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

Definition or signs of event

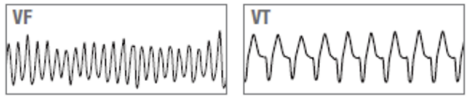
Step-by-step instruction for response

Standard drug doses

And

Supplementary materials

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_2 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 (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 $ETCO_2$
    - 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:	1mg IV, repeat every 3-5 min

ANTIARRHYTHMICS

Amiodarone:	1st dose: 300mg/IV/IO
	2nd 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

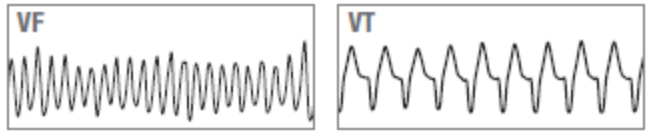
Hydrogen ions (acidosis)	Tamponade (cardiac)
Hyperkalemia	Tension pneumothorax
Hypothermia	Thrombosis (coronary/pulmonary)
Hypovolemia	Toxin (local anesthetic, beta
Hypoxia	blocker, calcium channel blocker)

During CPR

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

ACLS

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_2 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
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  - Repeat epinephrine every 3-5 min
- Consider antiarrhythmics for refractory VF/VT (amiodarone)
- Assess every 2 minutes
  - Change CPR compression provider
  - Check $ETCO_2$
    - 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:	1mg IV, repeat every 3-5 min

ANTIARRHYTHMICS

Amiodarone:	1st dose: 300mg/IV/IO
	2nd 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
Hypoxia	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 for select potentially reversible causes
Assign roles:	Chest compression, Airway, Vascular access, Timing,
Code	cart, documentation

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_2 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 $ETCO_2$
    - 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 **1-VF/VT**

DRUG DOSES and treatments ADULT

Epinephrine:	1mg 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
Ca chan blocker	Ca chloride 1g IV push
Bicarbonate	1-2mEq/kg, slow IV push; max 50mEq

HYPERKALEMIA treatment

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 Consider IV fluids wide open Consider ECMO for select potentially reversible causes
Assign roles:	Chest compression, Airway, Vascular access, Timing,
Code	cart, documentation

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_2 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
Digoxin	Digoxin Immune FAB; consult pharmacy for patient-specific dosing

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 Consider IV fluids wide open
Assign roles: documentation	Airway, Vascular access, Timing, Code cart,

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_2 to 100%, turn off volatile anesthetics

3 Analyze Rhythm

- If wide complex, irregular: treat as VF, go to CHKLST **1-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 CARDIOVERSION 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 CHKLST **1-VF/VT**

Critical CHANGES

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

If **cardiac arrest**:

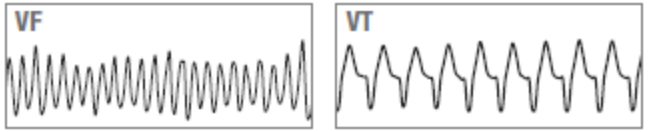
VF/VT	Go to CHKLST **1-VF/VT**
Asystole/PEA	Go to CHKLST **2-Asystole/PEA**

During resuscitation

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

PALS

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_2 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 $ETCO_2$
    - 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:	1st and 2nd dose: 5mg/kg bolus
Lidocaine:	1mg/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
	Consider IV fluids wide open
	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_2 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 $ETCO_2$ for ROSC
- Give epinephrine
  - Repeat epinephrine every 3-5 min
- Assess every 2 minutes
  - Change CPR compression provider
  - Check $ETCO_2$
    - 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)	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 if cardiac arrest > 6min
Assign roles: Code	Chest compression, Airway, Vascular access, Timing, 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_2 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 PEDS

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

OVERDOSE Treatments

Beta-blocker	Glucagon 0.05mg/kg IV push, then 0.07mg/kg/min IV
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)
- Go to CHKLST **6-Asystole/PEA**

