Aspiration   |
| 9- Fire- airway or surroundings                   | 27- Failure or malfunction of CIED                               |
| 10- Evacuation                                    | 28- Postoperative airway problem                                 |
| 11- Loss of Power                                 | Administrative   |
| 12- Loss of Oxygen                                | 29- Transfer of care MH patient                                  |
| 13-Workplace Violence                             | 30- Transfer of care non-MH patient                              |
| Critical events                                   |  |
| 14- Allergies -> Anaphylaxis (adult + ped dosing) |  |
| 15- Difficult airway                              |  |

# How to use this Emergency Manual

Name of Event

## Cardiac Arrest – VF/VT



Shockable pulseless cardiac arrest

Definition or signs of event

### START

#### 1 Call for help and a code cart

- Ask: “Who will be the crisis manager?”
- Say: “Shock patient as soon as defibrillator arrives”
- Call: “Initiate Transfer Protocol”

#### 2 Put backboard under patient, supine

#### 3 Turn FiO<sub>2</sub> to 100%, turn off volatile anesthetics

#### 4 Start CPR – defibrillation – assessment cycle

- Perform CPR
  - “Hard and fast” 100-120 compressions/min to depth of 2-2.3 inches
  - Ensure full chest recoil with minimal interruptions
  - 10 breaths/min, do not overventilate.
- Defibrillate
  - Shock at highest setting (200) biphasic in defibrillator mode)
  - Resume CPR immediately after shock
- Give epinephrine
  - Repeat epinephrine every 3-5 min
- Consider antiarrhythmics for refractory VF/VT (amiodarone)
- Assess every 2 minutes
  - Change CPR compression provider
  - Check ETCO<sub>2</sub>
    - If <10mmHg: evaluate CPR technique
    - If suddenly >40mmHg: may indicate ROSC
  - Treat reversible causes, consider reading aloud Hs and Ts (see list on right)
  - Check rhythm; if rhythm organized, check pulse
    - If VF/VT continues:
      - Resume CPR – defibrillation – assessment cycle (restart step 4)
    - If asystole/PEA:
      - Resume CPR
      - Go to **CHKLST 2-Asystole/PEA**

Step-by-step instruction for response

### DRUG DOSES and treatments ADULT

Epinephrine: 1mg IV, repeat every 3-5 min

#### ANTIARRHYTHMICS

Amiodarone: 1<sup>st</sup> dose: 300mg/IV/IO

2<sup>nd</sup> dose: 150mg/IV/IO

Magnesium: 1 to 2 g IV/IO for TdP

### DEFIBRILLATOR instructions

- 1 Place electrodes on chest
- 2 Turn defibrillator ON, set to DEFIB mode, and increase ENERGY LEVEL to highest setting
- 3 Deliver shock: press CHARGE, then SHOCK

### Hs and Ts: Reversible Causes

|                          |   |
|--------------------------|---|
| Hydrogen ions (acidosis) | Tamponade (cardiac)   |
| Hyperkalemia             | Tension pneumothorax  |
| Hypothermia              | Thrombosis (coronary/pulmonary)                                 |
| Hypovolemia              | Toxin (local anesthetic, beta blocker, calcium channel blocker) |
| Hypoxia                  |   |

### During CPR

Airway: Bag-mask sufficient (if ventilation adequate)

Circulation: Confirm adequate IV/IO access  
Consider IV fluids wide open  
Consider ECMO for select potentially reversible causes

Assign roles: Chest compression, Airway, Vascular access, Timing, Code cart, documentation

Standard drug doses

And

Supplementary materials

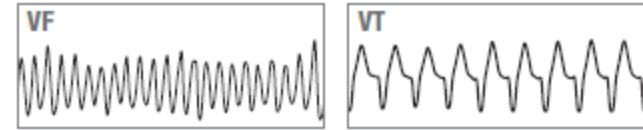
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# ACLS

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# Cardiac Arrest – VF/VT



Shockable pulseless cardiac arrest

## START

### 1 Call for help and a code cart

- Ask: “Who will be the crisis manager”?
- Say: “Shock patient as soon as defibrillator arrives”
- Call: “Initiate Transfer Protocol”

### 2 Put backboard under patient, supine

### 3 Turn FiO<sub>2</sub> to 100%, turn off volatile anesthetics

### 4 Start CPR – defibrillation – assessment cycle

- Perform CPR
  - “Hard and fast” 100-120 compressions/min to depth of 2-2.3 inches
  - Ensure full chest recoil with minimal interruptions
  - 10 breaths/min, do not over-ventilate
- Defibrillate
  - Shock at highest setting (200J biphasic in defibrillator mode)
  - Resume CPR immediately after shock
- Give epinephrine
  - Repeat epinephrine every 3-5 min
- Consider antiarrhythmics for refractory VF/VT (amiodarone)
- Assess every 2 minutes
  - Change CPR compression provider
  - Check ETCO<sub>2</sub>
    - If <10mmHg: evaluate CPR technique
    - If suddenly >40mmHg: may indicate ROSC
  - Treat reversible causes, consider reading aloud Hs and Ts (see list on right)
  - Check rhythm; if rhythm organized, check pulse
    - If VF/VT continues:
      - Resume CPR – defibrillation – assessment cycle (restart step 4)
    - If asystole/PEA:
      - Resume CPR
      - Go to **CHKLST 2-Asystole/PEA**

## DRUG DOSES and treatments ADULT

Epinephrine: 1 mg IV, repeat every 3-5 min

### ANTIARRHYTHMICS

Amiodarone: 1<sup>st</sup> dose: 300mg/IV/IO  
 2<sup>nd</sup> dose: 150mg/IV/IO  
 Magnesium: 1 to 2 g IV/IO for TdP

## DEFIBRILLATOR instructions

- 1 Place electrodes on chest
- 2 Turn defibrillator ON, set to DEFIB mode, and increase ENERGY LEVEL to highest setting
- 3 Deliver shock: press CHARGE, then SHOCK

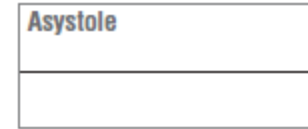
## Hs and Ts: Reversible Causes

|                          |   |
|--------------------------|---|
| Hydrogen ions (acidosis) | Tamponade (cardiac)   |
| Hyperkalemia             | Tension pneumothorax  |
| Hypothermia              | Thrombosis (coronary/pulmonary)                                 |
| Hypovolemia              | Toxin (local anesthetic, beta blocker, calcium channel blocker) |
| Hypoxia                  |   |

## During CPR

Airway: Bag-mask sufficient (if ventilation adequate)  
 Circulation: Confirm adequate IV/IO access  
 Consider IV fluids wide open  
 Consider ECMO for select potentially reversible causes  
 Assign roles: Chest compression, Airway, Vascular access, Timing, cart, documentation  
 Code

# 2 Cardiac Arrest – PEA/asystole



Non-shockable pulseless cardiac arrest

## START

### 1 Call for help and a code cart

- Ask: “Who will be the crisis manager”?
- Say: “High quality CPR”
- Call: “Initiate Transfer Protocol”

### 2 Put backboard under patient, supine

### 3 Turn FiO<sub>2</sub> to 100%, turn off volatile anesthetics

### 4 Start CPR and assessment cycle

- Perform CPR
  - “Hard and fast” 100-120 compressions/min to depth of 2-2.3 inches
  - Ensure full chest recoil with minimal interruptions
  - 10 breaths/min, do not over-ventilate
- Give epinephrine
  - Repeat epinephrine every 3-5 min
- Assess every 2 minutes
  - Change CPR compression provider
  - Check ETCO<sub>2</sub>
    - If <10mmHg: evaluate CPR technique
    - If suddenly >40mmHg: may indicate ROSC
  - Check rhythm; if rhythm organized, check pulse
    - If asystole/PEA continues:
      - Resume CPR and assessment cycle (restart Step 4)
      - Read aloud Hs and Ts
    - If VF/VT:
      - Resume CPR
      - Go to **CHKLST I-VF/VT**

## DRUG DOSES and treatments ADULT

|                               |  |
|-------------------------------|--|
| Epinephrine:                  | 1 mg IV, repeat every 3-5 min  |
| <b>TOXIN Treatments</b>       |  |
| Local Anesthetic              | Intralipid 1.5ml/kg bolus, repeat for persistent asystole<br>Start 0.25-0.5ml/kg/min; 30-60min if refractory |
| hypotension                   |  |
| Beta-blocker                  | Glucagon 2-4mg IV push   |
| Ca chan blocker               | Ca chloride 1g IV push   |
| Bicarbonate                   | 1-2mEq/kg, slow IV push; max 50mEq   |
| <b>HYPERKALEMIA treatment</b> |  |
| 1. Ca gluconate               | 30mg/kg IV, max 3000mg   |
| ---                           | or ---   |
| Ca chloride                   | 10mg/kg IV, max 2000mg   |
| 2. Insulin                    | 10 units regular IV with 1-2 amps D50W   |

