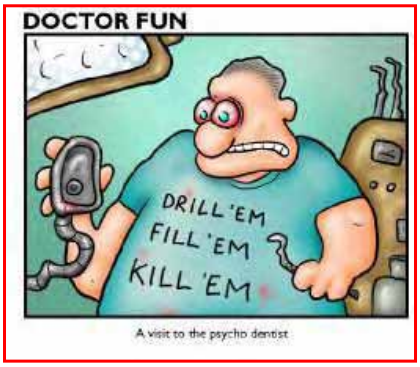
Respiratory Emergencies

Hyperventilation

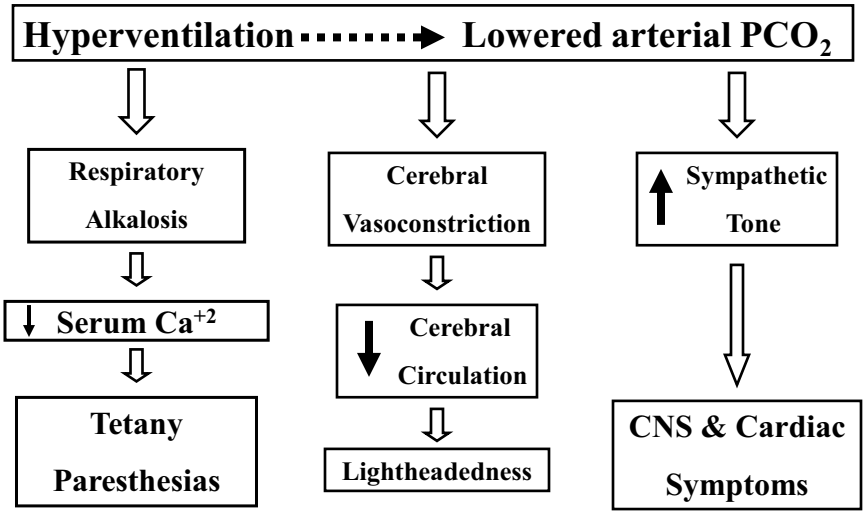
Steven W. Beadnell, DMD
Gum Gardners Study Club September 2014

Hyperventilation

High Anxiety

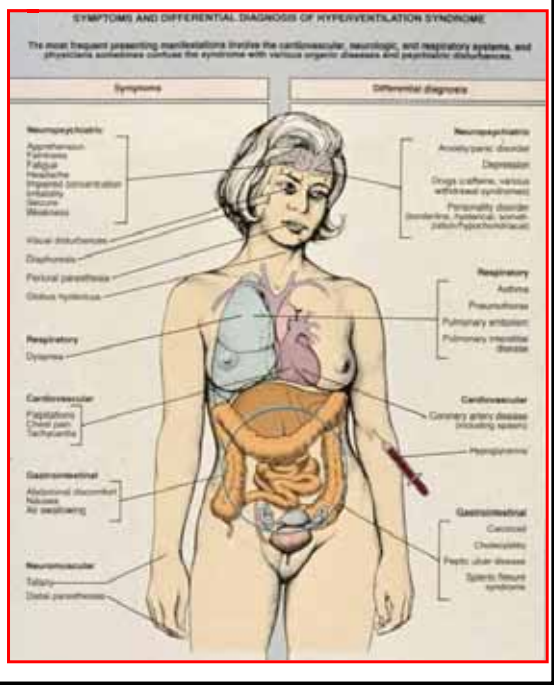


Hyperventilation - Pathophysiology



Hyperventilation
Clinical Manifestations

- Anxious patient
- Shortness of breath
- Palpitations
- Tachycardia
- Lightheadedness
- Circumoral paresthesia
- Carpopedal tetany



Hyperventilation - Management

Position patient comfortably (upright)

↓

C – A – B – BLS as needed

↓

Remove dental materials from patient's mouth
Calm patient
Correct respiratory alkalosis

↓

Drug management if needed – Versed, Valium

↓

Complete treatment, discharge

Respiratory Emergencies

Asthma

Asthma

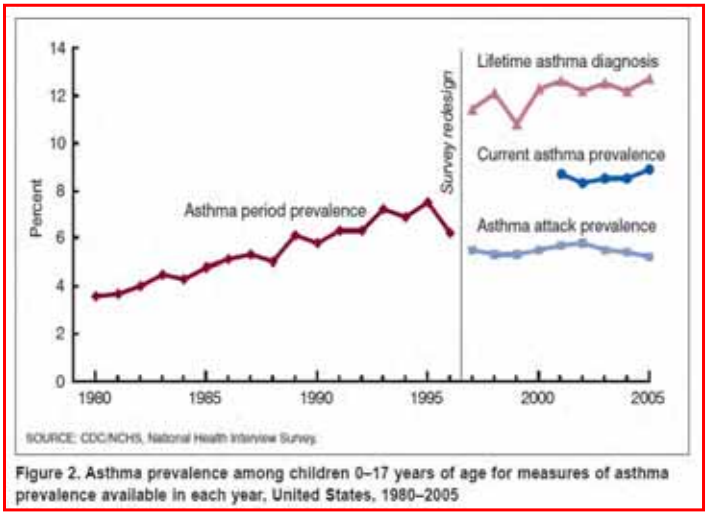


Figure 2. Asthma prevalence among children 0–17 years of age for measures of asthma prevalence available in each year, United States, 1980–2005

