


2024 **ANNUAL SESSION**



**mda** michigan dental ASSOCIATION  
THE LEADER IN DENTAL HEALTH

## Medical Emergencies in the Dental Office and Advanced Local Anesthesia



David Isen, BSC, DDS

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foundation  
IMPROVING DENTAL HEALTH

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June 13: Set-up  
June 14 & 15: Free Dental Clinic  
June 16: Tear-down

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## **Conflict of Interest:**

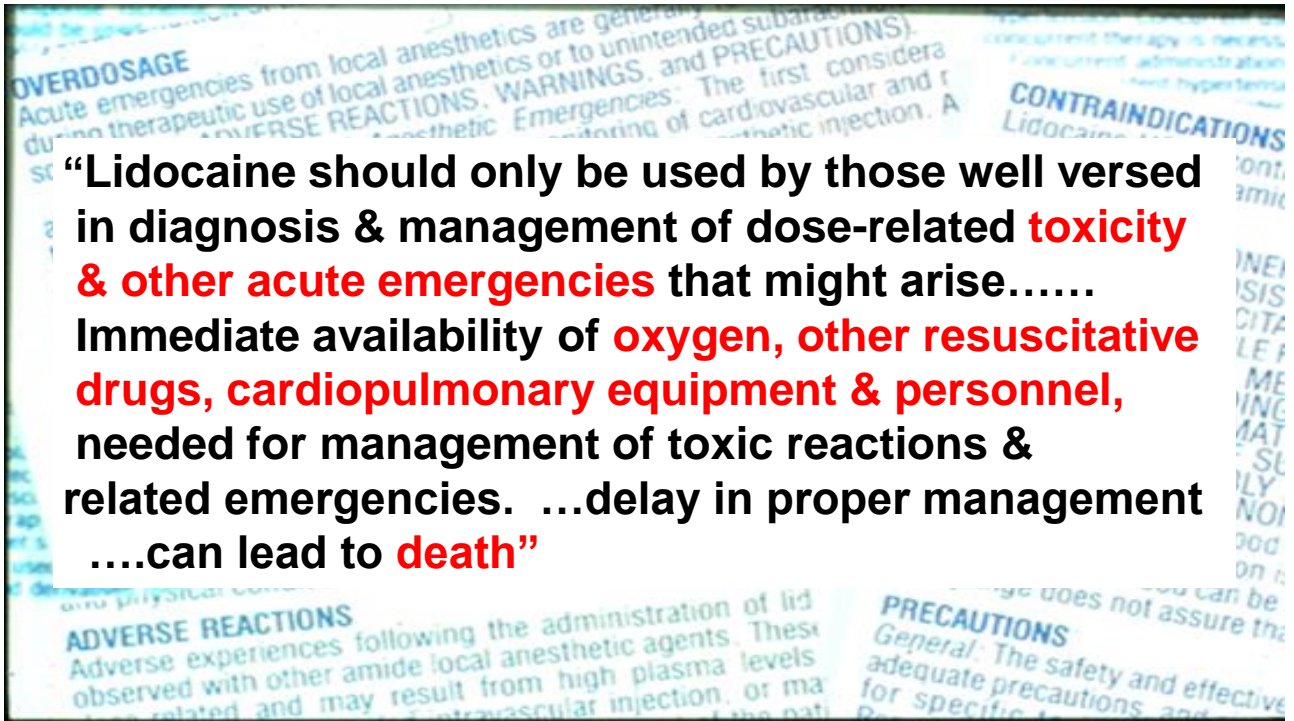
**Neither I nor my family have a financial interest that would create a conflict of interest or restrict my independent judgment with regards to the content of this course.**

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## **LEARNING OBJECTIVES**

- 1. Preventing A Medical Emergency**
- 2. Office Emergency Protocols (P-CAB-D)**
- 3. Emergency Scenarios**

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**“Lidocaine should only be used by those well versed in diagnosis & management of dose-related toxicity & other acute emergencies that might arise..... Immediate availability of oxygen, other resuscitative drugs, cardiopulmonary equipment & personnel, needed for management of toxic reactions & related emergencies. ...delay in proper management ....can lead to death”**

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## Emergency Frequency in Dental Offices

### Anecdotal & Reported Statistics:

- **One emergency every 1 – 2 yrs. per DDS: U.S. & Britain<sup>1,2</sup>**
- **1000 dental office deaths: 2010 – 15: U.S.<sup>3</sup>**
- **DDS office death Texas. Reporter: 1 death every other day<sup>4</sup>**
- **0.8 deaths / 1 mil. deep sed / GA dental cases in Ont.<sup>5</sup>**

1. Ellis et al, JADA, 1993
2. Sin M, et al, Brit Dent J, Nov. 2023
3. ADSA Pulse, May 2016
4. Dallas Morning News, Dec. 2015
5. Anes Prog, 66(3) 141-50, 2019

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## Forgetting BLS Rescue Training

- **Non-medical** people begin forgetting in **2 months**<sup>1</sup>
- **MDs** skills begin to decline in **1.5 months**<sup>2</sup>
- **Dentists** “rapid” decline in skills in **5 months**<sup>3</sup>
- Most **grad dental students** failed BLS test & could not do CPR after **6 months**<sup>4</sup>
- **Simulation training** ↑s performance & learning<sup>5</sup>

1. Einspruch E, et al, Resus 74:476-86, 2007
2. Smith KK, et al, Resus 78:59-65, 2008
3. Kentaro N, et al, Anes Prog 63:62-6, 2016
4. Malamed S, Oral Health 2004
5. Shimiza Y, et al, Anes Prog 68(2), 2021

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## Survey of Dentists: Correct Use of Epinephrine

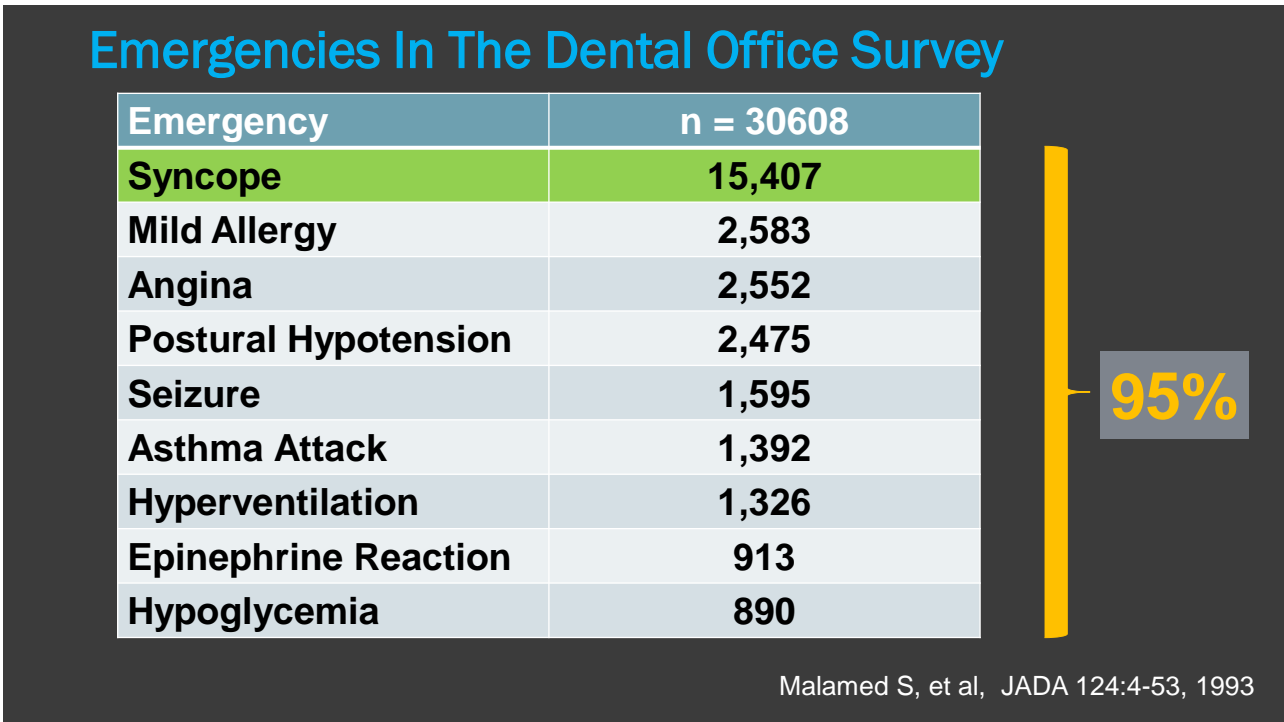
- Proportion who knew correct **dose** of epinephrine for anaphylaxis: **14%**
- Correct **route** of drug administration: **40%**
- Proper use of an epinephrine **autoinjector**: **27%**
- Which drug should be given first for anaphylaxis; **antihistamine, corticosteroid or epinephrine?**:  
**Most said antihistamine then corticosteroid**

Goto T, Anes Prog, 70(2), 2023

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## Emergencies In The Dental Office Survey

Emergency	n = 30608
Cardiac Arrest	334
Anaphylaxis	304
Myocardial Infarction	289
Local Anesthetic Overdose	204
Heart Failure	141
Unconscious Diabetic Emergency	109
Stroke	68
Adrenal Insufficiency	24
Thyroid Storm	4



5%

Malamed S, et al, JADA 124, 4-53, 1993

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## In Children

- Airway obstruction
- Asthma
- Allergy
- Seizure
- Hypoglycemia

### Practitioner mediated

- Local anesthetic overdose
- Sedation overdose

**All can lead to hypoxia**

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## When Do Emergencies Occur?

○ Immediately before tx	1.5%
○ <b>During or after LA</b>	<b>54.9%</b>
○ <b>During tx</b>	<b>22.0%</b>
○ After tx	15.2%
○ After leaving office	5.5%

Matsuura Anes Prog. 36:219-228, 1990

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## Tx Performed During Emergency

○ <b>Extraction</b>	<b>38.9%</b>
○ <b>Root Canal</b>	<b>26.9</b>
○ Unknown	12.3
○ C&B	7.3
○ Restorative	2.3
○ Incision	1.7
○ Other	10.6

Matsuura, Anes Prog, 36: 219-228, 1990

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## Level of Dental Fear

Question About Treatment	Frequency	%
Not afraid at all	703	63.9
A little afraid	228	20.7
Somewhat afraid	108	9.8
Very afraid	22	2.0
Terrified	39	3.5
Did not know answer	1	0.1



Chanpong et al Oral Health, Feb 2006

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## Sources Of Endogenous Epinephrine

- Life stress
- Personality types
- Anxiety (dental phobia)
- Pain (inadequate local anesthesia)


Endogenous epinephrine can ↑ 50 X during stress

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## The Challenge:

- Some patients are anxious
- Some have health issues
- Dental treatment can be painful
- We may need LA with epi
  
- How can we be safe?



