Medical Emergencies in the Dental Office, Medical Emergencies in Life!

NORTH DAKOTA DENTAL ASSOCIATION

Fargo, ND
September 20th, 2019

Mel Hawkins, DDS  BScD AN
Dentist/Dentist Anesthesiologist
Toronto, ON Canada
DISCLOSURE

Mel Hawkins

has no relevant financial relationship with any company or organization to disclose with respect to this continuing dental education program

NORTH DAKOTA DENTAL ASSOCIATION

Fargo, ND

September 20th, 2019
How can we as health professionals, who are supposed to have higher skills, be expected to treat an emergency situation in the office or in life when they never (well, almost never) occur?
Reality of Dental Emergencies

Almost **Always**  

Almost **Never**
What today is NOT:

A waterfall of different emergency situations involving just as many different medical scenarios, some of which you and I undoubtedly have never heard of, let alone memorized. Which drug to use, where to give it, IV? IM? IL? dose in mg., how often to repeat it? side effects? Then, which drugs can combat the side effects? etc…etc…
Are we facing an . . .

- INCONVENIENCE
- URGENCY
- EMERGENCY
- RARITY
Inconveniences

<table>
<thead>
<tr>
<th>Condition</th>
<th>Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syncope</td>
<td>15,407</td>
</tr>
<tr>
<td>Mild Allergy</td>
<td>2,583</td>
</tr>
<tr>
<td>Postural Hypotension</td>
<td>2,475</td>
</tr>
<tr>
<td>Bronchospasm (asthma)</td>
<td>1,392</td>
</tr>
<tr>
<td>Hyperventilation</td>
<td>1,326</td>
</tr>
<tr>
<td>Epinephrine Reaction</td>
<td>913</td>
</tr>
</tbody>
</table>

Martin & Ellis JADA 112:499-501, Malamed JADA 124:4-53 >30,000 events
# Urgencies

<table>
<thead>
<tr>
<th>Condition</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syncope</td>
<td>15,407</td>
</tr>
<tr>
<td>Angina</td>
<td>2,552</td>
</tr>
<tr>
<td>Seizure</td>
<td>1,595</td>
</tr>
<tr>
<td>Bronchospasm (asthma)</td>
<td>1,392</td>
</tr>
<tr>
<td>Epinephrine Reaction</td>
<td>913</td>
</tr>
<tr>
<td>Insulin Shock (conscious)</td>
<td>890</td>
</tr>
</tbody>
</table>

Martin & Ellis JADA 112:499-501, Malamed JADA 124:4-53  >30,000 events
"True" Emergencies
...are also related to duration

<table>
<thead>
<tr>
<th>Condition</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syncope</td>
<td>15,407</td>
</tr>
<tr>
<td>Angina</td>
<td>2,552</td>
</tr>
<tr>
<td>Seizure</td>
<td>1,595</td>
</tr>
<tr>
<td>Bronchospasm (asthma)</td>
<td>1,392</td>
</tr>
<tr>
<td>Myocardial Infarction</td>
<td>289</td>
</tr>
<tr>
<td>Local Anesthetic Overdose</td>
<td>204</td>
</tr>
<tr>
<td>C.V.A.</td>
<td>68</td>
</tr>
</tbody>
</table>

Martin & Ellis JADA 112:499-501, Malamed JADA 124:4-53  >30,000 events
**Rarity (“Non” Events)**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Pulmonary Edema</td>
<td>141</td>
</tr>
<tr>
<td>Diabetic Coma</td>
<td>105</td>
</tr>
<tr>
<td>Adrenal Insufficiency</td>
<td>25</td>
</tr>
<tr>
<td>Thyroid Storm</td>
<td>4</td>
</tr>
</tbody>
</table>

Martin & Ellis JADA 112:499-501, Malamed JADA 124:4-53 >30,000 events
<table>
<thead>
<tr>
<th>Condition</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syncope</td>
<td>15,407</td>
</tr>
<tr>
<td>Angina</td>
<td>2,552</td>
</tr>
<tr>
<td>Myocardial Infarction</td>
<td>289</td>
</tr>
<tr>
<td>Cardiac Arrest</td>
<td>???</td>
</tr>
<tr>
<td>Asthma, Severe Allergy Bronchospasm</td>
<td>1,392</td>
</tr>
</tbody>
</table>
What’s Really Important?

