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Signature

Printed Name

Date



Introduction

Safety checklists originated from the military aviation industry in the 1930s following the crash of the prototype of the B-17 Flying Fortress. Powered flight had become increasingly complex; so much so that it was easy for pilots to overlook or forget critical steps that lead to disasters. Having a checklist eliminated the risk of pilots forgetting one or more of these critical steps and drastically improved aviation safety.

Studies show that memory worsens during periods of stress and critical steps in the management of rare events often get overlooked. As a result, checklists have become integrated into many industries and professions including nuclear power, aviation, and medicine. Checklists serve as cognitive aids during rare crisis events and guide individual actions during the management of that crisis.

The World Health Organization pioneered the use of checklists during surgery more than 10 years ago. Stanford and Harvard Universities have since published emergency cognitive aid manuals for operating room crisis management.

This manual and electronic application is the first cognitive aid resource for dental practitioners providing office-based anesthesia and sedation care and was funded through a grant from the American Dental Society of Anesthesiology's Anesthesia Research Foundation.

The Ten Minutes Saves A Life!® Manual and Application is divided into sections containing common critical events seen during dental office-based anesthesia and sedation. The algorithms vary with the training level of the provider and are meant to guide management of the crisis during the first 10 minutes until emergency medical services arrives. Drug doses are taken from multiple sources including drug package inserts and authoritative texts. They are automatically populated into the algorithms once the weight of the patient is entered.

In addition to use during an actual crisis events, this cognitive aid is also intended for use during office team mock practice drills of crisis resource management. The Anesthesia Research Foundation Working Group sincerely hopes this manual and electronic application will contribute to patient safety in dentistry.

Anesthesia Research Foundation Working Group

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Provider Categories

Level I:

General/specialty dentist using only local anesthesia or nitrous oxide/oral minimal/oral moderate sedation

Level II:

General/specialty dentist can urgently initiate IV access but does not provide deep sedation/general anesthesia (provides IV moderate sedation routinely). Provider is current in BLS. May be current in ACLS and/or PALS.

Level III:

Dentist providing deep sedation/general anesthesia. Provider is current in BLS and ACLS and/or PALS.



Patient date of birth Today's Date

Patient age

DOB

Patient weight

lbs

kgs

Allergies



Patient Assessment

Look for signs and symptoms and evaluate patient to determine a diagnosis to follow
Priority always follows stabilizing the patient and basic ABCs

R - Recognition of emergency

Call for assistance: retrieve O₂, AED, and emergency kit

P – Position

If conscious, comfortable for patient; usually sitting upright

A - Airway (assess airway patency)

If obstructed, head tilt–chin lift–jaw thrust (reposition if necessary with airway adjuncts like oral/nasal airway)

B – Breathing (assess breathing)

If breathing, provide 100% oxygen

If evidence of breathing difficulty or not breathing, positive pressure ventilation with BVM @ 10L/min 100% O₂

C – Circulation (assess pulse)

If pulse, check heart rate and blood pressure, record vital signs at least every 5 minutes

If no pulse, call 911; move to Cardiac Arrest Algorithm

D - Diagnosis, definitive therapy

E – Emergency medical services

Facilitate access of emergency personnel by waiting for arrival and escorting to office

Evaluate

1 - Respiratory

1-1 Airway Fire

spark or fire in a patient's airway and may include attached breathing circuit

1-2 Allergic Reaction

swelling, shortness of breath

1-3 Asthma / Bronchospasm

wheezing, labored breathing

1-4 Foreign Body Airway Obstruction

rasping, wheezing, coughing

1-5 Hyperventilation

rapid breathing

1-6 Ventilation & Oxygenation

hypoxia, hypoventilation, soft tissue obstruction

Hypoxia

low blood oxygen saturation

Hypoventilation

decreased respiratory rate and volume

Soft Tissue Obstruction

inability to maintain a patent airway

2 - Cardiac

2-1 Chest Pain

Acute Coronary Syndrome
Angina

Myocardial Infarction

acute substernal crushing chest pain or pressure which may radiate to either arm or jaw, BP decreased or elevated, shortness of breath, cyanosis, sweating