These can all ↑  
the risk of an  
emergency

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## Avoiding Medical Emergencies

1. Thorough med hx & assess vital signs
2. Profound & comfortable LA
3. Stress reduction protocol
4. Being prepared
  - a) BLS + EMS
  - b) Office plan
  - c) Emergency kit

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# 1. Medical History & Patient Evaluation



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## The Medical History

**Incomplete medical history evaluation increases the risk of a medical emergency.**

**How you ask the question, may change the answer you get.**

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ALL INFORMATION IS PRIVATE AND CONFIDENTIAL

Name: \_\_\_\_\_ Date of Birth: \_\_\_\_\_ Ht: \_\_\_\_\_ Wt: \_\_\_\_\_

Medical Doctor's Name, Address & Telephone

i. \_\_\_\_\_ ii. \_\_\_\_\_

1. Have you been hospitalized or had any operations? (Please list & date) \_\_\_\_\_
2. Have you or your relatives had problems with sedation or anaesthesia, including malignant hyperthermia? \_\_\_\_\_
3. List pills, medications, or non-prescription drugs/supplements (with dosage) \_\_\_\_\_
4. Drug allergies or bad reactions (please list) \_\_\_\_\_
5. Any other allergies (e.g. latex, eggs, metal, hayfever) \_\_\_\_\_



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AS OF NOVEMBER, 2012  
 PERCOCCET - IF NEEDED RO BAXACET - IF NEEDED  
 SINCE AUG 12  
 MEDS FOR: [REDACTED] DIGAN

Name of medication	Dosage	How often
CYBALTA	2 x 60 MG	ONCE DAILY
LYRICA	3 x 150 MG	TWICE DAILY
WELLBUTRIN	300 MG	ONCE DAILY
VEVICARE	5 MG	ONE PER DAY
PREMARIN	.625 MG	ONE PER DAY
PROPRANOLOL	2 x 10 MG	TWICE DAILY
DAMPRI DONE	2 x 10 MG	ONCE DAILY
CELEBREX	300 MG	ONCE DAILY
FUROSEMIDE	40 MG	ONCE DAILY
LORAZEPAM	1 MG	ONCE DAILY

**27% of adults over age 65 take more than 5 medications**

NON-PRESCRIPTION MEDICATIONS RECOMMENDED BY DOCTOR(S)

TYLENOL 3		IF NEEDED (MAX 3/DAY)
CYCLOBENZAPRINE		ONCE DAILY
SYNTHROID		ONCE DAILY
BETHANECHOL	10 MG	5 MG TWICE DAILY
ZINC	30 MG	TWICE DAILY
METHYLCOBALAMIN (AOR BRAND) (B12)	5 MG	TWICE DAILY
(AOR BRAND) BIO FOLATE	1 MG	ONCE DAILY
AOR - N-A-C BRAND	2 x 500 MG	TWICE DAILY
- AOR BASICS	2 x 399 MG	TWICE DAILY

Saunders, D. ODA Webinar Sept, 2018

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<input type="checkbox"/> Heart problems/Angina/Irregular heartbeat	<input type="checkbox"/> Sleep Apnea
<input type="checkbox"/> High/Low blood pressure	<input type="checkbox"/> Bleeding disorder or anem
<input type="checkbox"/> Diabetes/Hypoglycemia	<input type="checkbox"/> Dizziness, nervous disord
<input type="checkbox"/> Asthma, Persistant cough, Tuberculosis	<input type="checkbox"/> Epilepsy, seizures or conv
<input type="checkbox"/> Joint replacement	<input type="checkbox"/> Mental health
<input type="checkbox"/> Temporomandibular joint problems	<input type="checkbox"/> Bruise easily
<input type="checkbox"/> Hepatitis, Jaundice, Liver disease	<input type="checkbox"/> Wear contact lenses
<input type="checkbox"/> Kidney disorders	<input type="checkbox"/> Recreational drugs
<input type="checkbox"/> Thyroid disorders	<input type="checkbox"/> Smoker? Yes / No ; How r
<input type="checkbox"/> Gastric issues/Stomach bleeding/Ulcers	<input type="checkbox"/> Alcohol consumption

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7. Do you have any condition that could affect your immune system? (e.g. AIDS, HIV, leukemia)

8. Women: Are you pregnant? Yes / No Are you nursing: Yes / No

9. May we discuss your medical/dental treatment with your spouse, physician, parents, etc., if necessary? Yes / No

PATIENT/GUARDIAN SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

REVIEWED BY \_\_\_\_\_ BP \_\_\_\_\_ HR \_\_\_\_\_ SaO<sub>2</sub> \_\_\_\_\_ % Resp. rate \_\_\_\_\_ ASA \_\_\_\_\_

OTHER FINDINGS \_\_\_\_\_ UPDATES \_\_\_\_\_

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## Who Is At Risk?

- Medical history “red flags”:
  - ✓ Angina and/or MI history
  - ✓ Stroke history
  - ✓ Abnormal blood pressure or pulse
  - ✓ Asthma and chronic respiratory diseases
  - ✓ Diabetes
  - ✓ Seizure disorders
  - ✓ Allergy

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## Medical History Considerations

- Need current medication reference book or online source
- Most common lie: Drug use
- Surgical fitness evaluation
  - MD advises tx risk
  - May require tests
  - Buck stops where tx occurs

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## ASA Physical Status Classification

### ASA I: Healthy

### ASA II: One mild systemic disease, no effect on lifestyle:

- Mild asthma
- Well – controlled NIDDM
- Controlled epilepsy
- BP 140-160 / 90-95
- > 60 years old
- Anxiety

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## ASA Classification

### ASA III: Severe systemic disease, limits activity, not incapacitating:

- Exercise – induced asthma
- Well – controlled IDDM
- Stable angina
- > 6 months post MI or CVA, & no residual effects
- BP 160-200 / 95-115

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## ASA Classification

### ASA IV: Incapacitating disease, constant threat to life

- Uncontrolled IDDM
- Unstable angina
- MI or CVA < 6 months ago
- BP > 200 / 115
- Cannot walk up one flight of stairs

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## Remote Offices & ASA IV's

- ⊙ ↑ likelihood for GP treatment in remote areas:
- ⊙ Fewer OMFS or DA offices
- ⊙ Fewer hospital dental facilities
- ⊙ Less or no access to OR time for OMFS

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# Vital Signs

- I. Blood Pressure
- II. Heart Rate and Rhythm
- III. Respiratory Rate
- IV. Temperature
- V. Height
- VI. Weight

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## I. Blood Pressure

- ⦿ Worldwide prevalence ~ **1 billion**
- ⦿ Causes 7.1 million deaths / yr. worldwide
- ⦿ **~45% of U.S. adults\***
- ⦿ Millions of Americans are hypertensive & unaware
- ⦿ Millions are on BP meds

\*Yarows, SA., JADA 151(4), 239-44, Apr 2020

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## Hypertension Risk Factors (Adults) & Kids

- ⦿ (Smoking)
- ⦿ (Excessive alcohol)
- ⦿ Obesity
- ⦿ Sedentary lifestyle
- ⦿ Stress e.g. **white coat syndrome / dental anxiety**
- ⦿ Cardiac disease
- ⦿ **Diabetes Mellitus**
- ⦿ **Obstructive sleep apnea syndrome**
- ⦿ **Uncontrolled kidney or thyroid disease**

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systolic:    amount of work by heart  
diastolic:    condition of heart

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# Blood Pressure

Measuring the pressure required  
to collapse the brachial artery

BP > 130  
80 = Hypertension\*

AHA, 2017

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## Why New Definition of Hypertension?

○ If systolic goes from 120 to 130, risk of:

- Heart attack
- Stroke
- Heart failure
- Kidney failure

**Doubles!**

American Heart Assoc. Guidelines for Hypertension, Nov., 2017

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## Current AHA Guidelines on BP

1. Critical emphasis on **nutrition & exercise**
2. Teaching proper **home monitoring**
  - Approved device
  - When & how to measure
  - How to calculate mean values

*“With this, **~70%** of newly diagnosed hypertension will be manageable without medication”*

Am Heart Assoc. & Am College of Cardiology, Nov. 2017

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## Current BP Classification

Category	SBP (mm Hg)	DBP (mm Hg)
Normal	< 120 and	< 80
Elevated	120 – 129 and	< 80
Hypertension		
Stage 1	130 – 139 or	80 – 89
Stage 2	> 140 or	> 90

AHA Guidelines, Nov., 2017

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# Explanation

- **Prehypertension**
  - **Not a disease category**
  - **May be at risk for Stage 1**
  - **Lifestyle changes**
- **Stage 1 Hypertension tx with one drug:**  
**Usually thiazide diuretic**
- **Stage 2 usually 2 drugs needed: diuretic + a drug from another class**

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## MD Standard BP Measuring Protocol

- ⦿ Sitting, back straight, feet on floor
  - **Difficult in dental chair?**
- ⦿ Correct size cuff
- ⦿ Calibrated

Muntner P. et al, Hypertension, 73(5), 2019

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## Precautions

- ⦿ Arm at heart level & at rest
- ⦿ Arms may differ **5 – 10 mm Hg (left higher)**
  - **No more** than that. Use higher #
- ⦿ Sleeve forming tourniquet
- ⦿ **Rest** before measuring (~ 5 min.)
  - No caffeine, exercise, stress: **30 min. before**
- ⦿ Cuff too small: High readings
- ⦿ Cuff too big: Low readings

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## Summary: Can We Treat If Hypertensive?

- Medical history (recent MI...)
- **Urgency of treatment**
- Are they on BP meds?
  - Did they take them on day of tx?
- Last MD visit
- **Symptoms present**
- **Functional capacity:**

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## Functional Capacity

### Can you:

- Do light housework: Dusting, washing dishes...?
- Climb a flight of stairs?
- Walk one block?
- Run a short distance?
- Golf, bowl, dance, throw a baseball?

**YES to one: Can manage stress of dental visit**

Yarows SA., et al, JADA 151(4), 239.44 Apr, 2020

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## In-Office BP Management

ASA	Blood Pressure	Management
I	< 140/90	No special care
II	140-160/90-100	Reassess at next visit Possible monitor BP, refer to MD
III	160-180/100-110	Refer to MD Monitor BP
III-IV	180-200/110-120	No elective tx, refer to MD ASAP Emergency care with BP monitored
IV	>200/120	MD stat 911 if symptomatic

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## II. Heart Rate & Rhythm

HR < 60 Bradycardia

HR > 100 Tachycardia

Child: 60 - 110

Regular vs. Irrregular

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## Cardiac Dysrhythmias

- Medical consultation
- **EMS** if associated with:
  - Dizziness
  - Light headedness
  - Syncope
  - Weakness

**No elective treatment**  
**Watch out for CIEDs**

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## III. Respiratory Rate

Normal rate:

**12 – 20 breathes / min**  
(children faster)

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## Avoiding Medical Emergencies

1. Thorough med hx & assess vital signs
2. **Profound and comfortable LA**
3. Stress reduction protocol
4. **Be prepared**
  - a) BLS+ EMS
  - b) Office plan
  - c) Emergency kit

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## Avoiding Medical Emergencies

1. Thorough med hx & assess vital signs
2. Profound and comfortable LA
3. **Stress reduction protocol**
4. **Be prepared**
  - a) BLS+ EMS
  - b) Office plan
  - c) Emergency kit

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### 3. Stress Reduction Protocol

- Recognize signs of anxiety
- Minimize waiting
- Early morning appointment
- **Verbal anesthesia**



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- Get personal
- Easy, quick procedures first
- Go slow or go fast
- Hide scary instruments
- Tell – show – do?
- Distraction aids
- Refer? DA, OMFS, hospital



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## Using Anxiolytics

- Ensure compliance with **local rules**
- Must have appropriate **reversal agents**
  - Flumazenil & / or naloxone
- **Understand pharmacology** of agents including nitrous oxide, benzodiazepines, opioids

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## Flumazenil (Benzodiazepine Antidote)

