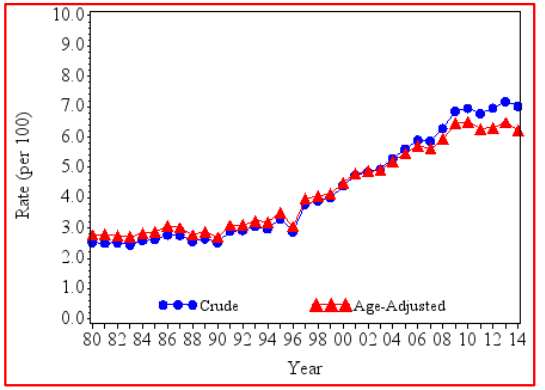
# Medical Emergencies Update 2017 – Part II


# Altered Consciousness

## Altered Consciousness

# Diabetic Emergencies ( Insulin Shock )

## U.S. Incidence of Diabetes




Source: Centers for Disease Control and Prevention (CDC), National Center for Health Statistics

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**September 25, 2017**

# Diabetes Classification

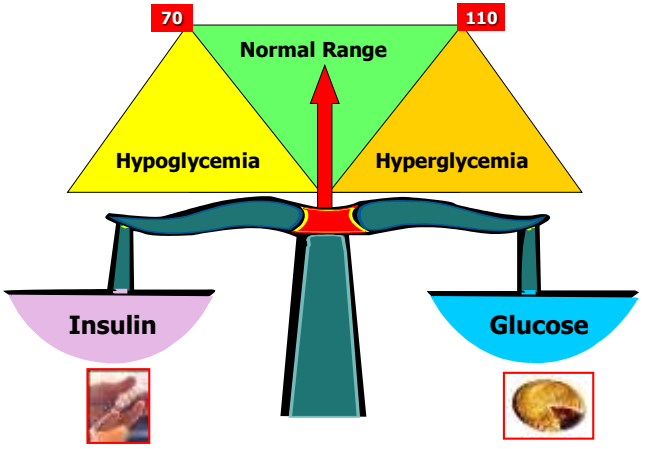
- Type 1
  - Absolute insulin deficiency, usually autoimmune process – 8%

Type 2

Insulin resistant with relative deficiency – 90%

- Gestational Diabetes Mellitus
  - Abnormal glucose tolerance during pregnancy
- DM associated with other conditions
  - Pancreatic disease, drug-induced, etc.

# Diabetic Emergencies

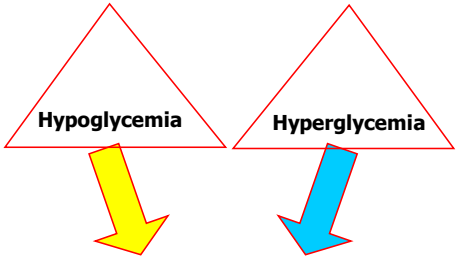



# Diabetic Emergencies

Dental Management to Avoid Problems

- Morning appointments are best
- Confirm took insulin and ate usual meal
- What is their CBG – Check with glucometer
  - CBG < 70mg/dL or > 200mg/dL, defer Tx
- Major goal => "KEEP 'EM SWEET"

# Diabetic Emergencies




## Altered Consciousness

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# Diabetic Emergencies

Differential Diagnosis in Diabetic with aLOC

| Hypoglycemia | Hyperglycemia |
|---|---|
| ❖Cool, wet, pale | ❖Hot, flushed, dry |
| ❖Confusion | ❖Acetone breath |
| ❖Lethargy | ❖Dry mouth |
| ❖Hunger | ❖Irritable |

# Diabetic Emergencies

## Diabetic Ketoacidosis

Lack of Insulin - - Hyperglycemia

↓

Glycogenolysis
Gluconeogenesis
Ketogenesis

↓

Ketoacidosis

↓

Coma

# Diabetic Emergencies

**Diabetic patients who behave in a bizarre manner or exhibit altered level of consciousness should be managed as if they are**

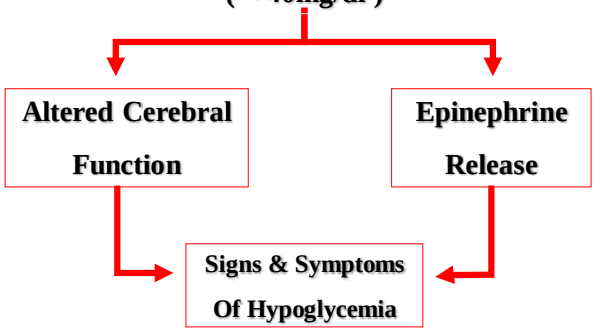
**HYPOGLYCEMIC**

**until proven otherwise.**

# Insulin Shock

Hypoglycemia

( < 40mg/dl )