2-2 Bradycardia (Symptomatic)

low heart rate with hypotension

2-3 Cardiac Arrest

Pulseless Patient

unresponsive, no carotid pulse

2-4 Hypertension

blood pressure > 180/120, chest pain, altered mental status

2-5 Hypotension

low blood pressure with dizziness, light headedness, confusion, chest pain, shortness of breath

2-6 Stroke

Cerebrovascular Accident

facial droop, arm drift, slurred speech sudden, severe headache

2-7 Tachycardia

child: heart rate ≥ 180 beats per minute

adult: heart rate ≥ 150 beats per minute

3 - Other

3-1 Low Blood Sugar / Hypoglycemia

sweaty, dizzy, pale, disoriented, rapid heart rate

3-2 Local Anesthetic Toxicity

anxiety, dizziness, slurred speech, seizures, arrhythmias, unconsciousness

3-3 Nausea & Vomiting

retching, heaving, vomiting

3-4 Seizure

convulsions, blank stare, unaware

3-5 Syncope / Altered Mental Status

dizziness, light headedness, paleness, sweating, altered mental status, unconsciousness



Airway Fire

spark or fire that occurs in a patient's airway and may include attached breathing circuit

ACTIONS

1. Immediately disconnect oxygen
2. Stop procedure
3. Remove all foreign objects
4. Spray water and extinguish any flaming debris
5. **Call 911**



Allergic Reaction

Mild - slow to development of rash and itchiness

Major - rapid development of hives, flushing, swelling, shortness of breath, hypotension, wheezing, decreased oxygen saturation

ACTIONS

Mild or major reaction?

Mild

Major

1. Remove potential causative agents (e.g., latex)
2. Administer diphenhydramine

1. **Call 911**
2. Remove potential causative agents
3. Administer 100% oxygen
4. Administer IM epinephrine; additional doses likely needed

Wheezing?

YES

NO

1. Treat as “Major”
2. See also

1. Inform patient and/or responsible party of potential sedative effects of diphenhydramine
 * If symptoms worsen, immediately treat as “Major”



Asthma / Bronchospasm

Wheezing, difficulty breathing, increased respiratory effort

ACTIONS

1. Administer 100% oxygen
2. Administer albuterol
3. If unresolved
Call 911
4. Administer IM epinephrine
may need additional doses



Choking / Foreign Body Airway Obstruction

Partial airway obstruction - rasping, wheezing, coughing

Total airway obstruction - no air movement leading to cyanosis and unconsciousness

ACTIONS

1. Sit the patient upright
2. Encourage coughing
3. If unable to cough or speak,
administer abdominal thrusts until object removed or patient becomes
unresponsive (chest thrusts for obese/pregnant patient)
4. **Call 911**
5. If unresponsive,
start BLS
*Note: before giving a breath look in mouth for object and remove (if visualized)
No blind finger sweep



Hyperventilation

*Increased rate of ventilation, patient visibly anxious
Consider paradoxical reaction if CNS depressants were used*

ACTIONS

1. Remove all objects from mouth
2. Remain calm and provide reassurance
3. Verbal coaching to reduce respiratory rate
4. Encourage breathing into cupped hands
5. If longer than 10 minutes,
Call 911



Ventilation & Oxygenation (hypoxia / hypoventilation / soft tissue obstruction)

Hypoxia - Low blood oxygen saturation, grey or blue color changes on lips, fingers and oral mucosa

Hypoventilation – Decreased respiratory rate

Soft Tissue Obstruction – Inability to maintain a patent airway

ACTIONSSS

	Is the patient attempting respiratory efforts?	
--	--	--

YES

NO/MINIMAL

1. Administer 100% Oxygen
2. Remove all objects from mouth
3. Triple airway maneuver and assess ventilation (e.g. chest rise, EtCO₂, pulse oximeter)
4. Maintain triple airway maneuver and apply positive pressure with 100% oxygen via bag valve mask; Consider two person rescue bag valve mask
5. Rule out equipment failure,
 - check oxygen source
 - check pulse oximeter
6. **Call 911**
7. Rule out:

1. Administer 100% Oxygen
2. Remove all objects from mouth
3. Suction airway
4. Triple airway maneuver and assess ventilation (e.g. chest rise, EtCO₂, pulse oximeter)
5. Maintain triple airway maneuver and apply positive pressure with 100% oxygen via bag valve mask
6. Insert oral airway and resume bag valve mask with triple airway maneuver consider two person rescue bag valve mask
7. **Call 911**
8. Rule out:



Chest Pain (Acute Coronary Syndrome / Angina / Myocardial Infarction)

Acute substernal crushing chest pain or pressure which may radiate to either arm or jaw, BP decreased or elevated, shortness of breath, cyanosis, sweating

ACTIONS

History of angina with typical chest pain?