- An IV emergency drug given in incremental doses
- **0.2 mg IV per min.** until overdose reversed. Max = 1 mg
- **Shorter half-life than benzo. Onset 5 – 10 min.**
- **So, keep in office for 2 hrs.**
- If no IV, try both deltoids. **This is off-label.**  
(No scientific evidence)
- **Oxygen, airway, EMS paramount**



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# Naloxone (Opioid Antidote)

	IV	IM / SC
Onset	2 min	10 min
Duration	30 min	1 – 4 hrs
Adult Dose	0.1 mg q 2–3 min	0.4 mg q 5 min x2

- Supplied as 0.4 mg/ml or 1 mg/ml
- **Nasal spray available (4 mg dose)**
- **EMS** and ABC / CAB



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## Intranasal Naloxone. Single dose

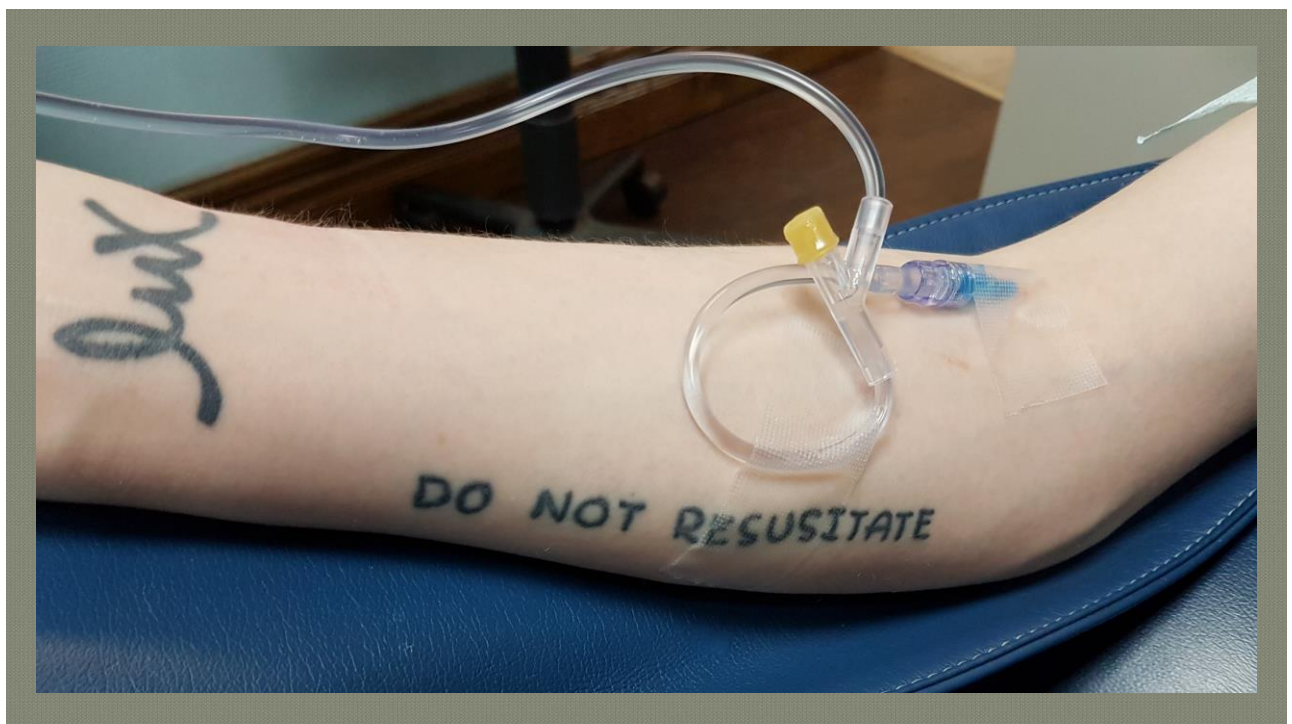


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## TOPICS

1. Preventing A Medical Emergency
2. Office Emergency Protocols (P-CAB-D)
3. Emergency Scenarios

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## ADSA App: Ten Minutes Saves a Life



- Can be a practice tool
- Calculates drug dose by wgt.
- Dexterity with hand-held devices

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## Sudden Cardiac Arrest

- ~400,000 die of SCA in U.S.
- 60 – 70% occur outside of a hospital
- Surviving SCA outside hospital ~8% (with CPR)
- Immediate shock: Chance of survival ~73%
- Survival ↓ 10% every minute shock is delayed
- After shock, start CPR immediately

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## Basic Life Support

- ⦿ SCA most likely to occur at home (on Sunday night)
- ⦿ So, rescue is likely on someone familiar
- ⦿ But **only 30%** bystanders try a rescue!
- ⦿ Why?

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## Bystander Apathy

- ⦿ Fear of hurting someone
- ⦿ **Don't know what to do, panic**
- ⦿ Embarrassed in a crowd
- ⦿ **HCP: Fear of catching something**

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## SCA In Women: ↓ Survival

- ⦿ Females less likely to be resuscitated with an AED by a bystander
- ⦿ Females less likely to receive chest compressions by a bystander
- ⦿ Shockable rhythms disappear faster in women
- ⦿ Elderly females more likely to live alone

Tan, H., European Heart J, May 2019

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## Cardio - Pulmonary Resuscitation

- ⦿ THE PURPOSE:
  - Not to revive the patient
  - 1. Chest compressions + AED, ASAP
  - 2. Prevent cerebral hypoxia
  - 3. Buy time until EMS arrives

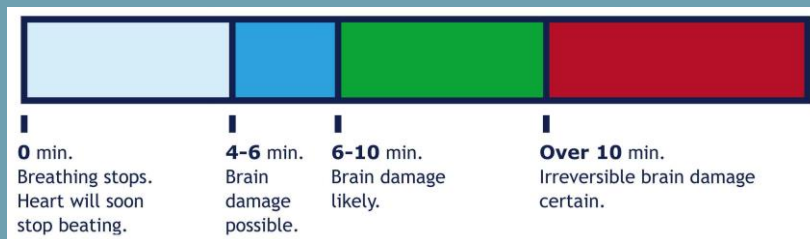
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# What Happens Without O<sub>2</sub>

- When heart stops, oxygen is not circulated
- Within 4 min. brain damage begins (**clinical death**)
- Within 10 min. brain death occurs (**biological death**)

How long will EMS take to arrive?



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## Cardiac Arrest Likely Due To:

- **Adults:** Secondary to **coronary artery disease**
- **Children:** Secondary to **respiratory failure** leading to **shock** (poor tissue perfusion) which then causes cardiac arrest (**H's & T's**)  
(**ABC better in kids**)
- E.g., dehydration, infection, anaphylaxis

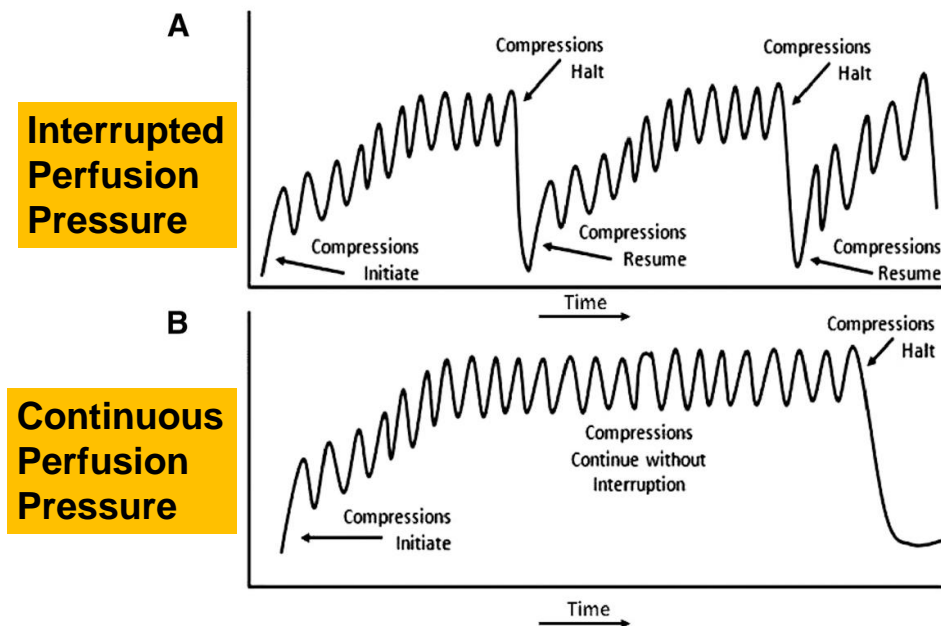
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## Maximize Compression Effectiveness

- **Hard surface**
- Palm on lower ½ of sternum, elbows locked
- Compression rate **100 – 120 / min. Rate ap.**
- **Correct depth**
- **Chest fully recoils**
- Avoid fatigue, rotate compressors every 2 minutes
- **Do not over – ventilate**
- **~60% of rescue should be on C**
- **Minimize C interruptions**

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Perfusion During Cardiac Arrest with Chest Compressions



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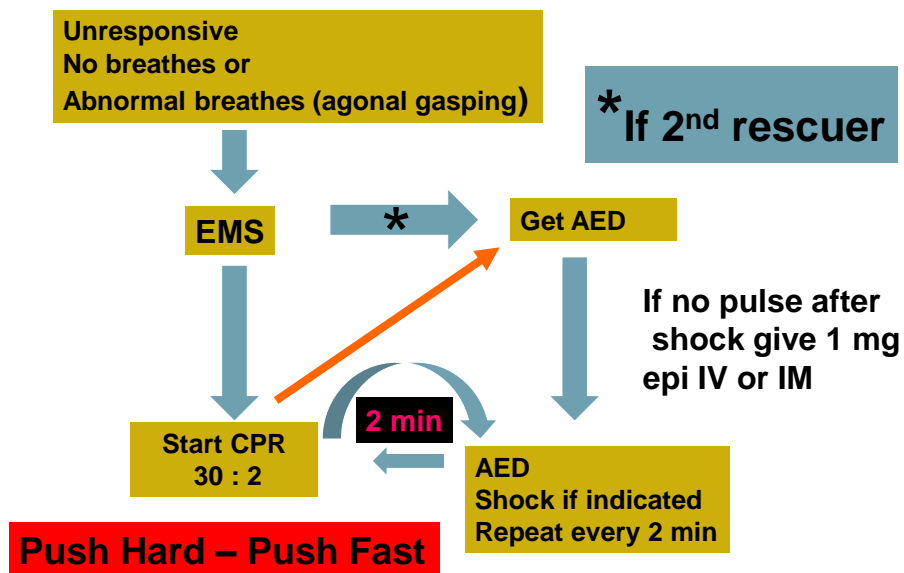
# Muscle Fatigue During Chest Compressions

- Electromyography study on back muscles
- Young healthy subjects
- Muscle fatigue starts in **2 minutes**
- Impairment mostly in **depth**, not frequency

Cobo-Vazquez et al, Anes Prog, 65(1), 30-7, 2018

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## Simplified Adult BLS



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## Pulse Locations

Central Pulses	Peripheral Pulses
Femoral	Radial
<b>Brachial (infants)</b>	Dorsalis pedis (top of foot)
<b>Carotid (older kids &amp; adults)</b>	Posterior tibial (medial ankle)
Axillary	

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## Carotid Pulse

- Grove between trachea & neck muscles
  - Use 2 or 3 fingers
  - Same side
- Start chest compressions ASAP

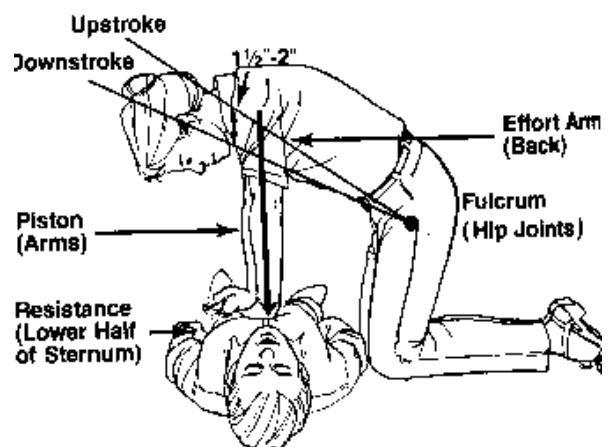


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## Landmark

- No longer using rib cage
- Expose chest, look for **lower half of sternum**
- In some people, between nipples
- **From armpits, slide hand across to midline**

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## Rescue in dental chair or on floor?