SUMMARY:
Syncope occurs more times than all the other conditions COMBINED i.e. > 50%

CONCLUSION:
If we can treat syncope by position, A. B. C.’s and \( \text{O}_2 + \) sugar, then we can treat over 50% of unconscious victims or patients

WHAT’s THE ROLE of CDE?:
You know more than you think...
FURTHERMORE:
By knowing this syncope protocol a health professional or member of the public or both can always at least initiate treatment of the other 50% of emergencies WITHOUT MAKING or NEEDING A DIAGNOSIS:
Supportive care and CPR or BLS fundamentals including (rarely) chest compressions will maintain life until consciousness returns or EMS arrives.
<table>
<thead>
<tr>
<th>Condition</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetic Coma/Insulin Shock</td>
<td>Sugar</td>
</tr>
<tr>
<td>Epilepsy/Seizure/Convulsions</td>
<td>Airway + Protect</td>
</tr>
<tr>
<td>Hyperventilation - O2 Sat?</td>
<td>100%</td>
</tr>
<tr>
<td>Mild Allergy Itchiness/Rash</td>
<td>Wait</td>
</tr>
<tr>
<td>Local Anesthetic/Epinephrine</td>
<td>β Blockers</td>
</tr>
</tbody>
</table>
WHAT TODAY IS:

1. Protocols, Age/Risk Pharmacodynamics
2. Airway + a few good adjuncts, Oxygen, Vasoconstrictors
3. Defib, Drugs and Diagnosis
- Protocols,
- Age/Risk
- Pharmacodynamics
Emergency Protocols

Is 911 a false sense of security?

IT DEPENDS on:
• What,
• When, and
• Where the problem is!
Emergency Protocols

YES

911 is a solution.

Problem

What to do in the meantime???
Communication

• Front Desk
• Office Manager
What is your Emergency?

The 3 U’s

Unconscious

Unresponsive

Unable to find a pulse
RESPONSIBILITIES

Attending person 911

“I HAVE AN UNRESPONSIVE CHILD WITHOUT A PULSE”.
123 Home Street.
Hawkins residence.
Front door.
“I will meet you there”
RESPONSIBILITIES

Front Desk 911

“WE HAVE A PATIENT IN CARDIAC ARREST WITH CPR IN PROGRESS”
91 Rylander Blvd.
Dr. Hawkins office.
Front parking lot.
“I will meet you there”
Must know location of:

- Portable oxygen with masks/cannulas
- Bag-Valve-Mask with airways
- Automatic External Defibrillator
- Emergency drug kit
- Portable suction
- Emergency lighting source
Staff Training

• **Current BLS training**
• **Task designation:** 2 groups, action + support
• **Mock simulations:**
  → shorter time (15 min.)
  → higher frequency (2 mo.)
  → repetition, repetition, repetition
Staff member’s enthusiasm? willingness? screening?

Recommendation:

Can you discover, *privately*, without embarrassment who *is* and who *may not be* prepared or willing before an event, *not* during?
Every 2 Months: Syncope

for 15 Minutes: Syncope
Syncope Algorithm

Position, ABC’s’s
Time, Time, Time

Always!

O₂ by nasal cannula
4 litres/minute
+ Glucose
Syncope Algorithm

The Nasal Cannula is an open and therefore a diluted system

How much enriched % oxygen can actually be administered?
Room air has ~ 21 % oxygen

The percentage $O_2$ approximates:
$20 + 4 \times \text{liter flow of } O_2 = \% \text{ oxygen received}$

- 3 liters/min = 32 %
- 4 liters/min = 36 %
- 5 liters/min = 40 %
- 6 liters/min = 44 %
Hey Doc, how do I treat your medically compromised patient?
1. Dental treatment risk/benefit
2. Contemplated medications in mg. or μg.
EMERGENCY KITS

Ready made?
Self assembled?

Acme™ Dental / Medical Kit
Pharmacodynamics: Age/Risk

Senior Citizen

“Average” Patient

Pediatric considerations
Physical Classifications – ASA
American Society of Anesthesiology

ASA I – normal, healthy
ASA II – mild systemic disease
ASA III – severe multiple systems, medication
ASA IV – severe disease, threat to life
ASA V – won’t survive without operation
ASA VI – brain dead, alive ⇒ organ transplant
E – operation modification e.g. ASA III-E
Although inaccurate, a “senior” in our society is usually $< \text{ or } = 65$ years old.

A “bad day” will usually happen because of an attack of a pre-existing condition.
Senior’s Considerations

Physiology
Age of 65 is arbitrary
How often do we see a 65 year old who looks 50 and vice versa?

Hepatic metabolism and renal clearance can be reduced by 50% in patients over the age of 65.

Becker DE Mod Curric Moder Sed, Miami Valley Hosp. Dayton OH
Senior’s Considerations

Fear Factors:
• Loss of independence
• Institutionalization and isolation
• Disability
• Death
Senior’s Considerations

C.N.S:

• Loss of Neurons

C.V.S:

• Systolic B.P. $\uparrow$ with age
• Rate $\downarrow$ due to parasympathetic activity

Becker DE Mod Curric Moder Sed, Miami Valley Hosp. Dayton OH
Senior’s Considerations

Pulmonary:

• Loss of alveolar septa
• ↓ elasticity of lungs
• Impact of smoking
Senior’s Considerations

COMMUNICATION DIFFICULTIES
ASA I or II are generally very safe sedation patients.

ASA III is a judgment call. A “heart” patient is safer with sedation than without it.

A “bad day” will usually happen because of lack of attention to the rules - doses, lack of good L.A. or “point of no return” feelings.
Why does Morbidity – Mortality “target” CHILDREN?
Although inaccurate, a “child” in our society is usually defined as ≤ 12 years old.