YES

1. Administer nitroglycerin
2. Administer 100% oxygen

Resolved within five (5) min?

YES

1. Decide clinical course
- or -
Call 911 for transport

NO

1. **Call 911**
2. Retrieve AED
3. Administer aspirin
 - *confirm no allergy, see reference*
4. Consider nitrous oxide for pain relief
5. Be prepared to begin CPR

NO

1. **Call 911**
2. Retrieve AED
3. Administer 100% oxygen
4. Administer aspirin
 - *confirm no allergy, see reference*
5. Consider nitrous oxide for pain relief
6. Be prepared to begin CPR



Bradycardia (Symptomatic)

Low heart rate with hypotension

ACTIONS

1. Check pulse; evaluate patient for signs of poor perfusion
 - Child with altered/absent consciousness or signs of poor perfusion, start CPR for a pulse <60
If no pulse,
2. Administer 100% oxygen
3. Assess ventilation & oxygenation
4. **Call 911**
5. Be ready to start CPR
If chest pain present,



Cardiac Arrest / Pulseless Patient

Unresponsive, no carotid pulse

ACTIONS

1. **Call 911**
2. Start CPR and retrieve AED
 - Compressions 100-120 / minute
 - Compression : breaths ratio
 - Peds 15:2 (2 rescuers)
 - Peds 30:2 (1 rescuer)
 -
 - Adult 30:2
3. Turn on AED and follow prompts