# Insulin Shock

## Hypoglycemia – Early manifestations

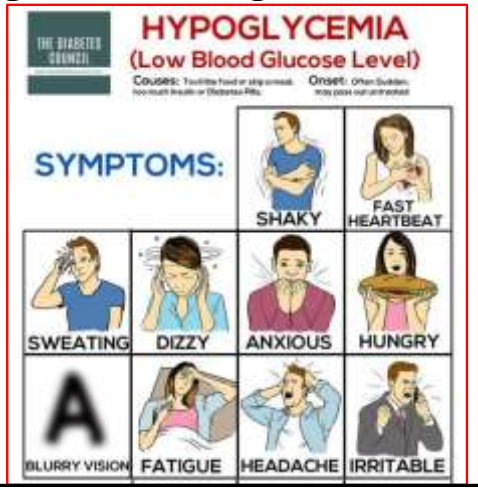
- Diminished cerebral function
  - Alteration of mood
  - Lack of spontaneity
- Weakness, dizziness
- Pale, moist skin
- Headache

# Insulin Shock

## Hypoglycemia – Late manifestations

- Sweating
- Tachycardia
- Hypotension
- Anxiety
- Seizure activity
- Unconsciousness

# Hypoglycemia Signs & Symptoms




# Insulin Shock - Management

*** * Conscious Patient * ***

Position patient comfortably

↓

C - A – B – BLS as needed

↓

Administer oral carbohydrate (InstaGlucose)

| (Episode terminates) | (Episode continues) |
|---|---|
| ↓ | ↓ |
| Observe one hour | Activate EMS |
| ↓ | ↓ |
| Discharge patient, escort? | Glucagon 1mg IM or IV |
| | Dextrose 50% 50ml IV |
| | ↓ |
| | Discharge or hospital ? |

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# Insulin Shock - Management

*** * Unconscious Patient * ***


Position patient supine, legs elevated

↓

C – A – B – BLS as needed

↓

Activate EMS - ASAP

↓


<u>Parenteral Carbohydrates</u>

Dextrose 50% 50ml IV

Glucagon 1mg IM or IV

(Epinephrine 0.5mg SQ or IM)

↓

Oral carbohydrates after recovers

↓

Discharge or transport to hospital

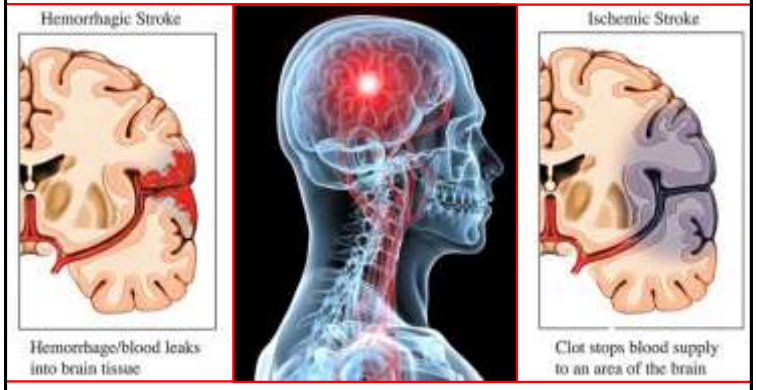
# Altered Consciousness

# Cerebrovascular Accident

# ( Acute Stroke )

# Cerebrovascular Accident

## CVA Classification




# Cerebrovascular Accident

## CVA Classification

### Transient Ischemic Attack (TIA)

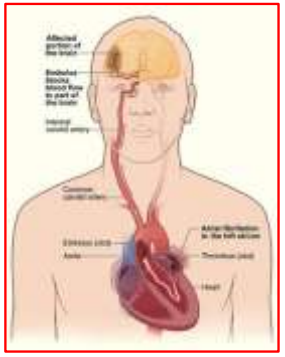
- Focal ischemic neurologic deficits that last < 24 hrs, usually resolve in 2 - 10 minutes
- Indicates cerebrovascular disease

## "Angina of the Brain"

# Cerebrovascular Accident

## Associated Risk Factors

- Hypertension
- Atrial Fibrillation
- Abnormal heart valve
- Smoking
- Elevated lipids
- Prior TIAs

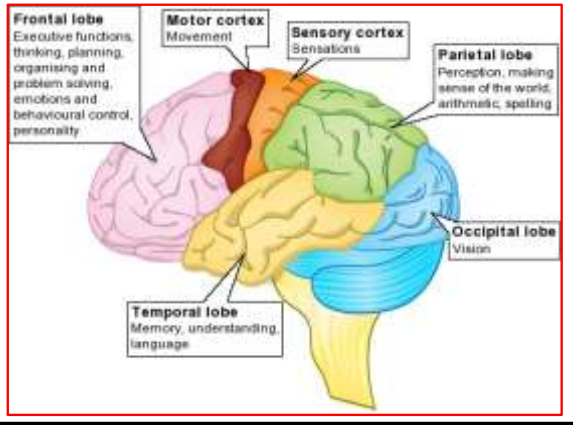


# Cerebrovascular Accident

## CVA or TIA Diagnostic Clues


# Cerebrovascular Accident

## CVA or TIA Diagnostic Clues




# Cerebrovascular Accident

## CVA or TIA Diagnostic Clues


- Hypertension, BP > 140/90
- Altered consciousness
- Hemiparesis, hemiparalysis
- Headache, blurred vision
- Asymmetry of face or pupils
- Incontinence
- Aphasia, slurring words