A “bad day” will usually happen because of lack of respect of their airway...
Pediatric Considerations

C.V.S / C.N.S:

The 2 MOST IMPORTANT Physiological Considerations in PEDIATRIC RESCUE are:

- High MYOCARDIAL O₂ Consumption
- High BRAIN O₂ Consumption
Pediatric Considerations

C.N.S:
The CPR / BLS guideline of:

“3 – 6 minutes until permanent brain damage begins” is for the adult without an O₂ debt. It does NOT apply to pediatric life.”
Pediatric Considerations

Drug (local anesthetic) impact:

• Unpredictable
• Blood Brain Barrier is immature
• ↓ Metabolism due to immature liver
Pediatric Considerations

COMMUNICATION DIFFICULTIES
Question Period 1
- Airway,
- A Few Good Adjuncts,
- Oxygen and
- Vasoconstrictors
MANAGEMENT OF AIRWAY

Actions & Armamentarium
Airway Obstructions: The Conscious Victim
Airway

• Know Each Patient’s Airway
• Always Maintain Patency
• Head Position
• Clear Debris
• Use Throat Partitions
• Use Rubber Dam When Possible
Airway Adjuncts

It would be ideal to be able to use emergency armamentaria in day-to-day dentistry too, for cost efficiency, familiarity and for practice!
“Mouth Rester”… not a prop
Disposable Laryngoscope

“A tongue depressor with a light on it”
Magill Forceps

Serated, circular tips,
double lumen
Disposable “long saliva ejector”

...with a screen tip that doesn’t come off
Airway Obstructions: The Unconscious Victim
Oral Pharyngeal Airway

Size? Angle of Mandible to Corner of Mouth
Airway open
STARTING POSITION

Airway is inserted backwards...

and rotated into position
CRICOTHYROTOMY  What is it?

- A mechanical opening of the airway at the 1\textsuperscript{st} tracheal ring – the cricothyroid membrane
- Done below a blockage of the plugged (food) OR constricted laryngeal vocal cords (laryngospasm) due to an irritant, that has resulted in little or no air exchange to the lungs
- Accompanied by panic, inability to speak and strained, contracted neck muscles
- Follows multiple, unsuccessful Heimlich manoevers
At the 1\textsuperscript{st} tracheal ring – the cricothyroid membrane

Done below the Adam’s Apple, just above the 1\textsuperscript{st} tracheal cartilage)

If respiratory effort is still present, an ingress of air will follow

This allows time to try to physically remove the obstruction

If not, a bag to tracheal tube or opening(?) must somehow do AR part of CPR.
Cricothyroid Membrane Puncture for Tracheal Access
CRICOTHYROTOMY

Obstructions?

- Food bolus
- Seaweed
- Laryngospasm but if just coughing, air is being exchanged – leave them alone
- Laryngospasm without air exchange ( cannot cough).
CRICOTHYROTOMY Actions?

- Trocar needle within a 13 ga. or 10 ga. metal tube inserted inward and downward
- Horizontal scalpel incision. Reverse blunt end inserted at 90 degrees
- Broken Bic® pen
- Fishing knife
- A “mouth to opening” must somehow do the AR portion of BLS/CPR.
Cricothyrotomy

What you really need to know about old and new ideas of cricothyrotomy is...
Cricothyrotomy

DON’T

DO

ONE  unless
Case Report:

Drowning - 27 y.o. female pulled unconscious from lake near Atlanta, GA

Hinman Dental Meeting, Atlanta GA
Medical Emergencies Office/Life

Hawkins, Mar 2008  audience member personal account
Case Report:

Foreign Object, Laryngospasm-35 y.o. male on sidewalk in Pittsburg, PA

*The Good Samaritan “Law”*

Male rescuer with knife or pen access to airway through cricothyroid membrane, but inserted upward not downward

Victim lived

Law suit claiming permanent speech loss

Moore P, University of Pittsburg Pittsburg, PA 2005 (personal commun)
MANAGEMENT OF BREATHING

Actions & Armamentarium
Oxygen Sources

• Portable tanks (Stem & Wrenches)
• Central tanks
  • Regulators and Components
  • Flow meters
Flow meter: 0-15 litres/min
Full: 2000 PSI
Non-rebreathing Mask (NRB)

O₂

6-10 l/min
Nasal Cannula - Disposable

O₂

4 l/min
Bag-valve-mask Systems (B.V.M.)
Bag Valve Mask (BVM)

Inflatable Mask
(use 10 cc. syringe – air)

One way valve- once sealed no need to lift edge of mask for exhalation

Transparent mask – see condensation, regurgitation

Supplemental O₂ with reservoir at 10-15 liters/minute

2-3 l. bag

Can be used IF breathing
These 2 digits press down

These 3 fingers pull up
Demand Valve

NOT Recommended
Question
Period 2
CIRCULATION

MANAGEMENT OF CIRCULATION

Actions & Armamentarium
Vasoconstrictor Considerations

VASOCONSTRICCTOR
“ISSUES”
or

Truths, Lies and Consequences
A. Use is based on vasoconstrictive alpha receptor agonists

