The Five Deadly Misconceptions

- A medical emergency will not happen to me.
- A medical emergency will not happen in my office.
- Calling EMS/9-1-1 is the answer.
- My staff and I will not panic during a medical emergency.
- CPR is all we need to know.

The Six Links of Survival:

1. Doctor training
2. Staff training
3. Medical emergency plan
4. Emergency drug kit
5. Proper equipment
6. Mock drills

The Six Links of Survival are imperative for every office when confronted with the issue of being prepared for medical emergencies. Any missing link will cause a decrease in the survivability of the patient.

Medical Emergencies

Basic Principles

Preparation
Recognition
Management
Satisfactory Outcome

The average response time for medical emergency services (EMS) to respond to a 911 call can be 11 minutes in an urban setting and 15 minutes in a rural setting.
Medical Emergencies Update 2017

Medically Complicated Patient

- Cardiac Disease
- Diabetes Mellitus
- Renal Dialysis
- Organ Transplants
- Immune Disorders
- Liver Failure
- Anticoagulated Pt

Here comes the Baby Boomers

2014 => 14.5% U.S. Population > 65y/o
(with life expectancy of 19.3yr)

A Pill Cures All

---

Steven W. Beadnell, DMD
Oregon Dental Conference
April 2017
Medical Emergencies Update 2017

A Pill Cures All

Total number of retail prescriptions filled annually in the United States from 2013 to 2021 (in billions)*

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Prescriptions Filled in Billions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>3.99</td>
</tr>
<tr>
<td>2014</td>
<td>4.08</td>
</tr>
<tr>
<td>2015</td>
<td>4.17</td>
</tr>
<tr>
<td>2016</td>
<td>4.27</td>
</tr>
<tr>
<td>2017</td>
<td>4.36</td>
</tr>
<tr>
<td>2018</td>
<td>4.47</td>
</tr>
<tr>
<td>2019</td>
<td>4.57</td>
</tr>
<tr>
<td>2020</td>
<td>4.67</td>
</tr>
<tr>
<td>2021</td>
<td>4.78</td>
</tr>
</tbody>
</table>

Source: Trifla.com

A Pill Cures All

<table>
<thead>
<tr>
<th>Age</th>
<th>Per Capita Rx</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 18 yrs</td>
<td>4.1</td>
</tr>
<tr>
<td>19 – 64 yrs</td>
<td>12.6</td>
</tr>
<tr>
<td>&gt; 65 yrs</td>
<td>27.9</td>
</tr>
</tbody>
</table>

Medical Emergencies

What's happening?
When's it happening?
What's causing it to happen?

<table>
<thead>
<tr>
<th>Emergency</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syncope</td>
<td>15,407(50.3%)</td>
<td>331(1.1%)</td>
</tr>
<tr>
<td>Mild allergy</td>
<td>2,583(8.4%)</td>
<td>304(1.0%)</td>
</tr>
<tr>
<td>Angina Pectoris</td>
<td>2,552(8.3%)</td>
<td>289(0.9%)</td>
</tr>
<tr>
<td>Postural hypotension</td>
<td>2,475(8.1%)</td>
<td>204(0.7%)</td>
</tr>
<tr>
<td>Seizure</td>
<td>1,595(5.2%)</td>
<td>141(0.5%)</td>
</tr>
<tr>
<td>Asthmatic attack</td>
<td>1,392(4.5%)</td>
<td>109(0.4%)</td>
</tr>
<tr>
<td>Hyperventilation</td>
<td>1,326(4.3%)</td>
<td>68(0.2%)</td>
</tr>
<tr>
<td>Epinephrine Rxn</td>
<td>913(3.0%)</td>
<td>25(0.09%)</td>
</tr>
<tr>
<td>Insulin Shock</td>
<td>890(2.9%)</td>
<td>4(0.01%)</td>
</tr>
</tbody>
</table>