## Hs and Ts: Reversible Causes

|                          |   |
|--------------------------|---|
| Hydrogen ions (acidosis) | Tamponade (cardiac)   |
| Hyperkalemia             | Tension pneumothorax  |
| Hypothermia              | Thrombosis (coronary/pulmonary)                                 |
| Hypovolemia              | Toxin (local anesthetic, beta blocker, calcium channel blocker) |
| Hypoxia                  |   |

## During CPR

|               |   |
|---------------|---|
| Airway:       | Bag-mask sufficient (if ventilation adequate)   |
| Circulation:  | Confirm adequate IV/IO access<br>Consider IV fluids wide open<br>Consider ECMO for select potentially reversible causes |
| Assign roles: | Chest compression, Airway, Vascular access, Timing, cart, documentation   |
| Code          |   |

# 3 Bradycardia - Unstable

HR < 50 with hypotension, acute heart failure, ischemic chest pain, or acutely altered mental status

## START

### 1 Call for help and a code cart

- Ask: "Who will be the crisis manager"?
- Call: "Initiate Transfer Protocol"

### 2 Turn FiO<sub>2</sub> to 100%, turn off volatile anesthetics

- Assess adequate ventilation/oxygenation

### 3 Give atropine

### 4 Stop surgical stimulation (if laparoscopy, desufflate)

### 5 If refractory to atropine

- Start epinephrine or dopamine infusion
- or --

- Start transcutaneous pacing

### 6 Additional Considerations

- Assess for drug-induced causes (beta-blockers, Ca chan blockers, digoxin)
- Suggest expert consultation, cardiology, during transfer sign-out

## TRANSCUTANEOUS pacing instructions

1. Place pacing electrodes on front and back
2. Connect 3-lead ECG from pacing defibrillator to patient
3. Turn monitor to PACER mode
4. Set PACER RATE to **80/min** (adjust based on clinical response once pacing established)
5. Start at **60mA** of PACER OUTPUT and increase until electrical capture (pacer spikes aligned with QRS complex)
6. Set final current to **10mA** above initial capture level
7. Confirm effective capture
  - Electrically: assess ECG tracing
  - Mechanically: palpate femoral pulse (carotid is unreliable)

## DRUG DOSES and treatments ADULT

|             |                          |
|-------------|--------------------------|
| Atropine    | 0.5mg IV; max 3mg total  |
| Epinephrine | 2-10 MICROgram/min IV    |
| Dopamine    | 2-20 MICROgram/kg/min IV |

### OVERDOSE Treatments

|                 |                        |
|-----------------|------------------------|
| Beta-blocker    | Glucagon 2-4mg IV push |
| Ca chan blocker | Ca chloride 1g IV push |

## Critical CHANGES

If **PEA** develops (no pulse):

- go to **CHKLST 3-Asystole/PEA**

## During resuscitation

|               |   |
|---------------|---|
| Airway:       | Assess and secure   |
| Circulation:  | Confirm adequate IV/IO access<br>Consider IV fluids wide open |
| Assign roles: | Airway, Vascular access, Timing, Code cart, documentation     |

# 4 Tachycardia - Unstable

Persistent tachycardia with hypotension, shock, ischemic chest pain, or acutely altered mental status

## START

### 1 Call for help and a code cart

- Ask: "Who will be the crisis manager"?
- Call: "Initiate Transfer Protocol"

### 2 Turn FiO<sub>2</sub> to 100%, turn off volatile anesthetics

### 3 Analyze Rhythm

- If wide complex, irregular: treat as VF, go to **CHKLST I-VF/VT**
- Otherwise continue to Step 4

### 4 Prepare for immediate synchronized cardioversion

1. Sedate all conscious patients unless rapid deterioration
2. Turn defibrillator ON -> DEFIB mode
3. Place electrodes on chest
4. Press SYNC
5. Look for spike on R-wave indicating synchronization mode
6. Adjust SIZE button, if necessary, until SYNC spikes seen with each R-wave

### 5 Cardiovert at appropriate energy level

1. Determine energy level (table right); begin at lowest and progress
2. Press ENERGY SELECT until desired energy shown
3. Press CHARGE
4. Press and hold SHOCK
5. Check monitor: if tachycardia persists, increase energy level
6. Press SYNC after each delivery of shock

### 6 Additional Considerations

- Suggest expert consultation during transfer sign-out

## BIPHASIC CARADIOVERSION energy levels

| CONDITION                 | ENERGY LEVEL -> PROGRESSION              |
|---------------------------|--|
| Narrow complex, regular   | 50 J -> 100 J -> 150 J -> 200 J          |
| Narrow complex, irregular | 120 J -> 150 J -> 200 J                  |
| Wide complex, regular     | 100 J -> 150 J -> 200 J                  |
| Wide complex, irregular   | Treat as VF, go to <b>CHKLST I-VF/VT</b> |

## Critical CHANGES

If **cardioversion required** but **unable to synchronize** shock, use HIGH-ENERGY unsynchronized shocks

If **cardiac arrest**:

VF/VT      Go to **CHKLST I-VF/VT**

Asystole/PEA      Go to **CHKLST 2-Asystole/PEA**

## During resuscitation

|               |   |
|---------------|---|
| Airway:       | Assess and secure   |
| Circulation:  | Confirm adequate IV/IO access<br>Consider IV fluids wide open |
| Assign roles: | Airway, Vascular access, Timing, Code cart, documentation     |

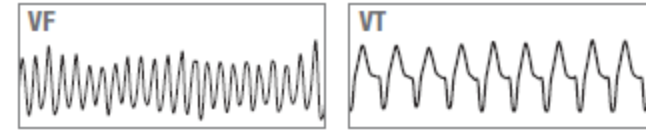
# PALS

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# 5 Cardiac Arrest – VF/VT



Shockable pulseless cardiac arrest

## START

### 1 Call for help and a code cart

- Ask: “Who will be the crisis manager”?
- Say: “Shock patient as soon as defibrillator arrives”
- Call: “Initiate Transfer Protocol”

### 2 Put backboard under patient, supine

### 3 Turn FiO<sub>2</sub> to 100%, turn off volatiles anesthetics

### 4 Start CPR – defibrillation – assessment cycle

- Perform CPR
  - “Hard and fast” 100 compressions/min to depth of 2-2.3 inches
  - Ensure full chest recoil with minimal interruptions
  - 8 breaths/min, do not overventilate
- Defibrillate
  - Shock at highest setting (2-4 J/kg biphasic in defibrillator mode)
  - Resume CPR immediately after shock
- Give epinephrine
  - Repeat epinephrine every 3-5 min
- Consider antiarrhythmics for refractory VF/VT (amiodarone)
- Assess every 2 minutes
  - Change CPR compression provider
  - Check ETCO<sub>2</sub>
    - If <10mmHg: evaluate CPR technique
    - If suddenly >40mmHg: may indicate ROSC
  - Treat reversible causes, consider reading aloud Hs and Ts (see list on right)
  - Check rhythm; if rhythm organized, check pulse
    - If VF/VT continues:
      - Resume CPR – defibrillation – assessment cycle (repeat step 4), Shock 4 J/kg
      - If VF/VT continues 2 min after prev attempt: Restart step 4, Shock 4-10 J/kg
    - If asystole/PEA:
      - Go to **CHKLST 6-Asystole/PEA**

## DRUG DOSES and treatments Peds

Epinephrine: 10 MICROgrams IV, repeat every 3-5 min

### ANTIARRHYTHMICS

Amiodarone: 1<sup>st</sup> and 2<sup>nd</sup> dose: 5mg/kg bolus

Lidocaine: 1 mg/kg bolus

## DEFIBRILLATOR instructions

- 1 Place electrodes on chest
- 2 Turn defibrillator ON, set to DEFIB mode, and increase ENERGY LEVEL to 2-4 J/kg
- 3 Deliver shock: press CHARGE, then SHOCK

## Hs and Ts: Reversible Causes

|                          |   |
|--------------------------|---|
| Hydrogen ions (acidosis) | Tamponade (cardiac)   |
| Hyperkalemia             | Tension pneumothorax  |
| Hypothermia              | Thrombosis (coronary/pulmonary)                                 |
| Hypovolemia              | Toxin (local anesthetic, beta blocker, calcium channel blocker) |
| Hypoxia                  | Trauma (bleeding)   |
| Hypoglycemia             |   |

## During CPR

|               |   |
|---------------|---|
| Airway:       | Bag-mask sufficient (if ventilation adequate)   |
| Circulation:  | Confirm adequate IV/IO access<br>Consider IV fluids wide open<br>Consider ECMO if cardiac arrest > 6min |
| Assign roles: | Chest compression, Airway, Vascular access, Timing, Code cart, documentation                            |

# 6 Cardiac Arrest – Asystole/PEA



Non-shockable pulseless cardiac arrest

## START

### 1 Call for help and a code cart

- Ask: “Who will be the crisis manager”?
- Say: “High quality CPR”
- Call: “Initiate Transfer Protocol”