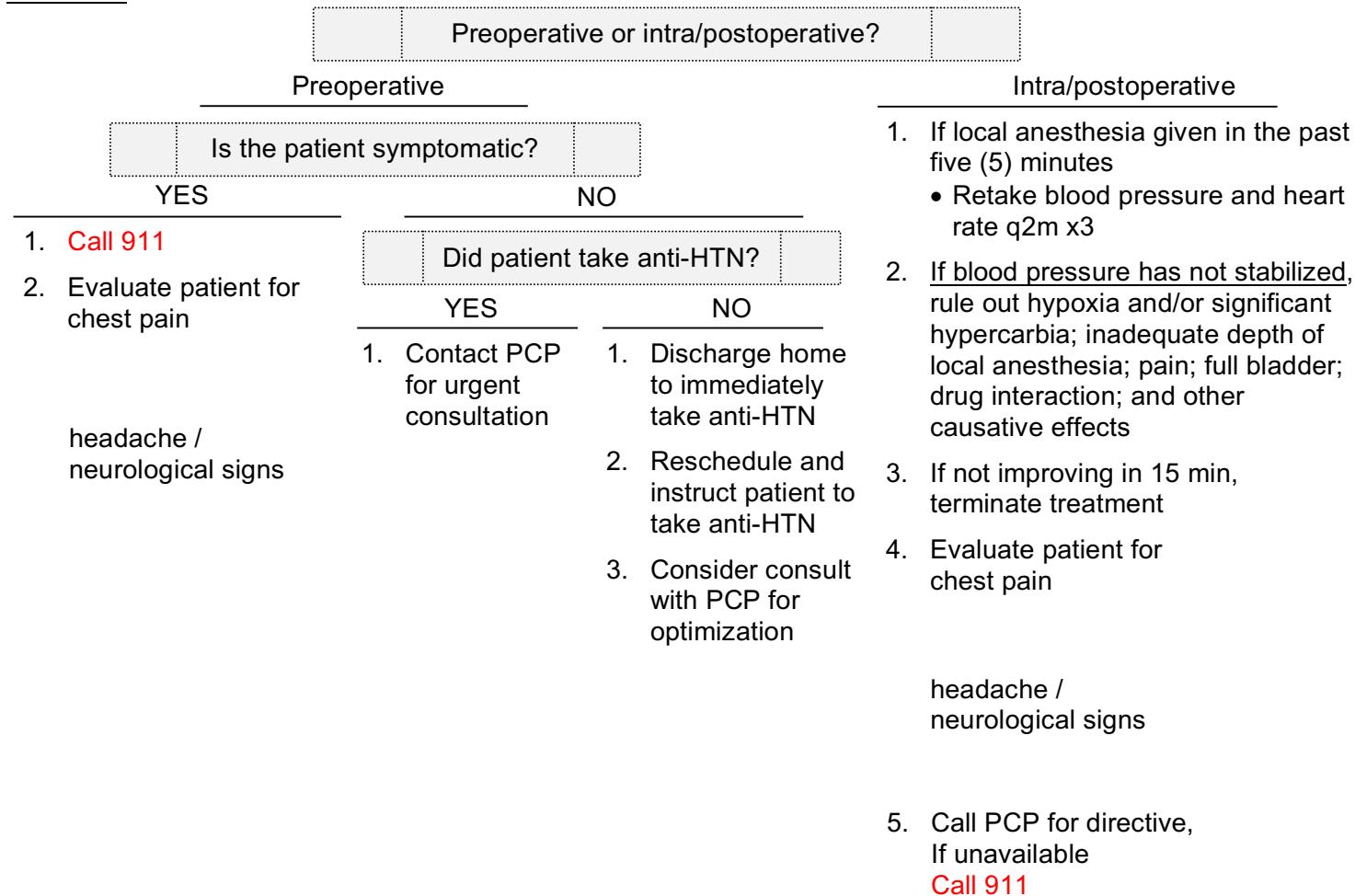


Hypertensive Emergency / Urgency

Urgency - blood pressure > 180/120 without signs and symptoms of chest pain, headache, palpitations, shortness of breath

Emergency - blood pressure > 180/120 with signs and symptoms of chest pain, stroke, pulmonary edema, congested heart failure, alter mental status

ACTIONS





Hypotension

Abnormally low blood pressure with signs of poor perfusion

(e.g., dizziness, light headedness, confusion, nausea, chest pain, shortness of breath cold/clammy skin)

For normotensive adults: Generally systolic BP < 85 mmHg or absolute MAP ≤ 55

For hypertensive adults: MAP < 30% from baseline

For children aged 1-10 years: General definition systolic BP < 70 + (age X 2)

ACTIONS

1. Check pulse; evaluate patient for signs of poor perfusion
 - Child with altered/absent consciousness or signs of poor perfusion, start CPR for a pulse <60
2. Evaluate for chest pain
3. Evaluate for:
 4. Administer 100% oxygen
 5. **Call 911**; prepare to terminate procedure
 6. Prepare for CPR if needed



Stroke / Cerebrovascular Accident

Side of the face droops or feels numb, speech difficulties, muscle weakness on one side of the body, sudden or severe headache, blurred vision

FAST; Facial droop, Arm drift, Slurred speech, and Time from onset of signs & symptoms

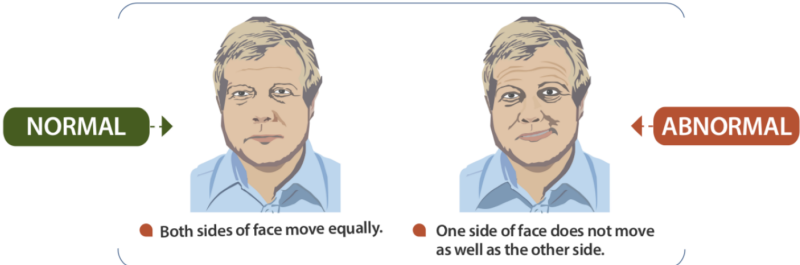
ACTIONS

1. Identify signs and symptoms of stroke (Cincinnati prehospital stroke scale)
Patients with one (1) of these three (3) findings as a new event have a 72% probability of an ischemic stroke. If all 3 findings are present the probability of an acute stroke is more than 85%.
 - Facial droop - instruct patient to smile
 - Arm drift - instruct patient to close eyes and extend both arms out with palms up for at least ten (10) secs
 - Slurred Speech – instruct patient to say “you cannot teach an old dog new tricks”
2. **Call 911**,
 - inform dispatcher of possible stroke
 - Time - the person calling 911 should note time 911 called, & time of signs & symptoms
3. Assess and support ABCs, vital signs
4. Administer 100% oxygen, if pulse oximeter available titrate up to 98%
5. Prepare for CPR