Malamed, JADA 1993

Private practice – 30,608 emergencies
### Medical Emergencies Update 2017

#### Table 1-7: Medical emergencies occurring among British dentists in a 12-month period

<table>
<thead>
<tr>
<th>Emergency situation</th>
<th>Percentage of dentists reporting emergency</th>
<th>Number of cases reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vasovagal syncope</td>
<td>63</td>
<td>596</td>
</tr>
<tr>
<td>Angina pectoris</td>
<td>12</td>
<td>53</td>
</tr>
<tr>
<td>Hypoglycaemia</td>
<td>10</td>
<td>54</td>
</tr>
<tr>
<td>Epileptic fit (seizure, convulsion)</td>
<td>10</td>
<td>42</td>
</tr>
<tr>
<td>Choking</td>
<td>5</td>
<td>27</td>
</tr>
<tr>
<td>Asthma</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Cardiac arrest</td>
<td>0.3</td>
<td>1</td>
</tr>
</tbody>
</table>


#### Stage of Treatment

<table>
<thead>
<tr>
<th>Treatment Stage</th>
<th>Occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediately before Tx</td>
<td>1.5%</td>
</tr>
<tr>
<td>During or after local</td>
<td>54.9%</td>
</tr>
<tr>
<td>During treatment</td>
<td>22.0%</td>
</tr>
<tr>
<td>After treatment</td>
<td>15.2%</td>
</tr>
<tr>
<td>After leaves office</td>
<td>5.5%</td>
</tr>
</tbody>
</table>

Malamed, JADA 1993

#### Medical Emergencies

### Treatment being performed

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tooth extraction</td>
<td>38.9%</td>
</tr>
<tr>
<td>Pulp extirpation</td>
<td>26.9%</td>
</tr>
<tr>
<td>Unknown</td>
<td>12.3%</td>
</tr>
<tr>
<td>Other treatment</td>
<td>9.0%</td>
</tr>
<tr>
<td>Preparation</td>
<td>7.3%</td>
</tr>
<tr>
<td>Filling</td>
<td>2.3%</td>
</tr>
<tr>
<td>Incision</td>
<td>1.7%</td>
</tr>
</tbody>
</table>

Malamed, JADA 1993

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April 2017
Basic Emergency Equipment

- Automated External Defibrillator (AED)

www.AEDsuperstore.com

Basic Emergency Drugs

Medical Emergency Drugs

Preparing for medical emergencies, Rosenberg, M., JADA 141:supp:15s-19s, 2010

Preparing for medical emergencies, Rosenberg, M., JADA 141:supp:15s-19s, 2010
## Medical Emergencies Update 2017

### Primary Emergency Drugs - Gotta Have 'Em

<table>
<thead>
<tr>
<th>Category</th>
<th>Drug</th>
<th>Preparation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-allergy</td>
<td>Epinephrine</td>
<td>1:1000 (EpiPen)</td>
</tr>
<tr>
<td>Histamine Blocker</td>
<td>Benadryl</td>
<td>50mg/ml</td>
</tr>
<tr>
<td>Vasodilator</td>
<td>Nitroglycerin</td>
<td>Spray (0.4mg/puff)</td>
</tr>
<tr>
<td>Bronchodilator</td>
<td>Albuterol</td>
<td>Inhaler</td>
</tr>
<tr>
<td>Anti-hypoglycemic</td>
<td>Insta-Glucose</td>
<td>Tube</td>
</tr>
<tr>
<td>Oxygen</td>
<td>Portable</td>
<td>100%</td>
</tr>
<tr>
<td>Antiplatelet</td>
<td>Aspirin (chewable)</td>
<td>81mg tablets</td>
</tr>
</tbody>
</table>

### Prevention

- **Recognition of risk**

### Medical History

- Past Medical History
- Review of Systems
- Current Medications
- Past Hospitalizations
- Medication Allergies

---

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April 2017
Blood Pressure Classification for Adults

<table>
<thead>
<tr>
<th>Blood Pressure Classification</th>
<th>Systolic BP (mmHg)</th>
<th>Diastolic BP (mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt; 120</td>
<td>&lt; 80</td>
</tr>
<tr>
<td>Pre-Hypertension</td>
<td>120 – 139</td>
<td>80 – 89</td>
</tr>
<tr>
<td>HTN Stage I</td>
<td>140 – 159</td>
<td>90 – 99</td>
</tr>
<tr>
<td>HTN Stage II</td>
<td>&gt;160</td>
<td>&gt;100</td>
</tr>
<tr>
<td>HTN Stage III</td>
<td>&gt;180</td>
<td>&gt;110</td>
</tr>
</tbody>
</table>