### 2 Put backboard under patient, supine

### 3 Turn FiO<sub>2</sub> to 100%, turn off volatile anesthetics

### 4 Start CPR and assessment cycle

- Perform CPR
  - “Hard and fast” 100-120 compressions/min to depth of 2-2.3 inches
  - Ensure full chest recoil with minimal interruptions
  - 8 breaths/min, do not overventilate
  - Do not stop compressions for pulse check, use ETCO<sub>2</sub> for ROSC
- Give epinephrine
  - Repeat epinephrine every 3-5 min
- Assess every 2 minutes
  - Change CPR compression provider
  - Check ETCO<sub>2</sub>
    - If <10mmHg: evaluate CPR technique
    - If suddenly >40mmHg: may indicate ROSC
  - Check rhythm; if rhythm organized, check pulse
    - If asystole/PEA continues:
      - Resume CPR and assessment cycle (restart Step 4)
      - Read aloud Hs and Ts
    - If VF/VT:
      - Resume CPR
      - Go to **CHKLST 5-VF/VT**

## DRUG DOSES and treatments PEDS

Epinephrine: 10 MICROgrams IV, repeat every 3-5 min

### TOXIN Treatments

Local Anesthetic Intralipid 1.5ml/kg bolus, repeat for persistent asystole  
Start 0.25-0.5ml/kg/min; 30-60min if refractory

hypotension

Beta-blocker Glucagon 2-4mg IV push

Bicarbonate 1-2mEq/kg, slow IV push; max 50mEq

### HYPERKALEMIA treatment

1. Ca gluconate 60mg/kg IV, max 3000mg  
--- or ---  
Ca chloride 20mg/kg IV, max 2000mg

2. Insulin 0.1 units/kg IV with Dextrose 0.25-1g/kg

## Hs and Ts: Reversible Causes

Hydrogen ions (acidosis)  
Hyperkalemia  
Hypothermia  
Hypovolemia  
Hypoxia

Tamponade (cardiac)  
Tension pneumothorax  
Thrombosis (coronary/pulmonary)  
Toxin (local anesthetic, beta blocker, calcium channel blocker)

## During CPR

Airway: Bag-mask sufficient (if ventilation adequate)

Circulation: Confirm adequate IV/IO access  
Consider IV fluids wide open  
Consider ECMO if cardiac arrest > 6min

Assign roles: Chest compression, Airway, Vascular access, Timing, Code  
Code cart, documentation

# 7 Bradycardia - Unstable

Bradycardia with hypotension, acute heart failure, ischemic chest pain, or acutely altered mental status

## START

### 1 Call for help and a code cart

- Ask: "Who will be the crisis manager"?
- Call: "Initiate Transfer Protocol"

### 2 Turn FiO<sub>2</sub> to 100%, turn off volatile anesthetics

- Assess adequate ventilation/oxygenation

### 3 Give atropine

### 4 Stop surgical stimulation (if laparoscopy, desufflate)

### 5 If refractory to atropine

- Start epinephrine
- or --

- Start transcutaneous pacing

### 6 Additional Considerations

- Assess for drug-induced causes (beta-blockers, Ca chan blockers)
- Suggest expert consultation, cardiology, during transfer sign-out

## TRANSCUTANEOUS pacing instructions

1. Place pacing electrodes on front and back
2. Connect 3-lead ECG from pacing defibrillator to patient
3. Turn monitor to PACER mode
4. Set PACER RATE to desired rate (adjust based on clinical response once pacing established)
5. Start at **65mA** of PACER OUTPUT and increase until electrical capture (pacer spikes aligned with QRS complex; threshold about 65-100mA)
6. Set final current to **10mA** above initial capture level
7. Confirm effective capture
  - Electrically: assess ECG tracing
  - Mechanically: palpate femoral pulse (carotid is unreliable)

| Age | < 30 days          | HR | < 100 |
|-----|--------------------|----|-------|
|     | > 30 days & < 1 yr |    | < 80  |
|     | > 1 yr             |    | < 60  |

## DRUG DOSES and treatments PEDI

|             |                                 |
|-------------|---------------------------------|
| Atropine    | 0.01-0.2mg/kg IV; max 3mg total |
| Epinephrine | 10 MICROgram/kg IV              |

## OVERDOSE Treatments

|                 |  |
|-----------------|--|
| Ca chan blocker | Ca chloride 10-20mg IV push                  |
|                 | --- or ---                                   |
|                 | Ca gluconate 50mg/kg IV                      |
|                 | If ineffective, then Glucagon at above doses |

## Critical CHANGES

- If **PEA** develops (no pulse)
  - o Go to **CHKLST 6-Asystole/PEA**

## During resuscitation

|               |   |
|---------------|---|
| Airway:       | Assess and secure   |
| Circulation:  | Confirm adequate IV/IO access<br>Consider IV fluids wide open |
| Assign roles: | Airway, Vascular access, Timing, Code cart, documentation     |

# 8 Tachycardia - Unstable

Persistent tachycardia with hypotension, shock, ischemic chest pain, or acutely altered mental status

## START

### 1 Call for help and a code cart

- Ask: "Who will be the crisis manager"?
- Call: "Initiate Transfer Protocol"

### 2 Turn FiO<sub>2</sub> to 100%, turn off necessary, anesthetics

### 3 Analyze Rhythm

- If no pulse, go to **CHKLST 6-Asystole/PEA**
- If pulse, see table on right to treatment
- Otherwise continue to Step 4

### 4 Prepare for immediate synchronized cardioversion

1. Sedate all conscious patients unless rapid deterioration
2. Turn defibrillator ON -> DEFIB mode
3. Place electrodes on chest
4. Press SYNC
5. Look for spike on R-wave indicating synchronization mode
6. Adjust SIZE button if necessary, until SYNC spikes seen with each R-wave

### 5 Cardiovert at appropriate energy level

1. Determine energy level (table right); begin at lowest and progress
2. Press ENERGY SELECT until desired energy shown
3. Press CHARGE
4. Press and hold SHOCK
5. Check monitor: if tachycardia persists, increase energy level
6. Press SYNC after each delivery of shock

### 6 Additional Considerations

- Suggest expert consultation during transfer sign-out

## BIPHASIC CARディオVERSION energy levels

| CONDITION               | ENERGY LEVEL -> PROGRESSION                |
|-------------------------|--|
| SVT, tachyarrhythmia    | 0.5-1J/kg -> 2J/kg                         |
| Wide complex, irregular | 2J/kg -> 4J/kg -> 6J/kg -> 8J/kg -> 10J/kg |

## CONDITION with pulse PEDS TREATMENT

| Narrow Complex, regular   | Wide complex, regular  | Torsades de Pointes  |
|---|--|--|
| Adenosine: 0.1-0.3mg/kg IV push (1 <sup>st</sup> dose 6mg max, 2 <sup>nd</sup> dose 12mg max) | Amiodarone: 5mg/kg IV over 20-60min<br>Procainamide: 15mg/kg IV over 30-60min<br>Lidocaine: 1 mg/kg IV | MgSO <sub>4</sub> : 25-50 mg/kg/dose over minutes<br>Lidocaine: 1 mg/kg IV<br>NaBicarb<br>Temp placing -> CHKLST 7 |

## Critical CHANGES

If **cardioversion required** but **unable to synchronize** shock, use HIGH-ENERGY unsynchronized shocks

If **cardiac arrest**:

VF/VT            Go to **CHKLST 5-VF/VT**

Asystole/PEA    Go to **CHKLST 6-Asystole/PEA**

## During resuscitation

|               |   |
|---------------|---|
| Airway:       | Assess and secure   |
| Circulation:  | Confirm adequate IV/IO access<br>Consider IV fluids wide open |
| Assign roles: | Airway, Vascular access, Timing, Code cart, documentation     |

# EMERGENCY

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# 9 Fire – airway or surroundings

Evidence of fire (odor, smoke, flash) on patient or drapes, or in patient's airway

## START

### 1 Call for help, call 911 and call Code Red at \_\_\_\_\_

- Ask: "Who will be the crisis manager"?
- Call: "Initiate Transfer Protocol"

### 2 Obtain fire extinguisher, if needed

#### If AIRWAY fire

#### Attempt to extinguish fire

- Shut off medical gases
- Disconnect ventilator
- Remove endotracheal tube
- Remove flammable material from airway
- Pour saline into airway

#### After fire extinguished

- Re-establish ventilation using self-inflating bag with room air
- If unable to re-establish ventilation, go to CHKLST 14-DIFFICULT AIRWAY
- Avoid N<sub>2</sub>O and minimize FiO<sub>2</sub>

## FIRE

### If NON-AIRWAY fire (IE EQUIPMENT, ELECTRICAL)

- Avoid N<sub>2</sub>O and minimize FiO<sub>2</sub>
  - Remove drapes/all flammable materials from patient
  - Extinguish burning materials with saline/saline-soaked gauze
- DO NOT use**  
Alcohol-based solutions  
Any liquid on energized electrical items (Laser, Bovie, anesthesia machine, etc)

#### After fire extinguished

- Maintain airway

#### Confirm no secondary fire

Check surgical area, drapes, towels

#### Assess airway for injury or foreign body

Assess ETT integrity (fragments may still be left in airway)