Reference information

Facial Droop

(have patient show teeth or smile)

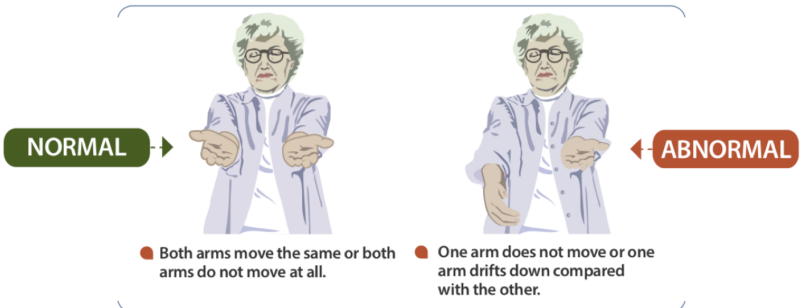


NORMAL → ← **ABNORMAL**

- Both sides of face move equally.
- One side of face does not move as well as the other side.

Arm Drift

(patient closes eyes and extends both arms straight out, with palms up for 10 seconds)



NORMAL → ← **ABNORMAL**

- Both arms move the same or both arms do not move at all.
- One arm does not move or one arm drifts down compared with the other.

Abnormal Speech

(have the patient say “you can’t teach an old dog new tricks”)

- Normal - Patient uses correct words with no slurring.
- Abnormal - Patient slurs words, uses the wrong words, or is unable to speak.

If any 1 of these 3 signs is abnormal, the probability of a stroke is 72%



Tachycardia

Pediatric - has a persistent pulse rate typically ≥ 180 beats per minute

Adult – has a persistent pulse rate typically ≥ 150 beats per minute

Persistent tachyarrhythmia causing:

- Hypotension
- Acutely altered mental status
- Signs of shock
- Ischemic chest discomfort
- Acute heart failure

ACTIONS

1. **Call 911**
2. Maintain patient airway; assist breathing as necessary
3. Administer 100% O₂
4. Treat underlying cause, if known
5. Vagal maneuver (e.g., bearing down, coughing, cold stimulus to the face, gagging)

Reference information

https://eccguidelines.heart.org/wp-content/uploads/2015/10/2010-Integrated_Updated-Circulation-ACLS-Tachycardia-Algorithm.png



Low Blood Sugar / Hypoglycemia

Sweaty, dizzy, pale, disoriented, rapid heart rate, confusion
Most likely to occur in diabetic patients

ACTIONS

	Is the patient conscious?	
--	---------------------------	--

Yes

No

-
1. Administer sugar containing product
 2. If known diabetic, check glucose level

-
1. **Call 911**
 2. Ensure ventilation and oxygenation
 3. BLS as indicated



Local Anesthetic Toxicity

Initial symptoms - anxiety, dizziness, slurred speech, confusion, tremors, hypotension,

Can progress to - seizures, bradycardia, ventricular arrhythmias, unconsciousness, cardiovascular collapse

ACTIONS

1. Check pulse; evaluate patient for signs of poor perfusion
 - Child with altered/absent consciousness or signs of poor perfusion, start CPR for a pulse <60

2. Remove all objects from mouth

	Seizure activity?	
--	-------------------	--

Yes

No

-
1. **Call 911**
 - 2.

-
3. Look for early signs and symptoms of local anesthetic toxicity and anticipate progression to possible seizure activity
 4. Monitor vital signs and treat symptomatically



Local Anesthetic Calculator

Chart for adult patients. Pediatric AAPD Guidelines in chart below.

AAPD guidelines have lower maximum dose than the manufacture's package insert.