# Cerebrovascular Accident

If any one of these signs is present, chance of stroke is 72%


# CVA or TIA Management

Position patient comfortably

↓

C – A – B – BLS as needed

↓

Monitor vital signs
Activate EMS

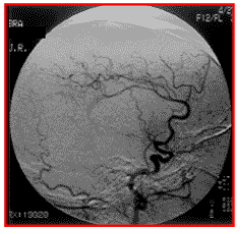
↓

Administer oxygen
Elevate head if BP elevated

↓

ASA Stroke Protocols

# CVA or TIA Management




# Altered Consciousness

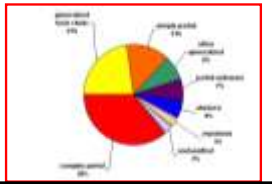
# Seizures

# Seizures

## Classifying Epilepsy and Seizures

**Seizure types:**

| Partial | | Generalized | |
|---|---|---|---|
| Simple | Complex | Absence | Convulsive |
| ↓ | ↓ | ↓ | ↓ |
| Consciousness is maintained | Consciousness is lost or impaired | Altered awareness | Characterized by muscle contractions with or without loss of consciousness |



# Seizures

What do you do when you have your seizure?

# Seizures

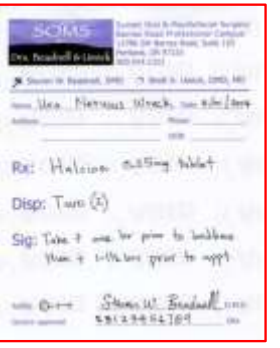
Questions to ask patient

- How frequent are seizures? Last?
- What precipitates seizures?
- What type of seizure activity?
- How long do seizures last?
- How are you after seizure?
- What medications do you take?

# Seizures

Common triggering factors

- Flashing lights
- Fatigue, missed meal
- Emotional stress
- Alcohol ingestion
- Physical stress
- Hypoglycemia



# Seizures

Possible causes in dental office

- Epilepsy
- Local anes overdose
- Hyperventilation
- CVA (stroke)
- Hypoglycemia
- Syncope (hypoxia)

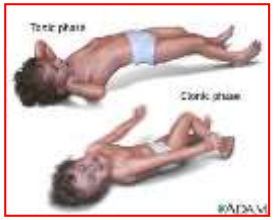
# Grand Mal Seizures

- Prodromol Phase
  - Change in mood
  - Aura – related to senses
- Preictal Phase
  - Falls to floor
  - Epileptic cry



# Grand Mal Seizures

- Ictal Phase
  - Tonic – sustained contractions
  - Clonic – alternate flexor / extensor




- Postictal Phase
  - Muscle flaccidity
  - Incontinence
  - Slowly regains consciousness

# Grand Mal Management

## Ictal Phase

**Position supine, legs slightly elevated**

↓

**Activate EMS if new onset**

↓

**C - A – B – BLS as needed**

↓

*** Protect from injury ***

**Administer oxygen**

**Monitor vital signs**

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# Grand Mal Management

Postictal Phase

**Keep supine, legs slightly elevated**

**C - A – B – BLS as needed**

**Monitor vital signs**

**Reassure patient, permit recovery**

**Discharge patient**

To hospital | To home | To physician

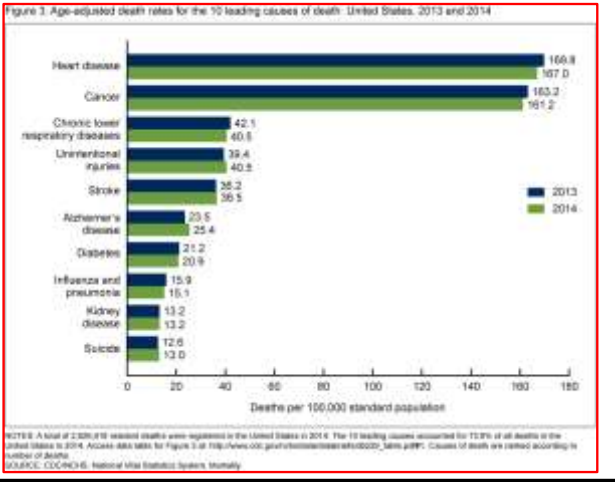
# True Seizure vs Syncope

**Hypoxic seizure associated with syncope:**

- **Movement mainly in extremities**
- **Generally lasts only 5 – 10 seconds**
- **No confusion afterwards**
- **No urinary incontinence**
- **No injury to tongue/cheek**