Consider bronchoscopy, if available

#### Assess patient status and devise ongoing management plan

Save involved materials/devices for review

Fire PERSISTS after 1 ATTEMPT

N

Y

- Use fire extinguisher (safe in wounds)

Fire STILL PERSISTS

N

Y

- Evacuate patient
- Close OR door
- Turn OFF gas supply to OR room

# 10 Evacuation and emergency preparedness

Evidence of emergency or disaster in the office-based setting

## START

### Emergency or disaster preparedness

#### 1 Call for help

- Ask: “Who will be the crisis manager”?
- Call: “Initiate Transfer Protocol”
- Activate: “Facility Evacuation Policy”

#### 2 Have designated person call 911

- Office must have plan in place to ensure **EMT** arrives **within 10 min**

#### 3 Secure airway and ventilation

- Check patient vitals
- If time, attach portable vital machine

#### 4 Review available resources in the OR or procedure room

#### 5 Ensure lines of communication are opened between the Office-based facility and the Receiving Health Care Facility (RHCF)

- Ensure transport team is equipped to monitor patient

#### 6 Prepare to evacuate

- Bring medications, airway equipment, extra IV

# Power Loss

Lights off, loss of suction, loss of ventilation, etc

## START

### 1 Call for help

- Ask: "Who will be the crisis manager?"
- Activate: "Facility Power Failure Policy"

### 2 Have designated person call facility administrator

- Facility must have prior plan in place to ensure backup generator/power is turned on

### 3 Find portable Flashlights, additional light sources, walkie-talkie, etc.

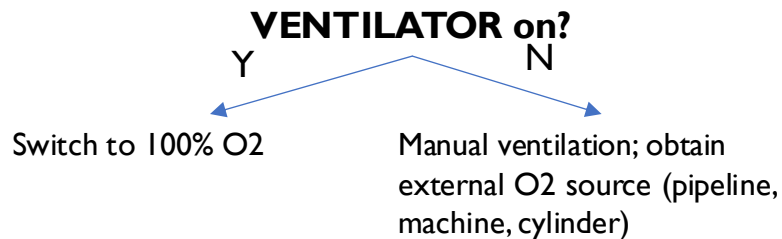
### 4 PAUSE surgery

### 5 Communicate

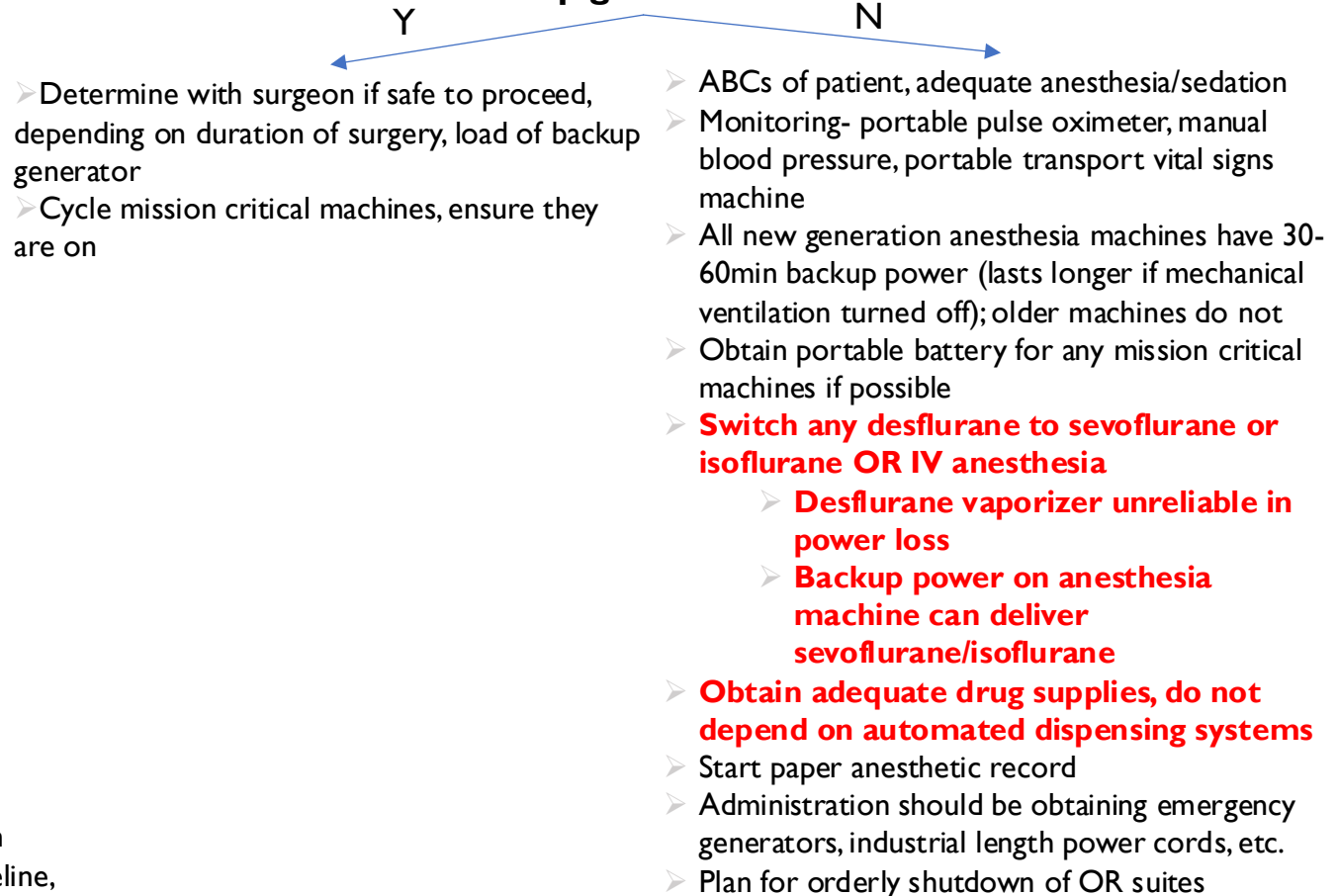
- With anesthesia, surgery, administrators, OR staff

### 6 Check outlets and plugs

- Mission critical machines normally plugged into **RED** outlets, uninterruptible
- If power is off on red outlet, try normal outlet



### Backup generator on?



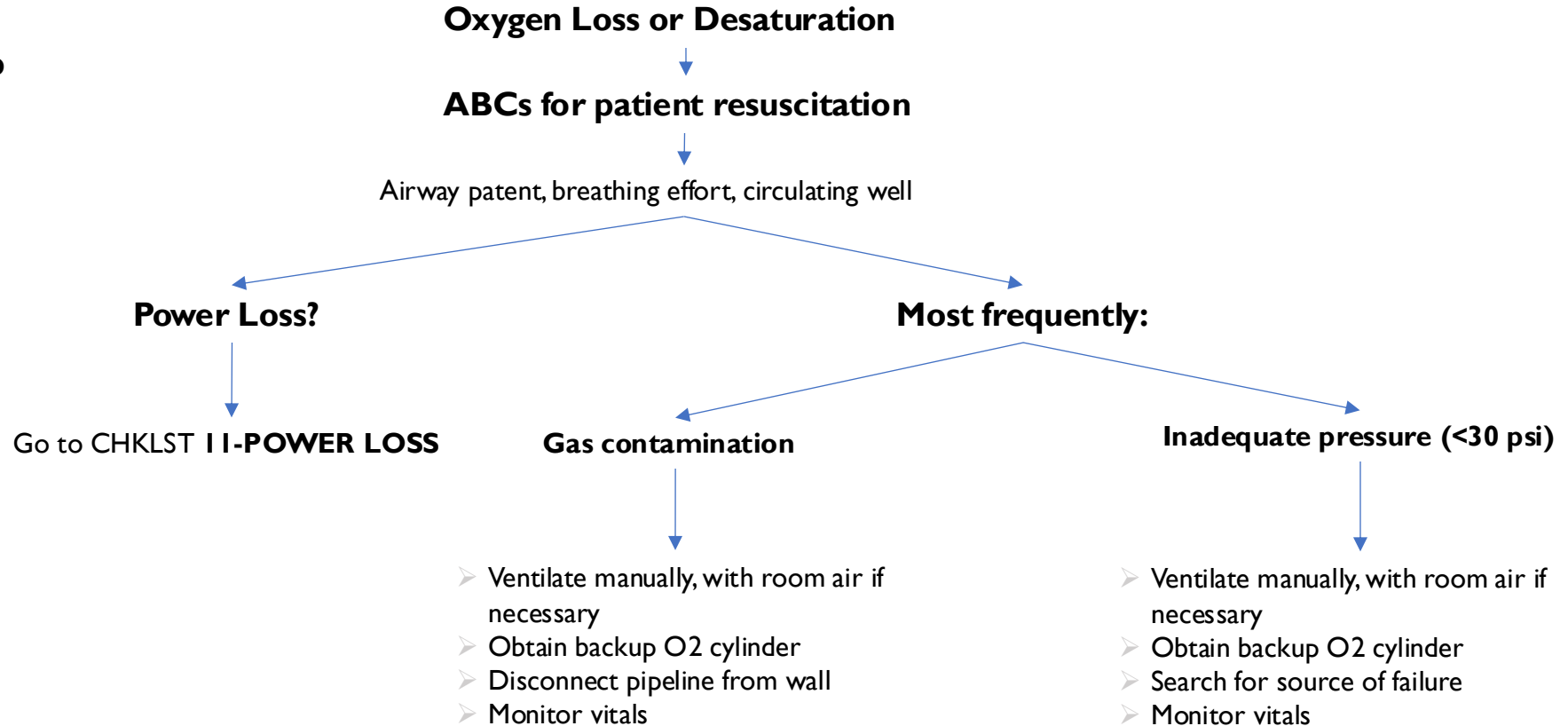


# 12 Oxygen Loss or desaturation

Sudden decrease in oxygen saturation despite flows

**START**

**I Call for help**



# 13 Workplace Violence

Threat of a weapon, physical assault, verbal assault

## START

- 1 Use de-escalation tips and be aware of safety principles
2. Call 911 when safe to do so
3. If an individual has a weapon or is an active threat:



*Run first. If you cannot run, hide. If you cannot hide, fight.*

- **Run** if not directly involved with patient care
- Have escape route in mind
- Leave physical belongings behind
- Keep your hands visible (palms out)
- **Hide** if running is not safe or patients cannot run
- Use large objects to block entry and lock door
- Silence your cell phone/pager
- **Fight ONLY** as a last resort
- Use objects as makeshift weapons
- Throw objects; punch; fight together if possible

### De-escalation tips

- Maintain awareness of your surroundings and have escape plan
- Approach individual at 45-degree angle
- Keep your palms up
- Use your name, ask for theirs and state why you are here
- Do not take their statements personally

### Safety Principles

|           |  |
|-----------|--|
| Awareness | Understand the situation and analyze risks   |
| Vigilance | Pay attention to gut feelings and external signals   |
| Avoidance | Place yourself in a position to minimize threats (seeming confident, recognizing dangers, using physical barriers) |
| Defense   | Defend yourself as a last resort. As needed, scream, use distractions, avoid tunnel vision                         |
| Escape    | Go to nearest exit, maintain distance  |

# CRITICAL EVENTS

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# 14 Allergic reaction -> Anaphylaxis

Hypotension, high peak airways pressure, bronchospasm, tachycardia, urticaria, lack of or decreased breath sounds

## START

### 1 Call for help and a code cart

- > Ask: "Who will be the crisis manager"?
- > Call: "Initiate Transfer Protocol"

### 2 Give Epinephrine

### 3 Turn FiO<sub>2</sub> to 100%, turn off volatile anesthetics

### 4 Open IV fluids and/or give fluid bolus

- > **ADULTS:** 1000 cc IV/IO push
- > **PEDS:** 20 cc/kg IV/IO push

### 5 Remove potential triggers

- > If Latex suspected, wash area thoroughly

### 6 Establish or secure airway

### 7 Additional Considerations

- > Epinephrine infusion for patients who initially responded to epinephrine but continue to experience symptoms
- > Diphenhydramine; H2 blockers; steroids; albuterol (peds)
- > Tryptase level: Draw for transfer
- > Other labs: Draw BMP, lactate if tubes available for transfer
- > Stop the procedure

## Critical CHANGES

If cardiac arrest **ADULT**

VF/VT            Go to **CHKLST 1-VF/VT**  
 Asystole/PEA    Go to **CHKLST 2-Asystole/PEA**

If cardiac arrest **PEDS:**

VF/VT            Go to **CHKLST 5-VF/VT**  
 Asystole/PEA    Go to **CHKLST 6-Asystole/PEA**

## DRUG DOSES and treatments ADULT

|                 |  |
|-----------------|--|
| Epinephrine:    | Bolus – 10-100 MICROgrams, repeat as necessary<br>Infusion – 1-10 MICROgrams/min |
| Diphenhydramine | 25-50 mg IV  |
| H2 Blockers     | Ranitidine – 50mg IV   |
| Hydrocortisone  | 100mg IV   |

## DRUG DOSES and treatments PEDS

|                    |  |
|--------------------|--|
| Epinephrine:       | Bolus – 1-10 MICROgrams/kg, repeat as necessary<br>Infusion – 0.02-0.2 MICROgrams/kg/min |
| Albuterol:         | 4-10 puffs   |
| Diphenhydramine    | 1 mg/kg IV/IO; max 50mg  |
| H2 Blockers        | Ranitidine – 1 mg/kg IV<br>Famotidine – 0.25mg/kg IV                                     |
| Methylprednisolone | 2mg/kg IV/IO; max 100mg  |

## Common causes

Neuromuscular blockade  
 Latex  
 Chlorhexidine  
 Antibiotics  
 IV contrast or IV colloids

# 15 Difficult Airway

2 unsuccessful intubation attempts by airway expert

## START

### 1 Call for help and a code cart

- Consider initiating transfer protocol

### 2 Call for airway cart and video laryngoscope

3 Turn FiO<sub>2</sub> to 100%, bag mask ventilate

### 4 Confirm adequate ventilation

## If ventilation NOT ADEQUATE

### ➤ Optimize Ventilation

- Reposition Patient
- Oral/nasal airway
- Two-handed mask

### ➤ Check Equipment

- Use 100% O<sub>2</sub>
- Capnography
- Circuit integrity

### ➤ Check Ventilation

## If still NOT ADEQUATE

## If ventilation ADEQUATE

## Consider

### ➤ Awakening patient or other means to secure airway

- LMA or face mask for duration of operation
- Video laryngoscope
- LMA as conduit to intubation
- Spontaneous ventilation
- Different blades
- Intubating stylet
- Light wand
- Fiberoptic intubation
- Retrograde intubation
- Blind oral/nasal intubation
- If awakening patient, try
  - Awake intubation
  - Regional or local for procedure
  - Canceling the case

- Place LMA or other supraglottic device or attempt intubation by video laryngoscope

- If consider trach (if available)
- Prep neck, call code airway (tracheostomy kit, surgeon)
- Re-check ventilation

## Still NOT ADEQUATE

- **Surgical Airway**
- **Mandatory transfer**

# 16 Embolism- venous, pulmonary, fat

Decreased end-tidal CO<sub>2</sub>, decreased oxygen saturation, hypotension

## START

### 1 Call for help and a code cart

- Ask: “Who will be the crisis manager”?
- Call: “Initiate Transfer Protocol”

### 2 Turn FiO<sub>2</sub> to 100%, bag mask ventilate

### 3 Turn off nitrous oxide and volatile anesthetics

### 4 Secure airway, confirm adequate ventilation

### 5 Monitor vitals

- BP, O<sub>2</sub>, pulse

### ➔ Pulmonary Embolism:

ECG **SIQ3T3**

- Identify risk factors (neoplasm, immobility, lack of anticoagulation)
- Vasopressors (norepinephrine) to improve RV function and to maintain BP, titrate to effect
- Support airway
- When emergency services arrives, inform them of the suspected pulmonary embolism and consideration for thrombolysis, STAT cardiovascular surgery or interventional radiology consult

### 6 If hypotensive, give IV fluids

- If severe, give vasopressors
- Go to **CHKLST 19-HYPOTENSION**

### 7 Consider:

- Left lateral decubitus for patient
- Suggesting TEE, CT, anticoagulation during transfer sign-out

## DRUG DOSES and treatments ADULT

### Anticoagulant treatment for acute PE

IV UFH, TPA alteplase: Suggest to 911/ambulance as treatment.