1. Delays absorption, reducing toxicity and prolonging duration
   No Advantage With Concentrations > 1:200,000

2. Reduces hemorrhage at surgical site
   (CONCENTRATION IS ADVANTAGEOUS IN THIS CASE)
Vasoconstrictor Considerations

Adrenergic alpha receptor functions and vascular distribution

\[ \alpha \rightarrow \text{Vasoconstriction} \]

\[ \beta_2 \rightarrow \text{Vasodilation} + \text{Bronchial dilation} \]

\[ \beta_1 \rightarrow \text{Cardio-tropic ONLY} \]
With most heart conditions, the most serious medical-dental risk for dental treatment is the vasoconstrictor.
A. Epinephrine is **not** safe for the hypertensive patient

True or False?
Cardiovascular Influences
Prototypic Catecholamines

<table>
<thead>
<tr>
<th>Blood Pressure</th>
<th>120</th>
<th>80</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse Rate</td>
<td>80</td>
<td>80</td>
</tr>
</tbody>
</table>

- **Epinephrine (EPI)**
- **Norepinephrine (LEVO)**

Graphs showing changes in blood pressure and pulse rate over time (0-15 minutes) with 10 micrograms/minute IV infusion.

Goodman & Gilman’s 1996
Selecting a Vasopressor

- **Epinephrine** for Hypertensive Patients
- **Levonordefrin** if Tachycardia is Concern
- Both **Increase** Myocardial Oxygen Demand

- ✓ **Epinephrine** ➡️ Heart Rate
- ✓ **Levonordefrin** ➡️ Blood Pressure

Becker DE Mod Curric Moder Sed, Miami Valley Hosp. Dayton OH
B. When anaesthetizing children – do not use epinephrine. Use a plain non-epi containing solution

True or False?
Dentists are responsible for safety!

Parents are responsible for lip/tongue biting
Vasoconstrictors

Why?

Epinephrine delays absorption, reduces toxicity and safely allows for $1 \frac{1}{2} \times$ maximum dose!
### “MRD” or Maximum Recommended Doses

<table>
<thead>
<tr>
<th>DRUG</th>
<th>Vasoconstrictor</th>
<th>No Vasoconstrictor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Articaine 4%</td>
<td>500 mg</td>
<td>300 mg</td>
</tr>
<tr>
<td>Lidocaine 2%</td>
<td>500 mg</td>
<td>300 mg</td>
</tr>
<tr>
<td>Mepiva 2, 3%</td>
<td>500 mg</td>
<td>300 mg</td>
</tr>
<tr>
<td>Prilocaine 4%</td>
<td>600 mg</td>
<td>400 mg</td>
</tr>
<tr>
<td>Bupiva 0.5</td>
<td>150mg</td>
<td>75 mg</td>
</tr>
</tbody>
</table>

* For healthy 70 Kg adult – must adjust for age and weight

Hawkins, M - various sources, 2017
C. Epinephrine and antidepressants do not interact (except POSSIBLY with tricyclics?)

True or False?
**ANTIDEPRESSANTS**

**CLASS: MONOAMINE OXIDASE INHIBITOR**

<table>
<thead>
<tr>
<th>GENERIC NAME</th>
<th>TRADE NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phenelzine sulfate</td>
<td>Nardil®</td>
</tr>
<tr>
<td>Tranyleypromine sulfate</td>
<td>Parnate®</td>
</tr>
</tbody>
</table>

**Local Anaesthetic/Vasoconstrictor Precautions:**
None, since both epinephrine and neocobefrin are metabolized by COMT, not MAO

Becker DE Mod Curric Moder Sed, Miami Valley Hosp. Dayton OH
## ANTIDEPRESSANTS

**CLASS:** TRICYCLICS

<table>
<thead>
<tr>
<th>GENERIC NAME</th>
<th>TRADE NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maprotiline hydrochloride</td>
<td>Ludiomil® Novo-Maprotilinel®</td>
</tr>
<tr>
<td>Trimipramine maleate</td>
<td>Apo-Trimip® NovoTripramine® NuTrimipramine®</td>
</tr>
<tr>
<td></td>
<td>Rhotrimine®, Surmontil®</td>
</tr>
</tbody>
</table>

**Local Anaesthetic/Vasoconstrictor Precautions:**
Use with caution; epinephrine and levonordefin have been shown to have an increased pressor response in combination with tricyclics. Clinically may only be seen in higher doses.
# ANTIDEPRESSANTS

## CLASS: SELECTIVE SEROTONIN REUPTAKE INHIBITORS

<table>
<thead>
<tr>
<th>GENERIC NAME</th>
<th>TRADE NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluoxetine hydrochloride</td>
<td>Prozac®</td>
</tr>
<tr>
<td>Fluvoxamine maleate</td>
<td>Luvox®</td>
</tr>
<tr>
<td>Paroxentine hydrochloride</td>
<td>Paxil®</td>
</tr>
<tr>
<td>Sertratine</td>
<td>Zoloft®</td>
</tr>
</tbody>
</table>