During resuscitation

Airway:	Assess and secure
Circulation:	Confirm adequate IV/IO access 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_2 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 CARDIOVERSION 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 (1st dose 6mg max, 2nd dose 12mg max)	Amiodarone: 5mg/kg IV over 20-60min Procainamide: 15mg/kg IV over 30-60min Lidocaine: 1mg/kg IV	MgSO4: 25-50 mg/kg/dose over minutes Isoproterenol: 0.05-2 MICROgrams/kg/min Lidocaine: 1mg/kg IV Phenytoin NaBicarb (for quinidine-related) 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 Consider IV fluids wide open
Assign roles:	Airway, Vascular access, Timing, Code cart, documentation

EMERGENCY

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-DIFFCULT AIRWAY**
- Avoid N_2O and minimize FiO_2

FIRE

If **NON-AIRWAY** fire (IE EQUIPMENT, ELECTRICAL)
- Avoid N_2O and minimize FiO_2
- 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)

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

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

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

11 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

VENTILATOR on?

Y → Switch to 100% O2

N → Manual ventilation; obtain external O2 source (pipeline, machine, cylinder)

Backup generator on?

Y
- Determine with surgeon if safe to proceed, depending on duration of surgery, load of backup generator
- Cycle mission critical machines, ensure they are on

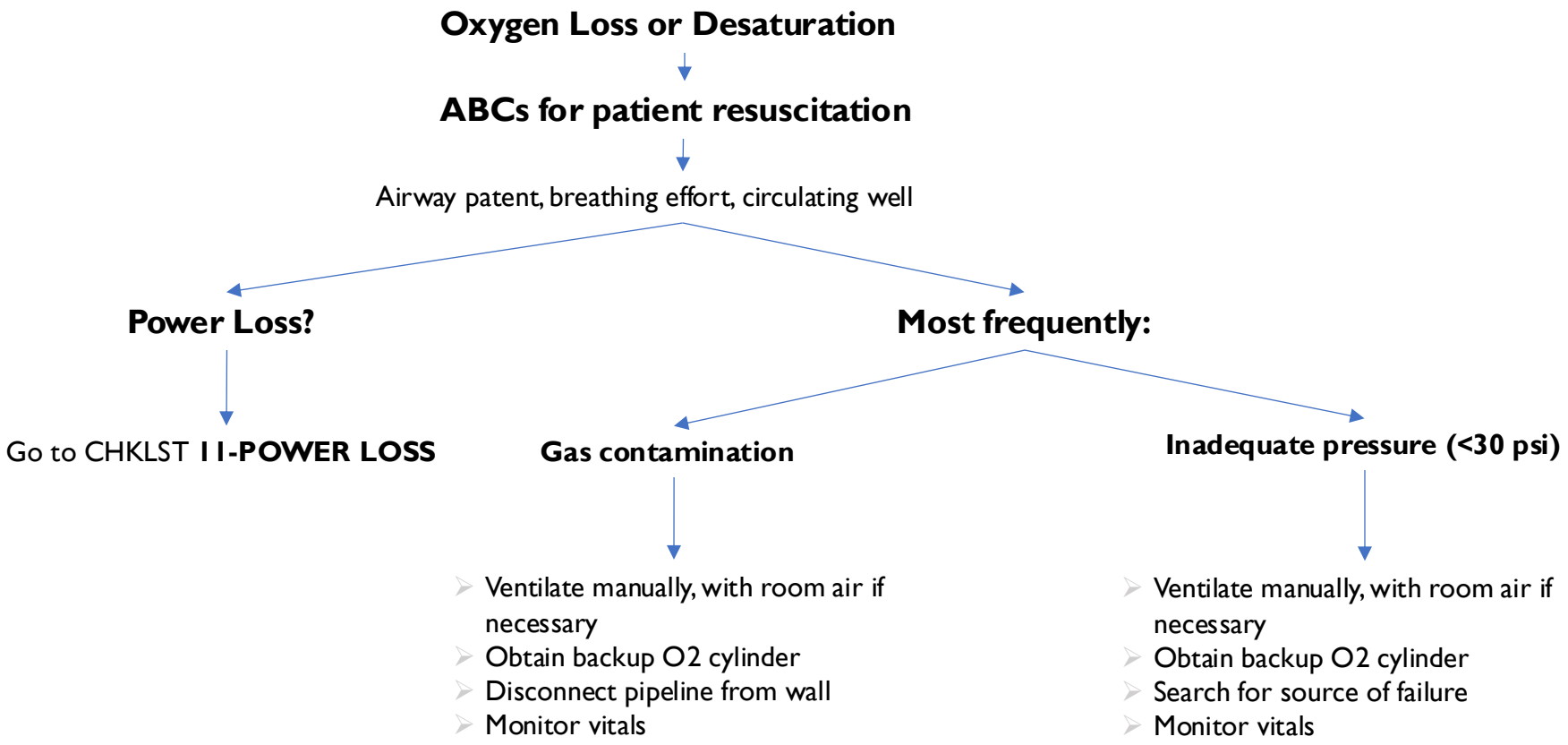
N
- ABCs of patient, adequate anesthesia/sedation
- Monitoring- portable pulse oximeter, manual blood pressure, portable transport vital signs machine
- All new generation anesthesia machines have 30-60min backup power (lasts longer if mechanical ventilation turned off); older machines do not
- Obtain portable battery for any mission critical machines if possible
- **Switch any desflurane to either isoflurane, sevoflurane, or IV anesthesia**
  - **Desflurane vaporizer unreliable in power loss**
- **Obtain adequate drug supplies, do not depend on automated dispensing systems**
- Start paper anesthetic record
- Administration should be obtaining emergency generators, industrial length power cords, etc.
- Plan for orderly shutdown of OR suites