The State of Childhood Asthma, United States, 1980–2005 , December 2006
CDC – National Center for Health Statistics

Asthma - Pathophysiology

Hyperactivity of tracheobronchial tree

↓

Bronchial smooth muscle contraction
Bronchial wall edema
Mucus hypersecretion

↓

Narrowed airways

↓

Wheezing
Shortness of breath
Coughing

Asthma

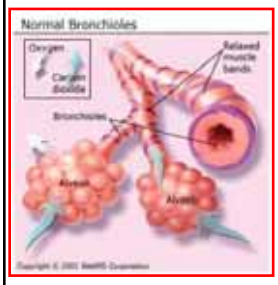
Asthma - Pathophysiology

Hyperactivity of tracheobronchial tree

↓

Bronchial smooth muscle contraction
Bronchial wall edema
Mucus hypersecretion

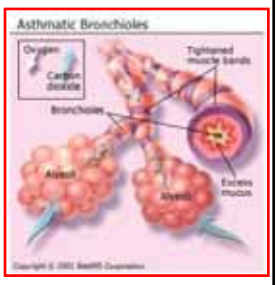
↓



Narrowed airways

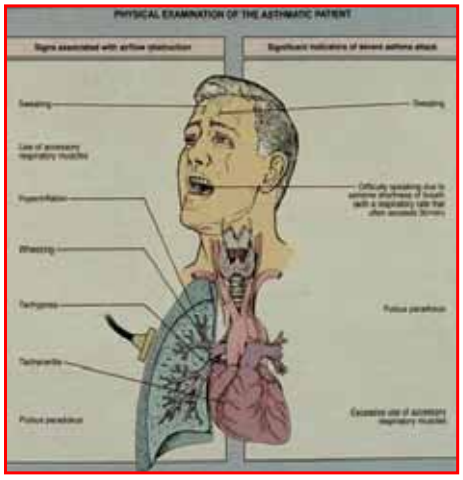
↓

Wheezing
Shortness of breath
Coughing



Asthma - Signs & Symptoms

- Chest congestion/tightness
- Cough, wheezing, SOB
- Anxiety or agitation
- Increased respiratory rate
- Increased heart rate
- Pt wants to sit or stand up
- Use of accessory muscles



Asthma

Indicators of a Severe Attack

- SaO_2 (pulse oximeter) is below 91%
- Bronchodilator doesn't improve Sx after two treatments
- Patient has difficulty speaking
  - Sentences < phrases < words < mute
- Patient is struggling for air

Asthma Management

Position patient comfortably (upright)

↓

C - A – B –BLS as needed

↓

Administer bronchodilator via inhalation
(Alubuterol inhaler)

(Episode terminates)

↓

Complete dental treatment

↓

Discharge patient

(Episode continues)