# Cardiac Emergencies

# U.S. Causes of Death 2014

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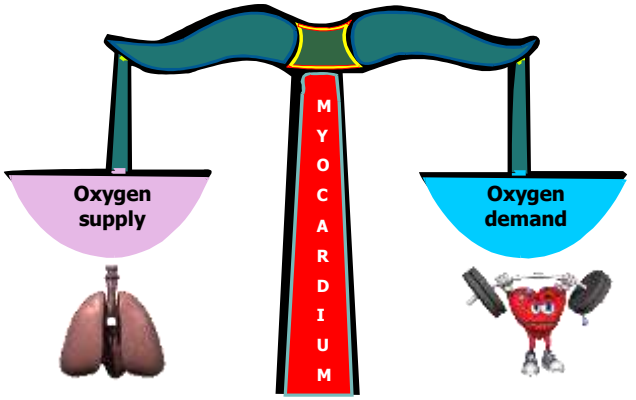
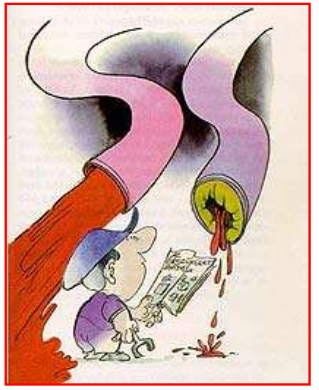
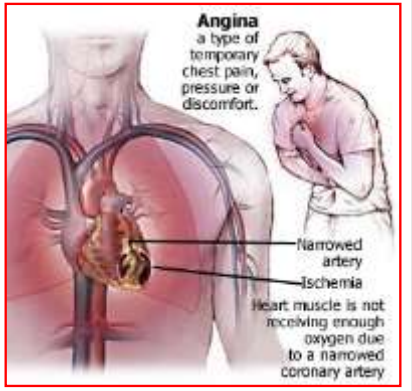
# Ischemic Heart Disease




# Ischemic Heart Disease






# Chest Pain

## Acute Coronary Syndrome

Unstable Angina

Myocardial Infarction

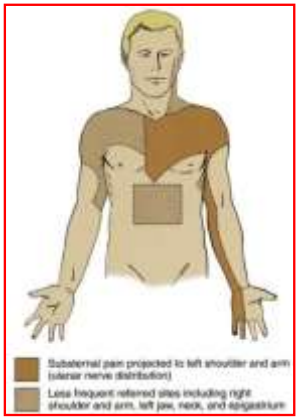
# Cardiac Emergencies

# Angina Pectoris

# Angina Pectoris

## Clinical manifestations

- Substernal, squeezing / burning pain
  - "Heavy weight", "Indigestion"
- Sudden onset with exertion or emotion
- Radiates to shoulder, face, left arm
- Subsides with rest or nitroglycerin




# Angina Pectoris

## Precipitating Factors

- Physical activity
- Hot, humid room
- Cold weather
- Large meals
- Emotional stress
- Caffeine ingestion
- Fever, anemia
- Cigarette smoking
- Smog
- High altitudes

# Angina Pectoris

Anxiety, fear, pain

↓

Release of catecholamines (EPI)

↓

Increases BP, heart rate, contraction

↓

 Increases myocardial oxygen demand 

↓

Myocardial ischemia

↓

Chest Pain

# Angina Pectoris Management

## Is this your typical angina?

- Location
- Radiation
- Severity of pain
- Other symptoms
- Response to NTG

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## Angina Pectoris Management

Position patient comfortably (upright)

BLS as needed, monitor vital signs

History of angina pectoris ? Typical Symptoms ?

YES ⟷ NO

Activate EMS

Nitroglycerin 0.4mg SL

Administer oxygen, monitor VS

Repeat NTG q3-5' , Total 3 doses

Discharge ← Pain Resolves → Hospital

**If no response in 3 doses, Tx as MI**

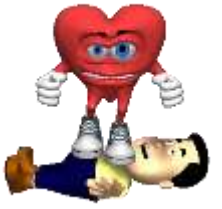
## Nitroglycerin Contraindication

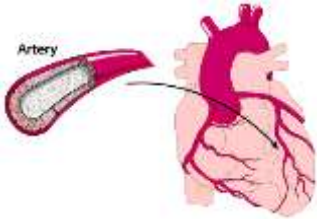
## Nitroglycerin Contraindication


Nitroglycerin is contraindicated in patients with hypotension (SBP < 90 mmHg), significant bradycardia (< 50 BPM), right ventricular ( RV MI) infarction, or those who have recently taken a phosphodiesterase inhibitor such as Viagra, Cialis or Levitra.