### ➔ Venous/air embolism:

- Find source and stop entry of air, including open venous lines
- Ask surgeon to irrigate wound with saline
- Turn off all sources of pressurized air (laparoscopy, endoscopy)
- Lower surgical site **below heart**, if possible (**reverse Trendelenburg**)
- Consider labs for transfer: ABG, BMP

### ➔ Fat embolism:

- Look for petechial rash, fever, tachycardia, tachypnea
- Ask surgeon to irrigate wound with saline
- Maintain adequate BP while avoiding volume overload
- Consider labs: ABG, BMP, ESR, fibrinogen serum microglobulin

## Critical CHANGES

- If **PEA** develops (no pulse)
  - Start CPR
  - **Adults CHKLST 2-Asystole/PEA**
  - **Peds CHKLST 6-Asystole/PEA**

# 17 Hemorrhage

Uncontrolled, acute bleeding

---

## START

### 1 Call for help and a code cart

- Ask: “Who will be the crisis manager”?
- Call: “Initiate Transfer Protocol”

### 2 Open IV fluids and ensure adequate access

3 Turn FiO<sub>2</sub> to 100%, turn down volatile anesthetics

### 4 Hold pressure over area of bleeding

5 Discuss management plan between surgical, anesthesiology, and nursing teams

6 Damage control surgery (**pack, close, resuscitate**)

### 7 Keep patient warm

### 8 Consider drawing labs for transfer

- CBC, coags, BMP, ABG, ionized calcium

### Suggestions for hospital actions...

- Electrolyte disturbances
- Contact blood bank
- Suggest expert consultation, transfusion medicine, vascular surgery, during transfer-signout

# 18 Hypercapnia

Unexplained elevation of **ET** PCO<sub>2</sub>

## START

**1 Call for help**

**2 Secure airway and ventilate**

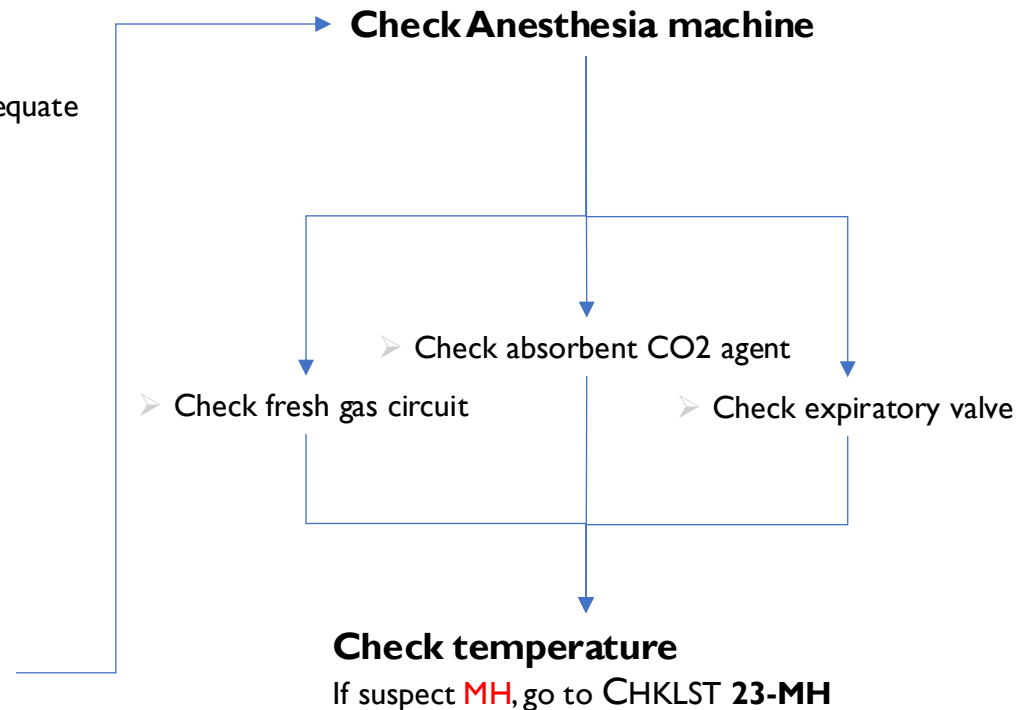
- Ensure mechanical ventilation has adequate tidal volumes

**Assess minute ventilation**

**Ensure adequate tidal volumes**

**Reverse known drug-induced depression of respiratory rate**

- Opioids, benzodiazepines, turn off inhaled halogenated agents



## Differential

- Laparoscopic procedure (consider diaphragmatic incompetence)
- Hypermetabolic state: thyroid storm, pheochromocytoma, sepsis
- Drug-induced **respiratory depression**: opioids, benzodiazepines, propofol, inhaled halogenated anesthetics
- Malignant hyperthermia
- Physiologic: increased dead space (COPD), hypoventilation



# 19 Hypotension

Unexplained drop in blood pressure refractory to initial treatment

## START

### 1 Call for help and a code cart

➤ Ask: “Who will be the crisis manager”?

### 2 Check for

➤ Pulse, BP, Equipment

➤ HR

If Bradycardia, adult **CHKLST 3-BRADYCARDIA**;  
peds **CHKLST 8-BRADYCARDIA**

➤ Rhythm

If VF/VT, adult **CHKLST 1-VF/VT**;  
peds **CHKLST 5-VF/VT**

If asystole/PEA, adult **CHKLST 2-Asystole/PEA**;  
peds **CHKLST 6-Asystole/PEA**

### 3 Run IV fluids wide open

### 4 Give vasopressors and titrate to response

➤ Mild hypotension: give ephedrine or phenylephrine

➤ Significant/refractory hypotension: give epinephrine bolus, consider starting epinephrine infusion

### 5 Turn FiO<sub>2</sub> to 100% and turn off volatile anesthetics

### 6 Look for external bleeding

➤ If bleeding, go to **CHKLST 16-HEMORRHAGE**

### 7 Consider...

➤ Patient in Trendelenberg

➤ Additional IV access

➤ Arterial line

## 8 Differential Diagnosis

### Operative field

- Mechanical/Surgical manipulation
- Insufflation during laparoscopy
- Retraction
- Vagal stimulation
- Vascular compression

### Unaccounted blood loss

- Blood in suction catheter
- Bloody sponges, blood on the floor
- Internal bleeding

### Drugs/Allergy

- Anaphylaxis, go to **CHKLST 13-ANAPHYLAXIS**
- Recent drugs given, ie vasodilators
- Dose error, wrong drug
- Drugs used on field, ie systemic injection of local anesthetic, go to **CHKLST 20-LAST**

### Breathing

- Hypoventilation
- Hypoxia, go to **CHKLST 19-HYPOXIA**
- Increased PEEP
- Persistent hyperventilation
- Pneumothorax
- Pulmonary edema

### Circulation

- Bradycardia, adult **CHKLST 3**; peds **CHKLST 7**
- Malignant hyperthermia, go to **CHKLST 23**
- Tachycardia, adult **CHKLST 4**; peds **CHKLST 8**
- Bone cementing
- Myocardial infarction
- Emboli, go to **CHKLST 15**
- Severe sepsis
- Tamponade

## DRUG DOSES and treatments ADULT

Phenylephrine: 40-200 MICROgrams IV, repeat as necessary  
Ephedrine: 5-25mg IV, repeat as necessary  
Epinephrine: Bolus – 5-10 MICROgrams  
Infusion – 0.1-1 MICROgrams/kg/min

## DRUG DOSES and treatments PEDS

Phenylephrine: 40-200 MICROgrams IV, repeat as necessary  
Ephedrine: 5-25mg IV, repeat as necessary  
Epinephrine: Bolus – 0.1mg/kg (1:1,000 solution), every 3-5 min

| Age     | <5 <sup>th</sup> % systolic BP |
|---------|--------------------------------|
| Preemie | <57                            |
| 0-3 mo  | <60                            |
| 3-12 mo | <70                            |
| 1-10 yr | <70 + (age in years x2)        |
| >10 yr  | <90                            |

# 20 Hypoxia

Unexplained desaturation in oxygen

## START

### 1 Call for help and a code cart

- Ask: "Who will be the crisis manager"?

### 2 Turn $\text{FiO}_2$ to 100% and turn off volatile anesthetics

- Confirm inspired  $\text{FiO}_2 = 100\%$  on gas analyzer
- Confirm  $\text{ETCO}_2$  and changes in capnography morphology

### 3 Hand ventilate to assess compliance

### 4 Listen to breath sounds

### Check for

- Pulse, BP, PIP

- ET tube position

- Pulse oximeter placement

- Circuit integrity: disconnection, bends, holes

### Consider...

- Draw blood gas for transfer
- Suction (to clear secretions, mucus plug)
- Disconnect circuit and hand-mask

### Additional tests to suggest during transfer

Fiberoptic bronchoscopy  
Chest x-ray  
Electrocardiogram  
Transesophageal echocardiogram  
Chest ultrasound

### Differential Diagnosis

YES **AIRWAY** issue suspected

NO **AIRWAY** issue suspected

#### Airway/Breathing

Aspiration  
Atelectasis  
Bronchospasm  
Hypoventilation  
Laryngospasm  
Obesity/positioning  
Pneumothorax  
Pulmonary edema  
Right mainstem intubation  
Ventilator settings -> autoPEEP

#### Circulation

Embolism go to **CHKLST 16-EMBOLISM**  
Heart disease  
Severe sepsis  
If hypoxia associated with hypotension, go to **CHKLST 19-HYPOTENSION**  
Drugs/Allergies  
Recent drugs given, ie NMB  
Dose error/allergy/anaphylaxis, go to **CHKLST 14-ANAPHYLAXIS**  
Dyes and abnormal hemoglobin, ie methemoglobinemia, methylene blue

# 21 Local anesthetic systemic toxicity (LAST)

Altered mental status, neurological symptoms, cardiovascular instability following regional anesthetic

## START

### 1 Call for Physician Anesthesiologist/CRNA/AA help and a code cart

- Ask: "Who will be the crisis manager"?
- Call: "Initiate Transfer Protocol"