↓

Administer oxygen, call EMS

↓

Epinephrine 0.3mg SQ or IM

↓

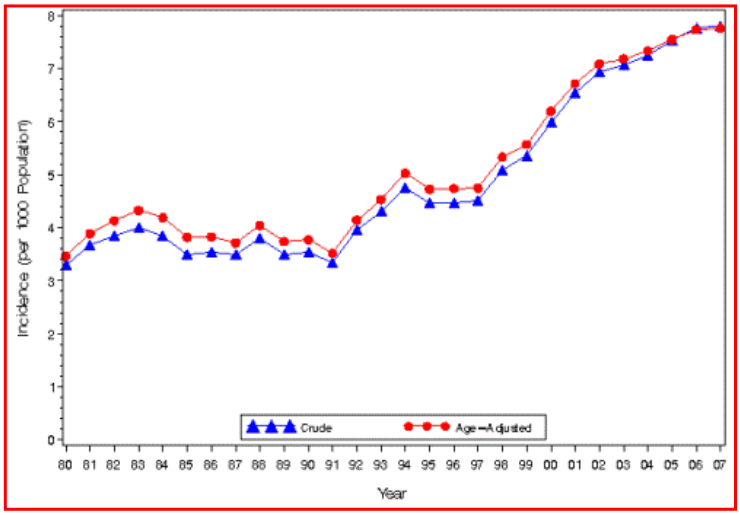
Discharge or hospital

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 , Feb 2009

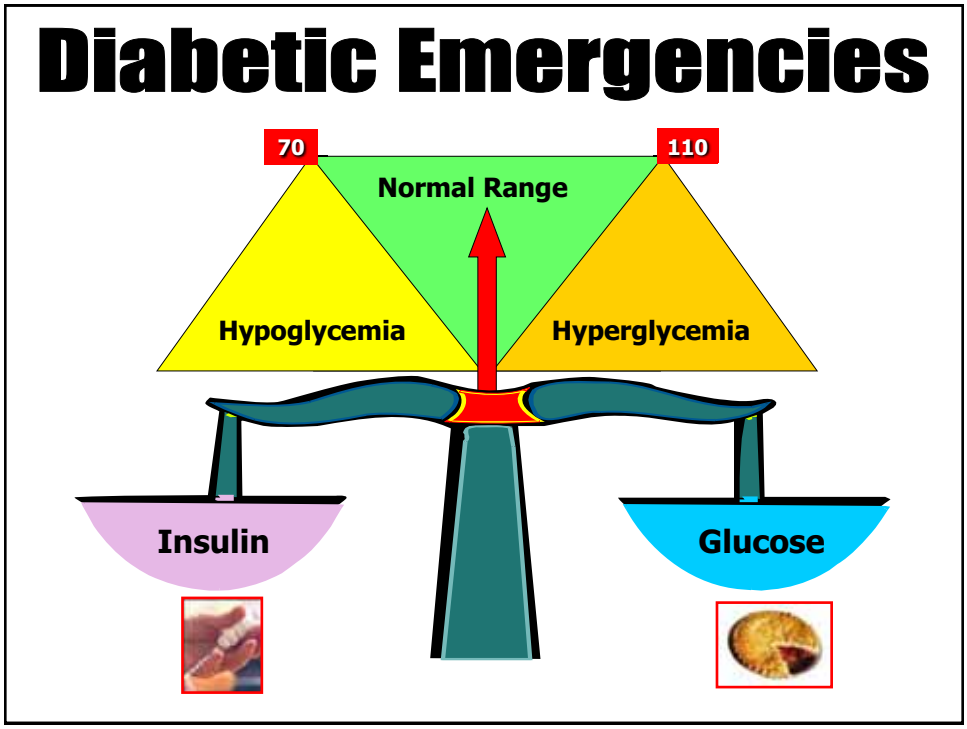
Diabetes Classification

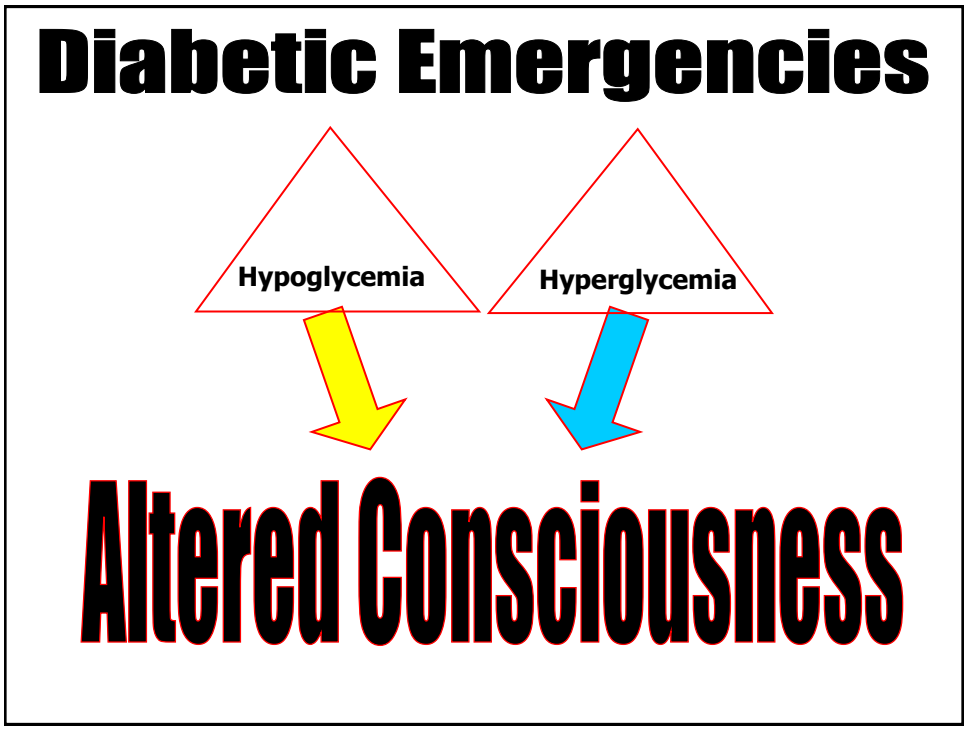
- Type 1
  - Absolute insulin deficiency, usually autoimmune process – 8%

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
70
110
Normal Range
Hypoglycemia
Hyperglycemia
Insulin
Glucose


Diabetic Emergencies
Hypoglycemia
Hyperglycemia
Altered Consciousness

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

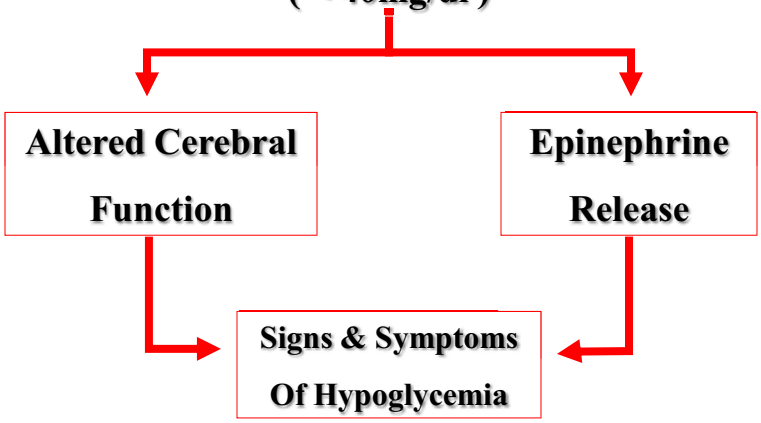
HYPOGLYCEMIC

until proven otherwise.

Insulin Shock

Hypoglycemia

(< 40mg/dl)



Insulin Shock

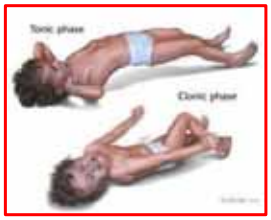
Hypoglycemia – Early manifestations

- 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



Insulin Shock - Management

* * Conscious Patient * *

Position patient comfortably

↓

C - A – B – BLS as needed

↓

Administer oral carbohydrate (InstaGlucose)

↓

(Episode terminates)

↓

Observe one hour

↓

Discharge patient, escort?