12 Oxygen Loss or desaturation

Sudden decrease in oxygen saturation despite flows

START

1 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

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_2 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
- Vasopressin (adults) for patients with continued hypotension refractory to repeated epinephrine
- Epinephrine infusion for patients who initially responded to epinephrine but continue to experience symptoms
- Diphenhydramine; H2 blockers; steroids; albuterol (peds)
- Tryptase level: Check within 1st hour, repeat at 4th hour and 18-24 hours s/p reaction
- Stop the procedure

Critical CHANGES

If cardiac arrest **ADULT**		If cardiac arrest **PEDS**:	
VF/VT	Go to CHKLST **1-VF/VT**	VF/VT	Go to CHKLST **5-VF/VT**
Asystole/PEA	Go to CHKLST **2-Asystole/PEA**	Asystole/PEA	Go to CHKLST **6-Asystole/PEA**

DRUG DOSES and treatments ADULT

Epinephrine:	Bolus – 10-100 MICROgrams, repeat as necessary Infusion – 1-10 MICROgrams/min
Vasopressin:	1-2 units IV
Diphenhydramine	25-50 mg IV
H2 Blockers	Ranitidine – 50mg IV Cimetidine – 300mg IV
Hydrocortisone	100mg IV

DRUG DOSES and treatments PEDS

Epinephrine:	Bolus – 1-10 MICROgrams/kg, repeat as necessary Infusion – 0.02-0.2 MICROgrams/kg/min
Albuterol:	4-10 puffs
Diphenhydramine	1 mg/kg IV/IO; max 50mg
H2 Blockers	Ranitidine – 1mg/kg IV 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_2 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_2
  - Capnography
  - Circuit integrity
- **Check Ventilation**

If still NOT ADEQUATE

- 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

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

Still NOT ADEQUATE

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

16 Embolism- venous, pulmonary, fat

Decreased end-tidal CO2, 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_2 to 100%, bag mask ventilate

3 Turn off nitrous oxide and volatile anesthetics

4 Secure airway, confirm adequate ventilation

5 Monitor vitals
- BP, O2, pulse

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: ABG
- Consider precordial Doppler, TEE if available

Pulmonary Embolism:
ECG S1Q3T3
- Identify risk factors (neoplasm, immobility, lack of anticoagulation)
- Vasopressors (norepinephrine) to improve RV function and to maintain BP, titrate to effect
- Pulmonary vasodilators to decrease PA pressure, increase CO, improve gas exchange
- Anticoagulate on case-by-case basis
- Support airway
- When emergency services arrives, inform them of the suspected pulmonary embolism and consideration for thrombolysis, STAT cardiovascular surgery or interventional radiology consult

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, CBC, ESR, fibrinogen serum microglobulin