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## Child:

One or two hands?

- Size of child
- Strength of rescuer
- 1 or 2 rescuers
- 30:2 or 15:2



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## Two Thumb – Hand – Encircle Technique

Suggested when **2 rescuers**

↑ blood supply to heart

Better control of depth & force

Less fatigue



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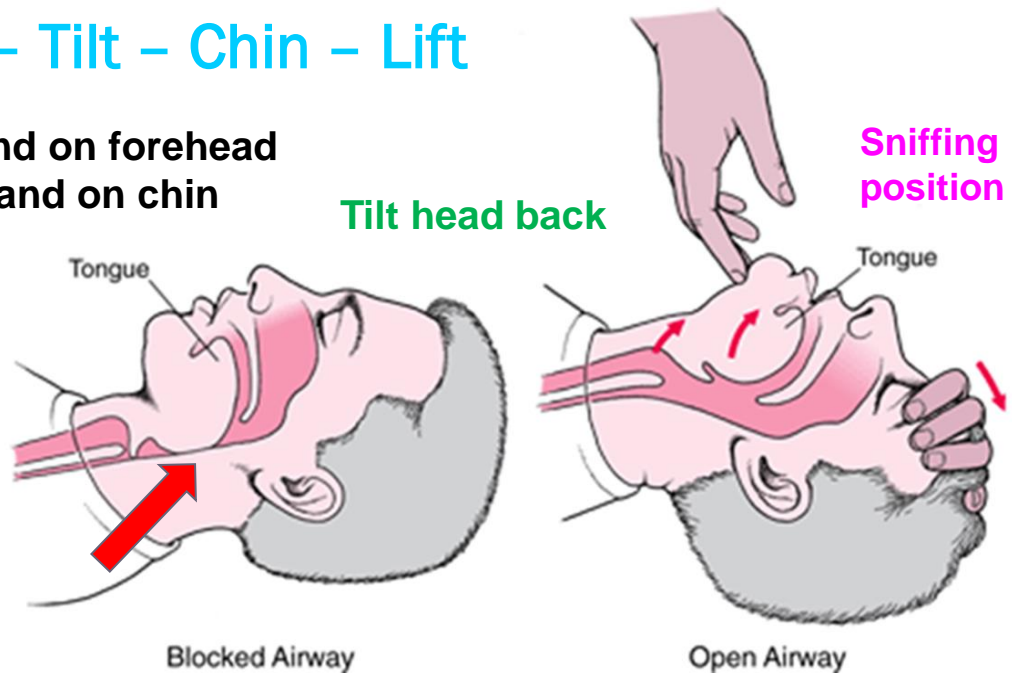
## Neck (Airway) Support



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## Head – Tilt – Chin – Lift

- One hand on forehead
- Other hand on chin



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## Automated External Defibrillator

- AED
- **Automated:** Device reads heart rhythm
- **External:** Electrodes on outside of chest
- **Defibrillator:** Takes away fibrillation
  - Work best in conjunction with CPR
  - Fully automatic vs. semi-automatic

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## Heart Start

Price range  
\$800 - \$4000



## Heart Stream



## Power Heart



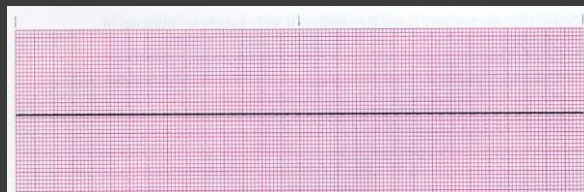
## Zoll



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## ECG Tracings With No Pulse

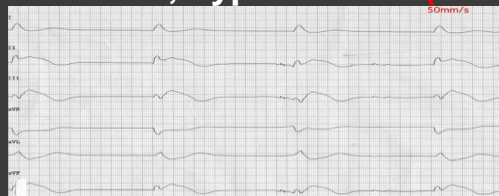
### 1. Asystole (flat line)



### 2. Pulseless electrical activity (PEA)

- From major blood loss, hypothermia (**H's and T's**)

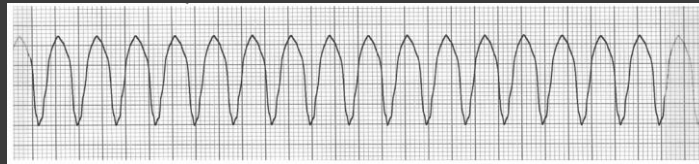
More common in  
children



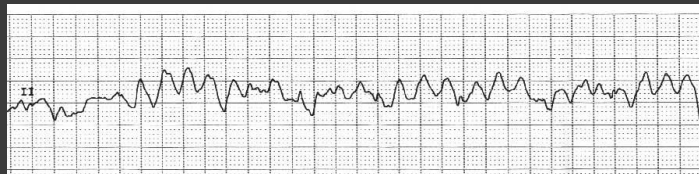
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## Rhythms With No Pulse

### 3. Pulseless ventricular tachycardia



### 4. Ventricular fibrillation



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## Prepare The Chest

- Remove or cut off clothing
  - Bra wire conducts electricity
- **Shave? Need shaver**
- Remove jewellery, medication patches?
- **Dry skin. Need rag**
  - **Diaphoresis common in cardiac arrest**
- Avoid direct contact with ICDs but use is OK

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## Pad Placement

- Recorders & shock delivery
- Metal foil & sticky gel  
(can dry out)
- 1. **Upper right sternal boarder:**  
Directly below clavicle
- 2. **Lateral & below left nipple:**  
Top of pad below axilla
- Adult & pedo size



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## AEDs In Children

- Not usually needed in pediatric cardiac arrest
  - Kids don't have CAD. **Vfib & pVT are rare**
  - Usually **PEA or asystole (H's & T's)**
  - After 1<sup>st</sup> shock, **chest compressions important**
- Children 1 – 12 yrs.
- Pediatric pads **or**
- Dose attenuator (**reduces dose by ~ 2/3**) **or**
- Pads anterior – posterior

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# Pediatric Pads

- 1 to ~ 12 years old
- 10 kg (22 lbs) → 25 kg (55 lbs)
- Most go A – P (check diagram)
- If no pedo pads, use adult A – P
- Pads no closer than **2 inches**



Infant may need manual defib

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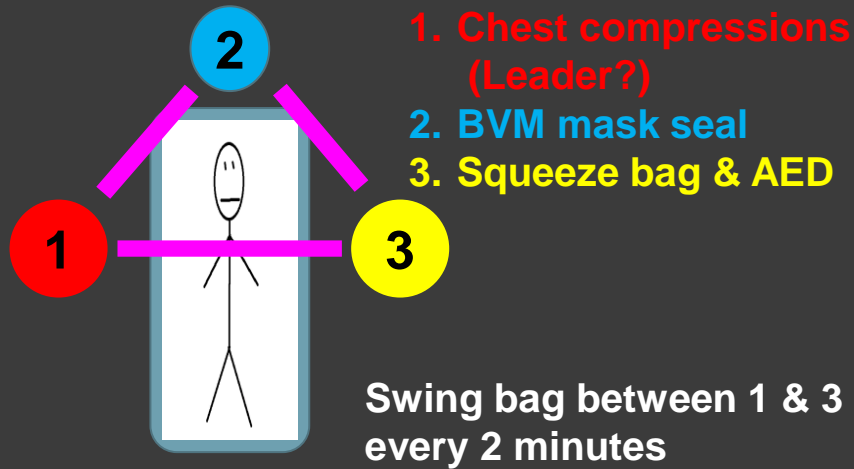
## Practiced Emergency Plan



- Team leader
- EMS caller
- Ambulance greeter
- Emergency kit, AED retrieval
- Airway / Breathing rescuer
- Circulation rescuer
- Drugs (IV)
- Fire safety
- Incapacitated leader

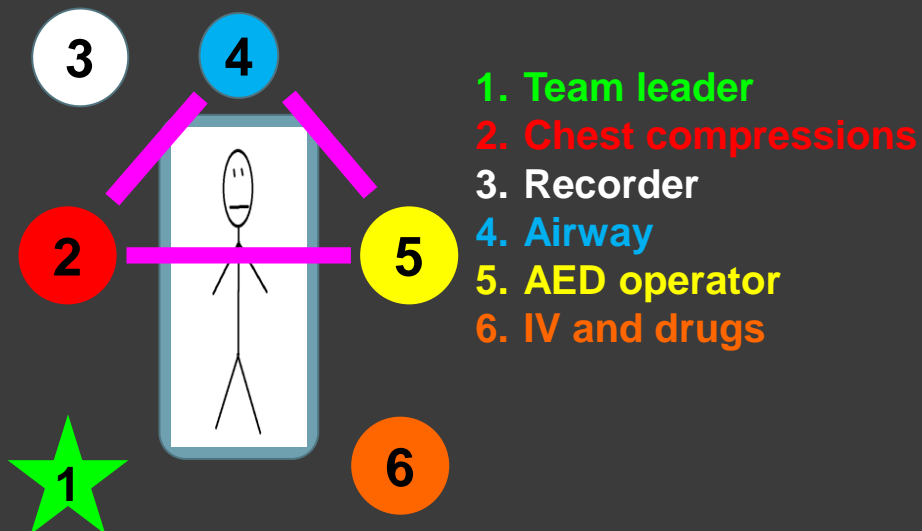
88

## Positions For 3 Rescuer Team



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## Positions For 6 Rescuer Team



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## Team Roles During Emergency

### Front Desk Staff:

- **Call EMS.** Give address, describe emergency
- **Watch reception area**
- Update people in reception area about delay
- **Victim's family members**
- Greet and usher EMS

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## Team Roles During Emergency

### Assistants:

- **Retrieve crash cart, O<sub>2</sub>, drug kit, AED**
- Watch patients in other ops
- **A & B rescuer**
- Record drugs given & time

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## Team Roles During Emergency

### RN:

- ⦿ Establish IV access
- ⦿ **Get emergency drugs ready**
- ⦿ Apply O<sub>2</sub>
- ⦿ **A & B person**
- ⦿ Open AED, apply leads
- ⦿ **Record drugs given & time**

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## Team Roles During Emergency

### Dr.

- ⦿ Team leader
- ⦿ **Chest compressions**
- ⦿ Administer drugs
- ⦿ **Use AED**
- ⦿ Follow-up, insurance

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## Team Roles: Based On Arrival To Scene