(Episode continues)

↓

Activate EMS

↓

Glucagon 1mg IM or IV

Dextrose 50% 50ml IV

↓

Discharge or hospital ?

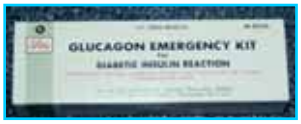
Insulin Shock - Management

* * 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

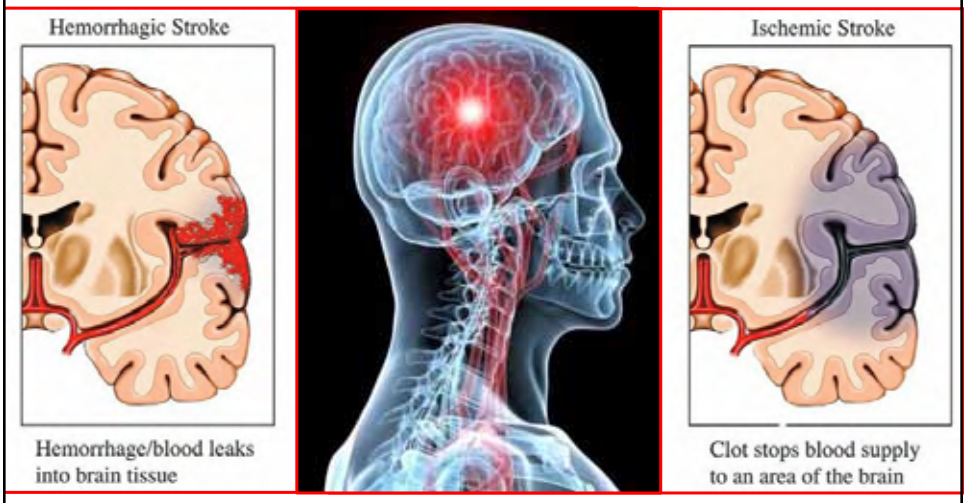
Altered Consciousness

Cerebrovascular Accident

(Acute Stroke)

Cerebrovascular Accident

CVA Classification



Cerebrovascular Accident

CVA Classification

Transient Ischemic Attack (TIA)

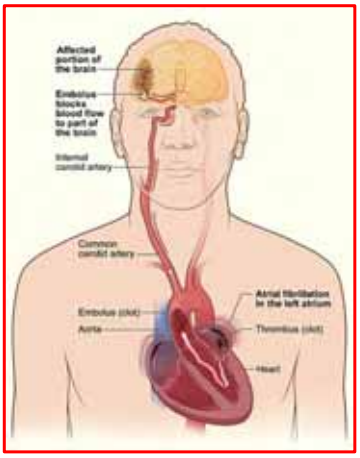
- Focal ischemic neurologic deficits that last < 24 hrs, usually resolve in 2 - 10 minutes
- Indicates cerebrovascular disease

"Angina of the Brain"