**Medical Risk Factors (MRF)**

- Prior Myocardial Infarction
- IHD – Angina
- High coronary disease risk
- Recurrent stroke prevention
- Diabetes
- Kidney disease

**BP = 198/96 – Should we treat the patient?**

**Is it safe to treat you today?**
### Management of Blood Pressure

**Dental Treatment and Blood Pressure**

<table>
<thead>
<tr>
<th>SBP</th>
<th>DBP</th>
<th>MRF*</th>
<th>Dentist Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>120-139</td>
<td>80-89</td>
<td>Yes/No</td>
<td>Routine Tx OK; Discuss HTN guidelines</td>
</tr>
<tr>
<td>140-159</td>
<td>90-99</td>
<td>Yes/No</td>
<td>Routine Tx OK; Refer for Med/Consult</td>
</tr>
<tr>
<td>160-179</td>
<td>100-109</td>
<td>No</td>
<td>Routine Tx OK; Refer for Med/Consult</td>
</tr>
<tr>
<td>180-209</td>
<td>110-119</td>
<td>No</td>
<td>No Tx w/o consult; Refer prompt M/Consult</td>
</tr>
<tr>
<td>≥ 210</td>
<td>≥ 120</td>
<td>Yes/No</td>
<td>No dental Tx; Refer emergent Med/Consult</td>
</tr>
</tbody>
</table>

*MRF = Medical Risk Factors

US Dept Health & Human Services, NIH, JNC7

### Assessment of Risk

- **Increased risk**
  - Medical Condition?
    - Severity
    - Stability
    - Control
  - Functional Capacity?
  - Emotional Status?
  - Dental Procedure?
    - Invasiveness
    - Length of procedure
    - Blood loss
    - Vasoconstrictor use

- **Decreased risk**

### Prevention

- **Recognition of risk**
- **Assessment of risk**

Stress is a common etiologic factor in emergency situations

---

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April 2017
Medical Emergencies Update 2017

Patient Assessment

Emergency Management

- Position
- Circulation
- Airway
- Breathing
- Definitive Treatment

Emergency Management

BLS

Emergency Management

P-C-A-B-D

Emergency Management

FIRST

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Emergency Management

Position
Circulation
Airway
Breathing
Definitive Diagnosis

Medical Emergency Plan

Reference Texts

Medical Emergency Unconsciousness
Unconsciousness Mechanisms

- Inadequate blood flow to brain
- Inadequate oxygen to brain
- Metabolic deficiencies
- Disorders of nervous system
- Psychic mechanisms

Unconsciousness in the Dental Chair

Differential Diagnosis

- Vasodepressor syncope
- Drug administration or ingestion
- Orthostatic hypotension
- Seizure disorders
- Hypoglycemic reaction
- Cerebrovascular accident (CVA)

Basic Unconsciousness Tx

- Recognition of Unconsciousness
- Position patient supine, feet elevated
- Assess Circulation (Carotid pulse)
  Artificial circulation if needed
- Assess Breathing (Look, Listen, Feel)
  Artificial ventilation if needed
- Activate EMS if delayed recovery
- Definitive management of cause

Unconsciousness in the Dental Chair

Vasodepressor Syncope

Recognition of Unconsciousness

- Position patient supine, feet elevated
- Assess Circulation (Carotid pulse)
  Artificial circulation if needed
- Assess Breathing (Look, Listen, Feel)
  Artificial ventilation if needed
- Activate EMS if delayed recovery
- Definitive management of cause
**Syncope - Etiology**

- Medication: 6.8%
- Other: 7.5%
- Cardiac: 9.5%
- Vasovagal: 21.2%
- Stroke or transient ischemic attack: 4.1%
- Orthostatic: 9.4%
- Unknown: 36.6%

**Source:** CardiQware © 2016 by the American College of Cardiology Foundation

**Syncope - Predisposing Factors**

- **Psychogenic**
  - Fright
  - Anxiety
  - Emotional stress
  - Unwelcome news
  - Sight of blood