- **Rescuer # 1:**
    - First arrives on scene, stays with patient
    - Yells for help
    - CAB until others arrive
  - **Rescuer # 2:**
    - Bring O<sub>2</sub>, drug kit, AED
  - **Rescuer # 3:**
    - All other staff. Perform all other roles (e.g. EMS activation...)
- 1, 2 & 3 could be any staff member
- When dentist arrives, they are in charge

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## Emergency Bags

1. **Syncope / hypoglycemia**
2. **Chest pain: Angina / MI**
3. **Cardiac arrest**
4. **Allergy / Anaphylaxis**
5. **Asthma**



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## Must Haves

1. **Oxygen**
2. **Epinephrine**
3. **An antihistamine (e.g., diphenhydramine)**
4. **Salbutamol**
5. **Nitroglycerine**
6. **ASA (non-enteric coated)**
7. **Glucose**
8. **Flumazenil and / or naloxone**

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## Other Drugs

- Atropine
- IV / IM benzodiazepine
- A corticosteroid
- Aromatic ammonia (smelling salts)

99

## Aromatic Ammonia

- Smelling salts
- A vaporole
- Noxious odor when cracked or crushed
- Irritates airway to stimulate breath
- No data that they shorten syncope episode\*
- **May cause nausea, vomiting, trigger asthma**

\*Goodchild JH et al, Gen Dent, Nov-Dec, 10-13, 2016

100



101

## TOPICS

1. Preventing A Medical Emergency
2. Office Emergency Protocols (P-CAB-D)
3. **Emergency Scenarios**

102

## Medical Emergency Response

1. **P: Position**



2. **ABC / CAB**



3. **D: Diagnose: Drugs, Defibrillate**

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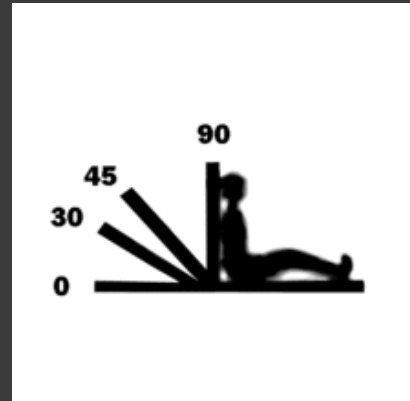
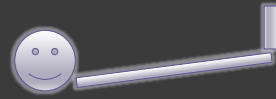
## Position

- ⦿ **If conscious:** Comfort & then rescue
- ⦿ **If unconscious:** Goals are:
  - Blood and O<sub>2</sub> to brain
  - Ability to rescue patient
  - Patient protection

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## Positions

- Supine vs. Trendelenburg
- **Semi-Fowler (30°)**
- Semi-prone (recovery)
- Special considerations
  - **Obese**
  - **Pregnant**
  - **Vomiting**
  - **Seizures**



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## Airway & Supine Position

- Cross section area of airway ↓ **23%** from upright to supine
- Chest weight on airway ↓ **lung volume** more in supine position
  - Especially concerning in obese

Memelman A. et al, J of Em Med Serv, 4, 2018

106

## Unconscious: Differential Diagnosis

- Orthostatic hypotension
  - Not associated with anxiety
- Vasovagal syncope
  - Pain, sight of blood, needle puncture, stress....
- Hypoglycemia (diabetic)
- Drug overdose (LA, cocaine, sedatives, beta blocker...)
- Stroke
- Cardiac arrest
- Adrenal insufficiency, hypothyroidism

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## Syncope

- ~ 50 % of all dental emergencies
- Sudden, temporary loss of consciousness
- Recovery in 1 – 2 min with correct care
- Hypotension causing ↓ blood flow to brain (protective)
- Possible seizure especially if rescue delay

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## Systemic Causes of Syncope

- Stress, anxiety
- Hypoglycemia (NPO status)
- Dehydration (NPO status)
- Hypotension
- Other cardiac: Blockage, irregular beats, heart defects
- Hypothyroidism

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## Treatment – Related Causes of Syncope

- Sudden posture change
- Visual cues
- Injection / treatment pain
  - Most likely time is **during injection**
- Injecting patient who is not supine
- Intraosseous or inadvertent IV injection

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## Who Faints?

- ⊙ ♂ > ♀
- ⊙ **Children rare: Move, get upset = ↑ blood flow to brain**
- ⊙ **Average age of people who faint is ~ 35**
- ⊙ **Common scenario:**
  - Young adult male
  - Anxious
  - Embarrassed, macho, stoic
  - Female dentist

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## Signs & Symptoms

- ⊙ **Pre-syncope:**
  - **Feeling warm, fuzzy**
  - **Pallor**
  - **Diaphoresis**
  - **“Feeling faint”**
  - **Nausea, vomiting**
  - **Blurred or tunnel vision**
  - **↓ BP and ↑ HR**

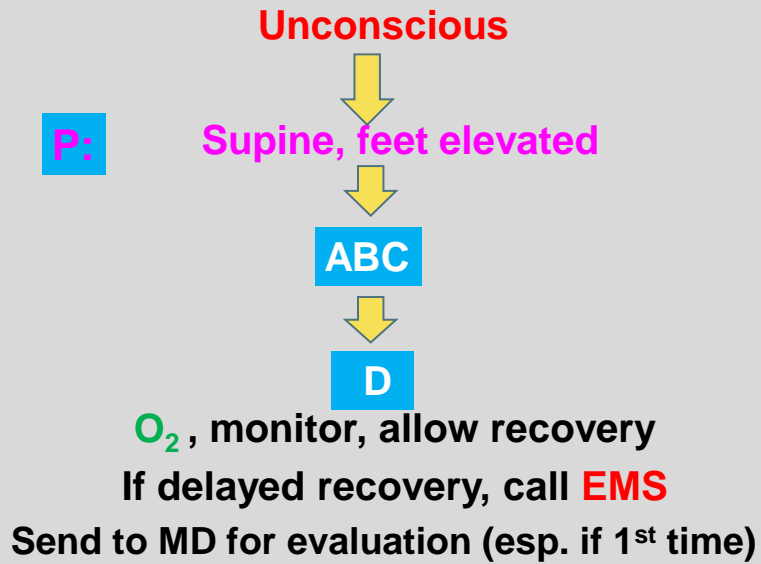
**FIGHT  
OR  
FLIGHT**

This progresses to ↓ HR and LOC

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# Syncope Algorithm



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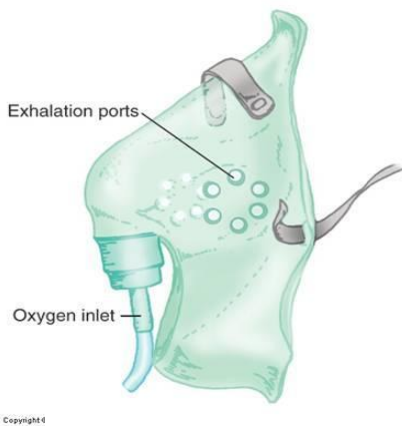
114

# Oxygen Delivery Breathing Patient

Delivery System	% Oxygen
Room Air	21%
Nasal Cannula	24 – 44%
Face Mask	40 – 60%
Face Mask + O <sub>2</sub> Reservoir (With Non-Rebreather NRB)	> 60% at 6 l/min ~100% at 10 l/min (NRB)

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## Full Face Mask



## Non-Rebreather Mask



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## Non - Rebreathing Mask

- ⊙ ↑ delivery of O<sub>2</sub>
- ⊙ Exhaled air leaves the mask
- ⊙ ↓ re-breathing of CO<sub>2</sub>
- ⊙ Fill up reservoir bag before putting on face

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## Oxygen Delivery If Not Breathing

	Normal Breathes / Minute	One Breath Every:
Infant	20 - 30	2 - 3 seconds
Child	16 - 20	3 - 4 seconds
Adult	10 - 12	5 - 6 seconds

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### Bag – Valve – Mask (Manual Resuscitator)

Crimp bag to fill reservoir

Turn O<sub>2</sub> flow to 10 – 14 lpm



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## Mild Hypoglycemia: Signs & Symptoms

↓ Blood glucose can cause:

- ⊙ Warm, sweaty skin
- ⊙ Anxiety
- ⊙ Confusion, irritability, can't concentrate, hallucinations
- ⊙ Tremors
- ⊙ Weakness
- ⊙ Hungry, nausea
- ⊙ ↑ HR, dysrhythmias

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## Severe Hypoglycemia: Signs & Symptoms

- ⊙ Seizure
- ⊙ Semi-consciousness
- ⊙ Coma
- ⊙ Death

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## Hypoglycemia Causes

- Malnourished (NPO)
- **Stress, anxiety**
- ↑ activity level
- **Illness, infection**
- Alcohol
- **Diabetic took meds but no meal**
- Incorrect insulin dose

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## Using A Glucometer

- Inexpensive
- Pharmacist can train you
- Some need to be calibrated
- Keep test strips & lancets with meter



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## Blood Glucose Levels (mg / dL)

	Non-Diabetic	Diabetic (Target)
Before A Meal	70 – 100	70 – 130
2 Hrs. After A Meal	Up to 140	< 180

**Less than 70 is considered hypoglycemic**

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## Hypoglycemia Management: **Conscious**

- ⦿ **P, ABC, D:**
- ⦿ Oral glucose, swallowed
  - **15 g kids**
  - **20 g adults**
- ⦿ **O<sub>2</sub> if < 94%**
- ⦿ **Stress reduction**
- ⦿ **EMS?**

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## Oral Glucose

- **Patient is awake enough to swallow**
- Simple glucose better for GI absorption
- Carbonation helps GI absorption
- Poorly absorbed through oral mucosa

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## Oral Glucose

Source	Grams of Glucose
350 ml. Can of Cola (not diet!!)	39
Insta – Glucose	30
200 ml. Apple Juice Box	21
Glucose Tablet	15
Sugar Packet	4
1 LifeSaver	2

**Cake icing: 20 grams / 2 TBSPs**

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# Insta-Glucose



- Thick syrup
- Twist off cap
- Adult whole tube **30 g**, half for child

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## Hypoglycemia Management: Semi or Unconscious

- EMS
- P, ABC: Airway, O<sub>2</sub> then D:

Drug	Adult	Child
Glucagon	< 20 kg: 0.5 mg > 20 kg: 1 mg (SC, IM, IV, IN)	0.02 – 0.2 mg/kg* (SC, IM, IV)
Dextrose (D50W)	50% in Water IV 50 – 100 ml (25 - 50 g)	25% in Water (2 – 4 ml/kg up to 25 ml)

\*Wide dose variation from different sources

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# Hyperglycemia

- Symptoms develop over days / weeks

	mmol/L (Can.)	mg/dl (U.S.)
Fasting	> 7	> 126
2 Hrs. After Meal	> 11	> 200

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## Hyperglycemia: Signs & Symptoms

### Early Signs:

- Frequent urination
- **Thirsty**
- Blurred vision
- Fatigue
- Headache

### Late Signs:

- Breath fruity smell
- Nausea, vomiting
- Abdominal pain
- SOB
- **Dry mouth and skin**
- Confusion
- Coma

**EMS P-ABC-D**

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## Emergency Management Hypo or Hyper?