Cerebrovascular Accident

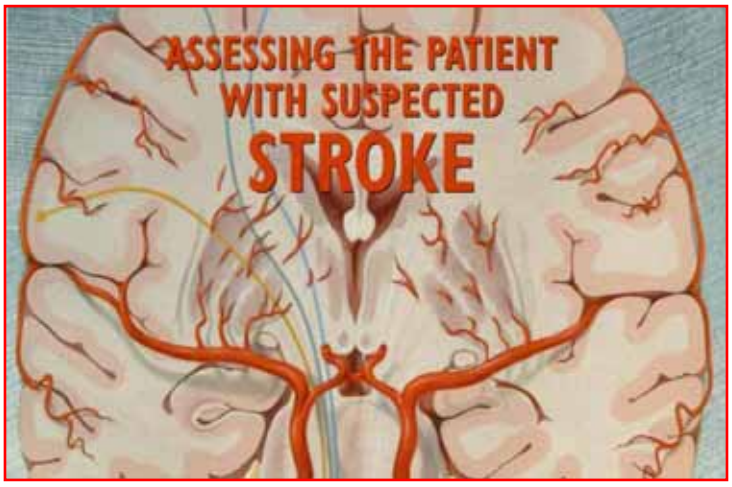
Associated Risk Factors

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



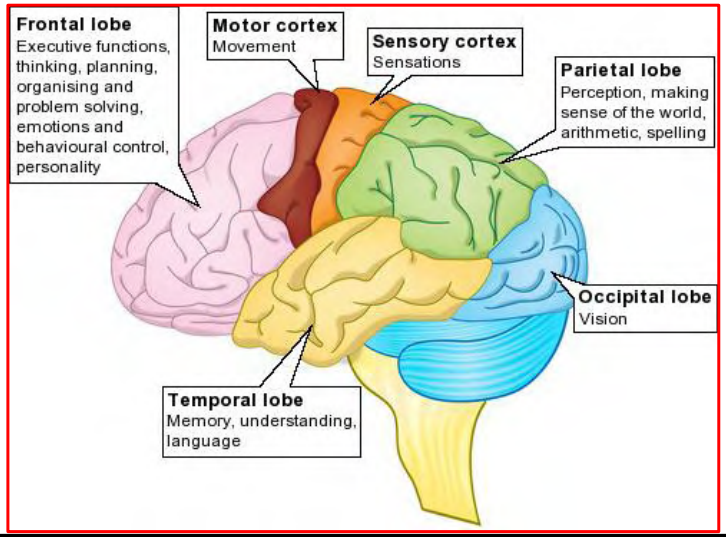
Cerebrovascular Accident

CVA or TIA Diagnostic Clues



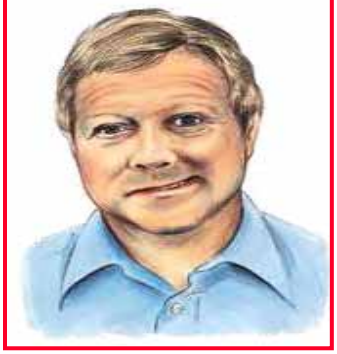
Cerebrovascular Accident

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

CVA or TIA Diagnostic Clues

Face
Smile - is one side drooping?

Arms
Raise both arms - is one side weak?

Speech
Speak - unable to? Words jumbled, slurred?

Time
Act fast and call 111
Time lost may mean brain lost.

CVA or TIA Management

Position patient comfortably

↓

C – A – B – BLS as needed

↓

Monitor vital signs

Activate EMS

↓

Administer oxygen

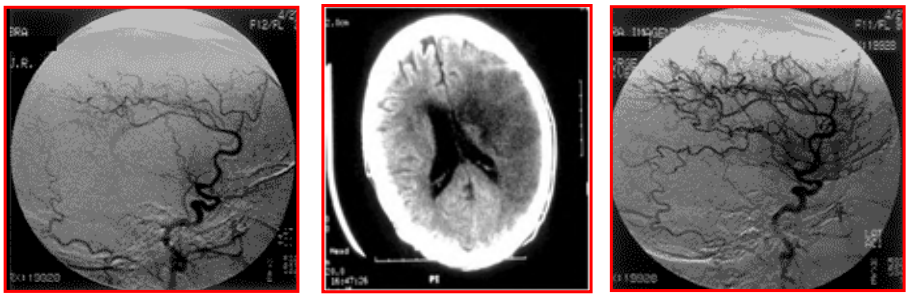
Elevate head if BP elevated

↓

ASA Stroke Protocols

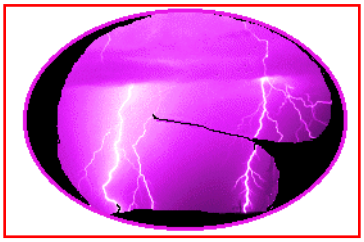
CVA or TIA Management

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


Steven W. Beadnell, D.M.D., P.C.
Practice Limited to
Oral and Maxillofacial Surgery

Name Ima Nervous Date 2/28/01

Address Phone

DOB

Rx: Ativan 2mg tablet

Disp: One (1)

Sig: One p.o. 1 hr prior to dental appt

Refills 0 Steven W. Beadnell, D.M.D.

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

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

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

Seizure Don'ts

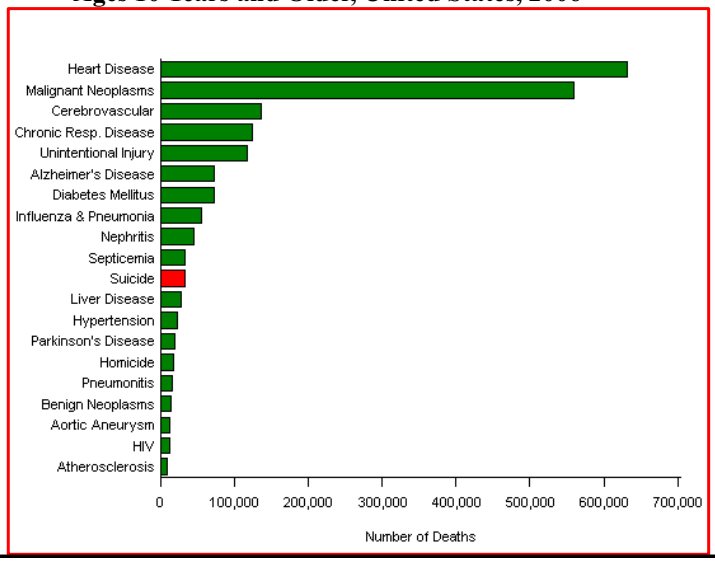
Potentially Dangerous Responses to Seizure

- Don't restrain person
- Don't put anything in the person's mouth
- Don't try to hold down or restrain the person
- Don't attempt to give oral antiseizure medication
- Don't keep the person on their back face up