Manufactures package insert calculation lbs kgs

Local Anesthetic Maximum Dose (Values from dental package insert. Max dose base on single type of local anesthetic only)					
Type	Max Dose (mg/kg)	MAX Calc (mg)	Absolute MAX Cartridge #	# Cartridge Used (Input)	% MAX Used
Articaine: 4% w/ epinephrine Note: Age > 4 y.o.	7.0				
Lidocaine: 2% w/ epinephrine	7.0 up to 500mg				
Mepivacaine: 3% plain	6.6 up to 400mg				
Mepivacaine: 2% w/ levonordefrin	6.6 up to 400mg				
Prilocaine: 4% plain	8.0 up to 600mg				
Prilocaine: 4% w/ epinephrine	8.0 up to 600mg				
Bupivacaine: 0.5% w/ epinephrine Note: Age > 12 y.o.	Total up to 90 mg				
				Total %	

AAPD guidelines calculation lbs kgs

Local Anesthetic Maximum Dose (Values from AAPD. Max dose base on single type of local anesthetic only)			
Type	Max Dose (mg/kg)	MAX Calc (mg)	Absolute MAX Cartridge #
Articaine: 4% w/ epinephrine Note: Age > 4 y.o	7.0 up to 500mg		
Lidocaine: 2% w/ epinephrine	4.4 up to 300mg		
Mepivacaine: 3% plain	4.4 up to 300mg		
Mepivacaine: 2% w/ levonordefrin	4.4 up to 300mg		
Prilocaine: 4% plain	6.0 up to 400mg		
Prilocaine: 4% w/ epinephrine	6.0 up to 400mg		

	# Cartridge Used	% MAX Single	% MAX w/ 3% Mepivacaine	% MAX w/ 4% Prilocaine	% MAX w/ 4% Articaine	% MAX w/ 2% Mepivacaine	% MAX w/ 2% Lidocaine
Articaine: 4% w/ epinephrine Note: Age > 4 y.o							
Lidocaine: 2% w/ epinephrine							
Mepivacaine: 3% plain							
Mepivacaine: 2% w/ levonordefrin							
Prilocaine: 4% plain							
Prilocaine: 4% w/ epinephrine							
	Total %						

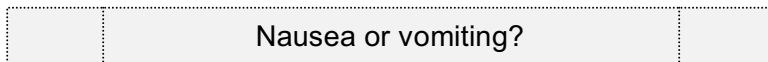


Nausea & Vomiting

Complaints of stomach upset, retching, heaving, vomiting

Patient with minimal sedation (e.g nitrous oxide or single enteral drug or without sedation.)

ACTIONS



Nausea

1. Remove all objects from mouth
2. Sit patient upright
3. Have suction ready
4. Administer 100% oxygen (if tolerated)
5. Consider fluids
6. Consider antiemetic

Vomiting

1. Remove all objects from the mouth
2. Roll patient on right side if supine
3. Thoroughly suction mouth
4. Discontinue possible causative agents (e.g., nitrous oxide)
5. Consider antiemetic
6. Evaluate oxygenation and ventilation
Rule out:



Seizure

Convulsions, blank stare, unaware

ACTIONS

1. **Call 911**
2. Remove all objects from mouth
3. Place in supine position
Suction if necessary
4. Protect the patient from physical harm
 - lightly restrain
 - provide padding
 - ensure patient is not biting on tongue
5. Administer 100% oxygen,
assist / control ventilation as needed



Syncope / Altered Mental Status

Dizziness, light headedness, paleness, sweating, altered mental status, unconsciousness

ACTIONS

1. Remove all objects from mouth
2. Call for in-office help
3. Place head down / legs raised
4. Assess oxygenation and ventilation

	Is the patient breathing?	
--	---------------------------	--

Yes

1. Ensure adequate ventilation and oxygenation during recovery

	Regained consciousness within two (2) minutes?	
--	--	--

YES

NO

1. Administer 100% oxygen
2. Observe
3. Cold compress to forehead

No

	Does the patient have a pulse?	
--	--------------------------------	--

YES

NO

1. **Call 911**
2. Assist ventilation as needed
3. Check pulse if no pulse

4. Rule out:



A
D
S
A | Ten Minutes Saves a Life!™
Anesthesia Research Foundation
Emergency Manual – Level I EM Drugs®