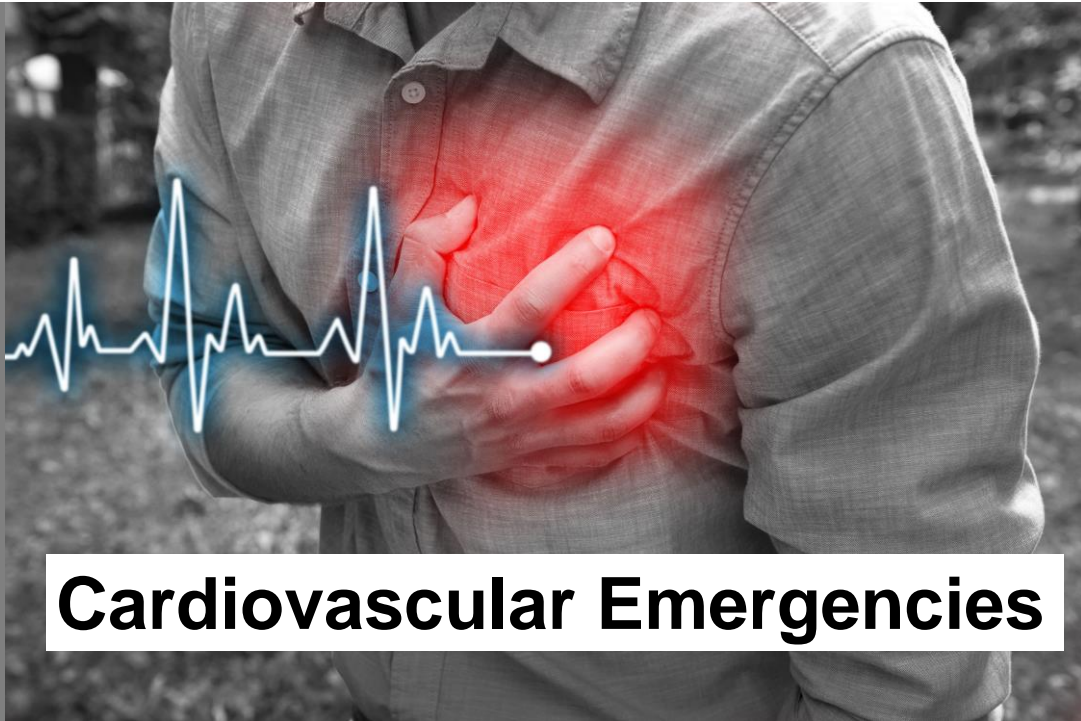
- Give glucose if not sure
- Withholding glucose if hypo worse than giving glucose if hyper
- **Call EMS**
- **Insulin, fluids, electrolytes**

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## Avoiding A Glycemic Emergency

- **25%** of adults > 65 are diabetic
- Know the patient's disease
- **Morning appointment & take meds**
- Good meal before tx
- **Stress reduction protocol**
- Watch patient. Be ready to stop
- **Possible post-op antibiotics**

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## Cardiovascular Emergencies

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## Pediatric Hypotension

- Ominous sign. Impending cardiac arrest

Age	Systolic Blood Pressure
Infants (1 – 12 months)	< 70
1 – 10 years	< 70 + (age in years x 2)
> 10 years	< 90

PALS, 2015

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## Chest Pain: Differential Diagnosis

- ⦿ Esophageal reflux
- ⦿ **Muscle cramp**
- ⦿ Hypertension
- ⦿ **Angina**
- ⦿ Myocardial infarction

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## Heart Disease Facts:

- ⦿ Millions of Americans have heart disease
- ⦿ Most people have multiple risk factors
- ⦿ Cost to economy almost in billions

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## Risk Factors For Cardiac Disease

- ⦿ High blood pressure
- ⦿ **Hyperlipidemia**
- ⦿ Obesity
- ⦿ **Smoking, excessive alcohol, drug abuse**
- ⦿ Diabetes
- ⦿ **Family history**
- ⦿ Stressful lifestyle

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## Angina Pectoris

- ⦿ Angina: Latin for **to choke or throttle**
- ⦿ “Dull, heavy, squeezing, ache”
- ⦿ Discomfort sub - sternal, epigastric, jaw, arm
- ⦿ **Caused by: CAD, aortic stenosis, hypertension**
- ⦿ Myocardium O<sub>2</sub> deficient
- ⦿ Pain **1 – 30 minutes**, severity varies
  - If prolonged, think MI
- ⦿ ASA **III** or **IV**

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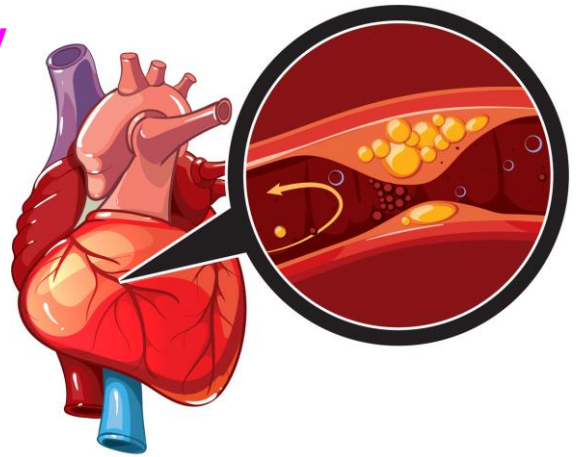
# Coronary Artery Disease

Level 1: **Angina: Excessive exercise**

Level 2: **Angina: Mild exercise**

Level 3: **Angina: Normal activity**

Level 4: **Angina at rest**



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## Stable Angina (Effort Angina)

- Physical activity (not usually at rest)
- Temperature extremes
- Large meals
- Emotional stress, anxiety
- Caffeine, smoking (stimulants)
- Fever
- **Characteristic pain** alleviated with nitroglycerine
- **ASA III**

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# Sublingual Tablets

- **Nitrostat™: 0.3, 0.4 or 0.6 m**
- **q 5 min. x three doses**
- **100 tablets per container**
- **Unstable**



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# Sublingual Spray

- **Nitrolingual® Spray**
- **1 metered doses (0.4 mg – 0.8 mg)**
- **Three doses, q 5 min. prn**
  
- **On or under tongue**
- **Mouth closed - not inhaled**
- **200 metered doses / bottle**
  
- **Shelf life 2 years**



**Label:**  
**Pulse > 50**  
**BP >  $\frac{90}{60}$**

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## Nitroglycerin Contraindications

- ⦿ BP < 90 / 60 & / or pulse < 50
  - ⦿ Suspected stroke
  - ⦿ Taking **phosphodiesterase inhibitors**:
    - **Within 24 hrs.** for sildenafil (Viagra) or vardenafil (Levitra)
    - **Within 48 hrs.** for tadalafil (Cialis)
    - Or if taking these drugs daily
- Put this on bottle

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## Myocardial Infarction

- ⦿ Infarction: Latin for **“to plug or cram”**
- ⦿ Deficient blood to heart muscle = **necrosis**
- ⦿ 1/3 die before reaching hospital
- ⦿ If total artery block, must treat within **3 – 6 hrs.** to avoid permanent cardiac damage
- ⦿ **90% of MI's are due to CAD**
- ⦿ Know risk factors

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## Signs and Symptoms

- ~ 25% are asymptomatic
- Pain, pressure, crushing – usually severe
- Radiates: Arms, neck, jaw, shoulders,
- Toothache
- Nausea and vomiting
- SOB
- Dizziness
- Diaphoresis
- Sense of doom

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## MI Gender Differences

Symptom	
Pain	No difference
SOB	No difference
Right side chest discomfort	4.7 X more by men
Indigestion	3.7 X more by men
Recognize that symptoms are cardiac	3.7 X more by men
Discomfort	2.7 X more by men
Throat discomfort	12 X more by women
Pressing on chest	7.3 X more by women
Dull ache	3.9 X more by women
Vomiting	3.9 X more by women
Time to seek help	3 hrs. men & 4 hrs. women

University of Rochester

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## ASA

- Give stat or up to 24 hrs. after MI
- **CHEW, SWISH & SWALLOW**
- Dose 160 – 320 mg
- Baby aspirin is sweet, **not enteric coated**
- Bitter taste might ↑ nausea / vomiting
- **Have at home**

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## Why Chew?

- **Swallow: Max blood levels of ASA:**  
**26 minutes**
- **Chew: Max blood levels of ASA:**  
**14 minutes**



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# M.I. Algorithm "N.O.N.A."

P: Comfortable

↓  
**ABC/CAB**

↓  
**D**

↓  
**EMS**

↓  
**O<sub>2</sub> If < 94% 5 – 6 L/min.**

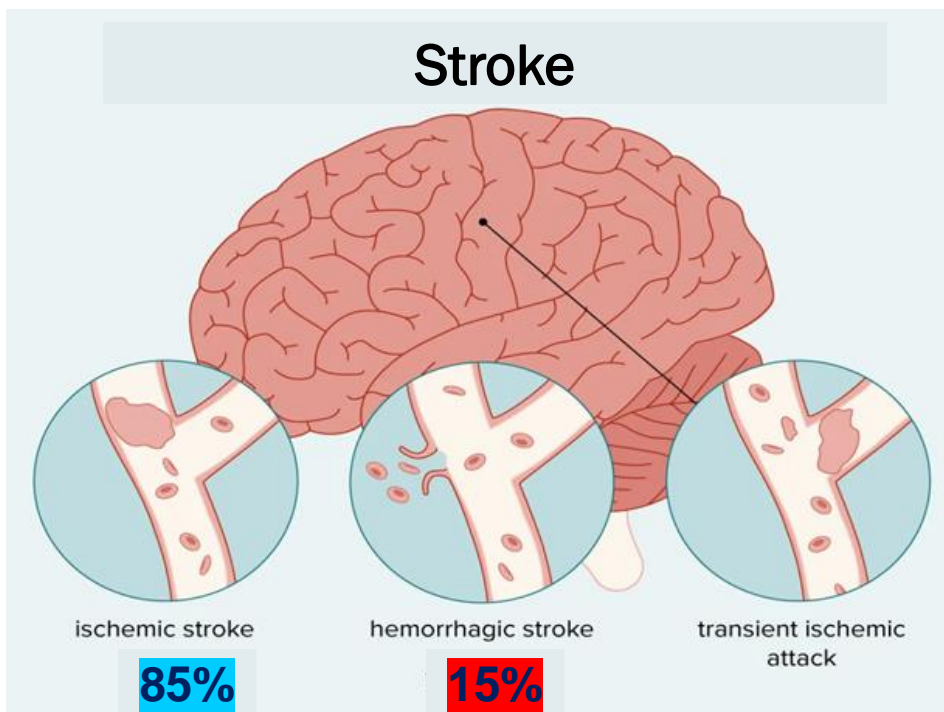
**0.4 mg q 5 min x 3 Nitroglycerine**

**+ N<sub>2</sub>O N<sub>2</sub>O + O<sub>2</sub> 50%**

**+ 160 - 325 mg Aspirin**

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## Stroke



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## Transient Ischemic Attack (TIA)

- “Mini or warning stroke”
- Transient blockage
- Symptoms last 1 – 5 min, usually reverse in 24 hr.
  - **20% will have a stroke in 3 months**
  - **10% will have a stroke in 2 days**
- **Therefore: EMS or go to ER**

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## Stroke: Risk Factors

- Age
- **History of stroke or TIA**
- Hypertension
- **Hyperlipidemia**
- CAD
- **Atrial fibrillation**
- Diabetes
- **Smokers, excess alcohol**
- Obesity
- **Inactivity**
- Family history

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## Stroke: Signs & Symptoms

- **FAST:**
  - **F**ace droop on one side
  - **C**an't raise both **A**rms to same height
    - Do this with eyes closed
  - **S**peech is slurred or mumbled
  - **T**ime: EMS ASAP