- **Nonpsychogenic**
  - Upright position
  - Hunger
  - Exhaustion
  - Male gender
  - Age 16 – 35 yrs

**Fight or Flight Response**

- Pain or fear
- Release of catecholamines (Adrenalin)
- Blood pumped to peripheral muscles
- Muscle activity – run or fight
- Blood pumped back to heart
- Normal cardiac output maintained

**Syncopal Reaction**

- Pain or fear – Catecholamine release – Blood to muscles
- No muscle activity - Blood pools in muscles
- Compensatory => vasoconstriction, tachycardia
- Mechanoreceptors => reflex bradycardia, vasodilation
- Reduced cardiac output & hypotension
- Cerebral ischemia – loss of consciousness
Syncopal Reaction

Presyncopal - Early signs & symptoms
- Feeling of warmth
- Loss of skin color, pale
- Heavy perspiration
- Nausea
- “Feel bad”, “feel faint”
- Tachycardia (↑ pulse)

Presyncopal - Late signs & symptoms
- Pupils dilation
- Yawning
- Rapid respirations
- Cold hands and feet
- Hypotension
- Bradycardia (↓ pulse)

Syncope Management
- Assess level of consciousness
- Position supine, feet elevated
- Assess Circulation, Airway, Breathing
  - Provide CPR if needed
- Activate EMS if recovery is not immediate
- Administer oxygen
- Monitor vital signs

Diagnosis correct?
Syncope Management
Definitive management
- Aromatic ammonia inhalants
- Cold towel on face
- Stimulate patient

(Post-syncopal recovery) (Delayed recovery)
Postpone dental treatment? Activate EMS
Escort for patient Patient to hospital

Prevention of Syncope
- Patient positioning
- Anxiety relief
  - Preop sedation
  - Nitrous oxide

Unconsciousness

Postural Hypotension

Postural Hypotension

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Postural Hypotension

Predisposing factors

- Drug administration
- Prolonged recumbency
- Inadequate postural reflex
- Pregnancy
- Addison’s disease

Drugs causing postural hypotension

- Antianginals
- Antiarrhythmics
- Antidepressants
- Antihistamines
- Antihypertensives
- Antipsychotics
- Beta-blockers
- Diuretics
- Phenothiazines
- Tranquilizers

Postural Hypotension Management

- Assess consciousness
- Position supine, feet elevated
- Assess Circulation, Airway, Breathing
  - Provide CPR if needed
  - Administer oxygen
  - Monitor vital signs

  (Episode terminates)
  (Episode continues)

- Slowly reposition chair, discharge
- Summon medical assistance

Prevention of Postural Hypotension

- PMH: medications, fainting Hx
- Slowly discharge from supine
Respiratory Emergencies

Respiratory Distress Potential Causes

- Hyperventilation
- Syncope
- Asthma
- Heart Failure
- Hypoglycemia
- Acute MI
- Anaphylaxis
- Angioedema
- Stroke
- Epilepsy

Airway Obstruction

Relaxed Tongue Blocks Airway

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Airway Obstruction

Opening the Airway

Head Tilt – Chin Lift

Opening the Airway

Jaw Thrust

The Lost Tooth

Magill’s Forceps

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The Lost Tooth
Aspirated Object

- Cough, wheeze, choking, shortness of breath
- Symptoms present within one hour 90% of the time
- Symptoms may be delayed up to six hours

Management of Aspiration

Management of Possible Aspiration

Place patient in left lateral decubitus position
Head tilted down over edge of chair
Encourage patient to cough

Object is retrieved
Consult physician or pulmonologist
Post-aspiration complications?

Object not retrieved
Transport to E.R.
Flat plate abdomen
Lateral and PA Chest X-rays

Swallowed object => Asymptomatic
Potential for Bowel Perforation?