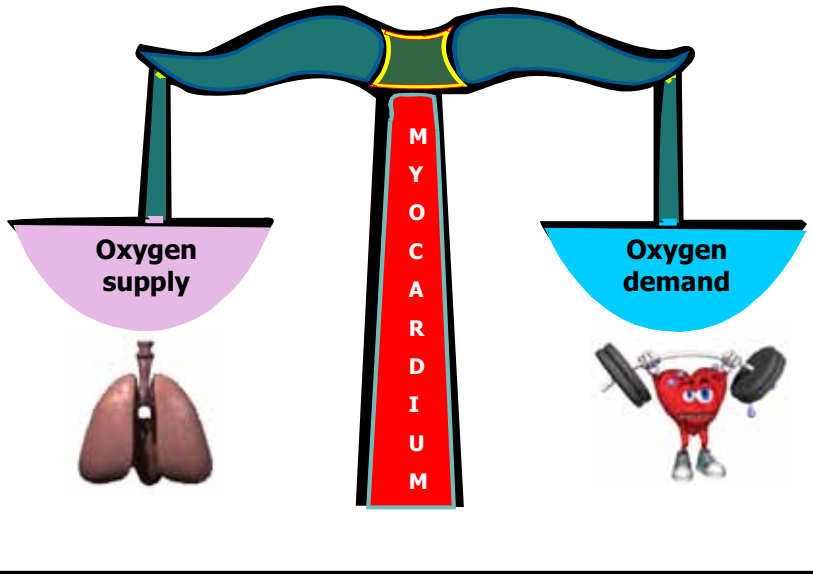
Cardiac Emergencies

U.S. Causes of Death 2006

Twenty Leading Causes of Death Among Persons
Ages 10 Years and Older, United States, 2006



Ischemic Heart Disease



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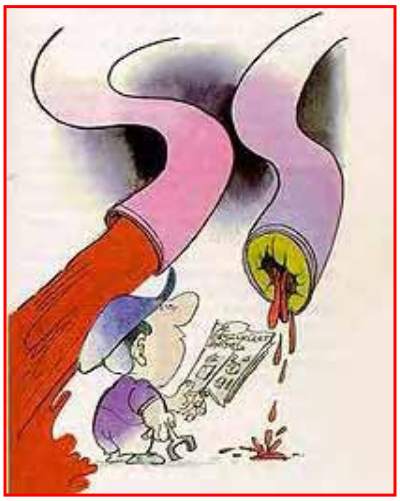
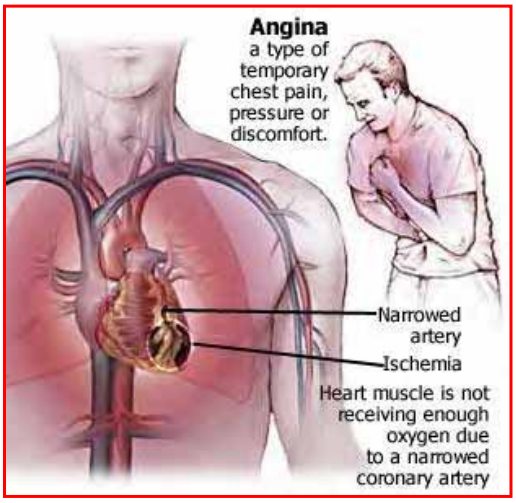
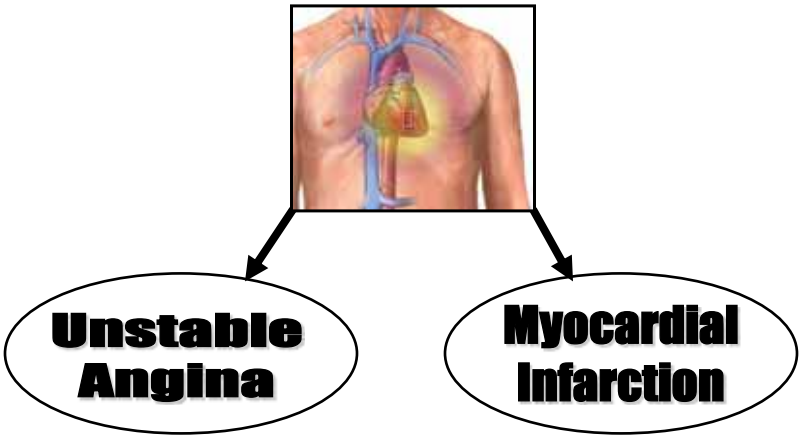