**Local Anaesthetic/Vasoconstrictor Precautions:**

No interactions reported with vasoconstrictors

Becker DE Mod Curric Moder Sed, Miami Valley Hosp. Dayton OH
## ANTIDEPRESSANTS

**CLASS:** MISCELLANEOUS

<table>
<thead>
<tr>
<th>GENERIC NAME</th>
<th>TRADE NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nefazadone hydrochloride</td>
<td>Serzone®</td>
</tr>
<tr>
<td>Venlafaxine hydrochloride</td>
<td>Effexor®</td>
</tr>
<tr>
<td>Buspirone hydrochloride</td>
<td>BuSpar®</td>
</tr>
</tbody>
</table>

**Local Anaesthetic/Vasoconstrictor Precautions:**
No precautions appear necessary.

*Becker DE Mod Curric Moder Sed, Miami Valley Hosp. Dayton OH*
D. Non-selective β-blocked patients are a *relative* precaution only. All other β-blocker categories are fine.

**True or False?**
Vasoconstrictor Considerations

Alpha receptor functions and non-selective $\beta$ blockade (e.g. propranolol-Inderal®)

- $\alpha$: Vasoconstriction
- $\beta_2$: Vasodilation + Bronchial dilation
- $\beta_1$: Cardio-tropic
<table>
<thead>
<tr>
<th></th>
<th>Sympathomimetics epinephrine</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(a) Cardioselective</strong></td>
<td>“alright” β 1 blocked only</td>
</tr>
<tr>
<td>Atenolol</td>
<td>Tenormin®</td>
</tr>
<tr>
<td>Metoprolol</td>
<td>Betaloc® Lopressor®</td>
</tr>
<tr>
<td><strong>(b) Noncardioselective</strong></td>
<td>“beware” β 1,2 both blocked</td>
</tr>
<tr>
<td>Nandolol</td>
<td>Corgard®</td>
</tr>
<tr>
<td>Propranolol</td>
<td>Inderal®</td>
</tr>
<tr>
<td>Sotalol</td>
<td>Sotacor®</td>
</tr>
<tr>
<td><strong>(c) Noncardioselective and alpha blocker</strong></td>
<td>“cool” all blocked</td>
</tr>
<tr>
<td>Labetalol</td>
<td>Trandate®</td>
</tr>
</tbody>
</table>
Non-Beta Blocked Patients
(15 ug Epinephrine I.V.)

% Change From Baseline

Time (sec.)

Mulroy MF, Regional Anesthesia 1989
Beta Blocked Patients
(15 ug Epinephrine I.V.)

Mulroy MF, Regional Anesthesia 1989
43 year old female, Candace, 1 hour hygiene appt.

Propranolol 40 mg. b.i.d. for *migraine headaches*, but *no CVD*, BP 128/86  HR 88

IV sedation - 4 mg. midazolam with RN Nancy

Local anesthesia:  4% articaine
1:100K epi 6.8 ml. – 4 cartridges

<table>
<thead>
<tr>
<th>Time</th>
<th>BP</th>
<th>HR</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 minutes</td>
<td>152/94</td>
<td>92</td>
</tr>
<tr>
<td>3</td>
<td>168/98</td>
<td>78</td>
</tr>
<tr>
<td>4</td>
<td>190/104</td>
<td>64</td>
</tr>
<tr>
<td>5 minutes</td>
<td>158/98</td>
<td>78</td>
</tr>
</tbody>
</table>
Case Report

NOW WHAT?

1. IF ANY SYMPTOM ➔ Activate EMS
2. Position, ABC’s, O₂
3. Lower Blood Pressure – Nitroglycerine spray + support
4. ASA? NO!

ER protocol, Miami Valley Hosp Becker DE Dayton OH
Managing Beta Blocked Patients

No issue with cardioselective agents, (a) category BUT
Caution with propranolol and others in the non-selective, (b) category

WHAT TO DEFINITELY DO!

1. Look it up
2. Wait 5 minutes after each cartridge and reassess vitals
Managing Beta Blocked Patients

**WHAT TO POSSIBLY DO?**

3. **Avoid** using a vasopressor if (b) category

4. **Consult** physician regarding discontinuing (b) beta blocker or changing it to a cardioselective (a) beta blocker
Hypertension Algorithm

Syncope Protocol

Reassess BP / Perfusion

Nitroglycerin

Nifedipine

EMS transport if symptomatic
Vasoconstrictor Summary

A. Epinephrine is **safe** for the hypertensive patient

B. When anesthetizing children - use epinephrine. It delays absorption, reducing toxicity

C. Non-selective $\beta$-blocked patients are a *relative* precaution only

D. Epinephrine and antidepressants do **not** interact (tricyclics?)
Question Period 3
Looking at the “Drug”

Local Anesthetic DOSAGES
Any “%” solution needs to be expressed as:

mg/cc (ml)
In 2% lidocaine, for example:

2\% \times 0 = \frac{20 \text{ mg}}{\text{cc}}

\text{a cartridge of } \frac{1.8 \text{ cc}}{}

\text{=} 36 \text{ mg}
**“MRD” or Maximum Recommended Doses**

<table>
<thead>
<tr>
<th>DRUG</th>
<th><strong>Vasoconstrictor</strong></th>
<th><strong>No Vasoconstrictor</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Articaine 4%</td>
<td>500 mg</td>
<td>300 mg</td>
</tr>
<tr>
<td>Lidocaine 2%</td>
<td>500 mg</td>
<td>300 mg</td>
</tr>
<tr>
<td>Mepiva 3%</td>
<td>500 mg</td>
<td>300 mg</td>
</tr>
<tr>
<td>Prilocaine 4%</td>
<td>600 mg</td>
<td>400 mg</td>
</tr>
<tr>
<td>Bupiva 0.5</td>
<td>150mg</td>
<td>75 mg</td>
</tr>
</tbody>
</table>

* For healthy 70 Kg adult – must adjust for age and weight*
## Maximum Doses

<table>
<thead>
<tr>
<th>Drug</th>
<th>Maximum Dose</th>
<th># “Carps”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Articaine 4%</td>
<td>7 mg/kg (up to 500 mg)</td>
<td>7</td>
</tr>
<tr>
<td>Bupiva .5%</td>
<td>2 mg/kg (up to 200 mg)</td>
<td>10</td>
</tr>
<tr>
<td>Lidocaine 2%</td>
<td>7 mg/kg (up to 500 mg)</td>
<td>13 ? 10 ?</td>
</tr>
<tr>
<td>Mepivac 3%</td>
<td>7 mg/kg (up to 400 mg)</td>
<td>9*</td>
</tr>
<tr>
<td>Prilocaine 4%</td>
<td>8 mg/kg (up to 500 mg)</td>
<td>7</td>
</tr>
</tbody>
</table>

Hawkins, JM: various sources compiled 2017
Factors:

3% mepivacaine PLAIN

Adult: 7 mg./kg = 490 mg. = 9 cartridges
Age 12-18 yrs: 6 mg./kg = 330 mg. = 6
Age 6-12 yrs: 5 mg./kg = 200 mg = 3.5
Age < 6 yrs: 4 mg./kg = 100 mg = < 2

Hawkins, JM: various sources compiled 2017
Factors:

2% lidocaine 1:100,000 epi

Adult: 7 mg./kg = 490 mg. = 13 cartridges
Age 12-18 yrs: 6 mg./kg = 330 mg. = 8.5
Age 6-12 yrs: 5 mg./kg = 200 mg = 5.5
Age < 6 yrs: 4 mg./kg = 100 mg = 3

Hawkins, JM: various sources compiled 2017
Scenario:

1. Good child 😊
2. Financial
3. L.A. is just “water”
4. Bell curve

Dr. Norman Treiger, DDS, MD Montefiore Hospital, the Bronx, NY
Case REPORT

Case: @ 55 lb 7 y.o. ♂ (25 k.g.)

Administered:
11 CART 2% LIDO 1:100,000 EPI

or

@ 400 mg!

How ..... Does This Happen???

Dr. Norman Treiger, DDS, MD Montefiore Hospital, the Bronx, NY
Factors:

1. Size: 1/3 of adult
2. Physiology of a child vs. adult
3. M.R.Dose = 133 mg. or no more than ~ 3.5 cartridges!
4. BUT adjust for physiology to 4 mg./kg. So... M.R.D. = 100 mg. or < 3 cartridges

Dr. Norman Treiger, DDS, MD Montefiore Hospital, the Bronx, NY
RESULTS:

Patient died

No dentist or assistant CPR (BLS) certification

No resuscitative equipment, including no oxygen

Defense: Medicaid case. “Had to do as much dentistry as possible”

Involuntary manslaughter, jail term

Dr. Norman Treiger, DDS, MD Montefiore Hospital, the Bronx, NY
CARDIAC ARREST
Racketball…
Readiness?..
Rescue
Attempt…
MONITOR THE VITAL SIGNS

Pulse

Pupils

Breathing
CONSTRICTED

(a)

DILATED

(2)
Cardiac Compressions

Victim Must Be On "Firm" Surface ???
Resusitation: Floor Resusci-Anne (n = 50)

Hawkins, M JODA. Jul/Aug Vol 6:28
Dental Chair Resusitation Resusci-Anne (n = 50)

Hawkins, M JODA. Jul/Aug Vol 6:28
Defibrillation, Drugs and Diagnosis
Defibrillation
A.E.D.s

One-Touch

$1245.00

CPR Savers and First Aid Supply®
AED + ECG

Simple but Sophisticated

$1999.00

CPR Savers and First Aid Supply®
A.E.D. State Standards and Philosophy

• If you are regulated to have one, then get one! FL, NY, TX (future)

• If you think that you might need one used on you, then get one
Automatic External Defibrillators
or A.E.D.s

• Increasingly common placement in malls, airports, golf courses, exercise facilities and office buildings

• They DO save lives when used by trained individuals

Automatic External Defibrillators or A.E.D.s

- How adequately do untrained persons perform in an emergency?
- Does lack of training influence patient outcomes?
- Can a lay person successfully operate an AED to deliver the shock needed in v-fib or pulseless v-tach?