Avoiding Aspiration

Respiratory Emergencies

Hyperventilation
**Hyperventilation**

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

**Hyperventilation - Pathophysiology**

- Hyperventilation \(\Rightarrow\) Lowered arterial PCO\(_2\)
  - Respiratory Alkalosis
  - Cerebral Vasoconstriction
  - Sympathetic Tone
  - Serum Ca\(^{+2}\)
  - Cerebral Circulation
  - Tetany
  - Lightheadedness
  - Cerebral Vasoconstriction
  - CNS & Cardiac Symptoms

**Hyperventilation - Management**

1. Position patient comfortably (upright)
2. C – A – B – BLS as needed
3. Remove dental materials from patient’s mouth
4. Calm patient
5. Correct respiratory alkalosis
6. Drug management if needed – Versed, Valium
7. Complete treatment, discharge

**Hyperventilation - Manifestations**

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

Asthma

Hyperactivity of tracheobronchial tree:
- Bronchial smooth muscle contraction
- Bronchial wall edema
- Mucus hypersecretion

Current Asthma Prevalence Percent by Age, Sex, and Race/Ethnicity, United States, 2012

- Child: 9.3%
- Adult: 8.0%
- Male: 7.0%
- Female: 9.5%
- White: 8.1%
- Black: 11.9%
- Hispanic: 7.0%

Etiologies:
- Narrowed airways
- Coughing
- Wheezing
- Shortness of breath

CDC – National Center for Health Statistics

www.copewithasthma.com

Asthma - Pathophysiology

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**Asthma**

**Medical Management of Asthma**

**Asthma Inhalers**

**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 Management**

- Position patient comfortably (upright)
- C - A – B – BLS as needed
- Administer bronchodilator via inhalation
  - (Episode continues)
  - (Episode terminates)
  - Complete dental treatment
  - Discharge patient
  - Administer oxygen, call EMS
  - Epinephrine 0.3mg SQ or IM
  - Discharge or hospital

**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

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Diabetic Emergencies

Altered Consciousness

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.

U.S. Incidence of Diabetes

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

Hypoglycemia

Normal Range

Insulin

Glucose

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”

Differential Diagnosis in Diabetic with aLOC

<table>
<thead>
<tr>
<th>Hypoglycemia</th>
<th>Hyperglycemia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cool, wet, pale</td>
<td>Hot, flushed, dry</td>
</tr>
<tr>
<td>Confusion</td>
<td>Acetone breath</td>
</tr>
<tr>
<td>Lethargy</td>
<td>Dry mouth</td>
</tr>
<tr>
<td>Hunger</td>
<td>Irritable</td>
</tr>
</tbody>
</table>

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April 2017
Diabetic Emergencies

Diabetic Ketoacidosis
Lack of Insulin - Hyperglycemia
  Glycogenolysis
  Gluconeogenesis
  Ketogenesis
  Ketoacidosis
  Coma

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)

Altered Cerebral Function
Epinephrine Release

Signs & Symptoms Of Hypoglycemia

Insulin Shock

Hypoglycemia – Early manifestations

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

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**Insulin Shock**

Hypoglycemia – Late manifestations

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

**Hypoglycemia Signs & Symptoms**

- 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)

(Episode continues)

Activate EMS

Glucagon 1mg IM or IV

Dextrose 50% 50ml IV

Discharge patient, escort?

Observe one hour

Discharge or hospital?

**Unconscious Patient**

Position patient supine, legs elevated

C - A – B – BLS as needed

Activate EMS - ASAP

Parenteral Carbohydrates
- Dextrose 50% 50ml IV
- Glucagon 1mg IM or IV
- (Epinephrine 0.5mg SQ or IM)

Oral carbohydrates after recovers

Discharge or transport to hospital

**Insulin Shock - Management**

* * Unconscious Patient * *

Position patient supine, legs elevated

C – A – B – BLS as needed

Activate EMS - ASAP

Parenteral Carbohydrates
- Dextrose 50% 50ml IV
- Glucagon 1mg IM or IV
- (Epinephrine 0.5mg SQ or IM)

Oral carbohydrates after recovers

Discharge or transport to hospital
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”

Associated Risk Factors

- Hypertension
- Atrial Fibrillation
- Abnormal heart valve
- Smoking
- Elevated lipids
- Prior TIAs
CV A or TIA Diagnostic Clues

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

- Time is Brain

Altered Consciousness

Seizures

ACT F.A.S.T.