Chest Pain

Acute Coronary Syndrome



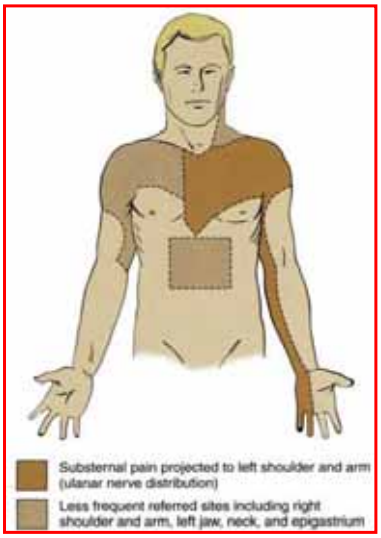
Cardiac Emergencies

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

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

Preventing Angina

Give 3-5' before local anesthetic injections

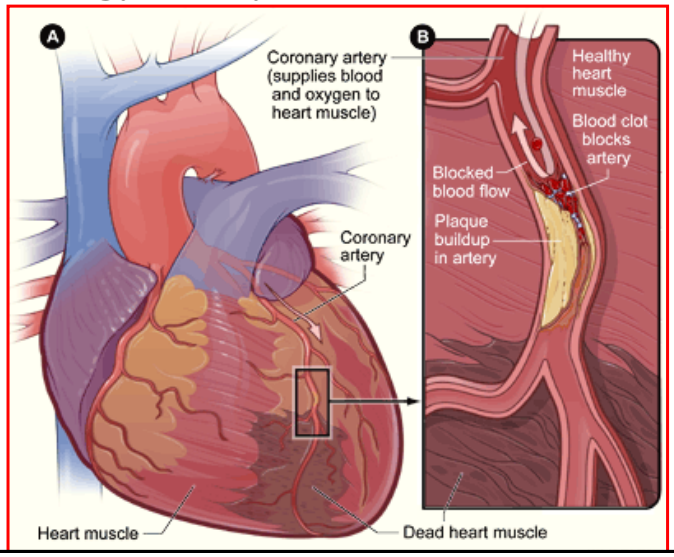
Nitroglycerin Contraindication

Cardiac Emergencies

Myocardial Infarction

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

	Study Characteristic							Proportion Without Chest Pain, %		
Source	Study Description	Patient Population	Study Years	Sample Size	Mean Age, y	Age Adjusted	Race Adjusted	Men	Women	All
Brieger et al,[37] 2004	GRACE Registry	ACS	1999-2002	20 881	65.8	Yes	No	7.3	10.6	8.4
Canto et al,[3] 2000	National MI Registry	MI	1994-1998	434 877	69.3	Yes	Yes	28.6	38.6	32.7
Canto et al,[38] 2002	Alabama UA Registry	UA	1993-1999	4167	72.3	Yes	Yes	50.2	53.0	51.7
Culi et al,[39] 2002	CCUs Croatia	MI	1990-1995	1996	58.8	Yes	No	12.4	20.3	14.8
Dorsch et al,[7] 2001	United Kingdom	MI	1995	2096	70.6	Yes	No	17.6	24.6	20.1
Goldberg et al,[40] 1998	Worcester MI Study	MI	1986-1988	1360	67.7	Yes	No	18.0	23.0	20.0
Milner et al,[41] 2004	Worcester MI Study	MI	1997-1999	2073	70.2	Yes	No	30.9	45.8	37.3
Roger et al,[42] 2000	Olmsted County, Minnesota	UA	1985-1992	2271	63.0	Yes	No	25.0	19.0	22.0
Stern et al,[43] 2004	26 Hospitals, CCU, Israel	ACS	2000	2113	64.9	Yes	No	18.7	29.7	21.7
Cumulative	...	...	...	...	...	...	...	27.4 (76 036 of 276 933)	37.5 (73 003 of 194 797)	31.6 (149 039 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

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)