## Cardiac Emergencies

# Myocardial Infarction



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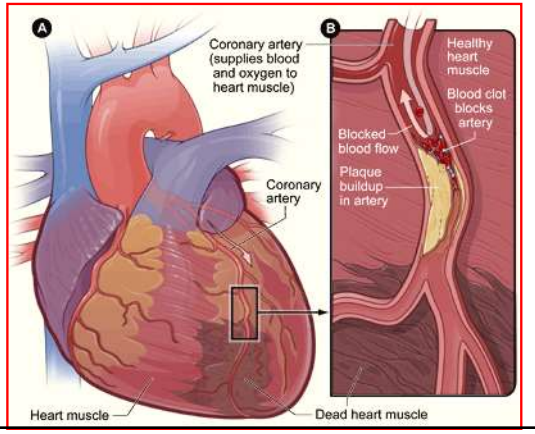
# Myocardial Infarction

## Etiology of Myocardial Infarction




# Myocardial Infarction

## Clinical manifestations

- Retrosternal severe pain
  - "Crushing", "choking"
- Usually > 30 minutes
- Radiates as angina
- N/V, palpitations, SOB
- "Impending doom"


From: **Symptom Presentation of Women With Acute Coronary Syndromes: Myth vs Reality**
Arch Intern Med. 2007;167(22):2405-2413. doi:10.1001/archinte.167.22.2405

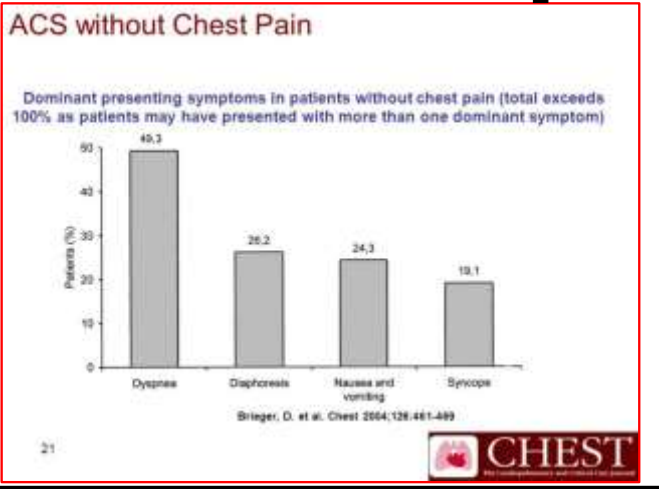
**Table 1. Acute Coronary Syndrome Presentation Without Chest Pain or Discomfort According to Sex—Summary of Studies From Large Cohorts**

| Source | Study Description | Patient Population | Study Years | Sample Size | Mean Age, y | Age Adjusted | Race Adjusted | Proportion Without Chest Pain, % | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Men | Women | All |
| Brieger et al[19] 2004 | GRACE Registry | ACS | 1999-2002 | 20 881 | 65.0 | Yes | No | 7.3 | 10.6 | 8.4 |
| Canto et al[7] 2000 | National MI Registry | MI | 1994-1999 | 434 877 | 69.3 | Yes | Yes | 28.8 | 30.8 | 32.7 |
| Canto et al[20] 2002 | Alabama UA Registry | UA | 1993-1999 | 4157 | 72.3 | Yes | Yes | 50.8 | 53.8 | 51.7 |
| Cuk et al[21] 2002 | CCUs Croatia | MI | 1990-1995 | 1996 | 58.8 | Yes | No | 12.4 | 20.3 | 14.8 |
| Dorosh et al[7] 2001 | United Kingdom | MI | 1995 | 2096 | 70.6 | Yes | No | 17.6 | 24.6 | 20.1 |
| Goldberg et al[22] 1996 | Worcester MI Study | MI | 1986-1988 | 1380 | 67.7 | Yes | No | 19.0 | 23.0 | 20.0 |
| Milner et al[23] 2004 | Worcester MI Study | MI | 1997-1999 | 2073 | 70.2 | Yes | No | 30.9 | 45.8 | 37.3 |
| Roger et al[24] 2000 | Olmsted County, Minnesota | UA | 1985-1992 | 2271 | 63.0 | Yes | No | 25.0 | 19.0 | 22.0 |
| Stern et al[25] 2004 | 26 Hospitals, CCU, Israel | ACS | 2000 | 2113 | 64.9 | Yes | No | 19.7 | 23.7 | 21.7 |
| Cumulative | | | | | | | | 37.4 (76 038 of 276 693) | 37.5 (73 003 of 194 797) | 31.8 (149 038 of 471 730) |

Abbreviations: ACS, acute coronary syndrome; CCU, coronary care unit; MI, myocardial infarction; UA, unstable angina.