### 2 Stop local anesthetics

### 3 Request for Intralipid kit

### 4 Secure airway and ventilation

- Turn FiO<sub>2</sub> to 100% and turn off volatile anesthetics

### 5 Seizure suppression

- Benzodiazepines
- Avoid propofol in patients with cardiovascular instability
- **Alert nearest facility with cardiopulmonary bypass capability**
- Go to **CHKLST 26-Transfer of non-MH patient**

### 6 Check for

- Pulse, BP, SaO<sub>2</sub>
- If unstable cardiopulmonary system, start CPR
  - If VF/VT, adult **CHKLST 1-VF/VT**;  
peds **CHKLST 5-VF/VT**
  - If asystole/PEA, adult **CHKLST 2-Asystole/PEA**;  
peds **CHKLST 6-Asystole/PEA**

### 7 Management of cardiac arrhythmias

- Avoid vasopressin, calcium channel blockers, beta blockers, and local anesthetics
- Reduce epinephrine to <1 MICROgram/kg for hypotension

### 8 Give Lipid emulsion 20% therapy

- Bolus 1.5 ml/kg over 1 min
- Start continuous infusion
- Repeat bolus for persistent cardiovascular collapse
- Double infusion rate if BP remains low
- Continue infusion for at least 10 min after stable vitals
- Max 10ml/kg over first 30 min

### 9 Post LAST events at

- [www.lipidrescue.org](http://www.lipidrescue.org)

### 10 Report use of LIPID at

- [www.lipidregistry.org](http://www.lipidregistry.org)

## DRUG DOSES and treatment ADULT

|                |  |
|----------------|--|
| Lipid emulsion | bolus 1.5 ml/kg IV over 1 min<br>continue infusion 0.25 ml/kg/min<br>increase infusion to 0.5 ml/kg/min if<br>BP remains low |
| Midazolam      | 2mg  |
| Epinephrine    | <1 MICROgram/kg  |

## DRUG DOSES and treatment PEDS

|                |  |
|----------------|--|
| Lipid emulsion | bolus 1.5 ml/kg IV over 1 min<br>continue infusion 0.25 ml/kg/min<br>increase infusion to 0.5 ml/kg/min if<br>BP remains low |
| Midazolam      | 0.05-1 mg/kg IV  |
| Epinephrine    | <1 MICROgram/kg  |

# 22 Loss of access

Fluids on floor, no change in vitals after drug administration

---

## START

### 1 Call for help

### 2 Communicate to surgeon

### 3 Check lines

Look for kinks in tubing

Ensure fluids are dripping

Look for fluid extravasation into surrounding tissue

Look for infiltration

### 4 Re-establish access

Choose another site starting distal to proximal in each limb:

different hand, arm, legs,

Use smaller gauge needle

### 5 If unable to establish access

#### Call for ultrasound

If still refractory, consider central access or intraosseous depending on access to patient and patient needs

If endotracheal tube, inject: lidocaine, atropine, narcan epinephrine (LANE)

IM- midazolam, succinylcholine, ketamine, glycopyrrolate, atropine

SQ- epinephrine

### 6 When successful, secure IV well

# 23 Mental status change and postoperative cognitive dysfunction

Delirium, obtundation, coma, confusion, speech deficit

## START

### 1 Call for help and a code cart

- Ask: "Who will be the crisis manager"?
- Call: "Initiate Transfer Protocol"

### 2 Secure airway and ventilation

### 3 Consider additional IV access

### 4 Consider drawing labs for potential transfer

- Point of care glucose

### 5 Treat reversible causes

### 6 Stroke assessment

- Consider expert consultation, neurology, during transfer sign-out

### 7 Review medications and antagonists

### Consider LABs during transfer sign-out

Complete blood count, metabolic panel, electrolytes, liver function tests  
Urinalysis, urine toxicology

### STROKE assessment

**Facial droop** Smile, show teeth  
**Arm drift** Close eyes, extend arms forward, palms up for 10 sec  
**Speech** Say "It is a sunny day in Boston"  
**Time** Recognize symptoms fast

### DRUG DOSES and treatment ADULT

Naloxone 0.4-2mg IV/IM/SC, repeat every 3 min as necessary  
Flumazenil 0.2mg IV, repeat as necessary  
Dextrose 50 cc D50W IV

### Critical CHANGES

If bleeding  
➤ Go to **CHKLST 16- HEMORRHAGE**  
If hemodynamically unstable  
➤ **Start CPR**  
If VF/VT, adult **CHKLST 1-VF/VT**;  
peds **CHKLST 5-VF/VT**  
If asystole/PEA, adult **CHKLST 2-Asystole/PEA**;  
peds **CHKLST 6-Asystole/PEA**  
If Bradycardia, adult **CHKLST 3-BRADYCARDIA**;  
peds **CHKLST 8-BRADYCARDIA**

### Reversible Causes

Hypoglycemia  
Hyperglycemia  
Opioids  
Benzodiazepines  
Acid-base disturbance  
Electrolyte abnormalities  
Hypoxia, go to **CHKLST 20-HYPOXIA**  
Hypercapnia, go to **CHKLST 18-HYPERCAPNIA**  
Azotemia

Hypovolemia  
Hypotension, go to **CHKLST 19-HYPOTENSION**  
Acute blood loss, go to **CHKLST 17-HEMORRHAGE**  
Urinary retention  
Infection, ie pneumonia, UTI  
Steroids  
Anticholinergics  
DKA

# 24 Malignant Hyperthermia

In presence of triggering agent: unexpected increase in ETCO<sub>2</sub>, unexplained tachycardia/tachypnea, prolonged masseter muscle spasm after succinylcholine. Hyperthermia is a LATE sign

## START

### 1 Call for help and a code cart

- Ask: "Who will be the crisis manager"?
- Call: "Initiate MH Transfer Protocol"

### 2 Get MH kit

### 3 Call MH Hotline 1.800.644.9737

### 4 Assign dedicated person to start mixing Dantrolene

### 5 Request chilled IV saline

### 6 Turn off volatile anesthetics and transition to non-triggering anesthetics

- **DO NOT** delay treatment to change circuit/CO<sub>2</sub> absorber

### 7 Turn FiO<sub>2</sub> to 100%

### 8 Hyperventilate patient at flows > 10L/min

### 9 Terminate procedure, if possible

### 10 Give Ryanodex/dantrolene

### 11 Give bicarbonate for suspected metabolic acidosis (maintain pH > 7.2)

### 12 Treat hyperkalemia, if suspected

### 13 Treat dysrhythmias, if present

- Standard antiarrhythmics; **DO NOT** use calcium channel blockers

### 14 Consider drawing labs for transfer

- Arterial blood gas
- Electrolytes
- Serum creatinine kinase
- Serum/urine myoglobin
- Coagulation profile

### 15 Initiate supportive care

- Consider cooling patient if T > 38.5C
- Place Foley catheter, monitor urine output

## TRIGGERING AGENTS

Inhalational (volatile) anesthetics  
Succinylcholine

## DRUG DOSES and treatments ADULT

|  |   |
|--|---|
| Dantrolene:  | Reconstitute 20mg vial in 60cc sterile water (shake until dilute)               |
| --- or ---   |   |
| Ryanodex:  | Reconstitute 250mg vial with 5 cc sterile water (shake until orange and opaque) |
| Give 2.5mg/kg, repeat up to 10mg/kg until symptoms subside |   |
| Rarely may require up to 30mg/kg                           |   |
| Bicarbonate  | 1-2mEq/kg, slow IV push<br>max 50mEq  |
| <b>HYPERKALEMIA treatment</b>                              |   |
| 1. Ca gluconate  | 30mg/kg IV, max 3000mg  |
| --- or ---   |   |
| Ca chloride  | 10mg/kg IV, max 2000mg  |
| 2. Insulin   | 10 units regular IV<br>1-2 amps D50W  |

## DIFFERENTIAL diagnosis (consider if refractory to high doses of dantrolene)

### Cardiopulmonary

Hypoventilation  
Sepsis

### Endocrine

Thyrotoxicosis  
Pheochromocytoma

### Iatrogenic

Exogenous CO<sub>2</sub> source  
Overwarming  
Neuroleptic Malignant Syndrome

### Neurologic

Meningitis  
Intracranial bleed  
Hypoxic encephalopathy  
Traumatic brain injury

### Toxins

Radiologic contrast  
Anticholinergic syndrome  
Cocaine, amphetamine, salicylate, alcohol withdrawal

# 25 Spinal Anesthesia: Adverse reactions

Hypotension, decreased respiratory effort, bradycardia, numbness or tingling in the fingers and hands, cardiopulmonary instability after spinal procedure

## START

### 1 Call for help and a code cart

- Ask: "Who will be the crisis manager"?
- Call: "Initiate Transfer Protocol"

### 2 Secure airway and ventilation

- Turn on FiO2 100%

### 3 Consider additional IV access

#### Treat hypotension

- Phenylephrine first line

#### Treat bradycardia

- Reverse with atropine and ephedrine
- Epinephrine second line
- Go to **CHKLST 3-BRADYCARDIA**