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 during transfer sign-out

DRUG DOSES and treatments ADULT

Anticoagulant treatment for acute PE

IV UFH:	bolus: 80U/kg or 5000U (70kg adult) infusion: 18U/kg/hr (adjust to aPTT equivalent of 0.3-0.7 anti-Xa activity
SQ UFH:	bolus: 333U/kg maintenance: 250U/kg BID
SQ LMWH Enoxaparin: Dalteparin:	 100IU/kg BID or 150IU/kg QD 100IU/kg BID or 200IU/kg QD
SQ Fondaparinux:	<50kg- 5mg QD 50-100kg- 7.5mg QD >100kg- 10mg QD
rtPA alteplase:	10 mg IV followed by infusion of 90 mg over 2 hours

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_2 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, electrolytes, 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** PCO2

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

Check Anesthesia machine

- Check absorbent CO2 agent
- Check fresh gas circuit
- Check expiratory valve

Check temperature

If suspect MH, go to CHKLST **23-MH**

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_2 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	<5th % 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 FiO_2 to 100% and turn off volatile anesthetics

- Confirm inspired FiO_2 = 100% on gas analyzer
- Confirm $ETCO_2$ 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

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

NO **AIRWAY** issue suspected

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_2 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_2
- 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

10 Report use of LIPID at
- www.lipidregistry.org

DRUG DOSES and treatment ADULT

Lipid emulsion	bolus 1.5 ml/kg IV over 1 min continue infusion 0.25 ml/kg/min increase infusion to 0.5 ml/kg/min if 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 continue infusion 0.25 ml/kg/min increase infusion to 0.5 ml/kg/min if 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
Glucagon	1mg IV/IM/SC

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 ETCO2, unexplained tachycardia/tachypnea, prolonged masseter muscle spasm after succhinylcholine. 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_2 absorber

7 Turn FiO_2 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 max 50mEq
HYPERKALEMIA treatment	
1. Ca gluconate	30mg/kg IV, max 3000mg
--- or ---	
Ca chloride	10mg/kg IV, max 2000mg
2. Insulin	10 units regular IV 1-2 amps D50W

DIFFERENTIAL diagnosis (consider if refractory to high doses of dantrolene

Cardiopulmonary	Iatrogenic	Neurologic	Toxins
Hypoventilation	Exogenous CO_2 source	Meningitis	Radiologic contrast
Sepsis	Overwarming	Intracranial bleed	Anticholinergic syndrome
Endocrine	Neuroleptic Malignant Syndrome	Hypoxic encephalopathy	Cocaine, amphetamine, salicylate, alcohol withdrawal
Thyrotoxicosis		Traumatic brain injury	
Pheochromocytoma			

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

- Ephedrine and then phenylephrine first line
- Epinephrine second line

Treat bradycardia

- Reverse with atropine
- Go to CHKLST **3-BRADYCARDIA**

Treat respiratory insufficiency

- Reverse with naloxone, flumazenil

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

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

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

26 Aspiration

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

START

1 Ensure patient has no ongoing signs of aspirations
2 Turn FiO_2 to 100%, bag mask ventilate
3 Position patient comfortably, in left lateral position and leaning forward
4 Terminate if the procedure has started
5 Call 911, obtain proper imaging and laboratory testing
6 Determine patient disposition

⇨ **Airway management strategies:**

- If gastric volume should be reduced, consider nasogastric aspiration
- If gastric contents should be reduced, consider antacids, H2 histamine antagonist, or proton pump inhibitors
- If extubation could amplify risk, position patient laterally, head down, or upright
- If pneumonia is suspected, consider antibiotics

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

Premature battery depletion, electrical reset, pacemaker-mediated arrythmia, 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

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

Critical CHANGES			
If cardiac arrest **ADULT**		If cardiac arrest **PEDS**:	
VF/VT	Go to CHKLST **1-VF/VT**	VF/VT	Go to CHKLST **5-VF/VT**
Asystole/PEA	Go to CHKLST **2-Asystole/PEA**	Asystole/PEA	Go to CHKLST **6-Asystole/PEA**

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 FIO2 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, bloood pressure

CAB Protocol

For CPR, go to CHKLST **1-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

29 Transfer of care Malignant Hyperthermia patient

In presence of triggering agent: unexpected increase in ETCO2, 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, $ETCO_2$ 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, $ETCO_2$ 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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