**Acute Coronary Syndrome Presentation Without Chest Pain or Discomfort According to Sex—Summary of Studies From Large Cohorts**

# ACS without chest pain




# Myocardial Infarction

**Assume MI, not angina, if:**

- New onset chest pain
- Change in previous angina pain
  - More severe, different location
- Pain unrelieved by rest or NTG

# Myocardial Infarction Management

Position comfortably

BLS, oxygen, NTG X 3 doses as in angina

** If no response or if pain resolves, but returns **

Activate EMS

Administer fibrinolytics (ASA)

Monitor vital signs

Manage pain - narcotics
Morphine 2-15mg IV q15 minutes
Nitrous oxide is option

Transport to hospital - - ACLS


23% mortality reduction

*ISIS-2 study*

# Myocardial Infarction Management


# Time is Muscle

# Cardiac Emergencies

# Cardiac Arrest


# Cardiac Arrest

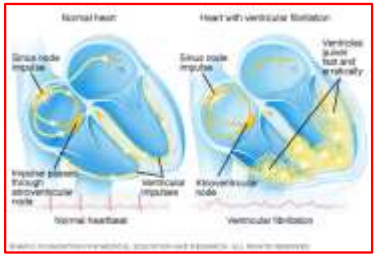
## Possible causes

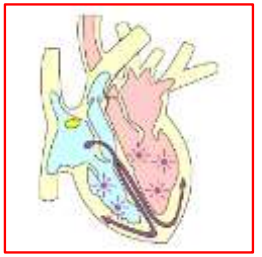
- Myocardial infarction
- Sudden cardiac death
- Airway obstruction
- Drug overdose reaction
- Anaphylaxis
- Seizure disorder
- Acute adrenal insufficiency

# Cardiac Arrest

## Ventricular Fibrillation

**About 90% of cardiac arrests**

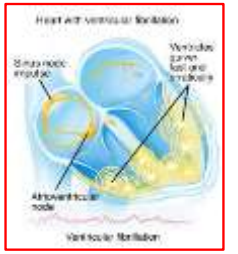


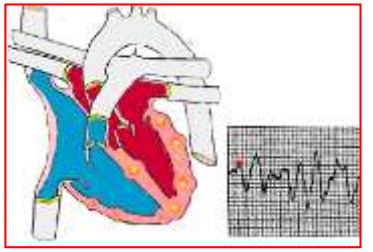


# Cardiac Arrest

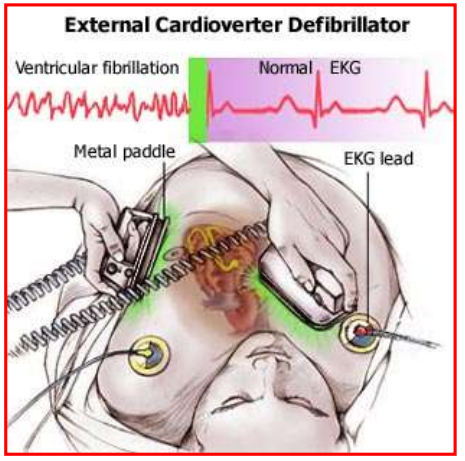
## Ventricular Fibrillation

**About 90% of cardiac arrests**





# Cardiac Arrest



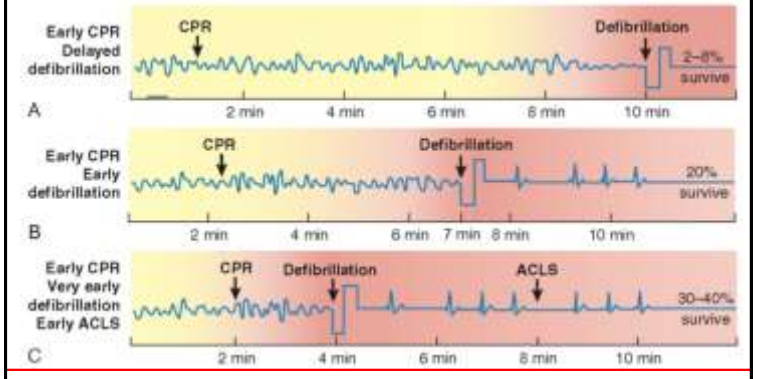

# Efficacy of Defibrillation

Conversion of Ventricular Fibrillation to normal rhythm

| Time in Ventricular Fibrillation | Success of Defibrillation |
|---|---|
| Less than one minute | 90% |
| One to two minutes | 80% |
| Each add'l minute | Decreases 10% |