STROKE is an emergency
Every minute counts

Face
- Facial droop
- Uneven smile

Arm
- Arm numbness
- Arm weakness

Speech
- Slurred speech
- Difficulty speaking or understanding

Time
- Call 911 and get to the hospital immediately

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April 2017
Seizures
Classifying Epilepsy and Seizures

Seizure types:

Partial
- Simple
- Consciousness is maintained

Partial
- Complex
- Consciousness is lost or impaired

Generalized
- Absence
- Altered awareness

Generalized
- Convulsive
- Characterized by muscle contractions with or without loss of consciousness

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?

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

**Status Epilepticus**

A continuous seizure or the repetitive recurrence of any type of seizure without recovery between attacks.
Any continuous seizure > 5 minutes.

Mortality rate is 3 – 23%.

**Status Epilepticus Management**

Position supine, legs elevated

* Protect from injury *
- Administer oxygen, monitor vitals
- Seizure persists > 5 minutes
- Activate EMS
- Midazolam (Versed) – titrated IV
- Dextrose 50% 25 – 50 ml IV
- BLS as needed
- Transport to hospital

**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
Chest Pain
Acute Coronary Syndrome

Unstable Angina
Myocardial Infarction

Cardiac Emergencies
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

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

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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.

Myocardial Infarction

Etiology of Myocardial Infarction

Coronary artery (supply blood and oxygen to heart muscle)
Myocardial Infarction

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

Assume MI, not angina, if:
- New onset chest pain
- Change in previous angina pain
- More severe, different location
- Pain unrelieved by rest or NTG

From: Symptom Presentation of Women With Acute Coronary Syndromes: Myth vs Reality
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
23% mortality reduction
ISIS-2 study
Transport to hospital - - ACLS

Cardiac Arrest

Possible causes
- Myocardial infarction
- Sudden cardiac death
- Airway obstruction
- Drug overdose reaction
- Anaphylaxis
- Seizure disorder
- Acute adrenal insufficiency
Ventricular Fibrillation
About 90% of cardiac arrests

Conversion of Ventricular Fibrillation to normal rhythm

<table>
<thead>
<tr>
<th>Time in Ventricular Fibrillation</th>
<th>Success of Defibrillation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than one minute</td>
<td>90%</td>
</tr>
<tr>
<td>One to two minutes</td>
<td>80%</td>
</tr>
<tr>
<td>Each add’l minute</td>
<td>Decreases 10%</td>
</tr>
</tbody>
</table>
Conversion of Ventricular Fibrillation to normal rhythm

Source: American Heart Association

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**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

---

**Automated External Defibrillator**

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Allergic Reactions

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

Allergic Reactions - Cutaneous

Clinical manifestations
- Increased vascular permeability
- Vasodilation
- Urticaria / Hives
- Rash
- Pruritis (itching)
- Tingling and warmth
- Flushing

Drug-Related Emergencies

Allergic Reactions

Allergen
- Mast cells & Basophils
  - Histamine
  - Leukotrienes
  - ECF – Anaphylaxis
  - Kallikreins
  - Prostaglandins

Allergic phenomenon

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Typical Distribution Pattern

Clinical manifestations

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

**Rhinitis**
- Nasal congestion
- Nasal itching
- Rhinorrhea

**Laryngeal edema**
- Dyspnea
- Hoarseness
- Throat tightness
- Laryngeal stridor

**Bronchospasm**
- Cough
- Wheezing
- Tachypnea
### 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
- Light-headedness
- Weakness
- Syncope
- Ischemic chest pain

- Dysrhythmias
- Light-headedness
- Weakness
- Palpitations
- Ischemic chest pain

- Cardiac arrest
- Pulselessness
- EKG changes
- Vent fibrillation
- Asystole

### 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
- 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)

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

**Rapid-Onset Allergic Skin Rxn Management**

Onset skin reaction (< 1 hour) from allergen
- Position patient comfortably
- Assess and perform BLS as needed

Definitive care
- NO
- Cardiac or respiratory involvement?
- YES
- Benadryl 50mg oral / IM
- 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

**Angioedema**

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**Angioedema**

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

**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
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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