Automatic External Defibrillators or A.E.D.s

FAILURE RATES:
General population: 80%
1st year dental students: 60%
3rd year dental students: 30%
Dental professionals/RN’s: 20%
Anaesthesiologists/OMFS: 10%

REASONS for FAILURE (n=50):
Failure to remove chest covering clothing: 52.4%
Incorrect placement of pads 28.6%
Operator touching patient or not saying, “CLEAR, CLEAR, CLEAR” 14.3%

Let’s Do Drugs
What do you need?

**DO NOT**

even *THINK* of using a drug you know nothing about!
Emergency Medications
Responsible Auxiliary:

• Check kit every two months (on a mock simulation day) to assure drugs are not expired or broken. Replace as needed.

• Review correct method for preparation of the drugs themselves periodically.
Drug # 1  Oxygen

OXYGEN
Drug # 2  Epinephrine

Various injectors available for anaphylaxis (severe allergy; bee stings, peanuts) and bronchospasm

CHILD / ADULT:

Packs of 1 or 2 vary in price

child: 0.15 mg

adult: 0.3 mg

*until you can draw up from an amp.
Drug # 2  Epinephrine

Equi-potent doses: (1ml 1:1000 amps) by route of administration:

- **SC** - 0.5 mg
- **IM** - 0.3 mg
- **IL** - 0.2 mg
- **IV** - 0.1 mg - must dilute 1:10,000

*If patient has air exchange β-2 inhaler - albuterol*
Drug # 2  Epinephrine (ampule)

5 sleeve (ampules):
$ 35.00 – $ 45.00 CND

Fabrizio, D PharmD SDM Toronto ON
Drug #2 Epinephrine (vacuum sealed)
Drug # 2   Epinephrine

EPIPEN®* for anaphylaxis (severe allergy; bee stings, peanuts) and bronchospasm

CHILD / ADULT: EpiPen Brand 2-Pak®:
  child: 0.15 mg….. $650.00 - $700.00
  adult: 0.3 mg…. $650.00 - $700.00
  ...before coupons, before discounts

This triggered a public outcry

*until you can draw up from an amp.
Drug # 2  Epinephrine

Mylan generic* pens for anaphylaxis (severe allergy; bee stings, peanuts) and bronchospasm

Teva generic* pen(s) (2018) < $150.00 CND

Products on line occasionally < $100.00 CND

CHILD / ADULT: Mylan generic* 2-pack “pen”:
  child: 0.15 mg..... $150.00 - $300.00 CND
  adult: 0.3 mg..... $150.00 - $300.00 CND

...before coupons, before discounts

*until you can draw up from an amp.
Drug # 3  Nitroglycerin

**Action is unclear**: SL administration ⇒ vasodilation result in a reduced venous return, or preload reduction, lowering myocardial $O_2$ consumption.

**Indications**: Ischemic chest pain - 1 tab Q5M x 3
Symptomatic hypertensive episodes

**Dose**: 0.3-0.6 SL mg. tabs / 0.4-0.8 SL spray

**Warning**: do not give another “nitro” if SBP < 90
Tablets are still in demand

Product currently N/A at SDM

(was ¼ price of the spray for 100 tabs)

Expiration date must be “Sharpied” to 8-10 weeks from breaking seal

Fabrizio, D PharmD SDM Toronto ON
Nitrolingual® Pumpspray
0.4 mg

> $32.00 CND

Mylan-NITRO SL spray
0.4 mg

< $30.00 CND + Disp. Fee

... expiry date IS the expiry date

Fabrizio, D PharmD SDM Toronto ON
Drug # 4  ASA

Giving the maximum as a 325 mg. tablet is OK but...
Drug # 4  ASA (for MI)

325 mg. = peak effect

It’s best via

4X baby ASA 81 mg - chewed aside from, over and above patient’s prophylactic use
Drug # 4  ASA (for MI)

325 mg. = peak effect

Action: Keeps # of platelets from increasing, which could lead to further coronary artery blockage or if cerebral blockage, STROKE!
Albuterol - \(\beta_2\) agonist

**Inhaler:** Inhale 1 to 2 puffs of albuterol up to 4 times daily.

More than 8 inhalations per day is not recommended.
Albuterol - Ventolin®
- 
β2 agonist
Bronchodilator

Drug # 5

$ 17.00 –
$ 20.00 CND
+
Disp. Fee

Fabrizio,D PharmD SDM Toronto ON
Drug # 6 Diphenhydramine

- Action and effect based on blocking histamine release
- Indications / Dose: (50mg/ml amp or SDV)
  - pruritus / urticaria / nausea
  - 50mg IM followed by 50mg TID P.O.
  - medical follow up to anaphylaxis
- **THINK FIRST!** Can they get a ride?
Drug #7  Glucose