# Efficacy of Defibrillation

Conversion of Ventricular Fibrillation to normal rhythm




Source: American Heart Association

# Automated External Defibrillator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September 25, 2017

# AED Instructions

Instructions for operation – two steps

Step one

- ✓ Patient is unconscious
- ✓ Patient is not breathing
- ✓ Patient is pulseless

Step two

- ✓ Apply defibrillator pads
- ✓ Follow verbal instructions

# BLS – The Primary Survey

## First C – A – B - D

- Circulation
  - Give chest compressions
- Airway
  - Open the airway
- Breathing
  - Provide positive-pressure ventilation
- Defibrillation
  - Shock ventricular fibrillation

# Drug-Related Emergencies

# Allergic Reactions

# Allergic Reactions

## Common Dental Allergens

- Antibiotics
  - Penicillin
  - Cephalosporins
  - Tetracyclines
- Analgesics
  - Aspirin-compounds
  - Nonsteroidals
- Opioids
  - Meperdine
  - Codeine
- Antianxiety agents
  - Barbiturates
- Local anesthetics
  - Esters: Benzocaine
  - Sodium bisulfite
  - Methylparaben
- Others
  - Acrylic monomer
  - Latex

# Allergic Reactions

Allergen

↓

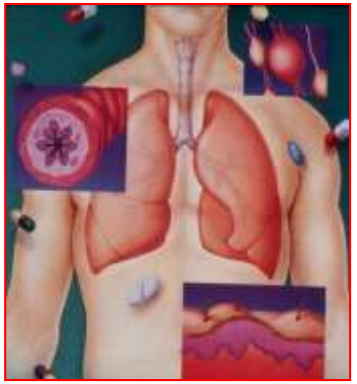
Mast cells & Basophils

↓

Histamine
Leukotreines
ECF – Anaphylaxis
Kallikreins
Prostaglandins

↓

Allergic phenomenon



# Allergic Reactions - Cutaneous

## Clinical manifestations

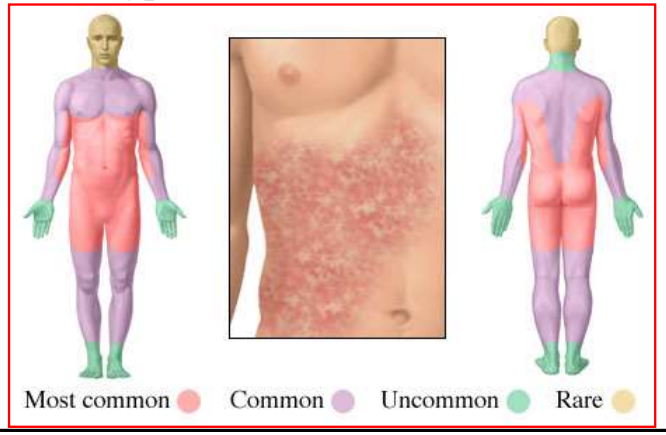
Increased vascular permeability
Vasodilation

↓

Urticaria / Hives
Rash
Pruritis (itching)
Tingling and warmth
Flushing

# Allergic Skin Reactions

Typical Distribution Pattern




# Allergic Reactions - Cutaneous

## Allergic Reactions - Cutaneous

## Allergic Reactions - Respiratory

### Clinical manifestations

Increased vascular permeability & vasodilation
Increased exocrine gland secretions
Bronchiole smooth muscle contraction

| Rhinitis | Laryngeal edema | Bronchospasm |
|---|---|---|
| Nasal congestion | Dyspnea | Cough |
| Nasal itching | Hoarseness | Wheezing |
| Rhinorrhea | Throat tightness | Tachypnea |
| | Laryngeal stridor | |

## Allergic Reactions - Respiratory

### Bronchospasm

Cough
Wheezing
Tachypnea

## Allergic Reactions - Cardiovascular

### Clinical manifestations

Increased vascular permeability & vasodilation
Decreased cardiac output
Loss of vasomotor tone

| Circulatory collapse | Dysrhythmias | Cardiac arrest |
|---|---|---|
| Light-headed | Light-headedness | Pulselessness |
| Weakness | Weakness | EKG changes |
| Syncope | Palpitations | Vent fibrillation |
| Ischemic chest pain | Ischemic chest pain | Asystole |