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## Stroke: Other Signs & Symptoms

- Weak or numb on one side, leg or arm
- **Dim or blurred vision one or both eyes**
- Severe sudden headache
- **Dizziness, sudden fall**
- Confusion

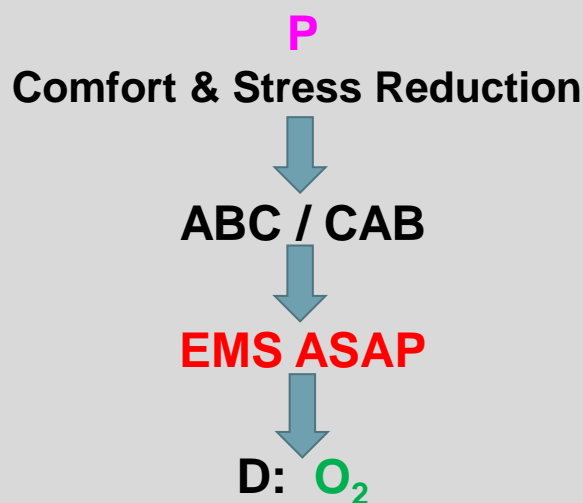
158

# Stroke Emergency Management

- ⊙ **No ASA or nitroglycerine**
  - Ischemic or hemorrhagic??
  - ASA may ↓ chance of future 2<sup>nd</sup> stroke BUT
  - Does not dissolve present clot (if ischemic)
  - **ASA may ↑ bleed if hemorrhagic**
  - No evidence ASA sooner than 1 hr. after stroke will help
- ⊙ NPO if swallowing deficit
- ⊙ **EMS & hospital thrombolytics ASAP**

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# Stroke Algorithm



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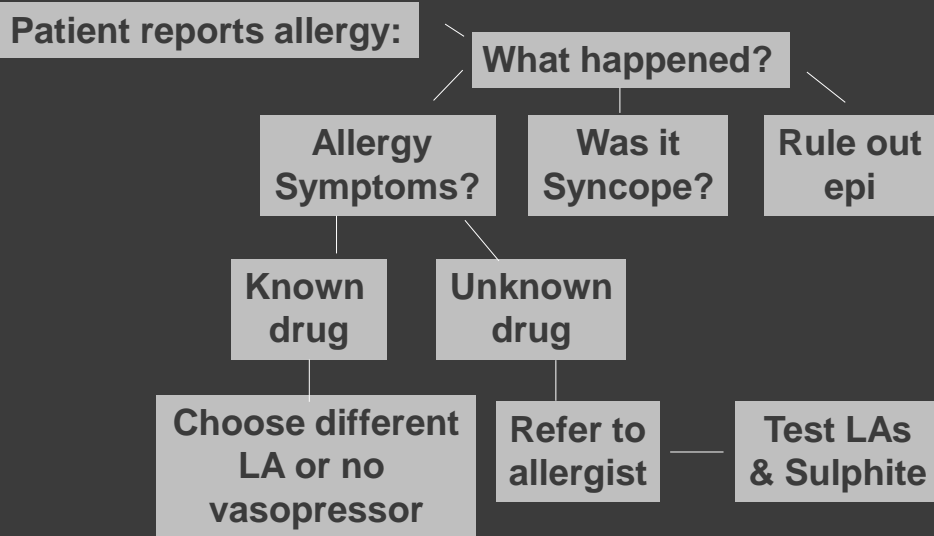


# Allergy



161

## LA Allergy..... Or Is It?



Adapted from Becker et al, Anes Prog 59:90-102, 2012

162

## Sodium Metabisulfite

- **Preservative & antioxidant** in foods & medications
  - Stops food from browning, epinephrine from oxidating...
- Prolongs **shelf-life** of anaesthetic (Plain solutions have ↑ shelf life)
- **1 – 7%** of population have sulphite allergy (↑ in asthmatics)\*

\*Santos L, Oral Health, Feb 2024

163

## Sulf.....

**Sulfur:** Chemical, mineral, essential for life

**Sulfa:** Class of antibiotics

**Sulfite:** Found in foods & drugs as preservative

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## Signs & Symptoms of Allergy (Variable)

- **Skin**
  - Red, itchy, swelling, blisters, rash, hives
- **Lungs**
  - Wheezing, cough, SOB
- **Eyes**
  - Red, itchy, swollen, watery
- **GI**
  - Cramps, nausea, vomiting, diarrhea
- **Headache**

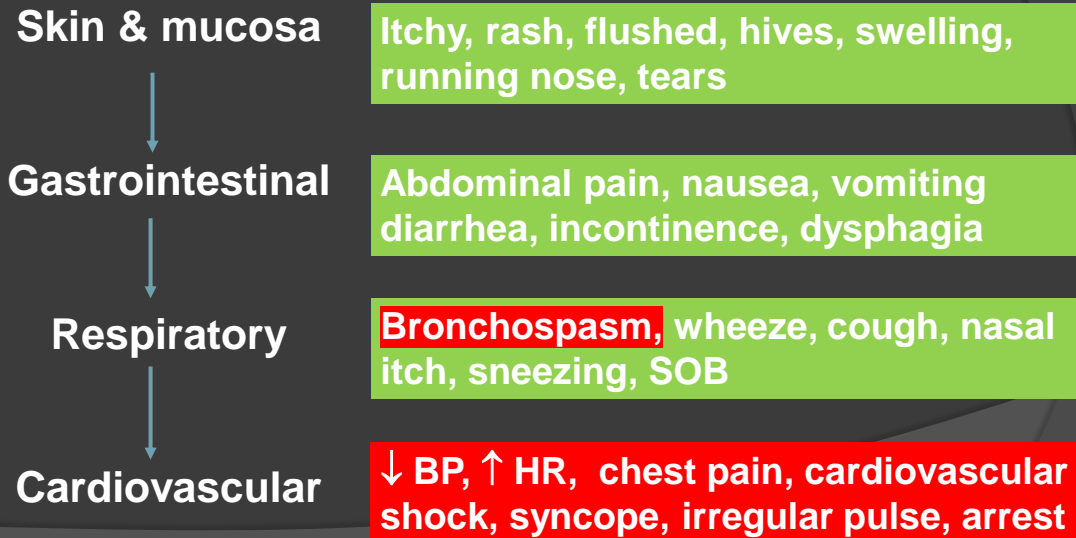
165

## Anaphylaxis

- Usually occurs immediately (seconds – minutes)
- **20%** occur (**or recur**) from 1 – 72 hrs.
- **96% of fatalities occur in 1<sup>st</sup> hour**
- **~ 1% result in death**
- Sense of doom and feeling unwell

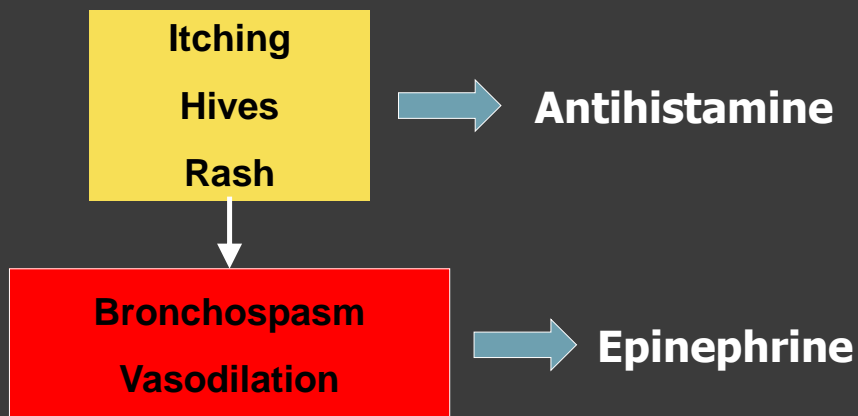
166

## Signs & Symptoms of Anaphylaxis



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## Allergy and Anaphylaxis



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## Factors Related To Death

- ⦿ **Delay** in epinephrine administration
- ⦿ Prior **history** of anaphylaxis
- ⦿ Comorbidity with **asthma**
- ⦿ **Tree nuts** (not peanuts) are the allergens

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## Common Causes Of Anaphylaxis

- ⦿ Insect stings (especially wasps)
- ⦿ **Foods (more in kids)**
  - Nuts, shellfish, milk, eggs
- ⦿ **Medications, e.g. penicillin (more in adults)**
- ⦿ Latex

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## Dental Office Allergens

- Latex
  - Esters vs. amides (topical LA)
    - True amide allergy = 1% of all LA adverse systemic reactions. Very rare.
  - Sodium metabisulfite
  - PABA (& methylparaben)
  - Other drugs, (e.g., chlorhexidine, formaldehyde , sodium hypochlorite)
  - Impression materials
  - Gelfoam (porcine)
- Allergy hx = ↑ likelihood of allergy to dental allergens**

\*Mulmani P., Br Dent J, 222:954-61, 2017

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## Management of Non-Anaphylactic Allergy

- Diphenhydramine
  - 50 mg IM for adults
  - 1 mg/kg IM for children to 50 mg max.

**Histamine can be released for 72 hours so:**

- Benadryl 50 mg qid for adults (drowsiness)
- Benadryl 25 mg qid for children (drowsiness)
- Or a non-drowsy 2<sup>nd</sup> gen. antihistamine

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## H<sub>1</sub> Antihistamines, Examples

1 <sup>st</sup> Generation	2 <sup>nd</sup> Generation
Diphenhydramine (e.g., Benadryl)	Cetirizine (e.g., Reactine)
Hydroxyzine (e.g., Atarax)	Loratadine (e.g., Claritin)
Promethazine (e.g., Phenergan)	Fexofenadine (e.g., Allegra)
	Desloratadine (e.g., Aerius)

All have multiple trade names

2<sup>nd</sup> gen. pediatric chewables, melts, syrup.... available

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## Antihistamine: DiphenhydrAMINE

- Many formulations

**Injectable: 1 ml vial with 50 mg dose**

**Capsules: 25 or 50 mg**

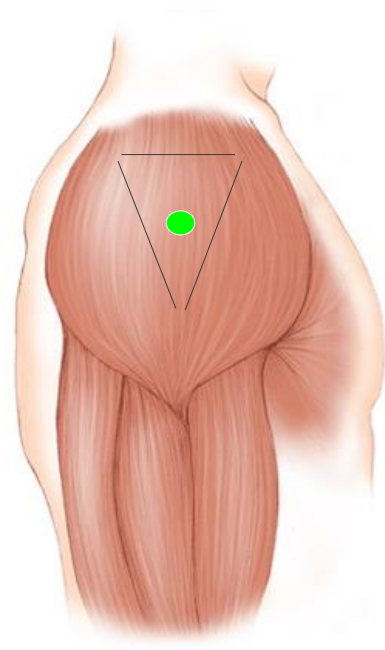
**Elixir: 12.5 mg / 5 ml**



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# Deltoid Injection

**Target: 2 – 3 finger widths (2 – 3 cm) below bony part of shoulder (acromion process)**



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## Epinephrine Formulations

Device	Dose / Injection	# of Doses	Weight
Ampoule 1:1,000 1 mg/ml	Variable	Multiple	0.01 mg/kg*
Adult Auto-Injector	0.3 mg	1	> 30 kg (66 lbs.)
Pediatric Auto-Injector	0.15 mg	1	15 – 30 kg (33-66 lbs)

\*Use dose of **0.01 mg/kg** for children < 15 kg

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## Doses of Epinephrine

Pediatric Dose: 0.01 mg/kg **IM**

Anaphylaxis: 0.3 – 0.5 mg **IM**

Asthma: 0.3 – 0.5 mg **IM**

Cardiac Arrest: 1.0 mg **IV**

Repeat **IM**  
dose every  
5 – 15 minutes

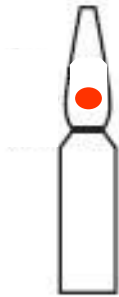
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**1:1000 epinephrine (1 mg/ml)**



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**Gauze**  
**Break tip away from you**

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## Auto-Injector Precaution

### Study:

- **Ultrasound** measured distance skin to vastus lateralis in **children 1 – 12 yrs.**
- **12% of children less than 30 kg:** Distance skin to muscle **>** length of needle on EpiPen Jr. ( $\frac{1}{2}$  inch)

Stecher, D et al, Pedtr, 124:65, 2009

180

## Using Auto-Injectors

Study: **50 users, trained & given written instructions.**

- 58% injected incorrectly
- **28.6% did not remove safety cap**
- 19% used it upside-down
- **19% injected wrong area**
- 100s of cases / yr. health care workers **injecting thumb** (ischemic tissue necrosis?)