Concentration & Volume Calculator

Input various concentration and desired drug amount to get volume required

Input drug amount & concentration of drug



Terms and abbreviations

AAPD: American Academy of Pediatric Dentistry
ABC: airway-breathing-circulation
ACLS: advanced cardiac life support
AED: automated external defibrillator
Anti-HTN: antihypertensive
BLS: basic life support
BP: blood pressure
BPM: beats per minute
BrPM: breaths per minute
BVM: bag valve mask
CHF: congestive heart failure
CPR: cardiopulmonary resuscitation
Continual: repeated regularly and frequently in a steady succession
Continuous: prolonged without interruption
DBP: diastolic blood pressure
ECG/EKG: electrocardiogram
ED: emergency department (room)
EMS: emergency medical services
ETCO₂: end-tidal carbon dioxide
ETT: endotracheal tube
ga: gauge
HR: heart rate
IM: intramuscular
IN: intranasal
IV: intravenous
kg: kilograms
q: given at interval (i.e. q 5 min)
LMA: laryngeal mask airway
m: minute
MAP: mean arterial pressure
MAX: maximum dose
mcg: microgram
mg: milligram
MHAUS: Malignant Hyperthermia Association of the United States
mmHg: millimeters of mercury
NEB: nebulized
NSR: normal sinus rhythm
PALS: pediatric advanced life support
PEA: pulseless electrical activity
Pediatric: younger than 13 years and/or less than 50 pounds (23 kg)
PCP: primary care provider
PO: by mouth
PRN: as needed
Push: given rapidly
SBP: systolic blood pressure
SL: sublingual
SpO₂: oxygen saturation of arterial blood as measured by pulse oximetry



Supraglottic airway: An oral passageway that facilitates unobstructed access of respiratory gases to the glottic opening by displacing soft tissue and sealing off the laryngeal area i.e. i-gel[®] or LMA

Triple Airway Maneuver: head tilt-chin lift-jaw thrust

Vagal Maneuver: simple maneuver that stimulates the vagus nerve sometimes resulting in slowed conduction of electrical impulses through the atrioventricular (AV) node of the heart i.e. bearing down, ice cold wet towel to face, coughing, or gagging

VF: ventricular fibrillation

VT: ventricular tachycardia

w/in: within

American Society of Anesthesiologists Physical Status Classification System

ASA I: A normal healthy patient i.e. non-smoker, no or minimal alcohol use.

ASA II: A patient with mild systemic disease i.e. mild diseases only without substantive functional limitations. Examples include (but not limited to): current smoker, social alcohol drinker, pregnancy, obesity (BMI 30-40), well-controlled DM/HTN, mild lung disease.

ASA III: A patient with severe systemic disease i.e. substantive functional limitations; one or more moderate to severe diseases. Examples include (but not limited to): poorly controlled DM or HTN, COPD, morbid obesity (BMI ≥ 40), active hepatitis, alcohol dependence or abuse, implanted pacemaker, moderate reduction of ejection fraction, ESRD undergoing regularly scheduled dialysis, history of MI, CVA, TIA, or CAD/stents (>3 months).

ASA IV: A patient with severe systemic disease that is a constant threat to life. Examples include (but not limited to) recent MI, CVA, TIA, or CAD/stents (<3 months), ongoing cardiac ischemia or severe valve dysfunction, severe reduction of ejection fraction, sepsis, DIC, ARD or ESRD not undergoing regularly scheduled dialysis.

ASA V: A moribund patient who is not expected to survive without the operation. Examples include (but not limited to) ruptured abdominal/thoracic aneurysm, massive trauma, intracranial bleed with mass effect, ischemic bowel in the face of significant cardiac pathology or multiple organ/system dysfunction.



Societies

Statements/Guidelines

Advanced Life Support



Airway Management

Articles of Sedation and Anesthesia

BMI Calculators

Complications/Medical Emergencies

Local Anesthesia/Pain Management

Monitoring/Documentation



Nitrous Oxide

Obstructive Sleep Apnea

Pharmacology

Preoperative Medical Evaluation

Video links