ALL dental offices have sugar availability in house!
Resources for Emergency Drugs and Equipment

ACE Surgical Supply Company
1034 Pearl St. Brockton, MA

AAMOS Supplier Marketplace
aaoms@multiview.com
www.multiview.com 800-816-6710

Salvin Dental Specialties, Inc.
Criticare monitors, AED’s,
3450 Latrobe Dr. NC 28211
www.salvin.com
Sedation Resource, Inc

texasrose@sedationresource.com
www.sedationresource.com
800-753-6376

Hals Med Dent Supply & Pharmacy, Inc
www.halsmeddent.com

Southern Anesthesia & Surgical
www.southernanesthesia.com
Question
Period 4
Diagnosis
Dependent
Treatment
Syncope

• Sudden, transient loss of consciousness

• Common immediately pre- or post injection

• Most common procedure – extraction

• Often recovery before advanced treatment can be implemented
Syncope Profile - Prevalence

• Male » Female
• Never in children
• Average age? 35 years old
• Scenario:
  Male, 35 y.o., anxious
  “macho” guy
  needlephobic
Syncope Signs/Symptoms

- Pallor
- Nausea
- Disorientation
- Loss of Consciousness
- Blood pressure
- Pulse thready, may arrest 30-45 sec.
- Low blood sugar
Syncope Causes

- Anxiety, Pain
- Sit up too fast
- Inject too fast
- Intraosseous injections
- Hypoglycemia (prolonged NPO)
Syncope Algorithm

Position, ABC’s

Time, Time, Time

Always!

O₂ by nasal cannula

4 litres/minute

+ Glucose
Nausea / Vomiting

...associated with syncope
Hyperventilation

Signs / Symptoms:

• Rapid, shallow breaths, “air hunger”
• Impaired inspiration / expiration
• Sense of panic
• Disorientation
• $O_2$ saturation = 100%
Hyperventilation

Sometimes...
Hyperventilation Treatment

• Rebreathe from paper bag?
• Do nothing and leave room?

*Nobody has ever died from a 100% oxygen saturation!
Angina

- Pallor, chest pain in “waves”
- “Indigestion?”
- Denial
- Midsternal pain, left arm, left mandible
- Nausea, diaphoresis
- Rapid, shallow breathing
- \( R_x \) 1 nitroglycerine tablet or 2 sprays
**Myocardial Infarction**

- **Female:** “weight on chest” / indigestion?
- mild shortness of breath (SOB), nausea
- **Male:** chest pain, sharp, severe, left arm
- ↑ SOB, ↑ BP (pain)
- Panic, fear, but denial
- Rapid, shallow breathing
Angina / MI Algorithm

Syncope Protocol

Nitroglycerin  q. 5 min x 3

Assume MI / Call EMS
Cardiac Arrest

- Marked hypotension
- Rapid, shallow breathing $\rightarrow$ LOC
- Apnea $\rightarrow$ cyanosis = respiratory arrest
- Fibrillation = no pulse
- AED gives diagnosis and action
Syncope Protocol

↓

CPR

100% Oxygen

→ 1 - 2 mg epinephrine
Asthma and Severe Allergy

Signs/Symptoms
Bronchospasm Algorithm

ABC’s & Position

↓

Oxygen

↓

B-2 inhaler

BUT if not exchanging air: epinephrine 0.3 mg
Seizures / Convulsions

DEFINITIONS:

• **Seizure**: “Fibrillation of the CNS”
• **Convulsion**: “Fibrillation of the CNS” with Motor Nerve activity added
Seizure Algorithm

Protect Patient, Protect Yourselves!

Syncope Protocol Following Seizure

If status seizure: EMS/PPV
Seizure Algorithm

Not practical
Flumazenil

Romazicon®

Anexate®

Romazicon® (flumazenil) Injection
0.5 mg/5 mL
5 mL Multiple-Use Vials (0.1 mg/mL)
For I.V. Use
Sterile
R only

Genentech

Anexate®

Flumazenil
0.5 mg i.v.
5 ampoules of 5 ml

Roche
Primary assessment is in front of you or in the history

Activate EMS, 911

Assign, Designate

It is still A, B, C
Unexplained, Unwitnessed, Unconscious

• Primary assessment

• Call for HELP, get to a phone even if it’s you that has to leave

• No medical history, no relatives, no knowledgeable friends

Cardiac arrest NOW C, A, B
IN LIFE...triple “U”

• Look for MEDIC ALERT bracelet or necklace

• Read allergies, medical conditions

• Phone emergency hot line # on MEDICAL ALERT tag, quote victim’s ID #

• Medical history will be given 24 / 7 by phone
Medical Emergencies in the Dental Office, Medical Emergencies in Life!

NORTH DAKOTA DENTAL ASSOCIATION
Fargo, ND
September 20th, 2019

Mel Hawkins, DDS  BScD AN
Dentist/Dentist Anesthesiologist
Toronto, ON Canada