#### Treat respiratory insufficiency

- Reverse with naloxone, flumazenil if necessary

#### Consider drawing labs for transfer

- CBC, electrolytes, ABG

#### Differential Diagnosis

##### Drugs/Allergy

- Anaphylaxis, go to **CHKLST 13-ANAPHYLAXIS**
- Recent drugs given, ie vasodilators
- Dose error, wrong drug
- Drugs used on field, ie systemic injection of local anesthetic, go to **CHKLST 21-LAST**

##### Breathing

- High Spinal
- Hypoventilation
- Hypoxia, go to **CHKLST 20-HYPOXIA**
- Increased PEEP
- Increased valsalva
- Persistent hyperventilation
- Pneumothorax
- Pulmonary edema

#### DRUG DOSES and treatments ADULT

|               |   |
|---------------|---|
| Atropine      | 0.5mg IV; max 3mg total                           |
| Naloxone      | 0.4-2mg IV/IM/SC, repeat every 3 min as necessary |
| Flumazenil    | 0.2mg IV, repeat as necessary                     |
| Ephedrine     | 5-25mg IV, repeat as necessary                    |
| Phenylephrine | 40-200 MICROgrams IV, repeat as necessary         |
| Epinephrine   | 2-10 MICROgram/min IV                             |

##### Circulation

- Bradycardia, adult **CHKLST 3-BRADYCARDIA**; peds **CHKLST 7-BRADYCARDIA**
- Malignant hyperthermia, go to **CHKLST 23-MH**
- Tachycardia, adult **CHKLST 4-TACHYCARDIA**; peds **CHKLST 8-TACHYCARDIA**
- Bone cementing
- Myocardial infarction
- Emboli, go to **CHKLST 16-EMBOLI**
- Tamponade

# 26 Aspiration

Inhalation of gastric or oro-pharyngeal contents into the larynx and the respiratory tract

## START

### 1 Call for help

- Ask: "Who will be the crisis manager"?
- Call: "Initiate Transfer Protocol"

### 2 Turn FiO<sub>2</sub> to 100% (be careful of bag mask ventilation if aspirate in lungs)

### 3 Position patient, in left lateral position

### 4 Suction oropharynx

### 5 Secure airway

### 6 Terminate if the procedure has started

### 7 Consider fiberoptic bronchoscopy to further suction lungs

### 8 Call 911 for transfer



### Airway management strategies:

- If gastric volume should be reduced, consider nasogastric aspiration
- If gastric acidity should be reduced, consider antacids, H<sub>2</sub> histamine antagonist, or proton pump inhibitors



# 27 Failure or malfunction of Cardiac Implantable Electronic Device (CIED)

Premature battery depletion, electrical reset, pacemaker-mediated arrhythmia, loss of pacing capture

## START

### 1 Call for help and contact CIED team or technical support number

Ask: "Who will be the crisis manager"?

- Call: "Initiate Transfer Protocol"
- If no CIED team nearby, call 24-hour technical support number for CIED
- Arrange transport and call 911

### 2 Place transcutaneous defibrillation/pacing pads on the patient's chest if not already

- Do not place pads directly over the CIED
- In most individuals with a left sided CIED, use standard anteroposterior pad positioning

### 3 Maintain monitoring with ECG and pulse oximetry plethysmography

### 4 Follow critical changes chart

## Critical CHANGES

If cardiac arrest **ADULT**

VF/VT            Go to **CHKLST 1-VF/VT**  
 Asystole/PEA    Go to **CHKLST 2-Asystole/PEA**

If cardiac arrest **PEDS:**

VF/VT            Go to **CHKLST 5-VF/VT**  
 Asystole/PEA    Go to **CHKLST 6-Asystole/PEA**

## Essential information for surgical team

|                                     |  |
|-------------------------------------|--|
| Date of last device interrogation   | Is there status alert for device?                                  |
| Device type, manufacturer and model | Battery longevity  |
| Is patient device-dependent         | Current programming  |
| Device placement                    | Device response to magnets   |
| Leads placed within last 3 months?  | Are there any individualized perioperative device recommendations? |

## Common causes

|  |
|--|
| Electromagnetic interference (EMI) from monopolar electrocautery |
| Magnet affecting device function                                 |
| Direct damage to device  |

## CIED technical support numbers

|                     |              |
|---------------------|--------------|
| Abbott / Saint Jude | 800-722-3774 |
| Boston Scientific   | 800-227-3422 |
| Medtronic           | 800-633-8766 |
| Biotronik           | 800-547-0394 |
| Sorin               | 800-352-6466 |

# 28 Postoperative Airway Problem

Derangement in physiological symptoms or signs attributed to the airway resulting in obstruction

## START

**1 Call for help and a code cart**

**2 Check ABCs and consider CAB protocols**

**3 Call 911**, consider sending the patient to the operating room

**4 Determine patient disposition**

**3 Differential Diagnosis**

Airway obstruction

- Administer FIO<sub>2</sub> 100%, suction secretions, jaw-thrust, insert oral or nasal airway

Anatomical management

- Laryngospasm treatment includes removing irritating stimulus, hyperextend neck, elevating head, oxygenation, suction, or positive pressure ventilation

Obstruction sleep apnea

- Monitoring apnea and oxygen saturation

Postoperative hypoxemia

- Address underlying cause (i.e., opioids, general anesthesia, insufficient reversal of neuromuscular blocking agents, decreased chest wall compliance, abdominal distension, constrictive dressings, or postoperative pain)

## ABC Assessment

### Airway

Determine if the patient is able to talk  
Look for edema, blood, vomiting, foreign body  
Listen for any noise or obstructions

### Breathing

Look for work of breathing, respiratory rate  
Listen for breath sounds  
Check pulse oximetry

### Circulation

Look at mental status, color  
Feel peripheral pulse  
Check heart rate, cardiac rhythm, blood pressure

## CAB Protocol

For CPR, go to **CHKLST I-CARDIAC ARREST**

### Compression

Push hard and fast on the center of the adult patient's chest

### Airway

Tilt the patient's head back and lift the chin to open the airway

### Breathing

Give mouth to mouth rescue breaths

# ADMINISTRATIVE

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# 29 Transfer of care Malignant Hyperthermia patient

In presence of triggering agent: unexpected increase in ET<sub>CO2</sub>, unexplained tachycardia/tachypnea, prolonged masseter muscle spasm after succinylcholine. Hyperthermia is a LATE sign

## START

### 1 Recognize suspected MH

- Have **designated person** call **911** and **EMT #** upon recognition
- Indicate that it is an “**Immediate Arrest Situation**”
- Call MHAUS MH Hotline **1.800.MH.HYPER (644.9737)** for additional assistance 24/7/365
- Use MHAUS “Emergency Therapy for MH” protocol poster criteria once MH diagnosis is made or suspected
- Qualified on-site Anesthesia Care Provider at OBA facility will serve as primary consultants for recognition and treatment of MH and decisions regarding TT and receiving health care facility (RHCF) and timing of transfer

### 2 Discontinue triggering agents, initiate treatment

- IV Dantrolene 2.5mg/kg (dissolved in sterile preservative-free water) should be given immediately
- See **CKLST 24-MH**; initiate pending transfer
- 36 vials of Dantrolene sodium must be available wherever MH triggering agents are used

### 3 Implement Emergent MH Transfer plan

- Collect patient data: vital signs, temperature, ET<sub>CO2</sub> trends, electrolytes, ECG
- Do not delay transfer!
- **Emergency transfer is mandatory**

### 4 Notify **Receiving Healthcare Facility (RHCF)**: coordinate communication

- Direct **personal communication** is ideal between  
Anesthesia Care Provider at OBA facility  
Receiving Physician (critical care, primary or emergency medicine providers at RHCF)
- Coordination of anticipated post-resuscitation needs is **ESSENTIAL** between Anesthesia Care Provider to Receiving Physician

# 30 Transfer of care non-Malignant Hyperthermia patient

In need of emergency transfer for cardiopulmonary reasons or unable to provide necessary and required care at current ambulatory facility

## START

**1 Recognize signs of an emergency**

**2 Initiate Facility Transfer Protocol**

**3 Have designated person call 911 and contact EMT # for emergency**

**4 Office must have prior plan/transfer of care agreement in place to ensure EMT arrives within 10 min**

**5 Qualified Office-based facility Anesthesia care provider must serve as primary provider for the patient**

**6 Implement Emergent non-MH Facility Transfer plan**

➤ Collect patient data: vital signs, temperature, ETCO<sub>2</sub> trends, labs, ECG

**7 Notify Receiving Healthcare Facility (RHCF): coordinate communication**

➤ Direct **personal communication** is ideal between

Anesthesia Care Provider at OBA facility

Receiving Physician (critical care, primary or emergency medicine providers at RHCF)

➤ Coordination of anticipated post-resuscitation needs is **ESSENTIAL** between Anesthesia Care Provider to Receiving Physician

# Credits

- Steven Young, MD
- Alex Hannenberg, MD
- Rich Urman, MD
- Brian Osman, MD
- Fred Shapiro, DO
- Justin Talluto, BS
- Nicolette Duong, BS, MIB
- Vikranth Chinthareddy, BA

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