# Allergic Reactions

**Predictors of severity of the reaction**

**Rapidity of onset**

**of signs and symptoms**

**Rapidity of progression**

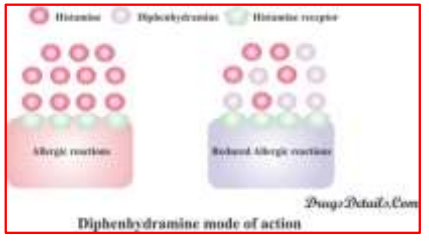
**of signs and symptoms**

# Tx Allergic Reactions

**Epinephrine**


**Diphenhydramine**

# Tx Allergic Reactions

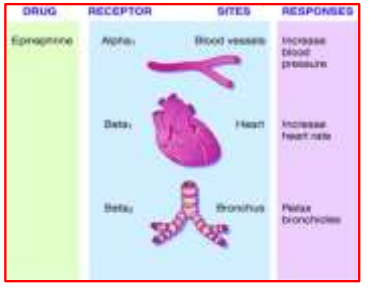

**Diphenhydramine**

- Antagonizes histamine, preventing progression of the allergic reaction

# Tx Allergic Reactions

**Epinephrine**

- Reverses the pathologic processes causing the allergic reaction



## Delayed-Onset Allergic Skin Rxn Management

Onset skin reaction (> 1 hour) from allergen

Position patient comfortably

Assess and perform BLS as needed

Definitive care

Increasingly severe symptoms

- Observe patient
- Administer oral histamine blocker prn Benadryl 50mg oral
- Administer IM + oral histamine blocker q4-6h Benadryl 50mg IV or IM Benadryl orally X 2-3 days (25 – 50mg qid)

## Rapid-Onset Allergic Skin Rxn Management

Onset skin reaction (< 1 hour) from allergen

Position patient comfortably

Assess and perform BLS as needed

Definitive care

Cardiac or respiratory involvement ?

NO

- Benadryl 50mg oral / IM
- Discharge

YES

- Oxygen, start IV
- Epinephrine 0.3mg SQ, IM, IV
- Activate EMS
- Benadryl 50mg IV or IM
- Hospital

## Tx Respiratory Allergic Rxn

Position patient comfortably

Assess and perform BLS as needed

Calm patient

Activate EMS

Administer Epinephrine 0.3mg q 15-30 min SC, IM, IV, inhaler

Benadryl 50mg IM

Discharge or hospitalize

## Allergic Reactions

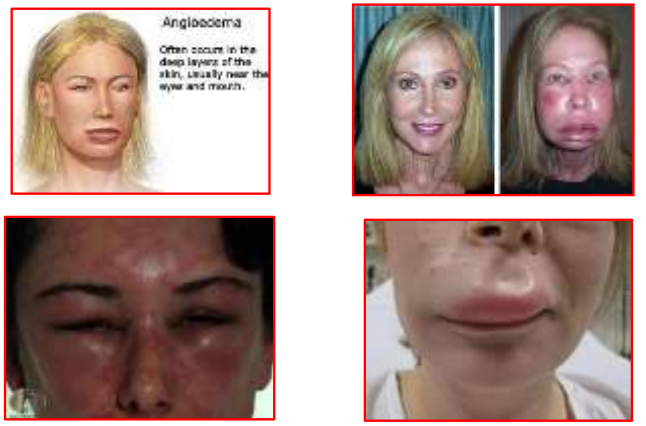
# Angioedema

Steven W. Beadnell, DMD
Gum Gardner's RDH Study Club
September 25, 2017

# Angioedema

A noninflammatory, nonpruitic edema involving the skin, subcutaneous tissue, underlying muscle, and mucus membranes, especially those of the GI and upper respiratory tracts.

# Angioedema




# Angioedema

Three types of angioedema:

Allergic angioedema

Hereditary angioedema

Idiopathic angioedema

# Angioedema

Exposure to trigger

⇓

Faulty or deficient C1-INH

⇓

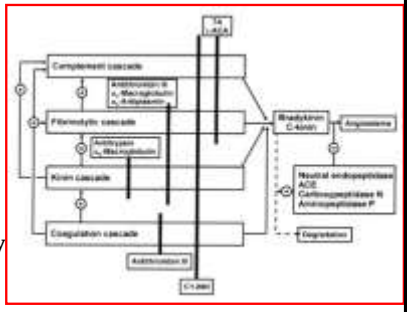
Increased Bradykinin levels

⇓

Increased vascular permeability

⇓

Mucosal edema



# Angioedema

- Deficiency or Defect in C1-INH
  - Inherited or acquired defect
- High association with dental office triggers
  - Latex, other office materials
- Other known triggers
  - ACE inhibitors
  - Other drugs: Abx, NSAIDs, ASA
  - Environmental

# Allergic Angioedema

## Allergic angioedema symptoms include:

- Marked skin swelling:
  - Eyes, mouth, hands, feet, throat
  - Usually does not itch, may burn or be painful
  - May be asymmetric



# Allergic Angioedema

## Allergic angioedema symptoms include:

- Marked skin swelling:
  - Eyes, mouth, hands, feet, throat
  - Usually does not itch, may burn or be painful
  - May be asymmetric
- Abdominal pain or cramping – swollen mucosa
- Hives possibly present
- Laryngeal edema, hoarseness

# Angioedema Management

Remove trigger

↓

Secure Airway

↓

Transfer to hospital

↓

Medical ICU

Medications include:
Antihistamines (Benadryl)
Adrenalin (Epinephrine)
Terbutaline (Bronchodilator)
Cimetidine (Tagamet)
Corticosteroids
Sedatives
Tranquilizers

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