Lombardelli S., Euro Ac Aller Clin Immun, Abstract 1599, Jun 2010

181

## Using An EpiPen

- Take off **yellow** cap & remove from tube
- **Blue to sky, orange to thigh**
- With **orange** tip down, remove **blue** safety cap
- **Orange** end into thigh – swinging motion
- **Inject perpendicular** to thigh
- Push firm against outer thigh until it clicks
- Leave in for **10 seconds**
- Message area

**Hold like a microphone**



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## Other Epinephrine Injectors

- **Allerject / Auvi-Q**
  - Voice prompt
- **AdrenaClick**
  - Lacks some safety features
- **Symjepi**
  - Not autoinjector, must self-inject thigh



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## Vastus Lateralis Injection

**Lateral thigh**

**Quadriceps = largest muscle**

**Good arterial supply**

**Good location for auto-injector**



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# Anaphylaxis Algorithm

**P - ABC/CAB - D**

Supine, feet elevated, if unconscious

**EMS**

May need to re-administer epinephrine in 5 – 15 minutes

★ Epinephrine

0.3 – 0.5 mg IM  
0.01 mg/kg kids

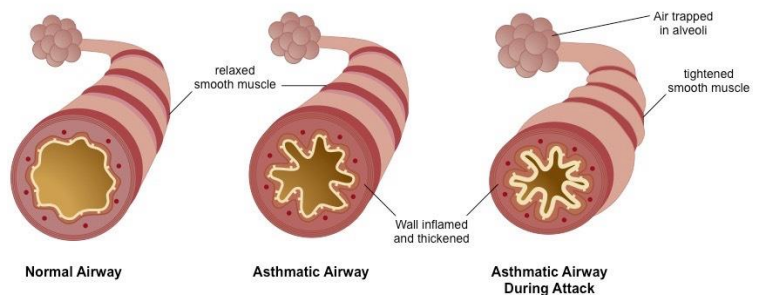
O<sub>2</sub> if needed

Antihistamine

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## Asthma

- ⊙ Most common disease in kids (~15%)
- ⊙ Extrinsic (allergy mediated) or intrinsic
- ⊙ 3 ways airway can be affected:
  - Bronchoconstriction
  - Mucosal edema
  - Mucous plugging



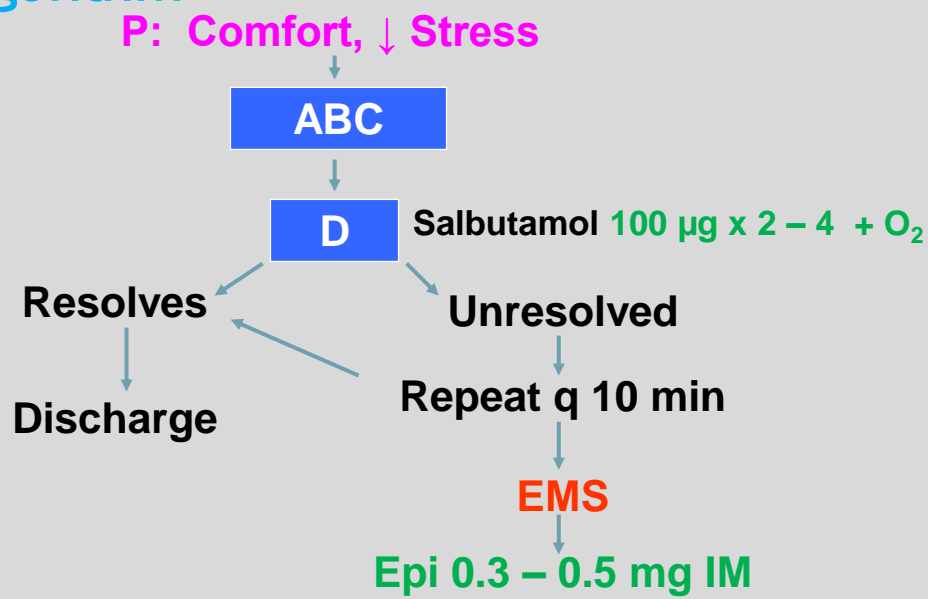
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## Preventing Asthma Emergency

- Know their asthma
- ↓ pain & anxiety during tx
- Watch sulfites & NSAID's
- Have patient bring inhaler
- Prophylactic O<sub>2</sub>
- Watch aerosols, irritants (counter sprays, perfume...)
- Use rubber dam
- Delay tx if URT infection or bad asthma day

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## Asthma Algorithm



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## Bronchodilator

- e.g., salbutamol trade name: **Ventolin®**
- **β-2 stimulation**
  - Direct action on bronchial smooth muscle
- **1 puff = 100 μg**
  - **Adult: 2 puffs q 2 minutes x 2**  
First puff may loosen airway for next puff
  - **Child: 1 puff**
- **Onset: 5 – 15 minutes**
- **Duration: 3 – 6 hours**

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## Using the Inhaler

- **Shake** vigorously for 5 – 10 seconds
- **Remove blue cap**
- **Empty lungs (blow out)**
- **Put inhaler in mouth & push top down**
- **Inhale drug**
- **Hold for 2 – 3 seconds**



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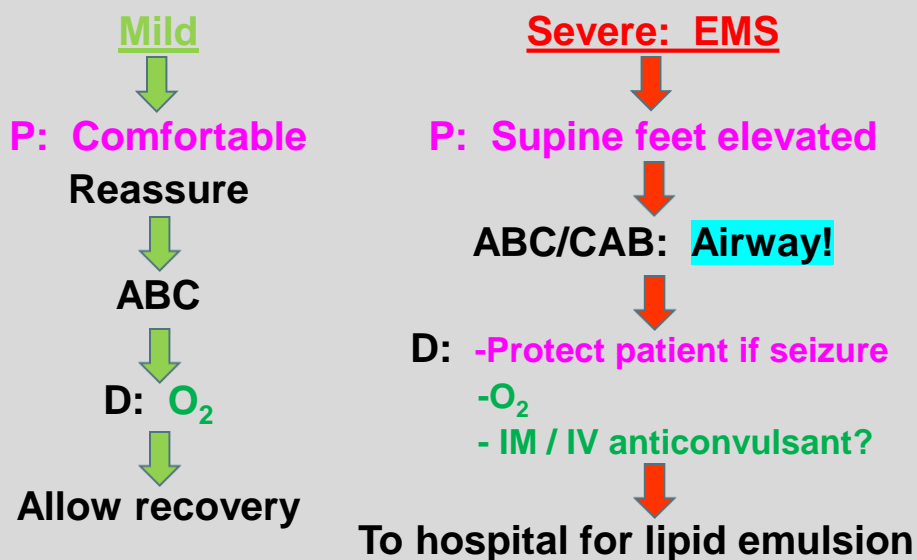
# Local Anesthetic Toxicity

Three mechanisms:

- True systemic toxicity due to overdose
- **Hypersensitivity**
- Practitioner mediated (IV injection)

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## LA Toxicity Algorithm



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## Seizures: Differential Diagnosis

- Epilepsy
- Hypoxia (syncope)
- Hypoglycemia
- Alcohol / drug withdrawal
- LA toxicity
- Anaphylaxis
- Fever or infection
- Stroke
- Benzodiazepine reversal

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## Seizure Classification

1. Petit mal / absence: Blank stare
2. Myoclonic: Repetitive muscle jerking
3. Atonic: Loss of postural tone, falls to the floor
4. Grand mal: Most common, tonic – clonic (= rigid & shaking). 90% of all seizures

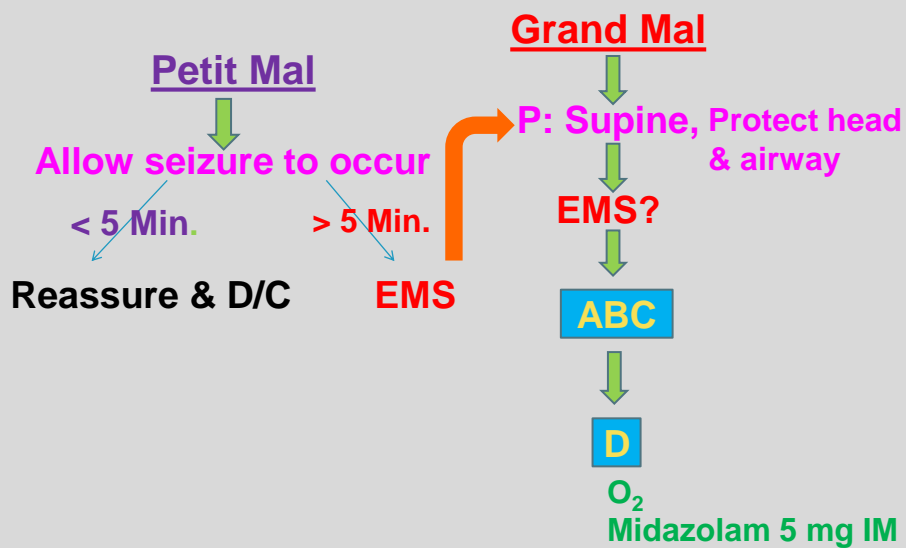
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# Seizure Progression

1. Pre-ictal: Aura with mood alterations?
  2. Ictal: LOC and seizure
  3. Post-ictal: Regain consciousness, stupor, AMS
- Avoid things that provoke aura or seizure

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# Seizure Algorithm



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# summary



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## Avoiding An Emergency

- ⦿ Take accurate medical history, assign ASA status
- ⦿ **Blood pressure – continuous?**
- ⦿ Contemplate referral if uncomfortable
- ⦿ **Minimize discomfort**
- ⦿ Reduce stress

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## Be Prepared

- ⦿ **Practice scenarios**
- ⦿ **Have current medical emergency kit**
  - Practice with stale drugs
- ⦿ **Ensure current BLS training for all – annually**
- ⦿ **Have a written, practiced office emergency protocol**
- ⦿ **Watch & engage your patient during their care**

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## If An Emergency Occurs

- ⦿ **Act quickly**
  - Drug kit, AED...
- ⦿ **Don't delay EMS**
- ⦿ **Remain calm: P – CAB – D**
- ⦿ **Continue stress reduction protocol**

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