23% mortality reduction

ISIS-2 study

Monitor vital signs

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

Transport to hospital - - ACLS

Myocardial Infarction Management

Time is Muscle

Cardiac Emergencies

Cardiac Arrest

Cardiac Arrest

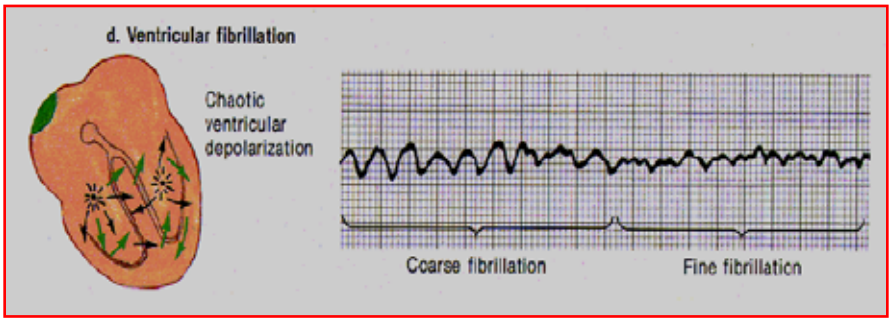
Possible causes

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

Cardiac Arrest

Ventricular Fibrillation

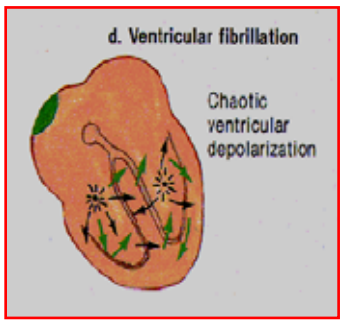
About 90% of cardiac arrests

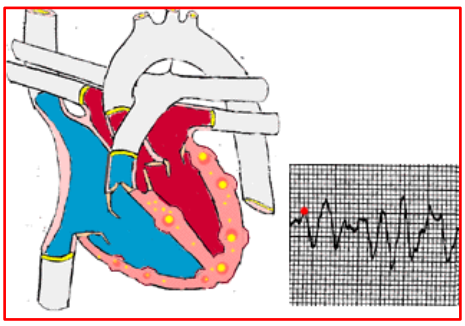


Cardiac Arrest

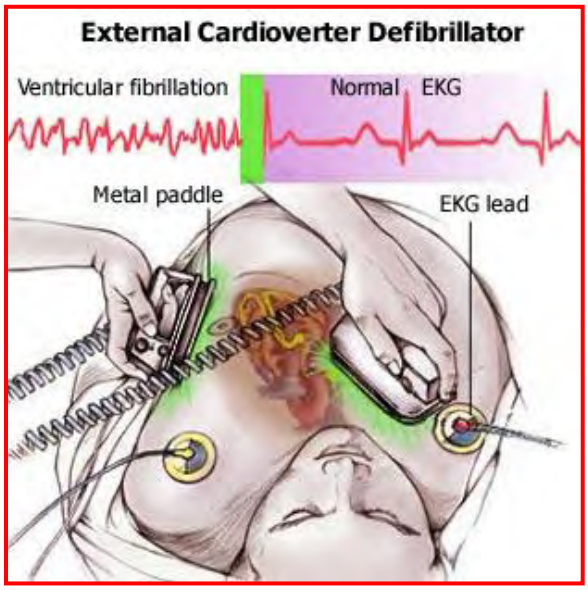
Ventricular Fibrillation

About 90% of cardiac arrests





Cardiac Arrest



Efficacy of Debibrillation

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%

Automated External Defibrillator


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

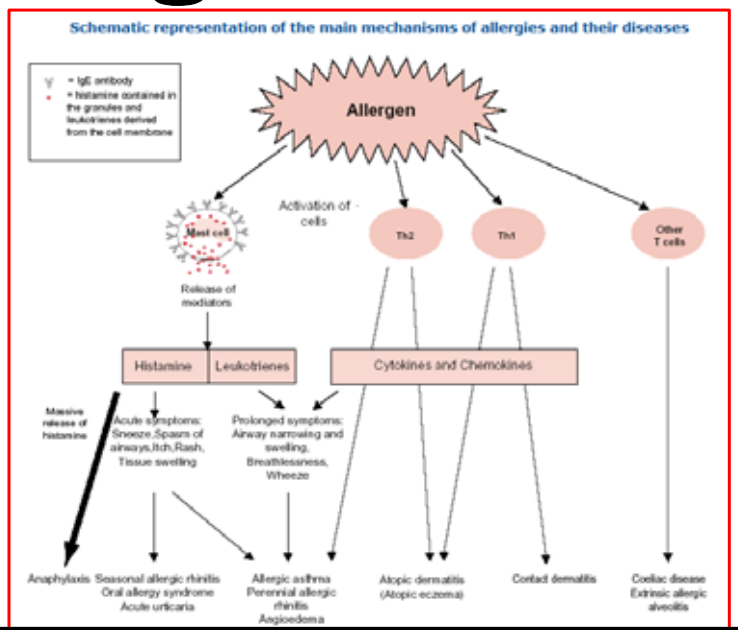
Allergic Reactions

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



Allergic Reactions

Allergen

↓

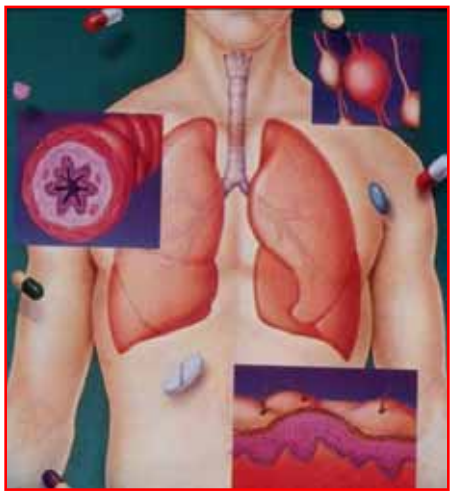
Mast cells & Basophils

↓

Histamine
Leukotreines
ECF – Anaphylaxis
Kallikreins
Prostaglandins

↓

Allergic phenomenon



Allergic Reactions - Cutaneous

Clinical manifestations

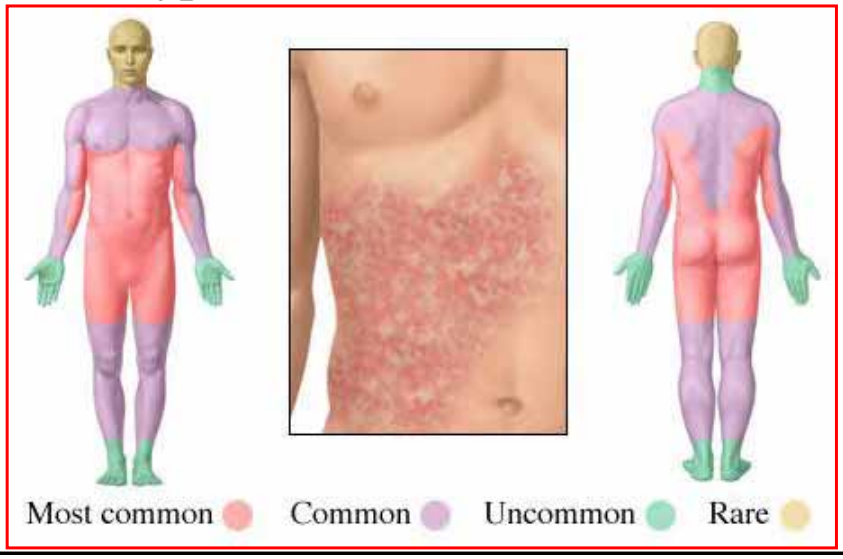
Increased vascular permeability
Vasodilation

↓

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

- Reverses the pathologic processes causing the allergic reaction

Diphenhydramine

- Antagonizes histamine, preventing progression of 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

What is it ?

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

⇩

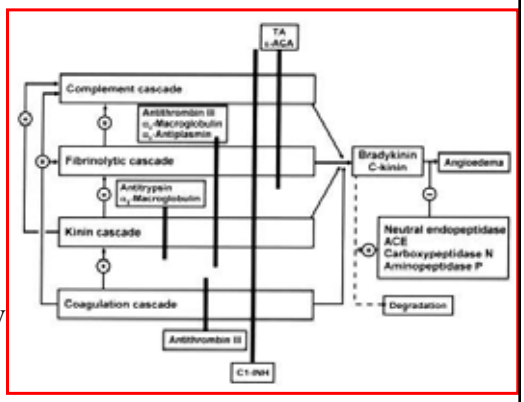
Increased Bradykinin levels

⇩

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

Activate EMS